Life History of *Plagiognathus albatus* (Hemiptera : Miridae), with a Description of the Fifth Instar[1]

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ABSTRACT

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The seasonal history of the so-called sycamore plant bug, *Plagiognathus albatus* (Van Duzee), was followed on London plane trees (*Platanus* × *acerifolia*) in central Pennsylvania during 1976–78. Eggs of this univoltine mirid hatched from late April to early May. Nymphs, which fed mainly on lower leaf surfaces, matured in late May or early June. Adults were present until mid-July. Relatively small populations damaged London planes in street and nursery plantings; injury consisted of chlorotic areas at feeding sites and eventually tiny holes where dead tissue dropped from the leaves. The 5th instar is described.

Plagiognathus albatus was described in the genus *Psallus* by Van Duzee (1915) from specimens collected in New York on American plane, *Platanus occidentalis* L. The so-called sycamore plant bug is a common mirid in much of eastern North America, its distribution nearly coinciding with the range of American plane, or sycamore, its apparent original host. This plant bug has adapted to the London plane, *P.* × *acerifolia*, a tree introduced from Europe in colonial times and now widely planted along streets of northeastern cities (Li 1963).

Injury by *P. albatus* takes a form inconsistent with that inflicted by most other mirids. At feeding sites, small holes appear when leaf tissue dies and drops out. The ragged or shothole appearance of the foliage has been attributed to chewing insects, hail, or a bacterial leaf spot. Little is known of biology, and presumably the accounts given in major works on pests of ornamentals (e.g., Westcott 1964, Johnson and Lyon 1976, Pirone 1978) are based on popular articles by Hamilton (1941) and Dodge (1943). Some of Hamilton's statements are inaccurate (e.g., adults may overwinter, eggs apparently are laid in leaf tissue). The present paper attempts to clarify the biology of *P. albatus*, presents the seasonal history in central Pennsylvania, and a description of the fifth instar.

Methods

Observations on seasonal history were made at irregular intervals during 1974–75; in 1976–78, 2 populations of *P. albatus* on ornamental London plane trees at Harrisburg, PA, were sampled in a manner similar to that used to study the mirid fauna associated with ornamental honeylocust (Wheeler and Henry 1976). Beginning with the first sign of bud break, foliage was examined at 1 - or 2 - day intervals to pinpoint egg hatch. After eggs had begun to hatch, collections were made every 7–10 days by tapping branch terminals over a beating tray (24 × 30 cm) and sorting to stage all dislodged specimens, usually a minimum of 10. Relative abundance was estimated in April and May 1976 and early June 1978 by counting all individuals beaten from the terminal 30 cm of 20 branches (4 branches on each of 5 trees). In another sample in early June all bugs were counted during visual examination of 200 leaves chosen at random (10 leaves on 10 terminals of 2 trees).

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Biology

Seasonal History.

The generalized seasonal occurrence of this univoltine mirid (Fig. 1) is a composite based on sampling populations of *P. albatus* at Harrisburg, PA for 3 consecutive seasons, 1976–78. Eggs which overwinter within woody tissue at the base of new leaf buds, began to hatch shortly after the first flush of leaves, usually when new leaves were about 3–4 cm in diameter. The date of first hatch was the 3rd week of April in 1976 and 1977, but eggs did not begin to hatch until the 2nd week of May in 1978 when leaves of the host were more fully expanded compared to their development the previous 2 seasons.

The majority of the adults matured in late May to early June, although 1 adult was found as early as May 18 in 1977. Males often outnumbered females during early June, but they apparently die sooner than females so that by early July the population normally consisted only of females. The latest collection of females in Pennsylvania was August 10 in Wayne Co. in the northeast and August 12 in Westmoreland Co. in the west.

Relative Abundance.

Populations of *P. albatus*, although injurious to their hosts, never attained the size of those of another common mirid pest of ornamentals, the honeylocust plant bug, *Diaphnocoris chlorionis* (Say). In the 3 samples taken April 21 to May 5, 1976, the number of nymphs beaten from the terminal 30 cm of 20 branches ranged from 1 to 15. The sample containing the single nymph was made when high winds may have removed much of the population or forced the early instars to seek shelter in crevices on host trees. Near the peak in numbers of nymphs in 1978 (June 1), 13 late instars were taken in the sample from 20 branch terminals. On the same day 7 and 9 nymphs were counted during examination of 100 leaves on each of 2 trees. These numbers were small when compared to the more than 2,000 individuals of *D. chlorionis* recorded from the terminal 36 cm of 8 branches on honeylocust trees near the *P. albatus* sample site (Wheeler and Henry 1976). McClure (1974) found relatively small populations of *P. albatus* compared to those of sycamore lace bug, *Corythucha ciliata* (Say), and several leafhopper species on American plane in Illinois.

