

Review of *Plesiodema* Reuter and a description of a new genus  
to accommodate *Psallus sericeus* Heidemann  
(Heteroptera: Miridae: Phylinae)

Обзор рода *Plesiodema* Reuter с описанием нового рода для  
*Psallus sericeus* Heidemann (Heteroptera: Miridae: Phylinae)

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KEYWORDS: Heteroptera, Miridae, Phylini, *Plesiodema*, *Coniferocoris*, new genus, new combinations, distribution, *Tilia*.

КЛЮЧЕВЫЕ СЛОВА: Heteroptera, Miridae, Phylini, *Phytocoris*, *Plesiodema*, *Coniferocoris*, новый род, новая комбинация, распространение, *Tilia*.

ABSTRACT. *Phytocoris pinetella* Zetterstedt, 1828 and *Coniferocoris pinicolus* Schwartz & Schuh, 1999 are congeneric, providing for *Plesiodema* Reuter, 1875 = *Coniferocoris* Schwartz & Schuh, 1999 **syn.n.**, causing *P. abiesicolus* (Schwartz & Schuh, 1999) **comb.n.**, *P. pinicolus* (Schwartz & Schuh, 1999) **comb.n.**, and *P. polhemi* (Schwartz & Schuh, 1999) **comb.n.** *Psallus sericeus* Heidemann, 1892, previously the only North American and non-*Pinus* (Pinaceae) associated member of the genus, is removed from *Plesiodema* and transferred to *Izyaius* Schwartz **gen.n.** as the type species, *I. sericeus* (Heidemann, 1892) **comb.n.** Scanning electron micrographs of the head, pronotum, dorsal vestiture, and pretarsus and illustrations of the vesica are provided for *P. pinetella*, *P. pinicolus*, and *I. sericeus*. The phallosoma, parameres, and female genitalia of *I. sericeus* are documented by illustrations. Distribution maps are presented for all species of *Plesiodema* and *Izyaius* **gen.n.**

РЕЗЮМЕ. *Phytocoris pinetella* Zetterstedt, 1828 и *Coniferocoris pinicolus* Schwartz & Schuh, 1999 принадлежат к одному роду. Таким образом *Plesiodema* Reuter, 1875 = *Coniferocoris* Schwartz and Schuh, 1999 **syn.n.**, что приводит к новым комбинациям: *P. abiesicolus* (Schwartz & Schuh, 1999) **comb.n.**, *P. pinicolus* (Schwartz & Schuh, 1999) **comb.n.**, и *P. polhemi* (Schwartz & Schuh, 1999) **comb.n.** *Psallus sericeus* Heidemann, 1892, считавшийся до сих пор единственным Североамериканским видом рода, не связанным с *Pinus* (Pinaceae), перенесён из рода *Plesiodema* в новый род *Izyaius* Schwartz **gen.n.** как его типовой вид, *I. sericeus* (Heidemann, 1892) **comb.n.** Приведены электронограммы головы, переднегруди, дорсального опушения, претарзуса и рисунки

везики для *P. pinetella*, *P. pinicolus*, и *I. sericeus*. Даны рисунки фаллотеки, параметров и гениталий самок для *I. sericeus*. Приведены карты с ареалами всех видов *Plesiodema* и *Izyaius* **gen.n.**

### Introduction

The present paper provides revised generic assignments for several previously misplaced North American phylinae species. *Coniferocoris pinicolus* Schwartz & Schuh, 1999, the type species of *Coniferocoris* Schwartz & Schuh, 1999, and two additional species, presently contained in the predominately pine-feeding genus *Coniferocoris* are transferred to *Plesiodema* Reuter, 1875, based on a preponderance of morphological features. Careful examination of *P. sericeus* (Heidemann, 1892), the only Nearctic and non-conifer inhabiting member of *Plesiodema*, confirms the observation of Yasunaga [2003] that the generic assignment of this species is suspicious. The description of a new genus is required to clarify the generic assignment of this new type species.

Locality data for the distribution map of the Palaeartic spp. (Fig. 1) were compiled from specimens labels (see specimens examined), personal communications (see acknowledgments), publications [Albrecht et al, 1984; Kerzhner, 1979; Kerzhner & Josifov, 1999; Lammes & Rinne, 1990; Linnavuori 1994; Ribes, 1978; Stichel, 1933; Tamanini, 1982; Wagner, 1968; Yasunaga 2003], and web site [Albrecht et al., 2006]. Digital representations of the *Pinus* spp. and *Tilia americana* L. used in the distribution maps are from Little [1971]. Specimen dimensions, in millimeters, are provided as the mean and range for 10 specimens.

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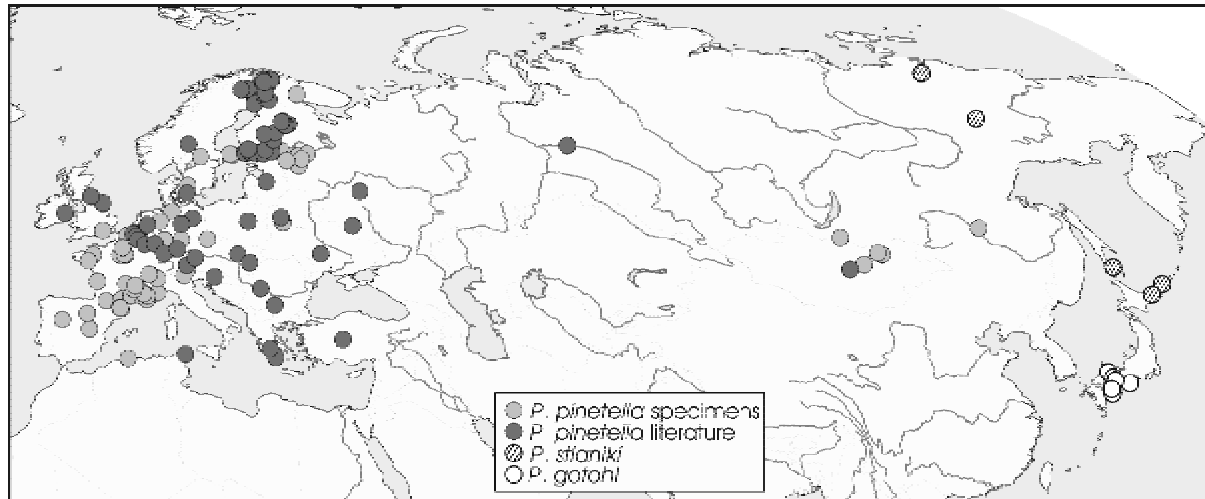


Fig. 1. Distribution of Palearctic species of *Plesiodema*.  
Рис. 1. Ареалы палеарктических видов рода *Plesiodema*

Approximately 750 specimens were examined for this study. Many of the specimens were equipped with bar code labels, which uniquely identify each specimen, and are referred to as unique specimen identifiers (USIs). The USI numbers (e.g., AMNH\_PBI 00108339), comprise an institution and project code (AMNH\_PBI) and a unique number (108339). USIs are provided in this paper for all documented specimens\*, examined specimens of *P. pinetella*, and most specimens of *I. sericeus*. Refer to the Planetary Biodiversity Project website on Plant Bugs [<http://research.amnh.org/pbi/index.html>] for USI additional information for all taxa (e.g., notes, collecting method, specimen dissections, photographs, etc.).

## Systematic Part

### Genus *Plesiodema* Reuter, 1875

*Plesiodema* Reuter, 1875: 15, 171 (gen.n.), type species by monotypy: *Phytocoris pinetellum* Zetterstedt, 1828 (Norway); Carvalho, 1958: 108 (cat.); Schuh, 1995: 393 (cat.); Kerzhner and Josifov, 1999: 395 (cat.); Yasunaga, 2003: 371 (disc.).

*Coniferocoris* Schwartz & Schuh, 1999: 205 (gen.n.), type species by original designation: *Coniferocoris pinicolus* Schwartz & Schuh 1999 (USA: California); **syn.n.**

**MATERIAL. *P. pinetella* — CZECH REPUBLIC: Central Bohemia:** Celakovice, 50.16999°N 14.77°E, 176 m, 4 Jun 1961, Unknown, 1♀ (AMNH\_PBI 00133440) (USNM). **FINLAND: Ahvenanmaan Laani:** Alands Island, 60.1°N 19.95°E, 1 m, Ingelius, 1♂ (AMNH\_PBI 00133447) (USNM). Eckero Torp, 60.2°N 19.6167°E, 17 m, 26 Jun 1943, Hakan Lindberg, 1♀ (AMNH\_PBI 00112030) (CNC). **Lansi-Suomen Laani:** Pargas (Parainen), 60.3°N 22.3°E, Reuter, 1♀ (AMNH\_PBI 00133448) (USNM). **FRANCE: Auvergne: Allier:** Brout Vernet, 43.1833°N 0.1167°E, 405 m, Unknown, 1♀ (AMNH\_PBI

