PLAGIOGNATHUS VITELLINUS (SCHOLTZ), A CONIFER-FEEDING MIRID NEW TO NORTH AMERICA (HEMIPTERA: MIRIDAE)

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PLAGIOGNATHUS VITELLINUS (SCHOLTZ), A CONIFER-FEEDING MIRID NEW TO NORTH AMERICA (HEMIPTERA: MIRIDAE)

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ABSTRACT—The Palearctic mirid *Plagiognathus vitellinus* (Scholtz) is reported in North America from 17 counties in Pennsylvania during 1972-73. A diagnosis and figures of the adult, last instar nymph, and male genitalia are provided. *Plagiognathus vitellinus* was found to breed on Douglas fir, *Pseudotsuga menziesii* (Mich.) Franco; European larch, *Larix decidua* Mill.; Norway spruce, *Picea abies* (L.) Karst.; Colorado spruce, *P. pungens* Engelm.; and white spruce, *P. glauca* (Moench) Voss. Characters are given for separating late instar nymphs of *P. vitellinus* from those of other phyline mirids breeding on these hosts. *Plagiognathus vitellinus* is an early season, univoltine species. Overwintered eggs hatched in early May; adults first appeared in late May and were abundant only for a few weeks in June. *Plagiognathus vitellinus* appears to be an introduced species in North America. An introduction on nursery stock rather than on ship ballast is considered probable.

Plagiognathus vitellinus (Scholtz) represents the second Palearctic mirid discovered in North America during our survey of the Miridae associated with conifers in Pennsylvania. Recently, we reported *Camptozygum aequale* (Villers) from Pennsylvania and its association with Scotch pine, *Pinus sylvestris* L. (Wheeler and Henry, 1973). This paper summarizes our observations on *P. vitellinus* during 1972-73.

Plagiognathus vitellinus was described as *Capsus vitellinus* by Scholtz in 1846 and placed in the genus *Psallus* by Fieber (1861). Wagner (1952) described the subgenus *Parapsallus* in which he included *vitellinus* and *dilutus* Fieber. This arrangement was followed in Carvalho's (1958) "Catalog of the Miridae of the World" which covered all literature to the end of 1955. In that year, however, Wagner (1955) removed *vitellinus* from *Psallus* to *Plagiognathus* based on the type of pubescence, tarsi, vesica, and certain other characters. Later, Wagner (1961) placed *dilutus* as a variety of *vitellinus*. Woodroffe (1957) agreed that *vitellinus* did not belong in *Psallus s. str.*; Stichel (1958) and Southwood and Leston (1959) also followed Wagner (1955). Kerzhner (1964) elevated *Parapsallus* to generic rank with *vitellinus* as the only included species. Since he gave no basis for this decision, we are following Wagner (1955) by retaining *vitellinus* in *Plagiognathus*.

Plagiognathus vitellinus occurs throughout Europe and in Siberia and Algeria (Carvalho, 1958) and perhaps represents an introduced species in England (Butler, 1923). It is restricted to conifers, including

