

**REVISION OF *KELTONIA* AND THE COTTON FLEAHOPPER  
GENUS *PSEUDATOMOSCELIS*, WITH THE DESCRIPTION  
OF A NEW GENUS AND AN ANALYSIS OF  
THEIR RELATIONSHIPS  
(HETEROPTERA: MIRIDAE: PHYLLINAE)**

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*Abstract.*—The New World genera *Keltonia* Knight, containing 12 species, and *Pseudatomoscelis* Poppius, containing three species and including the cotton fleahopper (*P. seriatus* (Reuter)), are revised, and the new species *Keltonia bifurca*, *K. mexicana*, and *K. schaffneri* from Mexico, *K. pallida* and *K. robusta* from the United States, *K. steineri* from Grand Bahama Island, *Lineatopsallus slateri* from Texas, and *Pseudatomoscelis insularis* from Puerto Rico and St. Thomas are described. The new genus *Lineatopsallus* is established to accommodate *Psallus biguttulatus* Uhler and the new species *L. slateri*. *Pseudatomoscelis tuckeri* Poppius is resurrected from synonymy and transferred to *Keltonia*; *Psallus flora* Van Duzee is transferred to *Pseudatomoscelis*; *Psallus conspurcatus* Blatchley and *Keltonia fuscipunctata* Knight are considered junior synonyms of *K. sulphurea*, and *Psallus atomophorus* Reuter, a junior synonym of *P. seriatus*; and revised keys to species of *Keltonia* and *Pseudatomoscelis* are given. A cladistic analysis, using *Lineatopsallus* as the outgroup, indicates that *Keltonia* and *Pseudatomoscelis* are sister genera.

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Despite the great amount of economic literature treating the cotton fleahopper, *Pseudatomoscelis seriatus* (Reuter) (Sterling and Dean, 1977; papers cited in Frisbie et al., 1989), little is known of its distribution outside the United States (Sterling et al., 1989), or the relationship of *Pseudatomoscelis* Poppius to other genera within the mirid tribe Phyllini (Phyllinae). This revision is provided to furnish information on the recognition, distribution, hosts, and relationships of *P. seriatus* and related taxa.

Before 1920, the cotton fleahopper did not attract much attention as a pest of cotton (Reinhard, 1926). Since then, however, *P. seriatus* has ranked among the most important pests of cotton in the United States, possibly behind only the boll weevil (*Anthonomus grandis* Boheman), the bollworm (*Helicoverpa virescens* (F.)), and lygus bugs (*Lygus elisus* Van Duzee, *L. hesperus* Knight, and *L. lineolaris* (Palisot)). Losses to U.S. cotton in 1983 from the *P. seriatus* were estimated at over 46,000 bales, with the greatest crop reductions occurring in Texas, followed in order by Mississippi, Louisiana, New Mexico, Oklahoma, and Arizona (USDA, 1984). Damage results from nymphs and adults feeding on the reproductive structures, causing blasting and shedding of young cotton squares and often abnormal plant growth (Gaylor and Sterling, 1975). Secondary problems can arise when insecticides applied to control the fleahopper eliminate natural enemies, resulting in more severe outbreaks of other pests (Almand et al., 1976). Although most often termed a "key" pest during pre-bloom periods (e.g., Adkisson, 1973; Bottrell, 1973), *P. seriatus* may at other times

reverse its role on cotton to become a "key" predator, especially on the eggs of *Helicoverpa* (as *Heliothis*) species (e.g., McDaniel and Sterling, 1982; Johnson et al., 1986).

Prior to this study, only one species of *Pseudatomoscelis* and only six of *Keltonia* were recognized. Herein, I describe one new species of *Pseudatomoscelis*, six new *Keltonia*, and the new genus *Lineatopsallus* to accommodate *Psallus biguttulatus* Uhler and the new species *L. slateri*. *Psallus atomophorus* Reuter is considered a junior synonym of *Pseudatomoscelis seriatus*, and *Psallus conspurcatus* Blatchley and *K. fuscipunctata* Knight junior synonyms of *K. sulphurea*. *Pseudatomoscelis tuckeri* Poppius is resurrected from synonymy, and *Psallus flora* Van Duzee is transferred to *Pseudatomoscelis*. Figures of male genitalia, habitus photos for selected species, habitus illustrations for *K. tuckeri* and *P. seriatus*, scanning electron micrographs of pertinent structures (magnifications given on plates are before reduction to JNYES page format), and identification keys to species of each genus are provided to facilitate recognition. Species of *Keltonia* and *Pseudatomoscelis* are arranged alphabetically in the Systematics Section and are followed by a description of the outgroup and a discussion of relations under the Phylogenetic Analysis.

The following abbreviations are used for institutions cited in this paper: AMNH (American Museum of Natural History, New York, New York, R. T. Schuh, M. D. Schwartz [now at CNC], and G. L. Stonedahl [now at CAB Internatl. Inst. Entomol., London]; CAS (California Academy of Sciences, San Francisco, P. Arnaud and N. Penny); CNC (Canadian National Collection, Ottawa, L. A. Kelton and M. D. Schwartz); FSCA (Florida State Collection of Arthropods, Florida Department of Agriculture, Gainesville, F. W. Mead); PDA (Bureau of Plant Industry, Pennsylvania Department of Agriculture, Harrisburg, A. G. Wheeler, Jr.); JTP (J. T. Polhemus Collection, Englewood, Colorado); OSU (Department of Entomology, Oregon State University, Corvallis, J. D. Lattin); PSU (Department of Entomology, Pennsylvania State University, State College, K. C. Kim); PU (Department of Entomology, Purdue University, West Lafayette, Indiana, A. V. Provonsha); TAM (Texas A&M University, College Station, Texas, J. C. Schaffner); KU (Department of Entomology, University of Kansas, Lawrence, P. D. Ashlock, deceased); USNM (Department of Entomology, U.S. National Museum of Natural History, Washington, DC); USU (Utah State University, Logan, W. J. Hanson); ZMU (Zoological Museum of the University, Helsinki, A. Jansson).

#### TAXONOMIC HISTORY OF *KELTONIA* AND *PSEUDATOMOSCELIS*

Poppius (1911) erected the genus *Pseudatomoscelis* to accommodate *Atomoscelis seriatus* Reuter and his new species *P. tuckeri*, which he separated from *Atomoscelis* Reuter based primarily on head structure. Van Duzee (1916), without comment, placed *Pseudatomoscelis* as a junior synonym under the genus *Psallus*, an opinion followed by Blatchley (1926), Knight (1926a, b, 1941), and Carvalho (1952, 1958, 1959). Knight (1968) reevaluated the position of *P. seriatus* and, based on the antennal spotting and clustered sericeous setae on the hemelytra, returned it to *Pseudatomoscelis*, where it has remained as the only recognized species until the present study.

Knight (1923), in recognizing that *Psallus sulphureus* Reuter was not congeneric with *Psallus* Fieber, transferred it to the genus *Reuteroscopus* Kirkaldy. Carvalho

(1958), apparently following Knight's concept of Reuter's species, synonymized *Pseudatomoscelis tuckeri* Poppius (then placed in the genus *Psallus*) with *R. sulphureus*. Kelton (1964) showed that *sulphureus*, based on genitalia and other characters, is not congeneric with other species of *Reuteroscopus* but, in cooperation with Knight, deferred taking taxonomic action. Subsequently, Knight (1966) established the genus *Keltonia* to accommodate *sulphureus*, transferred *Psallus balli* Knight to this new genus, synonymized *Psallus conspurcatus* Blatchley with *K. sulphurea*, and described the new species *K. fuscipunctata* and *K. rubrofemorata*. Kelton (1966) described the new species *K. clinopodii* and *K. knighti* and provided a revised key to species.

#### GENERIC RELATIONSHIPS OF KELTONIA AND PSEUDATOMOSCELIS

For this study, I have examined representatives of most New World and many Old World genera of Phylinae in search of potential relatives of *Pseudatomoscelis seriatus*. Initially, I narrowed my search to those taxa possessing dorsal spots and/or sericeous body pubescence (here defined as short, thickened, silky setae (Torre-Bueno, 1973); also referred to as moderately flattened, apically acuminate, scalelike setae by Schuh and Schwartz (1985) and Stonedahl (1990)). It soon became evident that dorsal spotting has evolved numerous times in the Phylinae, and although apomorphic for specific taxa, this character does not represent a synapomorphy for broad groups (e.g., *Atomoscelis*, some species of *Phymatopsallus* Knight and *Plagiognathus* Fieber). Even within *Pseudatomoscelis*, *P. seriatus* has distinct dorsal spotting, whereas its sister species *P. flora* (Van Duzee) is immaculate.

Schuh (1984), Schuh and Schwartz (1985), and Stonedahl (1990), among others, have shown that sericeous setae can be informative regarding phylina relationships. Schuh and Schwartz (1985) noted that *Pseudatomoscelis seriatus* possesses a mesially swollen, flattened, and apically acuminate, sericeous setal type shared by a number of taxa, including *Atractotomus magnicornis* (Fallén), *Campylomma verbasci* (Meyer-Dür), *Europiella stigmosa* (Uhler), and *Psallus ancorifer* (Fieber). Study of male genitalia, however, indicates that most of these taxa are not particularly close to *Pseudatomoscelis*. Most have sigmoid vesicae and the sericeous setae never appear in clusters.

Genitalia reveal that members of the genus *Keltonia*, not previously associated with *Pseudatomoscelis*, share a vesica type close to *P. seriatus*. Perusal of other characters indicates that these two genera form a sister-group relationship.

Synapomorphies that support the monophyly of *Keltonia* and *Pseudatomoscelis* are 1) a stout, C-shaped vesica, bearing a large, sickle-shaped spicule; 2) clumps or tufts of acuminate sericeous setae usually distributed over dorsum, but always present along the inner margin of the eye near the base of the antenna; 3) 1 or 2 patches of dark, bristlelike setae along inner margin of the cuneus; and 4) a large dark area on membrane near apex of cuneus.

Synapomorphies that support the monophyly of species included in *Pseudatomoscelis* are 1) a stout, C-shaped vesica, with a broad, swordlike spicule, but lacking a flattened, cuplike, apical process (as is found in *Keltonia*); 2) a stout, subapical spine on the phallosome; 3) antennal segment II spotted; and 4) a somewhat saltatorial metafemur bearing 2 or more stout, subapical, bristlelike setae.

Synapomorphies supporting the monophyly of species placed in *Keltonia* are 1) a

stout, C-shaped vesica bearing a flattened, cuplike, apical process (spicule variable from slender to broad and from acuminate to truncate apically); 2) head, pronotum, and scutellum with a distinct mesal line of silvery sericeus setae; and 3) membrane distinctly conspurcate.

A search for an outgroup to use in helping to polarize character information proved somewhat more difficult. G. M. Stonedahl (pers. comm.) indicated to me that *Psallus biguttatus* Van Duzee appeared to share a number of attributes with *Keltonia* and *Pseudatomoscelis* that suggested some relationship. This species, obviously not belonging in the genus *Psallus*, bears the clumps or tufts of silvery sericeus setae along the inner margin of the eye near the antennal base (the minimum found in *Keltonia* and *Pseudatomoscelis*), has indications of homologous dark patches along the inner margin of the cuneus (although no specimens examined have the dark bristlelike setae found in *Keltonia* and *Pseudatomoscelis*), and there is a dark area just beyond the apex of the cuneus on the membrane. Certain other apomorphies, however, indicate that *P. biguttatus* is not congeneric with *Keltonia* and *Pseudatomoscelis* and represents a new genus, which is described as *Lineatopsallus* in this paper. Synapomorphies supporting the monophyly of the species placed in this genus include 1) a distinct fuscous line present on antennal segment II, dorsally along each femur, and along the length of all tibiae; 2) a very slender, although C-shaped, vesica that lacks a spicule separate from the primary shaft; 3) a left paramere possessing a short process basal to the left arm; and 4) a unique, apically flattened phallotheca.

#### SYSTEMATICS

##### *Keltonia* Knight

*Keltonia* Knight, 1966:590; Kelton, 1966:668; Henry and Wheeler, 1988:469. Type species: *Keltonia rubrofemorata* Knight, 1966. Original designation.

**Diagnosis.** Phylinae: Phylini. *Keltonia* is distinguished from all other members of the tribe Phylini by the pale body coloration (pallid, yellow, yellowish orange, to reddish orange); dorsal spots limited to the hemelytra; conspurcate hemelytral membrane; dark setal patches on inner margin of cuneus; two types of dorsal pubescence, with sericeus pubescence present in distinct clumps or tufts and often in rows along midline of head and pronotum; pale tibiae with dark spots at the bases of the spines; and the stoutly formed, weakly twisted, C-shaped vesica, with a distinct slender spicule and a cuplike, apical process.

**Description.** Generally elongate oval, somewhat delicate, small to medium sized, length from apex of tylus to apex of hemelytral membrane 2.36–4.20 mm; coloration ranging from pallid or white to yellow, yellowish green, yellowish orange, and reddish orange, often appearing to have a phosphorescent, velvety bloom under certain reflected lights; dorsal surface impunctate, smooth, shiny or dull, clothed with simple, semierect setae, intermixed with individual and/or tufts and rows of silvery, sericeus or scalelike setae. Head subtriangular in dorsal aspect, tylus slender, pronounced, antennal segment I not or just surpassing apex of tylus, antennal fossa or socket set anteriorly adjacent to lower half of compound eye near shallow, inner emargination, eyes with short, sparse pubescence; jugum adjacent to base of tylus with a tuft of silvery, sericeus setae, often with 2 or 3 tufts near inner margin of each eye and a narrow row along midline or meson (Figs. 45, 46, 50, 51). Rostrum extending to

metacoxae or beyond. Antenna slender, segment I shortest and thickest, II longest, III and IV most slender, combined lengths subequal to length of II. Pronotum trapeziform, unspotted, with simple, recumbent and silvery, sericeus setae. Hemelytron macropterous, surface immaculate to variously spotted—spotting ranging from evenly sprinkled, to coalescing on inner half of corium and apical area of clavus forming a dark cloud at middle, to nearly absent on pale species (Figs. 13–16, 41–43); cuneus longer than wide at base, inner margin bordering membrane with 1 or 2 darkly pigmented patches giving rise to stout, fuscous or black setae; membrane always conspurcate (dark with pale spots or pale with dark spots). Legs slender; femora slender (i.e., not saltatorial), usually with fine, brown spots; tibiae pale with brown or fuscous spots at bases of spines; claws slender, with setiform parempodia and short, quadrate, fleshy pulvilli (Figs. 48, 53). Parameres typically phyline; left paramere with 2 parallel processes, anterior (left) one short, blunt or acute, posterior (right) one long, acute, vesica extending through and resting between processes of left paramere in withdrawn position; right paramere simple, elongate oval, with a slender stemlike base. Vesica stout, C-shaped, primary body sheathlike, with a slender spicule extending to apex of sheath, and apical process bluntly rounded, shallowly cuplike, and flattened; secondary gonopore subapical.

Females are similar to males in general coloration and pubescence, but usually differ in by their larger, broader body size, proportionately smaller eyes, broader vertex, and slightly more slender 2nd antennal segment.

**Remarks.** *Keltonia* is most closely related to the genus *Pseudatomoscelis* based on the shared hemelytral spotting of most species, the setigerous black patches on the cuneus and paracuneus (inner, basal angle of cuneus, lacking suture), two types of pubescence including the uniquely tufted sericeus setae, spots at the bases of the tibial spines, and the stoutly formed, C-shaped vesica. Species of this genus can be separated from those of *Pseudatomoscelis* by the lack of spots on the antennae, lack of stout, black, bristlelike setae on the apical third of the femora, the slender meta-femora that are never saltatorial, the distinctly conspurcate membrane, and the cuplike, apical process on the vesica. See “Phylogenetic Relationships” for further discussion.

Although *K. sulphurea* [of authors] has been placed in *Reuteroscopus* Reuter, and Knight (1966) wrote when describing *Keltonia* “a new genus near *Reuteroscopus*,” *Reuteroscopus* is not closely allied with *Keltonia* and *Pseudatomoscelis* in the tribe Phylini. Species of *Reuteroscopus* lack sericeus pubescence, spots at the bases of the tibial spines, and setigerous black cuneal spots, and the male genitalia (see Kelton, 1964) are bizarrely unique in the subfamily Phylinae and quite distinct from species in *Keltonia* and *Pseudatomoscelis*.

In the following key to species, reasonably well-preserved specimens are necessary to correctly evaluate the characters used, especially coloration, dorsal spotting, and relative position of the rostrum. Specimens prepared from alcohol tend to fade, and upon drying the natural position of the head and rostrum in relation to the body often becomes distorted.

#### KEY TO THE SPECIES OF *KELTONIA*

1. Hemelytral spots coalescing to form a conspurcate brown cloud or solid dark area through middle of corium and apex of clavus (Figs. 16, 42, 49) ..... 2

- Hemelytral spots evenly distributed or absent, never forming a dark area through middle of corium and apex of clavus ..... 6
- 2. Dorsum bright shiny yellow; hemelytron lacking small brown spots around solid dark area at middle; femora red to dark reddish brown; central Florida ..... *rubrofemorata* Knight
- Dorsum dull, sometimes phosphorescent, yellow; hemelytra with numerous spots surrounding coalesced spots or dark cloud at middle; femora always pale, with small brown spots ..... 3
- 3. Cuneus and embolium without brown setigerous spots; spots on corium nearly limited to central brown area; central Florida ..... *clinopodii* Kelton
- Cuneus, embolium, and corium with distinct, brown setigerous spots ..... 4
- 4. Rostrum short, extending only to metacoxae; vertex narrow, width subequal to 1.5× dorsal width of an eye in males, 2× in females; central and southern Mexico ..... *mexicana*, n. sp.
- Rostrum longer, extending well beyond metacoxae to base of male genital segment or ovipositor in females; vertex wider, 2.5× or more dorsal width of an eye in males, 3× in females ..... 5
- 5. Second antennal segment distinctly longer than basal width of pronotum in males, subequal in females; spicule of vesica curved upward apically (Fig. 17); Sinaloa, Mexico ..... *knighti* Kelton
- Second antennal segment less than or subequal to basal width of pronotum; spicule of vesica straight apically (Fig. 62); Massachusetts to Colorado, south through Mexico to Colombia and Venezuela ..... *tuckeri* (Poppius)
- 6. Dorsum yellowish to pale reddish orange, cuneus contrasting red to deep reddish orange (Fig. 13); central and northern Florida ..... *balli* (Knight)
- Dorsum pallid, yellow, or pale yellowish orange, cuneus never contrasting deep reddish orange ..... 7
- 7. Hemelytra devoid of spots, or the few spots present hardly visible ..... 8
- Hemelytra with numerous, evenly distributed, easily visible spots ..... 9
- 8. Overall coloration pallid to dull greenish white; clavus and corium uniformly pale, without spots (cuneus and embolium sometimes with a few indistinct spots); coastal Texas ..... *pallida*, n. sp.
- Overall coloration shiny, translucent yellow; clavus and corium with tiny, vague spots; Oaxaca, Mexico ..... *schaffneri*, n. sp.
- 9. Large robust species, length 3.50 mm or more; rostrum 2 mm long or more; northern Florida ..... *robusta*, n. sp.
- Smaller species, length 3.10 mm or less; rostrum 1.80 mm or less ..... 10
- 10. Length of rostrum 1.70–1.80 mm; dorsum pallid to pale lemon yellow; Grand Bahama Island ..... *steineri*, n. sp.
- Length of rostrum 1.60 mm or less; dorsum more greenish yellow ..... 11
- 11. Length of rostrum 1.30–1.40 mm, not extending beyond base of genital segment; apex of spiculum on vesica acute (Fig. 58); Jamaica and Florida ..... *sulphurea* (Reuter)
- Length of rostrum 1.45–1.60 mm, extending well beyond base of genital segment; apex of spiculum on vesica forked or bifurcate (Fig. 5); Guerrero, Mexico ..... *bifurca*, n. sp.

*Keltonia balli* (Knight)

Figs. 1–4, 13

*Psallus balli* Knight, 1926b:253.

*Keltonia balli*: Knight, 1966:591; Kelton, 1966:670; Henry and Wheeler, 1988:469.

**Diagnosis.** *Keltonia balli* is distinguished from all other species of the genus by the unique multicolored dorsum (Fig. 13) and legs. The orange to brownish or reddish-orange head and pronotum and deep-orange to red-orange cuneus, contrasted by the paler areas of the corium and clavus would suggest that this species is not congeneric with others of the genus. However, the peculiarly patterned silvery, sericeus pubescence, dark cuneal spots, conspurcate membrane, and male vesica support its current generic position.

In the key, I interpret this species as lacking a conspurcate or solid cloud through the middle of the corium and apex of the clavus. Even though the apical area of the clavus is often darkened or spotted, the inner angles of the corium always remain pale.

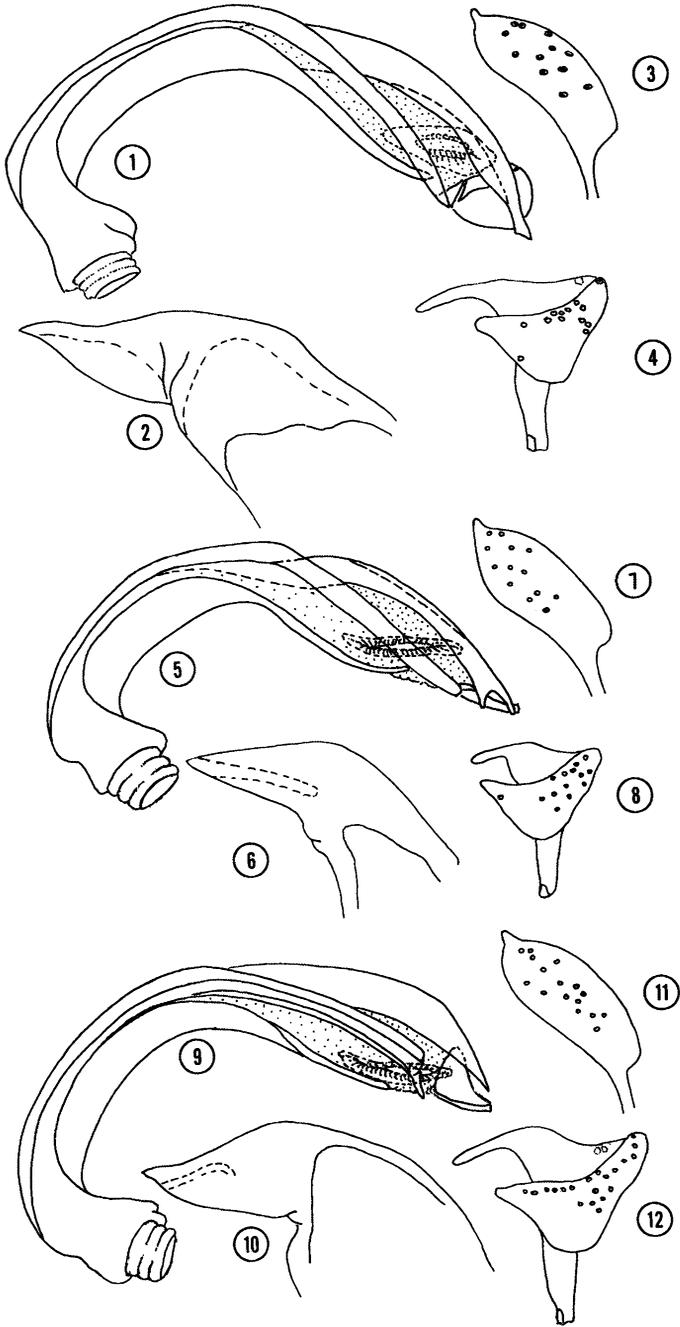
**Description.** Male (N = 4): Length 3.32–3.68 mm, width 1.32–1.36 mm. *Head:* Width 0.72–0.74 mm, vertex 0.32–0.34 mm. *Rostrum:* Length 1.22–1.24 mm, extending to bases of metacoxae. *Antenna:* Segment I, length 0.24–0.26 mm; II, 1.06–1.08 mm; III, 0.66–0.68 mm; IV, 0.56 mm (segment missing on remaining 3 specimens). *Pronotum:* Length 0.50–0.52 mm, basal width 1.08–1.12 mm.