00133450) (USNM). **Ile-de-France: Essonne:** Umg. Paris, Boissy-le-Cutte, 48.4667°N 2.2833°E, 140 m, 5 Jun 1954, E. Wagner, 1♀ (AMNH\_PBI 00133443) (USNM). Umg. Paris, Saclas, 48.3667°N 2.1167°E, 88 m, 12 Jun 1953, E. Wagner, 1♀ (AMNH\_PBI 00133444) (USNM). **Seine-et-Marne:** Fontainebleau, Umg. Paris, 48.42°N 2.70002°E, 113 m, 15 Jun 1953, E. Wagner, 2♀ (AMNH\_PBI 00133441, AMNH\_PBI 00133442) (USNM). **Nord-Pas de Calais: Nord:** Lille, 50.6333°N 3.0667°E, 25 m, L. Lethierry, 1♀ (AMNH\_PBI 00133449) (USNM). **GERMANY: Bavaria:** Coburg, Rossach, 50.15°N 10.95°E, 344 m, 9 Jun 1951, Eckerlein, 1♂ (AMNH\_PBI 00133445) (USNM). **Hamburg:** Lurade, Hamburg, 53.4167°N 9.9333°E, 40 m, 25 Jun 1930, Unknown, 1♀ (AMNH\_PBI 00133446) (USNM). **Lower Saxony (Niedersachsen):** Osnabruck, 52.2667°N 8.05°E, 70 m, 19 May 1990, K. - G. Bernhardt, *Pinus* sp. (Pinaceae), 2♂ (AMNH\_PBI 00133451, AMNH\_PBI 00133452) (USNM). Frankfurt, Schwanheim, 50.0833°N 8.5833°E, 95 m, 25 May 1918, Wld., *Pinus* sp. (Pinaceae), 1♀ (AMNH\_PBI 00112031) (CNC). Schwanheim, Frankfurt, 50.0833°N 8.5833°E, 95 m, 1 Jun 1918, Wld., *Pinus* sp. (Pinaceae), 1♂ (AMNH\_PBI 00112024) (CNC); 25 May 1918, Wld., *Pinus* sp. (Pinaceae), 1♀ (AMNH\_PBI 00112029) (CNC). **RUSSIAN FEDERATION: Saint Petersburg District:** Lebyazhye, 59.96111°N 29.41917°E, 5 m, 2 Jul 1900, Bianchi, 1♀ (AMNH\_PBI 00108340) (AMNH). **SPAIN: Castilla-Leon: Soria:** Sierra de Urbion, 41.7667°N 2.4667°W, 983 m, 12 Aug 1977, Ribes, *Pinus sylvestris* (Pinaceae), 1♂ (AMNH\_PBI 00108294) (AMNH). **UNITED KINGDOM: England: Surrey Co.:** Leith Hill Tower, Coldharbour, near Dorking, 51.1927°N 0.3556°W, 294 m, 16 Jun 1990, G. M. Stonedahl, *Pinus* sp. (Pinaceae), 8♂ (AMNH\_PBI 00108264–AMNH\_PBI 00108271), 14♀ (AMNH\_PBI 00108274–AMNH\_PBI 00108287) *Crataegus monogyna* Jacq. (Rosaceae), 2♂ (AMNH\_PBI 00108272, AMNH\_PBI 00108273), 6♀ (AMNH\_PBI 00108288–AMNH\_PBI 00108293) (AMNH).

*P. stlaniki* — **RUSSIAN FEDERATION: Far Eastern Federal District: Sakhalin Oblast:** Kuril Islands, Kunashir, Golovnina vulkan [=volcano], 43.85°N 145.53°E, 13 Jun 1973, I. M. Kerzhner, Paratype, 1♂ (AMNH\_PBI 00108338), 1♀ (AMNH\_PBI 00108339) (AMNH).

**REVISED DIAGNOSIS.** Body small; anteocular portion of head usually prominent (Figs 2–5); sexually dimorphic – male with antennal segment 2 cylindrical and greater diameter, eyes larger, and vertex narrower than in females; surface shining, coloration ranging from tan to nearly black, sometimes with pale markings; dorsal vestiture of evenly distributed, moderate length, reclining, black or brown simple dorsal setae

\* USI numbers for documented specimens (all numbers have prefix AMNH\_PBI). *I. sericeus* — Measurements: ♂ 112068, 133453–133457, 113459, 113460, 133464, 133466; ♀ 108251, 108254, 112022, 133458, 133461–133463, 133465, 133467, 133468. Illustration: vesica 112025, 112066; phallosome, left and right paramere 112025; female 112023. SEM 108244. *P. pinetella* — Illustration: vesica 108266; SEM 108270. *P. pinicolus* — Illustration: vesica 108270; SEM 108295.

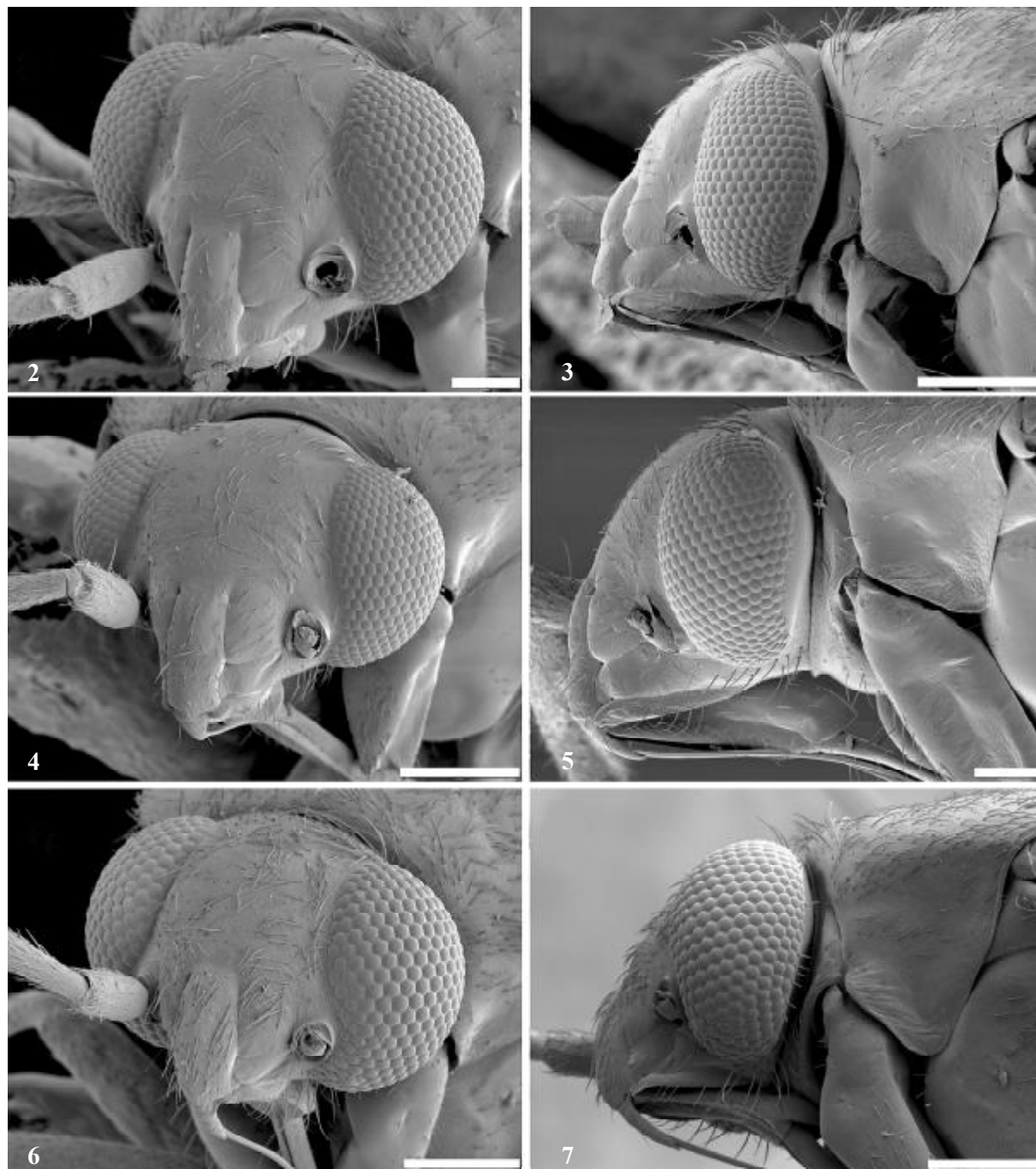
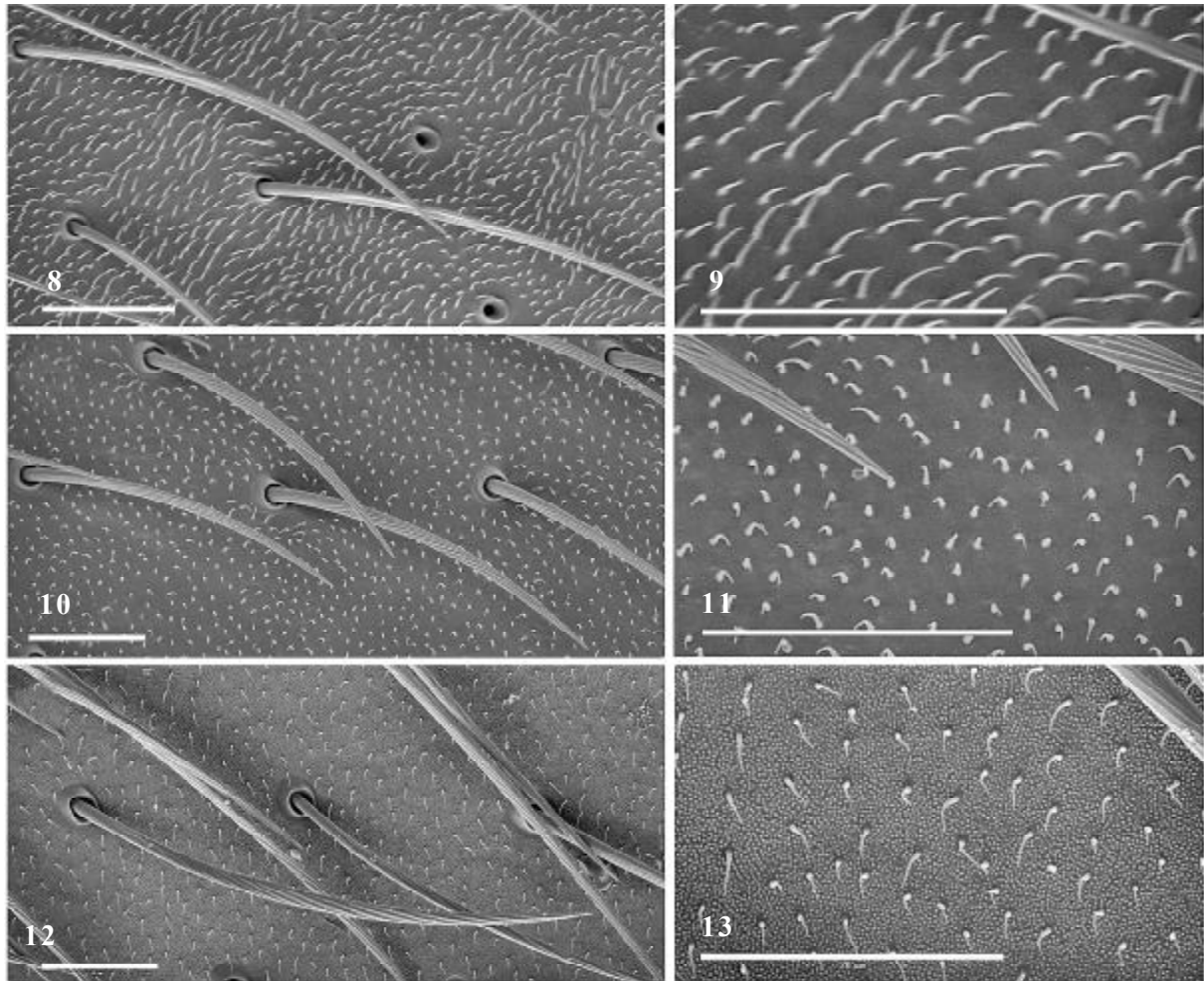


