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## Revision of *Phoenicocoris* Reuter with Descriptions of Three New Species from North America and a New Genus from Japan (Heteroptera: Miridae: Phylinae)

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### ABSTRACT

The genus *Phoenicocoris* Reuter is revised for North America. Three new species are described: *P. nevadensis* from California, Nevada, and Oregon, *P. pallidicornis* from the Prairie Provinces of Canada, Ontario and New Brunswick, and *P. ponderosae* from Arizona and Colorado. The following new synonyms are proposed (senior synonym first): *Lepidopsallus minusculus* Knight, 1923 = *Atractotomus crataegi* Knight, 1931; *Lepidopsallus rostratus* Knight, 1923 = *Lepidopsallus olseni* Knight, 1923 and *Lepidopsallus hesperus* Knight, 1968. The new genus *Kasumiphylus* is erected to accommodate the type species *Psallus kyushuensis* Linnavuori, 1961 and *Phoenicocoris ryukyuensis* Yasunaga, 1999. The new combination, *Salicarus qiliananus* (Zheng), 1996 (*Phoenicocoris*), is proposed. Illustrations of the male genital structures, photographs of the dorsal habitus, and new distributional records of all species are provided. Scanning electron micrographs are presented for the dorsal vestiture, hind femora, pretarsus, and lateral habitus of representative species.

### INTRODUCTION

The taxonomic history of *Phoenicocoris* Reuter, 1875 though not as complicated as

*Atractotomus* Fieber, 1858 (Stonedahl, 1990), *Europiella* Reuter, 1909 (Schuh et al., 1995), or *Plagiognathus* Fieber, 1858 (Schuh, 2001), is nonetheless confused for

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the same reason. Inadequate diagnoses founded on variable characters have resulted in an unstable taxonomy with changeable species affiliation and generic status. The species we treat as *Phoenicocoris* were previously placed in several generic level taxa: *Asthenarius* Kerzhner, 1962, *Phoenicocoris* Reuter, *Psallus* Fieber, 1858, *Salicarus* Kerzhner, 1962, and *Sthenarus* Fieber, 1858.

Reuter (1875) described the subgenus *Plagiognathus* (*Phoenicocoris*) to include the type species, *Capsus modestus* Meyer-Dür, 1843, then upgraded *Phoenicocoris* to generic status (Reuter, 1876), and when revising the European fauna (Reuter, 1878), synonymized *Phoenicocoris* with *Sthenarus*. Reuter's concept for *Sthenarus* focused on a group of eight species: *dissimilis* Reuter, 1878; *maculipes* Reuter, 1878; *modestus* Meyer-Dür, 1843; *ochraceus* Scott, 1872; *ocularis* Mulsant and Rey, 1852; *pusillus* Reuter, 1878; *roseri* Herrich-Schaeffer, 1838; and, the type species, *rotermundi* Scholtz, 1847.

This divergent assemblage of species, plus an additional seven, was the subject of a detailed revision by Wagner (1958). The subsequent disposition of these species is explained in the following paragraphs. Wagner retained a single genus, *Sthenarus*, and segregated the taxa into two subgenera, providing new status for *Phoenicocoris*. Wagner's diagnosis relied on the presence of scalelike or sericeous setae in the vestiture, the contour of the clypeus, the sharpness of the transverse basal carina of the vertex, and the extent of the thickening of antennal segment 2. All of these structures are prone to considerable variation and, while useful to distinguish individual species, are not diagnostic at the generic level (Stonedahl, 1990).

In preparation for a key to the European USSR (Kerzhner, 1964), Kerzhner (1962), was confronted with Wagner's polyphylectic amalgamation of species and organized them into five groups founded primarily on the structure of the male genitalia and host plant utilization rather than characters of "secondary taxonomic importance". He limited the concept of *Sthenarus* to the type species and *albipilis* Wagner, 1958. Presumably both species feed on *Populus* and possess large vesicae which may indicate a relationship to

*Psallus*. A species from Texas, *pubescens* Reuter, 1876, described in *Phoenicocoris*, was later placed in *Sthenarus* (Atkinson, 1890) where it remained in all subsequent catalogs (Van Duzee, 1917; Carvalho, 1958; Henry and Wheeler, 1988; Schuh, 1995). This enigmatic species is unknown to us and, along with *S. australis* Reuter, 1904, is currently considered incertae sedis (viz. Schuh, 1995). Three other species, which awkwardly resided in *Sthenarus*, are now accommodated by new genera: *cuneotinctus* (Van Duzee, 1915) in *Aurantiocoris* Schuh and Schwartz, 2003, *mcateei* (Knight, 1927) in *Sthenaropsidea* Henry and Schuh, 2002, and *myersi* (Woodward, 1950) in *Xiphoides* Eyles and Schuh, 2003.

Kerzhner (1962) erected the genus *Salicarus* to accommodate the *Salix* feeding type species, *roseri*. He diagnosed the genus by the scalelike setae being limited to the thoracic pleuron; however, many, if not all of the other eight species currently placed in *Salicarus* (Schuh, 1995; Kerzhner, 1997), have scalelike setae on the dorsum. The large S-shaped vesica with fused apical processes and the large secondary gonopore situated on the distal half of the vesica are also diagnostic for the genus. In addition to willows (*Salicaceae*), the known hosts for *Salicarus* spp. are *Halimodendron* and *Quercus* (*Fagaceae*), and *Perovskia* (*Lamiaceae*).

The subgenus *Psallus* (*Asthenarius*) was erected by Kerzhner (1962) to accommodate the type species, *ocularis*, and other *Quercus* feeding species distributed in the Mediterranean Region. This nominal subgenus was subsequently synonymized with *P.* (*Phyllidea*) Reuter, 1899 (Kerzhner, 1962), and currently contains 26 species (Kerzhner and Josifov, 1999). The group is recognized by a stout, small, oval, and dark habitus, pale tibiae with black basal spine spots, and most importantly, a large ventrally keeled, genital segment of the males, with a massive C-shaped vesica terminating in a dentate apical ring (Kerzhner, 1962).

Kerzhner (1962) raised *Phoenicocoris* to generic status and diagnosed *modestus*, the type species and two species transferred from *Psallus*: *obscurus* Fallén, 1829 (subgenus *Stenopsallus* Wagner, 1960) and *strobicola* Knight, 1923 on genitalic and host plant

characters. The vesica is strongly S-shaped, twisted, with two long, thin, subparallel apices of the vesical strap and with the secondary gonopore far removed from the apex of the vesica. All three taxa feed on *Pinus* spp. (Pinaceae). *Sthenarus dissimilis* was not included in the newly conceived *Phoenicocoris* by Kerzhner (1962) because the vesica did not conform completely to the form seen in *modestus* (see discussion in the species treatment of *dissimilis* below).

Stonedahl (1990) transferred nine North American species (eight from *Lepidopsallus* Knight, 1923 and one from *Atractotomus*) to *Phoenicocoris*. One of these species, *P. knighti* Kerzhner and Schuh, 1995, was subsequently transferred to *Pinomiris* Stonedahl and Schwartz, 1996 (see discussion in Kerzhner and Schuh, 1995, and Stonedahl and Schwartz, 1996). Previous to these actions *Phoenicocoris* was represented in the Nearctic Region by two species, the introduced, *dissimilis*, and the endemic, *strobicola*. Stonedahl (1990) also suggested that several Palearctic species of *Phoenicocoris* apparently were not congeneric with *modestus*. At the time of that revision there were seven Old World species (including *dissimilis* and *modestus*) recognized in the genus: *carbonarius* (Horváth), *flagellatus* (Wagner), *kyushuensis* (Linnavuori), *obscurus*, and *vidali* (Lindberg). *Phoenicocoris flagellatus* was transferred by Vinokurov and Kanyukova (1995) to *Salicarus* and is now considered a junior synonym of *fulvicornis* (Jakovlev) (Kerzhner, 1997); *opacus* (Reuter) was transferred from *Psallus* by Kerzhner (1997); and, *qiliananus* Zheng (in Zheng and Li, 1996) and *ryukyensis* Yasunaga, 1999, were described as new species. Currently 18 nominal species are recognized in *Phoenicocoris* and these are the subject of our revision. As a consequence of examining conifer-inhabiting Phylini for several projects (Stonedahl, 1990; Stonedahl and Schwartz, 1996; Schwartz and Schuh, 1999; Schwartz and Scudder, 2000, 2003) we have encountered specimens which require description of three new species of North American *Phoenicocoris*.

Specimen measurements (in millimeters) given are the mean and range (in parentheses) for 10 specimens of each sex, taken from across the distributional range, unless other-

wise indicated. Scanning electron micrographs are of males. Micrographs of scalelike setae are taken from a dorsal view on the corium, unless otherwise noted. The localities of taxa used for comparison with *Phoenicocoris* are given in the figure captions or appendix. Descriptions and redescriptions are of males, with relevant female attributes noted. Nomenclature for conifers conforms to the Gymnosperm Database (Earle, 2002).

The generic descriptions include documentation of the female genitalia. Terminology for these structures roughly follows Davis (1955) and Slater (1950). We make reference to a particular modification of the base of the first valvulae and vestibulum which was first noted by Henry and Schuh (1979) and discussed by Eyles and Schuh (2003).

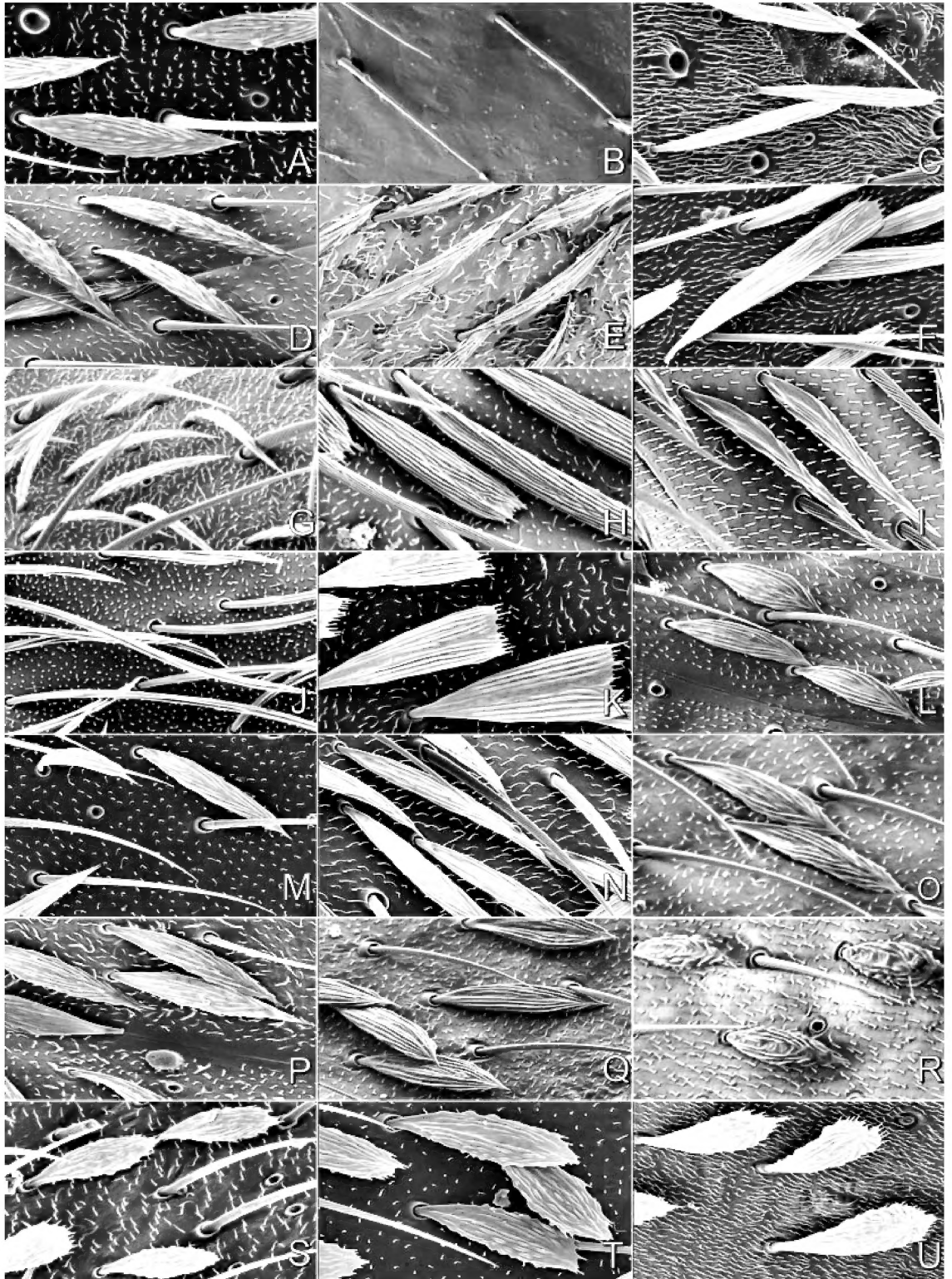
#### GENUS *PHOENICOCORIS* REUTER

*Plagiognathus (Phoenicocoris)* Reuter, 1875: 99 (new subgenus). Type species: *Capsus modestus* Meyer-Dür, 1843 (by monotypy).

*Phoenicocoris*: Reuter, 1876: 90 (upgraded to genus); Kerzhner, 1962: 231 (new status, diagnosis, discussion); Schuh, 1995: 373 (catalog); Kerzhner and Josifov, 1999: 387 (catalog); Maw et al., 2000: 123 (checklist).

*Stenopsallus* Wagner, 1960: 12 (as subgenus of *Psallus* Fieber). Type species: *Phytocoris obscurus* Fallén, 1829 (by original designation); Kerzhner, 1962: 381 (synonym).

**DIAGNOSIS:** Recognized among other Phylini by the following combination of features: densely distributed white or silvery, scalelike setae on a variable portion of the dorsum (figs. 10A, 14A, 16A), and sometimes thoracic pleura (figs. 12A, 15A, 18A, 19A) and lateral margins of abdomen; labium long, almost always reaching the abdominal sternum; antennal segment 2 usually cylindrical in both sexes; distal one-third to one-half of hind femur with irregular row of spinules dorsally (figs. 9C, 11B, 13B, 15D); pretarsus with slightly curved claw, moderately large pulvillus covering, at most, half of ventral surface of claw, and long apically spatulate parempodia (figs. 8C, 9C, 11A, 12C, 13C, 14D, 15C, 16D, 18C, 19E); and, vesica an S-shaped, strongly coiled strap, which is bifurcate distally, terminating in two long, usually divergent apices, with the secondary



gonopore situated slightly distal to the medial coil, and with a variable length gonopore sclerite (figs. 11C, 19F, 24, 25).

REDESCRIPTION: *Male*: GENERAL ASPECT: macropterous, slightly to moderately elongate, total length 2.15–3.70; length from apex of clypeus to cuneal fracture 1.56–2.70; width across humeral angles of pronotum 0.98–2.15; yellowish brown, reddish brown, or brownish black general coloration; antennae, tarsi, tibiae, and apices of femora sometimes pale yellow to dusky brownish yellow; dorsum with dark brown to black simple setae and moderately to densely distributed, silvery white or white, lanceolate to ovate, adpressed, scalelike setae; thoracic pleura and lateral margins of abdomen sometimes with scalelike setae; pronotum sometimes without scalelike setae. HEAD: slightly to moderately produced anteriorly, posterior margin mostly straight; frons strongly sloping; vertex weakly convex, sometimes with low, broad transverse basal carina; maxillary plate slightly sunken; buccal cavity narrow, obovate; eyes occupying about one-half to three-quarters head height in lateral view, posterolateral margin contiguous with anterolateral margin of pronotum, broadly emarginate anteriorly; antennal insertion slightly dorsal to, or level with, ventral margin of eye; antennae pale yellow to dark brown, segment 1 short, length less than one-half eye height; segment 2 uniformly cylindrical or sometimes slightly thickened distally, or rarely more strongly thickened and weakly fusiform; diameter of distal segments much less than segments 1 or 2; labium usually reaching beyond apices of hind coxae to base of genital segment. THORAX: pronotum trapezoidal, width about two times length, broadly rounded posterolaterally, lateral and posterior margins nearly straight; disk weakly convex, without distinct anterior and posterior lobes; calli weakly differenti-

ated; mesoscutum moderately to broadly exposed; scutellum flat. HEMELYTRA: subparallel or weakly curved laterally; cuneus as long as broad; membrane moderately suffused with brown; veins dark. LEGS: coxae, trochanters, and most of femora usually dark, apices of femora, tibiae, and basal segment of tarsi pale; sometimes entire femora pale; femora without scalelike setae or dark spots; tibial spines black, usually without black basal spots. GENITALIA: *genital segment* relatively small, apex pointed or somewhat truncate; *phallosome* relatively long apically, strongly curved; *vesica* with single sclerotized strap, coiled or strongly twisted medially, bifurcating at point even with distal end of secondary gonopore, with apices diverging distally, sometimes apex of anterior strap much shorter than apex of posterior strap; *secondary gonopore* situated much nearer medial coil than apex of strap, sometimes proximal portion of gonopore subtended by variable length gonopore sclerite; sometimes distal end of gonopore with spinules; *right paramere* simple; *left paramere* typically boat-shaped.

*Female*: Macropterous, usually slightly more rounded than male, total length 2.30–3.65; length from apex of clypeus to cuneal fracture 1.46–2.60; width across humeral angles of pronotum 0.98–2.16; similar to male except eyes slightly smaller, vertex wider, diameter of antennal segment 2 smaller, and labium reaching base of ovipositor. GENITALIA: *sclerotized rings* subovoid, moderately large, folded, separated, mesial portion somewhat produced, ring widest at anterolateral margin; *ventral labiate plate* small, present on lateralmost portion of rings, produced dorsally adjacent to ring; *dorsal structure* large, membranous, spanning and broadly attached to interramal sclerites, concave anteriorly, sinuate dorsally, covered with field of minute spinules; *vestibulum* large,

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Fig. 1. Details of scalelike setae. **A.** *Phoenicocoris dissimilis*. **B.** *Salicarus roseri*, dorsal setae. **C.** *Atractotomus magnicornis*. **D.** *P. dissimilis*. **E.** *Salicarus roseri*, thoracic setae. **F.** *Pruniocoris stonedahli*. **G.** *Kasumiphylus kyushuensis*. **H.** *A. mali incertae sedis*. **I.** *Arctostaphylocoris manzanitae*. **J.** *Guetherocoris atritibialis*. **K.** *Phoenicocoris minusculus*. **L.** *P. modestus*. **M.** *P. obscurellus*. **N.** *P. strobicola*. **O.** *P. claricornis*. **P.** *P. pallidicornis*. **Q.** *P. ponderosae*. **R.** *P. australis*. **S.** *P. longirostris*. **T.** *P. nevadensis*. **U.** *P. rostratus*. See appendix 1 for localities.

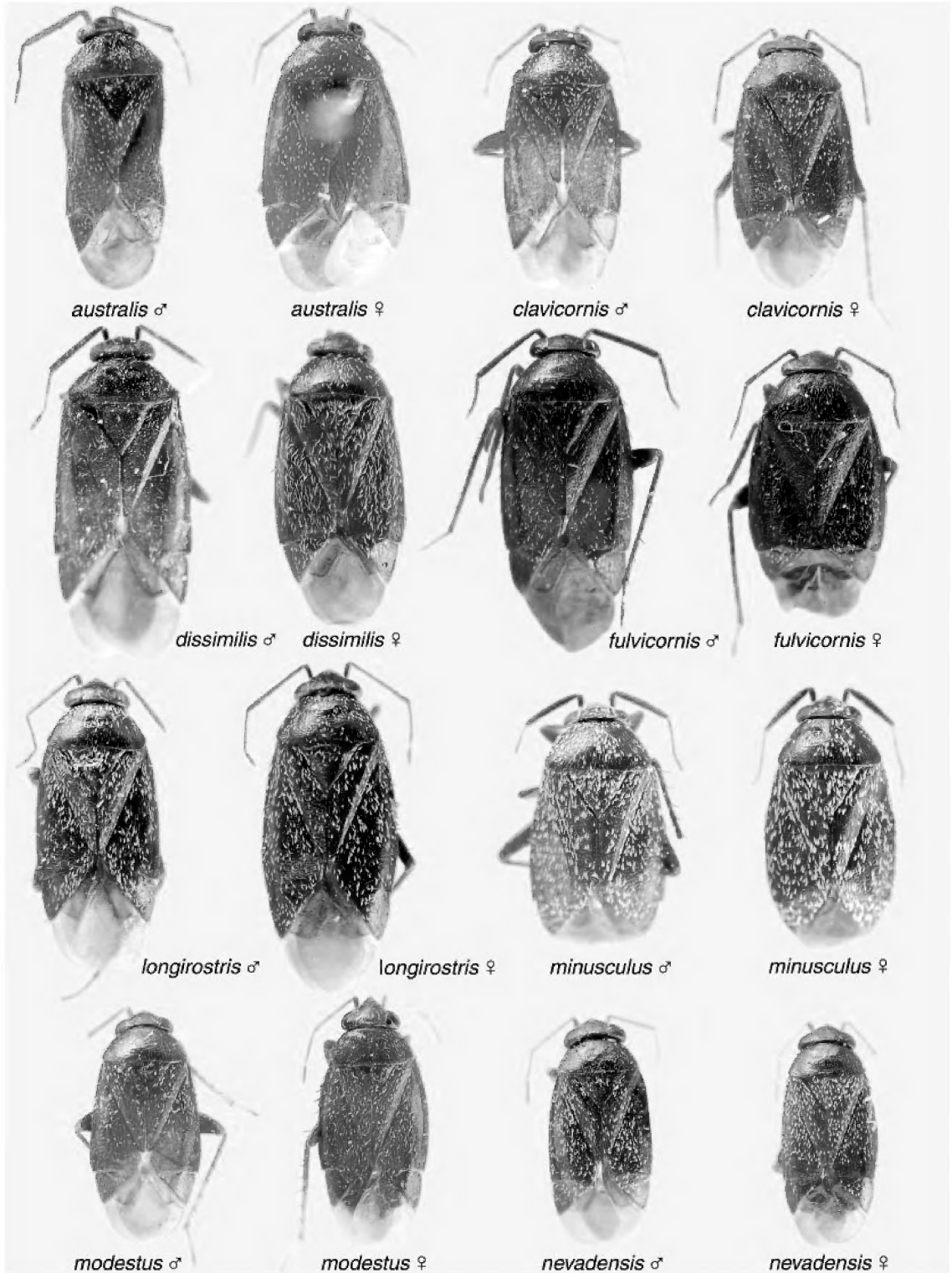


Fig. 2. Dorsal habitus photographs. See appendix 1 for localities.

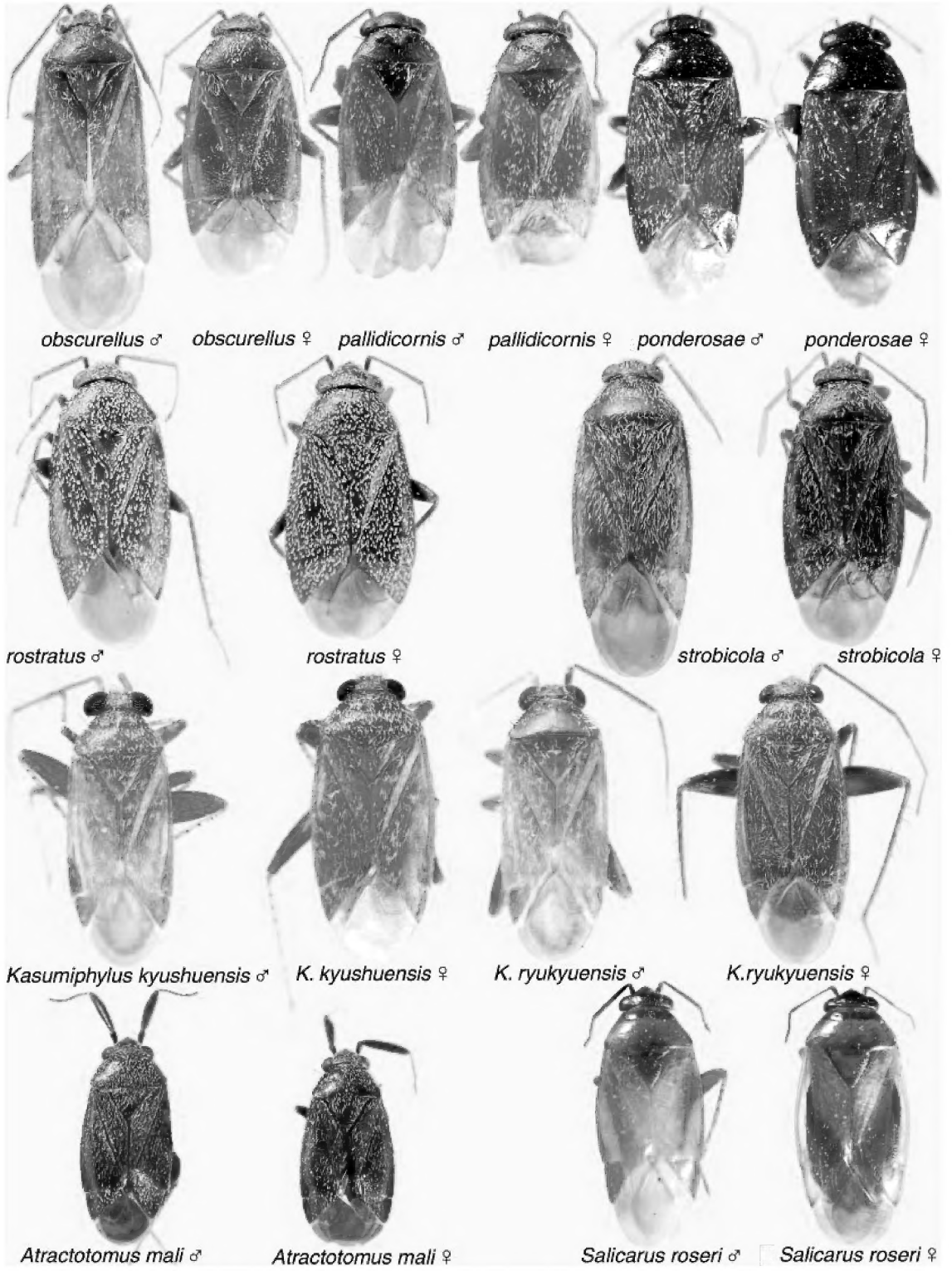


Fig. 3. Dorsal habitus photographs. See appendix 1 for localities.

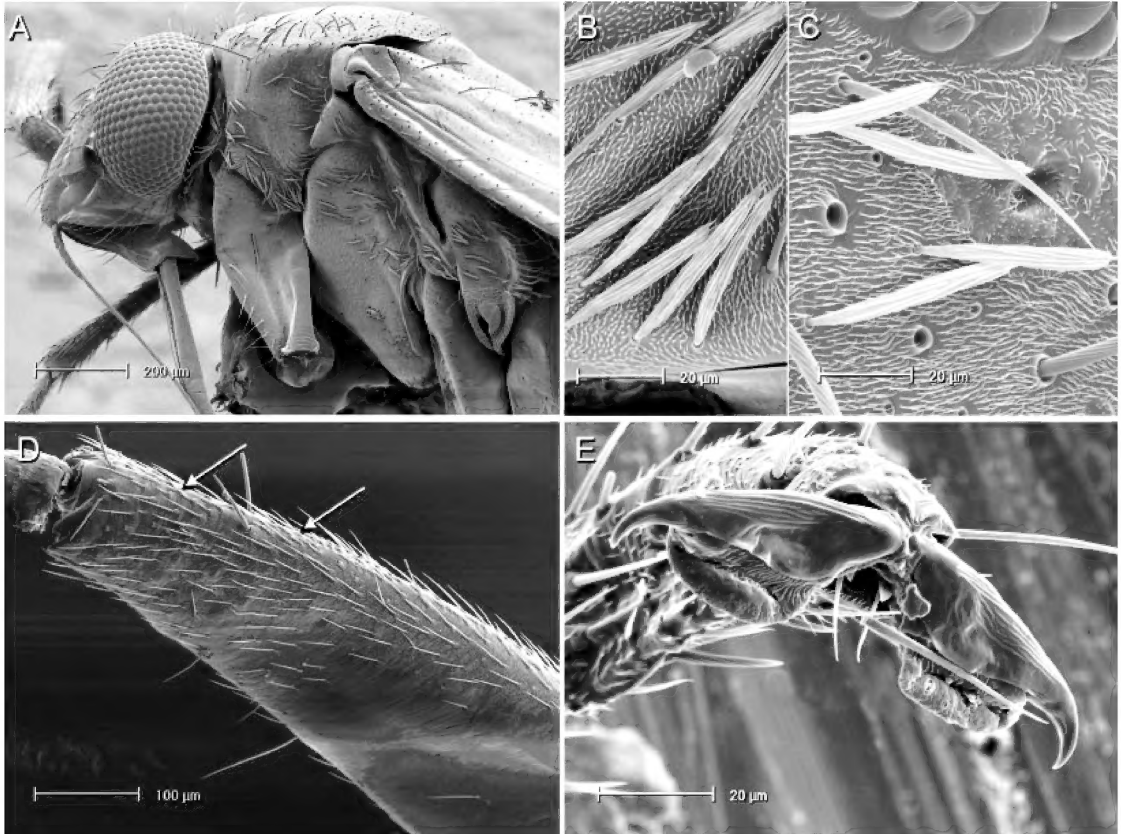


Fig. 4. Scanning electron micrographs of *Atractotomus magnicornis* (Fallén), Merion Station, Pennsylvania. **A.** Head and thorax, lateral view. **B.** Scalelike setae, mesepisternum. **C.** Scalelike setae, vertex. **D.** Hind femora, dorsodistal view. **E.** Pretarsus, apical view. Scales as indicated.

strongly sclerotized and convoluted, S-shaped, asymmetrical, strongly projecting anterior to right ring.

**DISCUSSION:** Our concept of *Phoenicocoris* is founded primarily on characters presented in the generic diagnosis. We will now present arguments for the inclusion of these defining features and discuss comparative information for related genera where possible.

Sexual dimorphism in *Phoenicocoris* is limited to the type observed in the vast majority of plant bug species. The females have the mesial hemelytral width slightly greater and the lateral margins slightly more curved than in males. No species has shortened forewings in either sex. The eyes of the male are usually larger, in dorsal and lateral views, and accompanied by a narrower interocular width of the vertex; in females the eyes are smaller and the vertex is wider. Antennal

segment 2 is of uniform diameter throughout its entire length in all *Phoenicocoris* spp. Only in *minusculus* is segment 2 of both sexes slightly fusiform. Segment 2 of *Atractotomus mali* is strongly fusiform and slightly flattened in both sexes. The length of segment 2 is roughly similar among the sexes in all the species treated herein.

The labium is generally long in *Phoenicocoris* with the apex reaching from the apices of the hind coxae to the middle of the abdominal venter or as far as the genital segment in males or the base of the ovipositor in females. Only in *dissimilis*, *minusculus*, and *A. mali* is the labium shorter, reaching only to the apices of the middle coxae.

The microstructure of scalelike or sericeous flattened setae has been documented and described for a number of North American Phylini (Schuh and Schwartz, 1985;



Stonedahl, 1990; Stonedahl and Schwartz, 1996; Schuh, 2000a, 2000b, 2001). These authors have also defined several types of scalelike setae, discussed the utility of including vestiture features in defining monophyletic groups for the tribe, and incorporated setal characters in phylogenetic analyses. Schuh and Schwartz (1985) characterized two basic types of scalelike setae: (1) [narrow,] swollen mesially, somewhat flattened, and apically acuminate; and (2) [broad,] strongly flattened, apically broad, and "truly scalelike". Stonedahl (1990) referred to these two basic groups as types 1 and 2. Type 2 setae were further classified by these authors based on the ridge structure: (2a) distinctly raised, more or less parallel, which sometimes ramify apically; (2b) nearly parallel, but faint or totally obliterated, especially near the setal midline and apex; and (2c) midline of seta with noticeably anastomosed pattern. The scalelike setae of the taxa considered herein can likewise be placed in these categories but, as noted for other genera by previous workers, not all *Phoenicocoris* spp. have setal types identical to the type species.