Female (N = 1): Length 3.52 mm, width 1.44 mm. *Head:* Width 0.72 mm, vertex 0.36 mm. *Rostrum:* Length 1.28 mm, extending to bases of metacoxae. *Antenna:* Segment I, length 0.24 mm; II, 1.02 mm; segment III and IV missing. *Pronotum:* Length 0.52 mm, basal width 1.16 mm.

General coloration pale to dark reddish orange, dorsum with recumbent, golden-brown, simple pubescence, intermixed with sericeus setae. Head orange to brownish orange, frons with a few darker orange spots or reticulations; tufts or clumps of silvery, sericeus setae patterned as follows: 3 along inner margin of eyes (almost merging to form a broken line), 1 on either side of tylus at base, and a broken row along meson. Antenna yellowish to pale yellowish orange; setae recumbent, golden brown, length of some approaching diameter of segment. Pronotum pale reddish to brownish orange, more orange on calli; silvery sericeus setae generally scattered with fine tufts forming a fine line along meson. Scutellum and mesoscutum orange to reddish orange, with sericeus setae mostly scattered, but on unrubbed specimens forming a fine, broken line along meson. Hemelytron multicolored; base of clavus, middle of corium, and cuneal fracture pale or yellowish; apex of clavus clouded with brown to smoky brown, usually also with small brown spots; lateral and basal  $\frac{1}{2}$  and apex of corium pale reddish orange, cuneus bright reddish orange; surface thickly scattered with silvery sericeus setae, setae more concentrated on pale middle area of corium; membrane brown to fumate, with numerous, small, pale spots giving a conspurcate appearance, and a large, elongate spot near apex of cuneus. Ventral surface uniformly pale brownish to reddish orange. Legs pale yellowish orange; femora yellowish orange, hind femora dark, brownish to reddish orange with numerous, fine, brown spots on apical  $\frac{2}{3}$ , pro- and mesofemora pale with brown spotting almost obsolete; tibiae pallid or pale yellow, pale tibial spines with brown spots at bases; claws brown.

**Male genitalia:** Vesica (Fig. 1); phallosome (Fig. 2); right paramere (Fig. 3); left paramere (Fig. 4).

**Specimens examined. United States**—FLORIDA: 3 ♂♂, Gainesville [Alachua Co.], 8–9 Oct. 1968, F. W. Mead, at blacklight trap (FSCA, USNM); 1 ♂, Highlands Co., Archbold Biological Station, 24 Nov. 1971, S. W. Frost (PSU); 1 ♂, Marion Co., 9



Figs. 1-12. Male genitalia of *Keltonia* spp. *K. balli*: 1. Vesica. 2. Phallosome. 3. Right paramere. 4. Left paramere. *K. bifurca*: 5-8. *K. clinopodii*: 9-12.

mi SSW Ocala, 27 VIII 1975, Drummond & Wiley (FSCA); 1 ♂ (autotype), Winter Park [Orange Co.], 25 Apr. 1940, H. T. Fernald, at light (USNM); 1 ♀ (allotype), Sanford [Seminole Co.], March 15, 1926, E. D. Ball (USNM).

**Distribution.** Known only from five counties in central and northern Florida.

**Hosts.** Unknown. The unusual orange coloration of this bug would suggest that it is cryptically colored for life suited to a plant of complementary color.

### ***Keltonia bifurca*, new species**

Figs. 5–8

**Diagnosis.** *Keltonia bifurca* is similar to *K. robusta*, *K. steineri*, and *K. sulphurea* is having distinct, evenly distributed hemelytral spots. It is distinguished from *K. robusta* by the smaller size and much shorter length of the rostrum. From *K. steineri* it differs in the more greenish-yellow coloration and shorter length of the rostrum. Externally, *K. bifurca* is very much like *K. sulphurea*, but has paler brown, less distinct hemelytral spots, and the rostrum extends well beyond the base of the male genital capsule and the ovipositor in females. The bifurcate or forked spicule of the vesica (Fig. 5) is unique in the genus.

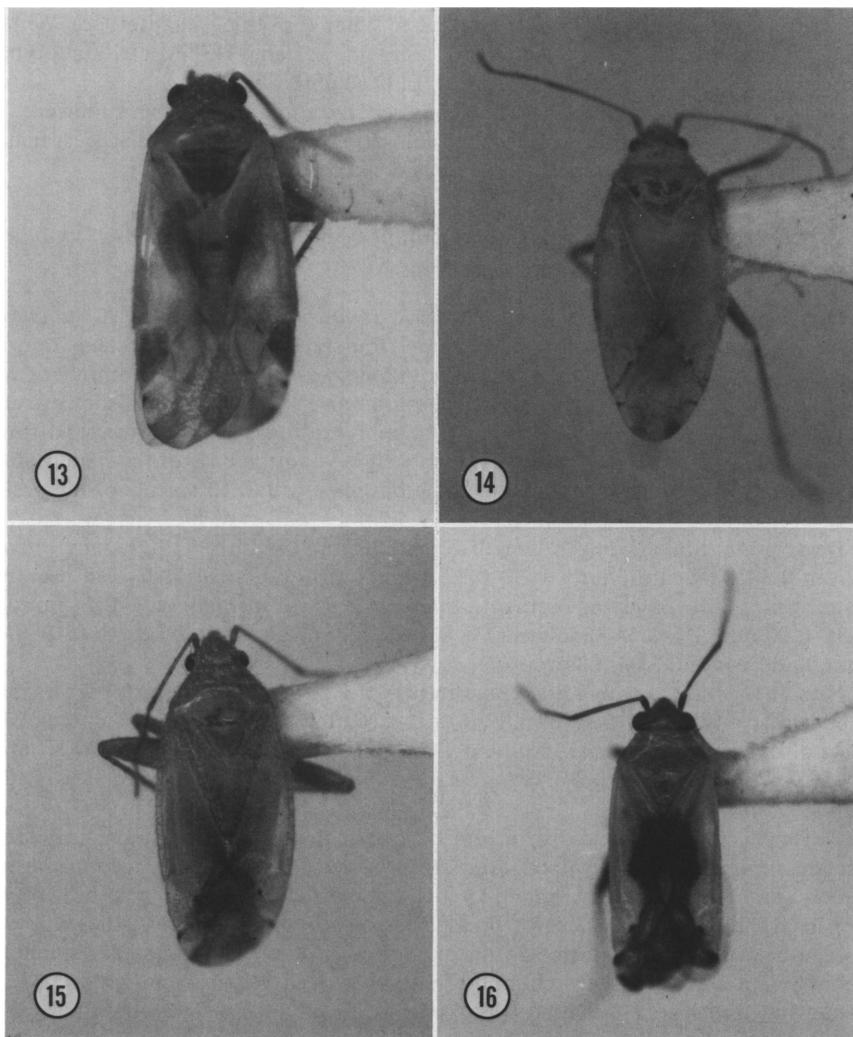
**Description.** Male (N = 3): Length 2.68–2.80 mm, width 1.12–1.22 mm. *Head*: Width 0.60–0.62 mm, vertex 0.30–0.32 mm. *Rostrum*: Length 1.46–1.48 mm, extending to middle of genital segment. *Antenna*: Segment I, length 0.22–0.24 mm; II, 0.86–0.90 mm; III, 0.54–0.56 mm; IV, 0.38–0.40 mm. *Pronotum*: Length 0.40–0.42 mm, basal width 0.88–0.92 mm.

Female (N = 2): Length 2.80–2.88 mm, width 1.20–1.22 mm. *Head*: Width 0.58–0.60 mm, vertex 0.30–0.34 mm. *Rostrum*: Length 1.46–1.56 mm, extending past base of ovipositor. *Antenna*: Segment I, length 0.20–0.22 mm; II, 0.84–0.90 mm; III, 0.54–0.56 mm; IV, 0.36–0.40 mm. *Pronotum*: Length 0.40–0.44 mm, basal width 0.90–0.92 mm.

General coloration yellow to greenish yellow, dorsum with semierect, golden-brown, simple setae, intermixed with silvery sericeus pubescence. Head uniformly yellow. Antenna yellowish, segment I with a subapical and subbasal, pale-brown spot or partial band, apex with 2 brown, bristlelike setae. Pronotum yellow, with semierect, golden-brown setae and scattered tufts or clumps of silvery sericeus setae. Scutellum yellow, with a few scattered clumps of silvery sericeus setae. Hemelytron yellow, somewhat translucent on some specimens, uniformly sprinkled with small, pale-brown spots, some specimens with larger brown spots along embolium and through middle of corium; thickly set with semierect, golden-brown, simple setae, intermixed with clumps of silvery sericeus setae; inner margin of cuneus with 2 patches of dark-brown, bristlelike setae; membrane dark smoky brown or fumate, broken by numerous small, pale spots, giving a conspurcate appearance, large area adjacent to apex of cuneus and just after large, solid, dark spot pale or clear. Ventral surface yellow to greenish yellow. Legs yellow; all femora sprinkled with pale-brown spots, but less so at bases; dark or fuscous tibial spines with dark-brown spots at bases, especially on metatibiae; tarsi yellow; claws brown.

**Male genitalia:** Vesica (Fig. 5), spiculum slender with apex forked or bifurcate; phallosome (Fig. 6); right paramere (Fig. 7); left paramere (Fig. 8).

**Type specimens.** Holotype ♂: Mexico, Guerrero, 20 mi E Acapulco, July 10, 1974,



Figs. 13–16. Habitus photographs. 13. *Keltonia balli*. 14. *K. pallida*. 15. *K. robusta*. 16. *K. rubrofemorata*.

Clark, Murray, Ashe, & Schaffner (USNM). Paratypes: 2 ♂♂, 2 ♀♀, same data as for holotype (TAM, 1 USNM).

**Etymology.** This species is named for the bifurcate or forked apex of the spiculum on the vesica.

**Distribution.** Guerrero, Mexico.

**Hosts.** Unknown.

*Keltonia clinopodii* Kelton

Figs. 9–12

*Keltonia clinopodii* Kelton, 1966:668; Henry and Wheeler, 1988:469.

**Diagnosis.** *Keltonia clinopodii* most closely resembles *K. tuckeri* in the greenish-to lemon-yellow coloration and the coalesced brown spots on the central area of the hemelytron. However, it differs consistently from *K. tuckeri* in having noticeably fewer spots on the hemelytron, especially on the cuneus and at the base and lateral ½ of the corium; on many specimens of *K. clinopodii*, the coalesced hemelytral spots are almost absent except for a few at the apex of the clavus and inner angle of the corium. Also, *K. clinopodii* feeds on a mint, whereas *K. tuckeri* appears to be a composite specialist.

**Description.** Male (N = 10): Length 2.80–3.32 mm, width 1.12–1.28 mm. *Head*: Width 0.54–0.60 mm, vertex 0.32–0.34 mm. *Rostrum*: Length 1.42–1.54 mm, extending to base of genital capsule. *Antenna*: Segment I, length 0.20–0.22 mm; II, 0.80–0.92 mm; III, 0.54–0.56 mm; IV, 0.36–0.40 mm. *Pronotum*: Length 0.36–0.44 mm, basal width 0.82–0.96 mm.

Female (N = 10): Length 2.76–3.20 mm, width 1.08–1.28 mm. *Head*: Width 0.52–0.60 mm, vertex 0.32–0.36 mm. *Rostrum*: Length 1.42–1.54 mm, extending past base of ovipositor. *Antenna*: Segment I, length 0.20–0.22 mm; II, 0.82–0.90 mm; III, 0.50–0.52 mm; IV, 0.40–0.42 mm. *Pronotum*: Length 0.38–0.42 mm, basal width 0.86–0.98 mm.

General coloration pale greenish yellow, dorsum with contrasting brown to golden-brown simple pubescence, intermixed with silvery sericeus setae. Head pale greenish yellow. Antenna pale yellow; segment I with 2 or 3 very faint brown spots; segments III and IV becoming dusky to fuscous. Pronotum pale greenish yellow; tufts of sericeus setae as follows: 3 or 4 along lateral margin, 3 or 4 on each side of disc, and a broken row along meson. Scutellum and mesoscutum pale greenish yellow with tufts of sericeus setae set evenly across mesoscutum, middle tuft extending through length of scutellum. Hemelytron uniformly greenish yellow; clavus, embolium, and inner ½ of corium with numerous small brown spots, spots coalescing near apex of clavus and inner angle of corium forming a dark but not solid area, some specimens with spotting absent, or nearly so, on embolium and clavus and, frequently, on most of corium; silvery sericeus pubescence scattered over surface, but more distinctly concentrated along embolium and in the shape of a wide band across coalesced spotted area of middle; membrane fumate, broken by numerous pale or whitish spots appearing conspurcate, small areole and a large spot adjacent to apex of cuneus pale or whitish. Ventral surface pale yellow. Legs pale yellow; apical ½ of femora with numerous, small, brown spots; golden-brown tibial spines with distinct brown spots at bases, basal spots sometimes fading apically; claws brown.

**Male genitalia:** Vesica (Fig. 9); phallosome (Fig. 10); right paramere (Fig. 11); left paramere (Fig. 12).

**Specimens examined.** United States—FLORIDA: 1 ♀, Alachua Co., Gainesville, 20–27 Apr. 1981, T. J. Henry, at blacklight (USNM); 2 ♂♂, 2 ♀♀ (paratypes), Highlands Co., Sebring 30-IV-1961, L. A. Kelton, on *Clinopodium* (USNM); 5 ♂♂, 3 ♀♀, Highlands Co., Archbold Biol. Stn., 20–27 Apr. 1981, T. J. Henry, at blacklight (USNM); 2 ♂♂, 5 ♀♀, Highlands Co., Rt. 27, 12 mi S Lake Placid, 20 Apr. 1981, T. J. Henry,

taken on *Satureja ashei* (USNM); 9 ♂♂, 25 ♀♀ (and nymphs), Highlands Co., Rt. 70, 2 mi W Rt. 27, nr. Archbold Biol. Stn., 20 Apr. 1982, T. J. Henry & A. G. Wheeler, Jr., taken on *Satureja ashei* (USNM); 6 ♂♂, 2 ♀♀, Marion Co., Rt. 40, 15 mi E Lynne, 24 Apr. 1984, T. J. Henry & A. G. Wheeler, Jr. (USNM); 6 ♀♀, Martin Co., 7 mi S of Okeechobee Co., Rt. 298-441, 29 Apr. 1982, T. J. Henry, on *Satureja ashei* (USNM); 9 ♂♂, 7 ♀♀ (and nymphs), Polk Co., Rt. 27, 2 mi N Frostproof, 25 Apr. 1984, T. J. Henry & A. G. Wheeler, Jr., taken on *Satureja ashei* (USNM).

**Distribution.** Known only from central Florida.

**Hosts.** Species was described from specimens collected on *Clinopodium ashei* Weatherby [Lamiaceae], thus, the specific epithet *clinopodii*. However, since that description, *ashei* has been placed in the genus *Satureja* L. A. G. Wheeler, Jr. and I have collected adults and nymphs of this species in abundance on the same host, which grows in open sandy areas in central Florida.

### *Keltonia knighti* Kelton

Figs. 17-20

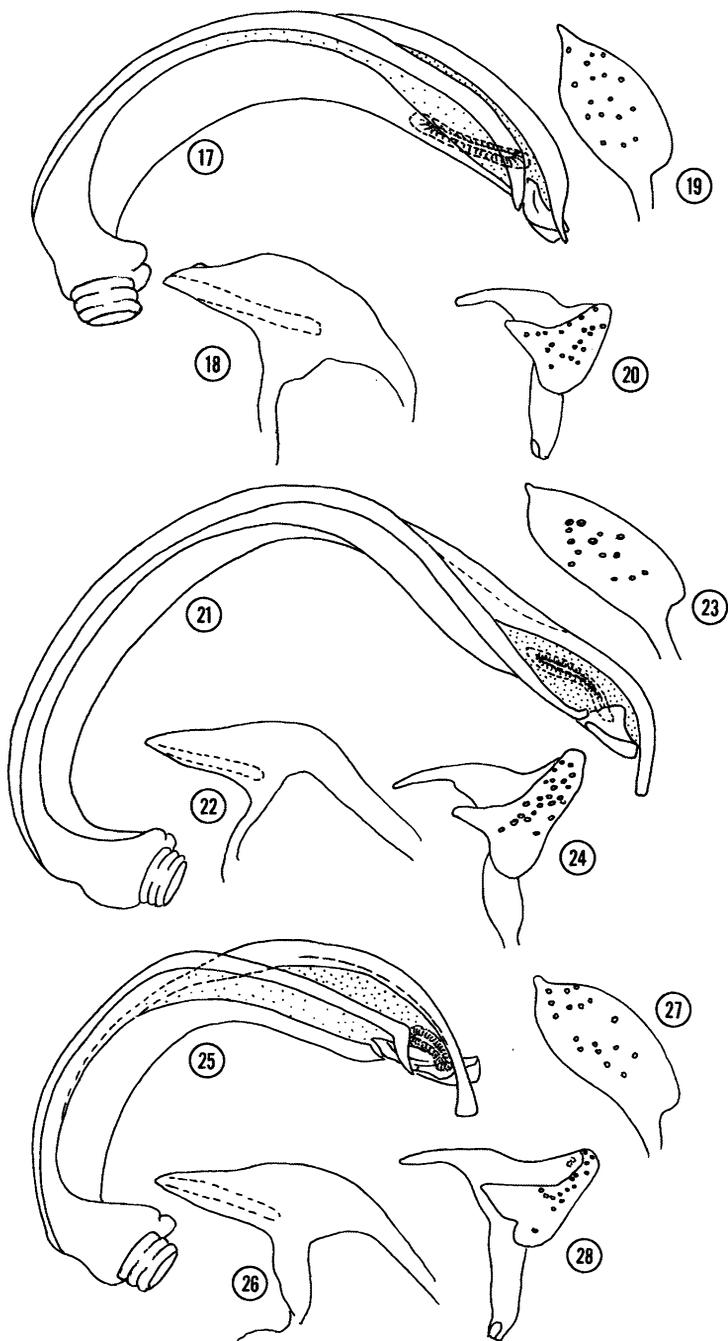
*Keltonia knighti* Kelton, 1966:668.

**Diagnosis.** *Keltonia knighti* resembles *K. mexicana* and *K. tuckeri* that also have the spots on the corium and clavus coalesced to form a large, central, brown cloud. It can be separated from *K. mexicanus* by the much broader vertex that is wider than the dorsal width of the eyes combined, and by the longer rostrum that extends well beyond the metacoxae to the base of the ovipositor or male genital segment. From *K. tuckeri* it is separated by the overall phosphorescent, yellowish-orange, dorsal coloration (rather than yellowish-green), and the 2nd antennal segment that is distinctly longer than the basal width of the pronotum in males.

**Description.** Male (N = 8): Length 2.80-3.12 mm, width 1.20-1.30 mm. *Head:* Width 0.56-0.60 mm, vertex 0.30-0.32 mm. *Rostrum:* Length 1.34-1.40 mm, extending beyond metacoxae to base of genital capsule. *Antenna:* Segment I, length 0.22-0.24 mm; II, 1.02-1.04 mm; III, 0.58-0.70 mm; IV, 0.44-0.46 mm. *Pronotum:* Length 0.44-0.46 mm, basal width 0.90-0.98 mm.

Female (N = 8): Length 2.72-3.08 mm, width 1.28-1.30 mm. *Head:* Width 0.58-0.60 mm, vertex 0.32-0.34 mm. *Rostrum:* Length 1.44-1.46 mm, extending to base of ovipositor. *Antenna:* Segment I, length 0.22-0.24 mm; II, 1.00-1.04 mm; III, 0.64-0.66 mm; IV, 0.42-0.52 mm. *Pronotum:* Length 0.46-0.48 mm, basal width 1.00-1.04 mm.

Coloration phosphorescent yellowish orange, dorsum with brown, semierect and recumbent, simple pubescence, intermixed with tufts of silvery sericeus setae as detailed below. Head yellowish orange. Pronotum yellowish orange, sometimes tinged with green on basal ½, tufts of silvery setae along lateral margins, through meson, and a few scattered between. Scutellum and mesoscutum yellowish orange, with scattered tufts of silvery setae. Hemelytron yellowish orange, with scattered, small, brown spots, usually over entire surface, spots coalescing across middle ½ of corium and across apex of clavus. Membrane smoky brown, broken by numerous pale spots and with a large pale spot adjacent to apex of cuneus and a slightly smaller one just beyond. Ventral surface uniformly pale yellow. Legs pale yellow; femora thickly



Figs. 17-28. Male genitalia of *Keltonia* spp. *K. knighti*: 17. Vesica. 18. Phallosome. 19. Right paramere. 20. Left paramere. *K. mexicana*: 21-24. *K. pallida*: 25-28.

spotted, less so at bases; tibiae with brown spots at bases of brown spines, especially at bases; tarsi and claws pale.

*Male genitalia:* Vesica (Fig. 17), with spicule stout, acuminate and slightly turned up apically; phallosome (Fig. 18); right paramere (Fig. 19); left paramere (Fig. 20).

*Material examined.* Holotype ♂, 10 ♂♂ and 9 ♀♀ paratypes (including designated allotype), Mexico, Sinaloa, Mazatlan, 6 Aug. 1964, L. A. Kelton (CNC; 6 paratypes in USNM).

*Distribution.* Known only from Sinaloa, Mexico.

*Hosts.* Unknown.

### *Keltonia mexicana*, new species

Figs. 21–24

*Diagnosis.* *Keltonia mexicana* is most similar to *K. clinopodii* and *K. tuckeri* in having the dorsal spots on the hemelytra coalesced at the middle, but is readily distinguished by the phosphorescent, yellowish-orange coloration, the relatively large eyes, for which the combined dorsal widths are equal to or greater than the width of the vertex, and the short, stout head, which in lateral aspect, the length of an eye is equal to or greater than the remaining part of the head distally to the apex of the tylus.

