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Three new species of *Pselnophorus* plume moths  
from southern United States (Lepidoptera: Pterophoridae)

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Three new species of *Pselnophorus* plume moths from southern United States (Lepidoptera: Pterophoridae)

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**Abstract.** Three new species of *Pselnophorus* are described from the Nearctic region. *Pselnophorus chihuahuaensis* Matthews, Gielis, and Watkins, *Pselnophorus hodgesi* Matthews, Gielis, and Watkins, and *Pselnophorus kutisi* Matthews, Gielis, and Watkins, are described and distinguished from the only previously named Nearctic congener *Pselnophorus belfragei* (Fish). Illustrations of the adults and male and female genitalia are provided along with a key to males.

**Key Words.** Nearctic, new species, *Pselnophorus*, Pterophorinae, Pterophorini, Pterophoroidea.

## Introduction

The Pterophoridae, plume moths, consist of 1,136 species in 89 genera (Gielis, 2003) and are now estimated to be approximately 1,413 species in 91 genera (Gielis, unpublished data). The family is easily recognized by the T-shaped resting posture, and the divided wings of all except the genera *Agdistis* Hübner and *Ochyrotica* Walsingham. More than 162 species are known from the Nearctic region with 91 of these belonging to the tribes Oidaematophorini and Pterophorini. Identification of species within these tribes is particularly difficult because of the abundance of similar patterns or look-alikes. Many are plain white or buff, while others are mottled shades of gray or brownish gray with similar maculation patterns of spots associated with the forewing cleft and vein terminals. Although antennae, palpi, and legs sometimes provide useful clues for casual recognition, these species usually require examination of genitalia for reliable determination. Fieldwork by the authors and colleagues since the 1980s, and examination of specimens from museums and private collections, revealed several pterophorid species from the Nearctic region new to science (Landry 1989, Matthews and Landry 2008, Gielis 2008, Matthews 2010). Some of these are from specimens already present in collections since the time of the last comprehensive treatment of the Nearctic fauna by Barnes and Lindsey (1921). Despite cursory examination of the male genitalia, without examining multiple specimens from the same location as well as different areas, it is sometimes difficult to understand the extent of variation of genital characters and easy to assume more variation than truly exists within a single species.

In the present work, we describe three new species of *Pselnophorus* Wallengren of the tribe Oidaematophorini, at least two of which were treated as variants of *Pselnophorus belfragei* (Fish) by Barnes and Lindsey (1921) and in fact eluded us for some time as we originally recognized only one variable new species distinguishable from *P. belfragei*. Long series of exquisitely prepared specimens in the

National Museum of Natural History, Washington, D.C. [USNM] collected in southeastern Arizona by Ronald W. Hodges prompted us to take a closer look at the range of variation and study the genitalia of multiple individuals. In doing so, we were thus able to distinguish between *P. belfragei* and the three new species named and described herein.

## Materials and Methods

In addition to USNM, specimens were examined from the following institutions and private collections: **CGC** - Cees Gielis Collection of the Nationaal Centrum voor Biodiversiteit, Naturalis (Formerly Rijksmuseum voor Natuurlijke Historie), Leiden, The Netherlands; **DMC** - Deborah Matthews Collection, Gainesville, Florida; **MGCL** - McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida; **FSCA** - Florida State Collection of Arthropods, Lepidoptera housed at McGuire Center for Lepidoptera and Biodiversity, Gainesville, Florida; **MEM** - Mississippi Entomological Museum, Mississippi State, Starkville, Mississippi; **UAIC** - University of Arizona Insect Collection, Tucson, Arizona; **UCB** - Essig Museum of Entomology, University of California, Berkeley, California.

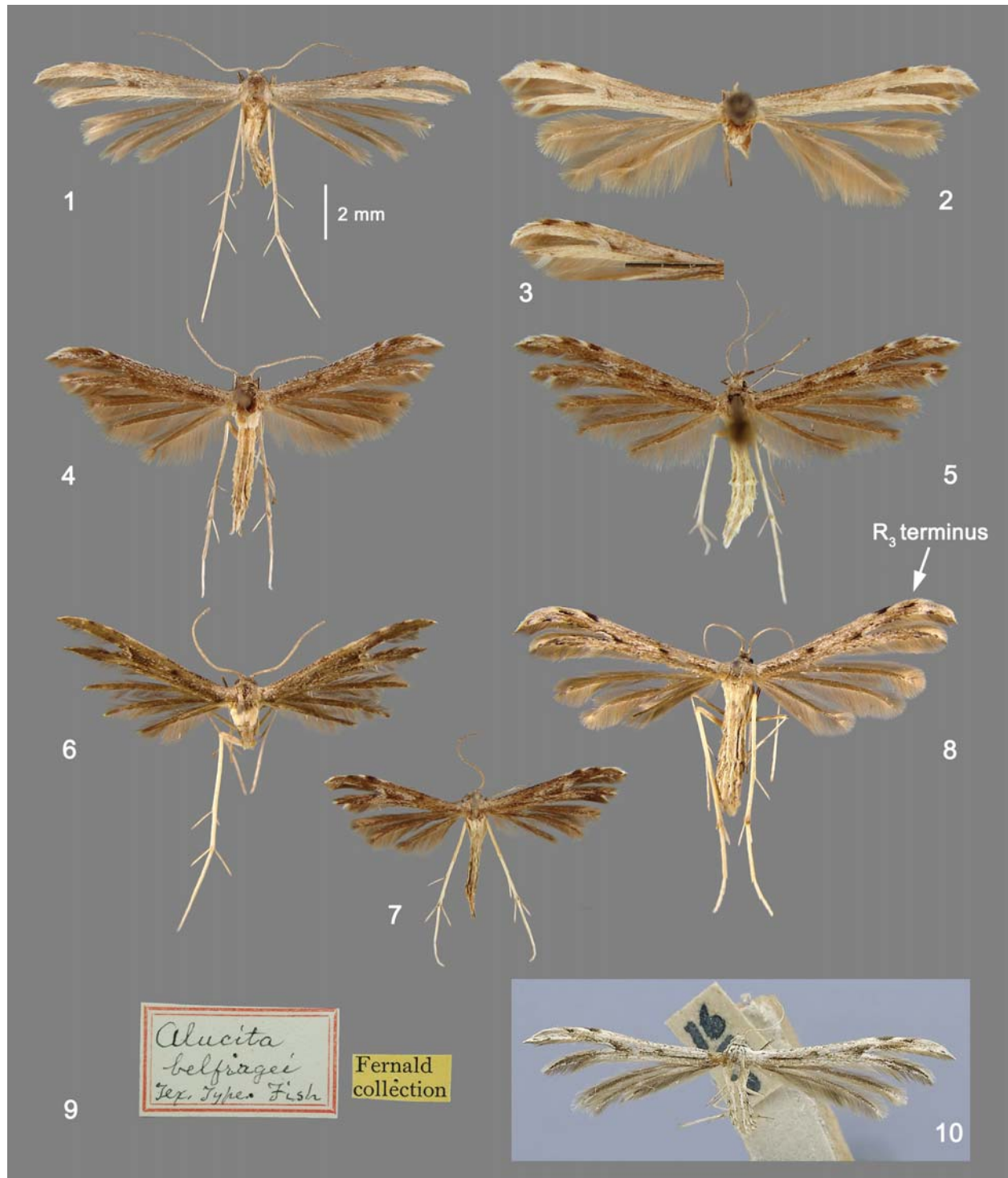
Genitalia were prepared following standard dissection techniques of tissue maceration in heated 10% KOH and light staining with Chlorazol Black followed by slide mounting in either Euparal or Canada balsam. Adult images by DLM were taken with a Sony H1 5.1 megapixel camera against a standard gray background in a white reflective light funnel illuminated with OttLite® bulbs and assembled on the plate with Adobe Photoshop CS5.1. Genitalia slides were photographed at manually selected multiple focal planes at the Florida Museum of Natural History with a Zeiss Axiophot transmitted light microscope (40× objective), Axiocam 3.1 camera software, and a KS 400 3.0 digital imaging system. These images were stacked with Zerene Stacker, version 1.04 and assembled and adjusted for contrast with Photoshop. Forewing measurements in descriptions are from the wing base to apex and include apical fringe scales. Colors in descriptions follow Ridgway (1912).

## *Pselnophorus* Wallengren, 1881

**Type Species.** *Alucita brachydactyla* Kollar, 1832, junior synonym of *Pselnophorus heterodactyla* (Müller, 1764).

Arenberger (1990) revised the Palearctic *Pselnophorus*-complex, which included species currently placed in *Gypsochares* Meyrick and *Puerphorus* Arenberger. Gielis (1993) presented a diagnosis of the genus based on the type species and two other species from the Palearctic region. Including species from other faunal regions (Ethiopian and Oriental) and those described herein, the genus now comprises 18 species (Gielis 2003, 2009; Hao and Li 2008; Ustjuzhanin and Kovtunovich, 2010). Gielis (1993) also noted that the placement of species outside the Palearctic region warrant re-examination. Pending additional comprehensive studies of the superfamily, including both morphological and molecular data, the Nearctic species are retained in the current genus. The scope of the present treatment is to differentiate and describe species of a complex previously treated as a single highly variable species (Fernald 1898, Barnes and Lindsey 1921). Life histories and larval hosts are known for three species and include the families Asteraceae (*P. heterodactyla* and *P. vilis* (Butler)) and Convolvulaceae (*P. belfragei*) (Matthews and Lott 2005).