The vestiture of almost all the *Phoenicocoris* spp., as well as *Atractotomus magnicornis* (Fallén), *A. mali* (Meyer-Dür) incertae sedis, and *Salicarus roseri* (Herrich-Schaeffer), are documented for the current study. Only the obscure Palearctic species *opacus* and *vidali* were not examined. Both types of scalelike setae were observed among examined taxa. As previously noted (Schuh and Schwartz, 1985: fig. 51; Stonedahl, 1990: fig. 65) *A. magnicornis* has type 1 setae, but the more parallel-sided, apically truncate setae shown in figure 4B, C demonstrate previously unreported variation. *Salicarus roseri* is the only species in which simple, unexpanded setae were found on the dorsum (figs. 1B, 5D) and type 1 setae (figs. 1E, 5C) on the thoracic pleura. Type 1 setae were observed in *dissimilis* (figs. 1A, D, 20B), *kyushuensis* (figs. 1G, 12B), *obscurus* (figs. 1M, 15B), and *strobicola* (figs. 1N, 19B). The setae of all four species vary slightly in mesial width, but all have silvery coloration. The remainder of the *Phoenicocoris* species and *A. mali* have type 2 setae which vary in ridge structure, mesial width, and apical attenuation, but have similar white coloration. Type 2a setae

with mostly complete ridges, moderate mesial width, and pointed apices are noted for *claricornis* (figs. 1O, 9B), *modestus* (figs. 1L, 13A), *pallidicornis* (figs. 1P, 16B), and *ponderosae* (figs. 1Q, 17A). *Atractotomus mali* has a more broad, apically truncate type 2a setae (figs. 1H, 7B) than the *Phoenicocoris* spp. Type 2c setae with anastomosed ridges, wide mesial width, and relatively broad, serrate apices were found in *australis* (figs. 1R, 8A), *longirostris* (figs. 1S, 10B), *nevadensis* (figs. 1T, 14B), and *rostratus* (figs. 1U, 18B; also see Stonedahl, 1990: fig. 59). As documented by Stonedahl (1990: fig. 58 for the junior synonym, *crataegi*), only *minusculus* (figs. 1K, 12B) has type 2b setae with diminished ridges mesially, wide mesial width, and broadly truncate, serrate apices. For comparison we include documentation for the scalelike setae of three additional phyline species: *Pruniocoris stonedahli* Schuh and Schwartz with type 2a setae (fig. 1F); *Arclostaphylocoris manzanitae* Schuh and Schwartz with type 1 setae (fig. 1I); and, *Guetherocoris atritibialis* (Knight) with very narrow type 1 setae (fig. 1J).

Scalelike setae are not uniformly distributed across the body of the examined species, and this variation is incorporated in our key to the species of *Phoenicocoris*. In *minusculus*, *obscurus*, *rostratus*, and *strobicola*, as well as *Atractotomus magnicornis* and *A. mali*, scalelike setae are found on the head, pronotum, thoracic pleura and abdominal venter. The remainder of the species do not have scalelike setae on the thoracic pleura, and abdominal venter, with *modestus*, *nevadensis*, and *ponderosae* also lacking scalelike setae on the pronotum. Although Wagner (1958) maintained that narrow scalelike setae are present on the dorsum of *Salicarus roseri*, Putshkov (1977), Kerzhner (1962), and our observations (figs. 1B, 5D) indicate otherwise. Scalelike setae are present on the dorsum of other species of *Salicarus* (see fig. 2, for *fulvicornis*), and all the species placed in *Salicarus*, including *roseri*, have scalelike setae on the thoracic pleura.

Hind femoral spicules were incorporated in the diagnoses of *Rhinacloa* Reuter 1876 (Schuh and Schwartz, 1985), in which a nearly linear row of close-set spicules occurs, and *Atractotomus* (Stonedahl, 1990), in

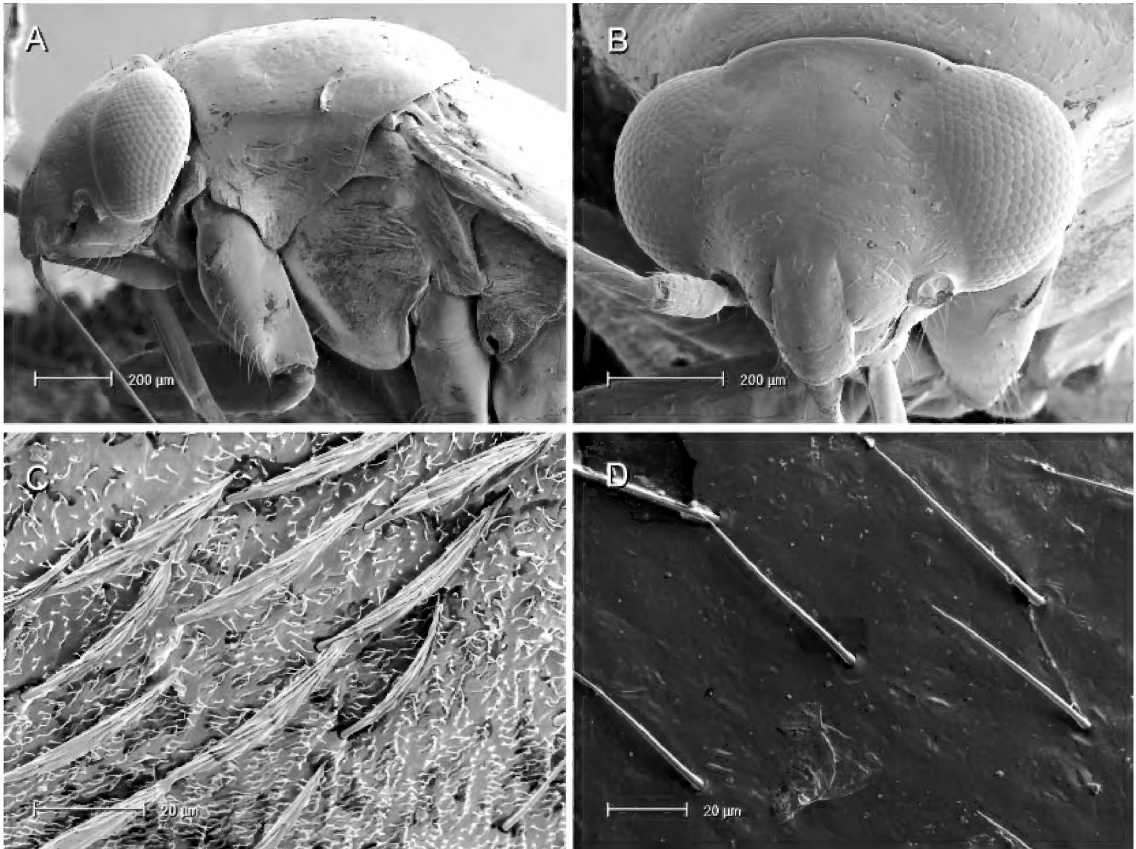


Fig. 5. Scanning electron micrographs of *Salicarus roseri* (Herrich-Schaeffer), Kennington, England. **A.** Head and thorax, lateral view. **B.** Head, apical view. **C.** Scalelike setae, propleuron. **D.** Simple setae, dorsal view. Scales as indicated.

which a partial row of more widely spaced spicules is present. Stonedahl (1990: figs. 76, 78) also documented a shorter, less regular or dispersed row of spicules in two species of *Phoenicocoris*. In this present work, we confirm that all species of the genus have at least a few spicules placed somewhere on the hind femora (figs. 14C, 16C, 19D), if not a short group or row of distal spicules (figs. 8B, 9C, 11B, 12D, 13B, 15D, 16C, 17C, 18D). Furthermore we document that *kyushuensis*, which is now accommodated in the new genus *Kasumiphylus* (fig. 22D), and *Salicarus roseri* have several widely dispersed spicules on the hind femora (fig. 6B). *Atractotomus mali* apparently does not possess spicules on the distal portion of the hind femora (fig. 7C).

The value of including pretarsal microstructure in revisional studies of phylinae

plant bugs was initiated by Schuh (1976). Schuh and Schwartz (1985) and Stonedahl (1990) surveyed the pretarsal structure of many phylinae, species providing a context in which we can interpret our observations. The claws of *Phoenicocoris* species are moderately curved in lateral view and have relatively broad bases and few, if any, claw hairs on the outer surface. The pulvillus is uniformly small throughout the genus, terminating mesial to the pronounced curve in the claw, and not extending ventrally more than a third of the claw height distal to the bend. The most striking feature of the *Phoenicocoris* pretarsus is the long parempodia, which terminate in a weakly spatulate apices. Parempodia with similar structure have been documented previously (Schuh and Schwartz, 1985: fig. 73; Stonedahl, 1990: figs. 97, 99; Schuh, 2000b: fig. 20D) in sev-

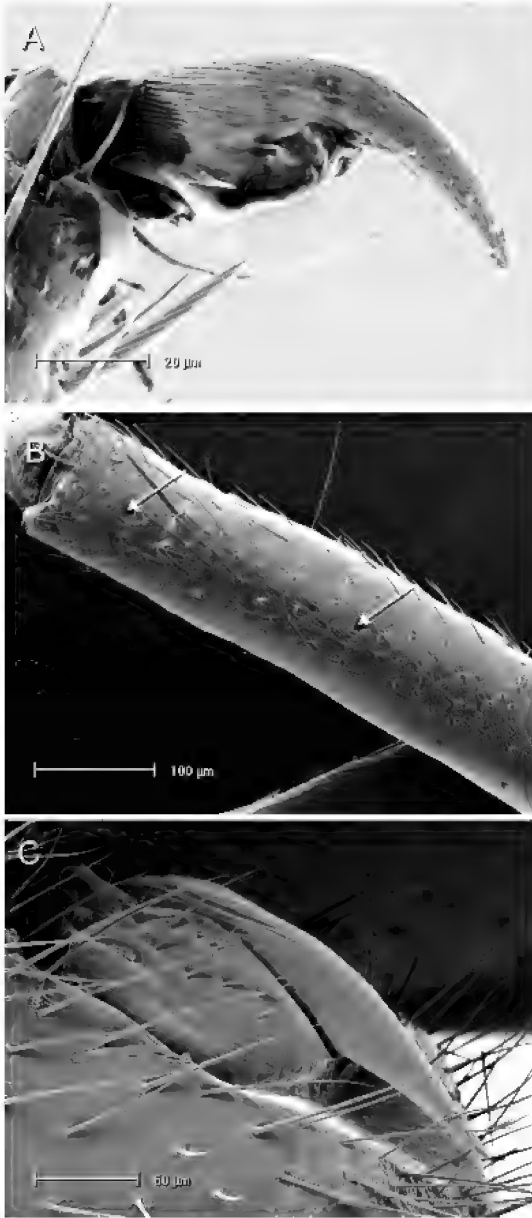


Fig. 6. Scanning electron micrographs of *Salicarus roseri* (Herrich-Schaeffer), Kennington, England. **A.** Pretarsus, lateral view. **B.** Hind femora, dorsodistal view. **C.** Left paramere and phallosome, lateral view. Scales as indicated.

eral seemingly unrelated species: *Campylomma verbasci* (Meyer-Dür), *Heterocapillus genistae* (Lindberg), and *Megalopsallus punctipes* (Knight). Now, *A. mali* and probably *S. roseri* are also known to possess apically spatulate parempodia (figs. 6A, 7D). A

species of *Lasiolabops* Poppius 1914, a member of the Leucophoropterini from the Indo-Pacific Region, demonstrates that long parempodia (however in this case, curved medially) with lamellate apices are not restricted to the Phylini (Schuh, 1984: fig. 458). *Phoenicocoris dissimilis* does not have the same parempodial structure as its congeners. The parempodia of this species are relatively short, uniformly wide throughout, strongly lamellate, and apically truncate (figs. 21B, 21C). Such structure is unlike the majority of phylines, except *Semium hirtum* Reuter (Schuh, 1976: fig. 27) and *S. subglaber* Knight (fig. 21D). However, lamellate parempodia exhibiting considerable structural diversity are well documented in the Pilophorini.

All species of *Phoenicocoris* have the femora concolorous with the dorsum, ranging from yellowish brown to reddish brown or brownish black; the tarsi, tibiae, and apices of the femora are pale yellow to dusky brownish yellow. Only in *dissimilis*, *minusculus*, and *A. mali* does the leg color differ from this pattern. In *dissimilis* the legs are dark brown to black with the apices of the femora and the basal tarsal segments dusky yellowish brown. The femora and tibiae are uniformly dark reddish brown to nearly black with the tarsi dusky yellow in *minusculus*. In *A. mali* the legs are dark reddish brown to black with the majority of the distal portion of the tibiae dusky yellowish or reddish brown.

Male genitalia have been used extensively to define genera, species groups, and broader phylogenetic relationships in the Phylini. The generic concepts of *Atractotomus* (Stonedahl, 1990) and *Plagiognathus* (Schuh, 2001) were primarily constructed of male genitalic features, especially those of the vesica. We find that the vesical form, unlike the other characters discussed above, does not occur in taxa outside of what we diagnose as *Phoenicocoris*. Our investigation of the taxa historically placed in *Phoenicocoris* reveals vesical forms which corroborate some of the groups recognized by Kerzhner (1962) in his treatment of *Sthenarus* of European Russia. Species conforming to our conception of *Phoenicocoris* have a tightly coiled, single vesical strap which bifurcates at a point even

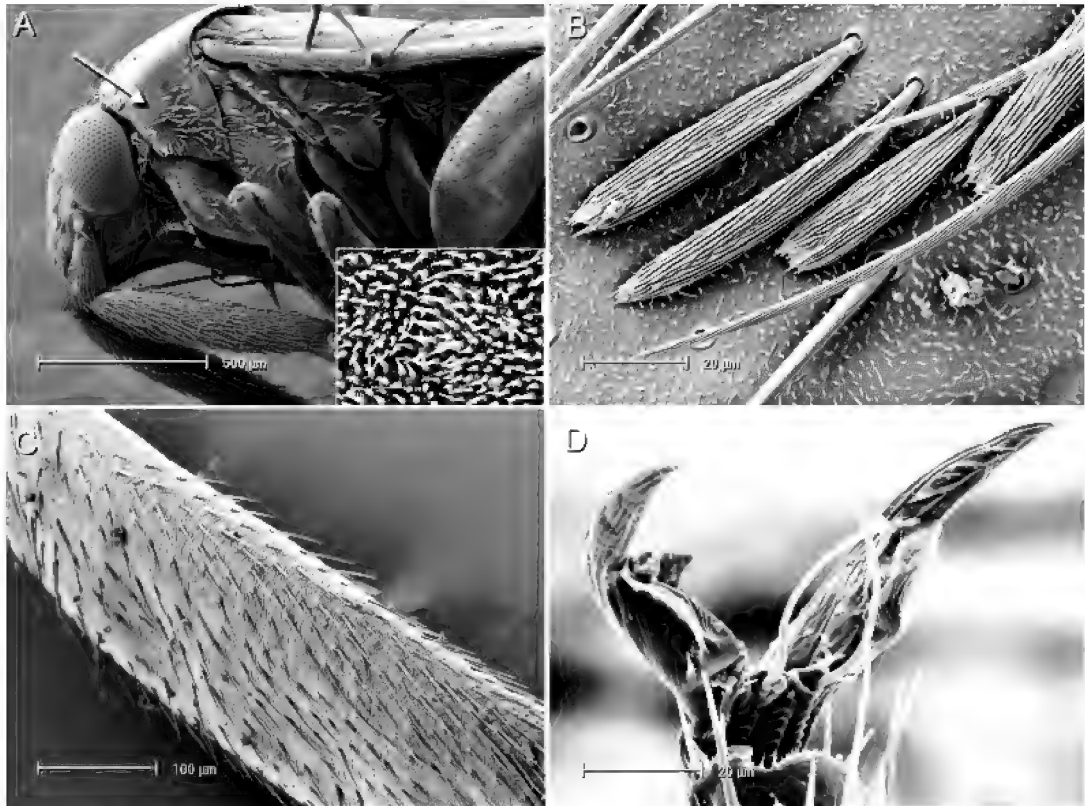


Fig. 7. Scanning electron micrographs of *Atractotomus mali* (Meyer-Dür), incertae sedis, Kentville, Nova Scotia. **A.** Head and thorax, lateral view; detail of velvety black patch on prothoracic pleuron (9147 $\times$ ). **B.** Scalelike setae, dorsal view. **C.** Hind femora, dorsodistal view. **D.** Pretarsus, ventral view. Scales as indicated.

with the base of the secondary gonopore. The apices of the strap usually diverge distally, with the anterior apex, which originates nearest the aperture of the secondary gonopore, the longer of the two apices; sometimes the anterior apex is shorter than the posterior apex (figs. 23, for *nevadensis*, 25, for *minusculus*). The secondary gonopore is situated in the middle and ventral side of the vesical strap, just distal to the medial coil. A gonopore sclerite, originally known from a number of other phyline genera (*Atractotomus* [Stonedahl, 1990], *Knightomiroides* and *Pinomiris* [Stonedahl and Schwartz, 1996], and *Megalopsallus* [Schuh, 2000b]) is present in *Phoenicocoris* in which this variable length sclerite is devoid of surface spinules.

Species placed in *Salicarus* have a vesical structure quite similar to that of *Phoenicocoris* spp. The vesicae of *S. fulvicornis* and

*S. roseri*, the species we examined in detail, are slightly larger and not as tightly coiled as in *Phoenicocoris* (fig. 26). The strap is singular and bifurcate, but the apices are fused along practically their entire length, and the secondary gonopore is placed closer to the apex of the strap. The vesica of *dissimilis* is tightly coiled, but its single strap is undivided distally and the apex is strongly sclerotized and conspicuously notched (fig. 25). The secondary gonopore does not have a subtending gonopore sclerite. Two Asian species, *kyushuensis* and *ryukyuensis*, previously placed in *Phoenicocoris* and now comprising *Kasumiphylus*, n.gen., have male genitalia which are of an entirely different form than that found in the three groups described above (fig. 25). The vesicae of these species are J-shaped, apically bifurcate, with roughly similar length apices, and have a ter-

minal membrane. The secondary gonopore is situated subapically between the strap apices and the gonopore sclerite is absent. Uniquely in *Kasumiphylus*, the ventral surface of the genital segment is covered with stout bristles (fig. 25 for *rykyuensis*), a feature not seen in species of *Phoenicocoris*.

We treat 12 *Phoenicocoris* species in the following key, recognizing nine North America species, three of which, *nevadensis*, *pallidicornis*, and *ponderosae*, are new, and also include three Palearctic species, one of which, *dissimilis*, was introduced into the eastern United States.

**BIOLOGY:** Almost all the collection records and field observations indicate that conifers, predominately species of *Pinus*, are the breeding hosts for *Phoenicocoris*. Wheeler (2001) mentioned that some species of *Phoenicocoris* “develop on the new growth of conifers without inducing chlorosis or other obvious external symptoms on the needles”. Only *P. minusculus* is consistently associated with nonconiferous hosts, being found on *Crataegus* and *Malus*, both genera of Rosaceae; it is also known to be entomophagous (Kelton, 1983). Plant hosts of the related taxa examined in this present study are either conifers or perennial shrubs of the same plant families discussed in Stonedahl (1990) for species of *Atractotomus*. *Kasumiphylus* spp. and *P. dissimilis* are conifer feeders (see species treatments below). *Atractotomus mali* prefers plant species from several rosaceous genera where it is both phytophagous and predaceous on aphids and mites (Kelton, 1983). Wheeler and Henry (1992) listed apple (*Malus sylvestris* Mill.), crabapple (*Malus* spp.), hawthorn (*Crataegus oxycantha* L.), pear (*Pyrus communis* L.), plum (*Prunus* spp.), and scarlet firethorn (*Pyracantha coccinea* M. J. Roem.) as hosts of *A. mali*. Host records for the two species of *Salicarus* examined, *fulvicornis* and *roseri*, are from *Caragana* sp. (Fabaceae) (Kerzhner, 1997) and white willow (*Salix alba* L.) (Salicaceae) (Wagner, 1975), respectively.

KEY TO SPECIES OF *PHOENICOCORIS* REUTER

- 1. Thoracic pleura and lateral margins of abdominal sternum with woolly or scalelike setae (figs. 12A, 15A, 18A, 19A) . . . . . 2
- Thoracic pleura and abdominal sternum

- without woolly or scalelike setae (figs. 10A, 14A, 16A) . . . . . 5
- 2. Body sexually dimorphic—male elongate, female ovate (fig. 3); length of antennal segment 2 much greater than width of head across eyes; dorsum with narrow, lanceolate, somewhat woolly setae (figs. 1M, N, 15B, 19B) . . . . . 3
- Body not sexually dimorphic—both sexes ovate; length of antennal segment 2 less than to slightly greater than width of head across eyes; dorsum with broad, strongly adpressed, ovate scalelike setae (figs. 1O–U) . . . . . 4
- 3. Antennae and legs pale yellow; vesica as in figures 19F, 24; Nearctic Region . . . . . *strobicola* Knight
- Antennae and legs yellowish brown to dark brown, tibiae sometimes slightly paler; vesica as in figure 23; Palearctic Region . . . . . *obscurellus* (Fallén)
- 4. Antennal segment 2 in both sexes thickened, slightly fusiform (fig. 2), uniformly reddish brown to nearly black (fig. 2) scalelike setae on dorsum broadest apically, truncate (figs. 1K, 12B); vesica as in figure 25; eastern Nearctic Region . . . . . *minusculus* (Knight)
- Antennal segment 2 slightly thicker in male, cylindrical, yellow or yellowish brown (fig. 3); scalelike setae on dorsum broadest medially, pointed apically (figs. 1U, 18B); vesica as in figure 24; Canada, northern and western montane, United States . . . . . *rostratus* (Knight)
- 5. Pronotum without scalelike setae or with a few on anterior margin . . . . . 6
- Pronotum with evenly distributed, flattened, scalelike setae . . . . . 8
- 6. Total body length greater than 3.0 mm; vesica as in figure 24; montane Arizona and Colorado . . . . . *ponderosae*, n.sp.
- Total body length less than 2.7 mm . . . . . 7
- 7. Labium reaching well beyond apices of hind coxae, sometimes to eighth or ninth abdominal sternite in males, sometimes only to base of ovipositor in female; vesica as in figure 23; widely distributed in California, Nevada, and Oregon . . . . . *nevadensis*, n.sp.
- Labium reaching to or just beyond apices of hind coxae; vesica as in figure 23; western Palearctic . . . . . *modestus* (Meyer-Dür)
- 8. Head, calli, anterior portion of pronotum, and most of mesoscutum and scutellum dark, posterior portion of pronotum and hemelytra noticeably paler; antecular portion of head short (fig. 16A); vertex wide,

- approximately equal to one-half width of head across eyes; vesica as in figure 24; central Canada . . . . . *pallidicornis*, n.sp.
- Head, pronotum, and hemelytra uniformly dull reddish brown, dark brown, or nearly black; anteocular portion of head prominent (figs. 10A, 20A); vertex more narrow, less than one-half of width of head across eyes . . . . . 9
9. Antennal segment I reddish brown to nearly black; rarely segment I pale yellow (fig. 2, ♂) but femora dark brown and from Sierra Nevada Mountains . . . . . 10
- Antennal segment I pale to dusky yellow . . . . . 11
10. Labium reaching posterior margin of mesosternum or sometimes middle of middle coxae, dorsum with narrow, lanceolate, woolly setae (figs. 1A, D, 20B); vesica as in figure 25; Palearctic Region and introduced in eastern United States . . . . . *dissimilis* (Reuter)
- Labium reaching beyond apices of hind coxae, dorsum with broad, ovate, scalelike setae (figs. 1S, 10B); vesica as in figures 11C, 23; montane western United States . . . . . *longirostris* (Knight)
11. Femora uniformly pale to dusky yellow; vesica as in figure 23; Florida . . . . . *australis* (Blatchley)
- Femora mostly darkened, only apices pale to dusky yellow; vesica as in figure 23; eastern United States . . . . . *claricornis* (Knight)

*Phoenicocoris australis* (Blatchley)

Figures 1R, 2, 8, 23

*Lepidopsallus australis* Blatchley, 1926: 953 (n.sp.).

*Phoenicocoris australis*: Stonedahl, 1990: 60 (n.comb.); Schuh, 1995: 374 (catalog).

DIAGNOSIS: Recognized by the uniformly chestnut or brownish red dorsum with broad, ovate, scalelike setae; pale yellow antennae and legs; thoracic pleura and lateral margins of abdominal sternum without scalelike setae; and by the secondary gonopore without prominent basal or apical spinules (fig. 23). Distribution of scalelike setae as in *claricornis*, *dissimilis*, *longirostris*, and *pallidicornis*. Distinguished from *dissimilis* and *longirostris* by the paler antennal segments 1 and 2 whereas these species have much darker antennal segments. The uniformly paler femora will distinguish *australis* from *claricornis*,

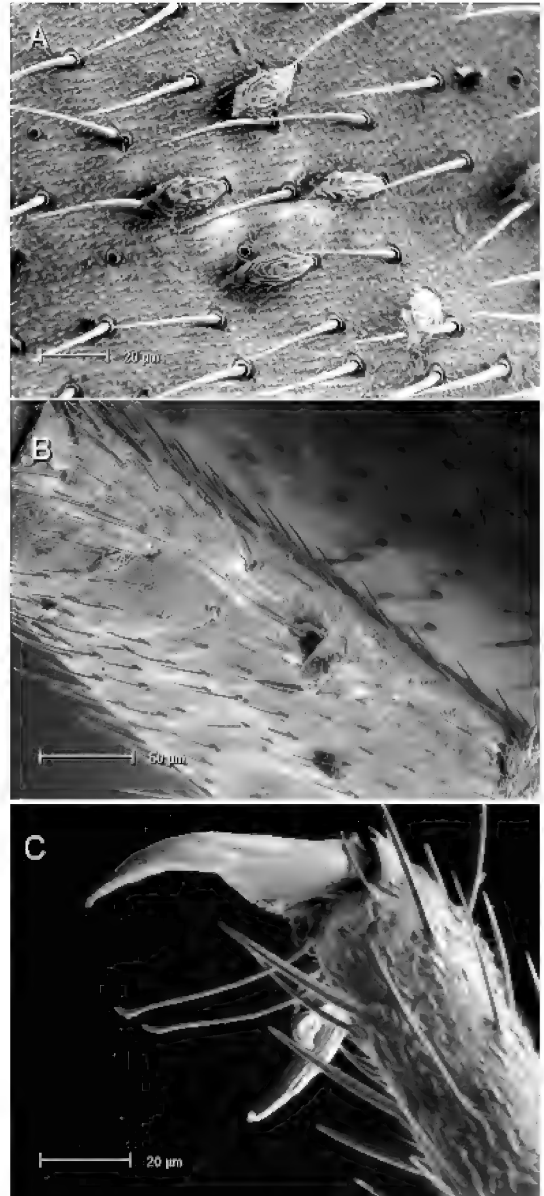


Fig. 8. Scanning electron micrographs of *Phoenicocoris australis* (Blatchley), Columbia Co., Florida. **A.** Scalelike setae, dorsal view. **B.** Hind femora, dorsodistal view. **C.** Pretarsus, lateral view. Scales as indicated.

which has only the apical portion of the femora pale, while the remainder of the femora is dark brown. Distinguished from *pallidicornis* by the uniformly reddish brown dorsum, whereas in *pallidicornis* the hemelytra, and usually a variable posterior portion of the

pronotum, is obviously paler than the remainder of the dorsum.

REDESCRIPTION: ( $N = 6\delta, 8\varphi$ ) GENERAL ASPECT: ovate; total length male 3.19 (3.00–3.40), female 3.19 (3.05–3.45); length to cuneal fracture male 2.26 (2.20–2.33), female 2.31 (2.21–2.43); coloration uniformly chestnut or reddish brown; antennae and legs, except for coxae, pale yellow and apex of tarsal segment 3, brown; dorsum, including vertex and pronotum, with moderately to densely distributed, broad, flattened, apically serrate, white scalelike setae and densely distributed, suberect to reclining, golden simple setae; thoracic pleura and venter without scalelike setae. HEAD: width male 0.74 (0.69–0.76), female 0.77 (0.74–0.79); vertex width male 0.31 (0.30–0.33), female 0.35 (0.32–0.36); region anterior to antennal insertion relatively short, antecular length male 0.20 (0.19–0.21), female 0.22 (0.20–0.23); eyes moderately large, about 83% of head height, ventral margin of antennal insertion dorsal to ventral margin of eye; antennal measurements male 0.19 (0.18–0.20): 0.82 (0.80–0.86): 0.44 (0.40–0.46): 0.32 (0.29–0.33), female 0.20 (0.19–0.20): 0.75 (0.72–0.78): 0.46 (0.44–0.50): 0.35 (0.34–0.36); antennal segment 2 is 10% longer than head width across eyes; labium with basal segment brown, distal segments dusky yellow, reaching just beyond apices of hind coxae in males and reaching apex of sternite 6 in females; labial length male 1.56 (1.51–1.60), female 1.69 (1.63–1.73); length of segment 4 male 0.45 (0.43–0.50), female 0.47 (0.44–0.49). THORAX: width male 1.09 (1.08–1.11), female 1.12 (1.08–1.14); length male 0.50 (0.49–0.53), female 0.51 (0.49–0.53); mesoscutum broadly exposed. HEMELYTRA: maximum width male 1.29 (1.25–1.34), female 1.38 (1.33–1.50); lateral margin slightly arcuate.

BIOLOGY: Collected on the microsporangiote strobili ("male cones") of the presumed breeding host, slash pine (*Pinus elliottii* Englemann), where the male flower buds or bud stems did not appear to be injured (Edel, 1963).

DISTRIBUTION: From northern and west central Florida.

SPECIMENS EXAMINED: USA: **Florida:** *Bradford Co.*: R746 (10), [Hopk. U. S. 40181], 19.II.1960,

B. H. Ebet,  $\delta$  flowers clusters, *Pinus elliotti*, reared 14.III.1960, 3 $\varphi$  (USNM); R 770 (4), [Hopk. U. S. 40181], 14.II.1960, B. H. Ebet,  $\delta$  flower clusters, *P. elliotti*, reared 15.II.1960, 1 $\delta$ , 5 $\varphi$  (USNM). *Columbia Co.*: "Wiggen's Place", Rd 450, [Hopk. U. S. 40181], 10.II.1960, B. H. Ebet,  $\delta$  flowers clusters, *P. elliotti*, reared, 23.II.1960, 4 $\delta$ , 5 $\varphi$  (USNM). *Lake Co.*: Lake City, 6.I.1958, B. H. Ebet, staminate flowers, *P. elliotti*, nymphs present, 2 $\delta$  (USNM).

*Phoenicocoris claricornis* (Knight)

Figures 10, 2, 9, 23

*Lepidopsallus claricornis* Knight, 1923: 471 (n.sp.).

*Phoenicocoris claricornis*: Stonedahl, 1990: 60 (n.comb.); Schuh, 1995: 374 (catalog); Wheeler, 1999: 240 (biology).

DIAGNOSIS: Distinguished by the dark reddish brown to nearly black dorsum with broad, scalelike setae; antennae uniformly pallid to dusky yellowish brown; legs with femora mostly darkened, apices of femora, tibiae, and tarsi pale yellow; thoracic pleura and abdomen without scalelike setae; and by the contiguous apices of the vesical strap (fig. 23). Distribution of scalelike setae as in *australis*, *dissimilis*, *longirostris*, and *pallidicornis*. Distinguished from *australis* by the uniformly pale femora of this species, whereas in *claricornis* only the apical portion of the femora is pale, while the remainder of the femora is dark brown. Distinguished from *dissimilis* and *longirostris* by the paler antennal segments 1 and 2 whereas these species have much darker antennal segments. Additionally, in *dissimilis* the labium reaches only as far as the middle coxae; in *claricornis* the labium reaches the abdominal sternum. The uniformly dark dorsum of *claricornis* will distinguish this species from *pallidicornis*, which has a contrasting colored dorsum.

REDESCRIPTION: ( $N = 9\delta, 7\varphi$ ) GENERAL ASPECT: small; total length male 2.81 (2.40–3.13), female 2.91 (2.73–3.00); length to cuneal fracture male 2.00 (1.85–2.13), female 2.13 (1.90–2.20); coloration dark reddish brown to nearly black; antennae, apices of femora, tibiae, and tarsi pale yellow to dusky brownish yellow; dorsum, including vertex and pronotum, with moderately to densely distributed, broad, flattened, apically pointed, white scalelike setae and densely

distributed, suberect to reclining, somewhat unkempt, brown simple setae; thoracic pleura and venter without scalelike setae. HEAD: width male 0.72 (0.68–0.77), female 0.75 (0.72–0.78); vertex width male 0.31 (0.29–0.33), female 0.34 (0.33–0.36); region anterior to antennal insertion relatively short, antecocular length male 0.19 (0.19–0.21), female 0.21 (0.20–0.22); eyes moderately large, about 85% of head height, ventral margin of antennal insertion just dorsal to ventral margin of eye; antennal measurements male 0.18 (0.18–0.19): 0.75 (0.69–0.81): 0.40 (0.34–0.43): 0.29 (0.26–0.31), female 0.17 (0.16–0.18): 0.70 (0.64–0.74): 0.41 (0.38–0.48): 0.32 (0.28–0.38); segment 2 is 16% longer than head width across eyes; labium brown, reaching sternite 6 in males and subgenital plate in females; labial length male 1.44 (1.38–1.48), female 1.53 (1.43–1.59); length of segment 4 male 0.40 (0.38–0.41), female 0.40 (0.39–0.44). THORAX: width male 1.07 (1.05–1.10), female 1.07 (1.05–1.13); length male 0.47 (0.41–0.49), female 0.49 (0.45–0.51); mesoscutum broadly exposed. HEMELYTRA: maximum width male 2.00 (1.85–2.15), female 2.13 (1.90–2.20); subparallel laterally.

**BIOLOGY:** Wheeler (1999) discussed the seasonal history, habits, and immature stages from throughout the range of this species. The host plants are pitch pine (*Pinus rigida* Miller) and Virginia or scrub pine (*P. virginiana* Miller) (Pinaceae) where immature and adult stages feed on microsporangiatae strobili.

