

# EPISIMUS MOTHS OF NORTH AMERICA (LEPIDOPTERA: TORTRICIDAE)

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**ABSTRACT.**— The genus *Episimus* is revised for North America with 9 known species, 3 of which are described as new from Florida: *Episimus lagunculariae*, n. sp.; *Episimus kimballi*, n. sp.; and *Episimus burserae*, n. sp. All Nearctic and subtropical *Episimus* species occur in Florida. Other than for 3 species widespread in eastern North America, most of the North American *Episimus* are restricted to southern Florida, with 3 species known to also occur in the West Indies. *Episimus guiana* (Busck), *Episimus nesiotis* Walsingham, and *Episimus transferranus* (Walker) are newly recorded for Florida and the United States.

**KEY WORDS:** Aceraceae, Amazonas, Anacardiaceae, Aquifoliaceae, Bahamas, Belize, Betulaceae, Brazil, Burseraceae, biology, Caprifoliaceae, Combretaceae, Compositae, Cuba, Diptera, *Enarmonia*, *Endopiza*, *Episimus burserae* n. sp., *Episimus kimballi* n. sp., *Episimus lagunculariae* n. sp., Ericaceae, *Eucoenogenes*, Euphorbiaceae, Guyana, *Hamamelidaceae*, Hawaii, hostplants, Hymenoptera, immatures, Jamaica, Magnoliaceae, Mesoamerica, Mexico, Myricaceae, Myrsinaceae, Nearctic, Neotropical, Nyssaceae, Olethreutinae, Olethreutini, pheromones, Rosaceae, St. Croix, St. Vincent, South America, taxonomy, Theaceae, Ulmaceae, USA, Venezuela, Virgin Islands, West Indies.

The genus *Episimus* comprises a small group of 32 New World species of primarily tropical distribution. North of Mexico there are 9 species, including 3 new species and 3 new United States records. New United States records include *Episimus guiana* (Busck) in southern Florida, and *Episimus nesiotis* Walsingham and *Episimus transferranus* (Walker) in both Florida and southern Texas. The addition of 3 new species gives southern Florida the most diverse *Episimus* fauna (9 spp.) outside of the Neotropics. The species known for the Neotropical region will be the subject of a future paper on the genus. Species described in "*Episimus*" from the Old World tropics are now referred to other genera, thus restricting *Episimus* to the New World. Razowski (1977) synonymized the Old World *Eucoenogenes* Meyrick, but this genus is considered distinct herein and by researchers in Asia (Kawabe, pers. comm.).

The only work on *Episimus*, other than new descriptions or isolated species notes, has been by Heinrich (1926). In the last century over two dozen species have been described or transferred to the genus, but no revision has been completed other than for the Nearctic species (Heinrich, 1926). Various short accounts have noted the West Indian and Mesoamerican faunas (Forbes, 1930; Walsingham, 1892, 1897, 1914). Forbes (1923) noted the two species of the northeastern United States. Heinrich (1926) briefly noted the two new species from Florida, in terms of a few specimens he had from Florida that were in poor condition and, thus, not described or only tentatively considered West Indian species of uncertain identity. In the present work, locality data for previously described species are noted in the Appendix; spe-

cimen data for new species are noted in the text. Distribution maps of specimen localities are dispersed in the text.

## EPISIMUS Walsingham

*Episimus* Walsingham, 1892:501 (Type-species: *Carpocapsa transferrana* Walker, by original designation)

*Episemus* Dyar, 1901, missp.

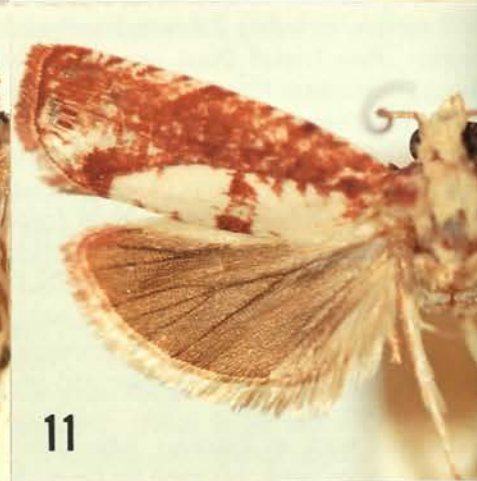
*Antictenista* Meyrick, 1927:337 (Type-species: *Antictenista mesotricha* Meyrick, by monotypy)

The genus *Episimus* appears related to olethreutine genera like *Olethreutes*, in the tribe Olethreutini (Heinrich, 1926). Earlier taxonomic notes were given by Fernald (1908), Walsingham (1914), Heinrich (1926), and Razowski (1977). The Nearctic fauna has been cataloged by Fernald (1882), Dyar, [1903], McDunnough, (1939), Kimball (1965), Powell (1983), and Arnett (1985).

**Diagnosis.**— Small to medium olethreutine moths (10-27mm wingspread); forewing termen concave, tornus rounded, radial veins separate with  $R_5$  to termen and parallel to  $M_1$ , with  $M_2$  and  $M_3$  convergent with  $CuA_1$  at termen; hindwing with  $R_s$  and  $M_1$  approximate, with inner margin unmodified; male with abdominal segment 1 lacking ventrolateral scale pockets. Male genitalia: uncus narrow; gnathos simple, distally a sharp point, flattened ventrally; socius broad; valva with prominent saccular projection; aedeagus short, with deciduous cornuti. Female genitalia: papilla anales setose, with several very long setae, and numerous short setae raised on small chazalae-like elevations; simple corpus bursae with 2 thorn-like signa (see also Miller, 1987).

**Biology.**— Biologies of *Episimus* species are poorly known, although all are leaf rollers or leaf-bud feeders. Cassani *et al.* (1989) reported on one species feeding at least partially on hostplant seeds or berries (*E. transferranus*), and D. H. Habeck

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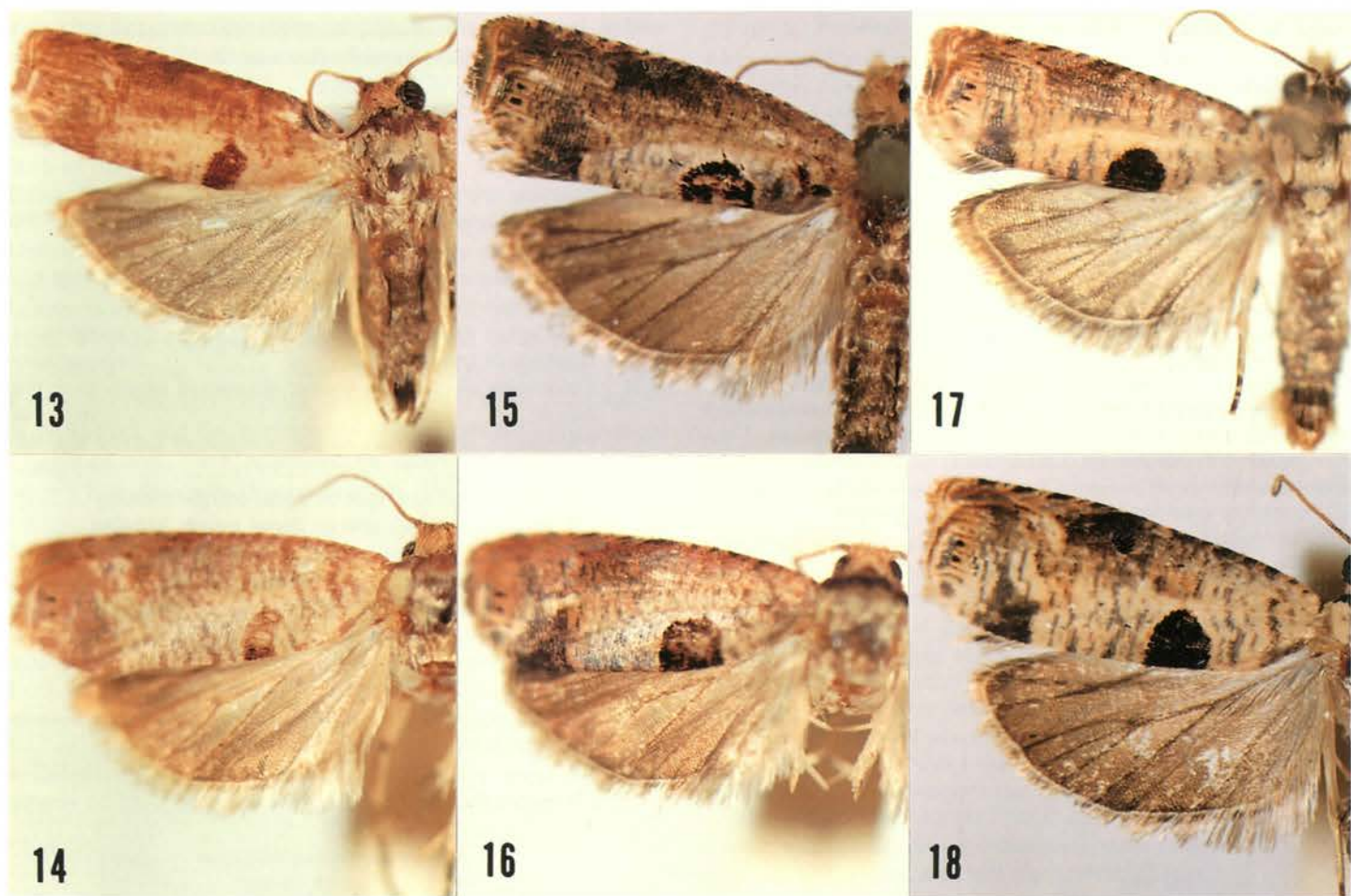


Fig. 13-18.— 13. *Episimus burserae* Heppner n. sp., ♂ paratype, No Name Key, FL (FSCA). 14. *E. burserae*, ♀ allotype, Key Largo, FL (FSCA). 15. *Episimus augmentanus* (Zeller), ♂ (dark form), Key Largo, FL (CNC). 16. *E. augmentanus*, ♀ (same, FSCA). 17. *Episimus transferranus* (Walker), ♂, Terra Ceia, Manatee Co., FL (FSCA). 18. *E. transferranus* (Walker), ♀ (same) (Figs. ca. 7x).