Fig. 2–7. *Plesiodema pinetella*, *P. pinicolus*, and *Izyaius sericeus*, ♂: 2–3 — *P. pinetella*; 4–5 — *P. pinicolus*; 6–7 — *I. sericeus*; 2, 4, 6 — head, anterior view; 3, 5, 7 — head, pronotum, lateral view. Scales: 2, 5 = 100  $\mu\text{m}$ ; 3–4, 6–7 = 200  $\mu\text{m}$ .

Рис. 2–7. *Plesiodema pinetella*, *P. pinicolus* и *Izyaius sericeus*, ♂: 2–3 — *P. pinetella*; 4–5 — *P. pinicolus*; 6–7 — *I. sericeus*; 2, 4, 6 — голова, вид спереди; 3, 5, 7 — голова и переднеспинка, вид сбоку. Мерные линейки: 2, 5 = 100  $\mu\text{m}$ ; 3–4, 6–7 = 200  $\mu\text{m}$ .

(Figs 8–11); labium reaching from apex of hind coxa to middle of abdominal sternum; claw relatively elongate, moderately broad basally, slender distally, pulvillus small, extending to one-half claw length, parempodia setiform and short (Figs 14–17); vesica J-shaped, with two straps, apices of straps with short, species specific spines (Figs 20–21), secondary gonopore open on ventral aspect, only slightly removed from apex and moderately large; phallosome sharply pointed.

North American *Plesiodema* can be distinguished from other small, conifer-inhabiting Phylini by the presence of simple, short, dark, dorsal setae only (Figs 10–11). Either silvery white, silky setae or white, flattened scale-like setae are present in the dorsal vestiture of all other conifers associates except for some small *Plagiognathus* spp. (e.g., in western North America, *P. fendleri* Schuh, 2001, *P. pemptos* Schuh, 2001, *P. piceicola* Schuh, 2001, and *P. vitellinus* (Scholtz,



Figs 8–13. *Plesiodema pinetella*, *P. pinicolus*, and *Izyaius sericeus*, ♂: 8–9 — *P. pinetella*; 10–11 — *P. pinicolus*; 12–13 — *I. sericeus*; 8, 10, 12 — dorsal setae; 9, 11, 13 — detail of dorsal setae. Scales = 20  $\mu$ m.

Рис. 8–13. *Plesiodema pinetella*, *P. pinicolus* и *Izyaius sericeus*, ♂; 8–9 — *P. pinetella*; 10–11 — *P. pinicolus*; 12–13 — *I. sericeus*; 8, 10, 12 — волоски на дорсальной поверхности; 9, 11, 13 — детали строения волосков. Мерные линейки = 20  $\mu$ m.

1847) have obviously longer and more densely distributed dorsal setae than *Plesiodema* spp. The structure of the vesica will separate *Plesiodema* from other phylinae genera, except some species of *Tuxedo* Schuh, 2001 [see Schuh, 2004: 5, Fig. 2].

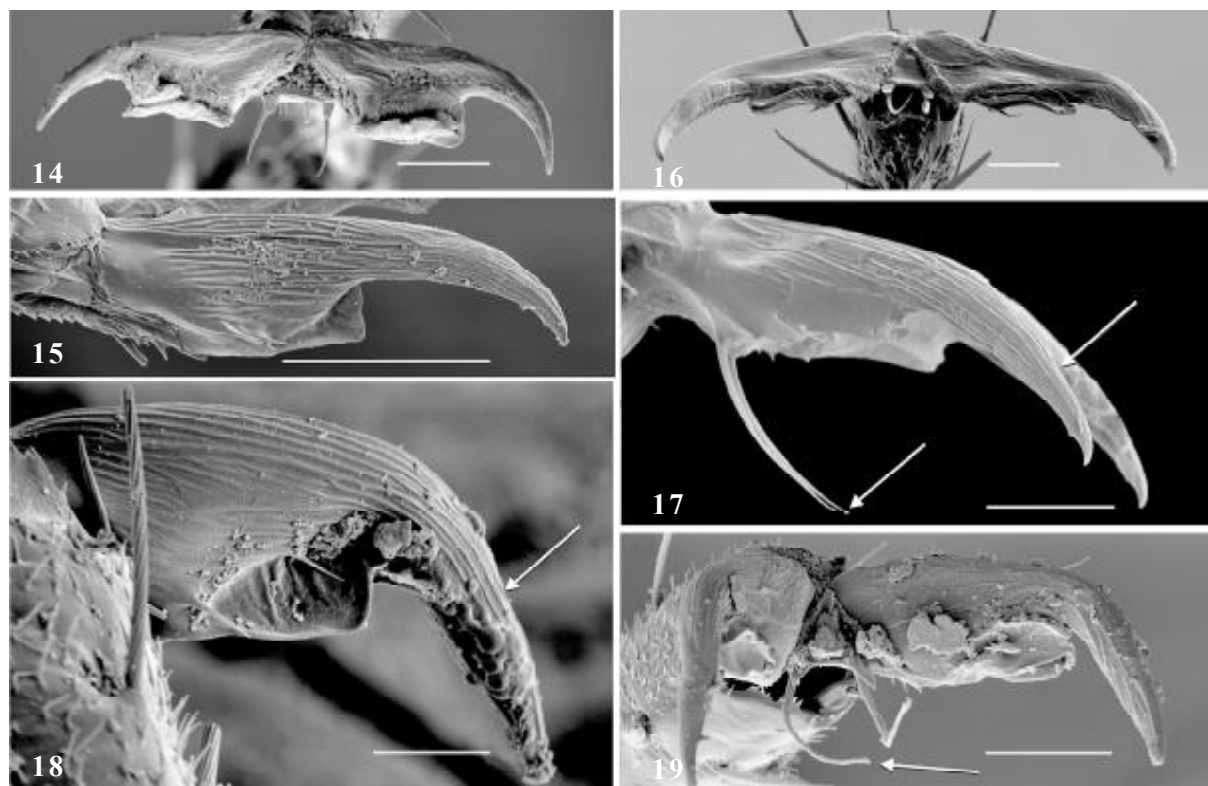
DISCUSSION. *Plesiodema* was described by Reuter [1875] to accommodate the European species *pinetella*. Four nominal species, *impurus* Boheman, 1852 (from Sweden), *lugubris* Fieber, 1861 (from Germany), *pallidipennis* Sahlberg, 1868 (from Russia), and *oblonga* Wagner, 1968 (from Spain), subsequently described, are now considered synonyms of *P. pinetella* [Kerzhner and Josifov, 1999]. Kerzhner [1979] described *stlaniki* from Far East of Russia and Yasunaga [2003] described *P. gotohi* from Japan.

*Coniferocoris* was erected [Schwartz & Schuh, 1999] to accommodate *pinicolus*, type species, *abiesicolus* Schwartz & Schuh, 1999, and *polhemi* Schwartz & Schuh, 1999. These small, mostly somber-colored, almost exclusively pine inhabiting species were uncommon and practically inconspicuous in collections. In our estimation they represented a monophyletic group that could not be placed in a known genus. Even though detailed descriptions and illustrations of the male genitalia of *P. pinetella* and *P. stlaniki* were obviously available to us, we failed to recognize that our three new species could conveniently be assigned to *Plesiodema*.