**DISTRIBUTION:** Originally described from New Jersey (Knight, 1923), then recorded from West Virginia (Wheeler et al., 1983). Wheeler (1999) provided records which span the eastern United States east of, and within, the Appalachian Mountains from Maine south to Georgia and as far west as Nelson Co., Kentucky and Dekalb Co., Alabama.

**SPECIMENS EXAMINED:** USA: **District of Columbia:** 20.V.1905 and 8.VI.1905, 2♀ (USNM). **New York:** *Saratoga Co.:* Co. airport, N of Ballston Spa, 12.VI.1993, A. G. Wheeler, Jr., *Pinus rigida*, 1♂, 2♀ (USNM). *Warren Co.:* Queensbury, 12.VI.1993, A. G. Wheeler, Jr., *P. rigida*, 1♂ (USNM). **North Carolina:** *Wake Co.:* Raleigh, 3.V.1969, D. A. Young, 5♂ (NCSU). **Pennsylvania:** *Dauphin Co.:* Fishing Creek Valley

School, Rte 443, 22.V.1976 and 30.IV.1976, A. G. Wheeler, Jr., 5th instar, *P. virginiana*, 1♂, 1♀ (USNM). **Tennessee:** *Cocke Co.:* Rtes 25 and 70, betw. 107N and 107S, 20.V.1979, Wygodzinsky, Schuh, Schmidt, 1♀ (AMNH). **Virginia:** *Fairfax Co.:* Falls Church, 2.X, N. Banks, 1♀ (USNM). *Roanoke Co.:* NE of Roanoke on I-81, 16.V.1988, M. D. Schwartz, *P. virginiana*, 1♂, 1♀ (AMNH).

*Phoenicocoris longirostris* (Knight)

Figures 1S, 2, 10, 23

*Lepidopsallus longirostris* Knight, 1968: 54 (n.sp.).

*Phoenicocoris longirostris*: Stonedahl, 1990: 61 (n.comb.); Schuh, 1995: 374 (catalog).

**DIAGNOSIS:** Distinguished by the broad, scalelike setae on the dorsum; thoracic pleura and abdominal sternum without scalelike setae; long labium, especially segment 4; long antecocular portion of head; antennal segments 1 and 2 usually brownish yellow to brown, length greater than width of head across eyes; legs with femora reddish brown to dark fuscous, tibiae dusky yellow or yellowish brown; and the secondary gonopore with distal spinules (fig. 23). Frequently collected with *rostratus* in montane western North America, but the absence of scalelike setae on the thoracic pleura readily distinguishes *longirostris*. Distinguished from *nevadensis* and *ponderosae* by the absence of scalelike setae on the pronotum whereas in *longirostris* the pronotum has evenly distributed scalelike setae.

**REDESCRIPTION:** ( $N = 14♂, 11♀$ ) **GENERAL ASPECT:** moderately elongate; total length male 3.32 (3.05–3.60), female 3.36 (3.05–3.50); length to cuneal fracture male 2.35 (2.25–2.60), female 2.46 (2.34–2.55); coloration dark brown to nearly black; apices of femora, tibiae and tarsi pale yellow to dusky brownish yellow; sometimes antennal segments 1 and 2 pale yellow (fig. 2, ♂), bases of femora sometimes darker brown; dorsum with moderately to densely distributed, broad, flattened, apically serrate, white scalelike setae and densely distributed, suberect to reclining, black simple setae; thoracic pleura and venter without scalelike setae. **HEAD:** width male 0.73 (0.69–0.75), female 0.75 (0.73–0.76); vertex width male 0.33 (0.30–0.35), female 0.35 (0.34–0.36); region anterior to antennal insertion elongate, anteo-



cular length male 0.25 (0.24–0.28), female 0.27 (0.26–0.28); eyes moderately small, 77% of head height, ventral margin of antennal insertion level with ventral margin of eye; antennal measurements male 0.20 (0.18–0.21): 0.76 (0.70–0.88): 0.47 (0.44–0.55): 0.34 (0.33–0.35), female 0.21 (0.19–0.25): 0.82 (0.79–0.91): 0.50 (0.45–0.53): 0.36 (0.33–0.39); antennal segment 2 equal to or as much as 5% greater than width of head across eyes; labium brown, reaching base of genital segment or ovipositor; labial length male 1.74 (1.64–1.84), female 1.79 (1.73–1.88); length of segment 4 male 0.52 (0.50–0.58), female 0.53 (0.51–0.54). THORAX: width male 1.07 (1.00–1.15), female 1.11 (1.05–1.16); length male 0.52 (0.50–0.55), female 0.51 (0.50–0.53); mesoscutum moderately exposed. HEMELYTRA: maximum width male 1.35 (1.30–1.43), female 1.50 (1.37–1.60); subparallel laterally.

**BIOLOGY:** Breeds on whitebark pine (*Pinus albicaulis* Engelmann), bristlecone pine (*P. aristata* Engelmann), lodgepole pine (*P. contorta* Douglas ex Loudon and subsp. *murryana* (Balfour) Engelmann), limber pine (*P. flexilis* E. James), and subalpine fir (*Abies lasiocarpa* (Hooker) Nuttall).

**DISTRIBUTION:** Southern Yukon Territory, British Columbia, western Alberta and Cypress Hills in Alberta and Saskatchewan; widely distributed in montane regions of western United States south to Arizona.

**DISCUSSION:** The color of antennal segments 1 and 2 in *longirostris* is variable. Specimens from the Sierra Nevada Mountains of California and Nevada and northern California have segments 1 and 2 which are apparently always pale yellow. Specimens from the remainder of the distributional range of this species have dusky brown to dark brown segments. Both *longirostris* and *rostratus* were collected together from *Pinus contorta* at the same locality near Washoe, Nevada. In addition to the distribution of scalelike setae on both species (only the thoracic pleura of *rostratus* with scalelike setae), the coloration of segment 1 is also diagnostic; in *longirostris* segment 1 is pale yellow and in *rostratus* segment 1 is dark brown.

**SPECIMENS EXAMINED:** CANADA: **Alberta:** Banff–Jasper Highway, Banff National Park, 25.VIII.1979, L. A. Kelton, 1 ♀ (CNC); Coal Val-

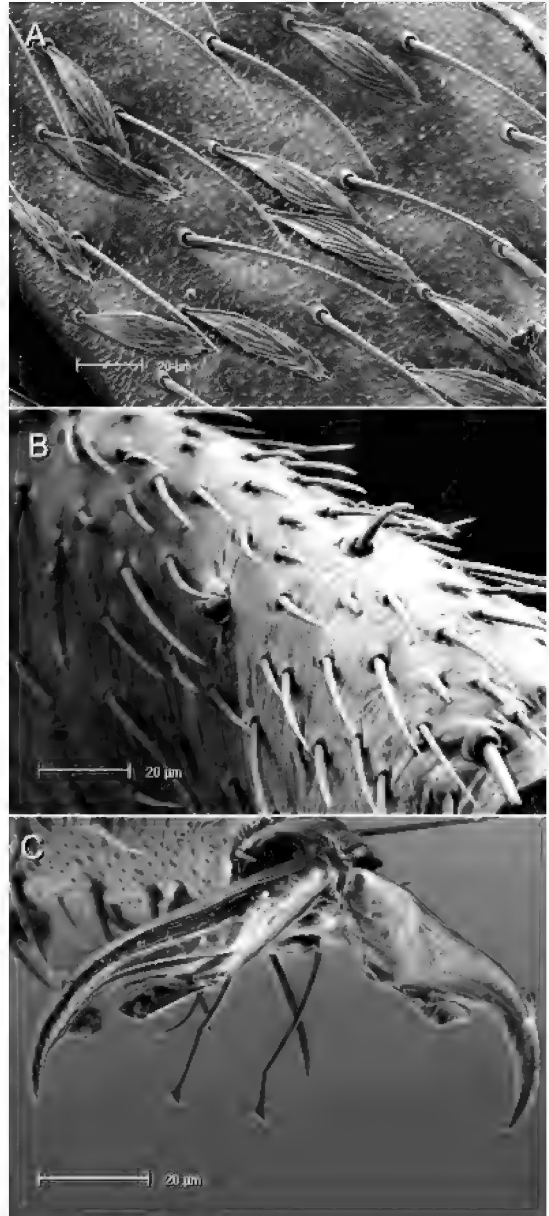


Fig. 9. Scanning electron micrographs of *Phoenicocoris claricornis* (Knight), Dauphin Co., Pennsylvania. **A.** Scalelike setae, dorsal view. **B.** Hind femora, dorsodistal view. **C.** Pretarsus, apical view. Scales as indicated.

ley, 31.VIII, 1978, L. A. Kelton, *P. contorta*, 2 ♂, 1 ♀ (CNC); Crowsnest, 19.VII.1975, L. A. Kelton, *P. contorta*, 6 ♂, 10 ♀ (CNC). Cypress Hills Provincial Park: Elkwater Lake, 20.VII.1956, O. Peck, *P. contorta*, 1 ♀ (CNC); Elkwater Park, 21, 28.VII, 14, 16.VIII.1952, L. A. Konotopetz, *P.*

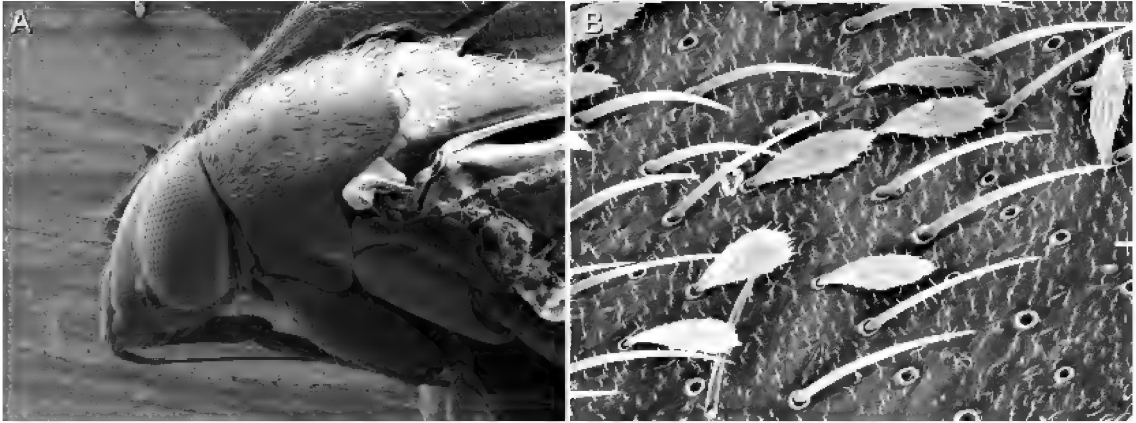


Fig. 10. Scanning electron micrographs of *Phoenicocoris longirostris* (Knight), Squaw Pass Road, Colorado. **A.** Head and thorax, lateral view. **B.** Scalelike setae, dorsal view.

*contorta murrayana*, 12♂, 21♀ (CNC). Eisenhower Junction, 5.VIII.1970, L. A. Kelton, *P. contorta*, 1♀ (CNC); Fisher Creek Forest Station, 26.VII.1973, L. A. Kelton, 2♂, 1♀ (CNC). Kananaskis Highwood/Cataract Zone, 24.VII.1994, M. D. Schwartz: Highwood House, just S of jct Hwy 40 and Rte 940, *P. contorta*, 1♂ (CNC); Lineham Creek Picnic Area on Hwy 40, ex *Abies lasiocarpa*, 1♀ (CNC). Kananaskis Road, 20, 25, 27.VII.1974, L. A. Kelton, *P. contorta*, 3♂, 5♀ (CNC). Lake Louise, 25.VII.1973, L. A. Kelton, *P. contorta*, 7♂, 5♀ (CNC); Waterton National Park, 4–6.VII.1970, 26.VII.1970, L. A. Kelton, *P. contorta*, 7♂, 8♀ (CNC). **British Columbia:** Aspen Grove, 25.VII.1970, L. A. Kelton, *P. contorta*, 1♂, 2♀ (CNC); Atlin, 15.VIII.1955, H. J. Huckel, 1♀ (CNC); Christina Lake, 12.VII.1970, L. A. Kelton, *P. contorta*, 1♂ (CNC); Fernie, 7.VII.1970, L. A. Kelton, *P. contorta*, 5♂, 9♀ (CNC); Fruitvale, 11.VII.1970, L. A. Kelton, 1♀ (CNC); Jaffray, 8.VII.1970, L. A. Kelton, *P. contorta*, 1♂ (CNC); Kaslo, 10.VII.1970, L. A. Kelton, *P. contorta*, 2♀ (CNC); Moyie, 9.VII.1970, L. A. Kelton, (CNC). Manning Provincial Park, Blackwall, L. A. Kelton, *Abies lasiocarpa*: 8.VII.1970, 1♂ (CNC); 23.VII.1970, 2♂, 8♀; Blackwall Peak Area, parking lot, alpine meadows nr Naturalist Hut, 19.VIII.1998, M. D. Schwartz, *A. lasiocarpa*, (UCB). Moyie, 9.VII.1970, L. A. Kelton, 1♀ (CNC); Nickel Plate City, Hedley, 5000 ft, 12.IX.1953, J. E. H. Martin, 1♀ (CNC); Summit, 16.VIII.1982, L. A. Kelton, *P. contorta*, 50♂, 41♀ (CNC); Terrace, W. R. Richards: 7.VII.1960, 1♂ (CNC); 17.VII.1960, 1♂ (CNC). Trail, 21.VII.1959, L. A. Kelton, 1♂ (CNC); Yahk, 22.VII.1959, L. A. Kelton, *P. contorta*, 1♂, 6♀ (CNC); Yoho National Park, 16.VIII.1970, L. A. Kelton, 1♂, 1♀ (CNC). **Sas-**

**katchewan:** Cypress Hills Provincial Park, 4.VII.1970, L. A. Kelton, *P. contorta*, 16♂, 30♀ (CNC). **Yukon Territory:** Carcross: 9.VIII.1983 and 1.VIII.1982, L. A. Kelton, *P. contorta*, *Lupinus* sp., 22♂, 43♀ (CNC); 28.VI.1982, G. G. E. Scudder, *P. contorta*, listed in Scudder 1997, 2♂, 3♀ (UBC). Morley Lake, 9.VIII.1982, L. A. Kelton, *P. contorta*, 5♂, 8♀ (CNC); Moose Creek, 28.VII.1983, L. A. Kelton, *Pinus* sp., 1♀ (CNC); Rancheria, 11.VII.1982, L. A. Kelton, 18♂, 28♀ (CNC); Squanga Lake, 7.VIII.1982, L. A. Kelton, *P. contorta*, 1♂, 2♀ (CNC); Watson Lake, 13.VIII.1982, L. A. Kelton, 1♂, 2♀ (CNC). Whitehorse, L. A. Kelton: 16.VII.1982, *Picea* sp., 4♀ (CNC); 30.VII.1982, *Pinus contorta*, 2♂, 5♀ (CNC). USA: **Arizona:** *Cochise Co.:* Rustler Park, Chiricahua Mountains, 7, 8.VII.1968, L. A. Kelton, *P. ponderosa*, 4♂, 2♀ (CNC). **California:** *Alpine Co.:* Alpine Lake, W end, Toiyabe National Forest, on Rte 4, 8000 ft, 5.VII.1994, M. D. Schwartz, *P. contorta*, 1♂ (CNC). *El Dorado Co.:* Lake Tahoe, 8.VIII.1937, Drake, Andre, *Lepidopsallus hesperus* paratype, 1♀ (USNM); near Bijou, Lake Tahoe, 19.VII.1929, R. L. Usinger, 1♂, 1♀ (UCB). *Mariposa Co.:* Yosemite Creek Ranger Station, Yosemite National Park, 21.VII.1946, R. L. Usinger, *P. murrayana*, 1♀ (UCB). *Lassen Co.:* Bogard Campground, 24 mi W jct. Hwys. 36 and 44, 10.VIII.1980, G. M. Stonedahl, *P. contorta*, 2♂, 1♀ (AMNH); Martins Springs, T31N, R9E, 5.VIII.1922, J. O. Martin, 1♀ (CAS). *Plumas Co.:* Caribou, 6.VII.1932, R. L. Usinger, 2♂ (UCB). *Siskiyou Co.:* Medicine Lake, on Medicine Lake Rd, G. M. Stonedahl, J. D. McIver, *P. contorta*: 1.4 mi S of, 19.VII.1985, 1♂ (AMNH); 2.5 mi N of, 18.VII.1985 3♂, 5♀ (AMNH). 6.6 mi S of Lava Beds National Monument, Lava Beds–Medicine Lake Road,

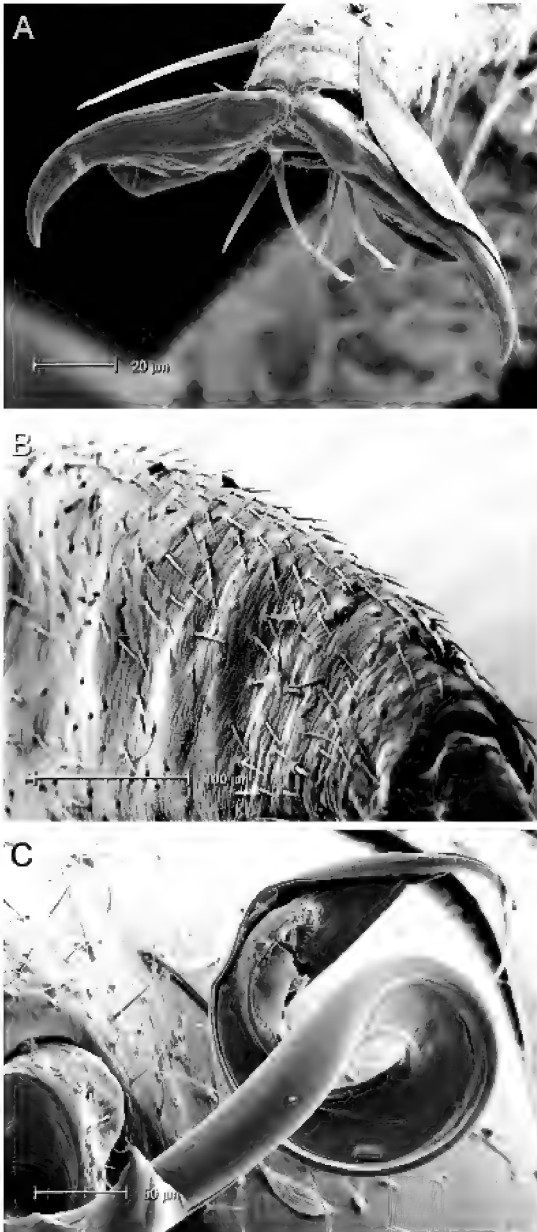


Fig. 11. Scanning electron micrographs of *Phoenicocoris longirostris* (Knight), Rustler Park, Arizona. **A.** Pretarsus, apical view. **B.** Hind femora, dorsodistal view. **C.** Vesica, distal view. Scales as indicated.

18.VII.1985, G. M. Stonedahl, J. D. McIver, *P. contorta*, 3♂, 8♀ (AMNH). **Tuolumne Co.:** Yosemite National Park, McCabe Lakes, 2.VIII.1939, R. L. Usinger, 1♀ (UCB). **Colorado:** **Boulder Co.:** Nederland, Roosevelt National Forest, 4.VIII.1968, L. A. Kelton, *P. albicaulis*, 2♀

(CNC); Rainbow Lakes, Roosevelt National Forest, 9800 ft, 3.VIII.1968, L. A. Kelton, 1♀ (CNC). **Clear Creek Co.:** Clear Creek Picnic Ground, 9400 ft, 10.VIII.1987, D. A. Polhemus, *P. flexilis*, 1♂, 2♀ (JTP); Green Lake, Guanella Pass, 9900 ft, 6.IX.1982, D. A., J. T. Polhemus, *P. aristata*, 1♀ (JTP). Juniper Pass on Rte 103, 10,500 ft, 21.VIII.1986, R. T. Schuh, J. T. Polhemus, *P. contorta*, 1♂, 2♀ (AMNH). Mt. Goliath area, 11,200 ft, 21.VIII.1986, R. T. Schuh, J. T. Polhemus, *P. aristata*, 1♂ (AMNH). Squaw Pass, Arapaho National Forest, 9800 ft, 27.VII.1968, L. A. Kelton, *P. contorta*, 6♂, 14♀ (CNC); Squaw Pass Road, J. T., D. A. Polhemus: 8.VIII.1983, *P. aristata*, 1♂, 2♀ (JTP); 14.VIII.1982, *P. contorta*, 2♂ 4♀ (JTP). West Chicago Creek Campground, Arapaho National Forest, 28, 9800 ft, 29.VII.1968, L. A. Kelton, *P. contorta*, 7♂, 11♀ (CNC). **Gilpin Co.:** Pinecliffe, 12.VIII.1973, J. C. Schaffner, 4♂, 2♀ (TAM); Rollinsville, Roosevelt National Forest, 1.VIII.1968, L. A. Kelton, *P. contorta*, 3♀ (CNC). **Grand Co.:** Grand Lake, 12.3 mi N of, on Hwy. 34, 16.VIII.1980, G. Stonedahl, *P. contorta*, 1♀ (AMNH); Grand Lake entrance, Rocky Mountain National Park, 18.VIII.1968, L. A. Kelton, *P. contorta*, 4♀ (CNC); St. Louis Creek Campground, 3.4 mi W of Fraser, 9000 ft, 16.VIII.1980, Stonedahl, *P. contorta*, 1♂, 4♀ (AMNH). **Jackson Co.:** Crowley, nr, at Jackson Co. and Wyoming State line on Rte 125, 4.VIII.1979, J. T. Polhemus, 1♂ (JTP); Gould, 5.VIII.1975, J. C. Schaffner: 2 mi E of, 6♂, 2♀ (TAM); 4 mi N of, 2♂, 1♀ (TAM). Gould, 9200 ft, 12, 13.VIII.1968, L. A. Kelton, *P. contorta*, 5♂, 11♀ (CNC). **Larimer Co.:** Chambers Lake, Roosevelt National Forest, 9200 ft, 11.VIII.1968, L. A. Kelton, *P. contorta*, 1♀ (CNC); Fish Creek Picnic ground, Pingree Park Road, 46 mi W of Fort Collins, 7700 ft, 14.VII.1986, R. T. Schuh, J. T. Polhemus, 2♂ (AMNH); Milner Pass, Rocky Mountain National Park, 10,500 ft, 18.VIII.1968, L. A. Kelton, 1♀ (CNC). Pingree Park: 20.VIII.1925, H. H. Knight, *Lepidopsallus longirostris* paratypes, 3♂, 11♀ (CNC, USNM); 25.VIII.1976, Beamer, Lawson, 1♂, 1♀ (USNM). **Park Co.:** Geneva Park, 9600 ft, 6.XI.1982, D. A., J. T. Polhemus, *P. flexilis*, 4♀ (AMNH, JTP). **Routt Co.:** Meadows, Routt National Forest, 20, 21.VIII.1968, L. A. Kelton, *Picea* sp., 1♂ (CNC); Steamboat Springs, H. H. Knight: 7000 ft, 16.VII.1964, 2♀ (USNM); 8500 ft, 17.VII.1964, 1♂ (USNM). **Summit Co.:** 8.7 mi W of jct. Hwy 91 on I-70, 14.VIII.1980, G. M. Stonedahl, *Pinus contorta*, 10♂, 6♀ (AMNH); Loveland Pass, 12,000 ft, 7.VIII.1961, C. M. Mann, 1♂ (CNC); Vail Pass summit, 10,350 ft, 11.VIII.1987, J. T., D. A. Polhemus, *P. flexilis*, 1♂ (JTP). **Idaho:** **Benewah Co.:** Charlie Creek Rd., 4 mi E of Emida, 8.VII.1979, G. M. Stonedahl,

2♂, 1♀ (AMNH); 4 mi W of Emida on Hwy 6, 9.VII.1979, G. M. Stonedahl, *P. contorta*, *Pseudotsuga menziesii*, 2♀ (AMNH). **Bonner Co.:** Pend Orielle River, Laclede, 4.VII.1966, W. Gagne, J. Haddock, *Pinus flexilis*, 3♀ (UCB). **Franklin Co.:** Strawberry Canyon, 0.5 mi N of m.p. 18 on ID Rte 36, T13S R14E Sec. 1, 8000 ft, 19.VII.1981, M. D. Schwartz, *P. contorta*, 4♂, 9♀ (AMNH). **Idaho Co.:** Lochsa River Valley, E of Wilderness Access Campground (m.p. 127), 2400 ft, 1.VIII.1987, G. M. Stonedahl, *Picea sitchensis*, 1♀ (AMNH); Lowell, Clearwater National Forest, 30.VII.1972, L. A. Kelton, 2♀ (CNC). **Latah Co.:** Palouse River, 5 mi E of Harvard, 3.VII.1966, W. Gagne, J. Haddock, 1♀ (UCB). **Lemhi Co.:** Meadow Lake Campground, 3 mi W of Gilmore, W of Rte 28, Lemhi Range, Salmon National Forest, 9600 ft, 31.VI.1994, M. D. Schwartz, *Pinus albicaulis*, 1♂ (CNC). **Teton Co.:** Pine Creek Pass, 6.VIII.1972, L. A. Kelton, *P. contorta*, 3♂, 3♀ (CNC). **Montana:** **Deer Lodge Co.:** Georgetown Lake on Rte 10A, 6500 ft, 9.VIII.1986, Schuh, Schwartz, Stonedahl, *P. contorta*, 1♀ (AMNH). **Glacier Co.:** Glacier National Park, 28.VII.1972, L. A. Kelton, *P. contorta*, 2♂, 5♀ (CNC). **Park Co.:** Colter Campground, 2 mi E of Cooke City on Rte 212, 8000 ft, 11.VIII.1986, Schuh, Schwartz, Stonedahl, *P. contorta*, 3♀ (AMNH); Soda Butte Campground, 2 mi E of Cooke City, 7700 ft, 11.VIII.1986, Schuh, Stonedahl, Schwartz, *P. contorta*, 1♀ (AMNH); Rte 212 at WY Border, 7750 ft, 11.VIII.1986, Schuh, Schwartz, Stonedahl, *P. contorta*, 1♀ (AMNH). **Montana-Idaho:** Rte 191, Targhee Pass, 7072 ft, 10.VIII.1986, Schuh, Schwartz, Stonedahl, *P. contorta*, 1♂, 3♀ (AMNH). **Nevada:** **Washoe Co.:** Little Valley Research Area, 4.5 mi SW of Washoe, T16N R19E Sec2 NE 1/4, 6200 ft, 4.VIII.1982, M. D. Schwartz, *P. contorta*, 4♂, 14♀ (AMNH). **Oregon:** **Baker Co.:** West Eagle Meadow, 20 mi E of Medical Springs, Wallowa Mts., 4700 ft, 3.VIII.1986, Schuh, Schwartz, Stonedahl, *P. contorta*, 4♂, 11♀ (AMNH). **Clackamas Co.:** 1 mi S of Government Camp, 25–29.VII.1966, W. Gagne, J. Haddock, *P. contorta*, 1♂, 1♀ (UCB). **Grant Co.:** Wildcat Springs Campground, Malheur National Forest, T14S, R33E, Sec. 10, 21.VII.1979, M. D. Schwartz, *P. contorta*, 3♂, 4♀ (AMNH). **Hood River Co.:** Mount Hood, Cloud Cap, 6000 ft, 5.IX.1979, G. M. Stonedahl, *P. contorta*, 1♀ (AMNH). **Klamath Co.:** 19 mi SE of LaPine on Hwy. 31, 4750 ft, 25.VI.1979, G. M. Stonedahl, *P. contorta*, 2♀ (AMNH); T30S R8E Section 9, 13.VII.1978, Oman, 2♂, 3♀ (OSU); Skookum Meadows, R9E, T27S, Section 16, 5310 ft, 17.VII.1979, G. M. Stonedahl, *P. contorta*, 1♀ (AMNH); Meadow Spring, Winema

National Forest, T27S R9E S16, 5500 ft, 17.VII.1979, M. D. Schwartz, *P. contorta*, 1♂ (AMNH). **Lane Co.:** Frog Camp Campground, NE Corner, 2.VIII.1966, W. Gagne, J. Haddock, 2♀ (UCB). **Umatilla Co.:** Blue Mountains, 4.VII.1940, R. L. Usinger, 1♂ (UCB). **Union Co.:** 0.1 mi NE of Tollgate Shopping Center on Hwy 204, 17.VIII.1979, M. D. Schwartz, *P. contorta*, 1♀ (AMNH). **Wallowa Co.:** Miram Lk. Trail, Wallowa–Whitman National Forest, 5590–7370 ft, 18.VIII.1979, M. D. Schwartz, *P. contorta*, 1♀ (AMNH). **Utah:** **Cache Co.:** 14 mi S of FS Rd 055 off Rte 89, T13N R4E S15, 8000–9000 ft, 25.VII.1981, M. D. Schwartz, *P. contorta*, 5♂, 1♀ (AMNH). **Uintah Co.:** nr Little Brush Creek, m.p. 22 on Rte 44, T1N, R22E, Uinta Mountains, 8620 ft, 2.VIII.1981, M. D. Schwartz, *P. contorta*, 1♀ (AMNH). **Wyoming:** **Albany Co.:** Medicine Bow Mountains, 29.VII.1931, H. H. Knight, *Lepidopsallus longirostris* paratype, 1♂ (USNM). **Fremont Co.:** Blue Ridge Summit, Wind River Mountains, Shoshone National Forest, 14 mi SW of National Forest Boundary on Rte 131, 9576 ft, 14.VIII.1986, Schuh, Stonedahl, *P. contorta*, 1♂, 6♀ (AMNH). **Park Co.:** Yellowstone National Park, 4.VIII.1931, H. H. Knight, 1♀ (USNM). **Shoshone Co.:** Fox Creek Campground, 6.9 mi E of Cooke City on Rte 212, 7250 ft, 11.VIII.1986, Schuh, Schwartz, Stonedahl, *P. contorta*, 1♀ (AMNH). **Teton Co.:** Colter Bay Village, 2 mi SE of, on Rte 89, Grand Teton National Park, 7000 ft, 22.VII.1981, M. D. Schwartz, *P. contorta*, 1♂, 5♀ (AMNH); Fishing Bridge Residential Area, Yellowstone National Park, 8400 ft, 21.VII.1981, M. D. Schwartz, *P. contorta*, 1♂, 1♀ (AMNH); Grand Teton National Park, 7.VIII.1972, L. A. Kelton, *P. contorta*, 3♀ (CNC).

*Phoenicocoris minusculus* (Knight)

Figures 1K, 2, 12, 25

*Lepidopsallus minusculus* Knight, 1923: 472 (n.sp.).

*Phoenicocoris minusculus*: Stonedahl, 1990: 61 (n.comb.); Schuh, 1995: 374 (catalog).

*Atractotomus crataegi* Knight, 1931: 37 (n.sp.).  
NEW SYNONYM.

*Phoenicocoris crataegi*: Stonedahl, 1990: 61 (n.comb.); Schuh, 1995: 374 (catalog).