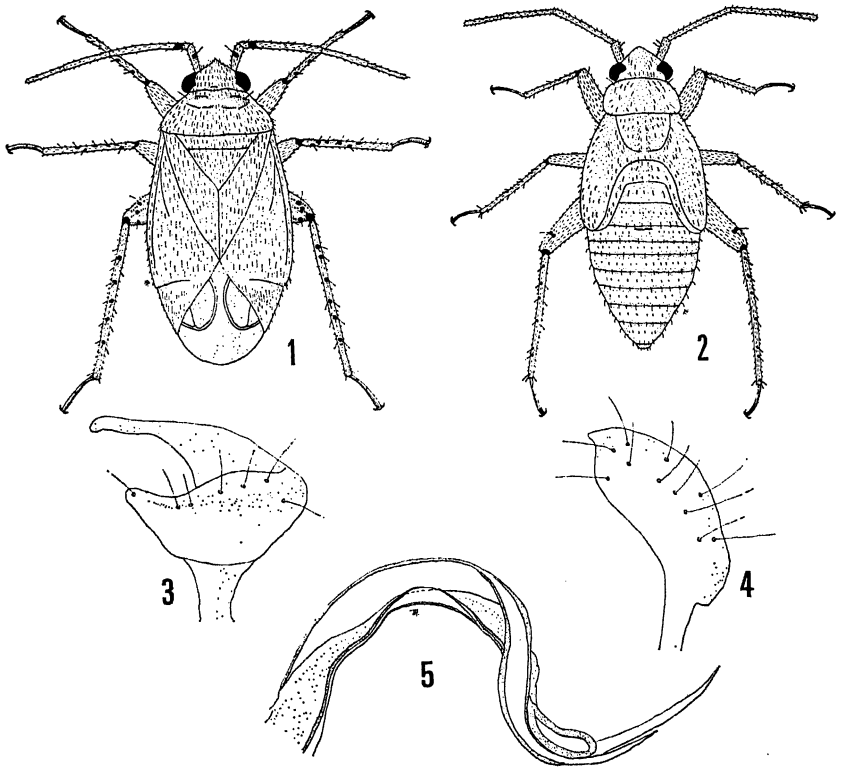

Fig. 1–5. *Plagiognathus vitellinus* (Scholtz): 1, adult; 2, fifth instar nymph; 3–5, ♂ genitalia: 3, left clasper; 4, right clasper; 5, vesica.

species of *Pinus, Picea,* and *Larix* (Reuter, 1908), and in England occurs mainly on spruces, less commonly on larch (Southwood and Leston, 1959). Kaltenbach (1874) listed it as a "Pflanzenfeind" on conifers, but gave no other information. Eggs are known to overwinter; adults appear in late June and persist until early August (Southwood and Leston, 1959).

In Pennsylvania 5 specimens were collected from spruces in 5 western counties during 7–14 July 1972. These specimens were keyed to *Plagiognathus* in Knight's (1941) key but did not fit descriptions of any of the phyline species included in his key. From a large series of specimens collected in 1973 this species was tentatively identified as the European *Plagiognathus vitellinus* (by TJH) using Southwood and Leston's (1959) key and by comparing our specimens with descriptions of *P. vitellinus* in Butler (1923), Wagner (1952), and Stichel (1958).

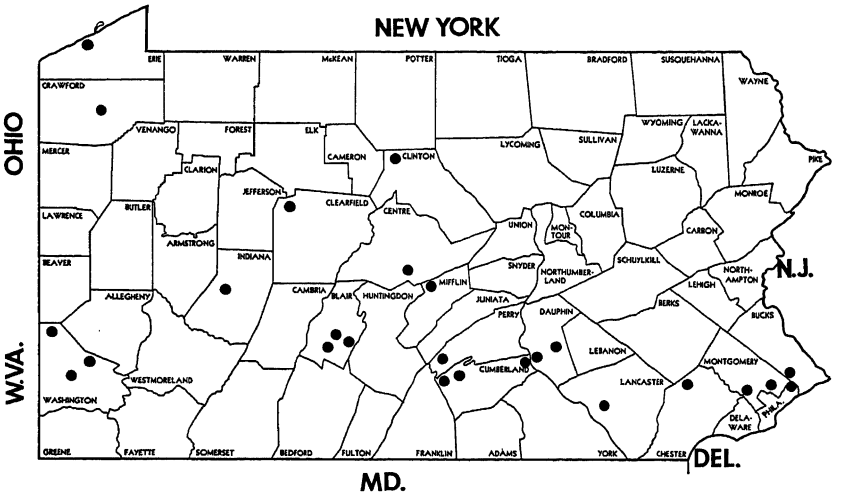

Fig. 6. Distribution of *Plagiognathus vitellinus* (Scholtz) in North America.

This identification was verified by comparison with specimens of *P. vitellinus* borrowed from the British Museum (Natural History).

This species may be distinguished from other species of *Plagiognathus* and phyline mirids in our area by the uniform flavotestaceous color, small size, pale yellow pubescence, first antennal segment with 1 or 2 black rings and sometimes the second with black at base, tibiae typically with black spots at base ("knees") and with black spines arising from large black spots, hind femora with black spots, last segment of hind tarsus almost as long as 1 and 2 together, and the structure of the male genitalia. Figures of the adult (fig. 1), last instar nymph (fig. 2), and male genitalia (fig. 3–5) are provided to facilitate identification.

Lengths of 10 ♂♂ and 20 ♀♀ are as follows: ♂ 3.00–3.32 mm ($\bar{X} = 3.18$ mm); ♀ 2.84–3.40 mm ($\bar{X} = 3.20$ mm). We have collected both the nominate form and variety *annulata* Stichel. The nominate form is characterized by having the first antennal segment black basally with a median black ring and the second segment black basally; the variety *annulata*, by the first segment black basally with 2 median brown spots and the second segment with a basal brown ring (Stichel, 1958). More detailed descriptions of the adult are given by Reuter (1878) and Hüeber (1911).