In the Nearctic region, *Pselnophorus* are most likely to be confused with certain species of *Adaina* Tutt and *Hellinsia* Tutt, in particular, some of the gray patterned species with externally feeding larvae. Adult characters that best differentiate Nearctic *Pselnophorus* from these genera include wing maculation patterns linked to venation (Fig. 39), markings on the abdomen, and the male and female genitalia. In *Adaina*, there is typically a proportionally wider separation between forewing costal spots at the terminus of  $R_2$  and  $R_3$  whereas in *Pselnophorus* the cleft,  $R_2$ ,  $R_3$ , and  $R_5$  (if present) spots are more evenly spaced. Abdominal patterns vary in *Adaina* and *Hellinsia* but in Nearctic *Pselnophorus* the middorsal line is the same as the body ground color, devoid of spots, and is flanked by a shiny sub-



**Figures 1-10.** Nearctic *Pselnophorus*. **1)** *P. chihuahuaensis* holotype ♂, Sutton Co., Texas [FSCA]. **2)** *P. chihuahuaensis* paratype ♂, Arizona [USNM]. **3)** forewing of *P. chihuahuaensis* paratype ♂, Jeff Davis Co., Texas [FSCA]. **4)** *P. hodgesi* holotype ♂, Madera Canyon, Arizona [USNM]. **5)** *P. hodgesi*, paratype ♀, Madera Canyon, Arizona [USNM]. **6)** *P. kutisi* paratype ♂, Marion Co., Florida [MGCL]. **7)** *P. kutisi* holotype ♂, Collier Co., Florida [MGCL]. **8)** *P. belfragei* ♀, Alachua Co., Florida [DMC] (images by D. Matthews). **9)** *P. belfragei* holotype labels (image by Mark Metz). **10)** *P. belfragei* holotype ♀, Bosque, Co., Texas [USNM] (image by Mark Metz).

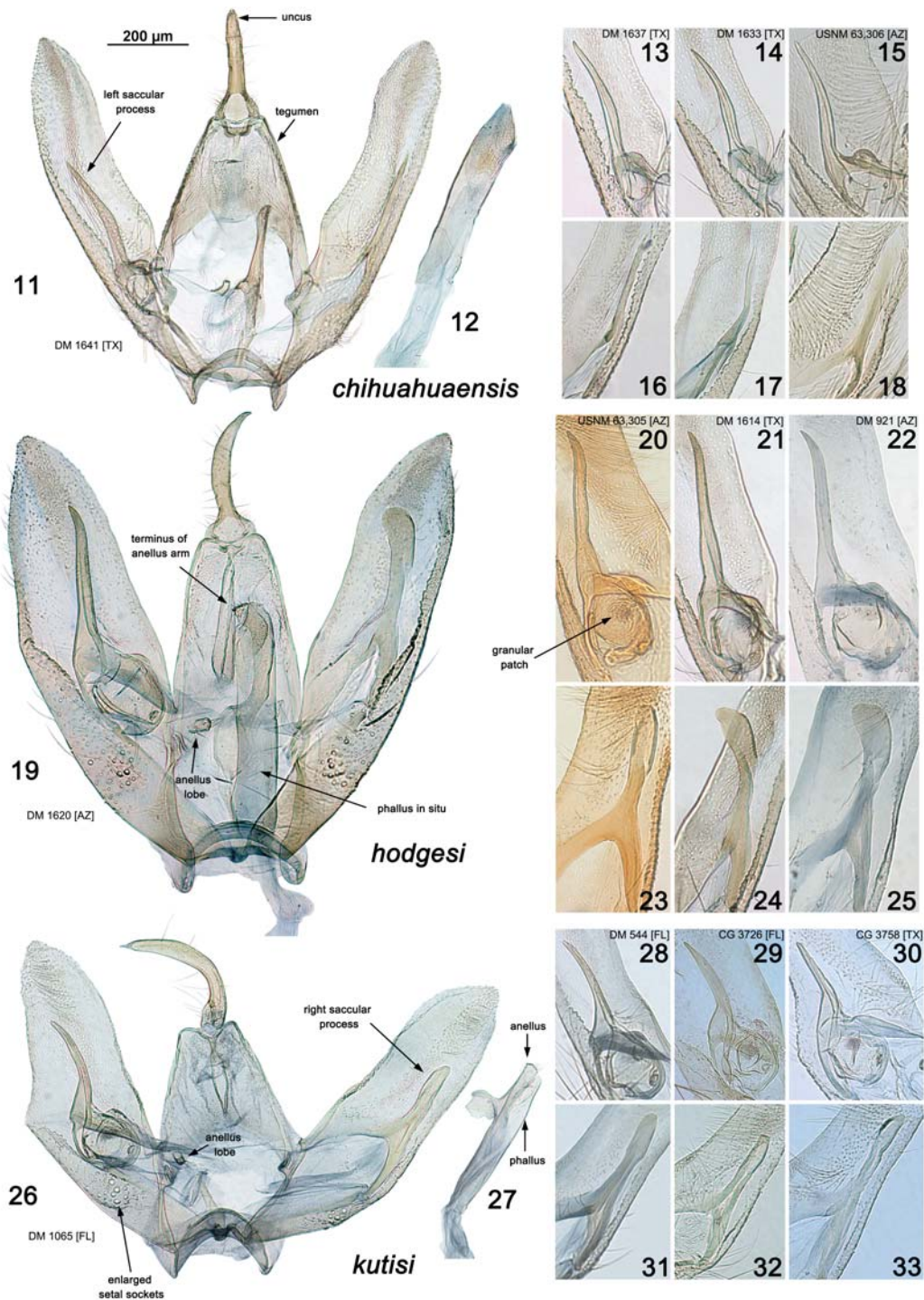
dorsal longitudinal pale line. In Nearctic *Pselnophorus* males, the juxta is narrow and contiguous with a single elongate anellus arm with minute setae at the apex. The second (left) arm is reduced to a tiny lobe attached to the right arm or separated by membranous cuticle. In *Adaina*, *Hellinsia*, *Oidaematophorus* Wallengren and Palearctic *Pselnophorus*, the juxta is broad and terminates in nearly equal, though often asymmetric-shaped anellus arms. Female genitalia of some Palearctic, and all Nearctic *Pselnophorus* have the ostium centrally placed, whereas in *Adaina*, *Hellinsia*, and *Oidaematophorus*, the ostium is shifted to the left.

***Pselnophorus chihuahuaensis* Matthews, Gielis, and Watkins, new species**  
(Figures 1–3, 11–18, 35)

**Diagnosis.** This species is distinguished from other Nearctic *Pselnophorus* by the mixed white and buff ground color of the forewing and from *P. belfragei* by the absence of dark scales at the  $R_5$  terminus and a single (subdorsal) as opposed to double (subdorsal and lateral) shiny white longitudinal band on the abdomen. The male genitalia differ from *P. belfragei* in the shape of the left saccular process and the absence of lateral socius-like lobes on the tegumen, and from the other two new species by the lack of a lobed or spatulate saccular process of the right valva.

**Description** (male, female). Based on the holotype (male) and 6 paratypes (4 males, 2 females). HEAD with labial palpi slender, erect, overall length just exceeding eye diameter, basal segment light buff, rough-scaled, second and third segments appressed or smooth-scaled, light buff with light drab lateral stripe, a few light drab scales on dorsum. Front and vertex with scales appressed, front light drab, vertex paler than front, with light drab or light drab-tipped scales grading into solid light buff area between antennae. Scales bordering eye white or light buff. Occipital fringe scales, bifid, mixed light buff and light drab. Antenna with scape and pedicel white, with a dorsal and ventral light drab patch. Flagellum sparsely scaled white or light buff dorsally, minutely ciliate ventrally. THORAX light buff or mixed with scattered light drab-tipped scales, posterior portion of mesoscutum buff. Tegula light buff, distal third grading to buff. Foreleg light buff and light drab striped, tibia and tarsomeres mostly light drab dorsally (mesally when folded), light buff ventrally (laterally when folded). Midleg similarly striped, tibial spurs unequal, drab ventrally. Hindleg tibia and tarsomeres light buff, faint light drab scaling at terminus of segments and spurs, spurs subequal. FOREWING length, males,  $\bar{x} = 8.44 \text{ mm} \pm 0.44$  (n=5), holotype 8.15 mm, females  $\bar{x} = 7.61 \text{ mm} \pm 0.16$  (n=2). Cleft origin at about  $0.57\text{--}0.61 \times$  wing length from base, lobe apices acute, without distinct termen. Ground color mixed white and buff. Discal cell with small obscure central light drab spot and subtriangular spot basad of cleft. Costal margin with light drab scales basad of cleft and alternating elongate patches of light buff and light drab along first lobe, the two light drab patches at the terminus of veins  $R_2$  and  $R_3$ . First lobe anal margin uniform light buff or buff, fringes uniform pale brownish gray or with a faint trace of pale scales at  $R_5$  terminus. Second lobe light buff or buff, with minute light drab spots at terminus of  $M_3$  and  $Cu_1$ . Fringes along lobe margins pale brownish gray, light buff at apex ( $M_3$ ) and  $Cu_1$  terminus. Ventral forewing uniform pale brownish gray except for pale and dark elongate patches along costa as on dorsum and minute brownish gray spots at terminus of both lobes. HINDWING uniform pale light drab, fringes concolorous. Venter with first and second lobes uniform light drab, third lobe admixed with light buff scales. Venous scales fuscous. ABDOMEN dorsum buff with subdorsal shiny white longitudinal stripe, flecked with light drab scales laterad of stripe at segment posterior. Venter buff laterally, light buff ventrally, with narrow pale light drab midventral line. Male with light buff lateral apical scale tuft on valvae.