Schwartz and Schuh [1999] suggested that the conspicuous sexual dimorphism of antennal segment 2, the relatively wide space separating the posterior margin of the head from the anterior margin of the pronotum, and the distinctly transverse head with a strongly produced anteocular region were a significant diagnostic features of their new genus, *Coniferocoris*; *Plesiodema* has identical morphology. A comparison of Figs 8–11 for male *pinetella* and *pinicolus* and 20–21, 27–28 [Schwartz & Schuh, 1999] for both sexes of *polhemi* and *pinicolus* documents that the head is transverse and anteriorly produced in all. The dorsal vestiture of *pinetella*, *pinicolus*, (Figs 8, 10; Schwartz & Schuh [1999: Fig. 5c]) and *polhemi* [Schwartz & Schuh, 1999: Fig. 6d] are composed of fine brown or black simple setae only.

The structure of the pretarsus in the same species is similarly identical. Micrographs document that the claws are relatively narrow and elongate and that the parempodia are short, parallel, and pointed (compare Figs 14–17 with Schwartz and Schuh [1999: Figs 5d, 6e]).

The vesical structure of both nominal type species is of the same form, specifically the distal portion of the ventral strap bifurcates near the secondary gonopore. The apical shape of each half of the ventral strap is species specific. The position of the vesica of *pinetella* in Fig. 20 does not clearly



Figs 14–18. *Plesiodema pinetella*, *P. pinicolus*, and *Izyaius sericeus*, ♂: 14–15 — *P. pinetella*; 16–17 — *P. pinicolus*; 18–19 — *I. sericeus*; 14, 16, 18 — pretarsus, anterior view; 15, 17, 19 — pretarsus, lateral view. Scales: 14–17, 19 = 20 μm; 18 = 10 μm.

Рис. 14–18. *Plesiodema pinetella*, *P. pinicolus* и *Izyaius sericeus*, ♂: 14–15 — *P. pinetella*; 16–17 — *P. pinicolus*; 18–19 — *I. sericeus*; 14, 16, 18 — претарзус, вид спереди; 15, 17, 19 — претарзус, вид сбоку. Мерные линейки: 14–17, 19 = 20 μm; 18 = 10 μm.

document the bifid and hooked apices of the ventral strap as in the illustrations of Ribes [1978: 73, Fig. 41] and Linnavuori [1994: 47, Figs 4c, d]. In *pinicolus* both apices of the ventral strap are pointed. The apex of the posterior strap in *pinetella* is blunt and barely surpasses the distal end of the secondary gonopore while in *pinicolus* the apex is elongate and obviously exceeds the secondary gonopore (compare Figs 20–21). The overall size of the vesica differs between the nominal type species.

Based on these observations I must conclude that the type species of *Coniferocoris*, *C. pinicolus*, is congeneric with *Plesiodema pinetella*. Consequently *Coniferocoris* is a junior synonym of *Plesiodema*. This action results in the following proposed new combinations: *P. abiescolus* (Schwartz & Schuh, 1999) **comb.n.**, *P. pinicolus* (Schwartz & Schuh, 1999) **comb.n.**, and *P. polhemi* (Schwartz & Schuh, 1999) **comb.n.**

**HOSTS.** *Plesiodema* spp. are almost exclusively pine inhabiting and diapause in the egg stage [Yasunaga, 2003]. Documented hosts for the Palearctic spp. are as follows: **gotohi**: Japanese red pine, *P. densiflora* Siebold & Zuccarini [Yasunaga, 2003]; **pinetella**: Aleppo pine, *P. halepensis* Miller [Stichel, 1933], maritime pine, *P. pinaster* Aiton [Wagner, 1968], Italian stone pine, *P. pinea* L. [Ribes, 1978], European black pine, *P. nigra* Arnold [Linnavuori, 1994], and Scots pine, *Pinus silvestris* L.; **stlaniki**: Japanese stone pine, *P. pumila* (Pallas) Regel [Kerzhner, 1978, 1979]. *Plesiodema pinetella* is also known from Norway spruce, *Picea abies* L. Karsten, European larch, *Larix decidua* Miller (Pinaceae) [Stichel, 1933] with sitting records on *Quercus*, *Salix* [Stichel, 1933] and *Crataegus monogyna* Jacq. (Rosaceae)

(see England in Material above). The three Nearctic *Plesiodema* occur on six species of pine [Schwartz & Schuh, 1999]. The majority of *P. pinicolus* specimens were taken on *P. contorta* Douglas ex Loudon and most *P. polhemi* were on *P. edulis* Engelm. *Plesiodema abiescolus* is apparently associated with two species of *Abies*. Fig. 29 plots the distribution of the Nearctic spp. and their pine hosts.

**DISTRIBUTION.** In the Palearctic region the distribution of *P. pinetella* spans the forested zone of central, Mediterranean, and northern Europe to northern Asia and Japan, as well south to southern France, Spain, and northern Africa. *Plesiodema stlaniki* is known from alpine, cold temperate, and temperate regions of Hokkaido and Honshu, Japan and Far East of Russia including East Siberia and Sakhalin [Yasunaga, 2003]. *Plesiodema gotohi* is known only from the warm region of Honshu and Shikoku, Japan. The distributional data compiled for Fig. 1 originated from a variety of sources (see Introduction). In North America *Plesiodema* spp. occur on pine and fir in the western cordillera from Washington south-east to west Texas (Fig. 29) [Schwartz and Schuh, 1999].

#### *Izyaius* Schwartz **gen.n.**

Type species: *Psallus sericeus* Heidemann, 1892.

*Plesiodema*: Henry and Wheeler, 1988: 491 (cat.); Wheeler, 2001: 332 (biol.).

**DIAGNOSIS.** Recognized by the small, uniformly pale yellow or greenish yellow body with pale yellow, shining simple vestiture, small fuscous spots on anterior surface of femora, and brown tibial spines; sexual dimorphism with the antennal segment 2 of the male somewhat more thickened and 13% to 17% longer than in the female. Distinguished from

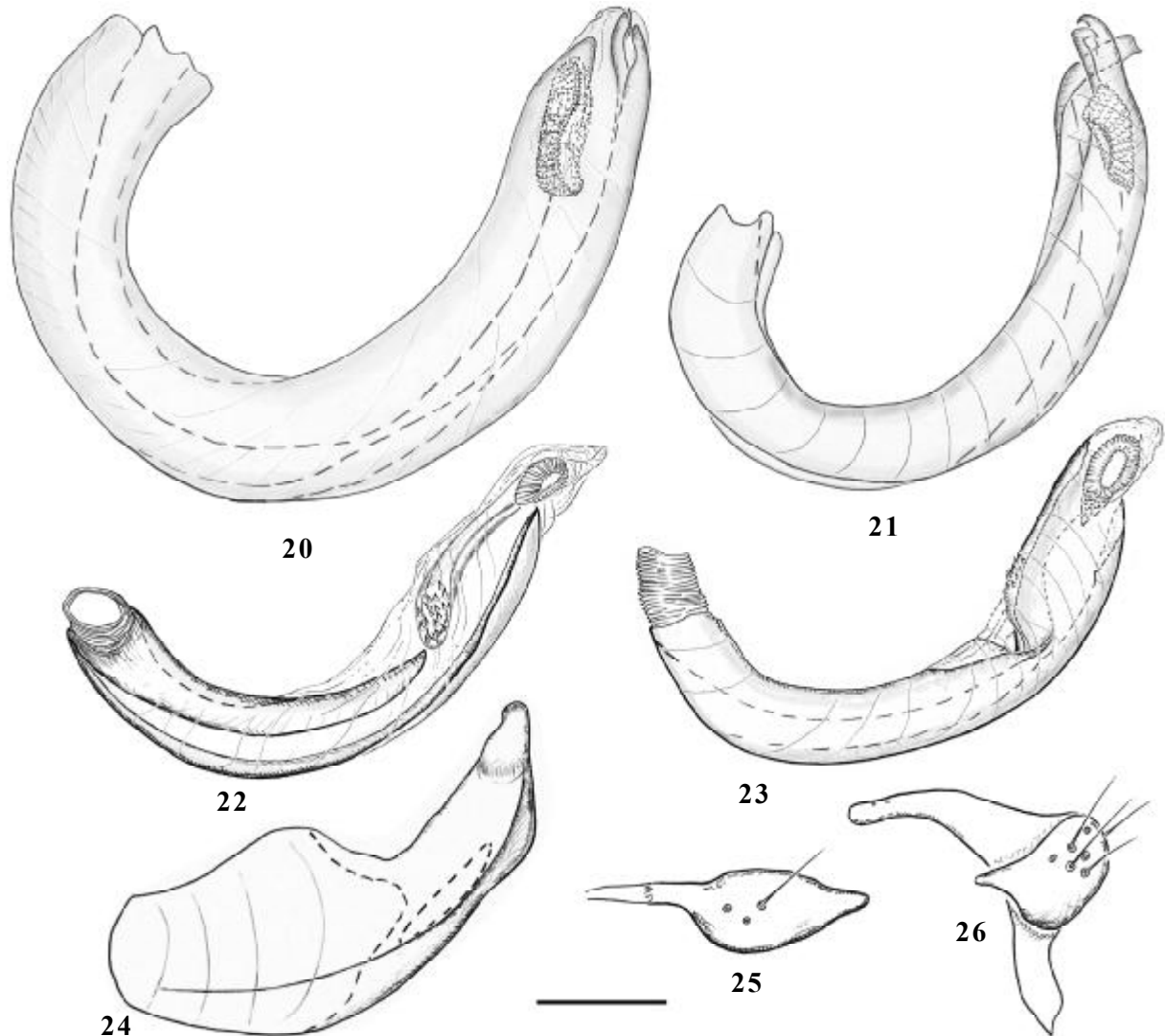


Fig. 20–26. *Plesiodema pinetella*, *P. pinicolus*, and *Izyaius sericeus*, ♂: 20 — *P. pinetella* vesica, lateral view; 21 — *P. pinicolus* vesica, lateral view; 22–23 — *I. sericeus* vesica, (22 — lateral view, CANADA, Hagersville; 23 — dorsolateral view, CANADA, Nepean); 24 — *I. sericeus*, phallosome, ventral view; 25 — *I. sericeus* right paramere, lateral view; 26 — *I. sericeus*, left paramere, lateral view. Scale = 0.1 mm.