(pers. comm.) has found *E. argutanus* at least partially feeding on berries of *Rhus copallina*. *Episimus* moths have been recorded on a variety of plants in Aceraceae, Anacardiaceae, Burseraceae, Combretaceae, Compositae, Ericaceae, Euphorbiaceae, Hamamelidaceae, Myrsinaceae, Nyssaceae, and Theaceae (see Table 1 for an index of recorded *Episimus* hostplants). Records on *Crataegus* (Rosaceae) and *Ulmus* (Ulmaceae) may be erroneous (unverified records of Clemens, 1860); likewise for *Solidago* (Compositae) (Kimball, 1965). Records for *Sambucus* (Caprifoliaceae) and *Alnus* (Betulaceae) from Canada also need verification (Prentice, 1966), as do Florida records for *Ilex opaca* (Aquifoliaceae), *Magnolia virginiana* (Magnoliaceae), and *Myrica cerifera* (Myricaceae) (DPI host records).

Fig. 1-12.— 1. *Episimus tyrius* Heinrich, ♂, Gainesville, Alachua Co., FL (FSCA). 2. *E. tyrius*, ♀, Dunedin, Pinellas Co., FL (FSCA). 3. *Episimus lagunculariae* Heppner n. sp., ♂ holotype, Honeymoon Id., Pinellas Co., FL (FSCA). 4. *E. lagunculariae*, ♀ allotype (same). 5. *Episimus argutanus* (Clemens), ♂, Tulli, Onondaga Co., NY (USNM). 6. *E. argutanus*, ♀ (same). 7. *Episimus guiana* (Busck), ♂, Big Pine Key, FL (UCB). 8. *E. guiana*, ♀ (dark form), Key Largo, Florida (FSCA). 9. *Episimus nesiotus* Walsingham, ♂, Long Pine Key, Dade Co., FL (FSCA). 10. *E. nesiotus*, ♀, Siesta Key, FL (FSCA). 11. *Episimus kimballi* Heppner n. sp., ♂ paratype, Key Largo, FL (FSCA). 12. *E. kimballi*, ♀ paratype, Islamorada, Monroe Co., FL (FSCA) (Fig. 1-6 and 9-12 ca. 7x; Fig. 7-8 ca. 8x).

Only two of the Nearctic species are known biologically: *Episimus tyrius* Heinrich and *Episimus argutanus* (Clemens). Biological notes have been published for *E. argutanus* from various rearings (Dyar, 1901; Habeck, 1989) and more recently for incidental captures at pheromone traps (Danko and Jubb, Jr, 1983; Jubb, Jr, 1973; Taschenberg and Roelofs, 1976). Six of the other species have been reared, with associated hostplant records, but little further is known about them; one Florida species remains completely unknown biologically.

Larvae of three species were described by MacKay (1959), and Zimmerman (1978) described the larva of *Episimus utilis* Zimmerman from Hawaii and Brazil. Larvae of the northern species (*E. tyrius* and *E. argutanus*) typically are pink when alive; *E. nesiotus* from the Virgin Islands is pale in body color (MacKay, 1959). Brown (1987) notes larval characters of *E. tyrius* in a key to some economic tortricid larvae. The only pupae studied thus far are of *E. argutanus* (Mosher, 1916) and, in Hawaii, of *E. utilis*, for specimens brought from Brazil; the only pupa illustrated is that of *E. utilis* (Zimmerman, 1978). Parasitoids have only been studied for *E. argutanus*, as noted by Schaffner (1959) for Canadian rearings.

**Remarks.**— *Episimus* overall are similar among related species by genitalic and maculation characters: *E. argutanus* and its group of species; *E. augmentanus* and its group of species. Distinctions

TABLE 1. Hostplants of North American *Episimus*.

ACERACEAE	
<i>Acer</i> sp.	<i>E. tyrius</i>
<i>Acer barbatum</i> Michx.	<i>E. tyrius</i>
<i>Acer rubrum</i> L.	<i>E. tyrius</i>
<i>Acer saccharinum</i> L.	<i>E. tyrius</i>
ANACARDIACEAE	
<i>Metopium toxiferum</i> (L.) Kring & Urban	<i>E. augmentanus</i>
<i>Rhus</i> sp.	<i>E. argutanus</i>
<i>Rhus copallina</i> L.	<i>E. argutanus</i>
<i>Rhus cotinoides</i> (Britton) Nutt.	<i>E. argutanus</i>
<i>Rhus glabra</i> L.	<i>E. argutanus</i>
<i>Rhus obovata</i> Sond.	<i>E. argutanus</i>
<i>Rhus typhina</i> L.	<i>E. argutanus</i>
<i>Schinus terebinthifolius</i> Raddi	<i>E. transferranus</i>
<i>Spondias</i> sp.	<i>E. augmentanus</i>
<i>Toxicodendron diversilobum</i> (T. & G.) Greene	<i>E. argutanus</i>
<i>Toxicodendron radicans</i> (L.)	<i>E. argutanus</i>
<i>Toxicodendron toxicarium</i> Salisb.	<i>E. argutanus</i>
AQUIFOLIACEAE [doubtful]	
<i>Ilex opaca</i> Aiton	<i>E. tyrius?</i>
BETULACEAE [doubtful?]	
<i>Alnus</i> sp.	<i>E. argutanus?</i>
BURSERACEAE	
<i>Bursera simaruba</i> (L.) Sarg.	<i>E. burserae</i>
CAPRIFOLIACEAE [doubtful]	
<i>Sambucus</i> sp.	<i>E. argutanus?</i>
COMBRETACEAE	
<i>Laguncularia racemosa</i> (L.) Gaertn.	<i>E. lagunculariae</i>
COMPOSITAE [doubtful]	
<i>Ambrosia trifida</i> L.	<i>E. argutanus?</i>
<i>Solidago</i> sp.	<i>E. argutanus?</i>
ERICACEAE	
<i>Arctostaphylos punila</i> Nutt.	<i>E. argutanus</i>
EUPHORBIACEAE	
<i>Euphorbia</i> sp.	<i>E. guiana</i>
<i>Euphorbia cyathophora</i> Murr.	<i>E. argutanus</i>
<i>Euphorbia heterophylla</i> L.	<i>E. argutanus</i>
<i>Euphorbia hypericifolia</i> L.	<i>E. guiana, E. nesioties</i>
<i>Hippomane mancinella</i> L.	<i>E. nesioties</i>
HAMAMELIDACEAE	
<i>Hamamelis virginiana</i> L.	<i>E. argutanus</i>
MAGNOLIACEAE [doubtful]	
<i>Magnolia virginiana</i> L.	<i>E. tyrius?</i>
MYRICACEAE [doubtful]	
<i>Myrica cerifera</i> L.	<i>E. tyrius?</i>
MYRSINACEAE	
<i>Ardisia escallonioides</i> Schlecht. & Cham.	<i>E. nesioties</i>
NYSSACEAE	
<i>Nyssa caroliniana</i> Poir.	<i>E. argutanus</i>
ROSACEAE	
<i>Crataegus</i> sp. [error?]	<i>E. argutanus?</i>
<i>Prunus caroliniana</i> Aiton	<i>E. tyrius</i>
<i>Prunus laurocerasus</i> L.	<i>E. tyrius</i>
THEACEAE	
<i>Gordonia lasianthus</i> (L.) Ellis	<i>E. tyrius</i>
ULMACEAE [erroneous?]	
<i>Ulmus</i> sp.	<i>E. argutanus?</i>

between species are often very slight, making identification difficult unless specimens can be compared with verified specimens from among several species, as shown together on the color plates. Genitalia, likewise, are extremely similar to each other, often differing mainly in size and slightly in shape, again requiring comparisons with verified samples to accurately identify.

The key to species should be used with care and only as a beginning point, followed thereafter with careful comparison of the figures of adults and genitalia.

KEY TO NEARCTIC *EPISIMUS*

1. Forewing (FW) brownish (head or costa not purple) . . . . . 2  
FW reddish (if brown, then head and costal margin of FW purple) . . . . . 5
- 2(1). FW with distinct dark spot at dorsal margin near midwing . . . 3  
FW without such spot . . . . . 4
- 3(2). Head vertex dark fuscous . . . . . *transferranus*  
Head vertex orange-buff . . . . . *augmentanus*
- 4(2). FW usually mottled dark brown; wingspread usually more than 10mm; . . . . . *argutanus*  
FW usually mottled tan brown; wingspread usually less than 10mm; . . . . . *guiana*
- 5(1). FW with distinct dark spot on dorsal margin midwing . . . . . 6  
FW without such dark spot on dorsal margin midwing . . . . . 7
- 6(5). FW with prominent white area on dorsal margin - *kimballi* (♂)  
FW with lighter areas but not prominently white . . . . . *burserae*
- 7(5). FW with dorsal margin white from base to beyond midwing and yellow-orange on tornal third . . . . . *tyrius*  
FW with mottled lighter areas along dorsal margin but not solid white . . . . . 8
- 8(7). FW brownish with costa purple; head purple . . . . . *lagunculariae*  
FW reddish-pink; head buff or ochreous . . . . . 9
- 9(8). FW dorsal margin strongly mottled white . . . . . *kimballi* ♀  
FW with only lighter areas on dorsal margin . . . . . *nesioties*

*Episimus tyrius* Heinrich

(Fig. 1-2, 19, 28-31)

*Episimus tyrius* Heinrich, 1923:107.

**Diagnosis.**— This is one of the most colorful species in the genus and is the only reddish species of *Episimus* in northern areas of the Nearctic. Among related species it is the only red species with the mid-forewing mark not touching the dorsal margin in a white field, and it has a prominent cream-white field on the basal 2/3 of the forewing. It is also distinguished by the usually prominent yellow-orange coloration of the forewing termen.