**Male genitalia.** Uncus curved, tapered, length about equal to middorsal part of tegumen. Tegumen venter with small bilobed median flange near base of uncus. Valvae similar in size and shape except for saccular processes. Left saccular process spinose, weakly curved laterad, tapered distad of middle; length, excluding rounded base, about one-third that of valva and about  $2.5 \times$  base. Process base with distinctive bump (Fig. 15), obscured in slide mounts in which valvae are not completely spread. Right valva without distinct saccular process but with an elongate sclerotized ridge present (Fig. 16–18). Stout semi-deciduous setae present basad on sacculus. Juxta elongate, weakly sclerotized, terminating



**Figures 11–33.** Male genitalia of three new species of *Pselnophorus* (slide numbers and state locality as indicated in figures). 11–18) *P. chihuahuaensis*. 11) genitalia with phallus removed. 12) phallus from same specimen. 13–15) left saccular processes of additional specimens. 16–18) right saccular ridge of additional specimens, each corresponding to specimen image directly above. 19–25) *P. hodgesi*. 19) genitalia with phallus in situ. 20–22) left saccular processes of additional specimens. 23–25) corresponding right saccular processes. 26–33) *P. kutisi*, 26) male genitalia with phallus removed (basal part of juxta in situ). 27) phallus from same specimen with anellus arm and distal part of juxta attached. 28–30) left saccular processes of additional specimens. 31–33) corresponding right saccular processes.

in anellus arm of similar length, moderately sclerotized, and with minute setae distad. Phallus about one-half valva length, tapered at apex, basally without developed coecum, cornuti absent.

**Female genitalia.** Apophyses posteriores at least 3× length of papillae anales, moderately sclerotized, narrow, with apex tapered anterad. Apophyses anteriores absent, anterior margin of tergite VIII simple. Sternite VII with ventrally convex posterior margin but not overriding ostium bursae or forming lamina. Ostium bursae partly sclerotized, appearing as small c-shaped receptacle, placed slightly to the left of meson. Antrum not distinctly segregated from ductus bursae, wider anterad, a pair of subequal lateral sclerites present. Corpus bursae ovoid, extended posteriad into short, broad, undifferentiated ductus bursae. Signa absent; corpus bursae granular, not distinctly spiculate. Inception of ductus seminalis just above antrum, laterad on right, sharply tapered to a narrow filament.

**Types. HOLOTYPE.** ♂ - with the following labels: 'TEXAS: Sutton Co. | Caverns of Sonora, Sonora | 14 Aug 2004 2200ft | J. B. Heppner' [white printed]; 'D. MATTHEWS | GENITALIA | PREP. # 1641' [white printed]; 'HOLOTYPE | *Pselnophorus* | *chihuahuaensis* | D. Matthews, C. Gielis' | & R. A. Watkins' [red printed]. **PARATYPES.** 4 ♂; 2 ♀ as follows: 1 ♀ - same data as holotype [FSCA/MGCL]; 1 ♂ - **USA: TEXAS: Jeff Davis Co.:** Davis Mts. St. Pk., Ft. Davis 15–16 Aug 2004, 5600ft, J. B. Heppner (slide DM 1633) [FSCA/MGCL]; 1 ♀ - same data as previous, slide DM 1634 [FSCA/MGCL]; 1 ♂ - Davis Mts. St. Pk., 27-VI/1-VII-87, 5200 ft, J. B. Heppner, slide DM 1637 [FSCA/MGCL]; 1 ♂ - ARIZONA: Slide No. 63-716 [yellow label], Genitalia Slide USNM 63,306 [USNM]; 1 ♂ - ARIZONA: "51" [yellow label], through C. V. Riley, "*Pterophorus inquinatus* Zell." (slide DM 1667) [USNM].

**Deposition of types.** The holotype is the property of the Florida State Collection of Arthropods [FSCA] and housed within the McGuire Center for Lepidoptera [MGCL]. The paratypes from Texas are likewise part of the FSCA collections housed at MGCL. The paratype from Arizona is deposited at the National Museum of Natural History, Washington, DC. [USNM].

**Type locality.** The holotype was collected at Caverns of Sonora State Park near Sonora, Texas. Terrain of this area is flat and surrounded by active oil fields. The rocky calcareous soils support a variety of desert plants principally scrub oaks and juniper.

**Etymology.** The specific epithet refers to the area in which the species has been collected thus far, which was historically part of the Mexican state of Chihuahua and presently lies within the region known as the Chihuahuan Desert. This region includes parts of the states of Chihuahua, Coahuila, Texas, New Mexico, and Arizona. While the exact location where the Arizona paratypes were collected is unknown, the western Texas specimens, including the Davis Mountains, are from within this desert region.

**Immature stages.** Unknown.

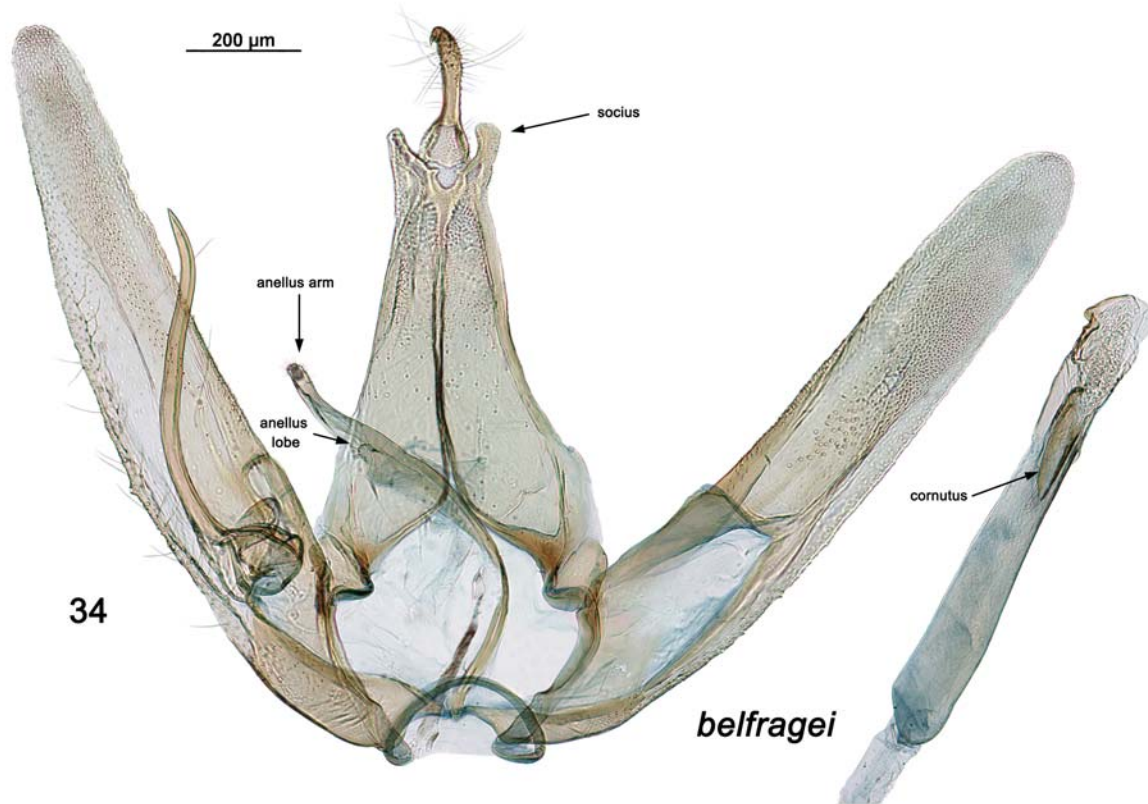
**Larval hostplant.** Unknown.

**Distribution and phenology.** As noted, the species is known to occur in western Texas and Arizona and probably occurs in the intermediary desert regions of Mexico. Specimens have been collected from late June to mid-August.

***Pselnophorus kutisi*** Matthews, Gielis, and Watkins, **new species**  
(Figures 6, 7, 26–33)

**Diagnosis.** This species is distinguished from *P. belfragei* and *P. chihuahuaensis* by the darker ground color and the presence of a distinct saccular process on the right valva. It is externally very similar to *P. hodgesi* but generally smaller and not overlapping in distribution. It is best separated from *P. hodgesi* by characters of the male genitalia, including the curvature of the left saccular process and the less developed, lobed as opposed to spatulate, terminus of the right saccular process.