Рис. 20–26. *Plesiodema pinetella*, *P. pinicolus* и *Izyaius sericeus*, ♂; 20 — *P. pinetella* везика, вид сбоку; 21 — *P. pinicolus* везика, вид сбоку; 22–23 — *I. sericeus* везика, (22 — вид сбоку, КАНАДА, Хэгервиль; 23 — вид сбоку и сверху, КАНАДА, Нэпэн); 24 — *I. sericeus*, фаллотека, вид снизу; 25 — *I. sericeus* правый парамер, вид сбоку; 26 — *I. sericeus*, левый парамер, вид сбоку. Мерная линейка = 0.1 мм.

other nondescript pale Phylini by the unique structure of the male genitalia, especially the short, predominantly membranous vesica with two weakly sclerotized straps supporting the dorsal and ventral surfaces (Figs 22–23). The medial portion of the dorsal strap is faint and distinctly bent ventrally; dorsal surface of the membrane, immediately distal to bend, with a small patch of spinules. The secondary gonopore extends distal to the terminus of the straps, where it is supported by membrane.

**DESCRIPTION.** Male. Small, moderately elongate ovoid, macropterous; total length 3.13–3.53, apex clypeus to cuneal fracture 2.15–2.35, width pronotum 0.94–1.14. **Coloration.** Uniformly pale yellow or greenish yellow, pinned specimens darken to orange yellow or fade to pale straw color with age; femora with few small, scattered fuscous spots on anterior surface; tibial spines and claw brown. **Surface and vesti-**

**ture.** Dorsal body surface smooth, impunctate, dull, hemelytra with micropustules (Fig. 13); vestiture composed of moderately densely distributed, moderately long, recumbent, pale yellow shining setae. **Structure.** **Head** short, transverse, conforming to anterior margin of pronotum, eyes removed by distance equal to basal diameter of antennal segment 2; frons slightly protruding beyond anterior margin of eyes; posterior margin of vertex rounded; eyes large in dorsal and lateral views (Figs 6–7), attaining ventral margin of head, surpassing anterolateral margin of pronotum; antennae inserted above ventral margin of eyes by distance slightly greater than diameter of antennal segment 1, antennal insertion contiguous with eye (Fig. 7); antennal segment 2 cylindrical, slightly tapered, at apex about same diameter as antennal segment 1; labium reaching apex of hind coxae. **Thorax** with trapeziform pronotum, anterior width just over one-

half posterior width; mesoscutum moderately exposed; mesothoracic spiracle with moderately wide evaporative area and metathoracic scent-efferent system with prominent pretrime and dorsal margin of evaporative area level with ventral margin of epimeron. **Legs** moderately long; claws moderately elongate, rather strongly curving; pulvilli flaplike, adhering basal portion of claw; parempodia setiform, long with truncate apex (Figs 18–19). **Abdomen** small, apex of small genital segment reaching to just short of apex of cuneus in lateral view. **Genitalia.** **Genital segment** small, conical, group of three erect bristlelike setae anteroventral to insertion of left paramere, ventral surface not modified. **Left paramere** typically phyline, posterior process somewhat elongate (Fig. 26). **Right paramere** small, fusiform (Fig. 25). **Phallosome** moderately elongate, conical, apex attenuate, distal ventral surface moderately keeled (Fig. 24). **Vesica** J-shaped, predominantly membranous with narrow dorsal and ventral straps, basal two-thirds with uniform diameter, dorsal strap deeply bent or notched medially, diameter of distal one-third of vesica wider than basal portion; secondary gonopore placed within apices of straps, with membrane forming apex of vesica; aperture open in lateral view (Fig. 23); basal end of secondary gonopore attenuate; membrane distal to medial bend of vesica with field of spinules (Figs 22–23)

**Female.** Similar to male in coloration, vestiture, and structure except for wider body, smaller eyes, wider vertex, and shorter, narrower antennal segment 2. **Genitalia.** **Sclerotized rings** ovoid, long axis parallel with ramus of first valvula, separated by distance equal to width of a ring, 0.16 long axis width, 0.09 perpendicular height. **Dorsal labiate plate** medallion shaped, anteromedial region projecting dorsally (Fig. 27; more folded than in situ); ventral labiate plate short not projecting posterior of middle of rings. **Vestibulum** practically symmetrical, minute weakly sclerotized plate. **Posterior wall** with inter-ramal sclerite consisting of two small faintly sclerotized plates, posterior surface covered with minute spinules, placed in suspending membrane (Fig. 28).

**ETYMOLOGY.** I dedicate this work to Izyaslav M. Kerzhner in recognition of his substantial contributions to our knowledge of heteropteran systematics and nomenclature. It is with great pleasure that I name this new genus in Izya's honor. It is based on the diminutive of his given name, the gender is masculine.

**DISCUSSION.** Heidemann [1892] described the nominal taxon, *sericeus* MS Uhler [*Psallus*], validating this nominal species collected on *Tilia americana* L. in Washington, D. C. Knight [1926] described *tiliae* [*Plagiognathus*] found on *T. americana* from Saint Paul, Minnesota. Subsequently, Knight [1941] placed his species in synonymy with *sericeus*, recognizing the validity of Heidemann's description. Carvalho [1955] agreed with Knight's action and provided the current generic placement of *Plesiodema* for this linden feeding species. When Wheeler and Henry [1975] designated a lectotype, the concept of *sericeus* was stabilized.

Carvalho [1955] did not provide morphological evidence for this combination, he stated only that *sericeus* represented the first record for *Plesiodema*, previously known from the Palaearctic region, in the Nearctic region. Yasunaga [2003] after describing *P. gotohi*, another *Pinus* inhabiting *Plesiodema* species, commented that the generic placement of *sericeus* was suspect based on the host association alone, but that providing a proper generic assignment for this species was beyond the scope of his study.

Perhaps the uniformly pale unmarked coloration of some specimens of *P. pinetella* in combination with fine simple vestiture, slightly anteriorly produced head, and sexually dimorphic

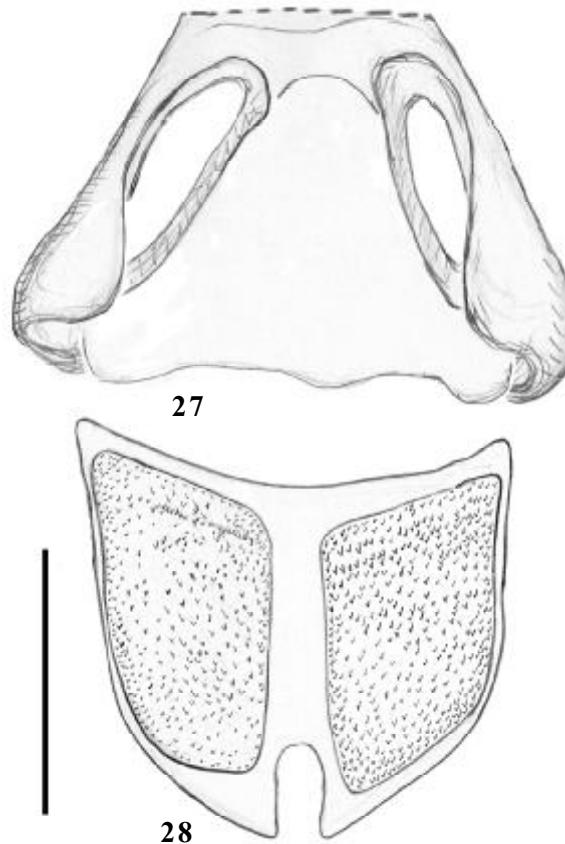


Fig. 27–28. *Izyaius sericeus*, ♀: 27 — dorsal labiate plate and sclerotized rings, dorsal view; 28 — posterior wall, posterior view. Scale = 0.1 mm.

Рис. 27–28. *Izyaius sericeus*, ♀: 27 — дорсальная лабиальная пластинка и склеротизованные кольца, вид сверху; 28 — задняя стенка, вид сзади. Мерная линейка = 0.1 мм.

eyes and antennae induced Carvalho [1955] to assign *sericeus* to *Plesiodema*. However the different host associations for *sericeus* and *pinetella* should have given him pause. A comparison of the same characters which allowed the reassignment of *pinicolus* to *Plesiodema* above, will justify erecting a new generic level taxon for *sericeus*. The head of *sericeus* is less produced than in any species of *Plesiodema* (compare Figs 6–7 with Figs 2–5). Even the slightly produced anterior aspect of the head in male *P. polhemi* [Schwartz & Schuh, 1999: Fig. 6a] is more prominent than in *sericeus*. The dorsal surface in species of *Plesiodema* is slightly shining. An examination of the dorsal microstructure reveals cuticular trichoid projections separated by smooth cuticle (Figs 9, 11). In *sericeus*, the space between the tricoids is covered with minute cuticular pustules (Fig. 13) giving the bug a dull appearance under visible light. The pretarsus of *sericeus* is different than those of *Plesiodema*. The claw is obviously wide at the base and curved and the parempodium is wavy, long, and truncate apically (Figs 18–19). In *Plesiodema* the claw is narrow and almost straight and the parempodium is straight, short, and apically pointed (Figs 14–17). Although the vesica of *Plesiodema* species and *sericeus* are J-shaped and small, there are significant differences. The vesica of *sericeus* is mostly membranous with a deeply bent dorsal strap, surface spinules, and terminal secondary gonopore (Figs 22–23). This structure might be unique among the Phylini. In *Plesiodema* the vesica is less membranous, the straps are unbroken medially, there are no spinules on the surface, the

secondary gonopore is subterminal, with the end of the straps terminating the vesica. Although only cursorily examined, the female posterior wall in *P. pinetella* has narrow interramal sclerites and those of *sericeus* have a greater height (Fig. 28).