*Description.* Male (N = 10): Length 2.90–3.40 mm, width 1.28–1.36 mm. *Head:* Width 0.62–0.64 mm, vertex 0.30–0.32 mm. *Rostrum:* Length 1.20–1.24 mm, extending to or just past apices of metacoxae. *Antenna:* Segment I, length 0.22–0.24 mm; II, 0.84–0.94 mm; III, 0.58–0.62 mm; IV, 0.44–0.46 mm. *Pronotum:* Length 0.46–0.52 mm, basal width 1.00–1.06 mm.

Female (N = 10): Length 2.92–3.48 mm, width 1.28–1.40 mm. *Head:* Width 0.60–0.64 mm, vertex 0.30–0.34 mm. *Rostrum:* Length 1.14–1.28 mm. *Antenna:* Segment I, length 0.22 mm; II, 0.78–0.94 mm; III, 0.34–0.46 mm; IV, 0.44–0.52 mm. *Pronotum:* Length 0.44–0.52 mm, basal width 0.90–1.04 mm.

General coloration phosphorescent yellowish orange, rather thickly clothed with recumbent, simple, brown setae, intermixed with tufts of silvery, sericeous setae on head, pronotum, and hemelytra. Head yellowish orange. Pronotum yellowish orange, calli somewhat more brown, with scattered tufts of silvery sericeous setae. Scutellum and mesoscutum yellowish orange, with scattered tufts of silvery sericeous setae. Hemelytron phosphorescent yellowish orange, thickly spotted with small brown spots, including cuneus, spots coalescing through middle of corium and apex of clavus to form a dark-brown clouded area, simple brown pubescence rather thick, recumbent, intermixed with scattered tufts of silvery sericeous setae, always arising from brown spots; membrane dark smoky brown, broken by numerous, small, pale spots, with larger pale areas near apex of cuneus and another slightly beyond. Ventral surface uniformly pale yellowish brown. Legs pale yellowish brown; femora with numerous small brown spots on apical halves, especially on metafemora; tibial spines dark brown, with distinct dark spots at bases, which fade apically; tarsi pale, claws brown.

*Male genitalia:* Vesica (Fig. 21); phallosome (Fig. 22); right paramere (Fig. 23); left paramere (Fig. 24).

*Type specimens.* Holotype ♂: Mexico, Oaxaca, 2.7 mi NW El Cameron, July 13, 1971, taken at light, Clark, Murray, Hart, & Schaffner (USNM). Paratypes: 35 ♂♂, 7

♀, same data as for holotype (AMNH, CNC, TAM, USNM); 28 ♂♂, 10 ♀♀, 24–25 July 1973, Mastro & Schaffner, same locality as for holotype (AMNH, TAM, USNM); 2 ♂♂, 21–22 July 1974, Clark, Murray, Ashe, & Schaffner, same locality as for holotype (TAM); 2 ♂♂, Mex., Oaxaca, 11.6 mi W Jalapa de Marques, July 12, 1971, taken at light, Clark, Murray, Hart, & Schaffner (TAM); 3 ♂♂, Mex., Oaxaca, 9 mi W Tehuantepec, IV-25-65, at light, Burke, Meyer, & Schaffner (TAM); 1 ♂, 1 ♀, Mex., Oaxaca, 6 mi W Tehuantepec, July 6, 1971, taken at light, Clark, Murray, Hart, & Schaffner (TAM); 1 ♂, Mex., Oaxaca, 11 mi W Tehuantepec, July 23, 1973, Mastro & Schaffner (TAM); 1 ♂, Mex., Oaxaca, 6 mi W of Jalapa de Marques, July 23, 1973, Mastro & Schaffner, taken at light (TAM); 4 ♂♂, 6 ♀♀, Mex., Oaxaca, 16.6 mi SE Rio Hondo, July 17, 1981, Bogar, Schaffner, & Friedlander (CNC, TAM); 1 ♀, Mex., Oaxaca, 2.1 mi NW Totolapan, July 11–17, 1981, Bogar, Schaffner, & Friedlander (TAM).

**Etymology.** This species is named for the country in which it was discovered.

**Distribution.** Oaxaca, Mexico.

**Hosts.** Unknown.

#### *Keltonia pallida*, new species

Figs. 14, 25–28

**Diagnosis.** *Keltonia pallida* is one of the most distinct species in the genus and can be separated from all others by the pallid or white to pale greenish-white coloration with, at most, only a few, vague, scattered spots on the cuneus and embolium, the indistinct or absent basal cuneal (paracuneal) patch, and the weakly conspurcate membrane.

**Description.** Male (N = 5): Length 3.32–3.44 mm, width 1.32–1.36 mm. *Head*: Width 0.62–0.64 mm, vertex 0.36–0.38 mm. *Rostrum*: Length 1.66–1.74 mm, extending past base of genital capsule. *Antenna*: Segment I, length 0.24–0.26 mm; II, 0.98–1.00 mm; III, 0.60–0.66 mm; IV, 0.44–0.46 mm. *Pronotum*: Length 0.44–0.46 mm, basal width 0.96–1.00 mm.

Female (N = 6): Length 3.16–3.44 mm, width 1.44–1.52 mm. *Head*: Width 0.60–0.62 mm, vertex 0.40–0.42 mm. *Rostrum*: Length 1.80–1.84 mm, extending to basal 1/3 of ovipositor. *Antenna*: Segment I, length 0.24–0.26 mm; II, 1.04–1.06 mm; III, 0.58–0.60 mm; IV, 0.42–0.44 mm. *Pronotum*: Length 0.44–0.46 mm, basal width 0.98–1.02 mm.

General coloration pallid to greenish white, dorsum with recumbent, pale, simple pubescence, intermixed with silvery, sericeus setae. Head pallid. Antenna pale, segments III and IV and apical 1/3 to 1/2 of II dusky brown; segment I sometimes with 1 or 2 dusky spots on inner side. Pronotum pallid to greenish white, with tufted sericeus setae as follows: 3 along lateral margin, 2 or 3 on each 1/2 of discal area, and a broken row along meson. Scutellum and mesoscutum pallid, with a clump of sericeus setae on each side of mesoscutum and a broken row extending through middle of scutellum. Hemelytron pallid to greenish white, except for a few indistinct pale-brown spots on embolium and apical area of cuneus, set with rather thickly scattered (i.e., not in distinct tufts) sericeus setae intermixed with distinct tufts, especially along embolium and on clavus and middle of corium; apical cuneal patch distinct, but patch at base (on paracuneus) indistinct or absent; membrane white with a transverse brown streak

just past apex of cuneus, a triangular brownish cloud at apical angle, and a few scattered, brown marmorations (weakly conspurcate) through middle between areoles. Ventral surface uniformly pale greenish white. Legs pallid, with only a few, small, indistinct, brown spots at apices of metafemora; tibial spines brown, with black spots at bases on meso- and metatibiae, basal spots fading on apical  $\frac{1}{3}$  of mesotibiae, some specimens with a few spots at bases of protibial spines; claws brown.

*Male genitalia*: Vesica (Fig. 25); phallosome (Fig. 26); right paramere (Fig. 27); left paramere (Fig. 28).

**Type specimens.** Holotype  $\delta$ : United States, Texas, Aransas Co., Ingleside, Rt. 361, 19 April 1983, T. J. Henry & A. G. Wheeler, Jr., taken on *Stemodia tomentosa* (USNM). Paratypes: 1  $\delta$ , 2  $\text{f}$ , same data as for holotype; 3  $\delta\delta$ , 7  $\text{f}$ , Texas, Kleburg Co., N Padre Island, 21 April 1983, T. J. Henry & A. G. Wheeler, Jr., on *S. tomentosa* (USNM).

**Etymology.** This species is so named because of its overall pallid or white to pale greenish-white coloration.

**Distribution.** Known only from coastal Texas.

**Hosts.** Adults and nymphs of this species were collected and reared on *Stemodia tomentosa* (Mill.) Greenm. & Thomps. [Scrophulariaceae]. The pale coloration of this bug makes it almost impossible to detect on the pubescent, pale, greenish-white stems and foliage of this unusual prostrate plant, which grows in sandy coastal areas of the Gulf States.

### **Keltonia robusta**, new species

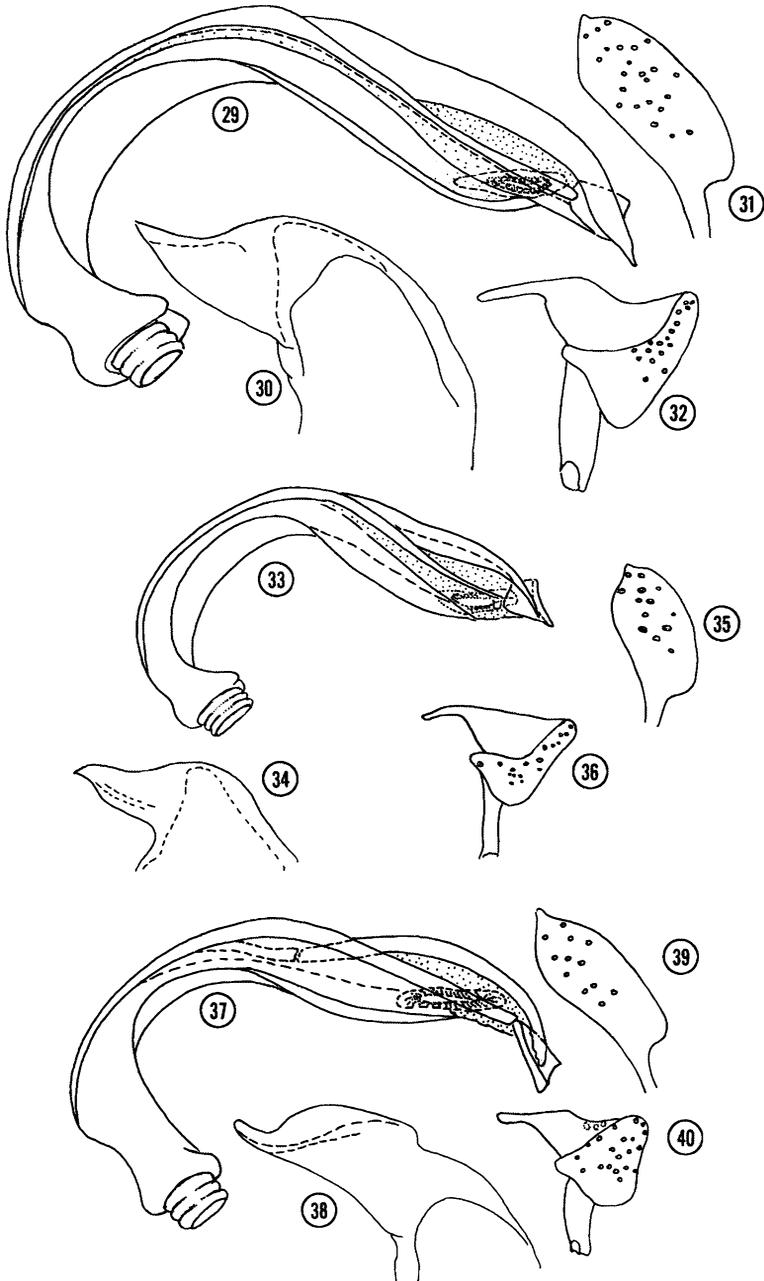
Figs. 15, 29–32

**Diagnosis.** *Keltonia robusta*, the largest species of the genus, is most similar to *K. sulphurea*. It can be distinguished from *K. sulphurea* by the larger size (length more than 3.50 mm vs. 3.00 mm or less for *K. sulphurea*), the smaller, more profusely sprinkled, hemelytral spots, and the longer length of the rostrum that reaches midway on the male genital capsule and base of the ovipositor in females.

**Description.** Male (N = 8): Length 3.52–4.20 mm, width 1.52–1.60 mm. *Head*: Width 0.68–0.70 mm, vertex 0.36–0.38 mm. *Rostrum*: Length 2.04–2.08 mm; extending midway on genital segment. *Antenna*: Segment I, length 0.24–0.30 mm; II, 1.16–1.18 mm; III, 0.68–0.74 mm; IV, 0.44–0.50 mm. *Pronotum*: Length 0.48–0.56 mm, basal width 1.16–1.24 mm.

Female (N = 10): Length 3.50–3.96 mm, width 1.52–1.56 mm. *Head*: Width 0.66–0.70 mm, vertex 0.38–0.40 mm. *Rostrum*: Length 2.04–2.20 mm; extending to base of ovipositor. *Antenna*: Segment I, length 0.24–0.26 mm; II, 1.06–1.18 mm; III, 0.68–0.76 mm; IV, 0.38–0.48 mm. *Pronotum*: Length 0.50–0.54 mm, basal width 1.16–1.20 mm.

General coloration phosphorescent yellowish green, dorsum with recumbent, golden-brown, simple pubescence, intermixed with silvery, sericeus setae. Head greenish yellow. Antenna uniformly yellow to greenish yellow, segment I sometimes with 2 pale-brown spots, segments III and IV and apical  $\frac{1}{2}$  of II sometimes pale, dusky brown; pubescence short, recumbent, pale golden brown. Pronotum greenish yellow, more green on discal area (posterior to calli); tufted sericeus setae finer than on head,



Figs. 29–40. Male genitalia of *Keltonia* spp. *K. robusta*: 29. Vesica. 30. Phallosome. 31. Right paramere. 32. Left paramere. *K. rubrofemorata*: 33–36. *K. schaffneri*: 37–40.

tufted pattern somewhat irregular, setae concentrated along lateral margins, rectangularly around calli, and along meson. Scutellum and mesoscutum greenish yellow, middle of mesoscutum with a large tuft of sericeus setae at middle, remaining surface with scattered (i.e., not tufted), sericeus setae. Hemelytron yellowish to greenish yellow, thickly and uniformly speckled with tiny, pale-brown spots more concentrated in the central area of hemelytron (on clavus and inner  $\frac{1}{2}$  of corium) but not coalescing to form a solid brown area; sericeus setae evenly, but thickly, scattered on embolium, corium, clavus, and cuneus; membrane yellowish brown with numerous pale or whitish spots appearing conspurcate, veins brownish, paler apically. Ventral surface uniformly yellowish to greenish yellow. Legs pale yellow; metafemora uniformly and finely brown spotted, pro- and mesofemora more sparsely spotted; tibial spines brown with brown spots at bases.

**Male genitalia:** Vesica (Fig. 29); phallosheca (Fig. 30); right paramere (Fig. 31); left paramere (Fig. 32).

**Type specimens.** Holotype  $\delta$ : United States, Florida, Franklin Co., Carrabelle, 4 May 1981, T. J. Henry, taken on *Conradina canescens* (USNM). Paratypes: 10  $\delta\delta$ , 17  $\text{♀♀}$ , same data as for holotype (FSCA, USNM); 3  $\text{♀♀}$ , Florida, Franklin Co., 5 mi W Carrabelle, 4 May 1981, T. J. Henry, on *C. canescens* (USNM); 2  $\delta\delta$ , 11  $\text{♀♀}$ , Florida, Franklin Co., Rt. 98, Carrabelle, 1 May 1984, T. J. Henry & A. G. Wheeler, Jr., on *C. canescens*; 12  $\delta\delta$ , 2  $\text{♀♀}$ , Florida, Gulf Co., Rt. 30, 8 mi S Port St. Joe on St. Joe Peninsula, 1 May 1984, T. J. Henry & A. G. Wheeler, Jr., on *C. canescens* (FSCA, USNM); 13  $\delta\delta$ , 11  $\text{♀♀}$ , Florida, Liberty Co., Rt. 12 & Jct. 271, 6 mi N Bristol, 2 May 1984, T. J. Henry & A. G. Wheeler, Jr., on *C. canescens*; 5  $\delta\delta$ , 10  $\text{♀♀}$  (and nymphs), Florida, Okaloosa Co., Niceville, Rt. 20, 9 May 1981, T. J. Henry, on *C. canescens*; 6  $\delta\delta$ , 14  $\text{♀♀}$ , Florida, Okaloosa Co., Niceville, 9 May 1982, T. J. Henry, on *C. canescens*.

**Etymology.** This species is so named because of its relatively large, robust size.

**Distribution.** Known only from the panhandle region of Florida.

**Host.** Nymphs and adults were abundant on and apparently are restricted to *Conradina canescens* (Torr. and Gray) Gray [Lamiaceae].

#### *Keltonia rubrofemorata* Knight

Figs. 16, 33–36

*Keltonia rubrofemorata* Knight, 1966:590; Kelton, 1966:670; Henry and Wheeler, 1988:469.

**Diagnosis.** *Keltonia rubrofemorata* is one of the most unusual species of the genus in having the dorsal surface bright shiny yellow to yellowish green and lacking the numerous hemelytral tufts of silvery sericeus setae found on most other species. In addition, the distinct hemelytral spotting prevalent in other species of *Keltonia* is replaced by a large, solid, centrally located, fuscous area that is clothed only with relatively slender sericeus setae (i.e., not distinct tufted patches), and the head, first antennal segments, and femora are profusely marked with red.

**Description.** Male (N = 10): Length 2.40–2.80 mm, width 0.92–1.08 mm. **Head:** Width 0.54–0.56 mm, vertex 0.30–0.32 mm. **Rostrum:** Length 1.04–1.08 mm, extending to apices of metacoxae, not quite reaching genital capsule. **Antenna:** Segment I, length 0.16–0.20 mm; II, 0.68–0.70 mm; III, 0.44–0.50 mm; IV, 0.36–0.40 mm. **Pronotum:** Length 0.32–0.36 mm, basal width 0.80–0.82 mm.

Female (N = 10): Length 2.36–2.84 mm, width 0.92–1.12 mm. *Head*: Width 0.52–0.56 mm, vertex 0.30–0.32 mm. *Rostrum*: Length 0.92–1.00 mm, extending to apices of metacoxae. *Antenna*: Segment I, length 0.18–0.22 mm; II, 0.68–0.76 mm; III, 0.44–0.50 mm; IV, 0.34–0.36 mm. *Pronotum*: Length 0.32–0.36 mm, basal width 0.78–0.86 mm.

General coloration shiny yellow to yellowish green, marked with red and fuscous or black; dorsum sparsely clothed with simple brown pubescence, intermixed with silvery sericeous setae limited to head and central area of hemelytra. Head yellowish green, with ventral surface, tylus, and transverse reticulate pattern on frons red, with recumbent, simple, golden-brown setae and a silvery sericeous, setal patch on either side of tylus at base. Antenna generally yellowish to yellowish brown; segment I red, segments III and IV fuscous; on some specimens, all segments red or tinged with red, segment II on pale specimens with apical  $\frac{1}{4}$  frequently red tinged; pubescence, simple, short, recumbent, golden brown. Pronotum uniformly yellowish green, setae simple. Hemelytron shiny yellowish green, with a large, fuscous, circular area encompassing apical  $\frac{1}{2}$  of clavus and inner angle of corium, sometimes with edges fading and separating into small spots, darkened area scattered with fine, silvery, sericeous setae (i.e., not forming tufts), cuneus with a black spot at middle of margin bordering membrane; membrane black, with a large pale spot near apex of cuneus and sprinkled with pale or white spots throughout most of central area. Ventral surface uniformly yellowish green. Legs: Coxae yellowish green, often strongly tinged with red; femora red to fuscureddish, apices pale; tibiae yellowish, sometimes tinged with red at bases, tibial spines pale with darker basal spots very faint and limited to basal halves; claws pale brown.

*Male genitalia*: Vesica (Fig. 33); phallosome (Fig. 34); right paramere (Fig. 35); left paramere (Fig. 36).

**Specimens examined.** United States—FLORIDA: 1 ♂, 1 ♀ (paratypes), [Highlands Co.] Sebring, 30-IV-1961, L. A. Kelton, on *Polygonella* (USNM); 27 ♂♂, 19 ♀♀, Polk Co., Rt. 27, 2 mi N Frostproof, 25 April 1984, T. J. Henry and A. G. Wheeler, Jr., taken on *Polygonella myriophylla* (PDA, USNM).

**Distribution.** Known only from the scrub pine/oak region of central Florida.

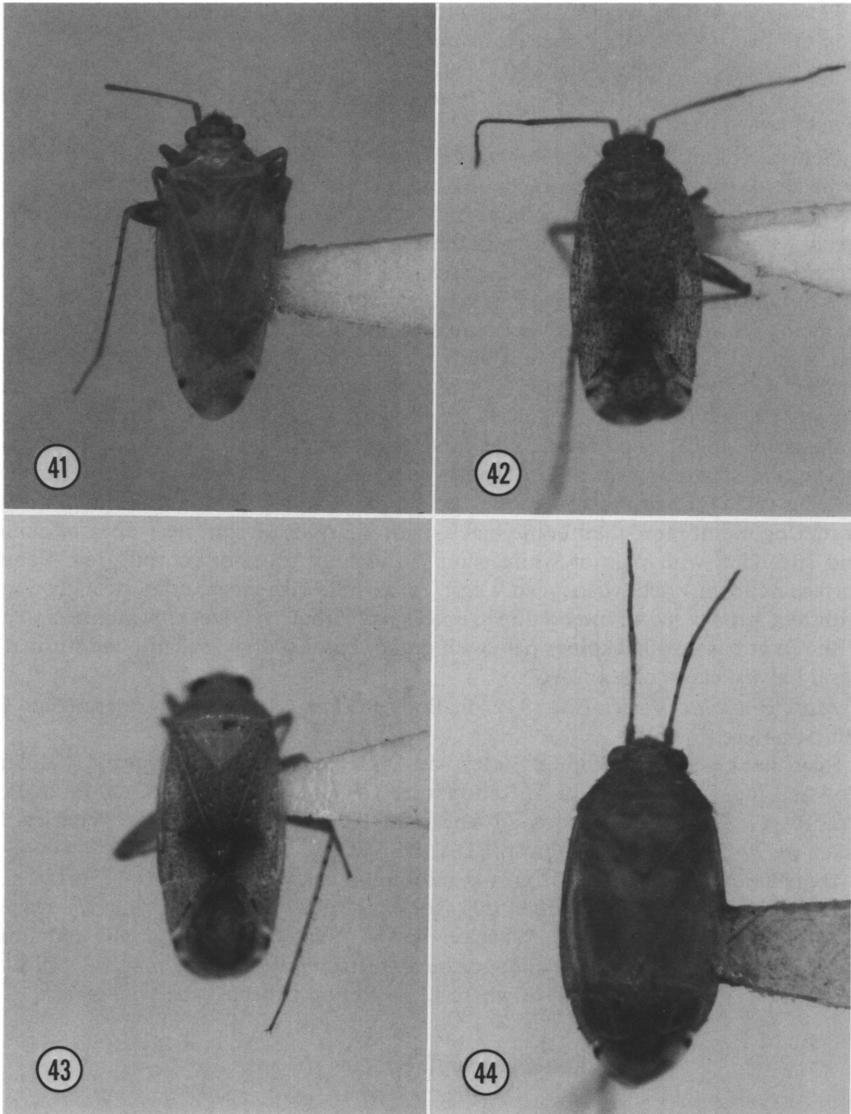
**Hosts.** Knight (1966) described this species from *Polygonella myriophylla* (Small) Horton [Polygonaceae]. A. G. Wheeler, Jr. and I also collected nymphs and adults of this attractive species in abundance on *P. myriophylla* growing on sandy hillsides along Rt. 1 a few miles north of where L. A. Kelton collected the type series.