**DIAGNOSIS:** Recognized by the uniformly dark reddish brown to nearly black dorsum with broad, truncate, apically serrate, white scalelike setae (fig. 12B) on the dorsum, thoracic pleura, and lateral margins of abdominal sternum (fig. 12A); the thickened, slightly fusiform antennal segment 2, in both sexes (fig. 2), with length less than to slightly

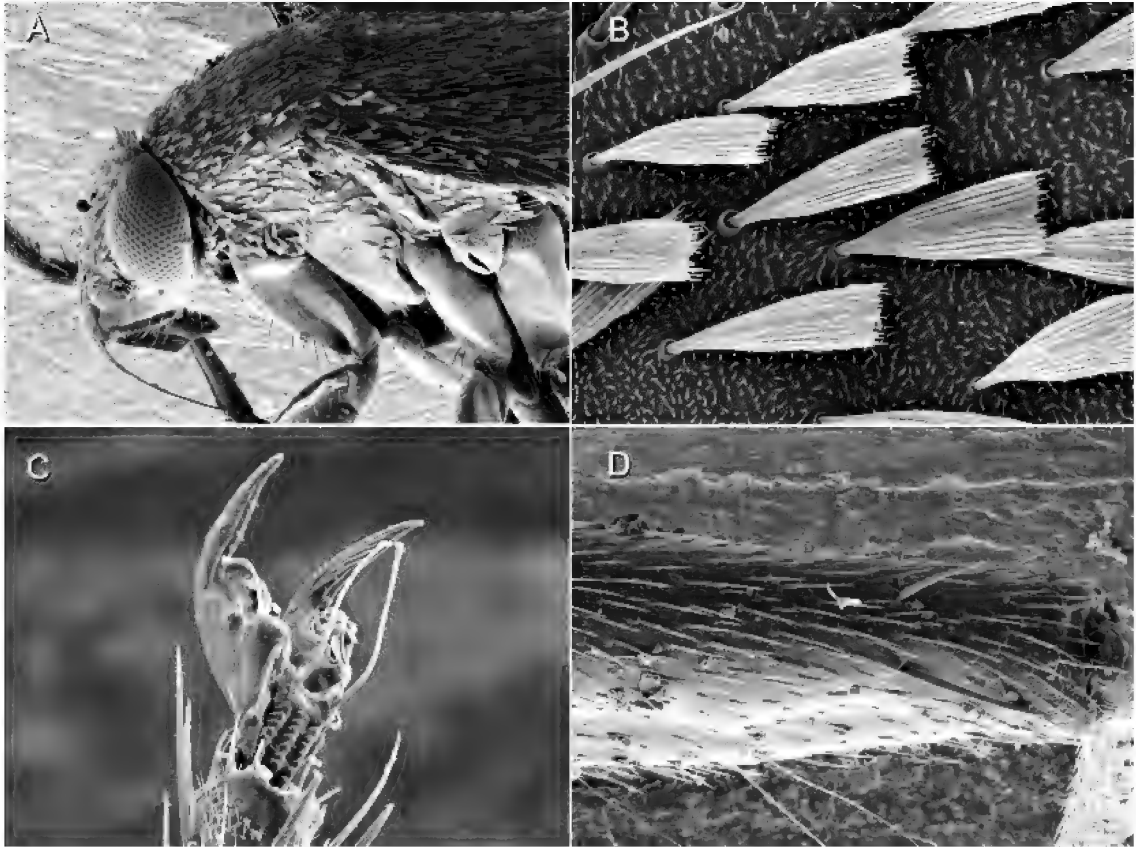


Fig. 12. Scanning electron micrographs of *Phoenicocoris minusculus* (Knight), Huyck Preserve, New York. **A.** Head and thorax, lateral view. **B.** Scalelike setae, dorsal view. **C.** Pretarsus, ventral view. **D.** Hind femora, dorsodistal view.

greater than width of head across eyes (ratio male 1:1.04–1.13; female 1:1.01–1.15); and male genitalia with the reduced, truncate apex of the anterior vesical strap and absence of the gonopore sclerite (fig. 25). Distribution of thoracic and abdominal scalelike setae as in *obscurellus*, *rostratus*, and *strobicola*. Distinguished from *obscurellus* and *strobicola* by the nonsexually dimorphic body and short antennal segment 2 (fig. 2), whereas these species have the male elongate and female ovate and the antennal segment 2 much greater than the width of the head (fig. 3). The fusiform antennal segment 2 and vesica with a short anterior strap (fig. 25) distinguish *minusculus* from *rostratus*, which has the antennal segment 2 of only the male slightly thickened and a long anterior vesical strap (fig. 24).

REDESCRIPTION: GENERAL ASPECT:

broadly ovate; total length male 2.55 (2.33–2.75), female 2.71 (2.50–2.90); length to cuneal fracture male 1.97 (1.88–2.20), female 2.09 (1.95–2.25); coloration dark reddish to brownish black; distal antennal segments and tarsi pale yellowish brown; claws dark; dorsum with densely distributed, flattened, broad, apically truncate and serrate, white scalelike setae and densely distributed, suberect to reclining, black simple setae; thoracic pleura and venter with scalelike setae. HEAD: width male 0.67 (0.64–0.69), female 0.69 (0.67–0.70); vertex width male 0.35 (0.34–0.36), female 0.37 (0.36–0.39); region anterior to antennal insertion elongate, antecular length male 0.20 (0.18–0.22), female 0.20 (0.18–0.21); eyes moderately large, about 81% of head height, ventral margin of antennal insertion level with ventral margin of eye; antennal measurements male 0.18

(0.17–0.19): 0.62 (0.58–0.65): 0.39 (0.36–0.44): 0.29 (0.28–0.31), female 0.18 (0.17–0.19): 0.63 (0.59–0.67): 0.41 (0.38–0.44): 0.29 (0.27–0.30); antennal segment 2 is 6% shorter than head width across eyes, slightly fusiform in both sexes; labium reaching apex of middle coxae in both sexes; labial length male 1.05 (1.00–1.09), female 1.07 (1.03–1.14); length of segment 4 male 0.30 (0.28–0.32), female 0.31 (0.29–0.31). **THORAX:** width male 1.04 (0.98–1.10), female 1.06 (0.98–1.09); length male 0.53 (0.48–0.56), female 0.53 (0.50–0.56); mesoscutum relatively narrowly exposed. **HEMELYTRA:** maximum width male 1.34 (1.20–1.43), female 1.39 (1.30–1.50); lateral margin broadly arcuate.

**BIOLOGY:** Unlike other members of the genus, *P. minusculus* is found on species of Rosaceae rather than on conifers. Presumed hosts include apple, (*Malus sylvestris* Mill.) and hawthorn (*Crataegus chrysocarpa* Ashe). Kelton (1983) also reported it as predaceous on aphids and mites. Bouchard et al. (1988) reported the feeding voracity of *P. minusculus* on apple aphid (*Aphis pomi* DeGeer (Aphididae)) in southwestern Québec.

**DISTRIBUTION:** Eastern Nearctic ranging from Québec and Ontario in the north, south to Massachusetts, New York, and South Carolina and west to Iowa.

**DISCUSSION:** Knight (1923, 1931) described *L. minusculus* and *A. crataegi* from White Plains, New York and Ames, Iowa, respectively. After examining paratypes of both nominal species we must conclude that *crataegi* is a junior synonym of *minusculus*. The original descriptions of both species are practically identical. Discrepancy is found only in the measurements; however, the range of measurement in our concept of *minusculus* subsumes the minute differences between the original descriptions. Examination of the vesicae of both nominal species also revealed no substantive structural differences.

**SPECIMENS EXAMINED:** CANADA: **Ontario:** Aldershot, 7.VII.1955, L. A. Kelton, 1 ♀ (CNC); Exeter, 12.VII.1962, Kelton, Thorpe, *Crataegus* sp., 3 ♂, 2 ♀ (CNC); Fort Erie, 10.VII.1955, L. A. Kelton, 1 ♂ (CNC); Hagersville, 9.VII.1962, Kelton, Thorpe, 6 ♀ (CNC). **Québec:** Frelighsburg,

13.VII.1977, L. A. Kelton, apple, 10 ♂, 28 ♀ (CNC). USA: **Connecticut:** Storrs, 8.VI.1977, D. Leston, 1 ♂ (AMNH). **Iowa:** Polk Co.: Mitchellville, Thomas Mitchell County Park, 29.VI.1980, K., R. Schmidt, 1 ♂ (AMNH). *Story Co.:* Ames, various dates (see Knight 1931), 21.VI.1964, H. H. Knight, including *Atractotomus crataegi* paratypes, 21 ♂, 13 ♀ (CNC, USNM). **Massachusetts:** *Essex Co.:* Rockport, Golf Club Road, 7.VII.1999, M. D. Schwartz, *Malus* sp., 1 ♂, 7 ♀ (CNC). **Michigan:** *Midland Co.:* 28.VI.1958, R. R. Dreisbach, 1 ♀ (USNM). **New York:** *Albany Co.:* Rensselaerville, Huyck Preserve, 29.VI–2.VII.1977, R. T. Schuh, *Malus* sp. 7 ♂, 1 ♀ (AMNH). *Nassau Co.:* Flower Hill, nr Rte 25A, Ridge Drive East, M. D. Schwartz, *Malus* sp., 2 ♂, 4 ♀ (AMNH). *Queens Co.:* Corona Heights, jct Van Doren St, 108th St., 13.VI.1986, M. D. Schwartz, *Malus* sp., 3 ♂ (AMNH); Flushing Meadow Corona Park, near zoo, 13.VII.1985, M. D. Schwartz, *Malus* sp., 2 ♀ (AMNH). *Westchester Co.:* White Plains: 10.VII.1915, apple, *Lepidopsallus minusculus* paratypes, 2 ♂, 1 ♀ (CNC); 29.VI.1929, C. E. Olsen, 1 ♀ (USNM). **Pennsylvania:** *Centre Co.:* State College, 6.VI.1977. Schuh, Henry, Wheeler, *Crataegus* sp., 7 ♂, 17 ♀ (AMNH). **South Carolina:** *Pickens Co.:* Clemson College, 22.V.1944, D. Dunavan, apple, 3 ♂ (CUCC). **Tennessee:** *Claiborne Co.:* Rte 25E, N of Bean Station, 21.V.1979, Schuh, Wygodzinsky, Schmidt, 1 ♂ (AMNH). **Vermont:** *Windsor Co.:* Mount Ascutney, 23.VII.1912, Parshley, 1 ♂ (CAS).

*Phoenicocoris modestus* (Meyer-Dür)

Figures 1L, 2, 13, 23

*Capsus modestus* Meyer-Dür, 1843: 69 (n.sp.).  
*Capsus gracilicornis* Scholtz, 1847: 139 (n.sp.);  
 Fieber, 1861: 394 (syn.).  
*Capsus atropurpureus* Kirschbaum, 1856: 262,  
 338 (n.sp.); Baerensprung, 1860: 17 (syn.).  
*Sthenarus modestus* form *purpurascens* Stichel,  
 1956: 366 (new form).  
*Phoenicocoris modestus*: Kerzhner, 1962: 231  
 (n.comb.); Schuh, 1995: 375 (catalog); Kerzhner and Josifov, 1999: 387 (catalog).

**DIAGNOSIS:** Recognized by the relatively small size (2.15–2.75 mm); scutellum and hemelytra with adpressed, narrowly ovate, apically pointed, scalelike setae (figs. 1L, 13A); thoracic pleura and abdominal sternum without scalelike setae; completely pale antenna, fore and middle tibiae; labium reaching to or just beyond apices of hind coxae; and by the comparatively small vesica with a large secondary gonopore (fig. 23). The

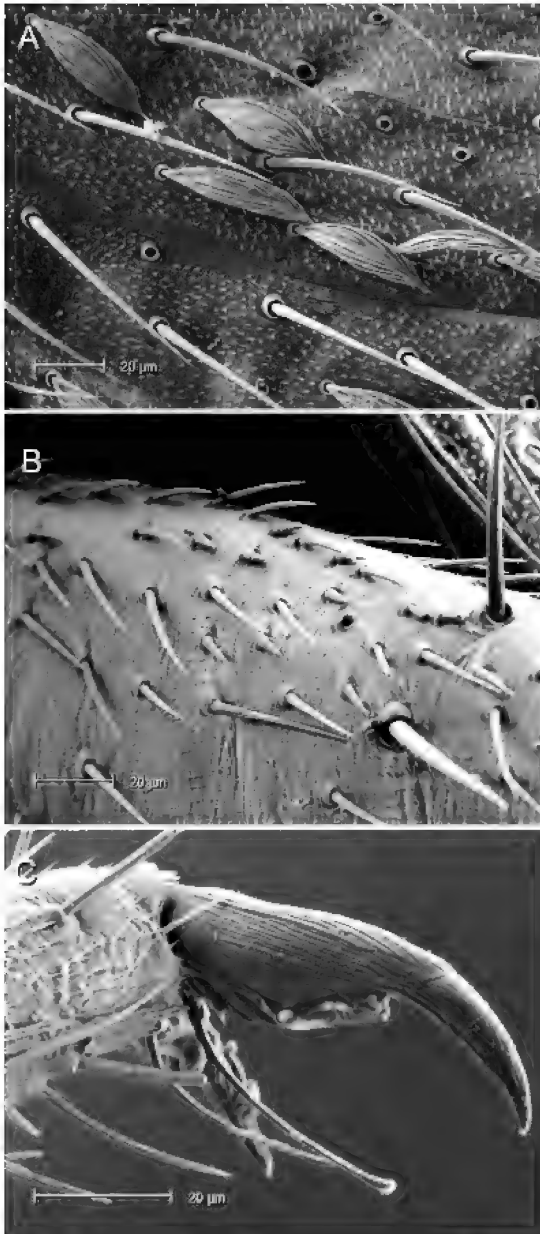


Fig. 13. Scanning electron micrographs of *Phoenicocoris modestus* (Meyer-Dür), Parainen [Pargas], Finland. **A.** Scalelike setae, dorsal view. **B.** Hind femora, dorsodistal view. **C.** Pretarsus, lateral view. Scales as indicated.

distribution of the pronotal scalelike setae in this Old World taxon is similar to those of the western North American species *nevadensis* and *ponderosae*. Distinguished from *nevadensis* by the short labium, which, at

most, just surpasses the hind coxae, whereas in *nevadensis* the labium reaches the middle of the abdominal sternum. Overall body length will separate *ponderosae* from *modestus*; in the former, body length is greater than 3.0 mm, whereas in *modestus* the body is less than 2.75 mm.

**REDESCRIPTION:** ( $N = 9♀$ ). **GENERAL ASPECT:** oblongate; total length male 2.46 (2.15–2.60), female 2.51 (2.30–2.75); length to cuneal fracture male 1.75 (1.63–1.93), female 1.83 (1.70–1.95); coloration reddish brown, dark reddish brown to dark brown; antennae, apices of femora, tibiae, and tarsi pale yellow; femora concolorous with dorsum; hemelytra with moderately to densely distributed, broad, flattened, apically pointed, white scalelike setae and densely distributed, suberect to reclining, pale brown simple setae; vertex, pronotum, thoracic pleura, and venter without scalelike setae. **HEAD:** width male 0.63 (0.61–0.64), female 0.63 (0.60–0.65); vertex width male 0.29 (0.28–0.30), female 0.30 (0.29–0.33); region anterior to antennal insertion moderately elongate, antecular length male 0.20 (0.18–0.21), female 0.19 (0.17–0.21); eyes moderately large, about 81% of head height, ventral margin of antennal insertion level with ventral margin of eye; antennal measurements male 0.16 (0.15–0.17): 0.57 (0.56–0.60): 0.35 (0.31–0.37): 0.27 (0.24–0.29), female 0.16 (0.15–0.17): 0.57 (0.55–0.61): 0.36 (0.31–0.41): 0.29 (0.25–0.30); segment 2 subequal to, equal to, head width across eyes; labium surpassing apices of hind coxae in both sexes, usually reaching base of abdominal sternum; labial length male 1.27 (1.25–1.29), female 1.25 (1.23–1.26); length of segment 4 male 0.34 (0.33–0.35), female 0.37 (0.36–0.38). **THORAX:** width male 0.90 (0.86–0.93), female 0.91 (0.85–0.94); length male 0.41 (0.39–0.42), female 0.41 (0.39–0.43); mesoscutum moderately exposed. **HEMELYTRA:** maximum width male 1.15 (1.05–1.21), female 1.16 (1.08–1.20); lateral margin slightly arcuate.

**BIOLOGY:** Stichel (1956) recorded Scots pine (*Pinus sylvestris* Linnaeus) as a Palearctic host. All specimens housed in the Zoological Institute, St. Petersburg, Russia, with documented hosts, were collected from *P. sylvestris* (Konstantinov, personal commun.).

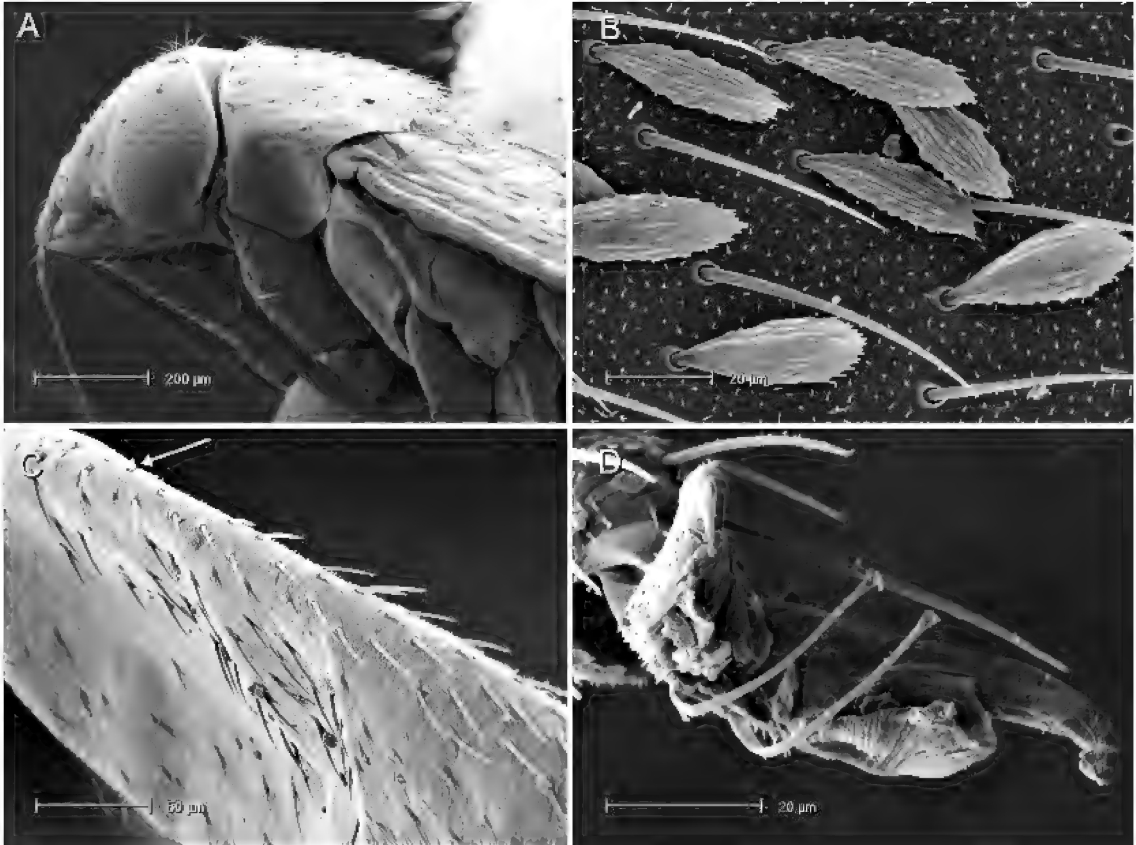


Fig. 14. Scanning electron micrographs of *Phoenicocoris nevadensis*, n.sp., Carroll Summit, Nevada. **A.** Head and thorax, lateral view. **B.** Scalelike setae, dorsal view. **C.** Hind femora, dorsodistal view. **D.** Pretarsus, apical view. Scales as indicated.

Wagner (1975) noted that *modestus* feeds on *Pinus* sp. with immatures present in June and July and eggs, the diapausing life stage.

**DISTRIBUTION:** Widely distributed in the Palearctic Region from the Russian Far East (Kerzhner, 1988a) south to Mongolia, west in the forest zone of Russia, Scandinavia, and Western Europe to as far west as Spain (Kerzhner and Josifov, 1999).

**SPECIMENS EXAMINED:** FINLAND: **Western:** Parainen [Pargas], *Sthenarus modestus* det. by O. M. Reuter, 2♂, 1♀ (CNC); GERMANY: **Bavaria:** Mühlstetten bei Pleinfeld, Mfr, 18.VI.1988, G. Schuster, 1♂ (SCHU). [Northern Bavaria]. Meyer-Dür Collection, 4♂, 5♀ (AMNH). MONGOLIA: [in Cyrillic characters] Hantau Aimak [= district], 8 km N of Binder, 5.VII.1976, I. M. Kerzhner, 1♂, 2♀ (AMNH). SPAIN: **Berguedá:** Ceres, 29.VI.1987, J. Ribes, *Pinus sylvestris*, 1♂, 2♀ (RIBE).

*Phoenicocoris nevadensis*, new species

Figures 1T, 2, 14, 23

**HOLOTYPE:** Male, "USA: NEVADA: Churchill [Co.], reststop W. of Carroll Summit, R37E T16N, elev. 6500 ft., Aug. 5, 1982, coll. M. D. Schwartz, *Pinus monophylla* [(Torrey et Frémont) (Pinaceae)]." Deposited in the American Museum of Natural History.

**DIAGNOSIS:** Similar to *modestus* in body size, color of the dorsum, antennae, and legs, and absence of scalelike setae on vertex and pronotum, but easily distinguished by the longer labium, gonopore sclerite longer than secondary gonopore, short anterior apex of the vesical strap (fig. 23), and geographical distribution. Distinguished from *ponderosae*, the only other species lacking scalelike setae



on the pronotum, by the smaller size and vesical structure.

**DESCRIPTION: GENERAL ASPECT:** small; total length male 2.40 (2.26–2.60), female 2.33 (2.05–2.65); length to cuneal fracture male 1.72 (1.56–1.85), female 1.67 (1.46–1.88); coloration dark brown to nearly black; antennae, apices of femora, tibiae, and tarsi pale yellow; antennal segment 1 with basal and distal red marks; apices of tarsal segment 3 and claws darker brown; mesoscutum, scutellum, and hemelytra dorsum with moderately to densely distributed, broad, flattened, apically serrate, white scalelike setae and densely distributed, suberect to reclining, brown simple setae; thoracic pleura and venter without scalelike setae. **HEAD:** width male 0.65 (0.63–0.68), female 0.64 (0.61–0.66); vertex width male 0.30 (0.29–0.30), female 0.31 (0.30–0.33); region anterior to antennal insertion elongate, anteocular length male 0.21 (0.20–0.23), female 0.21 (0.19–0.22); eyes moderately large, about 82% of head height, ventral margin of antennal insertion level with ventral margin of eye; antennal measurements male 0.14 (0.13–0.15): 0.50 (0.45–0.54): 0.31 (0.25–0.39): 0.26 (0.25–0.29), female 0.14 (0.13–0.14): 0.47 (0.42–0.53): 0.30 (0.28–0.33): 0.25 (0.23–0.29); labium brown, reaching seventh sternite to base of genital segment in males and from base to middle of ovipositor in females; labial length male 1.22 (1.08–1.38), female 1.19 (1.11–1.25); length of segment 4 male 0.36 (0.33–0.38), female 0.35 (0.33–0.38). **THORAX:** width male 0.86 (0.84–0.91), female 0.85 (0.79–0.89); length male 0.36 (0.34–0.38), female 0.36 (0.34–0.38); mesoscutum moderately exposed. **HEMELYTRA:** maximum width male 1.05 (0.98–1.10), female 1.09 (0.98–1.15); gently curved laterally.

**BIOLOGY:** Hosts include knobcone pine (*Pinus attenuata* Lemmon), lodgepole pine (*P. contorta* Douglas ex Loudon), piñon (*P. edulis* Engelmann), and singleleaf piñon (*P. monophylla* Torrey et Frémont).

**DISTRIBUTION:** Western United States from Hood River Co., Oregon in the north, south to northern and Santa Cruz Co., California, and east to central Nevada.

**DISCUSSION:** We have identified a female, in poor condition, from the Hualapai Moun-

tains of Mohave County, Arizona as our new species. We support this placement based on the small black body; short, white, scalelike setae on the hemelytra; labium reaching the base of the ovipositor; and the long parempodia with a spatulate apex. It is not unusual for plant bugs to be found on the flowers of nonhost plants, especially in this case, when the true host was present in abundance in the immediate vicinity.

**PARATYPES: USA: California:** *Santa Cruz Co.:* Mount Hermon, 8.VII.1922, F. E. Blasidell, 1 ♀ (CAS). *Siskiyou Co.:* McCloud, *Pinus attenuata:* 1090 m, 7.VII.1979, R. T. J. Schuh, 3 ♂, 6 ♀ (AMNH); 1100 m, 9.VII.1980, R. T. Schuh, G. M. Stonedahl, 10 ♂, 2 ♀ (AMNH); just NW of, 3700 ft, 27.VII.1986, R. T. Schuh, 1 ♀ (AMNH). **Nevada:** *Churchill Co.:* rest stop W of Carroll Summit, R37E T16N, 6500 ft, 5.VIII.1982, M. D. Schwartz, *P. monophylla*, 6 ♂, 20 ♀ (AMNH). *Clark Co.:* Charleston Peak, J. T. Polhemus, 20.VII.1982, *P. edulis*, 2 ♀ (JTP); no locality, 29.VII.1967, D. C., K. A. Rentz, 1 ♀ (UCB). *Lyon Co.:* N boundary Toiyabe National Forest, on Rte 22, 1780 m, 11.VII.1980, R. T. Schuh, G. M. Stonedahl, *P. monophylla*, 11 ♂, 40 ♀ (AMNH). *Douglas Co.:* Topaz Lake, 11.VII.1967, W. J. Turner, 1 ♀ (UCB). *White Pine Co.:* 4.2 mi W of Baker, 2031 m, 14.VII.1980, R. T. Schuh, G. M. Stonedahl, *P. monophylla*, 16 ♀ (AMNH). Lehman Cave National Monument, 24.VI.1966, W. Gagne: *P. monophylla*, 1 ♂, 1 ♀ (USNM); Lehman Creek, nr, with J. Haddock, 6 ♂, 4 ♀ (UCB). **Oregon:** *Grant Co.:* Dixie Campground on Rte 26, Malheur National Forest, 24.VIII.1981, G. M. Stonedahl, *P. contorta*, 1 ♀ (OSU). *Hood River Co.:* no locality, 23.VIII.1978, J. D. Lattin, *P. contorta*, 2 ♀ (OSU).

**ADDITIONAL SPECIMEN: USA: Arizona:** *Mohave Co.:* Hualapai Mountains, SE of Kingman, T20N R15W, 4000–6400 ft, 9,10.VI.1983, R. T. Schuh, M. D. Schwartz, G. M. Stonedahl, *Quercus* sp., 1 ♀ (AMNH).

*Phoenicocoris obscurellus* (Fallén)

Figures 1M, 3, 15, 23

- Phytocoris obscurellus* Fallén, 1829: 108 (n.sp.).  
*Capsus oculus* Kirschbaum, 1856: 250, 318 (n.sp.); Wagner, 1939: 47 (syn.).  
 ?*Atractotomus albipes* Fieber, 1858: 334 (n.sp.); Fieber, 1861: 296, (syn. with *Atractotomus oculatus*).  
*Capsus pityophilus* Flor, 1860: 463, 597 (n.sp.); Thomson, 1871: 446 (syn.).  
*Agalliaestes meyeri* Fieber, 1864: 231 (n.sp.); Puton, 1873: 25 (syn.).

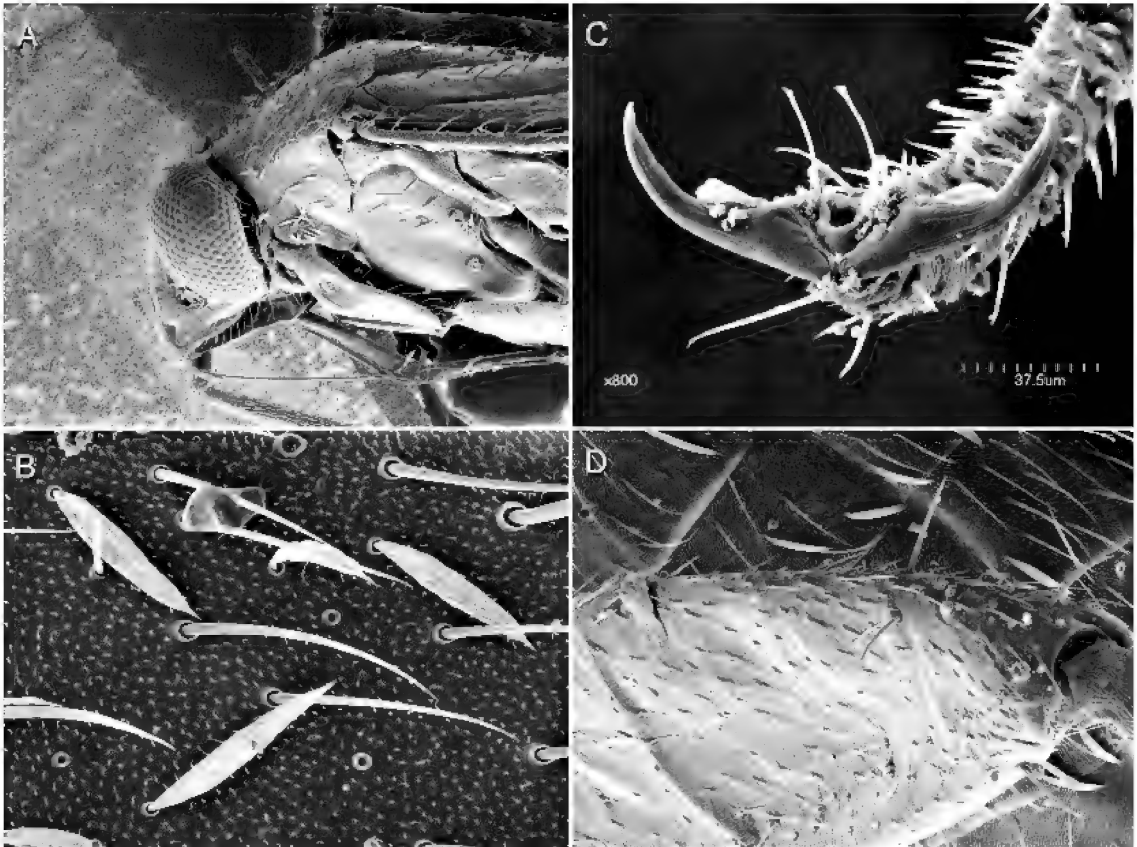


Fig. 15. Scanning electron micrographs of *Phoenicocoris obscurellus* Fallén, 2.5 mi NW of Aldershot, England. **A.** Head and thorax, lateral view. **B.** Scalelike setae, dorsal view. **C.** Pretarsus, apical view; scale and magnification as indicated. **D.** Hind femora, dorsodistal view.

*Atractotomus pini* Fieber, 1864: 224 (n.sp.);  
Douglas and Scott, 1868: 268 (syn. with *C. pityophilus*).

*Psallus obscurellus* form *griseofusca* Stichel,  
1933: 262, 264.

*Phoenicocoris obscurellus*: Kerzhner, 1962: 231  
(n.comb.); Schuh, 1995: 375 (catalog); Kerzhner and Josifov, 1999: 388 (catalog).

**DIAGNOSIS:** Distinguished by the sexually dimorphic eyes and hemelytra; male with large eyes, elongate body, and parallel-sided lateral margin of corium and female with small eyes, shorter body, and gently curved lateral margin of corium; narrow, lanceolate scalelike setae on the dorsum, thoracic pleura, and lateral margins of abdominal sternum; length of antennal segment 2 much greater than width of head across eyes; legs and antennae mostly darkened; and the gonopore sclerite nearly twice as long as the secondary

gonopore (fig. 23). The sexually dimorphic body form is also found in *strobicola*, but the pale appendages of this North American species will distinguish it from *obscurellus*, which has darker legs and antenna and has an Old World distribution.

**REDESCRIPTION: GENERAL ASPECT:** moderately elongate (female) to elongate (male); total length male 3.52 (3.35–3.70), female 2.97 (2.80–3.20); length to cuneal fracture male 2.36 (2.23–2.48), female 2.15 (2.03–2.33); coloration dark brown to nearly black; antennae, apices of femora, tibiae, and tarsi dusky brownish yellow to yellowish brown; femora yellowish or pale brown to brown; dorsum with densely distributed, relatively narrow, flattened, apically pointed, silvery scalelike setae and densely distributed, suberect to reclining, black simple setae; thoracic pleura and venter with scalelike se-

tae. HEAD: width male 0.68 (0.65–0.70), female 0.65 (0.63–0.66); vertex width male 0.25 (0.25–0.27), female 0.29 (0.28–0.30); region anterior to antennal insertion relatively elongate, antecular length male 0.19 (0.19–0.20), female 0.20 (0.18–0.21); eyes large, 89% of head height, ventral margin of antennal insertion dorsal to ventral margin of eye; antennal measurements male 0.19 (0.18–0.20): 0.98 (0.94–1.04): 0.50 (0.48–0.53): 0.31 (0.29–0.33), female 0.19 (0.18–0.20): 0.83 (0.78–0.85): 0.46 (0.44–0.50): 0.32 (0.30–0.34); segment 2 is 25% to 50% longer than head width across eyes; labium brown, reaching seventh sternite in male and sternite 5 in female; labial length male 1.40 (1.26–1.53), female 1.43 (1.39–1.48); length of segment 4 male 0.38 (0.38–0.40), female 0.39 (0.38–0.40). THORAX: width male 1.00 (0.94–1.03), female 0.97 (0.93–1.00); length male 0.48 (0.44–0.51), female 0.46 (0.44–0.48); mesoscutum broadly exposed. HEMELYTRA: maximum width male 1.30 (1.25–1.40), female 1.28 (1.23–1.33); lateral margin subparallel.

BIOLOGY: Stichel (1956) listed the following conifers as hosts: *Pinus sylvestris* and Norway spruce (*Picea abies* (Linnaeus) Karsten [as *P. excelsa* Link]) (Pinaceae), and common juniper (*Juniperus communis* Linnaeus) (Cupressaceae). All specimens, with documented hosts, housed in the Zoological Institute, St. Petersburg, Russia were collected from *P. sylvestris* (Konstantinov, personal commun.).

DISTRIBUTION: Widely distributed in the Palearctic Region from the Russian Far East (Kerzhner, 1988a) south to Mongolia, west in the forest zone of Russia, Scandinavia, Western Europe, including Great Britain and Italy, to as far west as Portugal (Kerzhner and Josifov, 1999).