Based on a preponderance of morphological evidence I must conclude that neither *Plesiodema*, nor any other phylinae genus, can adequately accommodate *sericeus* and the new genus *Izyaius* must be erected to contain it.

*Izyaius sericeus* (Heidemann) **comb.n.**

Figs 6–7, 12–13, 18–19, 22–28, 30.

*Psallus sericeus* Heidemann, 1892: 226 (sp.n., host), lectotype designation by Wheeler and Henry, 1975: 364 (USA: Washington, D. C.); Van Duzee, 1917: 407 (cat.).

*Plagiognathus tiliae* Knight, 1926: 252 (sp.n., host, holotype, USA: Minnesota, Saint Paul); syn. by Knight, 1941: 34.

*Plagiognathus sericeus*: Knight, 1941: 34 (comb.n.); Froeschner, 1949: 158 (dist.).

*Plesiodema sericeus*: Carvalho, 1955: 109 (comb. n.); 1958: 109 (cat.).

*Plesiodema sericeum*: Wheeler et al., 1983: 138 (dist.); Maw et al., 2000: 124 (dist.).

*Plesiodema sericea*: Schuh, 1995: 394 (cat.); Schwartz and Scudder, 2000: 266 (dist.); Wheeler, 2001: 228 (biol.); Yasunaga, 2003: 371 (disc.).

**MATERIAL. CANADA: Ontario:** Hagersville, 42.95°N 80.05°W, 9 Jul 1962, L. A. Kelton, Thorpe, *Tilia americana*, 1♂ (AMNH\_PBI 00112025) (CNC). Kingsville, 42.03333°N 82.75°W, 19 Jun 1962, Kelton and Thorpe, *T. americana*, 13♂ (AMNH\_PBI 00112007–AMNH\_PBI 00112019), 4♀ (AMNH\_PBI 00112020–AMNH\_PBI 00112023) (CNC). Nepean, Piney Forest, Lafontaine House, 43.1°N 82°W, 27 Jul 1991, M. D. Schwartz, 6♂ (AMNH\_PBI 00112065–AMNH\_PBI 00112070) (CNC). **USA: District of Columbia:** Washington, 38.90817°N 77.05105°W, N. Banks, 2♀ (AMNH\_PBI 00108255, AMNH\_PBI 00108256), 2♀ (AMNH\_PBI 00108255, AMNH\_PBI 00108256) (AMNH); N. Banks, 1♀ (AMNH\_PBI 00108257) (AMNH); 20 Jun 1900, N. Banks, 1♀ (AMNH\_PBI 00108258) (AMNH). Washington DC, 38.89178°N 77.00831°W, 16 Jun 1915, W. L. McAtee, *T. americana*, 3♂ (AMNH\_PBI 00133455–AMNH\_PBI 00133456, AMNH\_PBI 00133472), 1♀ (AMNH\_PBI 00133468) (USNM), 17♂, 2♀ (USNM); 18 Jun 1891, Unknown, 1♂ (AMNH\_PBI 00133466) (USNM); 18 Jun 1890, P. R. Uhler, 1♀ (AMNH\_PBI 00133467) (USNM); 11 Jun 1886, Unknown, 1♂ (AMNH\_PBI 00133475) (USNM); 17 Jun 1915, W. L. McAtee, 1♂ (AMNH\_PBI 00133474), 1♀ (AMNH\_PBI 00133473) (USNM); 30 Jun 1893, Unknown, *T. americana*, *Plagiognathus tiliae* Knight Paratype, 1♀ (AMNH\_PBI 00133476) (USNM); 18 Jun 1897, Unknown, *T. americana*, *P. tiliae* Paratype, 1♀ (AMNH\_PBI 00133477) (USNM). Same locality, various collection dates, and collectors, 13♂, 19♀ (USNM). **Illinois: Calhoun Co.:** Kampsville, 39.29783°N 90.60901°W, 131 m, 10 Jun 1932, H. L. Dozier, *Tilia* sp. (Tiliaceae), 5♂, 2♀ (INHS). **Champaign Co.:** Urbana, 40.11056°N 88.20722°W, 2 Jul 1914, Unknown, Light Trap, 1♀ (INHS); 27 Jul 1932, Frison and Ross, *Ulmus americana* L. (Ulmaceae), 1♀ (INHS). **Lake Co.:** Antioch, 42.47722°N 88.09556°W, 5 Jul 1932 - 7 Jul 1932, T. H. Frison, *Tilia* sp. (Tiliaceae), 2♂, 3♀ (INHS). Waukegan, 42.36361°N 87.84472°W, 6 Jul 1932, Frison et al., *Tilia* sp. (Tiliaceae), 2♀ (AMNH\_PBI 00108246, AMNH\_PBI 00108247) (AMNH); 6 Jul 1932, T. H. Frison, *Tilia* sp. L. (Tiliaceae), 11♂, 8♀ (INHS). **Vermilion Co.:** Muncie, 40.11559°N 87.84475°W, 197 m, 22 Jul 1932, Dozier and Park, 1♂, 1♀ (INHS). **Winnebago Co.:** New Milford, 42.18697°N 89.06788°W, 68 m, 3 Jul 1936, Ross and Burks, 1♂ (INHS). **Indiana: Tippecanoe Co.:** Tippecanoe County, 40.41722°N 86.89056°W, 12 Jun 1933, Musgrave, *Acer negundo* L. (Aceraceae), 1♂ (AMNH\_PBI 00133438) (USNM), 1♀ (USNM). **Iowa: Polk Co.:** Des Moines, 41.60054°N 93.60911°W, 266 m, 21 Jun 1940, Unknown, Light Trap, 1♂ (AMNH\_PBI 00133437) (USNM). **Story Co.:** Ames, 42.03472°N 93.61972°W, 14 Jul 1940, J. U. McGuire, 2♀ (AMNH\_PBI 00133435, AMNH\_PBI 00133436) (USNM). **Maryland: Anne Arundel**