### ***Keltonia schaffneri*, new species**

Figs. 37–41

**Diagnosis.** *Keltonia schaffneri* is readily distinguished by the uniformly translucent-yellow coloration, indistinct, brown hemelytral spots (appear absent under low magnifications), and the absence of dark cuneal patches (represented at most only by small, vague, brown spots and slightly darker brown setae) present in nearly all other species of *Keltonia* and *Pseudatomoscelis*.

**Description.** Male (N = 10): Length 2.60–2.88 mm, width 1.18–1.20 mm. *Head*: Width 0.54–0.56 mm, vertex 0.30–0.32 mm. *Rostrum*: 1.18–1.20 mm, extending



Figs. 41–44. Habitus photographs. 41. *Keltonia schaffneri*. 42. *K. sulphurea*. 43. *K. tuckeri*. 44. *Pseudatomoscelis flora*.

past metacoxae to base of genital segment in most specimens. *Antenna*: Segment I, length 0.18–0.20 mm; II, 0.82–0.86 mm; III, 0.46–0.48 mm; IV, 0.32–0.36 mm.

Female (N = 10): Length 2.74–3.04 mm, width 1.14–1.16 mm. *Head*: Width 0.52–0.54 mm, vertex 0.28–0.30 mm. *Rostrum*: 1.10–1.20 mm, extending to base of

ovipositor. *Antenna*: Segment I, length 0.20–0.22 mm; II, 0.80–0.82 mm; III, 0.46–0.50 mm; IV, 0.30–0.32 mm. *Pronotum*: Length 0.38–0.40 mm, basal width 0.84–0.86 mm.

General coloration pale shiny yellow, dorsum with semierect, pale or yellow, simple setae, intermixed with silvery sericeus setae. Head shiny yellow, sometimes with a dusky brown patch at inner posterior margin of each eye. Antenna uniformly yellow. Pronotum uniformly, shiny yellow, sometimes paler across disc behind calli; sericeus setae scattered singly or in tufts of 2 or more. Scutellum and mesoscutum yellow with a few sericeus setae. Hemelytron shiny yellow, becoming translucent along embolium, middle of corium, claval commissure, and at base and apex of cuneus, set with indistinct, pale-brown spots on clavus, corium, and cuneus; distinct setigerous fuscous patches absent on inner margin of cuneus, represented at most by only small pale-brown spots and slightly darker setae; clothed with pale-yellow, simple setae, intermixed with scattered individual or small tufts of 2–3 sericeus setae. Membrane smoky brown, broken by pallid or whitish spots, some areas becoming almost entirely pallid, lateral margin just past apex of cuneus with a large fuscous spot. Ventral surface uniformly yellow. Legs yellow; apical half of metafemur sparsely set with tiny, scattered, brown spots; tibial spines pale brown with brown spots at bases, basal spots fading apically; claws pale brown.

*Male genitalia*: Vesica (Fig. 37); phallosheath (Fig. 38); right paramere (Fig. 39); left paramere (Fig. 40).

**Type specimens.** Holotype ♂: Mexico, Oaxaca, 10 mi E Totolapan, elev. 4,000 ft, 20 July 1987, Kovarik & Schaffner (USNM). Paratypes: 10 ♂♂, 15 ♀♀, same data as for holotype (TAM, USNM); 4 ♀♀, Mexico, Oaxaca, 11 mi W Tehuantepec, 23 July 1973, Mastro & Schaffner (TAM, USNM); 1 ♀, Mexico, Sinaloa, Mazatlan, 16–18 July 1964, L. A. Kelton (CNC).

**Etymology.** This species is named in honor of its primary collector Joseph C. Schaffner (TAM), who also furnished more than 700 of the specimens used in this study.

**Distribution.** Oaxaca and Sinaloa, Mexico.

**Host.** Unknown.

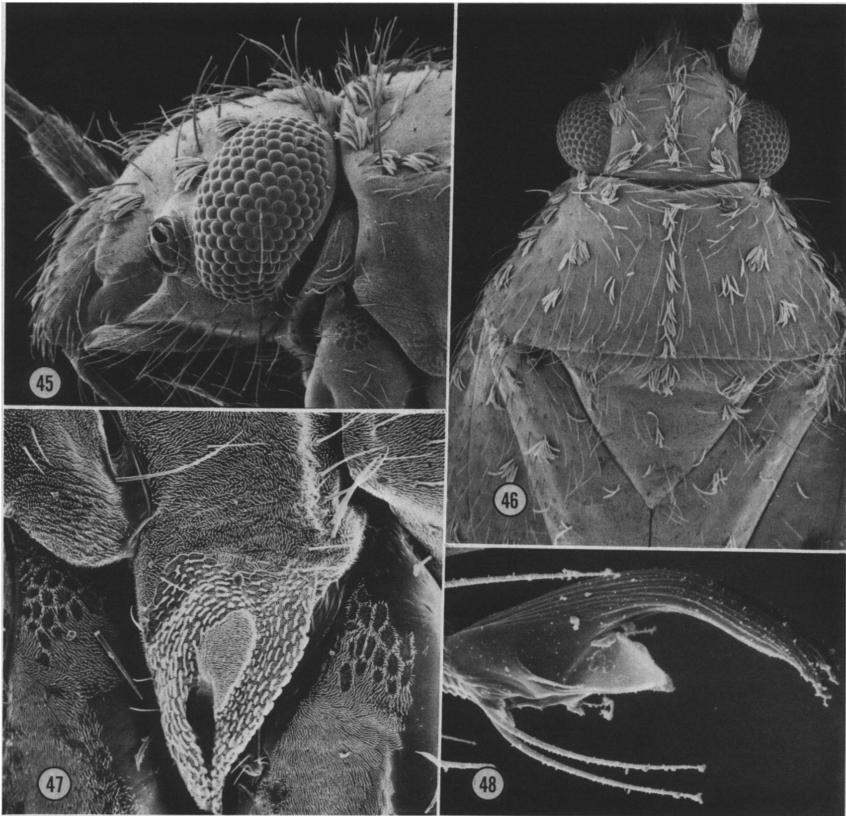
### *Keltonia steineri*, new species

Figs. 54–57

**Diagnosis.** *Keltonia steineri* belongs to the group of species that lacks the coalesced brown cloud on the middle of the hemelytron. It is most similar to *K. sulphurea* in having uniformly sprinkled, small, brown spots on the hemelytra, but is distinguished by the creamier or more “delicate” yellow coloration, and the much longer rostrum that extends well onto the male genital capsule and past the base of the ovipositor in females.

**Description.** Male (N = 2): Length 2.80–3.08 mm, width 1.10–1.18 mm. *Head*: Width 0.60–0.64 mm, vertex 0.32–0.34 mm. *Rostrum*: Length 1.74–1.80 mm, extending well past metacoxae to base of genital segment or beyond. *Antenna*: Segment I, length 0.22–0.24 mm; II, 0.96–0.98 mm; III, 0.54–0.60 mm; IV, 0.42–0.44 mm. *Pronotum*: Length 0.42–0.44 mm, basal width 0.90–0.92 mm.

Female (N = 1): Length 2.92 mm, width 1.18 mm. *Head*: Width 0.58 mm, vertex



Figs. 45–48. SEM micrographs of *Keltonia sulphurea*: 45. Lateral aspect of head (145 $\times$ ). 46. Dorsal aspect of head and pronotum (77.8 $\times$ ). 47. Ostiolar opening and evaporative area (285 $\times$ ). 48. Pretarsal structure.

0.34 mm. *Rostrum*: Length 1.80 mm, extending well beyond base of ovipositor. *Antenna*: Segment I, length 0.22 mm; II, 0.94 mm; III, 0.56 mm; IV, 0.40 mm. *Pronotum*: Length 0.40 mm, basal width 0.88 mm.

General coloration very pale to lemon yellow, with erect and semierect brown setae on dorsum, intermixed with fine tufts of silvery sericeus setae. Head pale lemon yellow. Pronotum pale lemon yellow (bright lemon yellow sometimes fading in dried specimens), with a distinct row of sericeus setae along meson, a few broken tufts along lateral margins and scattered through middle. Scutellum and mesoscutum pale lemon yellow, with scattered tufts of sericeus setae. Hemelytron very pale yellow, with evenly scattered, small, brown spots over entire surface, thickly set with erect and semierect dark-brown simple setae, sparsely intermixed with fine tufts of silvery sericeus setae. Membrane smoky brown, broken by numerous small pale spots, with a large clear spot near apex of cuneus and another just beyond; veins pale. Ventral surface uniformly pale yellow. Legs pale to very pale yellow; femora thickly speckled

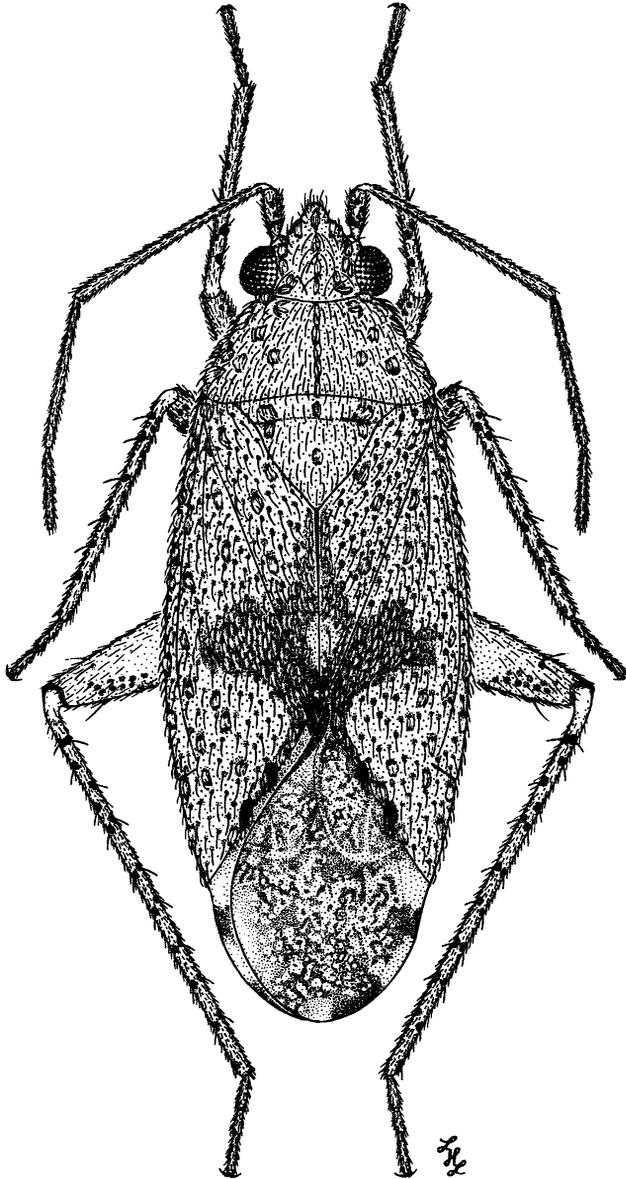


Fig. 49. Habitus of *Keltonia tuckeri*.

with small pale-brown spots on apical  $\frac{2}{3}$ ; tibiae with distinct dark-brown spots at bases of dark-brown to black spines; tarsi and claws pale.

*Male genitalia:* Vesica (Fig. 54); phallosheca (Fig. 55); right paramere (Fig. 56); left paramere (Fig. 57).

**Etymology.** This species is named in honor of Warren E. Steiner (USNM), who collected this attractive new mirid.

**Type specimens.** Holotype ♂: Grand Bahama Island, Xanadu Beach, 23 June 1987, W. E. Steiner, M. J. & R. Molineaux (USNM). Paratypes: 1 ♂, 1 ♀, same data as for holotype (USNM).

**Distribution.** Known only from Grand Bahama Island.

**Host.** Unknown.

*Keltonia sulphurea* (Reuter)

Figs. 42, 45–48, 58–61

*Psallus sulphureus* Reuter, 1907:23; Van Duzee, 1907:27, 1909:183 (in part).

*Apocremnus sulphureus*: Barber, 1914:500 (in part?).

*Reuteroscopus sulphureus*: Knight, 1923:462 (in part); Blatchley, 1926:951 (in part); Knight, 1941:49 (in part); Carvalho, 1958:138 (in part).

*Psallus conspurcatus* Blatchley, 1928:16; Blatchley, 1930:66 (synonymized under *sulphurea* of authors by Knight, 1966:591). **NEW SYNONYMY.**

*Keltonia fuscipunctata* Knight, 1966:591; Kelton, 1966:670. **NEW SYNONYMY.**

*Keltonia conspurcata*: Knight, 1966:591.

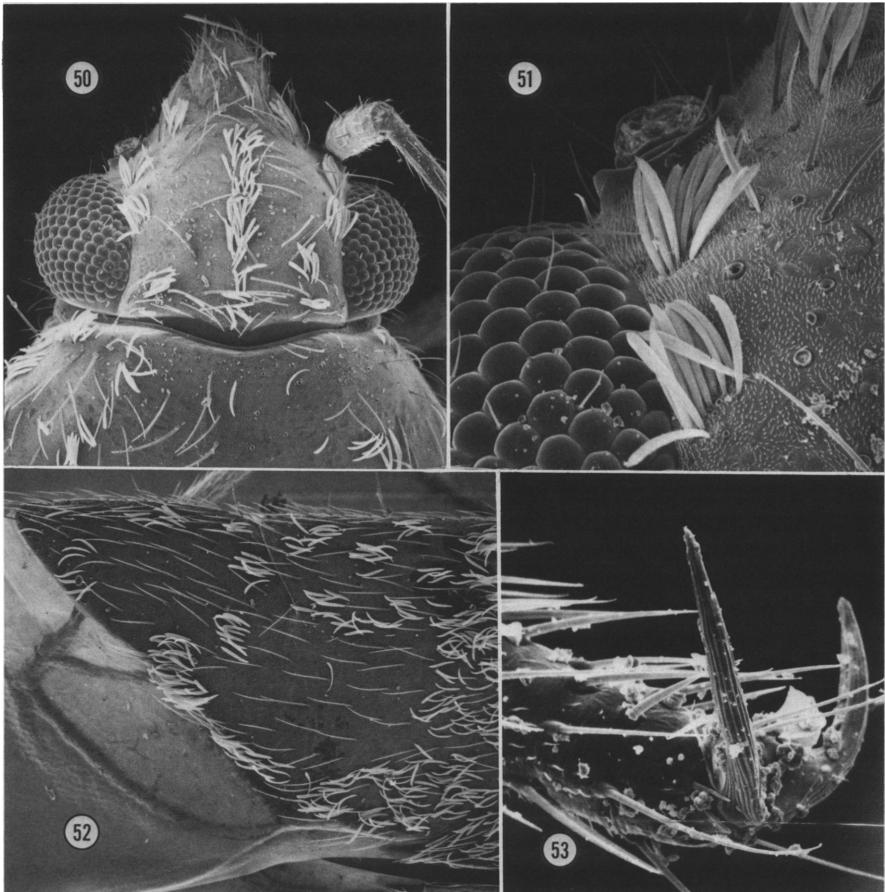
*Keltonia sulphurea*: Knight, 1966:590 (in part); Kelton, 1966:668 (in part); Henry and Wheeler, 1988:469 (in part).

**Diagnosis.** *Keltonia sulphurea* belongs to the group of species possessing a uniformly brown-speckled hemelytron lacking a coalesced, central, brown area. It differs from *K. robusta* in the smaller size (length less than 3.20 mm vs. 3.50 mm or longer in *K. robusta*), the much shorter length of the rostrum that extends only just beyond the apices of the metacoxae, the larger, more distinct and uniformly distributed spots and more distinctly clumped sericeus on the hemelytra. From *K. steineri* it is distinguished by the greenish-yellow coloration, and more dense hemelytral spotting and shorter rostrum. Externally, this species is much like *K. bifurca*, but has slightly larger, more distinct hemelytral spots and the rostrum does not extend beyond the male genital capsule or the ovipositor in females.

**Description.** Male (N = 10): Length 2.88–3.12 mm, width 1.25–1.28 mm. *Head*: Width 0.56–0.58 mm, vertex 0.30–0.32 mm. *Rostrum*: Length 1.30–1.36 mm, extending to base of genital segment. *Antenna*: Segment I, length 0.20–0.22 mm; II, 0.86–0.92 mm; III, 0.50–0.52 mm; IV, 0.42–0.44 mm. *Pronotum*: Mesal length 0.40–0.42 mm, basal width 0.86–0.90 mm.

Female (N = 10): Length 2.88–3.16 mm, width 1.24–1.28 mm. *Head*: Width 0.56–0.58 mm, vertex 0.32–0.34 mm. *Rostrum*: Length 1.28–1.32 mm, extending to base of ovipositor. *Antenna*: Segment I, length 0.22–0.24 mm; II, 0.86–1.02 mm; III, 0.50–0.52 mm; IV, 0.40–0.44 mm. *Pronotum*: Length 0.40–0.42 mm, width 0.86–0.92 mm.

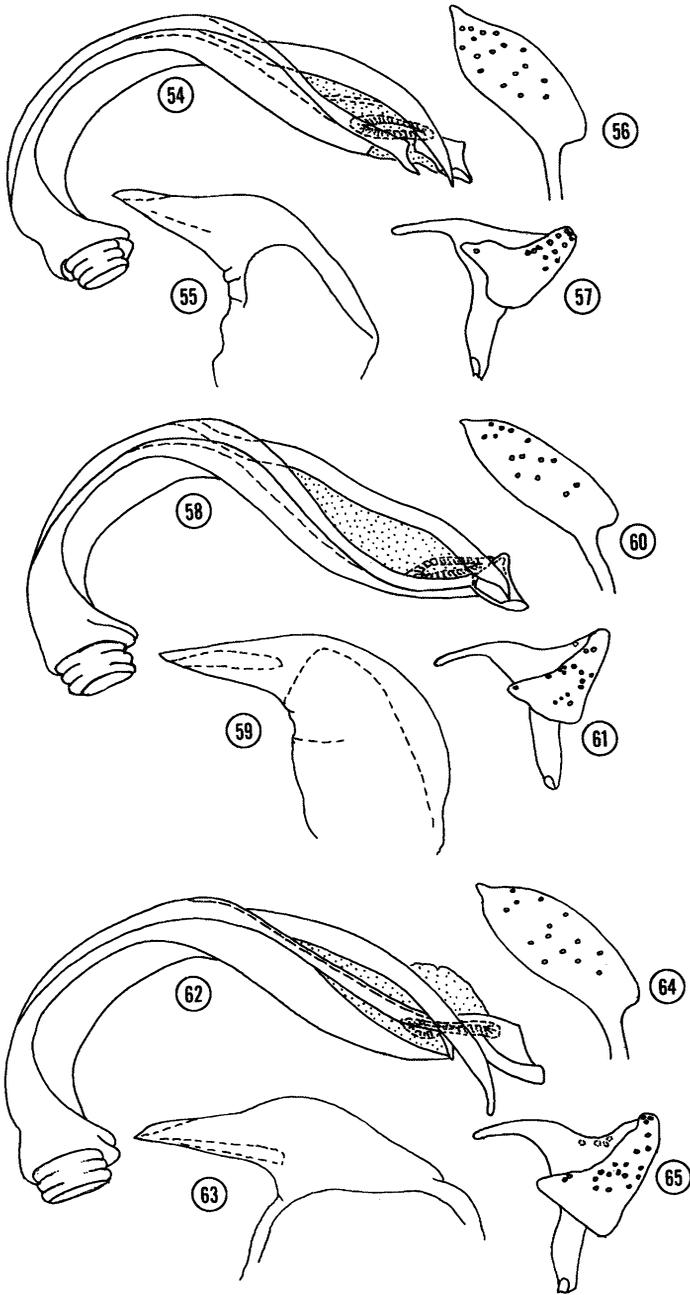
General coloration phosphorescent greenish yellow, dorsum with semierect, golden-brown, simple setae, intermixed with silvery sericeus pubescence. Head (Fig. 45) uniformly greenish yellow. Antenna yellowish, with a few pale-brown spots on segment I, general pubescence short, recumbent, segment I with 2 larger bristlelike setae. Pronotum (Fig. 46) greenish yellow; sericeus setae as follows: 3 clumps on lateral



Figs. 50–53. SEM micrographs of *Keltonia tuckeri*: 50. Dorsal aspect of head (108 $\times$ ). 51. Cluster of sericeus setae along inner margin of eye (384 $\times$ ). 52. Hemelytral pubescence, including setal patches along inner margin of cuneus (90.9 $\times$ ). 53. Pretarsal structure (956 $\times$ ).

margin, 2 on anterior and posterior margins, and a broken row along meson. Scutellum uniformly greenish yellow with 3 clumps of sericeus setae across base. Hemelytron greenish yellow, uniformly sprinkled with small, distinct, brown, setigerous spots, the larger spots bearing a patch of silvery sericeus setae, inner margin of cuneus with 2 dark-brown or black spots bearing dark bristlelike setae; membrane brownish black or fumate, broken by numerous pale or whitish spots giving a conspurcate appearance. Ventral surface uniformly greenish yellow; ostiole (Fig. 47). Legs greenish yellow; all femora with pale-brown spots on apical  $\frac{2}{3}$ ; tibiae with distinct dark-brown spots at bases of brown spines; tarsi yellow, claws (Fig. 48) brown.

*Male genitalia*: Vesica (Fig. 58); phallosome (Fig. 59); right paramere (Fig. 60); left paramere (Fig. 61).



Figs. 54–65. Male genitalia of *Keltonia* spp. *K. steineri*: 54. Vesica. 55. Phallosome. 56. Right paramere. 57. Left paramere. *K. sulphurea*: 58–61. *K. tuckeri*: 62–65.

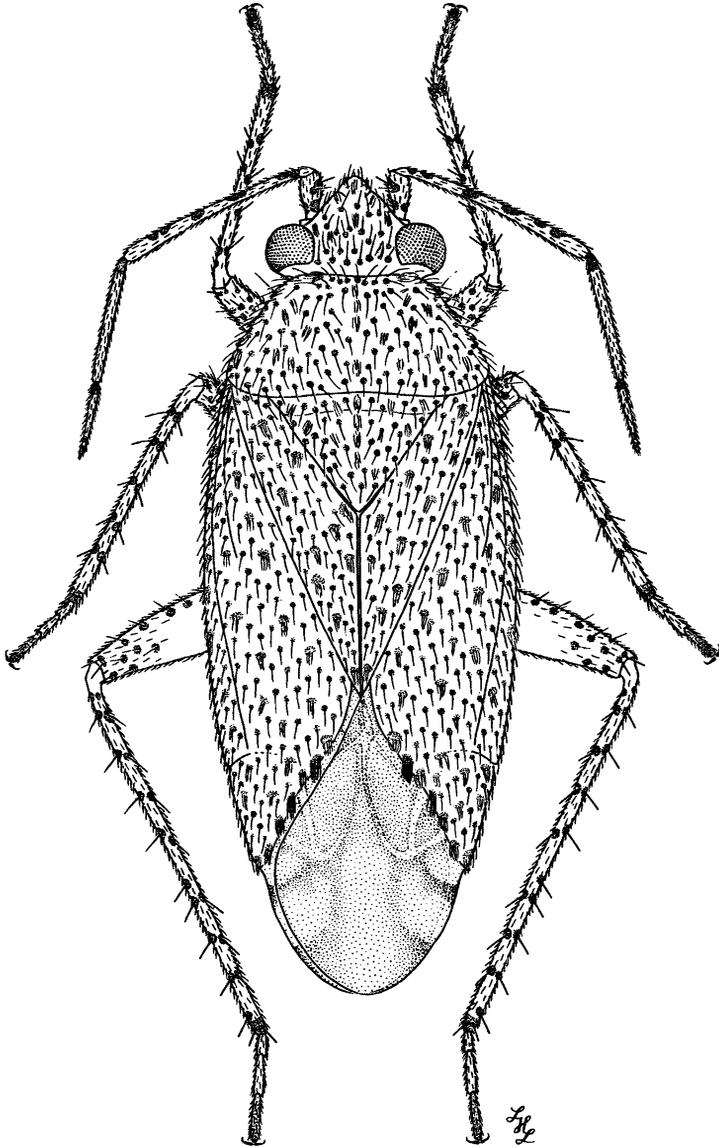


Fig. 66. Habitus of *Pseudatomoscelis seriatus*.