**Figure 34.** Male genitalia of *Pselnophorus belfragei*. Phallus (right) removed.

**Description** (male). Based on the holotype and 14 paratypes. HEAD with labial palpi, slender, erect, length about equal to eye diameter, base roughly scaled light buff or mixed with buff, terminal segments light buff with narrow lateral brown band. Front and vertex medium light drab, uniform or mottled with bicolored dark-tipped scales, scales appressed. Area between antennae variable, light buff, buff or mottled with light drab-tipped scales. Occipital fringe scales light buff and brown, bifid. Scales bordering eye white or light buff. Antenna scape and pedicel light buff and brown, pale areas contiguous with area between antennae. Flagellum with dorsum buff, flanked by a single row of light buff scales; venter without scales, minutely ciliate. THORAX mesoscutum mottled pale light drab to medium light drab, posterior third darkest, tegula also mottled with dark-tipped scales posteriad. Metascutum light buff with shiny white subdorsal band, midline light buff, thinly separating subdorsal bands. Foreleg and midleg brown and light buff striped as in *P. chihuahuaensis*. Hind tibia and tarsus light buff, tibial spurs light buff or with bases marked with dark scales and faintly trailing along spur. FOREWING length  $\bar{x} = 5.91 \text{ mm} \pm 0.50$  ( $n=14$ ), holotype 5.58 mm. Cleft origin about  $0.59 \times$  length from base, lobe apices acute, without termen. Ground color light drab mixed with dark fuscous and sparse light buff scales. Discal cell area with diffuse fuscous central spot and larger subtriangular spot basad of cleft. Cleft base and area between cell spots with scattered light buff scales. Costa along first lobe with subequal alternating patches of light buff and fuscous or drab gray and fuscous. Two fuscous patches uniformly present, distal part of costa mostly light buff or with mixed fuscous and drab-gray scales. First lobe anal margin sometimes bordered by light buff scales and with 2–3 fuscous scales marking  $R_5$  terminus. Fringes light drab, few light buff fringe scales sometimes at  $R_5$ . Second lobe variable, uniformly light drab or with some diffuse light buff scaling near base, marginal scaling along cleft sometimes with light buff scales near apex. Fringes along cleft light drab, anal fringes light drab with a light buff patch at  $Cu_1$  terminus. Ventral forewing uniform light drab except for some light buff scales along costa and

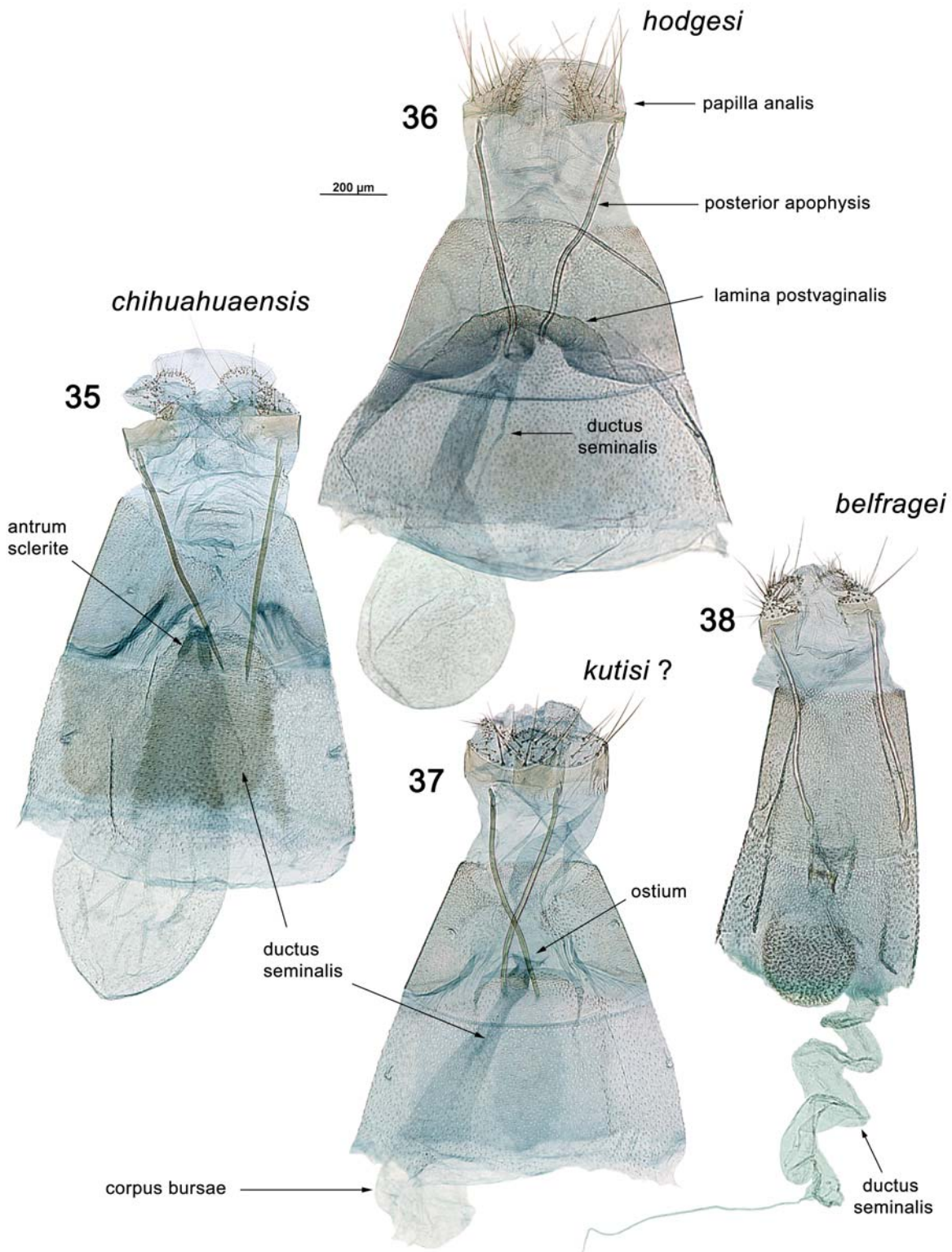
fuscous and light buff patches along first lobe as on dorsum. HINDWING uniform light drab, fringes concolorous. Ventral hindwing with first and second lobes uniform light drab, third lobe light buff near base, light drab toward apex. Venous scales fuscous. ABDOMEN dorsum light buff, contrasting with wings and mesothorax, with subdorsal shiny white longitudinal stripe extending from metascutum of thorax to lateral scale tuft of tegumen; middorsal stripe light buff grading to buff or drab gray posteriad; lateral margin of segments flecked with drab gray scales. Venter light buff to shiny white with light drab narrow subventral longitudinal stripe and drab gray median stripe. Valvae with terminal light buff and buff scale tuft.

**Male genitalia.** Uncus stout, curved, length equal or exceeding tegumen. Tegumen with lightly sclerotized paired thin middorsal sulci. Valvae about equal in length. Left saccular process spinose, distinctly curved laterad near middle, entire process about half valva length. Process base round, diameter just exceeding one-third entire process length. Base with central granular patch. Right valva with closely appressed, moderately sclerotized flat lobe-shaped process (Fig. 31–33), apex rounded but not distinctly spatulate. Valvae with stout semi-deciduous setae in small patch basad on sacculus, sockets enlarged, appearing blister-like. Juxta elongate, weakly sclerotized, terminating in short anellus arm less than juxta length. Anellus arm with minute setae distad, closely attached to aedeagus and thus easily breaking away with part of the juxta in preparations. Phallus slightly less than half length of valvae, weakly sclerotized distad, appearing blunt apically; without coecum; inception of ductus ejaculatorius basal; cornuti absent.

**Female genitalia.** The female genitalia are not described and only tentatively identified as this species in Additional material below.

**Types. HOLOTYPE.** ♂ - with the following labels: 'Florida: Collier Co. | Naples | 13.xi.1993 | R. A. Belmont, UVBLT' [white printed]; 'HOLOTYPE | *Pselnophorus kutisi* | D. Matthews, C. Gielis | & R. A. Watkins' [red printed]. **PARATYPES.** 14 ♂, data as follows: 1 - ♂ same locality as holotype, 10.xi.1993, R. A. Belmont, with genitalia slide DM 1065 [MGCL]; 1 ♂ - USA: FLORIDA: Collier Co., Golden Gate Estates, 9.vi.1996, R. A. Belmont, UVBL [DMC]; 1 ♂ - Marion Co., Ocala Nat. For., NFR 75, Lake Delancy, John S. Kutis 25.vi.1991, collected at MV light, with genitalia slide DM 544 [MGCL]; 4 ♂ - FLORIDA: Monroe Co.: Deer Reserve, Big Pine Key 19.vi.1973 J. Powell, at light, with genitalia slides CG 3726/Essig Museum of Entomology slide no. 3879, CG 3727/Essig Museum of Entomology slide no. 3878 [UCB]; 2 ♂, - same data, Gielis database numbers 13182, 13183 [CGC]; 1 ♂ - TEXAS: Bexar Co.: San Antonio 175 m, 29°20'55"N, 98°26'50"W, 31.v.1995 C. Gielis, with genitalia slide CG 2591, Gielis database # 13181 [CGC]; 1 ♂ - San Patricio Co.: 8 mi NE Sinton, Welder Wildlife Refuge, 15.v.1974, R. L. Brown, with slide DM 795 [MEM]; 1 ♂ - same location as previous, 13–15.v.1985, R. Brown, D. Adamski, William H. Cross Expedition (slide DM 796) [MEM]; 1 ♂ - same location as previous but without "8 mi NE", 21–22.v.1981, J. K. Liebherr, J. Doyen, blacklight (slide CG 3758/Essig Museum of Entomology slide no. 3902) [UCB]; 1 ♂ - TEXAS: Beutenmuller Collector, Slide No. 66-563 [yellow label], Genitalia Slide USNM 63,308 [green label], "Alucita belfragei Fish, Comp. with Type Coll. Fernald type much larger & paler but abdominal markings & neuration of primaries are the same A.W.L. Nov. 10, 20" [red bordered label] [USNM]; 1 ♂ - TEXAS [Blanco Co.]: Shovel Mt. 7/1900, W. G. Dietz Coll., "B&McDCheck List No. 5892" (slide DM 1645) [USNM]; 1 ♂ - same location, 2/14 [?] [handwriting not legible], W.G. Dietz Coll. (not dissected) [USNM].