**Co.:** Odenton, 39.08389°N 76.70056°W, 20 Jun 1915, W. L. McAtee, *T. europaea*, 2♂ (AMNH\_PBI 00133453, AMNH\_PBI 00133454) (USNM). **Prince George's Co.:** Oxon Hill, 38.80345°N 76.9897°W, 57 m, 30 Jun 1972, G. F. Hevel, 1♀ (AMNH\_PBI 00133433) (USNM). **Michigan: Washtenaw Co.:** Washtenaw County, 42.25059°N 83.84994°W, 286 m, 11 Jul 1919, R. F. Hussey, *P. tiliae* Paratype, 1♀ (MSU), 1♀ (USNM). **Minnesota: Ramsey Co.:** Saint Anthony Park, 44.97805°N 93.19083°W, 6 Jun 1923, H. H. Knight, *T. americana*, *P. tiliae* Paratype, 1♂ (AMNH\_PBI 00133457), 1♀ (AMNH\_PBI 00133458) (USNM), *T. americana*, *P. tiliae* Paratype, 1♂ (USNM); 11 Jul 1922, H. H. Knight, *T. americana*, *P. tiliae* Paratype, 2♀ (AMNH\_PBI 01211772) (CAS). *T. americana*, *P. tiliae* Paratype, 3♂ (AMNH\_PBI 00112026–AMNH\_PBI 00112028) (CNC). *T. americana*, 1♀ (AMNH\_PBI 00133465), *P. tiliae* Paratype, 7♂ (AMNH\_PBI 00122114, AMNH\_PBI 00133459–AMNH\_PBI 00133460, AMNH\_PBI 00133469–AMNH\_PBI 00133471, AMNH\_PBI 01211779), 4♀ (AMNH\_PBI 00122115–AMNH\_PBI 00122116, AMNH\_PBI 00133461–AMNH\_PBI 00133462) (USNM), *T. americana*, *P. tiliae* Paratype, 23♂, 25♀ (USNM); 25 Jul 1924, H. H. Knight, *T. americana*, 1♂ (AMNH\_PBI 00133464) (USNM), 4♀ (USNM); 14 Jul 1924, H. H. Knight, *T. americana*, *P. tiliae* Paratype, 2♀ (AMNH\_PBI 00133463, AMNH\_PBI 01211778) (USNM), *T. americana*, *P. tiliae* Paratype, 11♂, 4♀ (USNM). **Missouri: Boone Co.:** Columbia, 38.95167°N 92.33389°W, 9 Jun 1941, R. C. Froeschner, 1♂ (AMNH\_PBI 00133434) (USNM). **Buchanan Co.:** Buchanan County, 39.7802°N 94.8142°W, 293 m, Unknown, adult sex unknown (UMRM). **Greene Co.:** Springfield, Montebello St. and University St., 37.1835°N 93.29683°W, 15 Jun 2004, T. J. Henry and A. G. Wheeler, Jr., *T. americana*, 1♂, 5♀ (USNM). **Jefferson Co.:** Jefferson County, 38.3653°N 90.3629°W, 125 m, Unknown, adult sex unknown (UMRM). **St. Louis Co.:** Saint Louis County, 38.7106°N 90.3115°W, 193 m, Unknown, adult sex unknown (UMRM). **New York: New York Co.:** New York City, American Museum of Natural History, 40.781°N 73.9727°W, 34 m, 15 Jun 1977, R. T. Schuh, 2♂ (AMNH\_PBI 00108244, AMNH\_PBI 00108245) (AMNH). **Tompkins Co.:** Ithaca, Stewart Park, 42.4602°N 76.5067°W, 119 m, 8 Jul 1979, A. G. Wheeler, Jr., *Tilia* sp. (Tiliaceae), 1♂ (AMNH\_PBI 00133431), 1♀ (AMNH\_PBI 00133432) (USNM). **North Carolina: Buncombe Co.:** Swannanoa, 35.59778°N 82.4°W, 914 m, 16 Aug 1933, R. W. Leiby, adult sex unknown (NCSU). **Wake Co.:** North Carolina State University Campus, Raleigh, 35.7856°N 78.6686°W, 120 m, 14 Apr 1995, R. L. Blinn, *T. americana*, adult sex unknown (NCSU); 21 May 1996, R. L. Blinn, *T. americana*, adult sex unknown (NCSU); 1 Jun 2000, R. L. Blinn, *T. americana*, adult sex unknown (NCSU). Raleigh, 35.77194°N 78.63889°W, 26 May 1990, D. L. Stephan, *T. americana*, adult sex unknown (NCSU); 29 May 1990, R. L. Blinn, *T. americana*, adult sex unknown (NCSU); 3 Jun 1933, R. W. Leiby, adult sex unknown (NCSU). **Pennsylvania: Centre Co.:** Bellefonte Cemetery, 40.914°N 77.7724°W, 243 m, 7 Jun 1976, T. J. Henry, *T. americana*, 4♀ (AMNH\_PBI 00108260–AMNH\_PBI 00108263) (AMNH). **Dauphin Co.:** Harrisburg, William Penn High School, 40.27361°N 76.88472°W, 18 Jun 1974, T. J. Henry, A. Enagay, G. R. Stinner, *T. americana*, 1♂ (AMNH\_PBI 00108259) (AMNH). **Virginia: Falls Church Co.:** Falls Church, 38.88222°N 77.17138°W, 7 Jun 1900, N. Banks, 3♀ (AMNH\_PBI 00108249–AMNH\_PBI 00108251) (AMNH); 18 Jun 1900, N. Banks, 1♂ (AMNH\_PBI 00108248), 1♀ (AMNH\_PBI 00108252) (AMNH); 20 Jun 1900, N. Banks, 1♀ (AMNH\_PBI 00108253) (AMNH); 25 Jun 1900, N. Banks, 1♀ (AMNH\_PBI 00108254) (AMNH). **West Virginia: Kanawha Co.:** Kanawha County, 38.32149°N 81.58207°W, 187 m, Unknown, adult sex unknown (PDA). **Marion Co.:** Fairmont, 39.48508°N 80.14258°W, 304 m, 25 Jul 1928, P. N. Musgrave, 3♀ (ZISP).

**DIAGNOSIS.** Slightly smaller but remarkably similar in coloration and vestiture to *Plagiognathus flavidus* Knight, but distinguished externally by the larger genital segment of the male, the dark fuscous spots at the base of the black tibial spines, and the less rounded vertex. However, the vesical



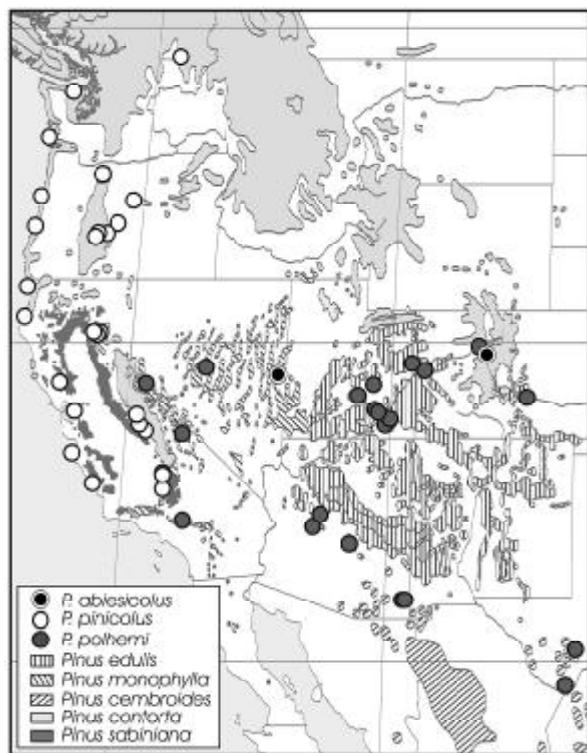


Fig. 29. Distribution of Nearctic species of *Plesiodema* and *Pinus* host plants.

Рис. 29. Ареалы неарктических видов *Plesiodema* и кормовые растения рода *Pinus*.

structure of these species are completely different; *P. flavidus* is typical of *Plagiognathus* species with strongly sclerotized, sigmoid, slightly twisted vesicae terminating in two long, blades that extend beyond the secondary gonopore.

**DESCRIPTION.** Male. Small, ovate. Total length 3.28 (3.13–3.53), length to cuneal fracture 2.25 (2.15–2.35), maximum width across hemelytra 1.30 (1.24–1.45). **Measurements.** *Head:* width 0.70 (0.65–0.73); vertex width 0.29 (0.28–0.31); anteocular length 0.17 (0.14–0.18); eye width 0.19 (0.18–0.21); eye height 0.37 (0.36–0.40); antennal measurements 1: 0.21 (0.19–0.21), 2: 1.03 (0.94–1.09), 3: 0.49 (0.46–0.51), 4: 0.31 (0.29–0.38); labial length 1.28 (1.19–1.34). *Pronotum:* width 1.07 (0.94–1.14); length 0.55 (0.48–0.59). **Coloration.** As in generic description, but sometimes with small, variable, green blotches on head, antennal segment 1, anterior margin of pronotum, propleura, epimeron, and lateral margins of venter; usually labial segment 4 and tarsal segment 3 infuscate. **Surface and vestiture, structure, and genitalia.** As in generic description.

**Female.** Similar to male in coloration and vestiture, but hemelytra wider across middle and antennal segment 2 shorter and thinner. Total length 3.54 (3.30–3.75); length to cuneal fracture 2.50 (2.25–2.63); maximum width across hemelytra 1.60 (1.50–1.75). **Measurements.** *Head:* width 0.69 (0.67–0.71); vertex width 0.37 (0.35–0.38); anteocular length 0.20 (0.18–0.22); eye width 0.15 (0.14–0.16); eye height 0.35 (0.34–0.37); antennal measurements 1: 0.21 (0.20–0.22), 2: 0.85 (0.80–0.94), 3: 0.47 (0.41–0.55), 4: 0.30 (0.29–0.33); labial length 1.34 (1.25–1.45). *Thorax:* width 1.21 (1.15–1.25); length 0.62 (0.59–0.65).

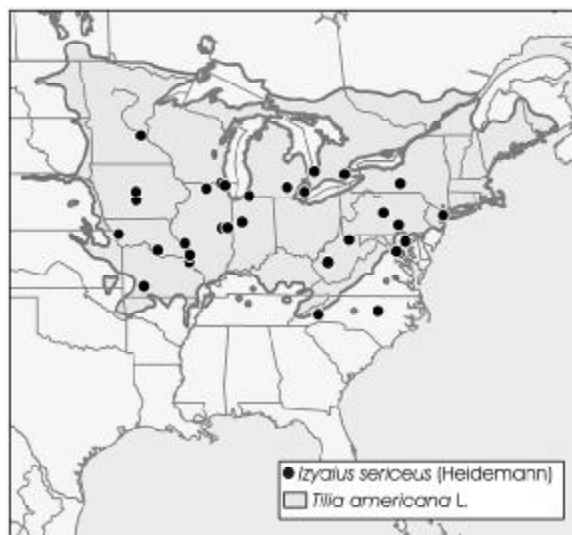


Fig. 30. Distribution of *Izyaius sericeus* and *Tilia americana*.  
Рис. 30. Ареалы *Izyaius sericeus* и *Tilia americana*.

**HOSTS.** Two species of *Tilia*, American linden or basswood, *Tilia americana* and European linden or common lime, *T. europaea* L. (Malvaceae: Tilioideae; previously Tiliaceae) are recorded breeding hosts. Records for box elder, *Acer negundo* L. and American elm, *Ulmus americana* L. are considered sitting records. Fig. 30 presents collection sites of *I. sericeus* on an overlay of the distribution of *T. americana* from Little [1971]. The one collection record outside the distribution of linden was from the University of North Carolina Campus.

All previous citations [Heidemann, 1892; Knight, 1926, 194; Wheeler, et al. 1983; Wheeler, 2001] and Henry [personal commun.] mention only the *Tilia* spp. as hosts. These authors also noted the difficulty in observing the cryptically colored pale greenish yellow immature and pale straw yellow adult stages hiding in and feeding on the developing flower petals and fruits. Wheeler [2001: 228] also listed an additional five North American and three European plant bug species that utilize the petalous inflorescence of *Tilia* spp.