**Remarks.** *Keltonia sulphurea* has been misidentified since its original description. This species keys to *Psallus conspurcatus* in Blatchley (1926) and to *K. fuscipunctatus* in Knight (1966) and Kelton (1966). Knight (1966) correctly, although inadvertently, synonymized *conspurcatus* with *sulphurea*; however, he clearly misidentified *sulphu-*

*rea*, as is indicated by his description of *K. fuscipunctata*. Both are junior synonyms of *K. sulphurea*. All records of *K. sulphurea* outside Jamaica and Florida, and most within Florida, are misidentifications of *K. tuckeri*.

**Type designations.** No primary type has been selected from the syntype series used by Reuter (1907) in describing this species. Therefore, for nomenclatural stability, I here designate the top specimen, a male, of 3 on separate triangular points, all attached to the same pin, as the lectotype. Label data as follows: Label 1, "Kingston, Ja., Apr. 06"; 2, "Kingston, Ja., Apr. 06 [identical to label 1]"; 3, "Van Duzee Collector"; 4, "Van Duzee Collector [identical to label 3]"; 5, "24"; 6, "Mus. Zool. H:fors, Spec. typ. No. 9908, *Psallus sulphureus* Reut."; 7 (here added), "Lectotype: ♂, #1 [paralectotypes: ♀♀, # 2 & 3] *Psallus sulphureus* Reuter, by T. J. Henry." In addition, 3 other specimens, 1 male and 2 females, are attached to two pins with the same locality and collectors data and are considered paralectotypes. All specimens studied, except 1 male and 1 female (USNM), deposited in ZMU.

**Other specimens examined. United States — FLORIDA:** 1 ♂ (holotype of *P. conspurcatus* Blatchley), Royal Palm Park [Collier Co.], 18 April 1927, W. S. Blatchley (PU); 1 ♀ (paratype of *K. fuscipunctata*), Homestead [Dade Co.], July 19, 1939, P. Oman coll. (USNM); 5 ♂♂, 1 ♀, Gulf Co., Rt. 30, 8 mi S Port St. Joe on St. Joe Peninsula, 1 May 1984, T. J. Henry & A. G. Wheeler, Jr., on *Pluchea purpurescens* (USNM); 1 ♂, Highlands Co., Lake Placid, Archbold Biol. Stn., 19 Apr. 1982, T. J. Henry & A. G. Wheeler, Jr., at blacklight (USNM); 9 ♂♂, 9 ♀♀ (and nymphs), Liberty Co., 1.5–4 mi S Bristol, Co. Rd. 379, 7–8 May 1981, T. J. Henry, taken on *Pluchea* sp. (USNM); 6 ♂♂, 7 ♀♀, Liberty Co., Bristol, 1.5–3.0 mi S Bristol, Co. Rd. 379, 7 May 1982, T. J. Henry, taken on *Pluchea purpurescens* (USNM); 1 ♂ (holotype of *K. fuscipunctata*), [Seminole Co.] Sanford, 15 May 1926, E. D. Ball (USNM); 1 ♂ (paratype of *K. fuscipunctata*), [Volusia Co.], New Smyrna, June 1926, E. D. Ball (CNC); 1 ♀ (allotype of *K. fuscipunctata* Knight), [county?] St. John's Bluff, V-8-1927, E. D. Ball (USNM).

**Distribution.** Known only from Jamaica and the United States (Florida).

**Hosts.** No hosts have been recorded in the literature. I have collected adults and nymphs on *P. purpurescens* (Sw.) DC. [Asteraceae] in the panhandle region of Florida.

*Keltonia tuckeri* (Poppius),  
Revised Status and New Combination  
Figs. 43, 49–53, 62–65, 74

*Pseudatomoscelis tuckeri* Poppius, 1911:86 (synonymized with *sulphurea* by Carvalho, 1958:138).

*Apocremnus sulphureus*: Barber, 1914:500 (in part).

*Psallus tuckeri*: Van Duzee, 1916:46; Van Duzee, 1917:407.

*Reuteroscopus sulphureus*: Knight, 1923:462 (in part); Blatchley, 1926:951 (in part); Knight, 1927:36 (in part); Watson, 1928:40; Knight and McAtee, 1929:6; Knight, 1941:48 (in part); Froeschner, 1949:161 (in part); Carvalho, 1958:138 (in part); Kelton, 1964:1421 (in part).

*Keltonia sulphurea*: Knight, 1966:590, 591 (in part); Kelton, 1966:668, 670 (in part); Wheeler et al., 1983:136; McPherson et al., 1983:37; Snodgrass et al. 1984:846; Henry and Wheeler, 1988:469 (in part).

*Keltonia sulphureus* [sic]: Henry and Smith, 1979:213.

**Diagnosis.** *Keltonia tuckeri* belongs to the group of species having the hemelytral spots coalesced at the middle of the corium and apex of the clavus. It is distinguished from *K. mexicana* by the much longer rostrum, broader vertex, and shorter, more compact vesica. From *K. clinopodii* it is separated by the much more profusely spotted hemelytra and larger, dark area at the middle; *K. clinopodii* has the spots restricted to area immediately surrounding the small dark area at the middle of the hemelytra. From *K. knighti* it can be separated by the shorter 2nd antennal segment and the straight, apically acute spiculum.

**Description.** Male (N = 10): Length 3.00–3.40 mm, width 1.20–1.36 mm. *Head*: Width 0.62–0.64 mm, vertex 0.34–0.36 mm. *Rostrum*: Length 1.44–1.48 mm, extending past metacoxae nearly to genital capsule. *Antenna*: Segment I, length 0.20–0.24 mm; II, 0.94–1.06 mm; III, 0.58–0.62 mm; IV, 0.40–0.42 mm. *Pronotum*: Length 0.42–0.46 mm, basal width 0.96–1.02 mm.

Female (N = 10): Length 2.88–3.36 mm, width 1.20–1.24 mm. *Head*: Width 0.60–0.62 mm, vertex 0.32–0.34 mm. *Rostrum*: Length 1.40–1.52 mm, extending onto basal ¼ of ovipositor. *Antenna*: Segment I, length 0.20–0.22 mm; II, 0.90–1.04 mm; III, 0.60–0.68 mm; IV, 0.40–0.42 mm. *Pronotum*: Length 0.42–0.44 mm, basal width 0.90–0.96 mm.

General coloration phosphorescent, greenish yellow, often fading to yellow or yellowish-orange in preserved specimens, dorsum with semierect brown to golden-brown, simple setae, intermixed with silvery sericeus setae. Head (Figs. 50, 51) greenish yellow. Antenna yellowish, segment I with a few vague brown spots on inner surface; all segments with recumbent pale-brown setae, segment I with 3 long, brown, bristlelike setae. Pronotum greenish yellow; sericeus setae as follows: scattered patches along lateral margins and a distinct row, sometimes broken, along meson. Scutellum greenish yellow, with 3 sericeus patches across base and a broken row, often rubbed, along meson. Hemelytron greenish yellow, with small brown setigerous spots over entire surface, but sometimes fading basally on clavus and corium, spots coalescing at apex of clavus and corium to form a large, often nearly solid, brown area; patches of silvery sericeus setae (Fig. 74) scattered, but always arising from brown spots, sericeus setae on central brown area more scattered (rather than distinct patches) but dense; inner margin of cuneus (Fig. 52) and corium with a distinct dark patch bearing dark, bristlelike setae; membrane fumate, broken by numerous pale spots, appearing conspurcate, area just beyond apex of cuneus with a large fuscous spot, followed by a larger pale area. Ventral surface uniformly greenish yellow. Legs yellowish; apical halves of femora with fine brown spots; tibiae with brown spots at bases of spines, which fade apically; tarsi yellowish to pale brown; claws (Fig. 53) brownish.

*Male genitalia*: Vesica (Fig. 62); phallosome (Fig. 63); right paramere (Fig. 64); left paramere (Fig. 65).

**Remarks.** All records of *K. sulphurea* for North America, including most for Florida, should be applied to *K. tuckeri*. Essentially, all workers have followed Knight's (1923) concept of *K. sulphurea*, a species limited in distribution to Jamaica and parts of Florida. *Keltonia sulphurea* has the spots on the hemelytra evenly distributed, whereas *K. tuckeri* (and *K. sulphurea* of Knight and others) has a coalesced cloud of spots through the middle of the corium and apical area of the clavus.

In addition, I note that the material I have associated with *K. tuckeri* from Colombia, El Salvador, Guatemala, Panama, and Venezuela is slightly smaller than

more northern examples of this species, but, otherwise, is inseparable by me at this time based on external characters. However, the spiculum of the male vesica of this southern material tends to be more rounded apically than is typical for specimens of *K. tuckeri*. With the study of more material, this neotropical material may prove to represent a distinct species.

**Type material examined.** *K. tuckeri* was described from a single specimen taken in Texas. That holotype is in the Mus. Zool., Helsinki with the following labels: 1, "Plano, Texas, Oct. at night, E. S. Tucker"; 2, "Mus. Zool. H:fors Spec. typ. No. 10301, *Pseudatomoscelis tuckeri* Popp."; 3 (red label here added), "Holotype: female, *Pseudatomoscelis tuckeri* Poppius." The condition is fair. Missing are all antennal segments (except both first segments), the right pro- and left metatibiae, and the right middle and right hind legs, and most of the sericeous pubescence is rubbed away.

**Other material examined.** **Colombia**—1 ♂, Magdal., Santa Marta, Oct. 8, 1971, G. E. Bohart (USU); 1 ♂, Tol. Armero, June 26–30, 1977, Peyton & Suarez, taken in malaise trap (USNM). **El Salvador**—1 ♂, Tonacatepeque, June 20, 1958, L. J. Bottimer (USNM). **Guatemala**—1 ♂, Yepocapa, Chimatango, Apr. 7, 1948, H. D. Alberto (USNM). **Honduras**—1 ♂, Coyles, Dec. 20, 1976, G. V. Manley (TAM). **Mexico**—**CHIAPAS**: 1 ♀, 25 mi SW Cintalapa, July 11, 1971, Clark, Murray, Hart, & Schaffner (TAM); 1 ♀, 3 mi SW Cintalapa, 19 Oct. 1976, Cate & Clark (TAM). **GUERRERO**: 1 ♀, Iguala, July 8–9, 1971, Clark, Murray, Hart, & Schaffner (TAM). **JALISCO**: 4 ♂♂, 16 km N Autlan, July 12–14, 1983, at blacklight, Kovarik, Harrison, & Schaffner (TAM). **OAXACA**: 5 ♂♂, 1 ♀, 9 mi W Tehuantepec, VI-25-65, at light, Burke, Meyer, & Schaffner (TAM); 45 ♂♂, 11 ♀♀, 12 mi W Tehuantepec, July 11, 1971, at light, Clark, Murray, Hart, & Schaffner (TAM, USNM); 3 ♂♂, 2 ♀♀, 6 mi W Tehuantepec, July 6, 1971, at light, Clark, Murray, Hart, & Schaffner (TAM); 14 ♂♂, 8 ♀♀, 11.6 mi W Jalapa de Marques, July 12, 1971, at light, Clark, Murray, Hart, & Schaffner (TAM, USNM); 1 ♂, 11 mi W Tehuantepec, July 23, 1973, Mastro & Schaffner (TAM); 6 ♂♂, 9 mi W Tehuantepec, July 17, 1973, at light, Mastro & Schaffner (TAM); 1 ♂, 12 mi W Zanatepec, July 18, 1973, Mastro & Schaffner (TAM); 6 ♂♂, 5 ♀♀, 2 mi N Totlapan, July 17, 1973, Mastro & Schaffner (TAM); 7 ♂♂, 5 ♀♀, 8 mi N La Vertosa, July 22, 1973, at light, Mastro & Schaffner (TAM); 2 ♂♂, 1 mi SW Rio Hondo, July 22, 1974, Clark, Murray, Ashe, & Schaffner (TAM); 5 ♂♂, 2 ♀♀, 2.7 mi NW El Cameron, July 21–22, 1974, Clark, Murray, Ashe, & Schaffner (TAM); 1 ♂, 10.5 mi W Tehuantepec, July 22, 1974, Clark, Murray, Ashe, & Schaffner (TAM); 8 ♂♂, 2.1 mi NW Totolapan, July 11–17, 1981, Bogar, Schaffner, & Friedlander (TAM). **PUEBLA**: 1 ♀, 13.3 mi NE Tehuiztzingo, July 13–14, 1974, Clark, Murray, Ashe, & Schaffner (TAM). **QUERETARO**: 1 ♀, 1 mi NW Ayutla, July 24, 1970, at light, Murray, Phelps, Hart, & Schaffner (TAM). **Panama**—2 ♀♀, Pt. Aguadulce, Nov. 21, 1952, F. S. Blanton (USNM); 1 ♀, Rio Sajalises, near Villa Real, Sept. 12, 1952, F. S. Blanton (USNM). **United States**—**ALABAMA**: [Cullman Co.] Garden City, July 7, 1939, D. E. Hardy (KU); 1 ♀, [Jefferson Co.] Edgewood, Birmingham, Aug. 10, 1916, Ac 4849 (AMNH); 2 ♂♂, 5 ♀♀, [Montgomery Co.] Pickett Springs, Montgomery Aug. 5–6, 1916, Ac. 4849 (AMNH); 1 ♀, [Morgan Co.] Decatur, July 6, 1939, P. B. Lawson (KU); 2 ♂♂, 2 ♀♀, [Tallapoosa Co.] Alexander City, G. Nelson, Aug. (AMNH). **ARIZONA**: 1 ♂, [Maricopa Co.] Buckeye, 6-12-35, H. G. Johnston, on *Salvia* (USNM); 4 ♂♂, 1 ♀, [Maricopa Co.] Palo Verde, 6-20-1935, H. G. Johnston, on wild sunflower (USNM); 1 ♀, [Pima Co.] San Xavier, Mission, X-15-36, E. P.

Van Duzee (CAS). ARKANSAS: 6 ♂♂, 12 ♀♀, Newton Co., Rt. 74, nr. Jasper, June 16, 1987, T. J. Henry & A. G. Wheeler, Jr., taken on *Aster* sp., poss. *pilosus* (USNM); 2 ♂♂, 3 ♀♀, Polk Co., 7-21-28, L. D. Beamer (KU); 1 ♀, Washington Co., VI-30-1940, M. W. Sanderson (KU). COLORADO: 21 ♂♂, 23 ♀♀, Douglas Co. Waterton, June 18-30, 1981, J. T. Polhemus, taken on *Chrysopsis villosa* (JTP); 2 ♂♂, 2 ♀♀, [Douglas Co.] Perry Park, CL873, July 13, 1977, D. A. & J. T. Polhemus (JTP); 1 ♀, Jefferson Co., O'Fallen Park, nr. Kittridge, Aug. 31, 1981, D. A. Polhemus (JTP); 11 ♂♂, 15 ♀♀, Mesa Co., John Brown Creek, 5 mi W of Gateway, 15 Aug. 1987, T. J. Henry, D. A. & J. T. Polhemus, taken on *Chrysopsis villosa* (USNM). DISTRICT OF COLUMBIA: 1 ♀, July 3, 1926, H. H. Knight (USNM); 1 ♂, 1 ♀, Nat'l. Arboretum, 27 Sept. 1981, T. J. Henry & A. G. Wheeler, Jr., on *Ambrosia artemisiifolia* (USNM). FLORIDA: 1 ♂, [Alachua Co.] Waldo, 8-18-1930, L. D. Tuthill (KU); 2 ♀♀, [Alachua Co.], Waldo, 4 May 1961, L. A. Kelton (CNC); 1 ♂, 2 ♂♂, Gilchrist Co., Trenton, 2 May 1981, T. J. Henry, on *Eupatorium capillifolium* (USNM); 2 ♀♀, Marion Co., Rt. 40, 2 mi E Lynne, 24 Apr. 1984, T. J. Henry & A. G. Wheeler, Jr., on *Heterotheca* sp.; 1 ♀, [Nassau Co.] Hilliard, 8-19-1930, J. Nottingham (KU); 3 ♂♂, 1 ♀, Okaloosa Co., 5 mi N Crestview, 11 May 1982, T. J. Henry, on *Gaillardia pulchella* (USNM); 1 ♂, 1 ♀, [Putnam Co.] Crescent City, Apr. 1908, Van Duzee (CAS); 1 ♂, [Suwanee Co.] Branford, 7-31, 1930, R. H. Beamer (KU); 1 ♂, Taylor Co., Salem, VIII-29-1960, L. A. Stange (UCD); 1 ♀, [Leon Co.] Tallahassee, 7-14-1934, P. A. McKinstry (KU); 2 ♂♂, [Seminole Co.] Sanford, 8-22-1933, C. O. Bare (KU). GEORGIA: 3 ♂♂, 2 ♀♀, Clarke Co., Stonehenge, 8-14 May 1974, C. L. Smith, at light (USNM); 1 ♀, Clarke Co., 7 mi SW Winterville, 19 May 1974, C. L. Smith, at light (USNM); 1 ♂, Oconee Co., Decalb Farm, 22 July 1971, C. L. Smith, light trap (USNM). ILLINOIS: 1 ♂, [Alexander Co.] Olive Branch, 9-24-1941, R. L. McCarr, on cotton (USNM); 1 ♂, [Wayne Co.] Fairfield, June 12, 1934, DeLong & Ross (ANMH); 1 ♂, [county?] Meredosia, Aug. 22, 1898, F. M. McE. (AMNH). KANSAS: 2 ♂♂, [Douglas Co.] Lawrence, 9-20-1944, R. H. Beamer (KU). LOUISIANA: 2 ♂♂, [county?] Opelousas, G. R. Pilate, no collector or date (USNM). MARYLAND: 1 ♂, 1 ♀, Prince Georges Co., Hyattsville, Sept. 6, 1914, W. L. McAtee, on *Solanum "carolinianum"* (USNM); 2 ♂♂, Prince Georges Co., Lanham, 6-25, 1967, P. Oman (OSU). MASSACHUSETTS: 1 ♂, [Dukes Co.] Edgartown, 22 Aug. 1912, Parshley colln. (CNC). MISSISSIPPI: 1 ♂, 5 ♀♀, [Itawamba Co.] Fulton, 7-14-1930, P. W. Oman (KU); 1 ♂, [Lauderdale Co.] Meridian, 7-17-1930, L. D. Tuthill (KU); 1 ♀, [Leake Co.] Carthage, 25 Aug. 1928, H. G. Johnston [TAM]; 1 ♂, 4 ♀♀, [Lowndus Co.] Columbus, 7-16-1930, R. H. Beamer (KU); 1 ♂, [Monroe Co.] Hamilton, 7-15-1930, P. W. Oman (KU); 1 ♂, [Noxubee Co.] Shuqualak, 7-16, 1030, R. H. Beamer (KU). MISSOURI: 3 ♂♂, 2 ♀♀, [Taney Co.] Hollister, July 22, 1915, H. H. Knight (USNM). NEW JERSEY: 1 ♂, [Cape May Co.] Woodbine, 8-21-1902, E. P. Van Duzee (CAS). NORTH CAROLINA: 1 ♂, 1 ♀, Brunswick Co., Shallotte Point, 11 July 1960, P. D. Ashlock (CNC); 1 ♂, 12 ♀♀, Guilford Co., Greensboro, 17 June 1956, P. D. Ashlock (CNC); 1 ♂, [Macon Co.] Whiteface Cove, nr. Highlands, 17 Aug. 1957, L. A. Kelton, ex. ragweed (CNC); 1 ♂, [Macon Co.] Highlands, Horse Cove, 9 Aug. 1957, L. A. Kelton (CNC); 1 ♂, 1 ♀, [Johnson Co.] Benson, 8-9-1934, R. H. Beamer (KU); 1 ♂, [Shelby Co.] Raleigh, 8-30-1946, R. H. Beamer (KU); 1 ♀, Wake Co., 13 June 1958, D. A. Young (CNC). PENNSYLVANIA: 1 ♂, Dauphin Co., Conewago Twp., Cedar Rd., 28 June 1977, T. J. Henry, taken at light (USNM). SOUTH CAROLINA: 1 ♂, 2 ♀♀, [Aiken Co.]