**Additional material.** 1 ♀ - TEXAS: Blanco Co., Blanco St. Pk. 1200', 25-VI-87 J. Heppner, slide DM 1642. [FSCA/MGCL]. The wing maculation of this specimen is consistent with the males listed above including forewing  $R_5$  spot present, however, the specimen is slightly larger and paler than the male paratypes. We tentatively identify the specimen as this species based on forewing maculation; however, we feel it is best to exclude it from the type series because it is not associated with any males from the same location. The female genitalia from a Blanco County, Texas specimen (forewing length 7.44 mm) are illustrated (Fig. 37). This female is consistent with the type species, *Pselnophorus heterodactyla* and the other two new species presently described in having a filamentous ductus seminalis originating just anterior of the antrum. It can be distinguished from other *Pselnophorus* species, except *P. chihuahua*.



**Figures 35-38.** Female genitalia of Nearctic *Pselnophorus*. **35)** *P. chihuahuaensis*, slide DM 1634. **36)** *P. hodgesi*, slide DM 1469. **37)** *P. sp.*, possibly *kutisi*, slide DM 1642. **38)** *P. belfragei*, slide DM 1636.

*huaensis*, based on characters of the corpus bursae and the absence of a developed lamina postvaginalis. DNA sequencing may be useful to confirm the status of this specimen relative to the paratype males.

**Deposition of types.** The holotype is from the D. Matthews collection and is herewith donated to and deposited in the McGuire Center for Lepidoptera collections of the Florida Museum of Natural History. Paratypes are deposited in their respective collections as indicated by acronyms above.

**Type locality.** The holotype was collected in the vicinity of Naples, Florida. The Golden Gate Estates area of Naples where two paratypes were collected borders Everglades National Park south of I-75 (formerly SR 80, Alligator Alley). This area includes pine flatwoods, cypress and oak hammocks as well as disturbed habitat.

**Etymology.** This species is named in honor of the late John Stephen Kutis, an avid lepidopterist of Bellview, Florida, who collected one of the paratypes and first brought this new species to our attention.

**Immature stages.** Unknown.

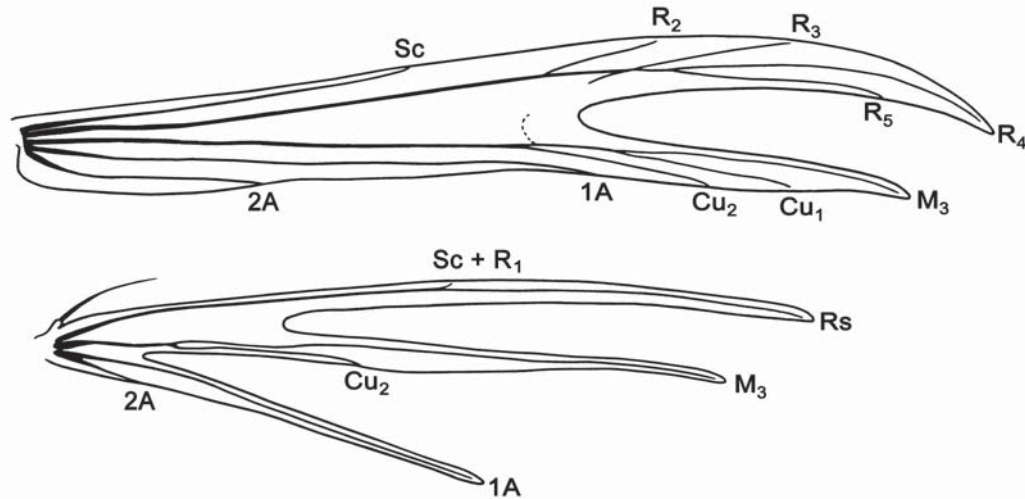
**Larval hostplant.** Unknown.

**Distribution and phenology.** Florida specimens have been collected in June and November, in Texas from mid-May to June. The handwritten dates on the Shovel Mts. specimens are not clearly legible but one specimen appears to indicate July.

***Pselnophorus hodgesi* Matthews, Gielis, and Watkins, new species**  
(Figures 4, 5, 19–25, 36)

**Diagnosis.** This species is distinguished from *P. belfragei* and *P. chihuahuaensis* by the darker ground color of the forewing, although this is somewhat paler in females. It can be differentiated from *P. kutisi* by the stout and straight as opposed to curved or bent middle portion of the left saccular process and the usually spatulate tip of the right saccular process.

**Description** (male, female). Based on the holotype (male) and 39 paratypes (19 male, 20 female). HEAD generally as in *P. kutisi*. Labial palpi equal to or just exceeding eye diameter. Base of labial palpi usually with a few buff or light drab scales laterally. Pale area between antennae often reduced. In dark individuals, light buff scales mostly laterad on scape and pedicel and posteriad along eye margin. Flagellum dorsally buff or drab gray, lateral margin of light buff scales sometimes absent. Males generally darker overall than females. THORAX mesoscutum and tegula mottled with bicolored scales, pale to drab, varying with extent of dark tips of scales. Metascutum light buff with a few yellowish buff scales. Silvery white bands usually not as clearly differentiated from light buff scales as in *P. kutisi*. Scattered drab gray scales sometimes present. Foreleg and midleg variously striped light drab and light buff as in *P. chihuahuaensis* and *kutisi*. Hind tibia, spurs, and tarsomeres variable: in males typically drab gray dorsally, somewhat paler ventrally; in females light buff to light drab, often light buff with a faint longitudinal lines of greyish brown on tibia, spurs, and basal tarsomere. FOREWING length, males,  $\bar{x} = 6.91 \text{ mm} \pm 0.45$  (n=20), holotype 7.15 mm, females,  $\bar{x} = 7.67 \text{ mm} \pm 0.41$  (n=17). Cleft origin about 0.55–0.60× from base, tending to be deeper in females. Ground color light drab to fuscous. Scattered light buff scales present in both sexes. Males tending to be darker than females. Discal cell area with diffuse fuscous central spot and larger subtriangular spot basad of cleft in females, obscure but present in males. Fuscous costal marks at  $R_2$  and  $R_3$  of first lobe as in *P. kutisi*. Marginal scaling between  $R_3$  spot and apex light buff subtended by pale brownish gray scales. Light buff scales absent in worn specimens. First lobe anal margin with minute fuscous  $R_5$  spot (2–4 scales) usually present in females but absent in males. Fringes uniform light drab in males and females, rarely 2 or 3 filiform white or light buff scales at  $R_5$  spot in females. Second lobe uniform light drab or with scattered light buff scales. A minute fuscous dash marking  $Cu_1$  terminus usually present in females, absent in males.



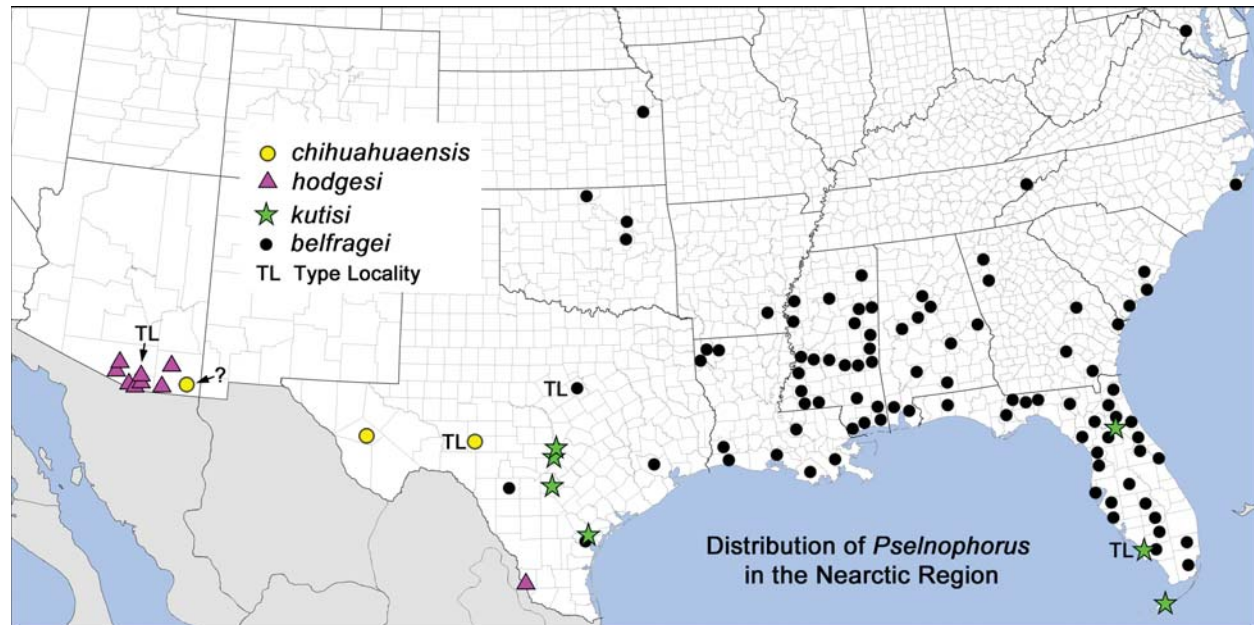
**Figure 39.** Wing venation of *Pselnophorus belfragei*.