Biological Observations

During 1972–73, we collected *P. vitellinus* from 17 counties in Pennsylvania (fig. 6). This species can be characterized as an early

season mirid that feeds at the base of needles on new growth of spruces, larch, and Douglas fir. The seasonal history of populations on Douglas fir, *Pseudotsuga menziesii* (Mich.) Franco, and European larch, *Larix decidua* Mill., was determined. We found no other phyline mirid to breed on Douglas fir, while on European larch only *Plagiognathus laricicola* Knight was collected with *vitellinus*. Fourth and fifth instar nymphs of *P. laricicola* can be distinguished by the fuscous head, pronotum, apical third of wing pads, and tarsi, by the 2 rows of uniformly small brown spots on hind femora, and the generally weaker spots at bases of tibial spines. Four species occur with *vitellinus* on spruces: *Atractotomus magnicornis* Fallén, another Palearctic species introduced into North America (Knight, 1923, 1924) and one known to occur with *vitellinus* on conifers in Europe (Hüeber, 1911); *Microphylellus tumidifrons* Knight; *Plagiognathus suffuscipennis* Knight; and *Psallus piceicola* Knight. Populations of *M. tumidifrons* and *A. magnicornis* develop at about the same time as those of *vitellinus*. Late instar nymphs of *M. tumidifrons* can be distinguished by the absence of dark spots at the bases of the tibial spines; those of *A. magnicornis,* by the thickened second antennal segment. Eggs of *Psallus piceicola* and *Plagiognathus suffuscipennis* hatch about a week later than those of *vitellinus*. Nymphs of *P. piceicola* are easily distinguished by their reddish color; nymphs of *P. suffuscipennis* could not be separated reliably from those of *vitellinus*.

Periodic collections were taken from populations of *P. vitellinus* on Douglas fir and European larch in southwestern, central, and southeastern Pennsylvania. In the latter two areas eggs hatched in early May; those in southwestern counties, about a week later. Populations consisted mainly of second instar nymphs by 10 May; by late May fourth and fifth instars predominated. The first adult was collected on 30 May. Adults were abundant only for a few weeks from about 5 June to 20 June. In many of our sampling sites adults had disappeared by the end of June. Our latest record was of a single female collected from Douglas fir on 17 July in Blair County.

The seasonal history on spruces is assumed to be similar. Large populations were found on Norway spruce, *Picea abies* (L.) Karst.; Colorado spruce, *P. pungens* Engelm.; and white spruce, *P. glauca* (Moench) Voss.

Discussion

Like *Camptozygum aequale, P. vitellinus* is known only from Pennsylvania (although it is probably more widely distributed) and may have been introduced into North America. This idea is supported by its collection from hosts that are not native to our area but have been introduced from western North America or from Europe. We did collect nymphs of what appeared to be *P. vitellinus* from American

larch or tamarack, *Larix laricina* (Du Roi) K. Koch, growing in a bog in Clinton County. These could not be reared to maturity but were identical to late instar nymphs of *P. vitellinus* taken on European larch, Douglas fir, and spruces. Recently, Kelton (1966) suggested that from its collection from a wide area and from undisturbed habitats in North America, *Pithanus maerkeli* (Herrich-Schaeffer), previously thought to be a European introduction, might represent a true Holarctic species. However, until additional collections of *P. vitellinus* are made, the most reasonable assumption is that it represents an introduced species.

The observation that eggs of *C. aequale* were inserted into stems of seedling Scotch pine, *Pinus sylvestris L.*, led us to speculate that this species could have been accidentally introduced with pine nursery stock (Wheeler and Henry, 1973). Even though *P. vitellinus* was not found associated with conifer seedlings, an introduction via nursery stock rather than on ship ballast seems more reasonable. Our area was never a major dumping grounds for European ballast, and most of the Heteroptera found associated with ballast sites have been species of ground-dwelling habits (Lindroth, 1957). Seed feeders such as rhyparochromine lygaeids or predators such as nabids may be able to survive for extended periods in ballast. The possibility of the more delicate Miridae surviving in ballast materials would seem to be less likely. Additional collections of this species may provide clues to its means and site of introduction into North America.

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