Aiken, 24 Aug. 1957, W. R. Richards (CNC); 1 ♂, [Lexington Co.] Batesburg, 8-21-1930, J. Nottingham (KU); 3 ♂♂, 2 ♀♀, [Oconee Co.] Seneca, 20 Aug. 1957, W. R. Richards & L. A. Kelton (CNC). TENNESSEE: 5 ♂♂, 1 ♀, Hamilton Co., 6-24-1943, Turner 20294, light trap at edge of peach orchard (USNM). TEXAS: 1 ♂, 1 ♀, Anderson Co., Salmon, 14-21 July 1974, H. R. Burke, taken from malaise trap (TAM); 1 ♂, Bell Co., Temple, Weems Farm, 31 01' L 97 12', 23 Sept. 1986, W. A. Palmer, taken on *Amaranthus psilostachys* (TAM); 1 ♂, 4 ♀♀, Bosque Co., 2 mi W Iredell, 22 May 1970, J. C. Schaffner (TAM); 1 ♂, 1 ♀, Brazoria Co., 6 Aug. 1968, D. P. Sanders (TAM); 15 ♂♂, 13 ♀♀, Brazos Co., Bryan, 28 Apr.-11 Oct. 1965-1975, J. C. Schaffner, at light (TAM); 3 ♂♂, 1 ♀, Brazos Co., College Stn., 12 Oct. 1928, S. E. Jones, at light (TAM); Brazos Co., College Stn., 28 May 1928, taken on *Amaranthus torreyii* and *Heterotheca subaxilaris* (TAM); 2 ♂♂, Brazos Co., College Stn., 10 May 1928, H. G. Johnston (TAM); Brazos Co., College Stn., 1 May 1973, W. E. Clark (TAM); 2 ♂♂, Brazos Co., College Stn., 6 May 1975, J. C. Schaffner, at light (TAM); 1 ♂, 1 ♀, Brazos Co., Koppe's Bridge, 5 mi SW Welborn, 22 June 1972, E. E. Grissell (TAM); 2 ♂♂, Brazos Co., Jones Rd., 1.6 mi N Hwy. 60, 1 June 1975, S. J. Merritt (TAM); 1 ♀, Brazos Co., Cedar Creek, 5 Sept. 1970, Board & Phelps, at light (TAM); 1 ♀, Burnet Co., Inks Lake St. Pk., 18 June 1965, M. H. Sweet (TAM); 1 ♀, Hidalgo Co., Bentsen-Rio Grande St. Pk., 18 June 1969, Board & Hafernik (TAM); 1 ♀, Hill Co., 15 mi W West, 26 Aug. 1971, J. C. Schaffner (TAM); 1 ♂, Robertson Co., 2.9 mi N Jct. OSR and FM 46, 24 July 1976, S. J. Merritt, sweeping *Monarda* (TAM); 5 ♂♂, 6 ♀♀, Kleburg Co., N Padre Island, 21 Apr. 1983, T. J. Henry & A. G. Wheeler, Jr., on *Heterotheca subaxilaris* (USNM); 2 ♂♂, 3 ♀♀, Kleburg Co., Nueces Bay, Corpus Christi, 19 Apr. 1983, T. J. Henry & A. G. Wheeler, Jr., on *Heterotheca subaxilaris* (USNM); 1 ♀, San Patricio Co., Lake Corpus Christi St. Pk., 8 June 1969, Board & Hafernik (TAM); 1 ♂, 1 ♀, San Patricio Co., Welder Wildlife Refuge, 25 June 1981, J. C. Schaffner (TAM); 1 ♂, Washington Co., Lake Somerville, 18 Apr. 1971, J. C. Schaffner (TAM). UTAH: 2 ♂♂, [Washington Co.] Zion Nat'l. Park, V. M. Tanner (USNM). VIRGINIA: 1 ♀, [Albemarle Co.] Charlottesville, 8-30-1930, L. C. Woodruff (KU). VENEZUELA—3 ♂♂, 3 ♀♀, Zulia, 6 km W La Concepcion, June 18, 1976, A. S. Menke & D. Vincent (USNM); 4 ♂♂, 1 ♀, Lara, 12 km N Cubrio, 800 m, Acacia & secondary growth, Dec. 27, 1985, P. Kovarik & R. Jones (TAM); 2 ♂♂, 4 ♀♀, Lara, 6 km S El Tocuyo, Acacia savannah, 700 m, Dec. 29, 1985, P. Kovarik & R. Jones (TAM).

**Distribution.** All distribution records for *K. sulphurea*, except Jamaica, as given by Henry and Wheeler (1988), should be applied to *K. tuckeri*. This species occurs across the United States from Massachusetts west to Colorado, and south through Mexico and Central America to Colombia and Venezuela. It is recorded from Alabama, Arizona, Arkansas, Connecticut, Delaware, District of Columbia, Florida, Georgia, Illinois, Kansas, Massachusetts, Mississippi, Missouri, North Carolina, Ohio, Texas, West Virginia, and Mexico. New United States records are Colorado, Louisiana, New Jersey, Pennsylvania, South Carolina, Tennessee, Utah, and Virginia. New country records are Colombia, El Salvador, Guatemala, Honduras, Panama, and Venezuela.

**Hosts.** *Keltonia tuckeri* (as *K. sulphurea*) has been recorded from *Ambrosia artemisiifolia* L. [Asteraceae], *A. trifida* L., *Aster pilosus* Willd. [Asteraceae], *Chenopodium album* L. [Chenopodiaceae], *Conyza canadensis* L. [Asteraceae], *Eupatorium serotinum* Michx. [Asteraceae], *Haplopappus divaricatus* (Nutt.) Gray [Asteraceae], *He-*

*lenium amarum* (Raf.) H. Rock [Asteraceae], *Heterotheca latifolia* Buckl. [Asteraceae], *Iva annua* L. [Asteraceae], *Oenothera laciniata* Hill. [Onagraceae], *Sida spinosa* L. [Malvaceae], *Solanum carolinense* L. [Solanaceae], *Symphoricarpos orbiculatus* Moench [Caprifoliaceae], and *Xanthium strumarium* L. [Asteraceae] (Knight, 1927, 1941, 1966; Knight and McAtee, 1929; Snodgrass et al., 1984). New records based on specimens studied include: *Amaranthus "psilostachys"* [Amaranthaceae], *A. torreyi* Benth., *Chrysopsis villosa* DC. [Asteraceae], *Eupatorium capillifolium* (Lam.) Small [Asteraceae], *Gaillardia pulchella* Foug. [Asteraceae], *Heterotheca subaxilaris* (L.) Britt. & Rusby [Asteraceae], *Monarda* sp. [Lamiaceae], and *Salvia* sp. [Lamiaceae].

In the eastern U.S., I have collected adults and nymphs of this species most frequently on *Ambrosia* spp.; in Colorado it was abundant on *Chrysopsis villosa*; and in Texas it was common on *Heterotheca subaxilaris*. Based on the numerous hosts listed above, especially those having immatures associated with them, *K. tuckeri* would appear to be primarily a composite (Asteraceae) specialist.

McPherson et al. (1983) studied the flight patterns of this species (as *K. sulphurea*) in North Carolina, noting that 85% of the adults were captured in their traps at a height of 1 meter. They also speculated that this species, which overwinters in the egg stage, probably has 3 generations (in N.C.), based on peak flight activity from late May to mid-July, mid-July to late August, and early September to October.

#### *Pseudatomoscelis* Poppius

*Pseudatomoscelis* Poppius, 1911:85; Carvalho, 1959: Addenda et Corrigenda (as synonym of *Psallus* Fieber); Knight, 1968:55; Sterling and Dean, 1977:1-28; Kelton, 1980:330; Henry and Wheeler, 1988:495. Type species: *Atomoscelis seriatus* Reuter, 1876. Original designation.

**Diagnosis.** Phylinae: Phylini. This genus is distinguished from all other genera in the tribe Phylini by the pale (pale green or yellow to pale orange) to green body coloration; 3 or more distinct fuscous spots or bands on the 2nd antennal segment, pale to brownish membrane with a dark fuscous mark just posterior to apex of the cuneus; one or more dark setal patches along inner margin of cuneus (and paracuneus) bordering membrane; two types of pubescence, with sericeous setae present in distinct clumps (but not in rows along midline as in *Keltonia*); dark bristlelike setae on dorsal edge of metafemur, pale tibiae with dark spots at the bases of the spines; the stoutly formed, C-shaped vesica, with a slender acuminate spiculum (lacking the apical, bluntly rounded, shallow cuplike process found in species of *Keltonia*); and the phallotheca with a subapical spine.

**Description.** Generally elongate oval, delicate, small sized, length from apex of tylus to apex of hemelytral membrane 2.15-3.40 mm; coloration pale yellow to dark green, or yellowish orange; dorsum impunctate, surface shiny to almost velvety, clothed with simple, often bristlelike, semierect setae, intermixed with individual or tufts (clumps of 2-6 setae) of silvery, sericeous or scalelike setae. Head subtriangular in dorsal aspect, tylus somewhat thickened, rounded apically; antennal segment I not or just surpassing apex of tylus, antennal fossa or socket set anteriorly adjacent to lower edge of compound eye just below emargination (Fig. 67), eyes sparsely pubescent; tufts of sericeous setae present at base of jugum and along inner margin of eye

near antennal fossa (Fig. 68), individual setae scattered over frons and vertex. Rostrum extending just beyond metacoxae to 2nd or 3rd abdominal segment. Antenna slender, segment I shortest and thickest, apex only slightly surpassing apex of tylus, II longest, nearly as thick as segment I in males, always possessing 3 or more dark spots or bands, III and IV most slender. Pronotum trapeziform, immaculate or spotted, with scattered simple and sericeous setae. Hemelytron macropterous, surface immaculate to uniformly spotted, spots when present fine and dark; cuneus longer than wide at base, inner margin bordering membrane with one or two (counting paracuneus) darkly pigmented patches giving rise to stout fuscous to black setae; membrane pale translucent brown to whitish, with a relatively large fuscous spot near apex of cuneus. Legs slender; femora somewhat thickened, weakly saltatorial, with fine to large dark spots, dorsal edge of metafemora with 6 stout, black, bristlelike setae; tibiae pale with fuscous spots at bases of spines; claws slender, with setiform parempodia and fleshy, quadrate pulvilli (Fig. 70). Male genitalia: Left paramere typically phyline with two parallel processes, the anterior (right) process long and slender, the posterior (left) short and blunt; right paramere flattened, elongate oval, with a short pointed process apically; vesica stout, weakly twisted, C-shaped, lacking shallow, cuplike process [found in *Keltonia*] apically.

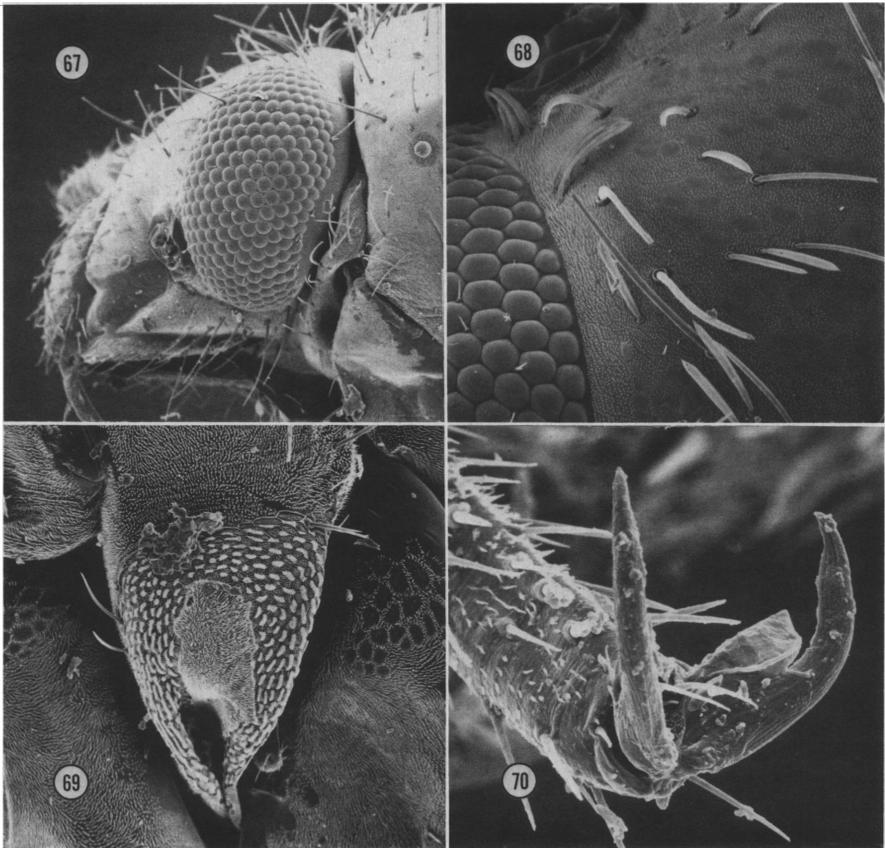
Females are similar to males in color and pubescence, but usually differ by their larger and broader body form, proportionately smaller eyes, broader vertex, and more slender 2nd antennal segment.

**Remarks.** This genus is mostly closely related to *Keltonia* based on the shared setigerous black spots on the inner margin of the cuneus and paracuneus, two types of pubescence, including the unique tufts of silvery sericeous setae, the spots at the bases of the tibial spines, the large dark spot on the membrane near the apex of the cuneus, and the stout, C-shaped vesica. However, all three species of *Pseudatomoscelis* can be separated from those in *Keltonia* by the spotted 2nd antennal segment, the nonconspicuous hemelytral membrane, and the vesica that lacks an apical process.

Schuh (1984) noted a superficial resemblance of *Pseudatomoscelis seriatus* to the Indo-Pacific phyline *Opuna annulatus* (Knight), presumably based on the similar coloration and spots on the antennae and legs. I have studied a series of *O. annulatus* (females) from Guam, Malaysia, Okinawa, and Thailand and I have compared Schuh's (1984) figures of male genitalia, and concur that the resemblance appears only superficial. The male vesica of *O. annulatus* is sigmoid or S-shaped and lacks the apical sheathlike area found in species of *Pseudatomoscelis*, the appendages of the left paramere are much stouter, and the body lacks sericeous pubescence. I do note that *O. annulatus* possesses dark setal patches along the inner margin of the cuneus, a character I consider synapomorphic for *Keltonia* and *Pseudatomoscelis*. However, because of the lack of other corroborative characters, these patches, along with the spotted 2nd antennal segment, probably are examples of convergence. Only a broader analysis of the phyline genera on a world basis will resolve relationships of such problematic taxa.

#### KEY TO SPECIES OF *PSEUDATOMOSCELIS*

1. Dorsum immaculate, without spots; body coloration yellow to yellowish orange (Fig. 44); Arizona and Mexico ..... *flora* (Van Duzee)



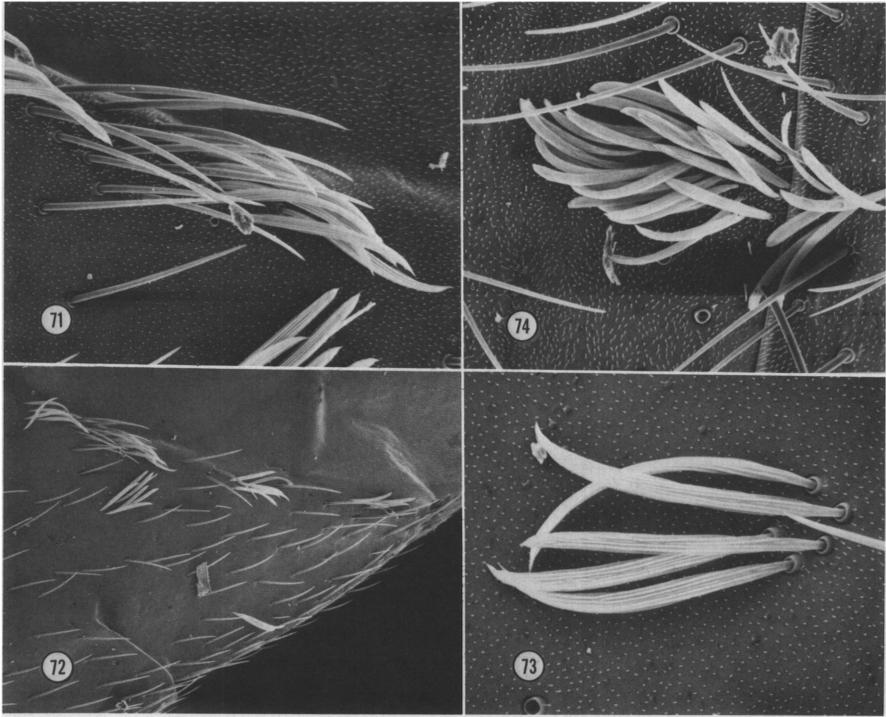
Figs. 67–70. SEM micrographs of *Pseudatomoscelis seriatus*: 67. Lateral aspect of head (145×). 68. Sericeus setae along inner margin of eye (350×). 69. Ostiolar opening and evaporative area. 70. Pretarsal structure (303×). 70. Pretarsal structure (841×).

- Dorsum always with dark spots; body coloration pale yellow to dark green, sometimes tinged with yellowish orange ..... 2
- 2. Small species, length 2.60 mm or less; inner margin of cuneus without or with only vague spots bearing 2 or 3 bristlelike setae; vesica of male (Fig. 79) short and stout; Puerto Rico and St. Thomas, West Indies ..... *insularis*, n. sp.
- Larger species, length 2.75 mm or more; inner margin of cuneus with 1 or 2 distinct dark spots bearing numerous dark bristlelike setae; vesica of male (Fig. 83) more slender; Saskatchewan, Canada south to Venezuela, and the West Indies ..... *seriatus* (Reuter)

*Pseudatomoscelis flora* (Van Duzee), New Combination

Figs. 44, 75–78

*Psallus flora* Van Duzee, 1923:158; Carvalho, 1958:121; Bibby, 1961:329; Henry and Wheeler, 1988:493.



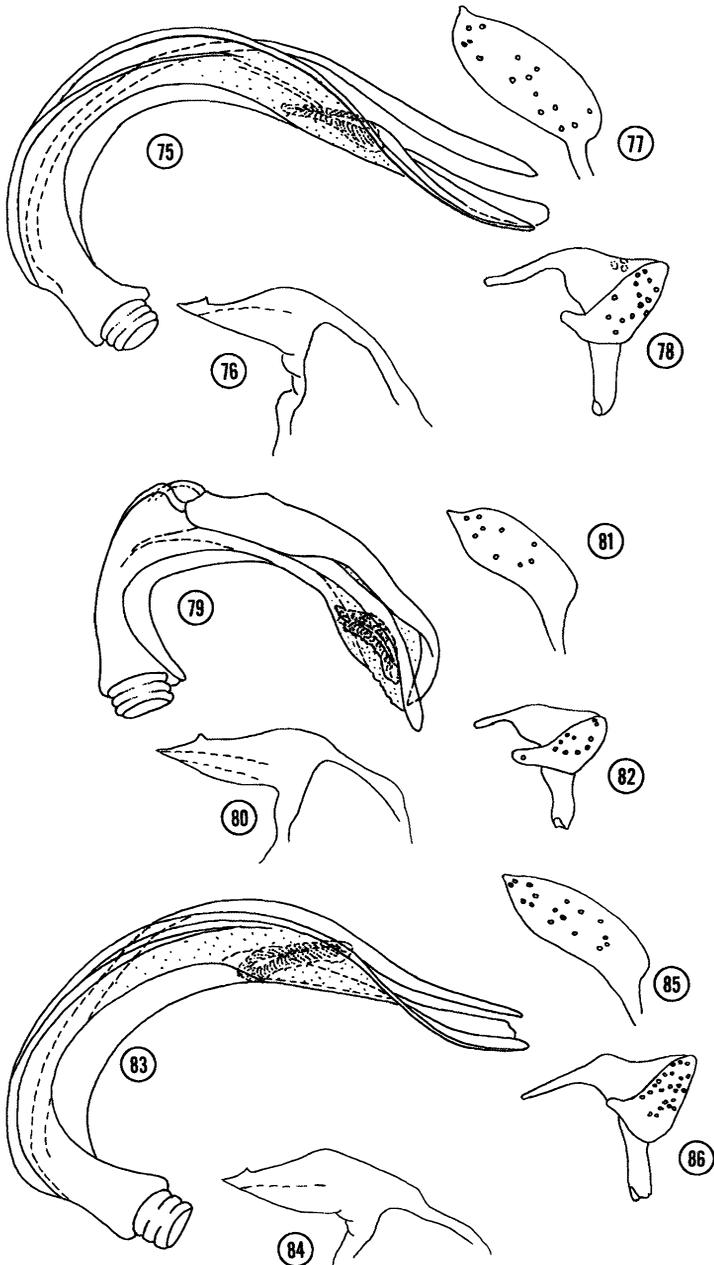
Figs. 71–74. SEM micrographs of setal types. *Pseudatomoscelis seriatus*: 71. Patch of bristlelike and sericeus setae along inner margin of cuneus (901 $\times$ ). 72. Patches of setae along inner margin of cuneus (149 $\times$ ). 73. Cluster of sericeus setae on corium (584 $\times$ ). *Keltonia tuckeri*: 74. Sericeus setae on corium (470 $\times$ ).

**Diagnosis.** This species is readily distinguished from *P. insularis* and *P. seriatus* by the deep-yellow to yellowish-orange coloration and lack of spots on the dorsum.

**Description.** Male (N = 5): Length 2.42–3.33 mm, width 1.20–1.32 mm. *Head*: Width 0.70–0.78 mm, vertex 0.34–0.40 mm. *Rostrum*: Length 0.76–0.90 mm, extending to bases of mesocoxae. *Antenna*: Segment I, length 0.20–0.22 mm; II, 0.70–0.78 mm; III, 0.44–0.50; IV, 0.30–0.32 mm. *Pronotum*: Length 0.50–0.62 mm, basal width 1.10–1.20 mm.

Female (N = 4): Length 3.12–3.40 mm, width 1.44–1.48 mm. *Head*: Width 0.72–0.74 mm, vertex 0.36–0.40 mm. *Rostrum*: 0.98–1.00 mm, extending to mesocoxae. *Antenna*: Segment I, length 0.22–0.24 mm; II, 0.82–0.90 mm; III, 0.46–0.50 mm; IV, 0.26–0.34 mm. *Pronotum*: Length 0.62–0.64 mm, basal width 1.18–1.20 mm.

Coloration uniform deep yellow to yellowish orange; dorsum clothed with pale to brown, semierect, simple pubescence, intermixed with individual and small tufts (2–4 setae) of silvery, sericeus setae. Head yellow, with a tuft of sericeus setae at base of buccula and 2 to 3 tufts along inner margin of eye. Antenna pale yellow; segment I with 1 or 2 dark spots on inner apical surface, each spot giving rise to a dark,



Figs. 75–86. Male genitalia of *Pseudatomoscelis* spp. *P. flora*: 75. Vesica. 76. Phallosome. 77. Right paramere. 78. Left paramere. *K. insularis*: 79–82. *K. seriatus*: 83–86.

bristlelike seta; II pale yellow, with 3 to 4 evenly spaced dark-brown spots; III yellow, with a narrow, dark-brown band at base; IV yellow. Pronotum uniformly yellow, with scattered simple and sericeous setae. Scutellum and hemelytron uniformly yellow, with scattered simple and individual and tufts of sericeous setae; cuneus yellow, with inner basal angle (paracuneus) bearing a dark spot giving rise to a cluster of fuscous or black bristlelike setae; membrane translucent white with a brown apical cloud and a dark spot posterior to apex of cuneus; veins yellow. Ventral surface yellow. Legs yellow; femora finely brown spotted on apical halves; tibiae yellow with brown spots at bases of fuscous tibial spines; tarsi yellow; claws brown.

*Male genitalia*: Vesica (Fig. 75); phallosome (Fig. 76); right paramere (Fig. 77); left paramere (Fig. 78).

**Specimens examined.** Mexico—BAJA CALIFORNIA SUR: 1 ♂, 1 ♀ (paratypes), Mulegé, 14 May 1921, E. P. Van Duzee [taken on *Wislizenia refracta*] (USNM); 1 ♀, intercepted at El Paso, Texas from Mexico, x-19-48, with mustard (USNM). **United States**—ARIZONA: 3 ♂♂, 4 ♀♀, Pima Co., 29 Sept. 1940, L. L. Stitt, taken on *Wislizenia refracta* (USNM); 5 ♂♂, 5 ♀♀, Pima Co., No. 1505, 4 May 1958 [F. F. Bibby], taken on *Wislizenia refracta* (USNM).

**Distribution.** Known only from Arizona and Baja, Mexico.

**Hosts.**—Van Duzee (1923), in the original description, wrote “on the yellow flowers of *Wislizenia refracta* [Engelm., Capparidaceae], the color of which they match exactly.” Bibby (1961), in reporting the first U.S. record, also listed *W. refracta* as the host. The record “with mustard” on a specimen in the USNM collection probably represents a sitting record or a plant misidentification.