Fringes of second lobe light drab except for light buff patch at  $Cu_1$  terminus in females, present or absent in males. Ventral forewing light drab except for costal markings as in *P. kutisi* and dull fuscous spot at  $Cu_1$  in some females. Lobes also with a few scattered light buff scales distally. HINDWING uniform light drab, fringes concolorous. Ventral hindwing uniform light drab or with mottled light buff scaling on third lobe. Venous scales fuscous. ABDOMEN variable, dorsum ground color light buff to mixed light buff and buff with scattered grayish brown scales. Females tending to be mostly light buff with some buff scales. Males darker mottled or with a thin line of light drab scales bordering subdorsal band. Subdorsal longitudinal band in both sexes shiny white, continuing from metathorax and extending laterad on tegumen in males, to posterior margin of eighth tergite in females. In females, this subdorsal band is subtended laterally by a broad light buff band such that the longitudinal band is more difficult to distinguish as it is less contrasted than in males. Venter light buff with buff midventral line, laterally drab gray, males admixed with fuscous scales. Male valva light buff with buff lateral line and protruding apical scale tuft.

**Male genitalia.** Uncus stout, curved, length slightly less than that of tegumen. Tegumen with distinct paired middorsal sulci extending for entire length. Valvae about equal in length, apices variably tapered. Left saccular process, stout, spinose, straight through middle, slightly curved laterad at tip, length just exceeding half valva length. Process base exceeding one-third of entire process length, central granular patch (Fig. 20) present. Right valva with well-developed spatulate process. Terminus of process usually widened, appressed or raised from valva surface (Fig. 19, 23–25). A patch of blister-like setal sockets basad on sacculus as in *P. kutisi*. Juxta basally narrow, weakly sclerotized, membranous at middle then expanded into broad bent anellus arm with minutely setose terminus. Anellus arm about half width of aedeagus. Aedeagus about half length of valvae; apex tapered or blunt, without coecum; cornuti indistinct or absent.

**Female genitalia.** Apophyses posteriores about 3.5× length of papillae anales, moderately sclerotized, with slight irregular curves anterad, apex blunt. Apophyses anteriores absent. Sternite VII overriding VIII, forming a distinct moderately sclerotized lamina postvaginalis with convex anterior margin. Ostium bursae centrally placed, partly obscured by lamina. Antrum flanked by parallel ventrolateral margins of sternite VIII, width about equal that of ductus bursae, sclerites present. Ductus bursae about two-thirds length of corpus bursae, with filamentous ductus seminalis branching at one-third length from antrum. Corpus bursae ovoid, somewhat granular, signa absent.

**Types. HOLOTYPE.** ♂ - with the following labels: 'Madera Canyon, 4880' | Santa Rita Mtns., Ariz | September 7, 1959 | R. W. Hodges' [off-white printed, day handwritten]; 'HOLOTYPE | *Pselnophorus*



**Figure 40.** Distribution of *Pselnophorus* in the Nearctic region. Locality data beyond state is not included in label data on Arizona specimens of *P. chihuahuaensis* and are thus marked with a question mark in the southeastern corner of the state.

*hodgesi* | D. Matthews, C. Gielis | & R. A. Watkins' [red printed]. **PARATYPES.** 19 ♂; 20 ♀ as follows: 2 ♂, 3 ♀ - same data as holotype (♂ USNM slide 63,305) [USNM]; 1 ♂ - same data, except 19 Jul 1959 [USNM]; 1 ♀ - 25 Jul 1959 [USNM]; 1 ♀ - 23 Aug 1959; 1 ♀ - 25 Aug 1959 (slide DM 1469) [USNM]; 1 ♂ - 29 Aug 1959 [USNM]; 1 ♂, 1 ♀ - 1 Sep 1959 [USNM]; 1 ♂, 1 ♀ - 2 Sep 1959 (♀ slide DM 1618) [USNM]; 1 ♀ - 3 Sep 1959 [USNM]; 1 ♀ - 4 Sep 1959 (slide on same pin, E. Jäckh prep.) [USNM]; 2 ♂ - 5 Sep 1959 (1 with slide on same pin, E. Jäckh prep.) [USNM]; 2 ♀ - 5 Sep 1959 [CGC, database nos. 13179, 13180]; 2 ♂ - 8 Sep 1959 [USNM]; 1 ♂, 1 ♀ - 20 Sep 1959 [USNM]; 1 ♀ - 29 Sep 1959 [USNM]; 1 ♂ - 6 Oct 1959 [USNM]; 1 ♀ - ARIZONA: Cochise Co.: Huachuca Mts., Ash Canyon, 30 Aug 1990, N. McFarland, R. Leuschner coll. MGCL Accession # 2009-30 (slide DM 1643) [MGCL]; 1 ♀ - Huachuca Mts., Miller Canyon, 29 Aug 1976 R. Leuschner, R. Leuschner coll. MGCL Accession # 2009-30 (slide DM 1640) [MGCL]; 1 ♀ - Huachuca Mts., Ramsey Cn., 5 Sep 1955, F.G. Wemer & G.D. Butler (slide DM 927) [UAIC]; 1 ♂ - Pima Co.: Baboquivari Mts., 15-30 Jun 1924, O. C. Poling, Coll. (slide DM 1646) [USNM]; 1 ♂ - flood plain E. sl. Coyote Mts. 15-16 Aug 1968, M.L. Noller, UV and Coleman lts. (slide DM 921) [UAIC]; 1 ♂ - Santa Cruz Co.: Peña Blanca Canyon 11 Aug 1959 R. W. Hodges; 1 ♂, 2 ♀ - same data but 1 Sep 1959 (♂ slide DM 1619, ♀ slides, DM 1467, DM 1617) [USNM]; 2 ♂, 1 ♀ - Sycamore Canyon, 3800', 25 Sep 1959 R. W. Hodges (1 ♂ slide DM 1620) [USNM]; 1 ♂ - TEXAS: Zapata Co.: 3 mi. S Zapata, 15 Oct 2002, 400ft, J. B. Heppner (slide DM 1614) [FSCA].

**Deposition of types.** The holotype is deposited in the USNM. Paratypes are deposited as listed above by collection acronym.

**Additional material.** 1 ♂ - USA: Arizona: Cochise Co. 3 mi. W of US-666 [now 191] on road to Driagoon, 12 Aug 1989, BL, P. Skelley (1 m, slide DM 902) [DMC]. This specimen is excluded from the type series as it is preserved in alcohol and identified only by the genitalia slide. The Arizona types were selected, in part, as a representative sample from a total of 307 specimens (84 ♂, 223 ♀) collected at three localities by R. W. Hodges in 1959. Of this collection, 279 specimens are from Madera Canyon. The entire date range of this material is represented in the type series.

**Type locality.** The type locality, Madera Canyon, is located within the Santa Rita Mountains and part of the Coronado National Forest.

**Etymology.** We are pleased to name this species in honor of Ronald W. Hodges who collected long series of this species in southeastern Arizona while doing fieldwork for his doctoral degree at Cornell University with the late John G. Franclemont.

**Immature stages.** Unknown.

**Larval hostplant.** Unknown.

**Distribution and phenology.** This species is known from southern Arizona in Cochise, Pima, and Santa Cruz counties, and in southern Texas in Zapata County. It has been collected at elevations ranging from 400 to 4880 feet. The extended flight period, with specimens collected from the end of June to mid-October, suggests the possibility of multiple broods. Specimens from the type locality were collected from 19 July through 6 October in 1959 with most individuals collected from 1-8 September and again from 19-20 September. In both date ranges females outnumbered males, most notably on 7 September, with 62 females and only 4 males collected. The reason for this ratio between the sexes was not investigated and remains speculative. These Madera Canyon type locality collection results are illustrated in Figure 41 along with less numerous collections by Ronald Hodges during the same time interval in two nearby canyons with similar habitat, namely Sycamore and Penã Blanca.

***Pselnophorus belfragei* (Fish, 1881)**

(Figures 8–10, 34, 38, 39)

*Aciptilus belfragei* Fish, Canadian Entomologist, Vol. XIII, p. 142, 1881.

*Pterophorus belfragei* Fitch, Fernald in Smith, List of the Lepidoptera of Boreal America, p. 88, 1891.

*Alucita belfragei*, Fernald, Pterophoridae of North America, Special Bulletin, Hatch Experiment Station, p. 37, 1898.

*Pselnophorus belfragei* Fish, Barnes and Lindsey, Contributions to the Natural History of the Lepidoptera of North America, Vol. IV, No. 4. The Pterophoridae of America North of Mexico, p. 362, 1921.