DISCUSSION: The coloration of specimens from Europe and western Russia conform to the redescription. Specimens from Yakutia and Mongolia are uniformly paler, with the dorsum and appendages pale brown or even dirty yellowish brown. Kerzhner and Josifov (1999) noted that Wagner (1939: 47) questioned the synonymy of *albipes* with *oculatus* proposed by Fieber (1861). In Wagner's view *oculatus* sensu Fieber, 1861 is identical with *Atractotomus magnicornis* and only

*oculatus* Kirschbaum is a junior subjective synonym of *obscurellus*. The synonymy of *albipes* with *obscurellus* needs to be confirmed to eliminate the possibility that *albipes* is rather a junior synonym of *modestus*.

SPECIMENS EXAMINED: ENGLAND: *Bedfordshire Co.*: Haynes, 16.VII.1975, D. Leston, *Pinus* sp., 4 ♀ (AMNH); Rowney Warren, 28.VII.1975, D. Leston, 1 ♀ (AMNH). *Hampshire Co.*: Aldershot, 2.5 mi NW of, on Rte 323, 2.VII.1989, G. M. Stonedahl, *Pinus* sp., 7 ♂, 23 ♀ (AMNH). *Surrey Co.*: Frensham Common, 29.VI.1994, G. M. Stonedahl, *Pinus* sp., 15 ♂, 12 ♀ (AMNH). FINLAND: Parainen [Pargas], *Psallus obscurellus* det. by O. M. Reuter, 1 ♂ (CNC); Tvärminne, H. Lindberg, 2 ♀ (CNC). GERMANY: **Bavaria**: *Schwaben*: Klosterlechfeld, 3.VII.1966, Gerh. Schuster, *Pinus* sp., 1 ♂ (SCHU). **Saxony**: *Oberlausitz*: Creba, 6.VIII.1942, Jordan, 1 ♀ (AMNH); Niederschlesien, VI.1943, Jordan, 1 ♂ (AMNH); Weisskalm, 11.VII.1942, Jordan, 1 ♀ (AMNH). MONGOLIA: [in Cyrillic characters] Eastern Aimak, 20 km ESE of Bayan-Ula, 8.VII.1976, I. M. Kerzhner, 3 ♂ (AMNH). RUSSIA: [in Cyrillic characters] Serezhino, Yamburgsk[iy] u[ezd] [uezd = district], 24, 25.VI.1896, Bianchi, 2 ♀ (AMNH). SPAIN: **Osona**: Colluspina, 10.VII.1977, J. Ribes, *Pinus sylvestris*, 1 ♂, 1 ♀ (RIBE). **Soria**: Urbión, 11.VIII.1978, J. Ribes, 3 ♂ (RIBE).

#### *Phoenicocoris opacus* (Reuter)

*Psallus opacus* Reuter, 1906: 72 (n.sp.); Schuh, 1995: 411 (catalog); Kerzhner, 1997: 247 (lectotype designation). *Phoenicocoris opacus*: Kerzhner, 1997: 247 (n.comb.); Kerzhner and Josifov, 1999: 388 (catalog).

REDESCRIPTION: ( $N = 1 ♂, 5 ♀$ ) GENERAL ASPECT: total length male 3.20, female 3.00 (2.90–3.20); length to cuneal fracture male 2.25, female 2.20 (2.15–2.40); overall coloration dirty yellow to pale brown; cuneus and apex of exocorium slightly darker than remainder of hemelytra; dorsum with narrow, flattened, and apically pointed silvery scale-like setae mixed with suberect dark brown simple setae; thoracic pleura, except propleura, and venter without scalelike setae. HEAD: width male 0.68, female 0.67 (0.65–0.68); vertex width male 0.33, female 0.38; antecular length male 0.20, female 0.22 (0.20–0.23); vertex usually with pale area medially; antennae measurement male 0.25: 0.88: 0.48: 0.30, female 0.26 (0.25–0.26):

0.84 (0.80–0.88): 0.53 (0.48–0.58): 0.35(0.32–0.38); labium always reaching to, usually slightly surpassing apices of hind coxae; labial length male 0.11, female 0.13 (0.12–0.13). THORAX: width male 1.0, female 1.04 (0.98–1.08); length male 0.43, female 0.45 (0.43–0.48); dirty yellow to brown. HEMELYTRA: maximum width male 1.25, female 1.38 (1.30–1.45). LEGS: pale yellow; femora covered with distinct dark brown dots of various sizes apically; tibia with large dark brown dots at bases of dark spines.

DISCUSSION: We have not personally examined specimens of this taxon; however, Kerzhner (1997), when designating the lectotype of *opacus*, tentatively placed it in *Phoenicocoris*. The new combination was based on one teneral male and 10 female syntypes. The vesica of *opacus* has two unequal apical processes. Kerzhner (1997) suggested that some external characters of *P. opacus* are similar to *P. kyushuensis*, while also noting that its eyes were much smaller and that its pale femora had dark spots. Linnavuori (1961), when describing *kyushuensis*, contrasted his new species with *opacus* stating that in the latter the vertex is 2 to 2.5 times as wide as the dorsal eye width and that the labium extends to the hind coxae. Herein we erect a new genus for *P. kyushuensis* based, in part, on the equal length vesical processes of the two included species. We maintain the generic assignment of *opacus* in *Phoenicocoris* and do not transfer it to our new genus because the vesical structure, eye size, labial length, and femoral spots are within the range of variation we attribute to *Phoenicocoris*. Current collection records of *opacus* indicate that its distribution is limited to Khunchyao Pass, Sichuan province in the southwest territory of China. The host plants of this species are unknown.

SPECIMEN INFORMATION: CHINA: Sichuan: les [=forest], sev[ernyi]. skl[on]. [=northern side], Khunchyao perev[al]. (=pass), 11.VIII.1893, Potanin, lectotype ♂ (ZISP); Tatszinlu, 21.V.1893–22.VI.1893, Potanin 10 ♀ paralectotypes (ZISP).

***Phoenicocoris pallidicornis*, new species**

Figures 1P, 3, 16, 24

HOLOTYPE: Male. "Can[ada]. W. Ontario Black Sturg[eon] Lake 1–15.VIII.1956 [H.]

Lindberg." Deposited in the Canadian National Collection of Insects, Arachnids, and Nematodes.

DIAGNOSIS: Recognized by the bicolored dorsum with the head, scutellum, and most of pronotum dark brown, posterior portion of pronotum and hemelytra yellowish brown; short anteocular portion of head; wide vertex; and long, roughened gonopore sclerite (fig. 24). Distribution of scalelike setae as in *australis*, *claricornis*, *dissimilis*, and *longirostris*, but the contrasting dorsal coloration will distinguish *pallidicornis* from these species with uniform dorsal coloration.

DESCRIPTION: GENERAL ASPECT: broad, relatively short; total length male 3.00 (2.75–3.15), female 2.92 (2.80–3.10); length to cuneal fracture male 2.10 (1.95–2.20), female 2.11 (2.00–2.18); coloration with head, anterior portion pronotum, including calli, mesoscutum, and scutellum dark brown to brownish black; posterior portion of pronotum and hemelytra pale yellowish brown; antennae, apices of femora, tibiae, and tarsi concolorous with hemelytra; ventral aspect concolorous with head; dorsum, excluding vertex, with moderately to densely distributed, broad, flattened, apically serrate, white scalelike setae and moderately densely distributed, suberect to reclining, black simple setae; thoracic pleura and venter without scalelike setae. HEAD: width male 0.77 (0.76–0.78), female 0.80 (0.77–0.82); vertex width male 0.39 (0.38–0.40), female 0.41 (0.39–0.43); frons and vertex broadly curved in lateral view; width of head and vertex wide; region anterior to antennal insertion short, anteocular length male 0.21 (0.19–0.22), female 0.22 (0.19–0.23); eyes relatively small, about 76% of head height, ventral margin of antennal insertion ventral to ventral margin of eye; antennal measurements male 0.18 (0.18–0.19): 0.60 (0.58–0.61): 0.38 (0.34–0.41): 0.28 (0.25–0.30), female 0.18 (0.18–0.19): 0.61 (0.54–0.63): 0.38 (0.35–0.41): 0.29 (0.25–0.31); antennal segment 2 is 20% shorter than width of head across eyes; labium yellowish brown, reaching middle of hind coxa; labial length male 1.01 (0.94–1.06), female 1.04 (1.00–1.09); length of segment 4 male 0.28 (0.26–0.30), female 0.28 (0.26–0.29). THORAX: width male 1.00 (0.94–1.03), female 1.01 (0.95–

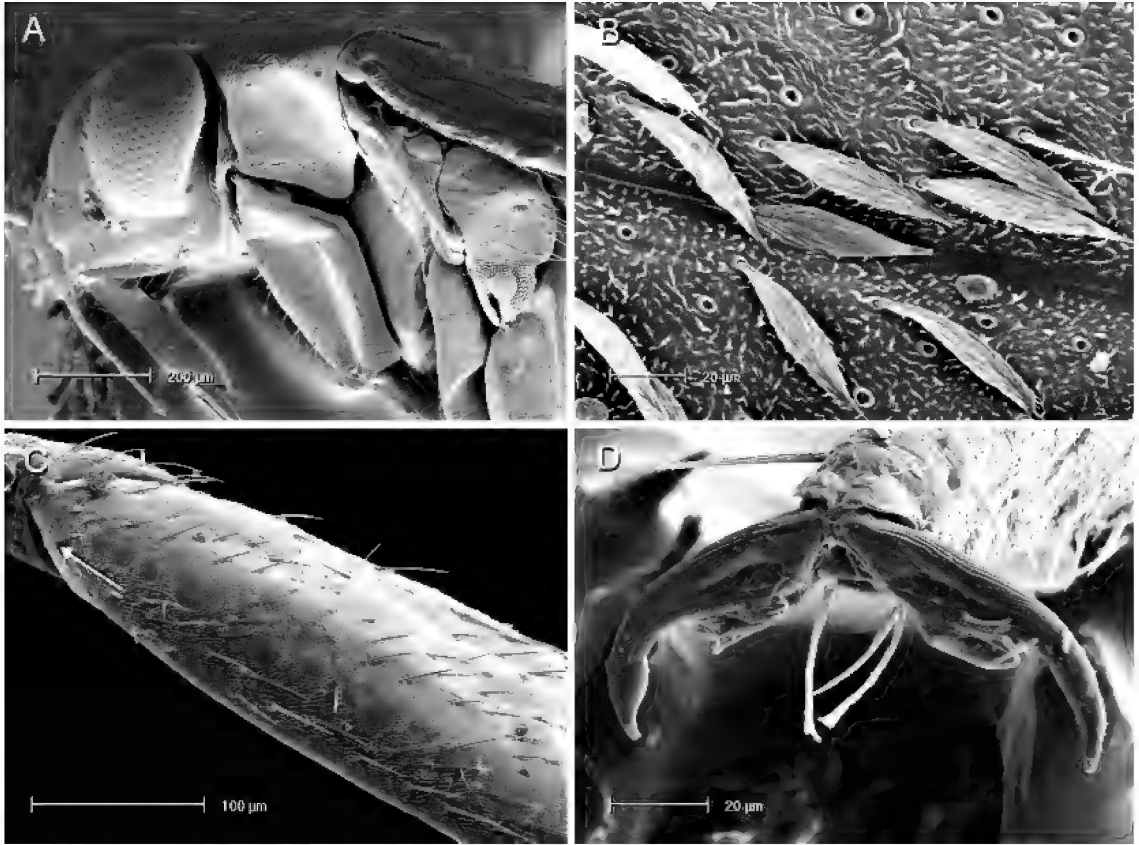


Fig. 16. Scanning electron micrographs of *Phoenicocoris pallidicornis*, n.sp., Falcon Lake, Manitoba. **A.** Head and thorax, lateral view. **B.** Scalelike setae, dorsal view. **C.** Hind femora, dorsobasal view. **D.** Pretarsus, apical view. Scales as indicated.

1.06); length male 0.43 (0.41–0.45), female 0.44 (0.42–0.45); mesoscutum moderately exposed. HEMELYTRA: maximum width male 1.27 (1.23–1.38), female 1.35 (1.28–1.40); lateral margin gently arcuate. LEGS: with diffuse dark brown spots at bases of long tibial spines.

**BIOLOGY:** Breeds on jack pine (*Pinus banksiana* Lambert)

**DISTRIBUTION:** From disparate localities in New Brunswick, Ontario, western Québec, eastern Manitoba, and central Saskatchewan.

**PARATYPES:** CANADA: **Manitoba:** Falcon Lake, 14.VII.1972, L. A. Kelton, *P. banksiana*, 4♂, 10♀ (CNC). **New Brunswick:** Kouchibouguac National Park, 24.VII.1972, D. J. E. Brown, jack pine, [codes 5736P, 5764R], 3♀ (CNC). **Ontario:** Black Sturgeon Lake, 1–15.VIII.1956, H. Lindberg, 1♂, 24♀ (CNC); MacKey, 27.VII.1962, Kelton, Thorpe, *P. banksiana*, 1♀ (CNC); Sibley Park, 1.VIII.1956, H. Lindberg,

4♀ (CNC); Sioux Narrows, 8.VIII.1960, Kelton, Whitney, 2♀ (CNC); Stittsville, 12.VII.1979, D. J. E. Brown, 2♂, 2♀ (CNC). **Québec:** Kazabazua, 15.VIII.1961, D. J. E. Brown, *P. banksiana*, 1♀ (CNC); Laniel, 10–11.VII.1963, L. A. Kelton, 1♂, 6♀ (CNC). **Saskatchewan:** Torch River, 11.VII.1950, L. A. Konotopetz, *P. banksiana*, 3♂, 8♀ (CNC); White Fox, 25.VII.1950, L. A. Konotopetz, *Potentilla fruticosa* L., 1♀ (CNC).

***Phoenicocoris ponderosae*, new species**

Figures 1Q, 3, 17, 24

**HOLOTYPE:** Male. “[USA.,] COLO[rado], Park Co. 3 mi S. of Guffey VII–30–1983 D. A. & J. T. Polhemus, *Pinus ponderosa* (Ponderosa Pine).” Deposited in the American Museum of Natural History.

**DIAGNOSIS:** Easily recognized by the large body size (2.90–3.65 mm); absence of scalelike setae on the vertex, pronotum, thoracic

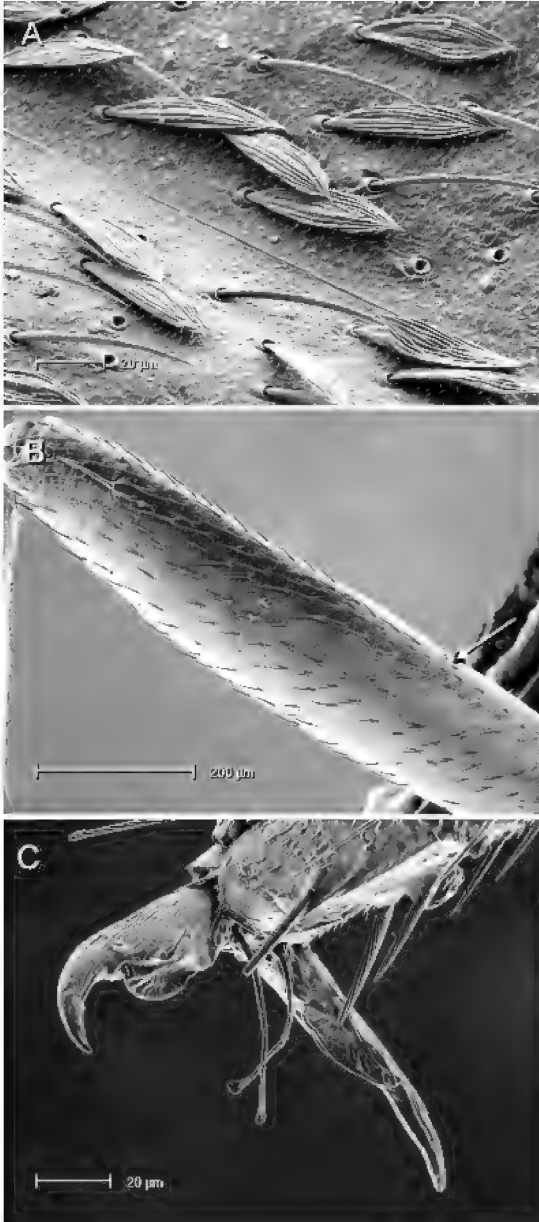


Fig. 17. Scanning electron micrographs of *Phoenicocoris ponderosae*, n.sp., Rustler Park, Arizona. **A.** Scalelike setae, dorsal view. **B.** Hind femora, dorsodistal view. **C.** Pretarsus, ventral view. Scales as indicated.

pleura, and abdominal sternum; and base of gonopore sclerite with conspicuous spinules (fig. 24). Further distinguished from *modestus* and *nevadensis*, which both have similarly distributed scalelike setae, by the much

longer labium and large overall size, respectively.

**DESCRIPTION:** ( $N = 6\delta$ ) **GENERAL ASPECT:** broad, moderately elongate; total length male 3.31 (2.90–3.60), female 3.43 (3.15–3.65); length to cuneal fracture male 2.51 (2.38–2.70), female 2.55 (2.45–2.60); coloration dark brownish black; antennae, apices of femora, tibiae, and tarsi pale to dusky yellow; apex of tarsal segment 3 and claws darkened; mesoscutum, and hemelytra with moderately to densely distributed, broad, flattened, apically serrate, white scalelike setae and densely distributed, suberect to reclining, brown simple setae; thoracic pleura and venter without scalelike setae. **HEAD:** width male 0.80 (0.79–0.81), female 0.83 (0.80–0.89); vertex width male 0.35 (0.33–0.36), female 0.38 (0.36–0.41); region anterior to antennal insertion elongate, antecular length male 0.26 (0.24–0.28), female 0.27 (0.26–0.28); eyes relatively small, about 79% of head height, ventral margin of antennal insertion level with ventral margin of eye; antennal measurements male 0.20 (0.19–0.21): 0.74 (0.73–0.76): 0.46 (0.44–0.49): 0.34 (0.31–0.37), female 0.20 (0.19–0.20): 0.76 (0.69–0.82): 0.49 (0.44–0.52): 0.33 (0.28–0.35); antennal segment 2 is 7% shorter than head width; labium yellowish brown, reaching sternite 5 to base of genital segment in males and to base of ovipositor to middle of ovipositor in females; labial length male 1.79 (1.70–1.86), female 1.85 (1.76–1.93); length of segment 4 male 0.54 (0.51–0.56), female 0.56 (0.54–0.59). **THORAX:** width male 1.16 (1.11–1.23), female 1.21 (1.15–1.30); length male 0.56 (0.54–0.60), female 0.59 (0.56–0.64); mesoscutum broadly exposed. **HEMELYTRA:** maximum width male 1.44 (1.35–1.53), female 1.49 (1.41–1.58); lateral margin gently curved.

**BIOLOGY:** Breeds on ponderosa or yellow pine (*Pinus ponderosa* Douglas ex Lawson and C. Lawson)

**DISTRIBUTION:** Central Rocky Mountains from Colorado southwest to Chiricahua Mountains, Arizona.

**PARATYPES:** USA: **Arizona:** *Cochise Co.:* Rustler Park, Chiricahua Mountains, 7, 8.VII.1968, L. A. Kelton, *Pinus ponderosa*, 3 $\delta$ , 5 $\text{♀}$  (CNC). *Coconino Co.:* Happy Jack, Coconino National Forest, 7600 ft, 13.VII.1968, L. A. Kelton, *P. pon-*

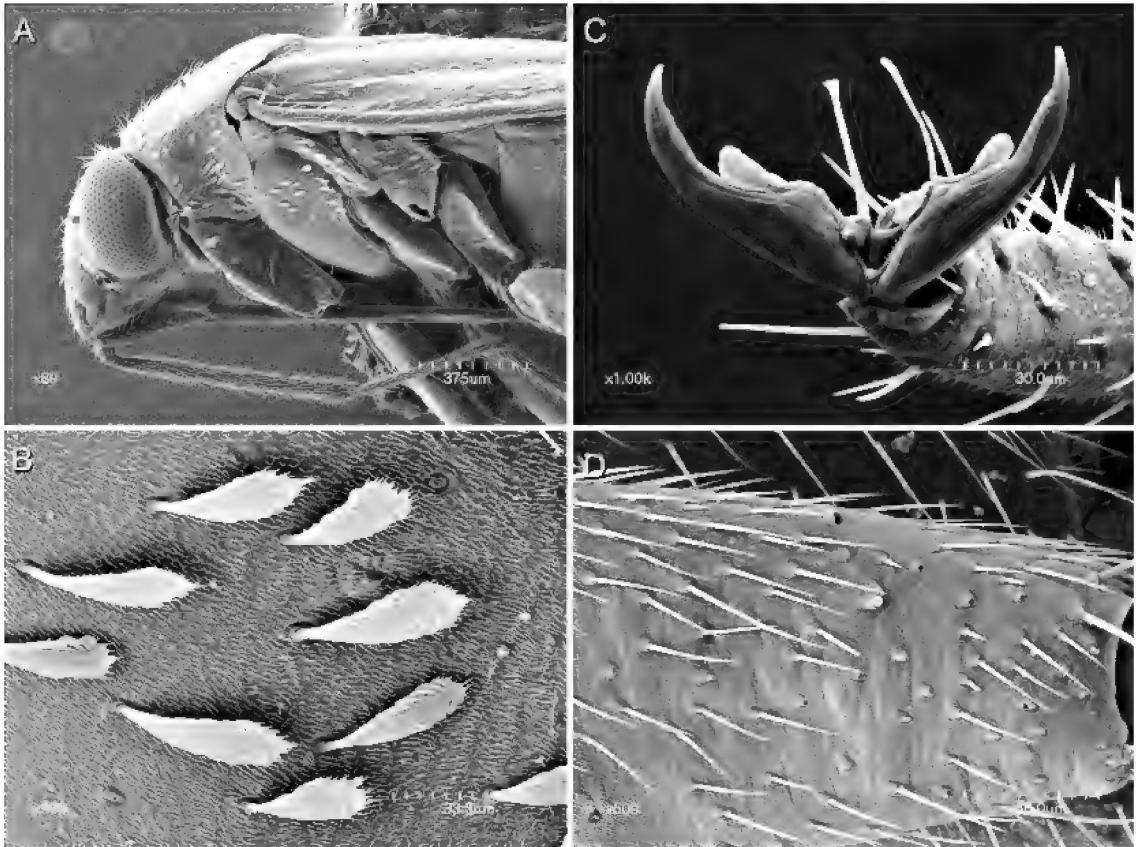


Fig. 18. Scanning electron micrographs of *Phoenicocoris rostratus* (Knight), Fish Creek, Colorado. **A.** Head and thorax, lateral view. **B.** Scalelike setae, dorsal view. **C.** Pretarsus, apical view. **D.** Hind femora, dorsodistal view. Scales and magnifications as indicated.

*derosa*, 1 ♀ (CNC). **Colorado:** Chaffee Co.: 5 mi W of Buena Vista, 25.VII.1982, J. T. Polhemus, 1 ♂ (JTP). La Plata Co.: Durango, 19.VII.1968, L. A. Kelton, *P. ponderosa*, 3 ♀ (CNC). Park Co.: 3 mi S of Guffey, 30.VII.1983, D. A., J. T. Polhemus, *P. ponderosa*, 1 ♂, 4 ♀ (JTP).

*Phoenicocoris rostratus* (Knight)

Figures 1U, 3, 18, 24

*Lepidopsallus rostratus* Knight, 1923: 470 (n.sp.).

*Phoenicocoris rostratus*: Stonedahl, 1990: 61 (n.comb.); Schuh, 1995: 375 (catalog).

*Lepidopsallus olseni* Knight, 1923: 473 (n.sp.).  
NEW SYNONYM.

*Phoenicocoris olseni*: Stonedahl, 1990: 61 (n.comb.); Schuh, 1995: 375 (catalog).

*Lepidopsallus hesperus* Knight, 1968: 53 (n.sp.).  
NEW SYNONYM.

*Phoenicocoris hesperus*: Stonedahl, 1990: 61 (n.comb.); Schuh, 1995: 374 (catalog).

DIAGNOSIS: Recognized by the broad, api-

cally serrate scalelike setae on the thoracic pleura and lateral margins of abdominal sternum; antennal segment 2 yellow or yellowish brown, cylindrical, length less than or subequal to width of head across eyes; and structure of the male vesica (fig. 24), especially the absence of spinules on the distal edge of the secondary gonopore. Further distinguished from *ponderosae* and *longirostris* in the western montane United States by the shorter antecocular region of the head and shorter labium, especially segment 4.

REDESCRIPTION: GENERAL ASPECT: weakly elongate; total length male 2.86 (2.75–3.03), female 2.77 (2.58–2.99); length to cuneal fracture male 2.05 (1.98–2.15), female 2.07 (1.90–2.30); coloration dark brown to nearly black; antennal segment 2–4, apices of femora, tibiae, and tarsi pale yellow to dusky brownish yellow; tibiae basally

and antennal segments 3 and 4 sometimes darker brown; dorsum, thoracic pleura, and lateral margins of abdominal sternum with moderately to densely distributed, broad, flattened, apically serrate, white scalelike setae and densely distributed, relatively long, suberect to reclining, black simple setae. HEAD: width male 0.73 (0.70–0.75), female 0.76 (0.73–0.79); vertex width male 0.33 (0.33–0.34), female 0.35 (0.33–0.36); antecular region relatively long, antecular length male 0.20 (0.19–0.22), female 0.21 (0.19–0.24); eyes moderately large, occupying about 80% of head height, ventral margin of antennal insertion slightly ventral to ventral margin of eye; antennal measurements male 0.18 (0.18–0.19): 0.72 (0.70–0.75): 0.44 (0.41–0.46): 0.30 (0.28–0.31), female 0.19 (0.18–0.20): 0.69 (0.64–0.75): 0.45 (0.40–0.50): 0.32 (0.30–0.35); antennal segment 2 is 6% shorter than or equal to width of head across eyes; labium brown, reaching to just beyond hind coxae, or extending to, at most, middle of venter; labial length male 1.38 (1.33–1.53), female 1.40 (1.34–1.45); length of segment 4 male 0.39 (0.35–0.43), female 0.41 (0.38–0.43). THORAX: maximum width male 1.00 (0.98–1.03), female 1.03 (1.00–1.10); length male 0.47 (0.41–0.52), female 0.47 (0.43–0.50); mesoscutum broadly exposed. HEMELYTRA: maximum width male 1.28 (1.23–1.35), female 1.32 (1.23–1.40); slightly curved laterally.

**BIOLOGY:** Breeds on pines, with *Pinus banksiana* Lambert and *P. sylvestris* Linnaeus the predominate hosts in the east and *P. contorta* Douglas ex Loudon (including var. *latifolia* Engelmann Critchfield) apparently the preferred host in the west. Also collected on the following conifers: shortleaf pine (*P. echinata* Miller), red pine (*P. resinosa* Aiton), pitch pine (*P. rigida* Miller), Scots pine (*P. sylvestris* Linnaeus), balsam fir (*Abies balsamea* (Linnaeus) Miller), Norway spruce (*Picea abies* (Linnaeus) Karsten), white spruce (*P. glauca* (Moench) Voss), and European larch (*Larix decidua* Miller).

**DISTRIBUTION:** Southern Yukon Territory and British Columbia, east to Nova Scotia. Widely distributed in montane regions of the western United States from Montana south to northern Arizona and California, east

across the northern tier of states to New Hampshire and south to West Virginia.

**DISCUSSION:** Knight (1923) described both *olseni* and *rostratus* in *Lepidopsallus* Knight, based on single females from Pigeon Cove, Massachusetts and Elkhorn Creek, Minnesota, respectively. Knight's (1923) key to *Lepidopsallus*, which in our taxonomy included three *Phoenicocoris* species (*claricornis*, *minusculus*, and *rostratus*) and two *Atractotomus* species (*atricolor* and *rubidus*), distinguished his new species based on the length of the labium and antennal segment 2. The description for *olseni* (Knight, 1923) stated that antennal segment 2 is long (surpassing the length of the pronotum) and slender, the venter is covered with scalelike setae, and that these setae are not apically truncate. Based on these features *olseni* cannot be confused with *claricornis* or *minusculus*; the former does not have scalelike setae on the venter, and the antennal segment 2 of the latter is fusiform and has truncate scalelike setae. Antennal segment 2 surpassing the length of the pronotum will distinguish all species of *Phoenicocoris* from both *A. atricolor* and *A. rubidus*. Only the "short" labium distinguishes *olseni* from *rostratus*. Knight (1923) observed that the labium of *olseni* did not extend beyond the hind coxae; however, as he also noted, and we can verify (upon seeing the holotype), this structure was imbedded in glue and impossible to accurately measure. Our examination of many females of *rostratus* revealed that the length of the labium is variable, reaching from the apices of the hind coxae to as far as sternite 5. Determining the true labial length in specimens in which it is either bent or obscured by glue can be difficult and usually provides a short-length measurement. Based on these arguments we surmise that Knight was examining a typical female of *rostratus* and we therefore propose *L. olseni* as a junior synonym of *L. rostratus*.

Knight (1968) described *L. hesperus* from California, Idaho, and Wyoming, apparently without considering the eastern North American species of his genus. Specimens from throughout the eastern portion of the range of *P. rostratus* will reach, without trouble, the couplet for *hesperus* in Knight's key (1968). Western specimens will likewise



reach the couplet for *rostratus* in Knight's key (1923). Knight's characterizations of both nominal species, *hesperus* and *rostratus*, adequately describe specimens from across North America and examination of paratypes of the former species and the holotype of the latter species shows that they fit comfortably within our concept of *rostratus*. As noted above, the majority of the eastern specimens examined were taken on *Pinus banksiana* whereas *P. contorta* was the predominate host of western specimens. These closely related pine species are shade-intolerant, common on well-drained sites, have indistinguishable diploxylon fossil pollen, and hybridize in west-central Alberta (MacDonald, et al. 1998). No morphological characters allowed for the differentiation of *Phoenicocoris hesperus* specimens based on host. We found no variation in the form for either the apices of the vesical strap or the secondary gonopore in vesical preparations of *P. rostratus* from across North America. The variation in the vesicae documented in figure 24 (compare *rostratus* 1 and 2) is due to a slight rotation of the preparations. We therefore treat *L. hesperus* as a junior synonym of *L. rostratus*.