### *Pseudatomoscelis insularis*, new species

Figs. 79–82

**Diagnosis.** This species is distinguished from *P. flora* by the presence of distinct spots on the dorsum. From *P. seriatus*, it is recognized by the small size (males 2.40 mm or less; females 2.60 mm or less), and shorter, stouter, more curved, male vesica. Also, the head, and often the pronotum, of *P. insularis* is much less profusely spotted than on *P. seriatus*, and the dark patches on the inner margin of the cuneus are much less distinct.

**Description.** Male (N = 6): Length 2.16–2.40 mm, width 1.10–1.12 mm. *Head*: Width 0.60–0.62 mm, vertex 0.28–0.30 mm. *Rostrum*: Length 1.10–1.12 mm, extending to base of genital segment. *Antenna*: Segment I, length 0.20–0.22 mm; II, 0.78–0.80 mm; III, 0.36–0.38 mm; IV, 0.24–0.26 mm. *Pronotum*: Length 0.44–0.46 mm, basal width 0.88–0.90 mm.

Female (N = 6): Length 2.40–2.60 mm, width 1.10–1.18 mm. *Head*: Width 0.58–0.60 mm, vertex 0.30–0.32 mm. *Rostrum*: Length 1.08–1.16 mm, extending to base of ovipositor. *Antenna*: Segment I, length 0.20–0.22 mm; II, 0.76–0.78 mm; III, 0.36–0.38 mm; IV, 0.24–0.28 mm. *Pronotum*: Length 0.44–0.46 mm, basal width 0.86–0.96 mm.

General coloration pallid to greenish yellow, with pronotum, scutellum, and hemelytra uniformly sprinkled with small brown spots, each spot giving rise to an erect to semierect, fuscous, bristlelike seta, intermixed with tufts of silvery sericeous setae. Head pallid to greenish yellow, often strongly tinged with deeper orange yellow,

sometimes with a few scattered brown spots, especially along base of vertex and across anterior edge of frons; set with long, erect, dark, bristlelike setae, intermixed with tufts of silvery sericeus setae on tylus, lorum, vertex, and 2 patches along inner margin of eye. Antenna pallid; segment I with a subapical and subbasal fuscous band, usually darkest on inner surface; segment II with 3–5 dark spots, most distinct dorsally; segment III brown, with a fuscous band at base; segment IV dark brown. Pronotum greenish yellow, tinged with orange yellow on calli, spots varying from uniformly sprinkled, except on area of calli, to nearly absent, each spot giving rise to a dark bristle. Hemelytron pallid to greenish yellow, often strongly tinged with deep orange yellow; uniformly spotted, with widely scattered tufts of 3–6 silvery sericeus setae; inner margin cuneus with 2 dark patches of dark bristlelike setae; membrane dark smoky brown, with a large darker spot just beyond apex of cuneus, area adjacent to apex of cuneus and posterior to dark spot pallid; veins pallid to orange yellow. Ventral surface greenish yellow, usually with a streak of orange or orange yellow on propleura, mesopleura, and prosternum; abdomen greenish yellow, with scattered brown spots, sides usually tinged with orange yellow. Legs pallid; femora thickly brown spotted, metafemora with 6 dorsal, stout, bristlelike setae; tibiae with large dark spots at bases of stout black spines; tarsi pale, becoming darker apically; claws fuscous.

*Male genitalia:* Vesica (Fig. 79); phallosome (Fig. 80); right paramere (Fig. 81); left paramere (Fig. 82).

**Type specimens.** Holotype ♂: Puerto Rico, Puente Blanco Quebradillas, 10 June 1990, A. G. Wheeler, Jr., beaten from *Croton* sp. (USNM). Paratypes: 5 ♂♂, 4 ♀♀, same data as for holotype (USNM); 3 ♀♀, Puerto Rico, Guánica Forest Reserve, 9 June 1990, A. G. Wheeler, Jr., on shrubs (USNM); 3 ♂♂, 6 ♀♀, St. Thomas, Vir. Ids., no specific locality, June 5, 1917, H. Morrison (USNM); 1 ♂, Charlotte Amalie, St. Thomas, Vir. Ids., June 2, 1917, H. Morrison (USNM).

**Etymology.** This species is named *insularis* after the Latin noun *insula*, meaning island, and refers to its distribution on the islands of Puerto Rico and St. Thomas.

**Distribution.** Known only from Puerto Rico and St. Thomas.

**Hosts.** Part of the type series from Puerto Rico was taken on *Croton* sp. (Euphorbiaceae), a common host for *P. seriatus*, as well.

### *Pseudatomoscelis seriatus* (Reuter)

Figs. 66–73, 83–86

*Atomoscelis seriatus* Reuter, 1876:91; Van Duzee, 1909:183; Van Duzee, 1914:29.

*Psallus delicatus*: Howard, 1898:101 (misidentification).

*Psallus atomophorus* Reuter, 1907:22; Van Duzee, 1907:27; Van Duzee, 1909:183.

#### NEW SYNONYMY.

*Pseudatomoscelis seriatus*: Poppius, 1911:86; Knight, 1968:55; Sterling and Dean, 1977:1–28 (bibliography); Kelton, 1980:331 (habitus, p. 286); Snodgrass et al., 1984:851; Schuh and Schwartz, 1985:434, fig. 54; Henry and Wheeler, 1988:495.

*Psallus seriatus*: Van Duzee, 1916:46; Van Duzee, 1917:407; Blatchley, 1926:957; Knight, 1926a:106, 1926b:36, 1941:45; Carvalho, 1958:131.

**Diagnosis.** *P. seriatus* is easily distinguished from *P. flora* by the dark-spotted pale to green dorsum. From *P. insularis*, it is separated by the larger size, more profusely

spotted dorsum, especially on head and pronotum, the larger, more distinct cuneal patches, and the longer, more slender vesica.

**Description.** Male (N = 10): Length 2.76–3.16 mm, width 1.20–1.28 mm. *Head:* Width 0.66–0.70 mm, vertex 0.32–0.36 mm. *Rostrum:* Length 1.32–1.45 mm, extending genital segment. *Antenna:* Segment I, length 0.20–0.22 mm; II, 0.74–0.76 mm; III, 0.46–0.48 mm; IV, 0.30–0.32 mm. *Pronotum:* Length 0.50–0.60 mm, basal width 1.02–1.06 mm.

Female (N = 10): Length 2.80–3.40 mm, width 1.28–1.40 mm. *Head:* Width 0.64–0.72 mm, vertex 0.34–0.38 mm. *Rostrum:* Length 1.30–1.58 mm, extending to base of ovipositor. *Antenna:* Segment I, length 0.22–0.24 mm; II, 0.70–0.86 mm; III, 0.46–0.50 mm; IV, 0.34–0.36 mm. *Pronotum:* Length 0.46–0.60 mm, basal width 1.00–1.16 mm.

General coloration pallid to olive green, with head, pronotum, scutellum, and hemelytra uniformly sprinkled with small to relatively large dark spots, density of spots varying from widely spaced to nearly contiguous, separated only by a distance equal to their own diameter, each spot giving rise to an erect or semierect, fuscous, bristlelike seta, intermixed with tufts of silvery sericeus setae. Head (Figs. 67, 68) colored as remainder of dorsum, often tinged with orange along base of vertex, set with long erect and semierect yellowish-brown setae, intermixed with 2 tufts of sericeus setae along inner margin of each eye and scattered tufts on frons, vertex, and around base of tylus. Antenna pale; segment I with a dark subapical spot, and on darker specimens often with a dark spot at base; segment II with 3–6 dark spots, on dark specimens spots almost forming bands; segment III pale to dusky, with a narrow dark band at base; segment IV dusky. Pronotum colored as remainder of dorsum, often tinged with orange on calli, set with simple yellowish-brown, dark bristlelike, and scattered silvery sericeus setae. Hemelytron, including cuneus, uniformly spotted, with scattered tufts of 3–6 silvery sericeus setae (Fig. 73); inner margin of cuneus (Figs. 71, 72) with 2 dark patches formed by clusters of stout, dark, bristlelike setae. Membrane translucent smoky brown, with a dark to fuscous triangular spot near apex of cuneus and a large, quadrate transparent area just beyond; veins pale. Ventral surface pale green to darker olive green, abdomen usually with small scattered spots; pro- and mesopleura each often with a pale orange spot or streak; ostiole (Fig. 69). Legs pale or pale green; femora thickly spotted, metafemur with dorsal edge of metafemur with a row of stout, erect, black, bristlelike setae; tibiae pale with large dark spots at bases of stout black spines; tarsi pale yellowish brown; claws (Fig. 70) fuscous.

*Male genitalia:* Vesica (Fig. 83); phalotheca (Fig. 84); right paramere (Fig. 85); left paramere (Fig. 86).

**Remarks.** *Pseudatomoscelis seriatus* is highly variable in coloration, density of the dorsal spots, and size, all of which appear to be greatly influenced by host plants. Specimens in the southern United States from *Croton* spp. and cotton are pale with rather sparse, small, dorsal spots. Specimens taken in Florida on *Syngonathus flavidulus* (Michx.) Rhuland are smaller, much darker (olive green), and the dorsal spots are larger and more dense, differing to the extent of suggesting a separate species. However, based on relative measurements and male genitalia, all of these individuals appear conspecific.

**Type designations.** I have studied a male in the California Academy of Sciences

that apparently is the only specimen remaining of the original type series of *P. atomophorus*. It is in very poor condition, having the head and all legs and antennae missing, and the pronotum is separated from but still attached to the body. The vesica allows me to conclude the species is conspecific with *P. seriatus*. It is interesting that Van Duzee (1909), in discussing *P. seriatus*, noted that "This species has much the aspect of *Psallus atomophorus* Reuter from Jamaica." For nomenclatural stability this specimen is here designated the lectotype with the following labels: label 1, "Kingston, Ja., Apr. 06"; 2, "VanDuzee Collector"; 3, "EPVanDuzee Collection"; 4 (handwritten), "Psallus atomophorus Reut., Comp. w. type"; 5 (here added), "Lectotype: ♂, *Psallus atomophorus* Reuter by T. J. Henry."

I have not studied any type material of *Atomoscelis seriatus* described from "Texas (Belfrage)." However, *P. seriatus* is the only pale North American mirid that possesses dorsal spots and spotted antennae and, thus, I have no doubt about the identity of Reuter's species.

**Other specimens examined.** Because *P. seriatus* is well known in the United States and I have discovered only one new state record from the several thousand specimens studied, only data for material taken outside the U.S., except the new Nevada record, are given (see U.S. distribution and hosts listed below). **Dominican Republic**—2 ♀, Barahora Prov., 13 VII 1967, L. H. Rolston (TAM). **Honduras**—2 ♂, Puerto Costilla, 2 IV 1926, R. H. Painter (TAM). **Jamaica**—1 ♂ (lectotype of *P. atomophorus*), Kingston, Apr. 1906, Van Duzee [see type designation] (CAS). **Mexico**—**CHIAPAS**: 1 ♂, Arriaga, 4 Aug. 1969, L. A. Kelton (CNC); 2 ♂, 3 ♀, Cintalapa, 3 Aug. 1969, L. A. Kelton (CNC); 19 ♂, 26 ♀, Comitán, 20 July 1969 & 13 Aug. 1969, L. A. Kelton (CNC); 6 ♂, 8 ♀, Puerto Arista, 4 Aug. 1969, L. A. Kelton (CNC). **DURANGO**: 11 ♂, 22 ♀, 25 mi S Durango, Hwy. 45, 24 July 1964, L. A. Kelton (CNC). **GUERRERO**: 2 ♂, 1 ♀, 20 mi E Acapulco, 10 July 1974, Clark, Murray, Ashe, & Schaffner (TAM). **NAYARIT**: 1 ♀, Acaponeta, 7 Aug. 1964, L. A. Kelton (CNC). **OAXACA**: 1 ♀, 11.6 mi W Jalapa de Marques, 12 July 1971, Clark, Murray, Hart, & Schaffner, at light (TAM); 3 ♂, 6 mi W Jalapa de Marques, 23 July 1973, Mastro & Schaffner, at light (TAM); 1 ♀, 27 mi NW El Cameron, 24 July 1973, Mastro & Schaffner, at light (TAM); 1 ♀, Jalapa de Marques, 17 Aug. 1969, L. A. Kelton (CNC); 2 ♂, 2 mi N Miahuatlan, 14 July 1973, Mastro & Schaffner (TAM); 10 ♂, 3 ♀, Oaxaca, 21 Aug. 1969, L. A. Kelton, ex. *Hiquerilla* (CNC); 15 ♂, 33 ♀, Tehuantepec, 28 July 1969, L. A. Kelton (CNC); 1 ♂, 2.1 mi NW Totolapan, 21 July 1974, Clark, Murray, Ashe, & Schaffner (TAM); 1 ♂, Presa Benito Juarez, 23 July 1974, Clark, Murray, Ashe, & Schaffner (TAM). **PUEBLA**: 1 ♂, Iz. Metamoros, 26 Aug. 1969, L. A. Kelton (CNC). **SAN LOUIS POTOSI**: 1 ♀, Palitla, 21 July 1970, Schaffner, Murray, & Phelps (TAM). **SINALOA**: 2 ♀, 13 mi E Concordia, 800', 5 Aug. 1964, L. A. Kelton (CNC); 38 ♂, 52 ♀, Mazatlan, 6 Aug. 1964, L. A. Kelton (CNC). **SONORA**: 15 ♂, 13 ♀, nr. San Jose Beach, 40 mi SW Cd. Obregon, 16–23 May 1961, Howden & Martin (CNC). **TAMAULIPAS**: 1 ♀, 8 mi W El Limon, 20 July 1970, Murray, Phelps, Hart, & Schaffner, at light (TAM). **VERA CRUZ**: 8 ♂, Vera Cruz, July 1965, N. L. H. Krauss (USNM); 1 ♂, 44 mi W Tampico, 22 Aug. 1967, G. F. Hevel (USNM). **Netherlands Antilles**—6 ♂, 3 ♀, Curaçao, Willemstad, Oct. 1950, N. L. H. Krauss (USNM). **Venezuela**—1 ♂, 3 ♀, Aragua, Puerto de Cata, 10–11 June 1976, A. S. Menke & D. Vincent (USNM).

**Distribution.** *P. seriatus* is a widespread species known in Canada and the United

States from Alabama, Arizona, Arkansas, California, Colorado, District of Columbia, Florida, Georgia, Illinois, Kansas, Louisiana, Maryland, Minnesota, Mississippi, Missouri, New Jersey, New Mexico, Nebraska, North Carolina, Oklahoma, South Carolina, Saskatchewan, Texas, Utah, and Mexico (Henry and Wheeler, 1988). I have examined Mexican specimens from the states of Chiapas, Durango, Guerrero, Nayarit, Oaxaca, Puebla, San Louis Potosi, Sinaloa, Sonora, Tamaulipas, and Vera Cruz.

A new United States record is 1 ♂, Nevada, BYU AE NTS, Mercury, 7 Aug. 1965 [no collector data] (USNM).

New records outside of the United States are the Dominican Republic, Honduras, Jamaica, the Netherlands Antilles, and Venezuela.

**Hosts.** The cotton fleahopper has been recorded from a great number of plants. Hixon (1941) stated that it feeds on 138 species of plants, distributed in 28 families. He added that, in Oklahoma alone, 87 plant species in 24 families are known. Numerous other authors have recorded large numbers of hosts for this polyphagous species (e.g., Reinhard, 1926; Knight, 1926a; Fletcher, 1940; Schuster et al., 1969; Snodgrass et al., 1984).

Although *P. seriatus* has acquired the common name cotton fleahopper, the addition of cotton to its name is somewhat of a misnomer. Despite its importance on cotton, *P. seriatus* prefers a number of other plants over cotton, and seems to move onto this crop only after its preferred host has declined or fleahopper populations have reached proportions that initiate migration.

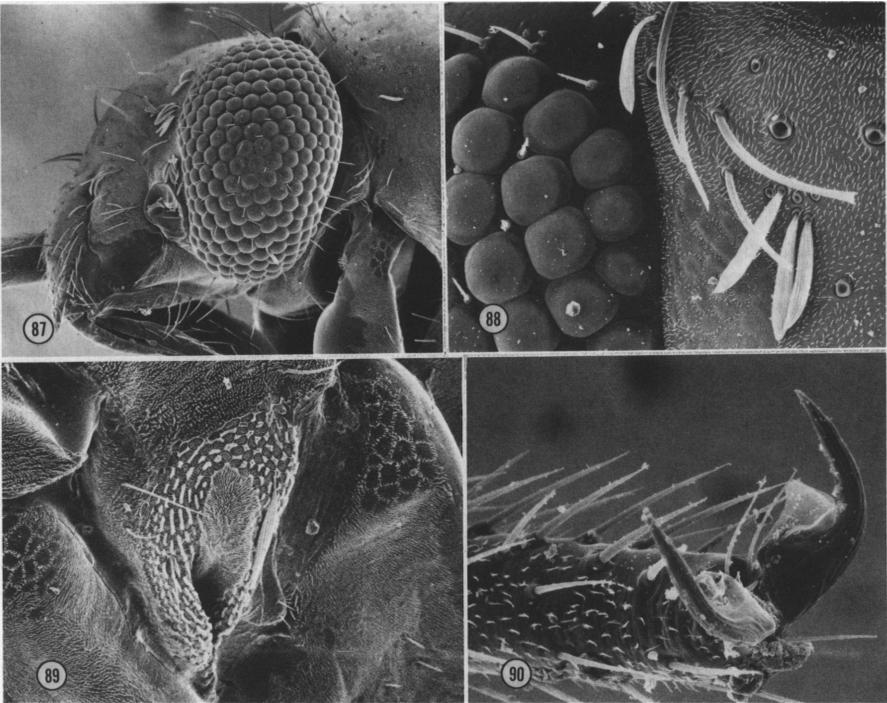
Host genera most commonly associated with *P. seriatus* include (listed alphabetically by family) *Amaranthaceae*: *Amaranthus* L. and *Tidestromia* Standley; *Asteraceae*: *Ambrosia* L., *Aster* L., *Conyza* L., *Eupatorium* Buhani, *Gutierrezia* Lag., *Helianthemum* Adans., *Helianthus* L., *Parthenium* L., *Ratibida* Raf., and *Xanthium* L.; *Euphorbiaceae*: *Croton* L.; *Fabaceae*: *Cassia* L.; *Lamiaceae*: *Monarda* L.; *Malvaceae*: *Gossypium* L.; *Onagraceae*: *Oenothera* L. and *Gaura* L.; *Polygonaceae*: *Polygonum* L.; *Solanaceae*: *Solanum* L.; and *Verbenaceae*: *Verbena* L. Of these, species of *Croton*, *Monarda*, *Oenothera*, and *Solanum* appear to be among the most common hosts (Hixon, 1941), although large populations can build up on many others. In the American Southwest, species of *Sphaeralcea* [Malvaceae] are the predominant hosts (R. T. Schuh, pers. comm.). In 1981, I collected a large population of *P. seriatus* in the Florida panhandle on shoe buttons, *Syngonathus flavidulus* (Michx.) Ruhl. (Eriocaulaceae), growing along several miles of moist ditches. It would appear that the great polyphagy demonstrated by this species contributes significantly to its broad range from Saskatchewan, Canada to Venezuela, and on many of the Caribbean islands.

#### TAXON USED FOR OUTGROUP COMPARISON

#### *Lineatopsallus*, new genus

Type species: *Psallus biguttulatus* Uhler, 1894.

**Diagnosis.** Phylinae: Phylini. This new genus is recognized by the overall pale-yellow coloration, clusters of silvery sericeous setae along the inner margin of each eye; the narrow black lines on the 2nd antennal segment, along the dorsal edge of



Figs. 87–90. SEM micrographs of *Lineatopsallus biguttulatus*: 87. Lateral aspect of head (152 $\times$ ). 88. Sericeus setae along inner margin of eye (670 $\times$ ). 89. Ostiolar opening and evaporative area (344 $\times$ ). 90. Pretarsal structure.

each femur, and on the basal half of each tibia; the pale membrane with a dark fuscous mark just posterior to apex of cuneus, and the paler, smoky gray or brown apical areas becoming weakly conspurcate; the black or fuscous spots along the inner margin of the cuneus; and the male genitalia having a slender C-shaped (approaching J-shaped as in some species of *Rhinacloa* Reuter) vesica, a complex left paramere with a short, blunt knob basal to the anterior (left) process, and a peculiar, apically flattened phallosome.

**Description.** Generally elongate oval, somewhat delicate, small sized, length from apex of tylus to apex of hemelytral membrane 2.35–3.40 mm; coloration pallid to pale yellow; dorsum impunctate, surface weakly shining; clothed with semierect simple setae, intermixed with clusters or tufts of silvery sericeous setae. Head (Fig. 87) subtriangular in dorsal aspect, frons broadly rounded, more so in females, tylus prominent, somewhat thickened, narrowly rounded apically, antennal segment I surpassing apex by  $\frac{1}{4}$  or less its length, antennal fossa set anteriorly adjacent to lower edge of compound eye at base of emargination, eyes sparsely set with short pale setae; tufts of sericeous setae present at base of jugum, along inner margin of eye (Fig. 88), and across vertex, intermixed with scattered, individual silvery setae. Rostrum extending to metacoxae. Antenna slender, segment I stoutest and shortest, with a dark

inverted L-shaped mark on dorsal and inner surface; segment II uniformly slender, with a distinct fuscous line (interrupted in some specimens) extending entire length; segment III and IV most slender. Pronotum trapeziform, immaculate, with scattered simple and tufts of silvery sericeous setae; calli prominent, contiguous at middle. Hemelytron macropterous, translucent, weakly shiny, with scattered, indistinct, pale-brown spots, set with semierect simple and scattered tufts of silvery sericeous setae; inner margin of cuneus with one to several pale-brown spots (set with only pale, golden-brown setae); membrane translucent pale or white, with a large fuscous spot laterally near apex of cuneus, apical areas weakly clouded with pale brown, some areas becoming indistinctly conspurcate. Legs relatively slender, femora often speckled, dorsal edge of each with a distinct fuscous line dorsally; each tibia with a fuscous "knee" spot and line extending distally to middle or beyond; claws slender, with setiform parempodia and quadrate fleshy pulvilli (Fig. 90). Male genitalia: Vesica very slender, C-shaped, lacking separate spicules, secondary gonopore located at middle; left paramere stout, with a short blunt knob at base of anterior arm; right paramere ovoid, somewhat tapering apically; phallosome oddly flattened apically.

**Etymology.** This generic name is derived from the Latin "*linea*," meaning line, and the mirid generic name "*Psallus*," to draw attention to the fuscous lines found on the antennae and legs of both included species. The gender is masculine.

*Lineatopsallus biguttulatus* (Uhler),

**New Combination**

Figs. 87-94

*Psallus biguttulatus* Uhler, 1894:275; Van Duzee, 1917:407; Knight, 1927:35 (in part); Carvalho, 1958:117; Henry and Wheeler, 1988:492.

*Oncotylus biguttulatus*: Van Duzee, 1923:157.