Forewing length: 4.7-5.5mm ♂, 5.0-6.0mm ♀. Head purple on vertex, tan laterally; labial palpus purple, with tan apical segment; antenna fuscous; thorax tan, with purple anteriorly. Forewing (Fig. 1-2) with purple and brown mixed on costal 2/3 to beyond midwing; dorsal margin with light cream-white field to midwing; central dark-brown patch not extending to dorsal margin; yellow-tan or orange termen area from 2/3 and angled to apex; silver and dark brown strigulae and marks from costal margin to apex; terminal quarter with silver spot centrally from mesad streaks of dark brown and purple on tan field; fringe purple near apex, then orange-tan; venter shining light fuscous. Hindwing fuscous. Male and female similar in maculation.

Male genitalia (Fig. 28-29) typical for the genus, with uncus short, pointed, and gradually bent posteriorly over prominent socii that are as long as uncus; valva elongate, narrow, nearly equally wide from apex to saccular projection, which is enlarged (nearly as long as valval width); saccular area with numerous setae of equal length; vesica with numerous cornuti. (n=3)

Female genitalia (Fig. 30-31) typical for the genus, with sterigma subquadrate, and with numerous microtrichia, round ostium bursae, ductus bursae relatively short and wider than in other species. (n=2)

**Types.**—*Holotype* ♂: Westbury Station, Queens Co., [Long Island], New York, [1894], [M. V. Slingerland], [Fernald Coll.] (CU) [site indicated on map Fig. 19 as symbol ▲]. *Paratypes* (2♂, 2♀): MISSISSIPPI.—Biloxi, Harrison Co., 13 Jun 1917 (1♂) (CU). NEW YORK.—Westbury Station, Queens Co., [Long Island], 6 Dec 1894 (1♀), 21 Dec 1894 (1♂), ex silver maple [*Acer saccharinum*], M. V. Slingerland, (Fernald Coll.) (USNM). Heinrich (1926) specified the type as being in the Cornell University collection and the others as paratypes.

**Distribution** (Fig. 19).—The species occurs along the Atlantic and Gulf states of the eastern United States, primarily a south-eastern distribution, and has been recorded from the following states: Florida, Georgia, Louisiana, Maryland, Mississippi, New Hampshire, New Jersey, New York, North Carolina, South Carolina, Texas, and Virginia. Forbes (1923) noted distributions in New York and the northeastern states; Kimball (1965) noted Florida records. See Appendix for specimen data. It is also known from Bermuda (Ferguson *et al.*, 1991).



Fig. 19. Distribution map of *E. tyrius*.

**Flight Period.**—Adults are active nearly year-round in Florida, probably with 4-5 overlapping generations per year. Northern populations are active during Jul-Aug [possibly also May-Jun] (New York/North Carolina emergence records include December).

**Hosts.**—The species uses maples (*Acer* sp.) as the primary larval host, including *Acer barbatum*, *Acer rubrum*, and *Acer saccharinum* (Aceraceae). *Gordonia lasianthus* (Theaceae) (K. Hibbard, DPI; D. H. Habeck, UF); *Prunus caroliniana* and *Prunus laurocerasus* (Rosaceae) have also been recorded as hostplants (D. H. Habeck, UF; Brown *et al.*, 1983). Records in Florida on *Ilex opaca* (Aquifoliaceae), *Magnolia virginiana* (Magnoliaceae), and *Myrica cerifera* (Myricaceae), are questionable (DPI host records) and may involve incidental feeding records rather than true hostplants.

**Remarks.**—*Episimus tyrius* is somewhat isolated in the genus and appears less developed in the female genitalia, otherwise showing relationships to *Episimus argutanus*. MacKay (1959) described

the larva. Brown (1987) noted some larval characters as part of a key to economic tortricids on fruit trees, although no significant pest status for *E. tyrius* on *Prunus* is known. Johnson and Lyon (1988) also noted this species as feeding on various maples. One of the paratypes of *E. tyrius*, from St. Petersburg, Florida, was misidentified and is placed under *E. nesiotetes* (see Appendix).

### *Episimus lagunculariae* Heppner, new sp.

(Fig. 3-4, 20, 32-35)

**Diagnosis.**—This species may be distinguished from *E. tyrius* by its less distinct whitish areas along the forewing dorsal margin and by its less intense yellow-orange termen.

**Description.**—Forewing length: 5.0-5.6mm ♂, 5.8-6.6mm ♀.

**MALE** (Fig. 3).—Head purple-brown, with vertex having some fuscous scales and iridescence; labial palpus fuscous laterally mixed with fulvous-brown; antenna fuscous and brown. Thorax ochreous-brown, with fuscous and purple-brown anteriorly; venter light tan and cream-white; legs light tan, with silvery-gray and fuscous dorsally. Forewing basal half fuscous mixed with purple-brown, with ochreous and tan along dorsal margin, then same color angled to median at midwing anterior to chocolate-brown central angled mark; costal margin with numerous fuscous marks alternating with brown and lead-gray marks, all angled toward tornus; distal half of wing ochreous and tan, with darker brown near tornus; termen with small black marks basal to silver subterminal line; apex brown with silvery-gray striae from costal margin; fringe ochreous, with silvery scales near apex; venter shining gray. Hindwing dull fuscous; fringe fuscous; venter shining gray. Abdomen shining tan.

Male genitalia (Fig. 32-33): uncus short, narrow; socius large and convex; tegumen angulate at socius level; valva elongated and narrow, gradually bent toward apex and approximately uniform in width from saccular projection distad; saccular projection large, narrow, and pointed; aedeagus of usual length for genus, vesica with extensive number of cornuti. (n=2)

**FEMALE** (Fig. 4).—Similar to male but usually more purple-brown scaling on head and forewing, and with most of tan coloration on forewing usually reduced or absent. (n=1)

Female genitalia (Fig. 34-35): apophyses nearly subequal and very thin; sterigma quadrate and microtrichulate; round ostium bursae; antrum simple; ductus bursae short, with sclerotized ring at bursa junction; ductus seminalis thick and arising at bursa junction; corpus bursae large, ovate, with moderate signa pair.

**Types.**—*Holotype* ♂: Honeymoon Id. S. P., Pinellas Co., 14 Dec 1988 (1♂), L. C. Dow (JBH slide 2008) (FSCA) [indicated on map Fig. 20 as symbol ▲]. *Allotype* ♀: (same), 9 Nov 1986 (1♀), L. C. Dow (JBH slide 2009) (FSCA).

*Paratypes* (12♂, 8♀): **FLORIDA.**—**INDIAN RIVER Co.:** *Orchid*, 28 Feb 1992 (1♀), ex *Laguncularia racemosa*, K. Hibbard (FSCA). **Vero Beach**, 15 Oct-15 Nov 1940 (1♂), J. R. Malloch (USNM). **LEE Co.:** *Sanibel Is.*, 22 Oct 1972 (1♂), 23 Oct 1972 (1♂), 17 Nov 1972 (1♂), ex *Laguncularia racemosa*, D. H. Habeck (FSCA). **MANATEE Co.:** *Terra Ceia*, 7 Mar 1986 (3♂), 28 Apr 1986 (1♀), 14 Jun 1986 (1♀), L. C. Dow (LCD). **MONROE Co.:** *Big Pine Key* (nr. Watson Hammock), 25 Dec 1987 (1♀), L. C. Dow (LCD). *Key Largo*, 17 Jan 1974 (1♂), J. B. Heppner (FSCA); 30 Mar 1986 (1♂), H. D. Baggett (FSCA); 31 Jul 1967 (1♂), R. Silberglied (USNM). *No Name Key*, 31 Mar 1986 (1♀), H. D. Baggett (FSCA). *Stock Id.*, 20 Dec 1972 (1♂), H. R. Dodge (FSCA). *Upper Snipe Key*, 31 Jul 1967 (1♂), R. Silberglied (USNM). **ST. LUCIE Co.:** *Ft. Pierce*, 25 Feb 1992 (1♀), 6 Mar 1992 (1♂), 16 Dec 1991 (2♀), ex *Laguncularia racemosa*, K. Hibbard (FSCA).

**Distribution** (Fig. 20).—Found only in coastal areas where white mangrove grows, from Pinellas County in the west and Indian River County in the east, south to the Lower Keys. The species may occur further north along each coast, wherever the hostplant



Fig. 20. Distribution map of *E. lagunculariae* n. sp.

can survive. Specimens of what appear to be this species from Belize are not included in the type series and await further study. It is possible *E. lagunculariae* will be found in Caribbean areas wherever white mangrove occurs.

**Flight Period.**— Records are for Jan-Apr, Jul, and Oct-Dec.

**Hosts.**— Larvae have been reared from white mangrove, *Laguncularia racemosa* (Combretaceae) as larval host (D. H. Habeck, UF; K. Hibbard, DPI).

**Remarks.**— During much of this study, *E. lagunculariae* specimens were mixed with *E. tyrius*, and even in part with *E. argutanus*. Worn specimens must be carefully examined to correctly identify them to species, since such specimens often resemble these other species. Questionable specimens will need to be dissected to verify their identities. Usually, *E. lagunculariae* resemble *E. tyrius* but lack the prominent yellow-orange of the forewing termen; females generally are darker in coloration.

This species is named after the hostplant, *Laguncularia racemosa*.

### *Episimus argutanus* (Clemens)

(Fig. 5-6, 21, 36-39)

*Bactra argutanus* Clemens, 1860:358.

*Catantega hamameliella* Clemens, 1861:78.

*Grapholitha (Hedya) allutana* Zeller, 1875:295.

**Diagnosis.**— The mottled brown to dark brown maculation is typical for the species. Maculation varies from the normal dark brown pattern to a lighter form.