**SPECIMENS EXAMINED:** CANADA: **Alberta:** Brooks, Special Crops and Horticultural Research Centre, 17.VII.1990, M. D. Schwartz, *Pinus sylvestris*, 3 ♀ (CNC); Canmore, 27.VIII.1955, A. R. Brooks, *Picea glauca*, 1 ♀ (CNC); Coal Valley, 31.VIII.1970, L. A. Kelton, *Pinus contorta*, 2 ♀ (CNC); Coleman, 25 mi N of, 14.VII.1988, R. Wharton, 1 ♂ (TAM); Cypress Hills Provincial Park: Elkwater Lake, 20.VII.1956, O. Peck, *P. contorta*, 1 ♂ (CNC); Elkwater Park, 21, 26.VII, 14.VIII.1952, A. R. Brooks, L. A. Konotopetz, *P. contorta*, 3 ♂, 1 ♀ (CNC); Top Road, 9.6 km E of jct Rte 41 and Top Road, 4700 ft, 15.VII.1990, M. D. Schwartz, *P. contorta* 1 ♂, 2 ♀ (CNC). Eisenhower Junction, 5.VIII.1970, L. A. Kelton, *P. contorta*, 1 ♂, 1 ♀ (CNC); Fisher Creek Forest Station, 26.VII.1973, L. A. Kelton, 2 ♂ (CNC); Grand Prairie, 25.VII.1961, A. R. Brooks, 2 ♀ (CNC); Kananaskis Highway, 20.VII.1974, 25.VII.1973, L. A. Kelton, *P. contorta*, 2 ♂, 1 ♀ (CNC). Peace River, 18.VI.1961, A. R. Brooks, 5 ♀ (CNC); Waterton Lakes, 22.VII.1923, J. McDunnough, 1 ♂ (CNC); Waterton National Park, 4–6.VII.1970, 26.VII.1970, L. A. Kelton, *P. contorta*, 7 ♂, 2 ♀ (CNC). **British Columbia:** Arrowhead, 29.VII.1947, *P. contorta* var. *latifolia*, FIDS# BC47–1383, 1 ♀ (CNC); Aspen Grove,

25.VII.1970, L. A. Kelton, *P. contorta*, 6 ♂, 20 ♀ (CNC); Blackwall, Manning Provincial Park, 23.VII.1970, L. A. Kelton, 2 ♂ (CNC); Christina Lake, 12.VII.1970, L. A. Kelton, *P. contorta*, 4 ♂, 7 ♀ (CNC); Cranbrook, 23.VII.1959, L. A. Kelton, *P. ponderosa*, 2 ♂, 6 ♀ (CNC); Crowsnest Provincial Park, 4 km W of Crows Nest Pass, 1.IX.1993, M. D. Schwartz, *P. contorta*, 1 ♂ 1 ♀ (CNC); Duncan, 16.VII.1959, L. A. Kelton, 1 ♀ (CNC); Elko, E Kootenay, 9.VII.1949, H. B. Leech, 1 ♀ (CAS); Fernie, L. A. Kelton: 7.VII.1970, *P. contorta*, 5 ♂, 4 ♀ (CNC); 23.VII.1959, 1 ♀ (CNC). Fruitvale, 11.VII.1970, L. A. Kelton, 1 ♂ (CNC); Gray Creek, 22.VII.1959, L. A. Kelton, 1 ♀ (CNC); Hedley, 22.VII.1970, L. A. Kelton, *P. contorta*, 7 ♂, 5 ♀ (CNC); Jaffray, 8.VII.1970, L. A. Kelton, *P. contorta*, 6 ♂, 5 ♀ (CNC); Kaslo, 10.VII.1970, L. A. Kelton, *P. contorta*, 2 ♂, 4 ♀ (CNC); Lumby, 13.VIII.1975, L. A. Kelton, 1 ♂, 2 ♀ (CNC); Moyie, 9.VII.1970, L. A. Kelton, 3 ♂, 2 ♀ (CNC); Osoyoos, 21.VII.1970, L. A. Kelton, 5 ♂ (CNC). Princeton, N. H. Anderson, *P. ponderosa*: 30 mi W of, 26.VII.1957, # 288, 1 ♂ (CNC); 15 mi W of, 31.VII.1957, # 290, 1 ♀ (CNC). Rossland, 11.VII.1970, L. A. Kelton, 2 ♀ (CNC); Sicamous, 17.VII.1970, L. A. Kelton, 2 ♀ (CNC); Summerland, 2–11.VII.1974, L. A. Kelton, *P. sylvestris*, 7 ♂, 6 ♀ (CNC); Terrace: 27.VII.1960, W. R. Richards, 1 ♂, 1 ♀ (CNC); 220 ft, B. S. Heming: 29.VII.1960, 1 ♀ (CNC); 31.VII.1960, 1 ♂ (CNC). Yahk, 22.VII.1959, L. A. Kelton, *P. contorta*, 15 ♂, 14 ♀ (CNC); Yoho National Park, 16.VIII.1970, L. A. Kelton, 1 ♂ (CNC). **Manitoba:** Carberry, W of, 1.0 km SE of jct. Hwy 1 and Rte 351 on Rte 351, 8.VII.1990, M. D. Schwartz, *P. banksiana*, 1 ♀ (CNC); Falcon Lake, 1, 5, 12.VII.1972, 6.VIII.1975, 14.VIII.1972, L. A. Kelton, *P. banksiana*, 9 ♂, 18 ♀ (CNC); Riding Mountain National Park, 20.VII.1972, L. A. Kelton, 1 ♀ (CNC); Sandilands Provincial Park, just S of Hwy 1, 19.VII.1990, M. D. Schwartz, *P. banksiana*, 2 ♂, 2 ♀ (CNC); West Hawk Lake, 28.VII.1972, L. A. Kelton, *P. banksiana*, 4 ♂, 5 ♀ (CNC); Victoria Beach, 18.VIII.1953, A. R. Brooks, L. A. Kelton, 2 ♀ (CNC). **New Brunswick:** Kouchibouguac National Park, 12, 22, 24, 28.VII.1977, D. J. E. Brown, D. B. Lyons, *P. banksiana*, 5 ♂, 12 ♀ (CNC); Penobscuis, 6.VIII.1978, L. A. Kelton, *P. banksiana*, 3 ♂, 1 ♀ (CNC); Sussex, 2.VIII.1966, L. A. Kelton, *P. banksiana*, 6 ♀ (CNC). **Nova Scotia:** Coldbrook, 10.VII.1966, L. A. Kelton, 1 ♀ (CNC); Halifax, 22.VII.1975, 7–8.VIII.1976, L. A. Kelton, *P. sylvestris*, 2 ♂, 18 ♀ (CNC); Kentville, 15–17.VII.1966, L. A. Kelton, *P. sylvestris*, 7 ♀ (CNC); Middleton, 9.VIII.1966, *P. resinosa*, 1 ♀ (CNC); Springhill, 12.VIII.1966, L. A. Kelton, *P. banksiana*, 1 ♀ (CNC). **Ontario:** Almonte, 4 mi

SW of, alvore, 26.VI.1990, M. D. Schwartz, *P. banksiana*, 7♂, 3♀ (CNC); Black Hawk, 3.VIII.1960, Kelton, Whitney, *P. banksiana*, 3♀ (CNC); Black Sturgeon Lake, 1–15.VIII.1956, H. Lindberg, 2♀ (CNC); Dryden, 12.VIII.1960, Kelton, Whitney, *Salix* sp., 1♀ (CNC); Ignace, 5 km W of, on Hwy 17 roadside, M. D. Schwartz, *P. banksiana*, 2♂, 1♀ (CNC); MacKey, 27.VII.1962, Kelton, Thorpe, *P. banksiana*, 10♂, 26♀ (CNC); Myers Road, 2 km E of Vermillion Bay, gravel pit, 4.VII.1990., M. D. Schwartz, *P. banksiana*, 1♂, 1♀ (CNC); Nepean, Piney forest, Lafontaine house, M. D. Schwartz, MV light, 27.VII.1991, 1♂ (CNC); Nestor Falls, 20.VII.1978, 7–8.VIII.1960, Kelton, Whitney, *P. banksiana*, 1♂, 14♀ (CNC). Ottawa, Central Experimental Farm, M. D. Schwartz: ca. K. W. Neatby Building, 7, 16.VI.1999, *P. banksiana*, *P. rigida*, 12♂, 9♀ (CNC); 19.VI.1991, *P. sylvestris*, (*Larix decidua* 2♂), 106♂, 179♀ (CNC); 15.VII.1994, *P. sylvestris*, 4♂, 12♀ (CNC). Shawanaga, 26.VII.1962, L. A. Kelton, G. Thorpe, *P. banksiana*, 2♂, 18♀ (CNC); Sioux Narrows, 8.VIII.1960, Kelton, Whitney, 3♀ (CNC); Stittsville, 12.VII.1979, D. J. E. Brown, 1♂, 3♀ (CNC); Tobermory, 1.VII.1962, G. Thorpe, *P. banksiana*, 3♂ (CNC); Vermillion Bay, 5–9.VII.1963, R. J. Acheson, *P. banksiana*, 1♂, 4♀ (CNC); Warton, 1.VII.1962, G. Thorpe, 1♂ (CNC). **Québec:** Fabre, 5.VII.1963, L. A. Kelton, *Picea glauca*, *Pinus banksiana*, 19♂, 16♀ (CNC); Kazabazua, 15.VIII.1961, D. J. E. Brown, *P. banksiana*, 1♀ (CNC); Laniel, 3–4, 10–11.VII.1965, L. A. Kelton, W. Gagne, *Picea* sp., *Pinus banksiana*, 38♂, 63♀ (AMNH, CNC); *Missisquoi* Co.: Mount Pinnacle, nr Frelighsburg, 400 m, 20.VI.1991, M. D. Schwartz, *Abies balsamea*, 3♂, 178♀ (CNC); *Charlevoix-Est* Co.: Port-au-Persil, 1.VIII.1986, Larochelle, Larivière, 2♀ (CNC); Rolled, 15.VIII.1968, W. Gagne, *P. banksiana*, 1♂, 6♀ (CNC); Taboret Station, 10.VIII.1963, L. A. Kelton, *Pinus* sp., 3♂, 5♀ (CNC). **Saskatchewan:** Christopher Lake, 13.VII.1959, *P. banksiana*, A., J. Brooks, 2♂, 9♀ (CNC); Hudson Bay, 25.VIII.1954, Brooks, Wallis, 1♀ (CNC); Meadow Lake, 6.IX.1970, L. A. Kelton, *P. banksiana*, 1♀ (CNC). Prince Albert: 5–7 km N of, on Rte 2, 12.VII.1990, M. D. Schwartz, *P. banksiana*, 3♂, 2♀ (CNC); 23.VII.1959, A., J. Brooks, 7♀ (CNC). Torch River: Campground, E of Rte 106, 12.VII.1990, M. D. Schwartz, *P. banksiana*, 9♂, 17♀ (CNC); 11.VII, 12.VIII.1950, L. A. Konotopetz, *P. banksiana*, 3♂, 1♀ (CNC). White Fox, 24.VII.1950, L. A. Konotopetz, *P. banksiana*, 2♀ (CNC). **Yukon Territory:** Carcross: 28.VI.1982, G. G. E. Scudder, listed in Scudder 1977, 2♀ (UBC); 1, 9.VIII.1983, L. A. Kelton, *P. contorta*, 1♂, 14♀ (CNC). Moose Creek, 18.VII.1982, 28.VII.1983, L. A. Kelton, *Pinus* sp., 3♂, 21♀ (CNC); Morley River, L. A. Kelton, *P. contorta*, 2♀ (CNC); Squanga Lake, L. A. Kelton, *P. contorta*, 2♀ (CNC); Tagish, 11.VIII.1983, L. A. Kelton, 1♂ (CNC); Tatchun, 11.VIII.1983, L. A. Kelton, *P. contorta*, 1♂ (CNC); Watson Lake, 13.VIII.1982, L. A. Kelton, 1♀ (CNC); Whitehorse, 30.VII.1982, L. A. Kelton, *P. contorta*, 6♂, 9♀ (CNC). USA: **Arizona:** *Coconino* Co.: Kaibab Lake, Kaibab National Forest, 16.VIII.1967, L. A. Kelton, 2♀ (CNC). San Francisco Mountains: Coconino National Forest, 9650 ft, 14, 15.VII.1968, L. A. Kelton, 1♂, 1♀ (CNC); 9.VIII.1929, E. D. Ball, *Lepidopsallus longirostris* paratypes, 4♂, 4♀ (USNM). **California:** *El Dorado* Co.: Lake Tahoe, 8.VIII.1937, Drake, Andre, *Lepidopsallus hesperus* paratypes, 2♂ (USNM); Strawberry, 8.VIII.1929, L. D. Anderson, 1♂ (KU). *Inyo* Co.: 20 mi W of Bishop, 9500 ft, 2.VIII.1954, J. D. Lattin, 3♂ (OSU); Round Valley, 27.VII.1947, R. H. Beamer, 2♀ (KU). *Lassen* Co.: Bogard Campground, 24 mi W of jct. Hwys 36 and 44, 10.VIII.1980, G. M. Stonedahl, *P. ponderosa*, 1♀ (AMNH). *Mono* Co.: Nevada National Forest, D. Poole, 2♀ (LACM). *Nevada* Co.: Sagehen Creek Station nr Hobart Mills, 20.VIII.1969, W. Gagne, 2♀ (UCB); Truckee, Tahoe National Forest, 29.VIII.1967, L. A. Kelton, *Artemisia* sp., 1♀ (CNC). *Siskiyou* Co.: Medicine Lake, on Medicine Lake Rd, G. M. Stonedahl, J. D. McIver, *P. contorta*: 1.4 mi S of, 19.VII.1985, 2♂, 1♀ (AMNH); 2.5 mi N of, 18.VII.1985 1♂ (AMNH). 6.6 mi S of Lava Beds National Monument, Lava Beds–Medicine Lake Road, 18.VII.1985, G. M. Stonedahl, J. D. McIver, *P. contorta*, 4♂, 7♀ (AMNH). *Tuolumne* Co.: Yosemite National Park, McCabe Lakes, 2.VIII.1939, R. L. Usinger, 1♀ (UCB). **Colorado:** *Boulder* Co.: Nederland, Roosevelt National Forest, 4.VIII.1968, L. A. Kelton, *P. albicaulis*, 17♂, 14♀ (CNC). *Gilpin* Co.: Pinecliffe, 12.VIII.1973, J. C. Schaffner, 1♀ (TAM). *Grand* Co.: 3.4 mi W of Fraser, St. Louis Creek Campground, 9000 ft, 16.VIII.1980, G. M. Stonedahl, *P. contorta*, 2♂ (AMNH). *Jackson* Co.: Crowley, nr, at Jackson Co. and Wyoming State line on Rte 125, 4.VIII.1979, J. T. Polhemus, 4♀ (JTP). *Larimer* Co.: Fish Creek Picnic ground, Pingree Park Road, 46 mi W of Fort Collins. 7700 ft, 14.VII.1986, R. T. Schuh, J. T. Polhemus, 1♂, 1♀ (AMNH). *Las Animas* Co.: 1 mi S of Cucharas Pass, 9000 ft, 29.VIII.1982, D. A., J. T. Polhemus, 1♀ (JTP). *Park* Co.: Wilkerson Pass, Pike National Forest, 28.VIII.1968, *P. albicaulis*, 1♂ (CNC). **Connecticut:** *New Haven* Co.: North Haven, 2.VII.1924, J. R. Torre-Bueno, 1♂ (USNM). **Idaho:** *Benewah* Co.: 4 mi E of Emida on Charlie Creek Road, 8.VII.1979, G. M. Stonedahl, 1♂

(AMNH); 4 mi W of Emida on Hwy 6, 9.VII.1979, G. M. Stonedahl, *P. contorta*, 1♂ (AMNH). Vicinity Emida, St. Joe National Forest, T42N R53W, 3000 ft, 5.VIII.1986, Schuh, Schwartz, Stonedahl, 2♀ (AMNH). **Bonner Co.:** Pend Orielle River, Laclede, 4.VII.1966, W. Gagne, J. Haddock, *P. flexilis*, 2♂ (UCB). **Fremont Co.:** Big Springs, 6.VIII.1931, H. H. Knight, *Pinus* sp., *Lepidopsallus hesperus* paratypes, 1♂, 4♀ (CNC, USNM). **Teton Co.:** Pine Creek Pass, 6.VIII.1972, L. A. Kelton, *P. contorta*, 2♀ (CNC). **Iowa:** **Clay Co.:** Peterson, 16.VI.1981, D. A., J. T. Polhemus, 1♂, 2♀ (JTP). **Story Co.:** Ames, 23.VI.1933, H. M. Harris, 1♂ (TAMU); H. H. Knight: 20.VI.1932, 1♂, 4♀ (USNM); 23.VI.1927, including *Atractotomus crataegi* paratypes, 35♂, 6♀ (CNC, TAMU, USNM); 6.VII.1927, 3♂, 14♀ (USNM); 11.VII.1928, 1♀ (USNM); 30.VI, 5.VII.1951 J. Laffoon, *Pinus* sp., 4♀ (AMNH); 19, 20, 27.VI.1962, J. C. Schaffner, *Pinus strobus*, *P. sylvestris*, 4♀ (TAMU); 23.VI.1950, J. A. Slater, 1♂ (AMNH). **Maine:** **Aroostock Co.:** Smyrna Mills, 26.VI.1952, 1♂ (USNM); Portage, 27.VI.1950, 1♀ (USNM); Wade, 30.VI.1950, Washburn, 1♀ (USNM). **Hancock Co.:** Bar Harbor, 3.VIII.1943, A. E. Brower, 1♀ (USNM). **Maryland:** **Saint George's Co.:** Branchville to Beltsville, 4.VI.1914, W. L. McAttee, 1♀ (USNM). **Massachusetts:** **Barnstable Co.:** Dennis, 4.VII.1954, J. W. Green, 1♂ (CAS). **Essex Co.:** Pigeon Cove, 28.VII.1916, C. E. Olsen, holotype *Lepidopsallus olseni*, 1♀ (USNM). **Michigan:** **Marquette Co.:** Marquette, 28.VIII.1988, 1♂ (USNM). **Schoolcraft Co.:** Grand Marais, 28.5 km S of, 17.VIII.1993, M. D. Schwartz, *P. banksiana*, 2♂, 3♀ (CNC); Seney, 7 km W of, just N of Rte 28, 17.VIII.1993, M. D. Schwartz, *P. banksiana*, 2♀ (CNC). **Minnesota:** **Brown Co.:** New Ulm, 20.VI.1921, H. H. Knight, 1♀ (USNM). **Mississippi:** **Holmes Co.:** Tchula, 18.V.1931, H. G. Johnston, 4♂ (TAMU). **Montana:** **Deer Lodge Co.:** Georgetown Lake on Rte 10A, 6500 ft, 9.VIII.1986, Schuh, Schwartz, Stonedahl: *P. contorta*, 7♂, 15♀ (AMNH); *Potentilla fruticosa* (Rosaceae), 2♂, 1♀ (AMNH). **Gallatin Co.:** Moose Flat Campground, 26 mi S Bozeman Hot Springs, Rte 191, 5700 ft, 10.VIII.1986, Schuh, Schwartz, Stonedahl, *P. contorta*, 2♂, 3♀ (AMNH). **Glacier Co.:** Glacier National Park, 10 mi W of Babb, 8.VIII.1969, P. W. Oman 1♀ (OSU). **Granite Co.:** 15 mi S of Drummond on Rte 10A, 5000 ft., VIII. 9, 1986, Schuh, Schwartz, Stonedahl, *P. contorta*, 1♂ (AMNH). **Park Co.:** Rte 212 at WY Border, 7750 ft, 11.VIII.1986, Schuh, Schwartz, Stonedahl, *P. contorta*, 1♀ (AMNH). **Nevada:** **Washoe Co.:** Little Valley Research Area, 4.5 mi SW of Washoe, T16N R19E Sec2 NE 1/4, 6200 ft, 4.VIII.1982, M. D. Schwartz, *P. contorta*, 21♂, 19♀ (AMNH). **New Hampshire:** **Coos Co.:** Gorham, 8.IV.1978, L. A. Kelton, 1♀ (CNC). **New York:** **Essex Co.:** Lake Placid, M. D. Schwartz, *P. sylvestris*: 4.VII.1991, 10♂, 35♀ (CNC); Patch Lane, 595 m, 3.VII.1991, 5♂, 11♀ (CNC). Whiteface Mountain, 1493 m, 4.VII.1991, M. D. Schwartz, *Abies balsamea*, 5♂, 5♀ (CNC). **Nassau Co.:** Roslyn, Fine Arts Museum and Gardens on Rte 25A, 10.VI.1987, 20.VI.1988, 27.VI.1986, M. D. Schwartz, *P. sylvestris*, 3♂, 8♀ (AMNH, CNC). **Suffolk Co.:** East Quoque, Ice Pond Road, 18.VII.1988, M. D. Schwartz, *Pinus rigida*, 1♂, 4♀ (AMNH, CNC). **Tompkins Co.:** Ithaca, Cornell University Campus, 1.VII.1978, A. G. Wheeler, Jr., *P. echinata*, *P. resinosa*, 1♂, 3♀ (PDA). **Ulster Co.:** Rte 28A near outlet of Ashokan Reservoir, 13.VII.1979, P. Wygodzinsky, K. Schmidt, *Pinus* sp., 3♂, 20♀ (AMNH). **Oregon:** **Baker Co.:** Boulder Park and Cougar Meadow, 20 mi E of Medical Springs, Wallowa Mountains, 4990 ft, 3.VIII.1986, Schuh, Schwartz, Stonedahl, *P. ponderosa*, 1♂, 14♀ (AMNH). Two Color Campground, 17 mi E of Medical Springs, Wallowa Mts., 4650 ft, 2.VIII.1986, Schuh, Schwartz, Stonedahl, *P. contorta*, 2♂, 4♀ (AMNH). West Eagle Meadow, 20 mi E of Medical Springs, Wallowa Mts., 4700 ft, 3.VIII.1986, Schuh, Schwartz, Stonedahl, *P. contorta*, 3♂, 4♀ (AMNH). **Coos Co.:** 7.3 mi E of Bandon, 15m, 12.VII.1979, R. T., Joe Schuh, 1♀. **Curry Co.:** 2 mi N of Port Oxford, 30 m, 12.VII.1979, R. T., Joe Schuh, *P. contorta*, 13♂, 25♀ (AMNH). Brookings, 4 mi N of, 60 m, 12.VII.1979, R. T., Joe Schuh, 1♀ (AMNH). **Deschutes Co.:** Three Creeks Meadow, 1.IX.1977, Lattin, *P. contorta*, 2♀ (OSU). **Grant Co.:** Funny Bug Basin, T17S R32E Sec 19, Malhuer National Forest, 23.VII.1979, M. D. Schwartz, *Juniperus occidentalis* (Cupressaceae), 1♀ (AMNH). **Hood River Co.:** Trillium Lake, 3500 ft, 12.IX.1978, J. D. Lattin, *P. contorta*, 1♂ (OSU). **Klamath Co.:** Cleetwood Cove Trail, Crater Lake National Park, 3.VIII.1979, M. D. Schwartz, *P. contorta*, 1♂, 2♀ (AMNH); Crescent, 1 mi W of, 4500 ft, J. D. Lattin, M. D. Schwartz, *P. contorta*, 5♂, 4♀ (AMNH, OSU); Meadow Spring, Winema National Forest, T27S R9E S16, 5500 ft, 17.VII.1979, M. D. Schwartz, *P. contorta*, 1♂ (AMNH). **Lincoln Co.:** Beverly Beach State Park, 5.VII.1979, G. Stonedahl, *P. contorta*, 1♂, 1♀ (AMNH); Fogarty Creek State Park, 5.VII.1979, G. Stonedahl, M. D. Schwartz, *P. contorta*, 28♂, 18♀ (AMNH); near Yaquina Light House, 5.VII.1979, M. D. Schwartz, G. M. Stonedahl, *P. contorta*, 2♂, 3♀ (AMNH, OSU); South Beach State Park, in campground and trail to beach, 29.VI.1994, M. D. Schwartz, A. E.-Martinez, *P. contorta*, 15♂, 12♀ (CNC). **Wallowa Co.:** Miram

Lake Trail, Wallowa-Whitman National Forest, 5590–7370 ft, 18.VIII.1979, M. D. Schwartz, *P. contorta*, 1 ♀ (AMNH). **Pennsylvania:** *Dauphin Co.:* Hershey, Hershey Hotel Grounds, 9.VI.1974, A. G. Wheeler, *P. virginiana*, 1 ♂ (AMNH). Fishing Creek Valley School, Rte 443, 9.VI.1976, A. G. Wheeler, *P. virginiana*, 1 ♂ (AMNH). *Monroe Co.:* Greenview Road, 3 mi E of Brodheadsville, 6.VII.1985, Schuh, Schwartz, Stonedahl, *P. resinosa*, 3 ♀ (AMNH). **Tennessee:** *Cocke Co.:* Rtes 25, 70 between 107N and 107S, 20.V.1979, Wygodzinsky, Schuh, Schmidt, 1 ♂, 3 ♀ (AMNH). *Grainger Co.:* Rte 25E, N of Cherokee Lake, 20.V.1979, Wygodzinsky, Schuh, Schmidt, 1 ♂ (AMNH). *Knox Co.:* Knoxville, University of Tennessee Campus, 27.V.1985, A. G. Wheeler, Jr., *Picea abies*, 1 ♂ (PDA). **Virginia:** *Washington Co.:* Bristol, 26.V.1985, T. J. Henry, A. G. Wheeler, *Pinus virginiana*, 2 ♂, 2 ♀ (USNM). **Wisconsin:** *Oneida Co.:* American Legion State Forest, T39N, R8E, 17.VII.1957, P. A. Jones, *P. banksiana*, 1 ♀ (USNM). *Wood Co.:* Griffith Street Nursery, 19.VI.1951, R. D. Shonefelt, 1 ♀ (AMNH). **Wyoming:** *Park Co.:* Shoshone National Forest, 15.VIII.1927, H. H. Knight, *Lepidopsallus hesperus* paratype, 1 ♀ (USNM). *Shoshone Co.:* Fox Creek Campground, 6.9 mi E of Cooke City on Rte 212, 7250 ft, 11.VIII.1986, Schuh, Schwartz, Stonedahl, *P. contorta*, 1 ♀ (AMNH). *Teton Co.:* Colter Bay Village, 2 mi SE of, on Rte 89, Grand Teton National Park, 7000 ft, 22.VII.1981, M. D. Schwartz, *P. contorta*, 1 ♂, 1 ♀ (AMNH). Grand Teton National Park, 6900 ft, 18.IX.1980, J. D. Lattin, *P. contorta*, 1 ♀ (OSU).

*Phoenicocoris strobicola* (Knight)

Figures 1N, 3, 19, 24

*Psallus strobicola* Knight, 1923: 467 (n.sp.); Wheeler, et al., 1983: 138 (list, host).

*Phoenicocoris strobicola*: Kerzhner, 1962: 381 (n.comb.); Schuh, 1995: 415 (catalog).

**DIAGNOSIS:** Similar to the sexually dimorphic *obscurellus* in the relatively elongate body of the male, the narrow, scalelike setae on the dorsum and lateral margins of body, and the long antennal segment 2, but distinguished by the much paler antennae and legs, and the gonopore sclerite subequal to the length of the secondary gonopore and the distal margin of the gonopore with prominent spinules (fig. 24).

**REDESCRIPTION: GENERAL ASPECT:** elongate (male) to moderately elongate (female); total length male 3.28 (3.13–3.50), fe-

male 2.95 (2.80–3.15); length to cuneal fracture male 2.28 (2.13–2.34), female 2.13 (1.98–2.31); coloration dark brown to black; antennae, legs, except coxae and tarsi pale yellow; dorsum, including vertex and pronotum, with densely distributed, broad, apically pointed, silvery scalelike setae and densely distributed, suberect to reclining, brown simple setae; thoracic pleura with scalelike setae. **HEAD:** width male 0.65 (0.62–0.69), female 0.64 (0.61–0.65); vertex width male 0.28 (0.27–0.29), female 0.30 (0.29–0.31); region anterior to antennal insertion elongate, anteocular length male 0.20 (0.19–0.21), female 0.21 (0.20–0.22); eyes large, 89% of head height, ventral margin of antennal insertion level dorsal to ventral margin of eye; antennal measurements male 0.19 (0.18–0.21): 0.92 (0.84–0.98): 0.57 (0.53–0.64): 0.35 (0.33–0.36), female 0.18 (0.17–0.19): 0.84 (0.79–0.89): 0.52 (0.50–0.55): 0.34 (0.32–0.36); segment 2 is 28% longer than head width across eyes; labium yellow, reaching sternite 6 in both sexes; labial length male 1.36 (1.31–1.41), female 1.36 (1.26–1.42); length of segment 4 male 0.36 (0.35–0.38), female 0.35 (0.33–0.38). **THORAX:** width male 0.96 (0.93–1.05), female 0.94 (0.90–0.98); length male 0.47 (0.44–0.50), female 0.45 (0.43–0.48); mesoscutum broadly exposed. **HEMELYTRA:** maximum width male 1.24 (1.13–1.39), female 1.23 (1.18–1.31); lateral margins subparallel.

**BIOLOGY:** Eastern white pine (*Pinus strobus* Linnaeus) (Pinaceae) is the breeding host. The occurrence on other plants are sitting records as adults disperse to nearby plants when populations are high. Based on field work (T. J. Henry, personal commun.) *P. strobicola* will not be found at a particular locality unless white pines are present.

**DISTRIBUTION:** An eastern Nearctic species found from Nova Scotia west to Ontario and Minnesota in the north, south to West Virginia and Illinois. Wheeler and Henry (1988) also listed Ohio and Oklahoma within the distribution this species.

**DISCUSSION:** The discovery of a female we collected on *Abies grandis* (Dougl.) Lindl. in the Wallowa Mountains of eastern Oregon apparently represents a contaminate in collecting vials or a mislabeled specimen considering the large range disjunction and host

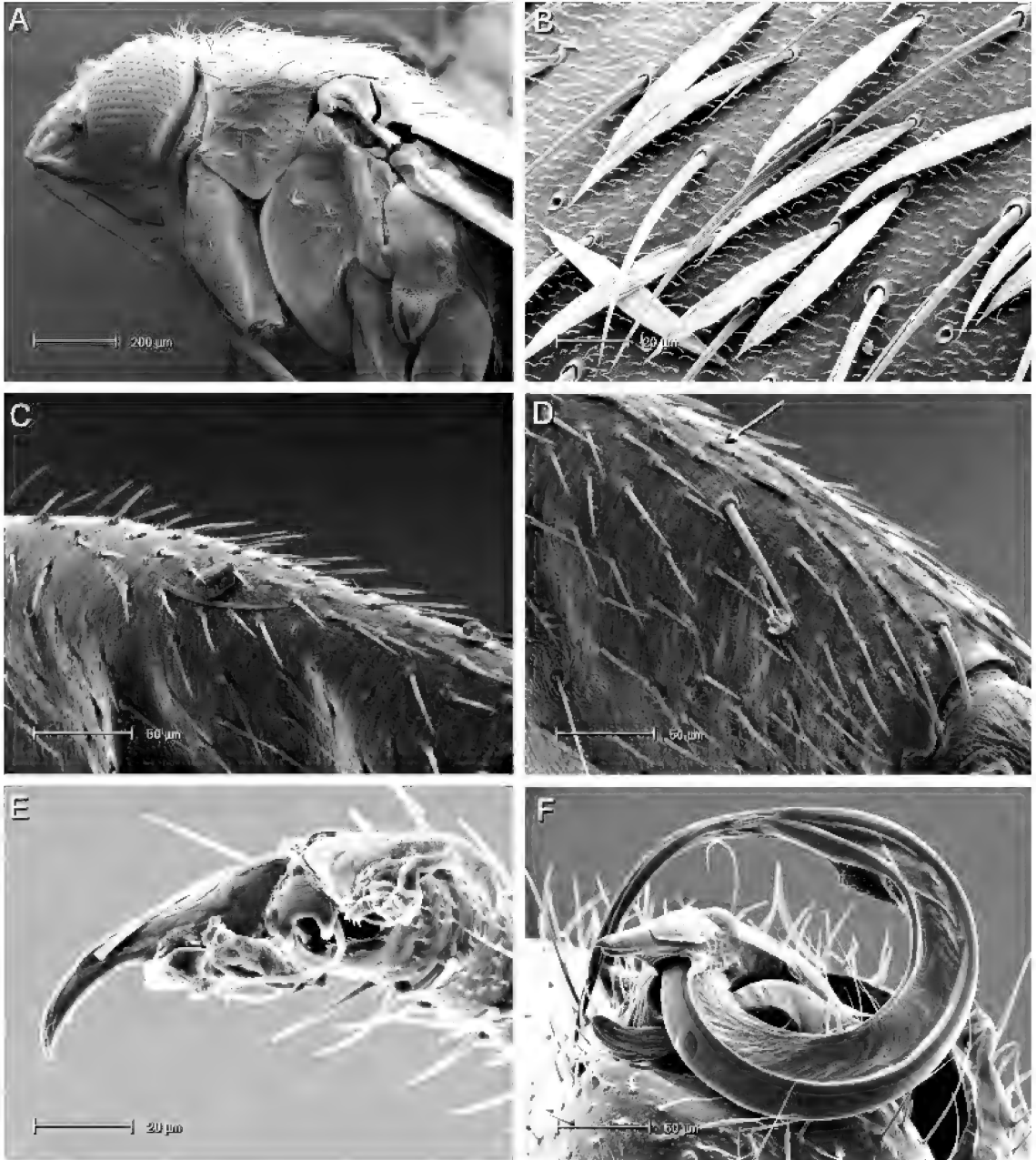


Fig. 19. Scanning electron micrographs of *Phoenicocoris strobicola* (Knight), Nepean, Ontario. **A.** Head and thorax, lateral view. **B.** Scalelike setae, dorsal view. **C.** Hind femora, dorsobasal view. **D.** Hind femora, dorsodistal view. **E.** Pretarsus, apical view. **F.** Vesica, distal view. Scales as indicated.

plant association of this one specimen. Regardless, the long, spatulate parempodia, long labium, silvery scalelike setae on the dorsum and lateral aspect, and pale yellow appendages substantiate our identification.