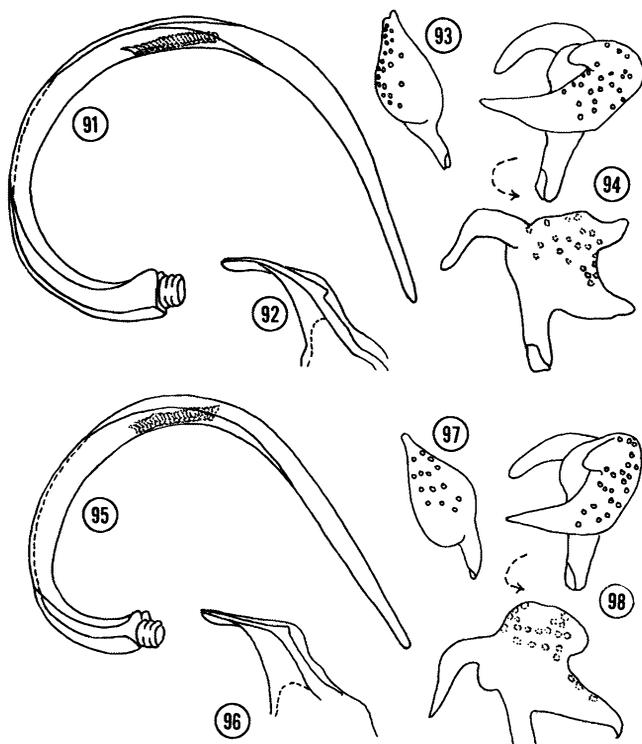
**Diagnosis.** *L. biguttulatus* is distinguished from *L. slateri* by the larger size, more distinct fuscous lines on the antennal segments and legs, and the larger, more distinct, subapical, fuscous spot on the posterior surface of the meso- and metafemur.

**Description.** Male (N = 9): Length 2.92-3.20 mm, width 1.16-1.24 mm. *Head*: Width 0.66-0.68 mm, vertex 0.28-0.30 mm. *Rostrum*: Length 1.00-1.04 mm, extending to metacoxae. *Antenna*: Segment I, length 0.22-0.24 mm; II, 0.88-0.92 mm; III, 0.50-0.56 mm; IV, 0.26-0.28 mm. *Pronotum*: Length 0.46-0.48 mm, basal width 1.00-1.04 mm.

Female (N = 14): Length 2.88-3.40 mm, width 1.42-1.62 mm. *Head*: Width 0.66-0.68 mm, vertex 0.36-0.38 mm. *Rostrum*: Length 1.18-1.32 mm, extending to metacoxae. *Antenna*: Segment I, length 0.22-0.24 mm; II, 0.88-0.92 mm; III, 0.50-0.56 mm; IV, 0.26-0.28 mm. *Pronotum*: Length 0.46-0.48 mm, basal width 1.00-1.04 mm.

Female (N = 14): Length 2.88-3.40 mm, width 1.42-1.62 mm. *Head*: Width 0.66-0.68 mm, vertex 0.36-0.38 mm. *Rostrum*: Length 1.18-1.32 mm, extending to metacoxae. *Antenna*: Segment I, length 0.22-0.24 mm; II, 0.88-1.02 mm; III, 0.44-0.48 mm; IV, 0.24-0.26 mm. *Pronotum*: Length 0.48-0.52 mm, basal width 1.06-1.22 mm.

General coloration pallid to very pale yellow, dorsum with erect and semierect



Figs. 91–98. Male genitalia of *Lineatopsallus* spp. *L. biguttulatus*: 91. Vesica. 92. Phallosome. 93. Right paramere. 94. Left paramere. *L. slateri*: 95–98.

pale to golden-brown simple setae, intermixed with tufts or clumps of silvery sericeus setae. Head (Figs. 87, 88) pale, with scattered pale simple setae and clumps of silvery sericeus setae at base of jugum, along inner margin of eye, and across vertex, frons on some specimens with darker yellow or brownish transverse striations. Antenna pallid; segment I with a distinct, thick, inverted, L-shaped mark on inner margin; segment II with a broad fuscous line extending from base to near apex; segments III and IV pale yellow. Pronotum pale yellow, calli deeper yellow, somewhat more shiny, with scattered silvery sericeus setae, especially across anterior margin. Mesoscutum and scutellum pale yellow. Hemelytron very pale, translucent yellow; setal bases of rubbed specimens giving a finely punctate appearance; most specimens with small, scattered, indistinct brown spots; apex of embolium tinged with brown on some specimens; set with rather long, semierect pale to golden-brown simple setae, intermixed with clumps and scattered individual silvery sericeus setae; inner margin of cuneus (and paracuneus) with 3–4 fuscous spots; membrane translucent white, with a fuscous spot near apex of cuneus, apical area clouded with brown, sometimes broken with pale spots to give a conspurcate appearance. Ventral surface pale yellow; ostiole (Fig. 89). Legs pale; dorsal edge of each femur with a distinct fuscous line, apical half

of anterior face of metafemur with small brown spots, meso- and metafemur with a large, fuscous, subapical spot on posterior side; pro- and mesotibia with a large fuscous "knee" spot and a narrow, fine, fuscous line extending  $\frac{2}{3}$  length of segment, metafemur with fuscous knee spot and contiguous line continuous to middle of segment; tarsi pale, claws (Fig. 90) brownish.

*Male genitalia*: Vesica (Fig. 91); phallosome (Fig. 92); right paramere (Fig. 93); left paramere (Fig. 94).

**Type designation.** Three syntype females are in the USNM collection. For nomenclatural stability, I select one of two specimens mounted on a single point (female with the dorsal side up) as the lectotype bearing the following labels: 1), "Calmalli Mines, Lower Cal., Mex., Chas. D. Haines, April 1889"; 2), "PR Uhler Collection"; 3) (handwritten), "Psallus biguttulatus Uhler"; 4), "Psallus biguttulatus Uhler [handwritten], Det. Uhler [printed]"; 5) (here added), "Lectotype: ♀ *Psallus biguttulatus* Uhler, by T. J. Henry." This specimen is in good condition, except the left middle leg and antennae are missing, and the dorsum is devoid of most pubescence. The second female on the same point (mounted with ventral side up) and third (bearing same locality data) are considered paralectotypes.

**Other specimens examined.** Mexico—1 ♀, San Pedro Martir Isl., Gulf of California, April 18, 1921, E. P. Van Duzee (USNM). United States—ARIZONA: 1 ♀, [Pinal Co.] Superior, Alt. 2,400 ft, Apr. 16, 1928, A. A. Nichol (USNM); 4 ♂♂, 5 ♀♀, [Presidio Co.] Tinajas Atlas, Apr. 23, 1935, E. D. Ball (USNM). NEW MEXICO: 8 ♂♂, 17 ♀♀, [Dona Ana Co.] Mesilla Pk., Jul. 12, 1927, H. H. Knight (USNM). TEXAS: 1 ♂, 2 ♀♀, [El Paso Co.] El Paso, Jul. 23, 1914, J. C. Bradley (USNM).

**Distribution.** Known from California, New Mexico, Texas, and Baja, Mexico (Carvalho, 1958). Arizona is a new state record.

**Hosts.** Van Duzee (1923) recorded adults and nymphs from *Vaseyanthus insularis* Rose (Cucurbitaceae) on San Pedro Martir Island, Mexico. One specimen in the USNM collection from this locality bears the label "ex. Brandegea," perhaps a misidentification of Van Duzee's published host. Knight's (1927) *Malvaiscus drummondii* record from Brownsville, Texas should be referred to *L. slateri*.

### ***Lineatopsallus slateri*, new species**

Figs. 95–98

*Psallus biguttulatus*: Knight, 1927:35 (in part); McGarr, 1933:953.

**Diagnosis.** *L. slateri* is distinguished from *L. biguttulatus* by the smaller size, the more narrow, often broken or spotted, fuscous lines on the antennae and legs, and the much smaller, fuscous, subapical spot on the anterior surface of the meso- and metafemur.

**Description.** Male (N = 5): Length 2.36–2.76 mm, width 1.06–1.08 mm. *Head*: Width 0.60–0.62 mm, vertex 0.28–0.30 mm. *Rostrum*: Length 0.96–1.12 mm, extending slightly beyond metacoxae. *Antenna*: Segment I, length 0.18–0.20 mm; II, 0.80–0.84 mm; III, 0.50–0.54 mm; IV, 0.24–0.26 mm. *Pronotum*: Length 0.40–0.42 mm, basal width 0.84–0.86 mm.

Female (N = 11): Length 2.36–2.68 mm, width 1.10–1.16 mm. *Head*: Width 0.56–0.60 mm, vertex 0.32–0.34 mm. *Rostrum*: Length 1.10–1.16 mm, extending to base

of ovipositor. *Antenna*: Segment I, length 0.16–0.18 mm; II, 0.64–0.76 mm; III, 0.44–0.46 mm; IV, 0.24–0.26 mm. *Pronotum*: Length 0.32–0.42 mm, basal width 0.80–0.90 mm.

General coloration pallid to very pale yellow, dorsum with pale, semierect simple setae, intermixed with clumps of silvery sericeus pubescence. Head pale, with scattered pale simple setae and clumps of silvery sericeus setae at base of jugum, along inner margin of eye, and across vertex (as in *L. biguttulatus*). Antenna pale yellow; segment I with a fuscous, inverted, L-shaped mark on inner surface, mark sometimes broken into separate dittolike spots but still forming L-shape; segment II with a narrow, sometimes broken, fuscous line ending distally near apical third of segment; segments III and IV pale. Pronotum pale yellow, calli deeper yellow and more shiny, with scattered clumps of silvery sericeus setae. Mesoscutum and scutellum pale yellow. Hemelytron very pale, translucent yellow, setal bases of rubbed specimens giving a punctate appearance (as in *L. biguttulatus*), some specimens with scattered, indistinct, small brown spots; set with rather long, pale, semierect simple setae and scattered clumps of sericeus setae; inner margin of cuneus (and paracuneus) with indistinct, small brown spots, membrane translucent white, with a fuscous spot near apex of cuneus, apical area usually weakly clouded with brown and sometimes broken to become conspurcate. Ventral surface pale yellow. Legs pale; dorsal edge of each femur with a narrow, sometimes broken, line or, more often, a series of fine linear spots, line on profemur sometimes absent, anterior and sometimes posterior surface finely brown spotted, meso- and metafemur with a small, subapical spot posteriorly (much smaller than on *L. biguttulatus*); tibiae and spines pale, pro- and mesotibia with a fuscous knee spot and narrow fuscous line or series of spots extending to apical third of segments, metatibia with knee spot and contiguous line continuous to near middle of segment, line often incomplete or broken into spots that frequently appear at bases of tibial spines; tarsi pale, claws brownish.

*Male genitalia*: Vesica (Fig. 95); phallosome (Fig. 96); right paramere (Fig. 97); left paramere (Fig. 98).

**Type specimens.** Holotype ♂: United States, Texas, [Cameron Co.] Brownsville, March 26, 1926, T. C. Barber, taken on *Malva.[viscus] drummondii* (USNM). Paratypes: 1 ♂, 3 ♀♀, same data as for holotype (USNM); 2 ♂♂, 7 ♀♀, Texas, Brownsville, April 25, 1925, taken on *Malvaviscus drummondii* (USNM); 2 ♂♂, 1 ♀, Texas, Brownsville, May 10, 1930, R. L. McGarr (USNM).

**Etymology.** I have the honor of naming this new species after James A. Slater to recognize his career-long accomplishments in systematic entomology. Although I was never one of his students, he has greatly influenced me through the high standards he has set in his own published works. Knowing his early admiration for the Miridae, I feel it is fitting to dedicate this distinctive new species to him.

**Remarks.** Knight (1927) reported two new state records for *L. biguttulatus*. I have studied his material (USNM) and have discovered that his New Mexico and El Paso, Texas records correctly refer to *L. biguttulatus*, whereas his record from Brownsville, Texas represents *L. slateri*. I also have examined McGarr's (1933) specimens (USNM) from Brownsville reported as *L. biguttatus* and here refer them to *L. slateri*.

**Distribution.** Known only from Brownsville, Texas.

**Hosts.** Knight's (1927) host record for *L. biguttatus* from *Malvaviscus drummondii* Torr. & Gray (Malvaceae) should be referred to this species.

Table 1. Character data used in analysis of *Keltonia* and *Pseudatomoscelis*.

## Antenna

1. 0) Antennal segment I immaculate or with indistinct markings only.  
1) Antennal segment I with inverted L-shaped mark.
2. 0) Antennal segment II without dark spots.  
1) Antennal segment II with 3–5 dark spots.
3. 0) Antennal segment II without a distinct dark line.  
1) Antennal segment II with a dark line, usually broken into a series of dots.  
2) Antennal segment II with a solid dark line.

## Head

4. 0) Head immaculate, without spots.  
1) Head distinctly spotted.
5. 0) Head short, distance from anterior margin of eye to apex of tylus less than  $\frac{1}{2}$  total length.  
1) Head elongate, distance from anterior margin of eye to apex of tylus greater than  $\frac{1}{2}$  total length.

## Pronotum

6. 0) Pronotum immaculate, without spots.  
1) Pronotum distinctly spotted.

## Hemelytra

7. 0) Hemelytra without spots.  
1) Hemelytra with evenly scattered spots.  
2) Hemelytra with spots coalesced through middle of corium and apex of clavus, surrounded by individual spots.
8. 0) Hemelytra with evenly scattered spots.  
1) Hemelytra with a solid central spot, without surrounding individual spots.
9. 0) Cuneus without dark patches along inner margin bordering membrane.  
1) Cuneus with dark patches, but without dark bristles.  
2) Cuneus with dark patches giving rise to dark bristles.
10. 0) Membrane clear or evenly colored.  
1) Membrane clouded with pale areas, but not conspurcate.  
2) Membrane distinctly conspurcate.
11. 0) Hemelytral membrane without a dark spot near apex of cuneus.  
1) Hemelytral membrane with a relatively large dark spot near apex of cuneus.

## Vestiture

12. 0) Head with sericeus setae, but never present in distinct clumps of 3 or more setae.  
1) Head with clumps of sericeus setae, at least along inner margin of eyes.  
2) Head with clumps of sericeus setae along inner margin of eyes, as well as clumps arranged in a row along median line.
13. 0) Pronotum without clumps of sericeus setae.  
1) Pronotum with scattered clumps of sericeus setae.  
2) Pronotum with scattered clumps of sericeus setae, as well as clumps arranged in a row along median line.
14. 0) Hemelytra with sericeus setae, but never in clumps of 3 or more setae.  
1) Hemelytra with scattered clumps of sericeus setae.  
2) Hemelytra with scattered clumps of sericeus setae, as well as more concentrated clumps over coalesced spots at middle.

Table 1. Continued.

## Legs

15. 0) Femora with small dark spots.  
1) Femora with large dark spots.
16. 0) Apex of metafemora without stout dark bristles.  
1) Apex of metafemora along dorsal edge with two or more long, stout, dark bristles.
17. 0) Metafemora normally slender.  
1) Metafemora swollen or saltatorial.
18. 0) Tibiae without spots at bases of spines.  
1) Tibiae with distinct spots at bases of spines, sometimes fading apically or indistinct on pro- and mesotibiae.
19. 0) Tibiae without knee spots.  
1) Tibiae with distinct knee spots.
20. 0) Tibiae without dark lines.  
1) Each tibia with a dark line, usually broken into a series of dots, extending distally midway or more.  
2) Each tibia with a solid line.

## Abdomen

21. 0) Abdomen immaculate, without spots.  
1) Abdomen distinctly spotted.

## Genitalia

22. 0) Vesica not C-shaped.  
1) Vesica slender, C-shaped.  
2) Vesica stout, C-shaped, with a visible spicule.  
3) Vesica stout, C-shaped, with a visible spicule and an apical cuplike process.
23. 0) Vesica not with a single spicule only (i.e., without a spicule or apex with an apical cuplike process).  
1) Vesica with spicule, elongate and slender.  
2) Vesica with spicule, short and stout.
24. 0) Phallosome simple apically.  
1) Phallosome with a distinct subapical spine.
25. 0) Phallosome acute apically.  
1) Phallosome apically flattened.
26. 0) Left paramere without a knob at base of anterior process.  
1) Left paramere with a distinct knob at base of anterior process.

## PHYLOGENETIC ANALYSIS

The data (Table 2) in this study were processed by Hennig86 (Farris, 1988) using the *mhennig* and *ie* function that generates trees by implicit enumeration. Analysis of 17 taxa (2 species of *Lineatopsallus*, 12 *Keltonia*, and 3 *Pseudatomoscelis*) and 26 characters (Tables 1, 2) resulted in three equally parsimonious cladograms, each having a length of 40 steps, a consistency index of 92, and a retention index of 95. *Lineatopsallus* was used as the primary outgroup, but a generalized phylone, bearing nontufted sericeous setae, was also included in the analysis to help polarize certain character information. The results support recognition of three monophyletic genera.

Table 2. Character matrix for *Keltonia* and *Pseudatomoscelis* processed by Hennig86.

Characters	123	45	6	11 78901	111 234	111112 567890	2 1	22222 23456
Outgroup	000	00	0	00000	000	000000	0	00000
<i>Lineatopsallus</i>								
<i>slateri</i>	101	00	0	10111	111	000011	0	10011
<i>biguttulatus</i>	102	00	0	10111	111	000012	0	10011
<i>Keltonia</i>								
<i>balli</i>	000	00	0	00221	221	000100	0	30000
<i>bifurca</i>	000	01	0	10221	221	000100	0	30000
<i>clinopodii</i>	000	01	0	20221	222	000100	0	30000
<i>knighti</i>	000	01	0	20221	222	000100	0	30000
<i>mexicana</i>	000	00	0	20221	222	000100	0	30000
<i>pallida</i>	000	01	0	10221	221	000100	0	30000
<i>robusta</i>	000	01	0	10221	221	000100	0	30000
<i>rubrofemorata</i>	000	00	0	11221	111	000100	0	30000
<i>schaffneri</i>	000	01	0	10221	221	000100	0	30000
<i>steineri</i>	000	01	0	10221	221	000100	0	30000
<i>sulphurea</i>	000	01	0	10221	221	000100	0	30000
<i>tuckeri</i>	000	01	0	20221	222	000100	0	30000
<i>Pseudatomoscelis</i>								
<i>flora</i>	010	00	0	00211	111	111100	0	21100
<i>insularis</i>	010	10	1	10211	111	111100	1	22100
<i>seriatus</i>	010	10	1	10211	111	111100	1	21100

The instability in the analysis resulted from a lack of synapomorphies to fully resolve *Keltonia*. The most resolved cladogram (Fig. 99) recognized *K. balli* (at component G), the *sulphurea* group (at component I), and the *tuckeri* group (at component J). Two of the 3 cladograms gave rise at component G to *K. balli* and the distal taxa (the *sulphurea* and *tuckeri* groups). These two cladograms hypothesized a paraphyletic *sulphurea* group, but a monophyletic *tuckeri* group. This instability resulted from the lack of a synapomorphy to define the *sulphurea* group, which may not be monophyletic. The strict (Nelson) consensus tree of these data collapsed the *sulphurea* group into a paraphyletic cluster similar to the latter two cladograms above, but included *K. balli* as well.

Component A defines the taxa treated in this analysis based on the spotted hemelytra, the patchily clouded or conspurcate hemelytral membrane, a dark spot near the apex of the cuneus on the membrane, clumped patches of sericeus setae at least on the head, and the generalized C-shaped vesica.

Component B defines the new genus *Lineatopsallus* by the fuscous lines on the antennae and legs, the unique left paramere, the apically flattened phallosome, and the slender, C-shaped vesica.

Component C defines the monophyletic grouping of *Pseudatomoscelis* and its sister

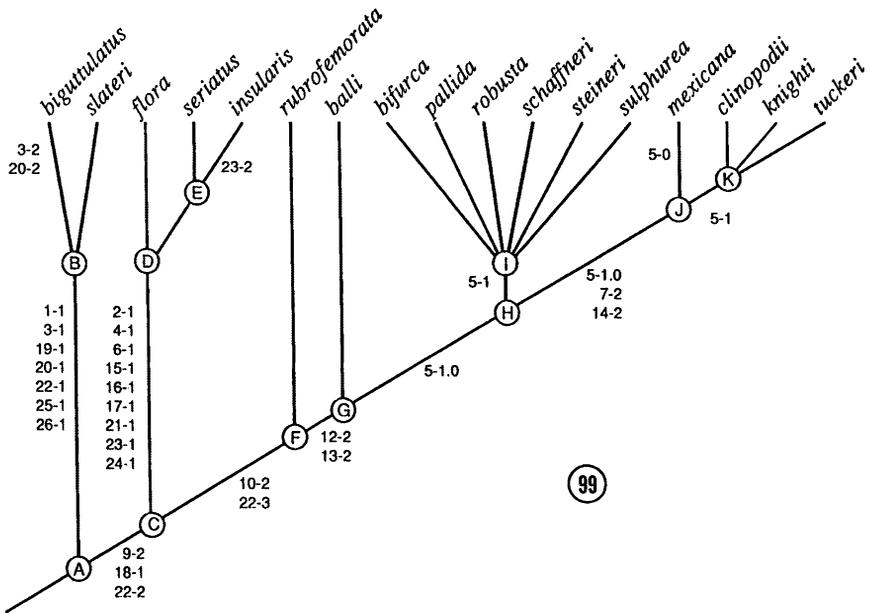


Fig. 99. Most resolved cladogram (one of three) of *Keltonia*, *Lineatopsallus*, and *Pseudatomoscelis* resulting from character matrix (Table 2) processed by Hennig86. Numbers are characters followed by character states.

genus *Keltonia*, based on the dark, setigerous patches on the inner margin of the cuneus, the distinct tibial spots, and the stout, C-shaped vesica.

*Pseudatomoscelis*, indicated at component D, is defined by the spotted 2nd antennal segment, saltatorial hind legs with dorsal bristles, and the apically spined phallosome. Although *P. seriatus* and *P. insularis* are externally quite similar, the vesica type in *P. insularis* is derived relative to that found in *P. flora* and *P. seriatus*.

Component F defines *Keltonia* based on the conspurcate hemelytral membrane and the vesica that possesses a cuplike apical process. This clade breaks into four groups: the *rubrofemorata*, *balli*, *sulphurea*, and *tuckeri* groups. *Keltonia rubrofemorata* possesses a number of autapomorphies (e.g., peculiar solid dark cloud on the hemelytra, shiny dorsum, red femora), but I was unable to find any character information to reveal a further relationship to the remainder of the genus.

Component G defines the remainder of the genus possessing sericeous setae along the midline of the head and pronotum. As with *K. rubrofemorata*, *K. balli* has several autapomorphies (e.g., pattern of the hemelytra, reddish cuneus), but lacks attributes that would indicate a relationship to the terminal taxa.

Component H depicts the *sulphurea* and *tuckeri* groups. As noted above, it is the instability of these taxa that primarily is responsible for three cladograms. Component I is supported by the derived, elongate head. Although the scattered, hemelytral spotting in *Keltonia* was scored plesiomorphic in relation to *Pseudatomoscelis* and *Lineatopsallus*, it is possible that this type of spotting is not a homologous state, and

may represent an additional synapomorphy for the group. The *tuckeri* group at component J is defined by the pubescent, coalesced spots at the middles of the hemelytra.

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