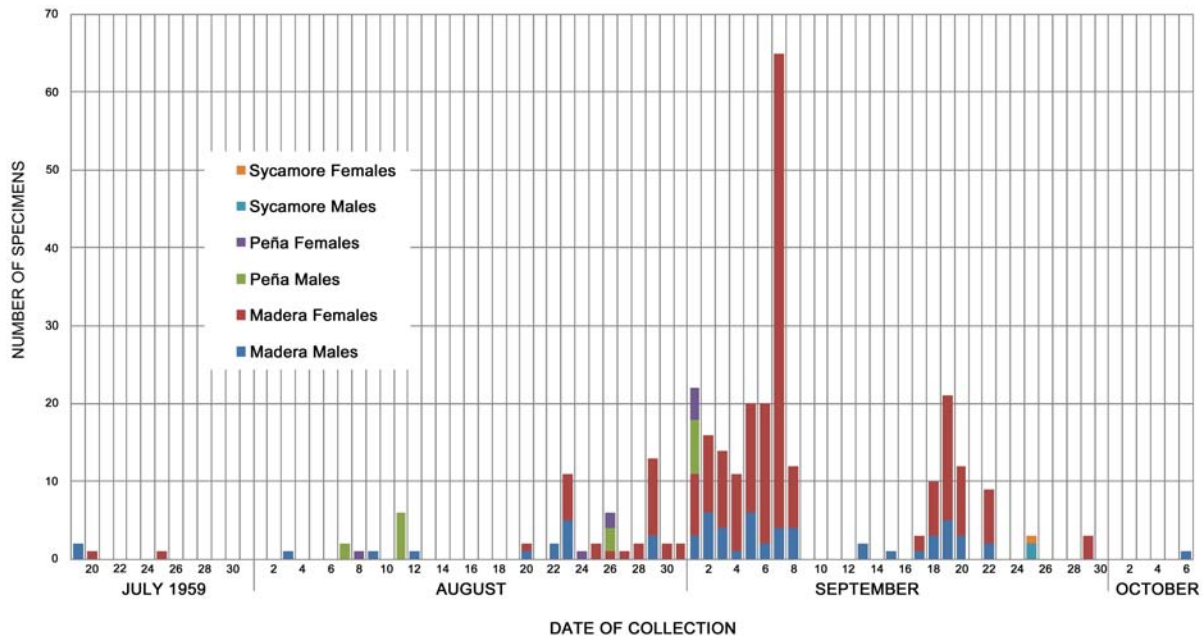
**Diagnosis.** This species is recognized by the attenuate, curved first lobe of the forewing in combination with the gray ground color and distinctive spot pattern arranged in a smooth arc composed of the oblique cleft spot and spots at the terminus of veins  $R_2$ ,  $R_3$ , and  $R_5$ . The spot at  $R_3$  is characteristic in appearing inset from the costal margin. This species is further distinguished from other Nearctic *Pselnophorus* by having uniformly colored fringes, without a contrasting patch of pale fringe scales at the terminus of vein  $Cu_1$ . The abdomen has both a subdorsal and lateral shiny white longitudinal stripe visible as opposed to only a subdorsal stripe. Male genitalia differ from other *Pselnophorus* in that the tegumen bears small distal socius-like lateral lobes. Female genitalia are unique in having an enlarged and spiraled ductus seminalis as opposed to a filamentous offshoot from the ductus bursae as in other *Pselnophorus* including the type species.

**Redescription** (male, female). HEAD with labial palpi slender, erect, length equal to or just exceeding eye diameter, basal segment light buff, distal segments fuscous to chestnut-brown dorsally, with thin white or light buff stripe ventrad. Front drab, vertex variable, light drab to drab, sometimes light buff, scales appressed. Occipital fringe scales, bifid, mixed, mostly light drab, elongate bifid scales laterally sometimes reaching antenna base; unmodified collar scales drab to light buff. Scales along posterior margin of eye white or light buff. Area between antennae white or light buff. This pale area sometimes extends halfway to collar. Antenna scape and pedicel with fuscous patch dorsad and anterad, bordered by narrow white or light buff bands. Flagellum dorsally drab to drab gray with a row of light buff scales along anterolateral margin, minutely ciliate ventrally. THORAX dorsum and tegula white or light buff admixed with buff or drab gray-tipped scales, metascutum warm buff with narrow shiny white subdorsal and lateral band. Foreleg light buff to white and fuscous striped: coxa fuscous with white anterolateral stripe; femur fuscous with white medial, lateral, and outer longitudinal stripes; tibia white laterally, fuscous medially, with terminal scale tuft, including buff scales laterad at epiphysis; tarsus

mostly light buff, basal tarsomere (I) with fuscous stripe dorsally, tarsomeres II–V white with weak light buff scaling medially. Midleg fuscous and light buff striped including spurs: coxa light grayish drab; femur light buff medially, fuscous laterally with pair of white longitudinal stripes; tibia white with lateral fuscous stripes, spurs white dorsally, fuscous laterad and ventrally, medial spur longest. Extent of striping on tarsomeres variable. Hindleg with coxa and femur drab gray; tibia buff with light buff scaling dorsally, light drab scales mixed in distal scale tuft, ventrally with warm or ochraceous-buff stripe; medial spurs longest, proximal pair longer than distal pair, light buff or buff with drab tips, lateral spur of each pair with a fuscous strip ventrally, mesal spurs sometimes also partly striped; tarsomeres I–II light ochraceous-buff above, light buff or white below, III–V mostly white or light buff. FOREWING length, males,  $\bar{x} = 7.79 \pm 0.90$  mm (n=20), females  $\bar{x} = 7.83 \pm 0.75$  mm (n=20), holotype 8.3 mm (7.9 mm excluding fringe scales). Cleft origin 0.53 to 0.60× wing length from base, generally appearing deeper than in preceding species. Lobes attenuate, apices acute, without distinct termen. First lobe appearing more curved than in preceding species. Forewing ground color appearing gray, consisting of mixed white or light buff, buff, ochraceous-buff, or drab gray scales and scattered fuscous scales. Discal cell area with distinct small central fuscous spot, and subtriangular spot basad of cleft, the latter spot appearing as an irregular oblique dash. A narrow fuscous dash from wing base to near central spot irregularly present, bordered with scattered light buff or buff scales anterad. Fuscous spots marking terminus of veins  $R_2$ – $R_5$ . Spots at  $R_2$  and  $R_3$  appearing as elongate dashes,  $R_3$  spot appears as fuscous dash off-set from costal margin, with scales directly anterad on costa forming a paler, buff or drab gray dash, yet still usually contrasting with the light buff or white scales flanking these spots along the costa. Costa mostly white distad of  $R_3$  spot. Fuscous spot at  $R_4$  and  $R_5$  small, sometimes indistinct in worn specimens;  $R_5$  spot subapical, within cleft of first lobe. Second lobe with up to 4 fuscous scales marking terminus of  $Cu_1$ , fewer at  $M_3$  and  $Cu_2$ . Fringes of both lobes concolorous, drab gray, light buff fringe scales rarely noticeable at  $Cu_1$  terminus. Ventral forewing uniform pale brownish gray except costa and lobes edged in light buff or white, with  $R_2$ – $R_5$ ,  $M_3$ , and  $Cu_1$  fuscous spots in distinct contrast and with buff scales on costa anterad of  $R_3$  spot. HINDWING uniform drab gray except for sparse white or light buff scaling near first and second lobe apices. Fringes concolorous. Ventral hindwing drab gray, apex of first two lobes with fuscous scale spot subtended by scattered light buff scales. Third lobe also with fuscous scales forming a line at apex and scattered or forming a short thin line along anal margin midway between lobe base and apex. ABDOMEN dorsum warm buff with two thin shiny white longitudinal stripes (subdorsal and lateral) continuing from metathorax and extending to tegumen and costa of valva in males, dorsally and laterally within long posterior scale fringe of tergite VIII in females. Small irregular dashes of fuscous scales bordering first band medially near anterior part of segments II–VI, second (lateral) stipe laterally bordered by larger fuscous dashes or scale clusters posteriad on most segments. Abdomen venter warm buff with subventral and lateral shiny white band, and a second white lateral band on segments III–IV. A broken fuscous band laterad of subventral band on segments IV–VI, solid on II–III.

**Male genitalia.** Uncus curved, tapered, length less than one-half tegumen at midline. Tegumen slender; distally with rounded lateral socius-like lobes flanking uncus base; midline suture strongly marked along entire length; basal margin v-shaped. Valvae elongate with rounded tips, asymmetrical, left valva slightly longer and broader than right and with moderately sclerotized saccular process. Process stout, of nearly uniform thickness except tapered near apex and with rounded base. Base maximum width about one-fifth process length. Process length including base about one-half that of valva. Process dorsally curved at middle but with distal fourth straight or weakly curved laterad. Right valva without distinct saccular process; basal half of costal margin, saccular margin, and inner margin between sacculus and costa moderately sclerotized, the later forming flap-like transverse connection. Vinculum and saccus narrow. Juxta an elongate dextrally curved process contiguous with equally slender right anellus arm, combined length just exceeding one-half that of right valva. Left anellus arm reduced to small lobe terminating at about three-fourths combined length of juxta and left arm. Both anellus arm and lobe with minute setae at tips. Phallus just less than two-thirds right valva length, coecum short, longitudinally aligned with phallus. Cornutus a single sclerotized blade, about one-fourth length of phallus.





**Figure 41.** Histogram illustrating number of male and female *P. hodgesi* collected from 19 July 1959 to 6 October 1959 in Madera, Sycamore, and Peña Blanca Canyons of southern Arizona.