**SPECIMENS EXAMINED:** CANADA: **New Brunswick:** Fredericton, 28.VI.1976, 1.VIII.1966, L. A. Kelton, *Solidago* sp., 1♂, 2♀ (CNC); Kennebec Banks, 23.VI.1976, L. A. Kelton, *Pinus strobus*, 12♂, 5♀ (CNC); Kouchibouguac National Park,

- 23.VII.1977, D. J. E. Brown, *Pinus* sp., 2♂, 1♀ (CNC); Waterford, 1.VIII.1966, L. A. Kelton, *P. strobus*, 4♂, 13♀ (CNC). **Nova Scotia:** Halifax, 22.VII.1975, L. A. Kelton, *Picea* sp., 1♀ (CNC); Ingonish, 2.VIII.1976, L. A. Kelton, *Pinus* sp., 1♂ (CNC). Kentville, 3–6.VII.1976, 15–17.VII.1968, L. A. Kelton, *Pinus* sp., 10♂, 2♀ (CNC); Mount Unlacke, 13–14.VII.1966, L. A. Kelton, 2♂ (CNC); Woodville, 20.VII.1966, L. A. Kelton, *Larix* sp., 3♀ (CNC). **Ontario:** Almonte, 28.VI.1979, D. J. E. Brown, 3♂, 2♀ (CNC); Buckhorn, 28.VI.1968, G. Thorpe, *P. strobus*, 5♂, 15♀ (CNC); Footes Bay, 25.VII.1962, Kelton, Thorpe, 2♀ (CNC); Hasting Co., 19.VI.1955, J. F. Brimley, 4♂, 5♀ (CNC); Huntley, 14.VII.1961, D. J. E. Brown, 3♂, 1♀ (CNC); Ignace, 5 km W of, on Hwy 17 roadside, M. D. Schwartz, *P. banksiana*, 1♂ (CNC); Lakefield, 28.VI.1962, H. Blanchard, 1♀ (CNC); Marmora, 5.VII.1952, J. R. Vockeroth, *Pinus* sp., 2♀ (CNC). Nepean, Piney forest, Lafontaine house, M. D. Schwartz, MV light: 18.VII.1991, 14♂, 4♀; 27.VII.1991, 110♂, 33♀ (AMNH, CNC). Nestor Falls, 7–8.VIII.1960, Kelton, Whitney, *Pinus* sp., 1♀ (CNC); Norway Point, Lake of Bays, 28.VI.1922, J. McDunnough, *Pinus* sp., 5♂, 4♀ (CNC); Ompah, 28.VI.1979; D. J. E. Brown, 2♂ (CNC); One Sided Lake, 4–5.VIII.1960, Kelton, Whitney, 1♀ (CNC). Ottawa, Central Experimental Farm, M. D. Schwartz: 19.VI.1991, *Picea glauca*, *Pinus sylvestris*, 7♂, 6♀ (CNC); ca Saunders Building, 17.VI.1999, 7♂, 1♀ (CNC). Parry Sound, 26.VII.1962, Kelton, Thorpe, 1♀ (CNC). Saint Lawrence Islands National Park: Gordon Island, 7.VIII.1976, W. Reid, 1♀ (CNC); Grenadier Island Centre, 27.VII.1975, E. Wilson, 1♂ (CNC); Thwartway Island, 19.VII.1976, W. Reid, 1♀ (CNC). Stirling, 26.VI.1962, G. Thorpe, *Pinus* sp., 5♂, 8♀ (CNC); Stittsville, 12.VII.1979, D. J. E. Brown, 1♂ (CNC). **Québec:** Fabre, 5.VII.1961, W. Gagne, *Picea glauca*, 9♂, 1♀ (CNC); Ladysmith, 24.VII.1958, L. A. Kelton, 1♂ (CNC); Laniel, 3–4.VII.1963, L. A. Kelton, 1♂ (CNC); Shawville, 22.VII.1958, L. A. Kelton, *Pinus strobus*, 12♂ (CNC). USA: **Illinois:** *Jo Daviess Co.:* Galena, 30.VI.1922, Dozier, Mohr, *P. strobus*, 1♀ (AMNH). **Maryland:** *Prince George's Co.:* College Park, University of Maryland, 4.VI.1988, T. J. Henry, A. G. Wheeler, Jr., *Pyracantha* sp., 1♀ (USNM). **Massachusetts:** *Berkshire Co.:* Lake Buell, Hurstville, 2.VII.1930, J. R. Torre-Bueno, 2♀ (KU). **Michigan:** *Emmet Co.:* 1 mi S of Pellston, 30.VII.1957, R. E. Beer, 2♀ (KU). **Minnesota:** *Carlton Co.:* Elkhorn Creek, 18.VIII.1920, H. H. Knight, 1♂ (USNM). *Ramsey Co.:* St. Anthony Park, 22.VIII.1924, H. H. Knight, 1♂ (USNM). **New York:** *Albany Co.:* Rensselaerville, Huyck Preserve, 29.VI–2.VII.1977, R. T. Schuh, *Pinus strobus*, 3♂, 5♀ (AMNH). *Essex Co.:* Lake Placid, 4.VII.1991, M. D. Schwartz, *Picea glauca*, 1♀ (CNC). *Nassau Co.:* East Meadow near Rte 25 on Bluebird Drive, M. D. Schwartz, 6, 10, 16.VI, 16.VIII.1986, *Picea abies*, *Pinus strobus*, *Tsuga canadensis*, 34♂, 13♀ (AMNH); Flower Hill near Rte 25A on Ridge Drive East, 10.VI.1986, 8.VII.1985, M. D. Schwartz, *P. strobus*, 1♀, *Picea glauca*, 1♀ (AMNH); Roslyn, Cemetery on Rte 25A, 23.VI.1986, M. D. Schwartz, *Pinus strobus*, 5♂, 14♀ (AMNH); Roslyn, Fine Arts Museum and Gardens on Rte 25A, 10.VI.1986, 1987, 18, 20.VI.1988, M. D. Schwartz, *P. sylvestris*, *Betula* sp. (Betulaceae), *P. strobus*, 4♂, 7♀ (AMNH). *Rockland Co.:* South Nyack, Ross Avenue, 18.VI.1988, M. D. Schwartz, *Pinus* sp., 1♂ (AMNH). *Suffolk Co.:* Bayshore, Brentwood Road, 22, 23.VI.1985, M. D. Schwartz, *P. strobus*, 14♂, 13♀ (AMNH). *Tompkins Co.:* Ithaca: H. H. Knight, 29.VI.1920, *P. strobus*, *Psallus strobicola* paratype, 4♂, 2♀ (CAS, CNC, USNM); A. G. Wheeler, Jr.: Cornell University Campus, 1.VII.1978, *Pinus mugo*, 2♀ (PDA); 0.5 mi NW of, 30.VI.1978, *P. strobus*, 1♂ (PDA). Ringwood Road, 13.VII.1920, 1♀ (USNM). Taughannock Falls, 2.VII.1920, 1♀ (USNM). **North Carolina:** *Henderson Co.:* Hendersonville, 1.VI.1907, F. Sherman, 1♂ (USNM). *Macon Co.:* Highlands, 35°3.2'N 83°11.3'W, 3850 ft, 5, 18.VII.1958, J. L. Laffoon, light, 3♂ (USNM). *Union Co.:* Monroe, 28.V.1973, A. G. Wheeler, Jr., *P. strobus*, 1♂ (PDA). **Oregon:** *Baker Co.:* Wallowa Mountains, Boulder Campground and Cougar Meadow, 20 mi E of Medical Springs, 4490 ft, 3.VIII.1986, Schuh, Schwartz, Stonedahl, *Abies grandis*, 1♀ (AMNH). **Pennsylvania:** *Blair Co.:* Altoona, Pleasant Valley Nursery, 11.VI.1972, S. M. George, *Picea abies*, 1♂ (PDA). *Centre Co.:* 2 mi N of State College, 10.VI.1977, Schuh, Henry, Wheeler, 3♀ (AMNH). *Cumberland Co.:* Camp Hill, 12.VI.1973, A. G. Wheeler, Jr., *Pinus sylvestris*, 1♀ (PDA). *Dauphin Co.:* Harrisburg, Agriculture Building, 10, 30.VI, 1973, 1974, A. G. Wheeler, Jr., *P. strobus*, 1♂, 1♀ (PDA); Hershey Hotel grounds, 12, 27.VI.1973, T. J. Henry, B. R. Stinner, A. G. Wheeler, Jr., *P. sylvestris*, *P. strobus*, 2♂, 7♀ (PDA). *Erie Co.:* Erie County Hospital, 4.VII.1972, F. Negley, H. Wolff, *P. strobus*, 4♂ (PDA). *Franklin Co.:* Mainsville, Snipe's Nursery, 16.VI.1972, Hauser, *P. strobus*, 1♀ (PDA). *Huntingdon Co.:* Greenwood Furnace, 28.VI.1990, A. G. Wheeler, Jr., *P. strobus*, 4♂, 1♀ (PDA). *Monroe Co.:* Long Pond, nr, 600 m, 41°01'N 75°28'W, M. D. Schwartz, *P. rigida*, 1♀ (CNC); Stroudsburg, La Bar's Nursery, 26.VI.1973, A. G. Wheeler, Jr., *P. strobus*, 2♂

(PDA). *Montgomery Co.*: Barnes Arboretum, Merion Station, 2.VI.1982, A. G. Wheeler, Jr., *P. strobos* 'nana', 2♂ (PDA); Forest Hills Cemetery, Philadelphia, 7.VI.1973, J. F. Stimmel, *Picea abies*, 1♂ (USNM); Manufacturers Golf and Country Club, 13.VI.1973, A. G. Wheeler, Jr., *Pinus strobus*, 3♀ (PDA). *Washington Co.*: Iannett's Nursery, 21.VI.1973, T. J. Henry, *P. strobos*, 1♂, 2♀ (PDA). *Wayne Co.*: Curtis Nursery, nr Callicoon, 3.VIII.1976, 1♀ (PDA). **Rhode Island:** *Providence Co.*: Providence, 1♀ (USNM). **Tennessee:** *Knox Co.*: Knoxville, University of Tennessee Campus, 27.V.1985, T. J. Henry, A. G. Wheeler, Jr., *P. strobos*, 4♂, 2♀ (PDA, USNM). **Virginia:** *Albemarle Co.*: Charlottesville, University of Virginia Campus, 23.V.1986, A. G. Wheeler, Jr., *P. strobos*, 3♀ (PDA). *Augusta Co.*: I-81, Verona exit, nr Staunton, 29.V.1973, A. G. Wheeler, Jr., *P. strobos*, 5th instar, 1♂ (PDA). *Rockingham Co.*: Harrisonburg, Rte 33, 25.V.1985, T. J. Henry, A. G. Wheeler, *P. strobos*, 2♂ (USNM). *Washington Co.*: Bristol, 26.V.1985, T. J. Henry, A. G. Wheeler, *P. strobos*, 3♂ (USNM). **West Virginia:** *Greenbrier Co.*: White Sulphur Springs, 25.V.1978, A. G. Wheeler, Jr., *P. strobos*, 3♀ (PDA).

*Phoenicocoris vidali* (Lindberg)

*Sthenarus vidali* Lindberg, 1940: 52 (n.sp.).  
*Phoenicocoris vidali*: Wagner, 1966: 18 (n.comb.); Schuh, 1995: 375 (catalog); Kerzhner and Josifov, 1999: 388 (catalog).

DISCUSSION: Lindberg (1940) compared *P. vidali* with *P. dissimilis* and commented that its body length was approximately 75% shorter. Wagner (1975: figs. 699, b 1–4) documented the male genitalia of *P. vidali*. Based on these illustrations it possesses a strongly twisted vesica, with the strap bifurcate apically, and the secondary gonopore situated mesially. Vesical form of this type is found in all species of *Phoenicocoris* except *P. dissimilis*. Based solely on Wagner's illustrations, the vesica of *P. vidali* appears to be most similar to *P. obscurellus*. The known distribution of this species is Ras-el-Ma in the Middle Atlas Mountains of Morocco (Lindberg, 1940). Host plants are unknown.

SPECIES REMOVED FROM *PHOENICOCORIS*

*Phoenicocoris dissimilis* (Reuter)  
 incertae sedis

Figures 1A, D, 2, 20, 21, 25

*Sthenarus dissimilis* Reuter, 1878: 174 (n.sp.);  
 Henry and Wheeler, 1974: 217 (biology); Ker-

zhner and Matocq, 1994: 59 (lectotype designation).

*Phoenicocoris dissimilis*: Andersen and Gaun, 1974: 119, 126, 131 (n.comb., distribution); Schuh, 1995: 374 (catalog); Kerzhner and Josifov, 1999: 387 (catalog).

*Sthenarus carbonarius* Horváth, 1888: 185 (n.sp.); Kerzhner, 1996: 100 (lectotype designation). NEW SYNONYM.

*Phoenicocoris carbonarius*: Wagner, 1975: 104 (n.comb.); Schuh, 1995: 374 (catalog); Kerzhner and Josifov, 1999: 387 (catalog).

DIAGNOSIS: Recognized by the large, elongate body; dorsum uniformly dark reddish brown to nearly black, with vestiture of narrow, lanceolate, somewhat woolly setae and longer, suberect, black simple setae; relatively short labium; antennal segments 1 and 2 fuscous, 3 and 4 dusky yellow; pretarsus with relatively short, wide parempodium; and by the structure of the male vesica (fig. 25). Distribution of scalelike setae as in *australis*, *claricornis*, *longirostris*, and *pallidicornis*. The labium of *dissimilis*, which only reaches as far as the middle coxa, is much shorter than the labium of these other species, which at the least reaches the hind coxae and sometimes reaches the middle of the abdominal sternum.

REDESCRIPTION: GENERAL ASPECT: elongate; total length male 3.57 (3.20–3.90), female 3.28 (3.10–3.40); length to cuneal fracture male 2.44 (2.26–2.58), female 2.34 (2.20–2.48); coloration dark brown to black; distal antennal segments, apices of femora slightly, and basal segment of tarsi dusky yellowish brown; dorsum with moderately to densely distributed, broad, flattened, apically pointed, silvery scalelike setae and densely distributed, suberect to reclining, black simple setae; thoracic pleura and venter without scalelike setae. HEAD: width male 0.73 (0.69–0.76), female 0.74 (0.72–0.76); vertex width male 0.32 (0.31–0.34), female 0.37 (0.36–0.38); region anterior to antennal insertion relatively short, anteocular length male 0.18 (0.18–0.19), female 0.20 (0.18–0.21); eyes large, about 90% of head height, ventral margin of antennal insertion dorsal to ventral margin of eye, only slightly ventral to midline of eye; antennal measurements male 0.20 (0.19–0.21): 0.86 (0.78–0.93): 0.42 (0.38–0.46): 0.32 (0.30–0.34), female

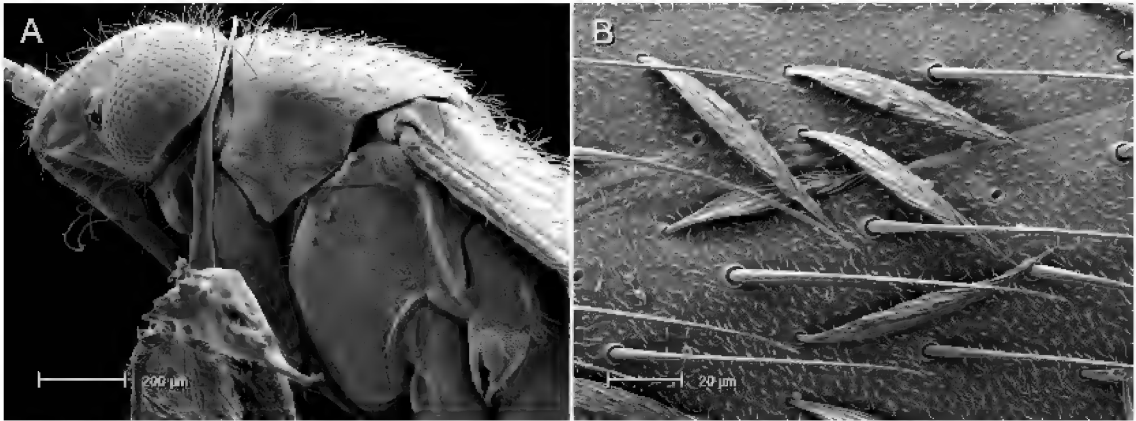


Fig. 20. Scanning electron micrographs of *Phoenicocoris dissimilis* (Reuter), Huntsville, Pennsylvania. **A.** Head and thorax, lateral view. **B.** Scalelike setae, dorsal view. Scales as indicated.

0.20 (0.18–0.21): 0.80 (0.74–0.86): 0.43 (0.39–0.45): 0.33 (0.31–0.36); antennal segment 2 is 20% longer than head width across eyes, evenly thickened slightly, throughout length, in both sexes; labium dark brown to black, reaching middle of middle coxae in both sexes; labial length male 0.98 (0.91–1.01), female 1.02 (1.00–1.04); length of segment 4 male 0.29 (0.26–0.30), female 0.28 (0.26–0.33). **THORAX:** width male 1.12 (0.98–1.18), female 1.13 (1.06–1.20); length male 0.53 (0.48–0.56), female 0.51 (0.48–0.54); mesoscutum moderately exposed. **HEMELYTRA:** maximum width male 1.46 (1.25–1.59), female 1.46 (1.38–1.55); male subparallel laterally, female slightly ovate.

**BIOLOGY:** Breeds on *Abies* spp. (Henry and Wheeler, 1974). Wheeler and Henry (1992) reported populations in the eastern United States on balsam fir (*A. balsamea* (Linnaeus) Miller), Grecian fir (*A. cephalonica* Loudon), Cilician fir (*A. cilicica* (Ant. et Kotschy), white fir (*A. concolor* (Gordon and Glendinning) Hildebrand), and Caucasian fir, *A. nordmanniana* (Steven) Spach. Wheeler (2001) reported that *P. dissimilis* is a predator of balsam twig aphid (*Mindarus abietinus* (Koch) (Mindaridae)) on white fir in Pennsylvania.

**DISTRIBUTION:** In Europe, Kerzhner and Josifov (1999) reported this species from Denmark, France, Germany, Poland, Romania, Slovakia, and Ukraine (Carpathians). Presumably introduced to eastern United

States on ornamental firs in the early nineteenth century (Wheeler and Henry, 1992). Henry and Wheeler (1974) first reported it from New York and Pennsylvania, and later (Wheeler and Henry, 1992) added Connecticut, Delaware, Massachusetts, Maryland, and Rhode Island.

**DISCUSSION:** Wagner (1975) distinguished *P. carbonarius* from *P. dissimilis* based on the black tibiae, slightly larger (up to 4 mm) oval body, and slightly wider vertex of the former species as opposed to the yellowish brown tibiae with black base, shorter (up to 3.6 mm) more elongate body, and slightly more narrow vertex of the latter species. Kerzhner (1962) suggested that *P. carbonarius* is a dark colored variation of *P. dissimilis*. We concur with Kerzhner and consider *S. carbonarius* the junior subjective synonym of *S. dissimilis*. The distribution of the junior synonym, described as endemic to the Carpathians (Romania and Ukraine), is subsumed by the range of *P. dissimilis*.

The illustrations of the vesicae for both nominal species, *carbonarius* and *dissimilis*, presented by Wagner (1975) are erroneous. Based on our examination of *dissimilis* the vesical strap has an undivided apex and not the bifurcate apices as in all other species of *Phoenicocoris*. The basal edge of the secondary gonopore in all species of *Phoenicocoris* has at least a short subtending gonopore sclerite (figs. 22, 23). The secondary gonopore of *dissimilis* does not have a subtending gonopore sclerite (fig. 25). The par-



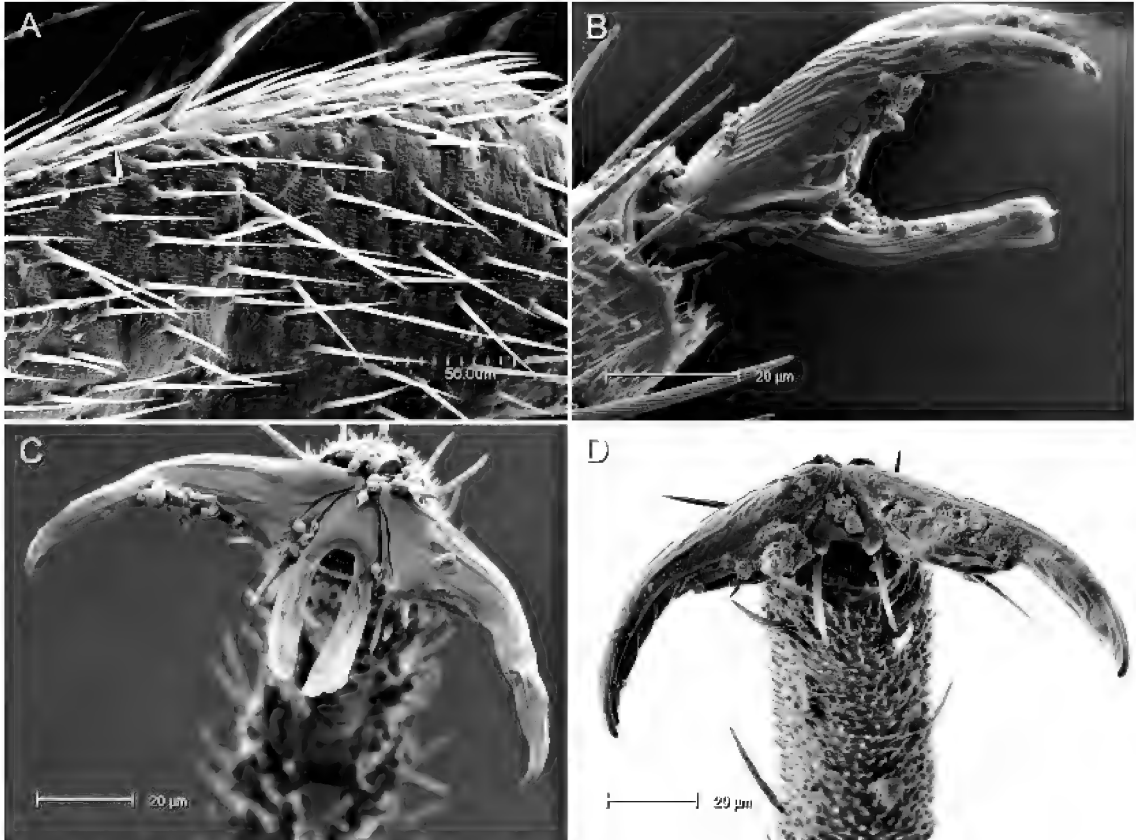


Fig. 21. Scanning electron micrographs of *Phoenicocoris dissimilis* (Reuter), Huntsville, Pennsylvania (A–C) and *Semium subglaber* Knight, Tucson, Arizona (D). **A.** Hind femora, dorsodistal view. **B.** Pretarsus, apical view. **C.** Pretarsus, lateral view. **D.** Pretarsus, apical view. Scales as indicated.

empodia of all *Phoenicocoris* species are long, narrow, and with flattened apices (figs. 8C, 9C, 11A, 12C, 13C, 14D, 15C, 16D, 18C, 19E). Our micrographs of the pretarsus of *dissimilis* document that the parempodium of this species does not have a flattened apex, but is unusually wide throughout the entire length (fig. 21B, 21C). Although the scale-like setae of *dissimilis* are relatively flattened as other *Phoenicocoris*, the distal edge is pointed as opposed to the truncate distal edge of all other *Phoenicocoris* except for *obscurellus* and *strobicola* (compare figs. 1A, D, M, N). All species of *Phoenicocoris*, except *minusculus*, utilize species of *Pinus* for their host plants. The known hosts for *dissimilis* in both the Palearctic and Nearctic regions are species of *Abies*.

**SPECIMENS EXAMINED:** ROMANIA: Bucarest, A. L. Montandon, 7♂, 4♀ (AMNH, USNM).

**USA: Connecticut:** Tolland Co.: University of Connecticut, Storrs, 29.V.1983, A. G. Wheeler, Jr., *Abies* sp., 5th instar, 2♂, 1♀ (PDA). **Delaware:** Kent Co.: Dover, 28.V.1984, A. G. Wheeler, Jr., *Picea abies*, 3♂ (PDA). **Maryland:** Washington Co.: Hagerstown, 23.V.1986, A. G. Wheeler, Jr., *P. abies*, 2♂ (PDA). **New York:** Nassau Co.: Roslyn, Fine Arts Museum and Gardens on Rte 25A, 13.VI.1986, M. D. Schwartz, *Abies balsamea*, 2♀ (AMNH). **Pennsylvania:** Bradford Co.: E of Athens, Shelan Gardens, A. G. Wheeler, Jr., *P. abies*, 1♀ (PDA). **Dauphin Co.:** Hershey Hotel grounds, 19, 30.V.1973, 1.VI.1974, T. J. Henry, A. G. Wheeler, Jr., *A. balsamea*, 8♂, 18♀ (PDA). **Luzerne Co.:** Huntsville Nursery, Huntsville, 4.VI.1975, A. G. Wheeler, Jr., *A. concolor*, 2♂, 7♀ (PDA). **Montgomery Co.:** Barnes Arboretum, Merion Station, 2.VI.1982, A. G. Wheeler, Jr., *A. cilicica*, *A. nordmanniana*, *P. glauca*, 1♂, 4♀ (PDA); Manufacturers Golf and Country Club, 31.V.1973, A. G. Wheeler, Jr., J. L. Stimmel, A.

*concolor*, 1♂, 1♀ (PDA); Philadelphia, Forest Hills Cemetery, J. L. Stimmel, *Tsuga canadensis*, 1♀ (PDA). *Northumberland Co.*: Turbotville, nr, 15.V.1986, A. G. Wheeler, Jr., *A. concolor*, 5th instar, 4♂, 1♀ (PDA). *Philadelphia Co.*: Chestnut Hills, Morris Arboretum, 11.V.1982, A. G. Wheeler, Jr., *A. cephalonica*, 5th instar, 4♂, 4♀ (PDA). *York Co.*: Strathmeyer Forest Nursery, nr Wellsville: 7, 17.V.1973, T. J. Henry, *A. concolor*, 3♂, 8♀ (PDA); 16.V.1974, T. J. Henry, A. G. Wheeler, Jr., *A. concolor*, 2♂, 7♀ (PDA).

*Salicarus fulvicornis* Jakovlev  
Figures 2, 26

*Agalliaestes fulvicornis* Jakovlev, 1889: 348 (n.sp.); Kerzhner, 1997: 247 (n.comb.).  
*Chlamydatus fulvicornis*: Carvalho, 1958: 32 (catalog); Schuh, 1995: 290 (catalog).  
*Phoenicocoris flagellatus* Wagner, 1967: 71 (n.sp.); Schuh, 1995: 374 (catalog).  
*Salicarus flagellatus*: Vinokurov and Kanyukova, 1995: 58 (n.comb.); Kerzhner, 1997: 247 (n.syn.). Kerzhner and Josifov, 1999: 421 (catalog).

DISCUSSION: Vinokurov and Kanyukova (1995) transferred *flagellatus* from *Phoenicocoris* to *Salicarus* based on the head structure, particularly the elevated transverse basal carina, the relatively strongly curved claws, the silvery vestiture on the dorsum and lateral portion of the prothorax, and the form of the vesica and parameres. Kerzhner (1997) placed *flagellatus* in synonymy with *fulvicornis* after designating a lectotype for the latter nominal taxon. We cannot comment on the synonymy; however, our examination of the specimens listed below allow us to support the combination, *S. flagellatus*. The posterior margin of the vertex in *flagellatus* is conspicuously pale (fig. 2); such coloration is not found in *Phoenicocoris* spp., as all have unicolorous black heads. The vesica of *flagellatus* (fig. 26) is of a form seen in species of *Salicarus* (ref. fig. 26, *roseri*), not those of *Phoenicocoris* spp. The vesica of *flagellatus* has several features which are unlike those of *Phoenicocoris* spp. (figs. 23–25): The secondary gonopore is situated more distally on the vesical strap, the anterior and posterior apices of the vesical strap are weakly diverging, and the vesical strap is not tightly coiled.

Although not indicative of unequivocal generic affiliation (as apparently both *Phoen-*

*icocoris* and *Salicarus* spp. have long parempodia with weakly spatulate apices), *flagellatus* does have parempodia similar to that of *S. roseri* (fig. 6A). The distribution of scalelike setae is also inconclusive for determining the generic placement of *flagellatus*. There are *Phoenicocoris* and *Salicarus* spp. with scalelike setae present on both dorsal and lateral aspects of the body.

SPECIMENS EXAMINED: [in Cyrillic characters] Mongolia: Suhe-Bator Aimak, Ongon-els, sandy desert, 15 km SSE of Hongor, 5–6.VI.1971, Kerzhner, *Caragana* sp. 3♂, 3♀ (AMNH).

*Salicarus qiliananus* (Zheng),  
new combination

*Phoenicocoris qiliananus* Zheng in Zheng and Li, 1996: 101, 103 (n.sp.); Kerzhner and Josifov, 1999: 388 (catalog); Qi et al., 2003: 428 (list).

DISCUSSION: The following characters argue for transferring *qiliananus* from *Phoenicocoris* to *Salicarus*: the minute pulvillus; the only slightly curved claw; the S-shaped, but not tightly coiled, vesica; the large secondary gonopore, placed near the apex of the vesica and without a gonopore sclerite; and the apical processes of the vesica fused throughout their entire length, giving the appearance of a single process.

The coloration and general distribution of *qiliananus*, from Gansu Province in northwestern China, is similar to that of *S. halimodendri* Putshkov, 1977 (Kerzhner, personal commun.). The latter is variably colored (dark brown or black to pale brown to yellow) and is distributed in Central Asia on the widely distributed legume, Russian saltree (*Halimodendron halodendron* (Pallas) Voss) (Fabaceae) (Putshkov, 1977). However, we hesitate to place the former species in synonymy pending examination of additional Palearctic material.

*Kasumiphylus*, new genus

*Phoenicocoris*: Yasunaga, 1999: 191 (discussion).

TYPE SPECIES: *Psallus kyushuensis* Linnavuori, 1961.

DIAGNOSIS: Recognized by the moderately elongate body, the brown general coloration, sometimes with hemelytra paler than rest of dorsum, the mixed dorsal vestiture of densely distributed, decurved, silvery sericeous setae

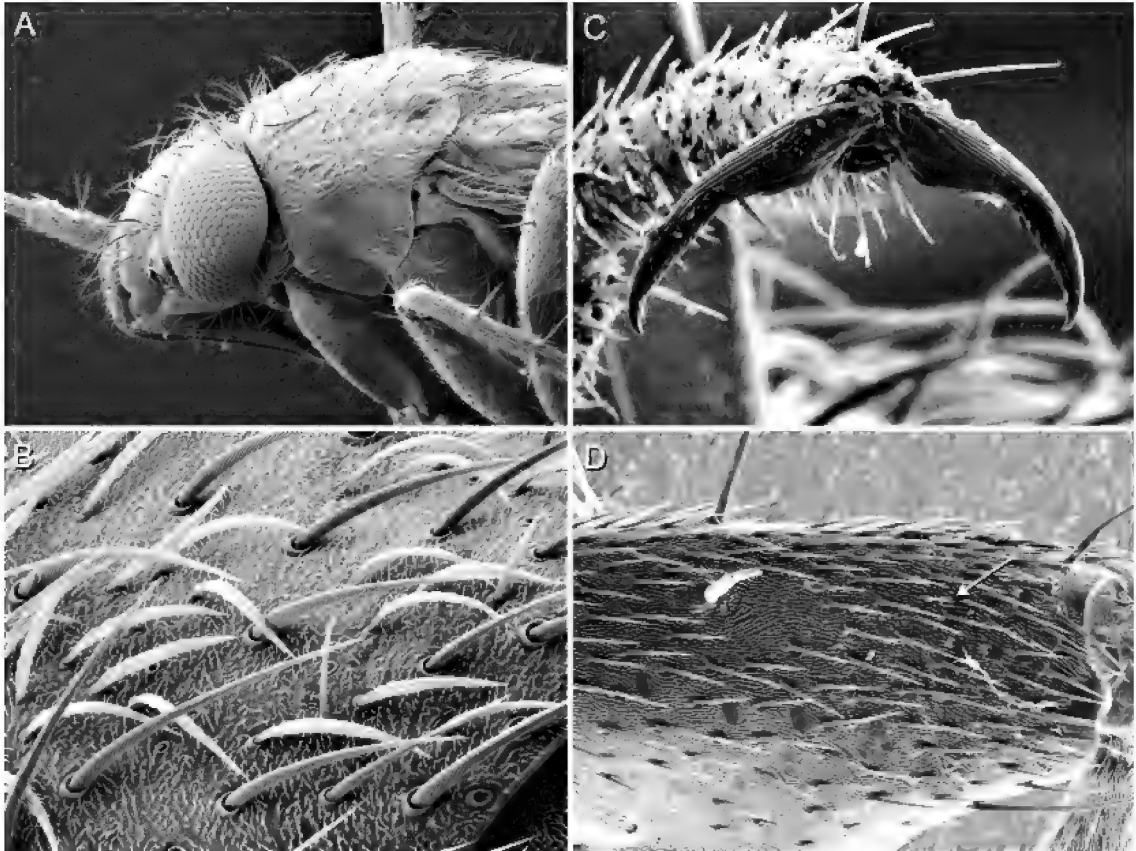


Fig. 22. Scanning electron micrographs of *Kasumiphylus kyushuensis* (Linnavuori), Kônoura Sotome, Japan. **A.** Head and thorax, lateral view. **B.** Scalelike setae, dorsal view. **C.** Pretarsus, apical view. **D.** Hind femora, dorsodistal view.

and pale brown to black, reclining simple setae, and especially the vesical structure consisting of subequal length, nondiverging apices of the strap, terminal membranous sac, and subterminally situated secondary gonopore.