Forewing length: 5.5-6.2mm ♂, 5.0-6.9mm ♀. Head tan, with vertex fuscous; tan thorax, with fuscous anterior border. Forewing (Fig. 5-6) mottled brown and tan, with more tan near base, merging with mixed silver-gray marks after midwing dark brown mark; costa with large dark brown wedge angled to termen at midwing, followed by dark brown marks along costal margin to apex interspersed with buff-brown and silver-gray lines directed to termen; silver bar near central termen distad of 4 black marks on tan field; fringe tan and fuscous; venter fuscous. Hindwing fuscous. Male and female similar in maculation.

Male genitalia (Fig. 36-37) with uncus short; socius relatively long (ca. 1.5x uncus length); valva elongate, narrow but of relatively equal width throughout, with moderate saccular projection of spines; saccular corner spines few; vesicula with dense field of cornuti. (n=9)

Female genitalia (Fig. 38-39) with sterigma subquadrate with larger posterior portion; ostium bursae round; ductus bursae length about equal to bursal width; corpus bursae relatively large. (n=5)

**Types.**— *Types*: "170" [Easton?, Northampton Co.], [Pennsylvania], [1859?], B. Clemens (ANSP) [*E. argutanus*, lectotype ♀, desig. Darlington (1947), Type 7221] [site indicated on map Fig. 21 as symbol ▲].

[PENNSYLVANIA]: [Easton?, Northampton Co.], [1860?], B. Clemens (ANSP) [*E. hamameliella*: larval description].

NEW YORK: Mar 1871, Speyer (MCZ) [*E. allutana*, ♀ lectotype desig. W. E. Miller, MCZ type 14325].

*Syntypes*: MASSACHUSETTS: Beverly, 9 Jul 1868, Burgess (MCZ) [*E. allutana*].

[PENNSYLVANIA], "170" [Easton?, Northampton Co.], [1859?], B. Clemens (ANSP) [*E. argutanus*, paralectotype [♂?], desig. Darlington (1947)].

TEXAS: [Dallas], 26 Jul [1872?], Boll [BMNH] [*E. allutana*].

**Distribution** (Fig. 21).— This is the most widespread species in North America, ranging across the entire continent from southern Canada to northern Mexico, but it is uncertain how much farther south it occurs. Walsingham (1914) reported *E. argutanus* south to Veracruz, but these records may represent other species similar to *E. argutanus*. In Florida, *E. argutanus* generally does not occur south of Lake Okeechobee, but there are a few verified records for south Florida, including one for Key Largo. Forbes (1923) noted the distribution for northern states, and Kimball (1965) noted Florida records. See Appendix for specimen data (records include published data from Godfrey *et al.*, 1987; Miller, 1987; Moffat, 1891; and Prentice, 1966).

Contrary to what Heinrich (1926) states, *E. argutanus* does not appear to occur in the West Indies where, as probably also in



Fig. 21. Distribution map of *E. argutanus*.

Central America, there are related species that have similar maculation. Alayo and Valdes (1976) reported *E. argutanus* for Cuba, and Forbes (1930) included Puerto Rico, but all Caribbean records probably refer to the very similar *E. guiana*. Some specimens have been seen from northern Mexico that appear to be *E. argutanus*, but the full range south of the United States border remains to be confirmed. There is also the possibility that specimens of *E. lagunculariae* may be involved with some of these old records, since worn specimens of this species often appear more like *E. argutanus* than *E. tyrius*.

**Flight Period.**— In northern areas, there are two generations, with adults during May-Jun and Jul-Aug. In Florida, records indicate about 5 generations: adults during Feb-Mar, Apr-May, Jun-Jul, Aug-Sep, and Oct-Nov.

**Hosts.**— Recorded hostplants include, *Rhus* sp., *Rhus copallina*, *Rhus cotinoides*, western poison oak (*Rhus diversiloba* [= *Toxicodendron diversilobum*]), *Rhus glabra*, *Rhus obovatus*, poison ivy (*Rhus radicans* [= *Toxicodendron radicans*]), *Rhus typhina*, poison oak (*Rhus toxicodendron* [= *Toxicodendron toxicarium*]) (Anacardiaceae); *Hamamelis virginiana* (Hamamelidaceae); and *Nyssa multiflora* [= *N. caroliniana*] (Nyssaceae). There also are rearing records for *Arctostaphylos pumila* (Ericaceae) in California, and *Ambrosia trifida* (Compositae). Poison ivy records have been summarized by Habeck (1989). In Florida, rearing records include poinsettia, *Euphorbia heterophylla*, and *Euphorbia cyathophora* (Euphorbiaceae): it was thought that *E. guiana* was the only *Euphorbia* feeder in Florida, but south Florida populations of *E. argutanus* do likewise. The preferred hosts generally are various species of sumac (*Rhus* sp.).

Older records for *Crataegus* (Rosaceae) and *Ulmus* (Ulmaceae) date from Clemens (1860) and appear to be erroneous, since he stated that larvae of each rearing lot appeared very different, indicating that the rearings were of mixed species (these Clemens records were repeated by subsequent authors). Records for *Alnus* (Betulaceae) and *Sambucus* (Caprifoliaceae) (Prentice, 1966), and for *Solidago* (Compositae) (Kimball, 1965), are also questionable.

Biological notes are limited mostly to rearing records (Clemens, 1860; Dyar, 1901; Forbes, 1923). Lutz (1935) noted that larvae of *E. argutanus* tend to twist young hostplant leaves into a cone or spiral tube when feeding. Brief notes of larvae feeding on forest trees were given by Baker (1972), Craighead (1950), and Drooz (1985). Habeck (pers. comm.) noted larvae feeding on berries, as well as leaves, of *Rhus copallina* in Florida. MacKay (1959) described the larva of *E. argutanus*; also noted was the larva of "*Episimus* sp." (reared from poinsettia), from Lake Worth, Florida, but adults examined appear to belong to *E. argutanus*. The pupa of *E. argutanus* is noted by Mosher (1916). Response by *E. argutanus* has been reported for a pheromone [(Z)-9-dodecenyl acetate] developed for the grape berry moth (*Endopiza viteana* Clemens) (Danko and Jubb, Jr., 1983; Jubb, Jr., 1973; Taschenberg and Roelofs, 1976) in Pennsylvania, and for the cherrybark tortrix (*Enarmonia formosana* Scopoli) in other states (S. Passoa, pers. comm.).

Parasitoids of *E. argutanus* immatures that have been reared in New England (Schaffner, 1959) include the following:

DIPTERA

Tachinidae      *Actia* sp.

*Nemorilla floralis* (Fall)  
*Phorocera erecta* Coquillett

HYMENOPTERA

Braconidae

*Apanteles* sp.

*Meterous trachynotus* Viereck

Eulophidae

*Dimmockia incongrua* (Ashmead)

Ichneumonidae

*Exochus pallipes* [= *pleuralis*] Cresson

*Labrorychus* sp. [= *Habronyx*]

*Macrocentrus delicatus* Cresson

*Scambus hispae* (Harris)

**Remarks.**— The species is difficult to distinguish from *E. guiana* in many cases in Florida (possibly also the Gulf Coast), since *E. argutanus* has a light form that resembles *E. guiana*, and *E. guiana* has a dark form that resembles *E. argutanus*. Many specimens of *E. guiana* lack the fuscous fringe scales at the center of the termen, as found in *E. argutanus*, but not all specimens conform to this. South Florida populations are known from *Euphorbia* sp., the hostplant of *E. guiana*, and also tend to be more fulvous-brown, especially in freshly emerged females. It is possible that *E. argutanus* and *E. guiana* hybridize in south Florida, but this remains to be confirmed. Generally, *E. argutanus* is darker and larger than *E. guiana*. Specimens of *E. argutanus* from California tend to be larger than eastern specimens. There is also a dark form, wherein the forewings are mainly gray-violet brown and the contrasting lighter markings are largely lacking: this variety is found in Canada as well as in Florida.

***Episimus guiana* (Busck)**

(Fig. 7-8, 22, 40-43)

*Olethreutes guiana* Busck, 1913:92.

**Diagnosis.**— This mainly West Indian species is very much like *E. argutanus*, differing primarily by its smaller size. The mottled coloration of the forewings is usually somewhat more contrasting between dark and light areas, but also generally more yellow-tan than the darker brown of *E. argutanus*.

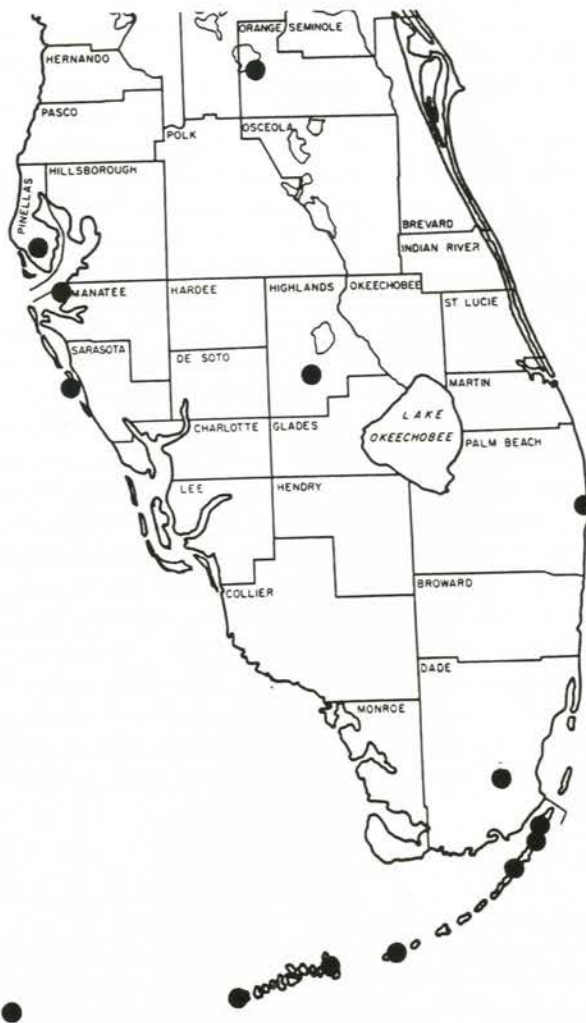
Forewing length: 4.5-5.5mm ♂ and ♀. Head tan, with some fuscous on vertex in dark forms; thorax tan with fuscous to orange-brown on anterior border. Forewing (Fig. 7-8) tan mottled with buff-brown, with light tan over wing on dorsal half to near tornus, near midwing with large dark brown and buff-brown spot; costal margin with many black-brown marks interspersed with tan, buff-brown and silver-gray lines angled to tornus; midwing on costal margin a large brown mark angled to apex; fringe ochreous; venter light fuscous. Hindwing gray-fuscous; fringe same; venter light fuscous. Male and female similar in maculation, but females often darker in coloration.