**Female genitalia.** Apophyses posteriores long, about 5× length of papillae anales, moderately sclerotized, with apex slightly expanded. Apophyses anteriores absent. Sternites VII–VIII weakly sclerotized. Ostium bursae centrally placed, wider than antrum, appearing as a curved flange. Antrum and ductus bursae undifferentiated, together forming a short truncate stalk from which the corpus bursae and ductus seminalis branch. Antrum sclerites present but obscured. Corpus bursae round, anterior two-thirds densely armed with minute spinules; signa absent. Ductus seminalis as wide as antrum/ductus bursae, loosely spiraled, terminating anteriorly in filamentous extension.

**Type. HOLOTYPE.** ♀ - with the following labels: '16/5' [white hand written]; 'Alucita | belfragei | Tex. Type Fish' [red bordered, hand written by Fernald]; 'Fernald | collection' [yellow, typed] (Fig. 9–10). The holotype is located in the USNM type collection. The original description by Fish (1881) indicates the type was collected on May 16, 1879, in Clifton, Texas [Bosque County], by G. W. Belfrage. This general area is an alluvial plain of the Bosque River, under 1000 ft. in elevation.

**Additional material.** This species is extremely common in the southeastern United States and we have examined more than 1,000 specimens firsthand in addition to the holotype. Specimens examined are from the authors' collections, USNM, MGCL, FSCA, MEM, and various private collections. Data for specimens figured herein are as follows: Florida: Alachua Co. Gainesville, reared ex. ova from ♀ coll. 8.xi.1988, p. 6.xii.1988, em. 15.xii.1988, D. Matthews, reared on *Dichondra caroliniensis* (♀, Fig. 8) [DMC]; Texas: Uvalde Co. Garner State Park, 8 mi. N of Concan, 2–4.x.2002, 1800ft, J. B. Heppner, slide DM 1635 (♂ genitalia, Fig. 34) [MGCL]; same data as previous, slide DM 1636 [MGCL] (♀ genitalia, Fig. 38). Additional specimen data for reared specimens are cited in Matthews (2006).

**Immature Stages.** The larvae and pupae were first reared and described by Matthews (1989) and described and illustrated in more detail by Matthews (2006). Brief diagnostic descriptions are included here. LARVA (final instar) maximum length 9 mm, width 1.5 mm. Head light yellow, thorax and abdominal segments cream or yellowish-white with three broken thin reddish subdorsal longitudinal stripes and a contiguous bold, dark brown middorsal stripe. Sclerotized elements of the middorsal stripe persisting in preserved material. Primary and secondary setae on verruca-like tubercles (D and SD).

Setae clear or brownish tinged, most simple with pointed tips. Some primary setae on dorsum very minutely spiculate, some XD, D, and SD setae with minutely tined tips. A few minute blunt-tipped setae present on prothorax, D, and SD tubercles. Dorsal (D) setae long, reaching 1.25 mm (0.84× maximum body width). Lateral fused verruca (L1+L2) with short to long setae and 2 very long setae reaching 2.3 mm (1.55× maximum body width). PUPA maximum length 8.5 mm. Dorsal and subdorsal setae long. Subdorsal setae appearing lateral and projecting slightly anteriad on A2–A4. Thorax and abdomen with numerous short spinose secondary setae, most in longitudinal rows associated with primary setae. Forewing with three main rows of short secondary setae. Hindwing with loosely organized row of short secondary setae. Antenna with row of about 14 setae at base. Legs and maxilla naked. Spiracles on A2–A7 forming conspicuously elevated rods.

**Larval hostplant.** Larvae feed on the leaves of a common lawn forb, *Dichondra caroliniensis* Michx. (pony-foot) [Convolvulaceae]. Most of the preserved larvae examined by Matthews (2006) were reared from eggs. These larvae were offered several forbs and readily fed on *Dichondra*. A larva was subsequently field collected on *Dichondra*, confirming the natural host association.

**Distribution and phenology.** The known distribution as reflected in the map (Fig. 40) includes USA: Alabama, Arkansas, Florida, Georgia, Kansas, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas. These data (combined as center of county plots) are from specimens examined firsthand as well as information associated with clearly recognizable online images (MPG 2013, Bugguide 2013). A single record for Maryland from the Bryant Mather collection [MEM], not shown on the distribution map (Washington, D.C. 9.viii.1962 B. Mather # 012616, abdomen missing), is the northernmost record for this species. The range of the larval host plant includes Pennsylvania and Ohio, so it is likely that *P. belfragei* may be found in additional states. Adults have been collected year-round in Florida, and all months except December in Mississippi, and December and February in Louisiana. Records for other states are scattered, ranging from April to October.

**Comments.** This is a very common species in the southeastern United States and is the one of the most frequently collected in terms of numbers of specimens represented in collections (MGCL, DMC, and MEM). Although extremely common, the redescription by Barnes and Lindsey (1921) emphasizes the confusion of the identity of the species for some time. Barnes and Lindsey state: “This species is so variable that no accurate description can be given...” and go on to mention both light and dark forms and mention the specimens from Shovel Mountain, Texas, which we designate above as paratypes of *P. kutisi*. Barnes and Lindsey also include a line drawing of male genitalia (Plate XLIX, figure 19) noting “The male genitalia are somewhat variable, and an average form is figured.” In their figure, the left saccular process is curved laterad and it appears that this stylized drawing is either *P. kutisi* or *P. chihuahuaensis*, perhaps a composite of two slides or if the latter species, drawn with the right saccular process separated from the valva.

### Key to Nearctic *Pselnophorus* Males

1. Forewing ground color dark (mixed light drab to dark fuscous scales with scattered light buff scales); right valva with lobed saccular process (Fig. 19, 23-25, 26, 31-33). ..... **2**
- Forewing ground color light (mixed white and buff to drab gray scales with scattered fuscous scales); right valva without lobed saccular process (Fig. 11, 16-18, 34). ..... **3**
- 2(1). Left valva with saccular process straight at middle (Fig. 19-22); right valve with saccular process well-developed, lobed to spatulate, distal part usually separated from valva. .... ***P. hodgesi*, new species**
- Left valva with saccular process curved laterad at middle (Fig. 26, 28-30); right valve with saccular process moderately developed, lobed, distal part usually adhering to valva. .... ***P. kutisi*, new species**

- 3(1). Tegumen with socius-like lobes laterad near uncus base; phallus with blade-like cornutus (Fig. 34); forewing with  $R_3$  spot appearing offset from costa, forewing  $R_5$  spot present. .... *P. belfragei* (Fish)
- Tegumen without socius-like lobes laterad near uncus base (Fig. 11); phallus without cornutus (Fig. 12); forewing with  $R_3$  spot on costa, forewing  $R_5$  spot absent. .... *P. chihuahuaensis*, new species

## Discussion

*Pselnophorus* warrants further study in terms of a worldwide revision. Few characters of the Nearctic species are consistent with the type species and other palaeartic species. These include forewing venation, development of the right saccular process of males (in part), and the inception of the usually filamentous (except in *P. belfragei*) ductus seminalis close to the antrum. Nearctic *Pselnophorus* share several characters that suggest an evolutionary relationship closer to each other than to other *Pselnophorus*. These characters include similar venation-linked spot patterns of the forewing, the shiny white longitudinal bands on the abdomen, pale metathorax and abdomen in contrast to meothorax, a narrow juxta, reduced left arm of the anellus of the male genitalia, and undeveloped coecum. Of the four Nearctic species, *P. belfragei* differs the most from the other three in having a swollen and spiraled ductus seminalis in females, round as opposed to ovate corpus bursae with spinules, phallus with a distinct cornutus in males, left anellus lobe approximate to juxta, no swollen setal sockets at base of valvae, and no pale fringe patch at forewing vein  $Cu_1$ .

The distribution of the Nearctic species (Fig. 40) appears to be divided between eastern and western species with *P. belfragei* widely distributed throughout the southeast and *P. kutisi* thus far restricted to peninsular Florida and eastern Texas. *Pselnophorus hodgesi* and *P. chihuahuaensis* are western species, known only from isolated desert areas of Arizona and Western Texas. As yet, *Pselnophorus* is unrecorded from the Neotropical region as delimited by Heppner (1991), however the localities of the latter two species are situated near the border and these species most likely occur in Northern Mexico and possibly southern New Mexico. Similarly, the disjunct distribution of *P. kutisi* between eastern Texas and Peninsular Florida, suggests the possibility of a semi-contiguous distribution across the Gulf Coast. Further predictions of ranges may be possible once the larval hosts of the new species are discovered. As for *P. belfragei*, while additional larval hosts are possible, the distribution of the known larval host corresponds with that of the moth. Although a common lawn forb, *Dichondra caroliniensis* is restricted to moist shady areas as opposed to the more arid conditions of the southwestern United States. Larval hosts of the three new species most likely belong to the Asteraceae as do the majority of hosts for the Pterophorini (Matthews and Lott 2005).

The identity of female *P. kutisi* is still problematic. The illustrated female (Fig. 37) that might be this species could also fall within the range of morphological variation of *P. chihuahuaensis*. Until more specimens are available to evaluate the range of variation or molecular studies completed, the most conservative approach is to treat this specimen as an unknown. The lack of female specimens was an early obstacle in dealing with the Nearctic fauna but at this time we feel the differences in male genitalia are significant enough to clearly delineate the species.

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