**DESCRIPTION: Male. GENERAL ASPECT:** macropterous elongate; reddish brown general coloration, sometimes hemelytra paler than remainder of dorsum, coxae and tibiae dusky yellowish brown; dorsum with densely distributed, narrow, sericeous, apically pointed, silvery scalelike setae and densely distributed, suberect to reclining, pale brown to black simple setae; simple setae on head and pronotum unkempt, more erect, longer, and darker than those on hemelytra; thoracic pleura and venter without scalelike setae. **HEAD:** dark brown, sometimes with obscure red marks, subshining, weakly pruinose, sub-

vertical, with densely distributed, suberect unkempt, black setae; anteocular portion slightly produced, region anterior to antennal insertion short, posterior margin straight; frons strongly sloping; vertex narrow, faintly convex, without transverse basal carina; maxillary plate slightly sunken; buccal cavity narrow, obovate; eyes occupying almost entire head height in lateral view, posterolateral margin slightly removed from anterolateral margin of pronotum, emarginate anteriorly; antennal insertion contiguous with, and slightly dorsal to ventral margin of eye; antennae dark brown, segments 1 and 2 yellowish brown; segment 1 with red markings; distal segments sometimes blackish brown, segment 1 relatively long, length equal to three-quarters eye height; segment 2 uniformly cylindrical; diameter of distal segments much less than segments 1 or 2; labium reaching

to or just surpassing apices of hind coxae. THORAX: dark chestnut brown, subshining, weakly shagreened; mesoscutum and scutellum dark brown, sometimes reddish brown; propleura dark brown, tinged with red, with usually reddish brown ostiolar peritreme; pronotum trapezoidal, width about two times length, lateral and posterior margins nearly straight; disk weakly convex, without distinct anterior and posterior lobes; calli weakly differentiated, but distinguished by slight darkening; mesoscutum moderately exposed; scutellum flat. HEMELYTRA: shining, dark brown, sometimes paler reddish brown, especially in female; cuneus usually slightly darker than corium; male subparallel-sided, female slightly ovate; cuneus slightly less than twice as long as broad; membrane faintly infuscate; veins concolorous with membrane. LEGS: dark brown, extreme apex of coxa and trochanter pale brown; femora without scalelike setae or dark spots; hind femora without minute spines on dorsoapical portion; tibia pale, brown to dark brown distally, with long, brown spines, spines with distinct, dark basal spots; tarsi brown. VENTER: dark brown with diffuse red areas. GENITALIA: *genital segment* relatively small, apex somewhat truncate, ventral surface covered with stout spinules and with slight spinose mesial carina (fig. 25); *phallosome* short, strongly attenuate, slightly curved; *vesica* with J-shaped bifurcate strap, with subequal length, nondiverging apices, and terminal membranous sac; posterior apex of strap bisected with variable length terminal spicule; *secondary gonopore* situated subterminally, without gonopore sclerite or spinules distally; *right paramere* simple; *left paramere* typically boat-shaped.

*Female*: Macropterous, lateral margin of hemelytra slightly more rounded than male, length from apex of clypeus to cuneal fracture 2.31–2.43; width across humeral angles of pronotum 1.23–1.44; similar to male except eyes slightly smaller, vertex wider, diameter of antennal segment 2 smaller, and labium reaching base of ovipositor. GENITALIA: *sclerotized rings* subquadrate, small, unfolded, widely separated; *ventral labiate* relatively large in relation to length of ring, present across width of ring, produced dorsally adjacent to ring; *dorsal labiate plate*

faintly sclerotized; *posterior wall* with two relatively wide, apically attenuate, basally contiguous interramal sclerites; *dorsal structure* membranous, spanning and broadly attached to interramal sclerites, slightly concave anteriorly; *vestibulum* small, flattened, faintly membranous.

ETYMOLOGY: Named to honor the daughter of our friend and colleague Dr. Tomohide Yasunaga of Okayama University, Japan, who has done much to further the knowledge of Asian Heteroptera. The name Kasumi has a dual meaning, either composed of two Chinese characters “ka” for fragrance and “sumi” for clear or pure or one Chinese character meaning “misty”. Kasumi-kame-mushi (“heteropterous bug”) is also the Japanese common name for members of the Miridae.

DISCUSSION: As with *Phoenicocoris* species, the two included species of *Kasumiphylus* are pine inhabitants. These taxa exhibit only small differences in all morphological attributes. We maintain them as distinct based primarily on their nonoverlapping distributions; nonetheless, the species are extremely closely related.

*Kasumiphylus kyushuensis* (Linnavuori),  
new combination  
Figures 1G, 3, 25

*Psallus kyushuensis* Linnavuori, 1961: 168 (n.sp.).

*Phoenicocoris kyushuensis*: Kerzhner, 1988a: 850 (diagnosis, male genitalia); 1988b: 75 (n.comb.); Schuh, 1995: 374 (catalog); Kerzhner and Josifov, 1999: 387 (catalog); Yasunaga, 1999: 192 (description, male genitalia, color photo); Yasunaga, 2001: 168 (description, color photo of male and female).

DIAGNOSIS: Recognized by the elongate oval body, mixed vestiture of densely distributed, dark simple and silvery, sericeous setae, contrasting coloration with pronotum dark brown and hemelytra pale brown, and the genitalic structure, especially the less prominent terminal extension of the posterior vesical apex.

REDESCRIPTION: ( $N = 4\delta, 3\text{♀}$ ) GENERAL ASPECT: total length male 3.16 (3.10–3.25), female 3.21 (3.10–3.33); length to cuneal fracture male 2.27 (2.10–2.39), female 2.38 (2.33–2.43); coloration usually reddish

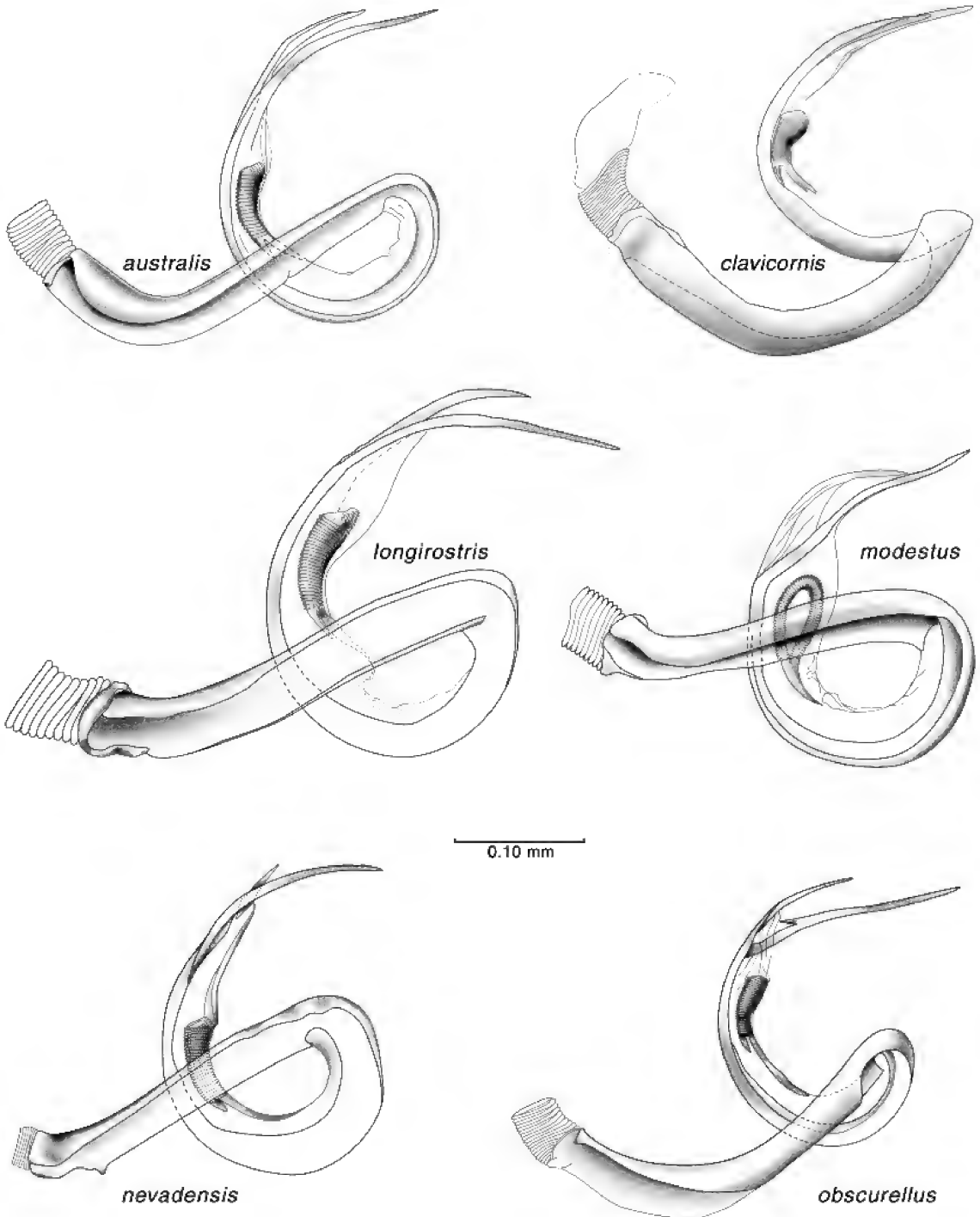


Fig. 23. Male genitalia of *Phoenicocoris* species—*australis*, Florida: “Wiggen’s Place”; *claricornis*, North Carolina: Raleigh; *longirostris*, Colorado: West Chicago Creek; *modestus*, Finland: Parainen [Pargas]; *nevadensis*, Nevada: Carroll Summit; *obscurellus*, England: Frensham Common. Scale = 0.10 mm.

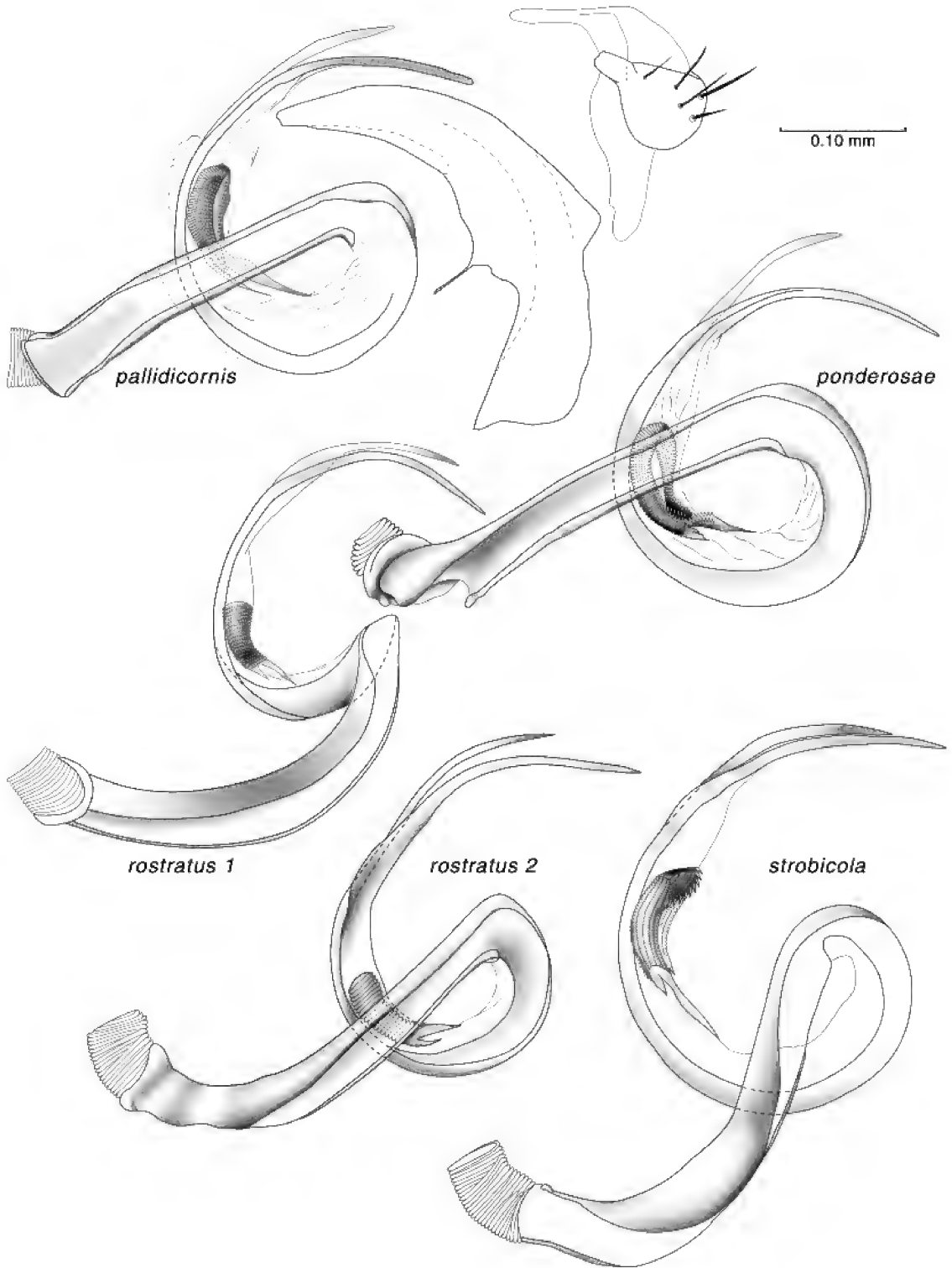


Fig. 24. Male genitalia of *Phoenicocoris* species—*pallidicornis*, Manitoba: Falcon Lake; *ponderosae*, Colorado: 3 mi S of Guffey; *rostratus 1*, New York: E. Qogue; *rostratus 2*, Iowa: Ames; *strobicola*, New Brunswick: Kennebec. Scale = 0.10 mm.

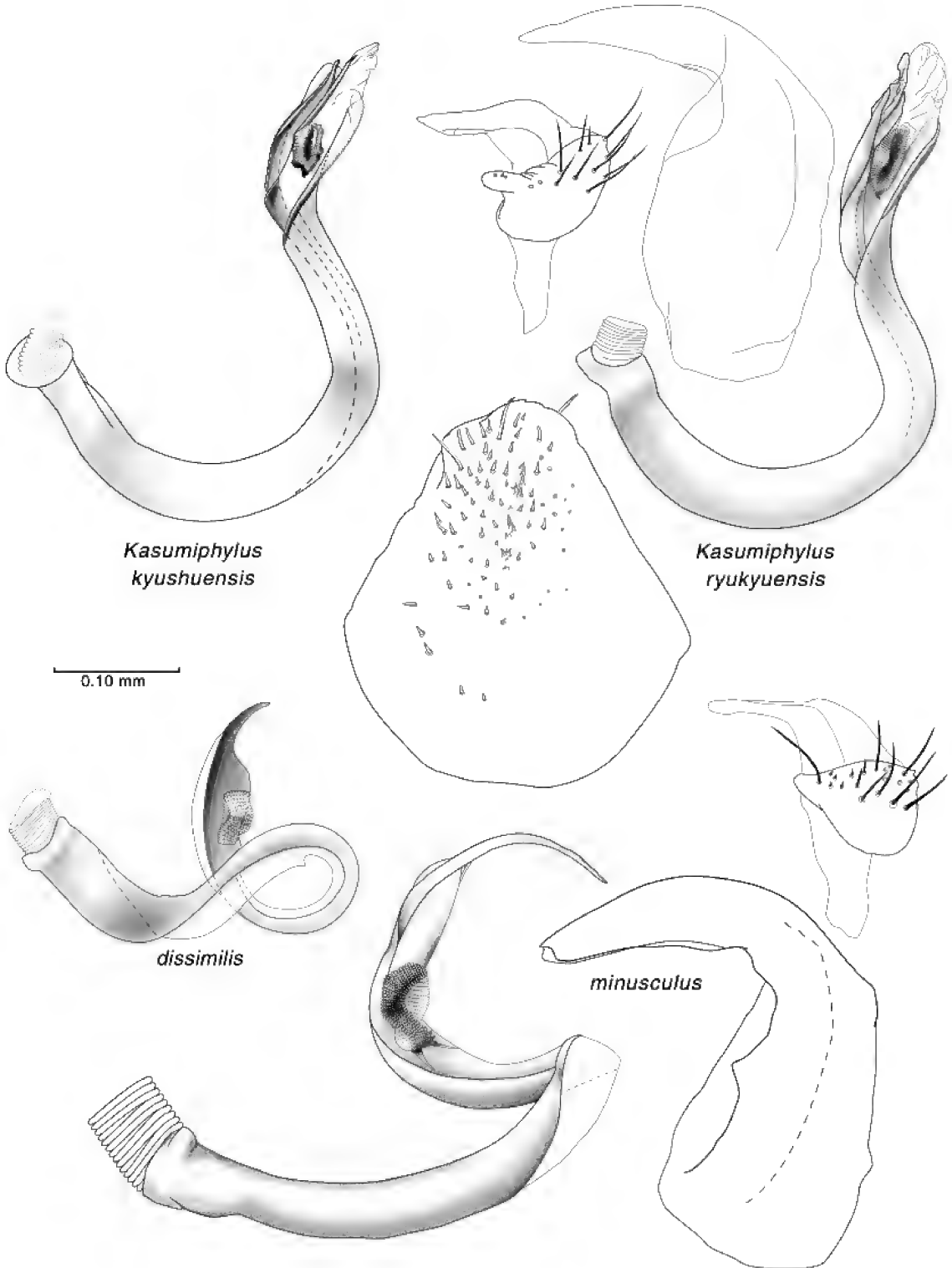


Fig. 25. Male genitalia of *Kasumiphylus* species, *Phoenicocoris dissimilis*, and *P. minusculus*—*Kasumiphylus kyushuensis*, Japan: Sotome; *ryukyuensis*, Okinawa: Kunigami Valley; *dissimilis*, Pennsylvania: Hershey Hotel; *minusculus*, Québec: Frelighsburg. Scale = 0.10 mm.

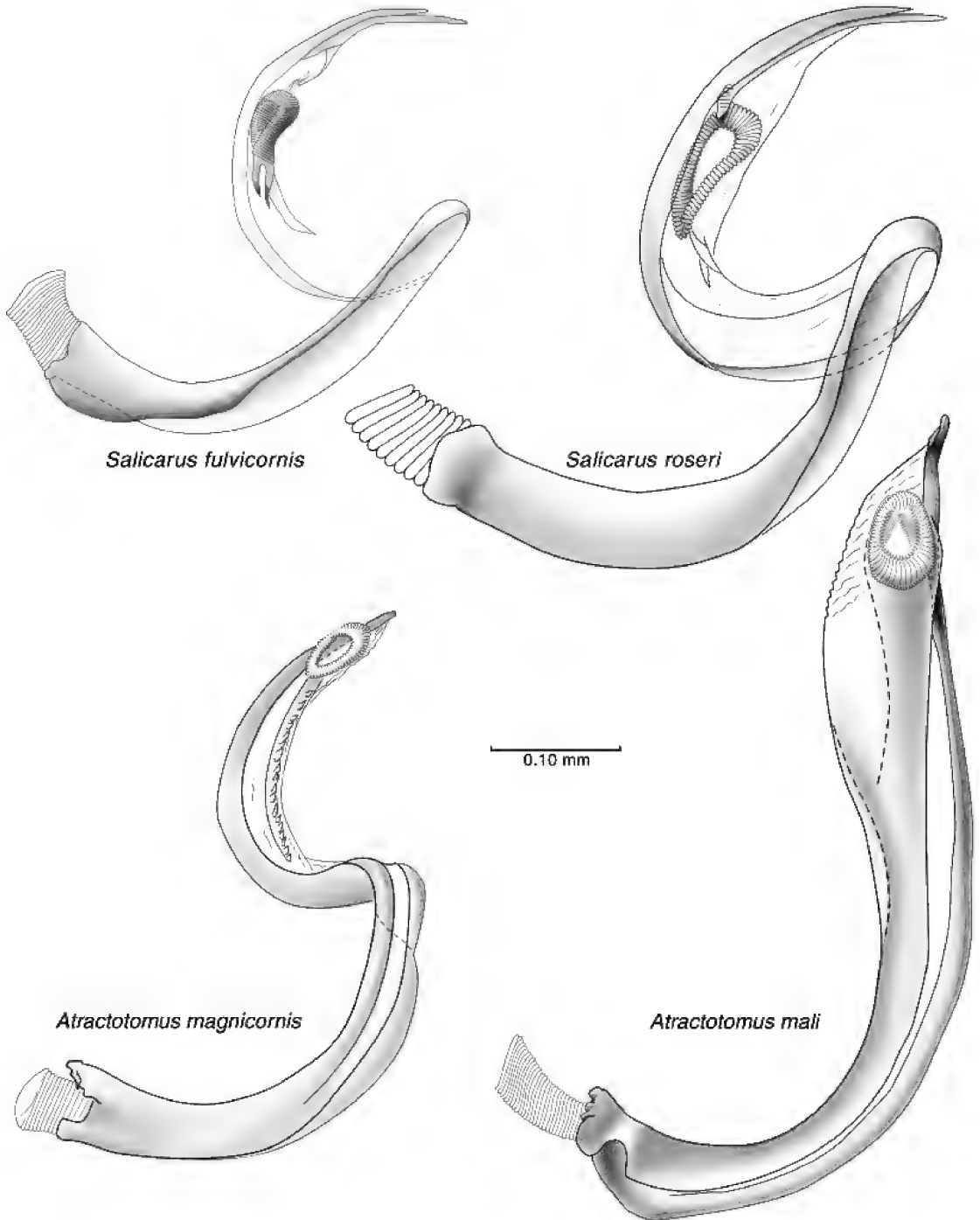


Fig. 26. Male genitalia of *Atractotomus* and *Salicarus* species—*Salicarus fulvicornis*, Mongolia: 15 km SSE of Hongora; *roseri*, England: Kennington; *Atractotomus magnicornis*, Ontario: Ottawa, Central Experimental Farm, 7.VI.1991, M.D. Schwartz, *Picea abies*, *P. glauca* (CNC); *Atractotomus mali*, British Columbia: Boundary Bay, 12.VI.1994, B. Gill, J. Bell, *Crataegus* sp. (CNC). Scale = 0.10 mm.



brown; head, pronotum, and distal antennal segments darker; vestiture as in generic description. HEAD: width male 0.76 (0.72–0.80), female 0.73 (0.69–0.76); vertex width male 0.24 (0.23–0.24), female 0.30 (0.29–0.31); anteocular length male 0.16 (0.14–0.17), female 0.19 (0.18–0.20); eyes large, 91% of head height; antennal measurements male 0.29 (0.28–0.30): 1.20 (1.14–1.28): 0.83 (0.80–0.84): 0.51 (0.50–0.53), female 0.30: 1.04: 0.74: 0.48; antennal segment 2 is 64% longer than head width across eyes, labium pale yellowish brown; labial length male 1.43 (1.38–1.46), female 1.34 (1.25–1.45); length of segment 4 male 0.40 (0.38–0.41), female 0.38 (0.37–0.38). THORAX: width male 0.98 (0.96–1.00), female 1.04 (1.00–1.07); length male 0.47 (0.46–0.48), female 0.47 (0.43–0.49). HEMELYTRA: maximum width male 1.20 (1.15–1.25), female 1.29 (1.25–1.32).

BIOLOGY: Japanese red pine (*Pinus densiflora* Siebold and Zuccarini), Korean pine (*P. koraiensis* Siebold and Zuccarini) (Pinaceae). Specimens from Primorskiy Krai housed in the Zoological Institute, St. Petersburg were collected on *P. densiflora* var. *funbris* (Komarov) Liou et Q.L. Wang ex Silba (Konstantinov, personal commun.).

DISTRIBUTION: Japan: Hokkaido, Honshu, Kyushu, Shikoku; Korea; Russia: Primorskiy Krai.

SPECIMENS EXAMINED: JAPAN: **Kyushu:** *Nagasaki Pref.:* Kônoura, Sotome, 1.VIII.1996, T. Yasunaga, *Pinus densiflora*, 2♂, 1♀ (CNC). **Honshu:** [in Cyrillic characters] Ipujama Prov.: Gidou Forest, 6.X.1981, Sugonjaev, 1♂, 1♀ (AMNH). *Kyoto Pref.:* Kyoto Midoroga-ike, 5.VII.1980, CL 1687, J. T. Polhemus, 2♀ (JTP).

*Kasumiphylus ryukuensis* (Yasunaga),  
new combination  
Figures 3, 25

*Phoenicocoris ryukuensis* Yasunaga, 1999: 192 (n.sp., description, male genitalia, color photo); Yasunaga, 2001: 169 (description, color photo of male and instar 5); Yasunaga, 2003: 12 (type information).

DIAGNOSIS: The overall darker coloration and vesical structure, especially the prominent terminal extension of the posterior apex, will distinguish this species from its congener.

REDESCRIPTION: ( $N = 2♂, 3♀$ ) GENERAL ASPECT: total length male 3.15 (3.10–3.20), female 3.28 (3.20–3.40); length to cuneal fracture male 2.28, female 2.36 (2.31–2.36); coloration usually dark reddish brown, pronotum and distal antennal segments brown; vestiture as in generic description. HEAD: width male 0.77 (0.74–0.80), female 0.74 (0.72–0.77); vertex width male 0.25 (0.24–0.26), female 0.33 (0.32–0.33); anteocular length male 0.17, female 0.17 (0.16–0.18); eyes large, 91% of head height; antennal measurements male 0.28 (0.26–0.29): 1.18 (1.09–1.26): 0.80 (0.75–0.84): 0.48, female 0.29 (0.28–0.29): 1.03 (1.00–1.08): 0.72 (0.70–0.73): 0.46 (0.45–0.48); antennal segment 2 is 68% longer than head width across eyes, labium pale yellowish brown, tinged with red; labial length male 1.36 (1.32–1.40), female 1.36 (1.31–1.39); length of segment 4 male 0.36, female 0.38. THORAX: width male 1.02 (1.00–1.04), female 1.08 (1.03–1.13); length male 0.49 (0.48–0.50), female 0.50 (0.49–0.51). HEMELYTRA: maximum width male 1.18 (1.15–1.20), female 1.30 (1.23–1.44).

BIOLOGY: Luchu pine (*Pinus luchuensis* Mayr) (Pinaceae).

DISTRIBUTION: Japan: Ryukyus: Okinawa and Ishigaki Islands.

SPECIMENS EXAMINED: JAPAN: **Okinawa:** Sate, Kunigami Valley, 24.V.1993, T. Yasunaga, 1♂, 2♀ (CNC).

## DISCUSSION

Based on the structure of the male genitalia, *Atractotomus mali* and three other species (*A. amygdali* Wagner, *A. rhodani* Fieber, and *Heterocapillus pici* (Reuter)) assigned incertae sedis status by Stonedahl (1990) should be accommodated in a new genus. A fourth species, *A. vireti* Wagner, identified by Stonedahl (1990) as belonging to this group, was subsequently proposed as a junior synonym of *A. mali* (Kerzhner and Matocq, 1994). The vesica of these taxa has a subapically placed secondary gonopore which is overlaid with one or two distal sclerotized straps of variable width. Considering the range encountered within other phylinae genera, it is perhaps coincidental that antennal segment 2 is fusiform in both sexes of the species forming this proposed monophyletic

group. Of the plants known to be inhabited by these species, *pici* occurs on *Crataegus* sp. (as does *mali*) and *rhodani* occurs on *Hippophae rhamnoides* L. (Elaeagnaceae). However, providing a generic group name is beyond the scope of this present paper. We have not had the opportunity to examine these European taxa in detail to confirm the structure of the apices of parempodia, the presence or absence of minute setae on the apex of the hind femora, the microstructure of the scalelike setae, or the length of the labium. Nor do we have the knowledge of other Palearctic Phylini which could affect the composition of the proposed group.

We must agree with Kerzhner (1962) and acknowledge that the placement of *dissimilis* in *Phoenicocoris* is unsatisfactory. Again, our knowledge of the Palearctic Phylini precludes the erection of a new genus to accommodate this species, so we must treat it as *incertae sedis*. We base this action on the apparently uniquely wide parempodia, structure of the vesica (with the apex of the strap undivided and absence of a gonopore sclerite), shorter labium, and dark appendages. The presence of spinules on the hind femora, shared with *Atractotomus*, *Phoenicocoris*, and *Pinomiris* and the type 1 scalelike setae of the dorsum, an apparently pleisomorphic feature found in a great number of phyline genera, indicate that detailed study of a wider group of Palearctic taxa is warranted before placement of *dissimilis* can be conclusively determined.

The combination of a slightly fusiform antennal segment 2 of both sexes, the type 2b scalelike setae, the dark appendages, the vesica with a short apex of the anterior strap, and the nonconiferous host plants of *minusculus* are unique within *Phoenicocoris*. The placement of *minusculus* is maintained in *Phoenicocoris* based on the shared presence of the long, spatulate parempodia and basic structure of the vesica with a basally bisected strap and gonopore sclerite. The apex of the anterior strap is also reduced in *nevadensis*.

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## APPENDIX 1

**Fig. 1. A. *Phoenicocoris dissimilis***, Pennsylvania: nr Wellsville; **B. *Salicarus roseri***, dorsal setae, England: *Berkshire Co.*: Kennington, 6–9.VII.1960, G. G. E. Scudder (CNC); **C. *Atractotomus magnicornis***, Pennsylvania: *Montgomery Co.*: Barnes Arboretum, Merion Station, 2.VI.1982, A. G. Wheeler, Jr, *Abies cilicillia* (PDA); **D. *P. dissimilis***, Pennsylvania: Huntsville; **E. *Salicarus roseri***, mesepisternal setae, (ibid.); **F. *Pruniocoris stonedahli***, Utah: *Washington Co.*: Snow Canyon State Park, T41S R16W (tent campground), 4100 ft, 22, 23.V.1981, M. D. Schwartz, *Prunus fasciculata* (Torr.) A. Gray (Rosaceae) (AMNH) **G. *Kasumiphylus kyushuensis***, Japan: Kōnoura Sotome; **H. *A. mali*** incertae sedis, Nova Scotia: Kentville, 3–6.VII.1976, L. A. Kelton, *Pyrus* sp. (CNC); **I. *Arctostaphylocoris manzanitae***, California: *Fresno Co.*: Big Creek Road, 2 km E of jct with Rte 168, 1500 m, 37°10.490' N 119°7.126' W, 25.VII.1999, M. D. Schwartz, *Arctostaphylos viscida* Parry (CNC); **J. *Guetherocoris atritibialis***, Texas: *Brewster Co.*: Big Bend National Park,

Tornillo Flat, 3200 ft, 5.V.1959, Howden, Becker (CNC); **K. *Phoenicocoris minusculus***, New York: Huyck Preserve; **L. *P. modestus***, Finland: Parainen [Pargas]; **M. *P. obscurellus***, England: nr Aldershot; **N. *P. strobicola***, Ontario: Nepean; **O. *P. claricornis***, Pennsylvania: Fish Creek Valley School; **P. *P. pallidicornis***, Manitoba: Falcon Lake; **Q. *P. ponderosae***, Arizona: Rustler Park; **R. *P. australis***, Florida: “Wiggen’s Place”; **S. *P. longirostris***, Colorado: Squaw Pass Road; **T. *P. nevadensis***, Nevada: Carroll Summit; **U. *P. rosstratus***, Colorado: Fish Creek.

**Fig. 2. *Phoenicocoris australis*** (♂: Florida: *Lake Co.*: Lake City; ♀: Florida: *Columbia Co.*: “Wiggins Place”); ***claricornis*** (♂: Pennsylvania: *Dauphin Co.*: Rte 443, Fish Creek Valley School; ♀: Washington, D.C.); ***dissimilis*** (♂: Pennsylvania: *Dauphin Co.*: Hershey Hotel; ♀: Pennsylvania: *Luzerne Co.*: Huntsville, Huntsville Nursery); ***Salicarus fulvicornis*** (♂ and ♀: Mongolia: Suhebator, Aiman, Orgon-els, 15 km SSE of Hongora); ***longirostris*** (♂: Nevada: *Washoe Co.*: Little Valley Research area; ♀: Colorado: *Park*

*Co.*: Geneva Park); *minusculus* (♂: New York: Albany Co.: Rensselaerville, Huyck Preserve; ♀: Iowa: Story Co.: Ames); *modestus* (♂: Finland: Pargas [Parainen]; ♀: Meyer-Dür Collection); *nevadensis* (♂: California: Siskiyou Co.: McCloud; ♀: Nevada: Lyon Co.: N of boundary of Toiyabe National Forest on Rte 22).

**Fig. 3.** *Phoenicocoris obscurellus* (♂: England: Surrey Co.: Frensham Common; ♀: England: Hampshire Co.: 2.5 mi NW of Aldershot on Rte 323); *pallidicornis* (♀: Ontario: Black Sturgeon Lake; ♂: Ontario: Sibley Park); *ponderosae* (♂: Colorado: Chaffee Co.: 5 mi W of Buena Vista; ♀: Colorado: La Plata Co.: Durango); *rostratus* (♂: Nevada: Washoe Co.: Little Valley Research

area; ♀: Oregon: Lincoln Co.: nr Yaquina Lighthouse); *strobicola* (♂: New York: Nassau Co.: East Meadow; ♀: New York: Suffolk Co.: Bayshore); *Kasumiphylus kyushuensis* (♂ and ♀: Japan: Nagasaki Pref.: Kônoura, Sotome); *ryukyensis* (♂ and ♀: Okinawa: Sate, Kunigami Valley); *Atractotomus magnicornis* (♂: Pennsylvania: Erie Co., Waterford, Rte 97, 24 VI 1995, A. G. Wheeler, Jr., *Crataegus* sp. (AMNH); ♀: Connecticut: New Haven Co.: Mount Carmel, 11.VI.1964, D. E. Leonard, on apple (AMNH)); *Salicarus roseri* (♂: Meyer-Dür collection (AMNH); ♀: England: Hampshire Co.: Fleet Pond, 2.VII.1989, G. M. Stonedahl, *Quercus robur* (AMNH)).

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