Male genitalia (Fig. 40-41) typical for genus, with uncus short, abruptly widening to tegumen; socius short and strongly curved (subequal to uncus length); valva elongate and gradually widened medially, with saccular projection of moderate length and saccular corner with few dense setae; vesicula with long dense field of cornuti. (n=4)

Female genitalia (Fig. 42-43) with sterigma subquadrate and posteriorly widened; antrum with minute spines; ostium bursae round; signum with 2 thorn-like spines. (n=2)

**Types.**— *Holotype* ♂: Georgetown, British Guiana [Guyana] (USNM 16018).

**Distribution** (Fig. 22).— It is widespread in the Caribbean. Typically, *E. guiana* is a resident of the Florida Keys, although records extend as far north as Orange County. See Appendix for

Fig. 22. Distribution map of *E. guiana*.

specimen data.

**Flight Period.**— Records are from Mar-Dec; probably year-round.

**Hosts.**— Hostplant records include *Euphorbia* sp. and *Euphorbia hypericifolia* (Euphorbiaceae).

**Remarks.**— As noted under *E. argutanus*, this Caribbean species is very similar to our common North American species, with *E. guiana* being generally smaller and much lighter in coloration. Some specimens, however, are darker, although they tend to be more fulvous-brown than in *E. argutanus*. The possibility of hybridization of these two species in south Florida needs to be investigated. Questionable specimens need to be dissected to verify their identities: the genitalia are much smaller in *E. guiana* and in the male the socii are smaller than in *E. argutanus*, even taking into account overall size reduction, and females have shorter apophyses than in *E. argutanus*.

#### *Episimus nesiotus* Walsingham

(Fig. 9-10, 23, 44-47)

*Episimus nesiotus* Walsingham, 1897:123.

**Diagnosis.**— This mostly West Indian species is distinguished by its reddish-brown coloration, with a mark on the wing center but

without a sharply demarcated lighter area along the dorsal margin of the forewing.

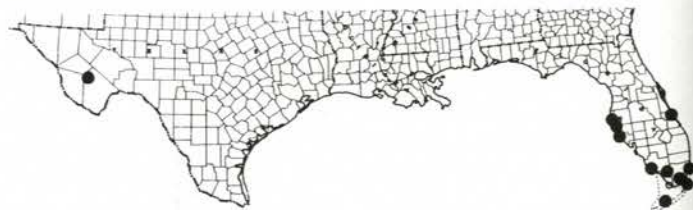
Forewing length: 5.2-6.2mm ♂, 6.0-7.1mm ♀. Head tan; labial palpus brown, with tan and black apical segment; antenna tan and fuscous; thorax tan, with fuscous and red-brown on anterior margin. Forewing (Fig. 9-10) red-brown mottled with cream-white; costal margin with several dark red-brown marks angled to tornus; dorsal margin with solid tan area mixed with red-brown to center of wing from base to 2/3; wing center at 1/3 with dark-brown spot; central termen with small silvery mark distad of black streaks mixed with red-brown on tan field; fringe red-brown; venter fuscous with tan on costa. Hindwing fuscous; fringe tan. Female similar to male but usually more dark red-brown, or with more buff-brown mixed in on forewing and with less cream-white.

**Male genitalia** (Fig. 44-45): uncus long, abruptly widening to tegumen; socius long and broad; valva elongate, with apical widening and saccular projection long, and saccular corner with numerous setae and one long seta; aedeagus with long field of cornuti spines (removed in Fig. 45). (n=5)

**Female genitalia** (Fig. 46-47): sterigma subquadratic but somewhat wider posteriorly; ostium bursae nearly round; antrum simple; ductus bursae slightly shorter than bursal length; usual ductus seminalis juncture; corpus bursae ovate, large; signum normal pair. (n=5)

**Types.**— St. Croix, 4 May-15 Jun (Godman, Hedemann, and Pontoppidan) (BMNH) [lectotype remains to be designated].

**Distribution** (Fig. 23).— This species is primarily West Indian. In Florida, it occurs only in the Keys and the Miami area, as well as northward along each coast as far as tropical elements can survive (about to St. Petersburg on the West Coast and possibly to Brevard Co. on the East Coast). In North America, there also is one record of this species for west Texas (Alpine, Brewster Co.), indicating a wider range in Mexico, although it is unclear what the hostplant may be in west Texas. See Appendix for specimen data.

Fig. 23. Distribution map of *E. nesiotus*.

**Flight Period.**— Successive generations, with records flight for Feb-Mar, Apr-May, Jun-Jul, and Nov-Dec.

**Hosts.**— *Ardisia escallonioides* (Myrsinaceae) has been recorded as a hostplant in Florida (D. H. Habeck, UF). In the West Indies, records include manchineel, *Hippomane mancinella* (Forbes, 1930), and *Euphorbia hypericifolia* (Euphorbiaceae), both on St. Croix (Walsingham, 1897). MacKay (1959) described the larva from specimens reared in the Virgin Islands (St. Croix, 19 Jun 1922, G. E. Wilson, ex *Hippomane mancinella*, USNM).

**Remarks.**— In general coloration, this species is somewhat similar to the following new species, both being distinctly red-brown in color, but *E. nesiotus* can easily be distinguished by its lack of larger prominent whitish areas on the forewings. A form of *E. nesiotus*, more common in the West Indies, can be found occasionally, where the basal area of the forewing appears as a lighter area, often with an almost silvery or lead-gray iridescence, and with the usually darker vertical markings at 1/3 changed to light tan.



***Episimus kimballi* Heppner, new sp.**

(Fig. 11-12, 24, 48-51)

**Diagnosis.**— This apparently endemic Floridian species is distinctly reddish in color (particularly freshly emerged specimens) and has a sharply demarcated white area along the dorsal margin of the forewing.

**Description.**— Forewing length: 5.2-7.3mm ♂, 7.2-9.5mm ♀.

**MALE** (Fig. 11).— Head light tan; labial palpus reddish to red-brown, with tan terminal segment (tan mesally); antenna tan and fuscous; thorax red to red-brown mixed with some white scales; legs tan with red-brown marks on tibiae and tarsal segments. Forewing red to red-brown, with some white scales mixed in; costal margin with several cream-white marks angled to tornus; dorsal 2/3 of wing with distinct cream-white patch from base to near tornus and with sharply defined border to midwing reddish areas, with red-brown central mark; silvery marks midwing and towards termen; termen red-brown bordered with large silver mark in lower central area and distad of red-brown streaks on cream-white field; fringe red-brown; venter fuscous with red-brown on costa and fringe. Hindwing fuscous; fringe red-brown. Abdomen tan.

**Male genitalia** (Fig. 48-49): tegumen without pronounced angulation at socius; uncus short; socius large and convex; valva long and uniformly narrow after sacculus area, with gradual bending toward apex; projection of sacculus short and wide; aedeagus normal; cornuti numerous (Fig. 49 with cornuti removed). (n=4)

**FEMALE** (Fig. 12).— Similar to male but red-brown more extensive, with generally less cream-white areas, and costal margin mark less distinct.

**Female genitalia** (Fig. 50-51): apophyses subequal; sterigma wide and angulate, seemingly split into three sections posteriorly (3-lobed); ostium bursae quadrate; antrum simple; ductus bursae short; ductus seminalis as usual at bursa junction; corpus bursae large and rounded; signa normal pair. (n=1)

**Types.**— *Holotype* ♂: Islamorada (1 mi. [1.6km] SW), Upper Matecumbe Key, Monroe Co., Florida, 23 Jun 1974, J. B. Heppner (FSCA) [indicated on map Fig. 24 as symbol ▲]. *Allotype* ♀: No Name Key, Monroe Co., Florida, 20 Jun 1974, J. B. Heppner (FSCA).