**DISTRIBUTION.** Eastern North America from southern Minnesota and Ontario, Canada south to North Carolina and west to Missouri (Fig. 30). Locality information was compiled from specimen label data and literature [Froeschner, 1949; Wheeler, et al., 1983].

**DISCUSSION.** All specimens examined from throughout the distribution of *I. sericeus* are deemed to be conspecific, based on external and genitalic features. The variation for all the body measurement for both sexes was small (SD = 0.04). The structure of the vesica was practically identical for all specimens examined, only the extent of sclerotization was variable.

**ACKNOWLEDGMENTS.** I am grateful to Robert Blinn, North Carolina State University, Raleigh (NCSU), Fedor Konstantinov, Zoological Institute, St Petersburg, Russia (ZISP), Armand Matocq, Muséum national d'Histoire naturelle, Paris, Jim Stimmel, Pennsylvania Department of Agriculture, Harrisburg, and Gaby Viskens, Royal Belgian Institute of Natural Sciences, Brussels for providing locality data from specimens in their care. Vasily V. Grebennikov, Canadian Food Inspection Agency, Ottawa kindly provided an English language translation of Kerzhner [1979] and the Russian language inserts for the present manuscript. Institutional

abbreviations, institutional names, and names of curators are as follows: (AMNH) American Museum of Natural History, New York, Randall T. Schuh; (CAS) California Academy of Sciences, San Francisco, Paul Arnaud, Jr., Norman Penny; (CNC) Canadian National Collection of Insects, Agriculture Canada, Ottawa, Robert G. Foottit; (INHS) Illinois Natural History Survey, Champaign, Chris Dietrich; (MSU) Michigan State University, East Lansing, Gary Parsons; (UMRM) University of Missouri, Columbia, Robert W. Sites; (USNM) United States National Museum of Natural History, Washington, D.C., Thomas J. Henry. This paper represents a contribution to NSF Planetary Biodiversity Inventory award DEB-0316495, R. T. Schuh, principal investigator (<http://research.amnh.org/pbi/>).

## References

- Albrecht A., Huldén L., Lammes T. & Rinne V. 1984. Heteroptera of Inari Lapland, Finland // *Kevo Notes*. Vol.7. P.41–46.
- Albrecht A. & Hemiptera-työryhmä. 2006. Expert group on Hemiptera web site. Species distribution of Heteroptera. [<http://users.utu.fi/veirinne/maps/ludemaps.htm>]
- Boheman C.H. 1852. Nya svenska Hemiptera // Öfversigt af Kungliga Vetenskaps-Akademiens Förhandlingar. Vol.9. P.65–80.
- Carvalho J.C.M. 1955. *Analecta Miridologica*: Miscellaneous observations in some American museums and bibliography // *Revista Chilena de Entomologia*. Vol.4. P.221–227.
- Carvalho J.C.M. 1958. Catalogue of the Miridae of the world. Part II. Phylinae. *Arquivos do Museu Nacional Rio de Janeiro*. Vol.48. No.4. (1959). 384 pp.
- Fieber F.X. 1861. Die europäischen Hemipteren. Halbflügler. (Rhynchota Heteroptera). Gerold's Sohn, Wien. P.113–444.
- Froeschner R.C. 1949. Contributions to a synopsis of the Hemiptera of Missouri, pt. IV. Hebridae, Mesoveliidae, Cimicidae, Anthocoridae, Cryptostemmatidae, Isometopidae, Miridae // *American Midland Naturalist*. Vol.42. P.123–188.
- Heidemann O. 1892. Note on the food-plants of some Capsidae from the vicinity of Washington, D.C. // *Proceeding of the Entomological Society of Washington*. Vol.2. P.224–226.
- Henry T.J. & Wheeler A.G., Jr. 1988. Family Miridae Hahn. In: T. J. Henry and R. C. Froeschner (eds). *Catalog of the Heteroptera, or true bugs of Canada and the continental United States*. Leiden: E. J. Brill. P.251–507.
- Kerzhner I.M. 1978. [Heteroptera of Sakhalin and Kurile Islands] // *Trudy Biologo-pochvennogo Instituta Dal'nevostochnoe Otdelenie Akademiyi Nauk SSSR*. (N. S.) Vol.50. P.31–57. [In Russian].
- Kerzhner I.M. 1979. [New Heteroptera from the Far East of the USSR] // *Trudy Zoologicheskogo Instituta Akademiyi Nauk SSSR*. Vol.81. P.14–65. [In Russian].
- Kerzhner I.M. & Josifov M. 1999. Cimicomorpha II, Miridae. In B. Aukema and C. Rieger (eds), *Catalogue of the Heteroptera of the Palaearctic*. Vol.3. Wageningen: Netherlands Entomological Society. xiv + 577 pp.
- Knight H.H. 1926. Descriptions of six new species of Miridae from Eastern North America (Hemiptera, Miridae) // *Canadian Entomologist*. Vol.58. P.252–256.
- Knight H.H. 1941. The plant bugs, or Miridae of Illinois // *Bulletin of the Illinois Natural History Survey*. Vol.22. P.234.
- Lammes T., Rinne V. 1990. Maps of the provincial distribution of Finnish Heteroptera // *Entomologica Fennica*. Vol.1. P.209–220.
- Linnavuori R.E. 1994. On the Miridae fauna of Greece // *Biologia Gallo-hellenica*. Vol.21. No.1. P.41–48.
- Little E.L., Jr. 1971. Atlas of United States trees. Vol.1. Conifers and important hardwoods // U.S. Department of Agriculture Miscellaneous Publication. No.1146. 9 p. 200 maps. [<http://esp.cr.usgs.gov/data/atlas/little/index.html>]
- Maw H.E.L., Foottit R.G. & Hamilton K.G.A. 2000. Checklist of the Hemiptera of Canada and Alaska. Ottawa: NRC Research Press. 220 pp.
- Reuter O.M. 1875. Hemiptera Gymnocerata Scandinaviae et Fenniae disposuit et descripsit. Pars I. Cimicidae (Capsina) // *Acta Societatis pro Fauna et Flora Fennica*. Vol.1. No.1. P.1–206, 1 pl.
- Ribes J. 1978. Miridos interesantes de la provincia de Soria (Castilla) (Insecta Heteroptera) // *Miscellanea Zoológica*. Vol.4. P.51–75.
- Sahlberg J. 1868. Entomologiska anteckningar fran en resa i sydostra Karelen sommaren 1866. I. Orthoptera och Hemiptera // *Notiser ur Sällskapet pro Fauna et Flora Fennicae Förhandlingar* Vol.9. P.159–197.
- Scholtz H. 1847. *Prodromus zu einer Rhynchoten-Fauna von Schlesien // Uebersicht der Arbeiten und Veränderungen der Schlesischen Gesellschaft für Vaterländische Kultur*. Vol.1846. P.104–164.
- Schuh R.T. 1995. Plant bugs of the world (Insecta: Heteroptera: Miridae): systematic catalog, distributions, host list, and bibliography. New York Entomological Society. i–xii. 1329 pp.
- Schuh R.T. 2001. Revision of New World *Plagiognathus* Fieber, with comments on the Palearctic fauna and the description of a new genus (Heteroptera: Miridae: Phylinae) // *Bulletin of the American Museum of Natural History*. Vol.266. P.1–267.
- Schuh R.T. 2004. Revision of *Tuxedo* Schuh (Hemiptera: Miridae: Phylinae) // *American Museum Novitates*. No.3435. P.1–26.
- Schwartz M. D. & Schuh R.T. 1999. New genera and species of conifer-inhabiting phylinae plant bugs from North America (Heteroptera: Miridae) // *Journal of the New York Entomological Society*. Vol.107. P.204–237.
- Stichel W. 1933. *Illustrierte Bestimmungstabellen der Deutschen Wanzen (Hemiptera-Heteroptera)*. Fasc.8–9. W.Stichel, Berlin-Hermsdorf. S.211–274.
- Tamanini L. 1982. Gli eterotteri dell'Alto Adige (Insecta: Heteroptera) // *Studi Trentini di Scienze Naturali, Acta Biologica*. Vol.59. P.65–194.
- Van Duzee E. P. 1917. *Catalogue of the Hemiptera of America north of Mexico excepting the Aphididae, Coccidae and Aleurodidae*. University of California Publications in Entomology 2. i–xvi + 902 pp.
- Wagner E. 1968. Über einige sudeuropäische Miridae (Hemiptera, Heteroptera) // *Reichenbachia*. Bd.10. S.271–277.
- Wheeler A.G., Jr. 2001. *Biology of the plant bugs (Hemiptera: Miridae) pests, predators, opportunists*. Ithaca, NY: Cornell University Press. i–xv + 507 pp.
- Wheeler A.G. Jr. & Henry T.J. 1975. Recognition of seven Uhler manuscript names, with notes on thirteen other species used by Heidemann (1892) (Hemiptera: Miridae) // *Transactions of the American Entomological Society*. Vol.101. P.355–369.
- Wheeler A.G. Jr., Henry T.J. & Mason T.L. 1983. An annotated list of the Miridae of West Virginia (Hemiptera-Heteroptera) // *Transactions of the American Entomological Society*. Vol.109. P.127–159.
- Yasunaga T. 2003. A review of Japanese species of the plant bug genus *Plesiodema* Reuter (Heteroptera: Miridae: Phylinae) // *Tijdschrift voor Entomologie*. Bd.146.Hf.2. S.371–375.
- Zetterstedt J.W. 1828. *Fauna Insectorum Lapponica*. Pars 1. i–xx + 563 pp.