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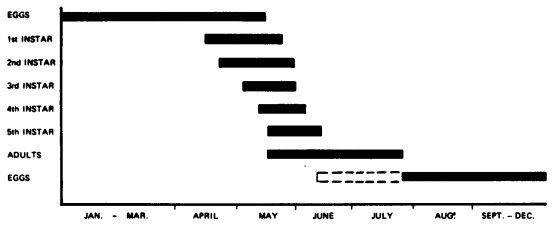

FIG. 1.—Seasonal history of *Plagiognathus albatus* in central Pennsylvania based on observations during 1976–78. Dotted line indicates probable beginning of oviposition period.

Feeding Sites and Host Injury.

Nymphs and adults were found on both upper and lower leaf surfaces, but most of the feeding seemed to occur on the lower surface. Dodge (1943), however, reported more feeding on the upper surface. Nymphs also were found on the developing fruit-heads. Numbers of *P. albatus* were generally higher on leaves near the tips of branches and on water sprouts.

Discoloration of London plane leaves began to appear when the populations consisted of 3rd to 5th instars and became severe by late May. In Delaware, discoloration and distortion of young foliage has been observed in early June (Milliron 1958). Chlorotic areas consisted of irregularly placed yellow to reddish specks in contrast to the more uniform discoloration of leaves injured by sycamore lace bug and leafhoppers (McClure 1974). Discolored tissue may drop from injured leaves, and by late June London plane foliage sometimes took on a characteristic tattered appearance (Fig. 2). In Pennsylvania, injury has been most severe in large blocks of London plane in nurseries. The hop plant bug, *Taedia hawleyi* (Knight), is one of the few North American mirids known to produce similar injury to its host (Hawley 1917).

Dodge (1943) and Pirone (1978), among others, have suggested that *P. albatus* injects a poisonous substance into leaves of its host. This suggestion is reasonable since no other sucking arthropod associated with *Platanus* species is known to produce similar injury, but an investigation of the salivary composition of this plant bug and host sensitivity to their secretions (and also possible reaction to the mere piercing of leaves by the bugs' proboscis) are needed to explain the atypical damage to London plane foliage.

Dodge (1943) described injury by *P. albatus* as more severe on American plane than on London plane trees and noted that London planes planted along streets of New York City were not seriously injured. In recent years, however, *P. albatus* has noticeably damaged street and park plantings of London plane in New York City (P. P. Pirone, pers. comm). The observations of relatively small numbers of this mirid on native American planes, and often larger, injurious populations in Pennsylvania nurseries and street plantings suggest that *P. albatus,* like the honeylocust plant bug, can become a pest in urban environments while maintaining smaller populations under more natural conditions.

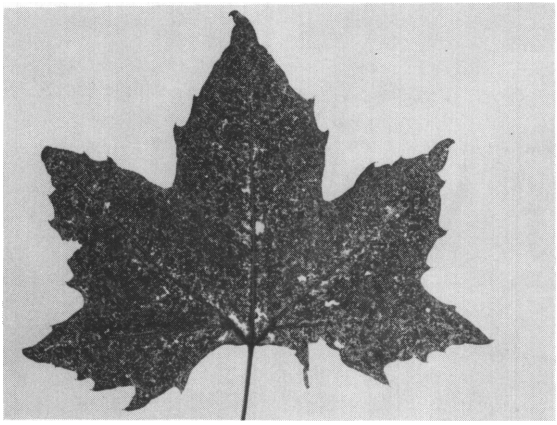

FIG. 2.—*Plagiognathus albatus* injury to London plane leaf showing holes where dead tissue has dropped from feeding sites.

Description of Fifth Instar

Length 2.44-2.92 mm, $\bar{x}$ = 2.78 mm (n=5). Uniformly pale yellowish-green. Head sparsely clothed with pale, erect setae; pronotum, wing pads, and abdomen with recumbent setae, longer, suberect setae along lateral margins. Rostrum reaching or nearly reaching hind coxae. Antennal segment I with 2 stout setae apically on inner face, remaining segments with shorter, recumbent setae; I, length 0.24 mm; II, 0.82 mm; III, 0.58 mm; IV, 0.20 mm. Dorsal abdominal scent gland opening not apparent. Femora sparsely clothed with fine, recumbent setae, and stouter, suberect setae on outer face, 1 longer seta at base; tibiae with several rows of pale spines with black spots at bases.

The 5th instar of *P. albatus* resembles that of many phyline Miridae. See the illustration of *P. delicatus* Knight (Wheeler and Henry 1976 : 1098) for a typical habitus.

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