*Paratypes* (156♂, 130♀): FLORIDA.— *DADE Co.*: *Florida City*, 17 May 1980 (10♂, 2♀), T. S. Dickel (TSD). *Navy Wells*, 17 Nov 1980 (10♂, 2♀), T. S. Dickel (TSD); 18 Nov 1988 (2♂), H. D. Baggett (FSCA). *Paradise Key* [Royal Palm Hammock, Everglades Natl. Pk.], Mar 23, 1954 (1♀), H. E. Evans (AMNH). *MONROE Co.*: *Bahia Honda S. P.*, 3 Mar 1989 (1♀), 12 Mar 1989 (1♀), 23 Mar 1990 (1♀), 30 Nov 1988 (1♂, 1♀), T. S. Dickel (TSD). *Big Pine Key*, 3 Mar 1992 (8♀), D. Matthews, D. H. Habeck & J. Gillmore (UF); 27 Mar 1976 (1♂), E. C. Knudson (ECK); 4-9 Apr 1951 (1♀), L. J. Sanford (AMNH); 3 May 1983 (4♂), J. B. Heppner (FSCA); 19 Jun 1973 (1♂), J. A. Powell (UCB); 26 Nov 1976 (12♂, 4♀), D. C. Ferguson (USNM); 25 Dec 1987 (3♂, 5♀), L. C. Dow (LCD). *Big Torch Key*, 3 Sep 1972 (2♂, 1♀), J. B. Heppner (FSCA). *Islamorada* (1 mi. [1.6km] SW), Upper Matecumbe Key, 27 Apr 1975 (2♀), 18 Jun 1974 (1♀), 21 Jun 1974 (3♀), 21 Jun 1989 (1♀), J. B. Heppner (FSCA). *Key Largo*, 7 Jan 1992 (3♂, 1♀), 9 Jan 1992 (3♀), 21 Jan 1990 (2♀), 25 Jan 1992 (7♂, 1♀), 27 Jan 1990 (1♀), 30 Jan 1992 (1♀), 3 Feb 1992 (1♀), 8 Feb 1992 (2♀), 28 Feb 1992 (1♀), 6 Mar 1990 (2♀), 6 May 1983 (1♀), 11 Nov 1983 (2♀), 21 Nov 1992 (1♀), 30 Dec 1991 (1♀), T. S. Dickel (TSD); 15 Jan 1966 (1♂), 18 Feb 1966 (1♂), 25 Mar 1968 (1♂), 25 May 1966 (1♂), 10 Sep 1977 (1♂), 18 Sep 1968 (1♂), 22 Sep 1968 (1♀), 25 Oct 1965 (2♂), 26 Oct 1968 (1♀), 1 Nov 1965 (1♂), 16 Nov 1965 (1♀), S. Kemp (FSCA); 17 Jan 1967 (1♂), 27 Feb 1966 (1♂), 28 Aug 1965 (1♂), 1 Sep 1965 (1♀), 8 Sep 1968 (1♀), 22 Sep 1968 (1♂), S. Kemp (UCB); 17 Feb 1966 (1♂), 8 Mar 1972 (2♀), 8 Apr 1972 (1♂), 14 Jun 1971 (1♂), 15 Jun 1971 (1♀), 20 Jun 1971 (2♂), 1 Aug 1971 (1♂), 6 Sep 1972 (1♀), 13 Nov 1971 (1♂), S. Kemp (AMNH); 11 Mar 1986 (31♂, 20♀), 29 Mar 1986 (7♂), 24 May 1986 (7♂, 4♀), 30 Aug 1986 (1♂, 4♀), 21 Nov 1987 (2♂), L. C. Dow (LCD); 29 Mar 1986 (3♂, 3♀), 30 Mar 1986 (1♂), 30 Dec 1981 (1♀), H. D. Baggett (FSCA); 22 Apr 1972 (1♂), E. C. Knudson (ECK); 18 Jun 1973 (2♀), J. B. Heppner & J. A. Powell (UCB); 7 Dec



Fig. 24. Distribution map of *E. kimballi* n. sp.

1966 (4♂, 1♀), R. E. Woodruff (FSCA). *Long Key*, 3 Jan 1985 (1♂), 3 Mar 1984 (1♀), 24 Mar 1984 (1♂), 19 May 1984 (1♀), 15 Dec 1984 (2♂, 1♀), T. S. Dickel (TSD); 31 Mar 1984 (1♂, 1♀), H. D. Baggett (FSCA). *No Name Key*, 19 Feb 1992 (1♂, 6♀), 23 Nov 1991 (1♀), T. S. Dickel (TSD); 31 Mar 1984 (1♀), 31 Mar 1986 (2♀), 1 Apr 1984 (3♂, 2♀), 30 Dec 1981 (1♀), H. D. Baggett (FSCA); 25 May 1986 (1♂, 3♀), L. C. Dow (LCD); 20 Jun 1974 (4♂, 12♀), J. B. Heppner (FSCA); 30 Dec 1972 (3♂, 1♀), H. R. Dodge (FSCA). *Plantation Key*, 8 Apr 1966 (1♂), [coll.?] (FSCA). *Stock Id.*, 13 Feb 1963 (1♂), F. A. Buchanan (FSCA). *Tavernier* (2 mi. NE), Key Largo, 20 Jun 1973 (1♂, 1♀), J. A. Powell & J. B. Heppner (UCB); 19 Sep 1955 (1♀), J. N. Todd (FSCA); 24 Oct 1955 (1♂), J. N. Todd (UCB). *Windley Key*, 16 Apr 1982 (2♂), 11 Jun 1982 (1♂), T. S. Dickel (TSD).

**Distribution** (Fig. 24).— Subtropical south Florida, from south of Miami to the Keys. Apparently a Florida endemic.

**Flight Period.**— Successive generations; records for all months of the year.

**Hosts.**— Unknown. Although this species is abundant in the Florida Keys, it has not been reared.

**Remarks.**— It is remarkable that specimens of this species were not available for Heinrich (1926) to describe, since it is the most common *Episimus* in the Florida Keys. It does not appear to be a more recent introduction, since no other species in the genus are like it in the Neotropics, yet the oldest record for it dates from 1951. The reddish coloration, together with the large cream-white areas, serve to distinguish this species. Females generally do not show the reddish costal margin mark and tend to have less white on the forewings, although clearly still more than evident in such similar species as *E. nesiotus*. However, there are some females of *E. kimballi* that are more extensively dark reddish-brown.

The species is named in honor of the late C. P. Kimball, who made so many contributions to the study of Lepidoptera in Florida.

***Episimus burserae* Heppner, new sp.**

(Fig. 13-14, 25, 52-55)

**Diagnosis.**— The reddish-brown coloration, along with the angular forewing mark on the dorsal margin, will distinguish this species.

**Description.**— Forewing length: 5.0-7.1mm ♂, 6.3-7.7mm ♀.

**MALE** (Fig. 13).— Head tan with red-brown on vertex; labial palpus red-brown, with tan apical segment; antenna tan; thorax cream-white with red-brown on anterior margin; legs tan, with fuscous marks on

tibiae and tarsal segments (hind legs all tan). Forewing red-brown (occasionally darker red-brown), with fuscous mark near base; large-cream-white field on dorsal half from base to 2/3 and with borders midwing gradually merging to red-brown areas; dorsal margin with large red-brown mark before midwing (appears angled and truncated; sometimes darker-brown in color); costal margin with dark red-brown marks interspersed with tan and silver marks angled to tornus; termen with central silver mark distad of red-brown streaks on cream-white field; fringe light red-brown; venter fuscous with tan near base. Hindwing fuscous; fringe tan.

Male genitalia (Fig. 52-53): tegumen with gradual angle at socius; uncus short; socius large and convex; valva long and very narrow, with only slight bending about 2/3 toward apex; saccular projection short and rounded; aedeagus normal; cornuti numerous. (n=6)

FEMALE (Fig. 14).— Similar to male but less cream-white evident, being more suffused with red-brown scales. (n=2)

Female genitalia (Fig. 54-55): apophyses short; sterigma subquadratic and 3-lobed; ostium bursae rounded; antrum simple; ductus bursae short; ductus seminalis at bursa junction; corpus bursae very large and rounded; signa pair normal.

**Types.**— *Holotype* ♂: No Name Key, Monroe Co., Florida, 20 Jun 1974, J. B. Heppner (FSCA) (JBH slide 1715) [indicated on map Fig. 25 as symbol ▲]. *Allotype* ♀: Key Largo (10 mi. [16km] NE), 17 Jan 1974, J. B. Heppner (FSCA) (JBH slide 1716).

*Paratypes* (23♂, 7♀): **FLORIDA**.— **COLLIER Co.:** *Chokoloskee*, [1912?] (1♂, 1♀), [J. H. McDunnough?] (USNM). **LEE Co.:** *Sanibel Id.*, 29 Jun 1984 (1♂), H. D. Baggett (FSCA). **MONROE Co.:** *Bahia Honda S. P.*, 17 Jan 1990 (1♀), 29 Mar 1990 (1♀), T. S. Dickel (TSD). **Big Pine Key**, 24 Mar 1945 (1♂), ex *Bursera simaruba*, [coll.?] (USNM). **Key Largo**, 6 Jan 1969 (1♂), 24 Feb 1972 (1♀), S. Kemp (AMNH); (10 mi. NE) 17 Jan 1974 (8♂, 2♀), J. B. Heppner (FSCA); 15 Apr 1966 (1♂), C. V. Covell, Jr. (UCB). **Key West**, [no date] (1♂), Fernald Coll. (USNM). **No Name Key**, 20 Jun 1974 (4♂), J. B. Heppner (FSCA, 3♂; UCB, 1♂). **Plantation Key**, 27 Nov 1955 (1♀), H. A. Denmark (FSCA). **Tavernier** (2 mi. [3.2km] NE), [Key Largo], 20 Jun 1973 (1♂), J. B. Heppner & J. A. Powell (UCB). **Windley Key**, 16 Apr 1982 (1♂), 11 Jun 1982 (1♂), 18 Aug 1982 (2♂), T. S. Dickel (TSD).

**Distribution** (Fig. 25).— Known only from southern Florida, in

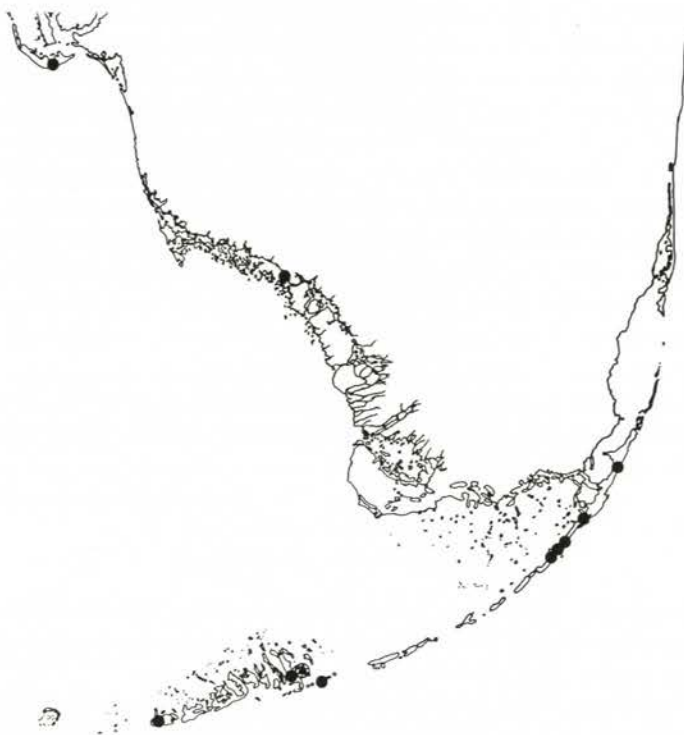


Fig. 25. Distribution map of *E. burserae* n. sp.

coastal areas, mainly in the Keys.

**Flight Period.**— Records are for Jan-Apr, Jun, Aug, and Nov, but probably with successive generations.

**Hosts.**— Rearings have been made from larvae found on gumbo-limbo, *Bursera simaruba* (Burseraceae). Only one rearing has been made in 1945, and more are needed to verify this record, but from the range of hosts for other *Episimus* species this record is likely valid.

**Remarks.**— This species generally is reddish in coloration, with the large forewing cream-white area not as distinctly demarcated from the reddish areas as in *E. kimballi*. The red form is generally more common, but many specimens can be found where the reddish markings are more brown in coloration.

This species is named after the hostplant, *Bursera simaruba*.

### *Episimus augmentanus* (Zeller)

(Fig. 15-16, 26, 56-59)

*Grapholitha (Hedya) augmentana* Zeller, 1877:160.

*Episimus augmentanus*.— Kimball, 1965:255, missp.

**Diagnosis.**— This mainly West Indian species is distinguished by its ochreous head vertex and the dark reddish-brown forewing markings, including a half-circular dorsal margin mark.

Forewing length: 5.5-6.8mm ♂, 6.8-7.3mm ♀. Head light tan to ochreous, with tan frons; labial palpus purple-brown laterally; tan and cream white dorsally and mesally; antenna tan. Thorax tan and cream-white, with fuscous and purple on anterior margin; venter shining white; legs tan, with some fuscous on tarsi and tibiae. Forewing (Fig. 15-16) like *E. transferranus*, with basal 2/3 cream-white, with gray-brown irregular markings to midwing, with large half-circular brown to purple-brown mark on dorsal margin; remainder of wing tan-brown with chocolate-brown overlaid scales to costal margin at 2/3, and large lead-gray mark at tornus; costal margin with numerous tan and silvery-gray marks angled toward tornus; termen with silvery subterminal line before few black spots; fringe ochreous and silver near apex, light tan at tornus; venter shining light-gray and tan. Hindwing light fuscous; fringe shining gray; venter shining light gray and tan. Male and females similar, with females usually having more purple-brown scales on costal half of forewing.

Male genitalia (Fig. 56-57): tegumen angulate at socius level; uncus short; socius relatively small, convex; valva large, somewhat abruptly angled toward apex and slightly wider at bend than remainder of valva; saccular projection short, triangular; aedeagus normal; cornuti numerous (absent in Fig. 57). (n=4)

Female genitalia (Fig. 58-59): apophyses long; sterigma wide and 3-lobed; ostium bursae quadrate; antrum simple; ductus bursae short; ductus seminalis normal; corpus bursae large and ovate; signa normal pair. (n=2)

**Types.**— *Holotype* ♂: Cuba, [1876?], (Staudinger Coll.) (ZMHU) [holotype by monotypy].

**Distribution** (Fig. 26).— This species occurs in Cuba and in subtropical south Florida, from the Miami area to the Florida Keys. Its further distribution in the West Indies is not known. See Appendix for specimen data.

**Flight Period.**— Successive generations throughout the year; records are for every month of the year.

**Hosts.**— Records include a rearing on *Metopium toxiferum* (Anacardiaceae), reported on by Dyar (1901), and more recently rearings by D. H. Habeck (see Appendix). It has been recorded on *Spondias* sp. (Anacardiaceae) in Cuba.



Fig. 26. Distribution map of *E. augmentanus*.

**Remarks.**— This species resembles the closely related *E. transferranus*, but is easily distinguished by the tan head vertex versus the dark-fuscous head vertex of *E. transferranus*; rarely, some *E. augmentanus* are found with a darker head vertex but this will only be brown instead of tan and not dark fuscous. The forewings also lack the distinct median vertical silvery-gray striae of *E. transferranus*. Differences with *E. burserae* include having the forewing dorsal margin mark more rounded and larger.

***Episimus transferranus* (Walker)**

(Fig. 17-18, 27, 60-63)

*Carpocapsa transferrana* Walker, 1863:398.

*Episimus augmentus* [sic].— Cassani *et al.*, 1989, misid. (not Zeller, 1877)

**Diagnosis.**— Distinctive features of this species include the dark brown or fuscous head vertex, concolorous with the half-circular forewing dorsal margin mark, and in the silvery-gray vertical irrorations in the whitish areas of the forewing.

Forewing length: 5.4-7.0mm ♂, 6.0-7.1mm ♀. Head tan, with fuscous vertex; frons tan; labial palpus tan with fuscous towards base; antenna tan, fuscous towards base; thorax tan, with fuscous near neck and front of tegulae; legs tan, with fuscous rings on tibiae and tarsal segments. Forewing (Fig. 17-18) tan, irrorated with silver-gray striae midwing to 2/3; dorsal margin with large brown-black half circle just before midwing; terminal quarter with large band of silvery-gray or fuscous mesad of tan area and interspersed with dark brown rays to buff-brown terminal marks; apex with silver-gray line from apical 1/3 to below apex. Male and female similar in maculation.

Male genitalia (Fig. 60-61): tegumen rounded toward short uncus; socius large and convex; valva very long and narrow, with sacculus projection short and rounded; aedeagus normal; cornuti numerous (absent in Fig. 61). (n=3)

Female genitalia (Fig. 62-63): apophyses long; sterigma rounded; ostium bursae round; antrum simple; ductus bursae short; ductus seminalis normal; corpus bursae large and ovate; signa normal pair. (n=2)

**Types.**— *Holotype* ♂: Ega, [Amazonas], Brazil, [1860?], [H. W. Bates] (BMNH) [Holotype by monotypy].

**Distribution** (Fig. 27).— This species has a circum-Caribbean distribution, from Mexico to Venezuela, and south to Brazil (Amazonas). It occurs in the United States only in southern Florida and Texas. In Florida, it may be a recent introduction, since there are no records from the Keys, and all specimens are recent examples (post-1983) from the Gulf Coast and from the Atlantic Coast as far north as Brevard Co. The Texas record may represent a stray from Mexico. See Appendix for specimen data.



Fig. 27. Distribution map of *E. transferranus*.

**Flight Period.**— USA records are for Jan-Jun, and Sep to Dec.

**Hosts.**— Brazilian pepper, *Schinus terebinthifolius* (Anacardiaceae), as recorded from recent rearings in Florida by D. H. Habeck (reported by Cassani *et al.* (1989) under the name *E. augmentus* [sic]). This is the first report of an *Episimus* on *Schinus* other than *E. utilis* (from Brazil and Hawaii). Larval feeding in Florida includes host leaves, as well as berries (Habeck, pers. comm.).

**Remarks.**— This species is very similar to *E. augmentanus* but has the head vertex dark fuscous, rather than tan. The forewings usually have the dorsal margin mark more brown than reddish, and also have prominent silvery-gray striae, which are lacking or reduced in *E. augmentanus*. Most specimens of *E. transferranus* also appear lighter overall due to the extent of whitish areas on the forewings. Walsingham (1892) described a variety of *E. transferranus* from St. Vincent, as *E. transferranus vincentanus*, but further study is needed to verify the status of this population.

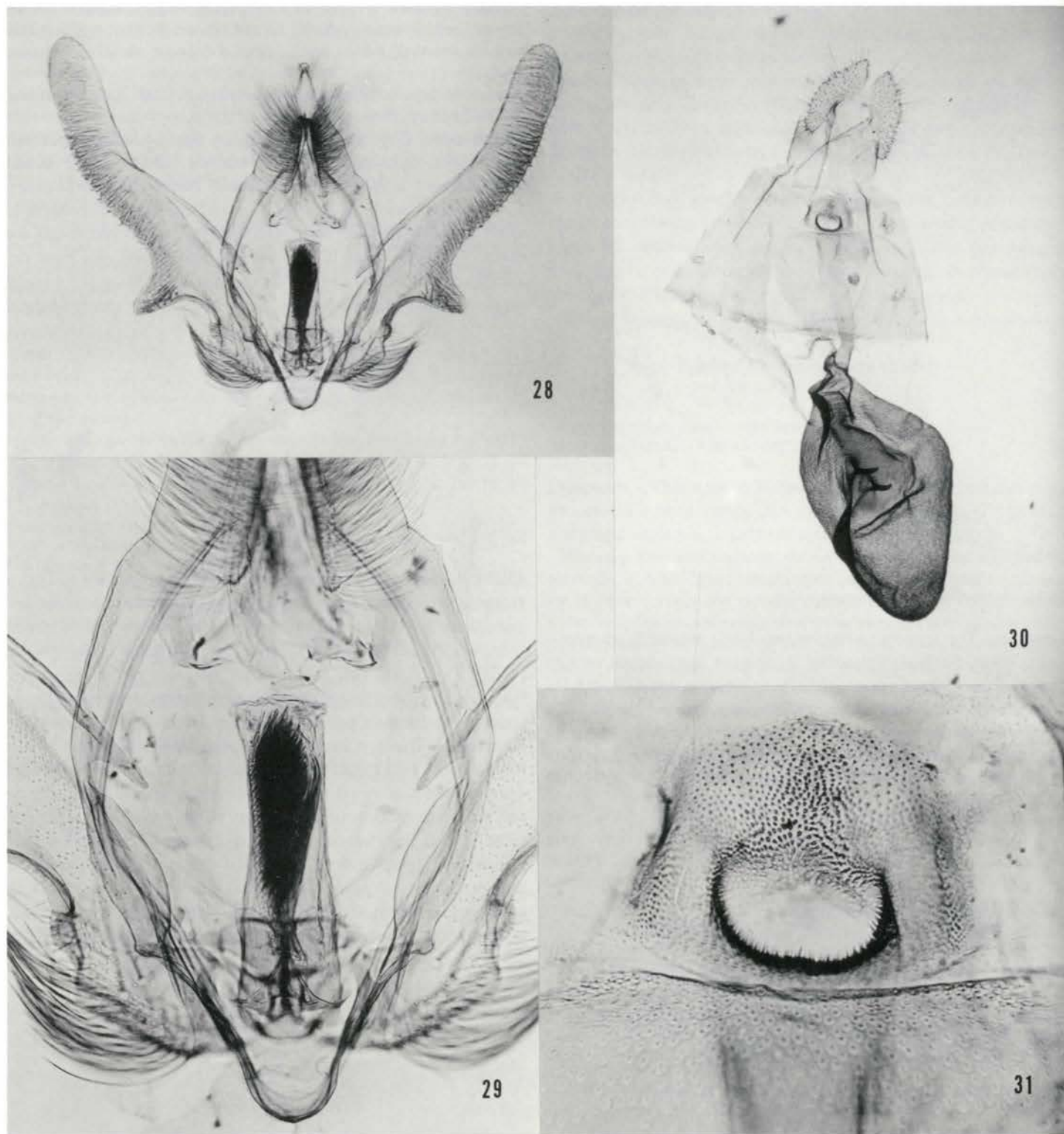


Fig. 28-31. Genitalia of *E. tyrius*: 28) ♂ syntype, Westbury, Queens Co., NY (JBH 1501/USNM 77833); 29) same (detail); 30) ♀ syntype, same locality (JBH 1502/USNM 77834); 31) same (ostium detail).

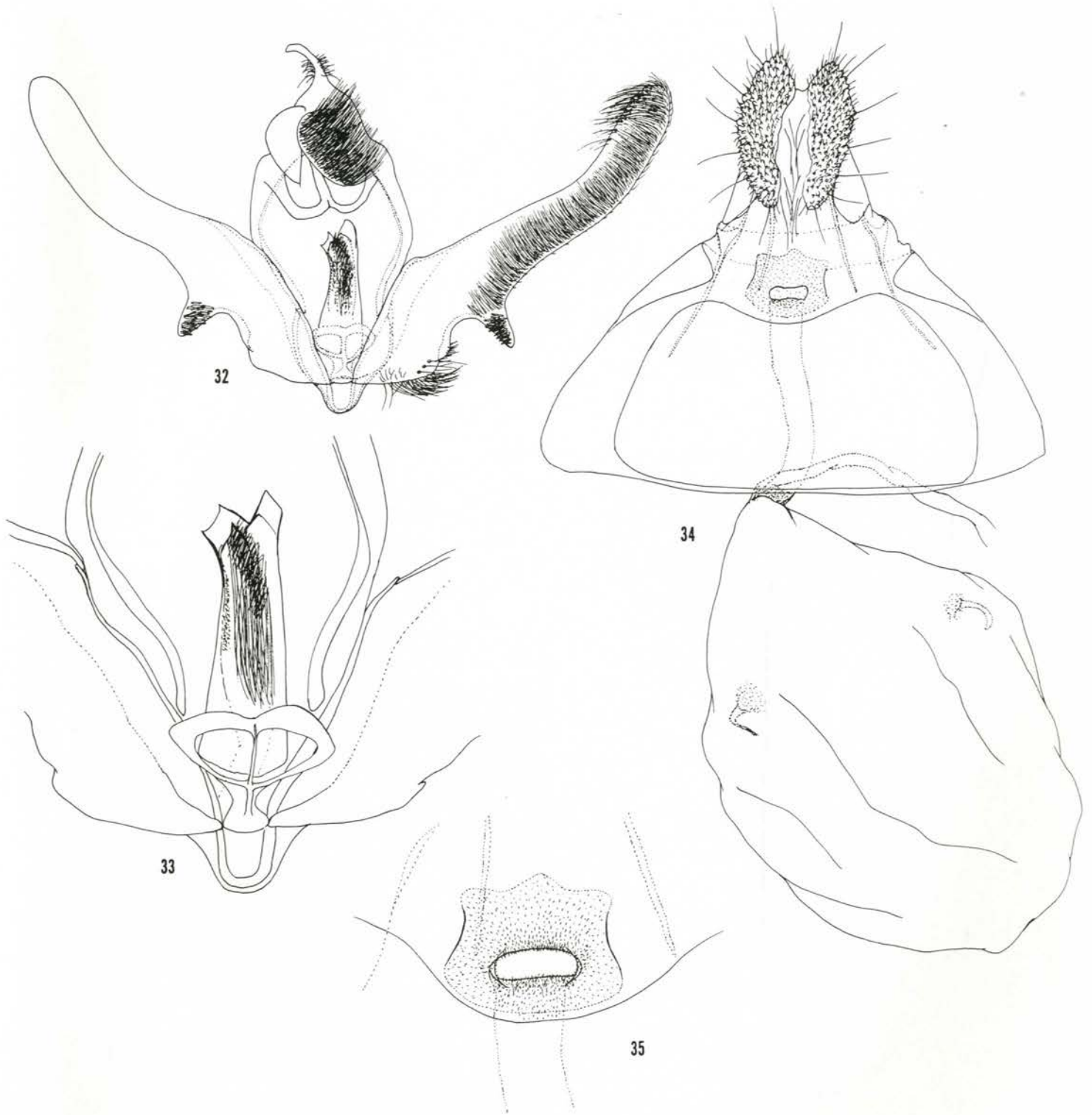


Fig. 32-35. Genitalia of *E. lagunculariae* n. sp.: 32) ♂ holotype, Terra Ceia, Pinellas Co., FL (JBH 2008); 33) same (detail); 34) ♀ allotype, same locality (JBH 2009); 35) same (ostium detail).

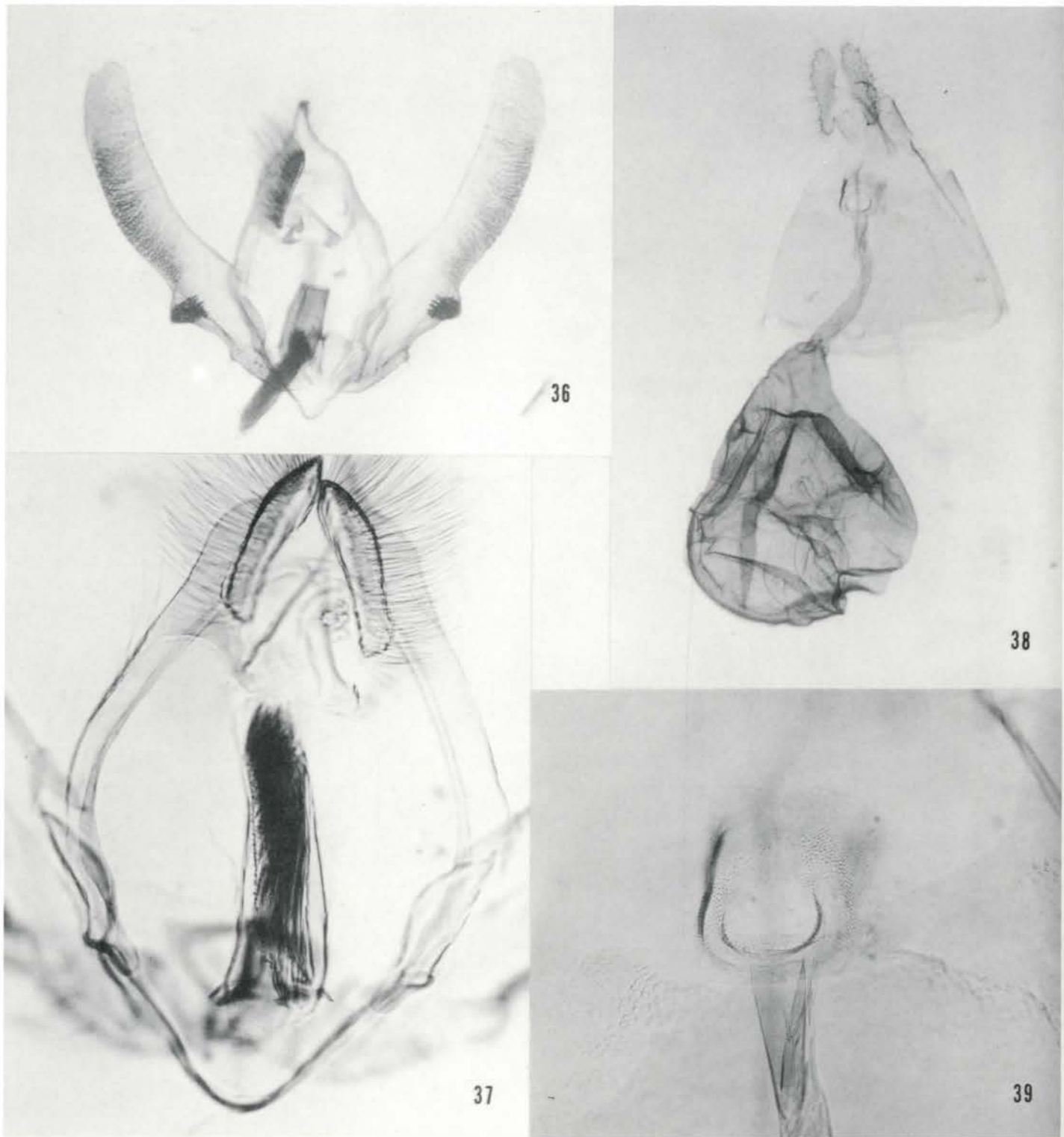


Fig. 36-39. Genitalia of *E. argutatus*: 36) ♂, Geneva, Ontario Co., NY (USNM 77868) [right socius damaged]; 37) Ithaca, Tompkins Co., NY (detail) (USNM 77933); 38) ♀, Gainesville, Alachua Co., FL (JBH 1565); 39) same (ostium detail).

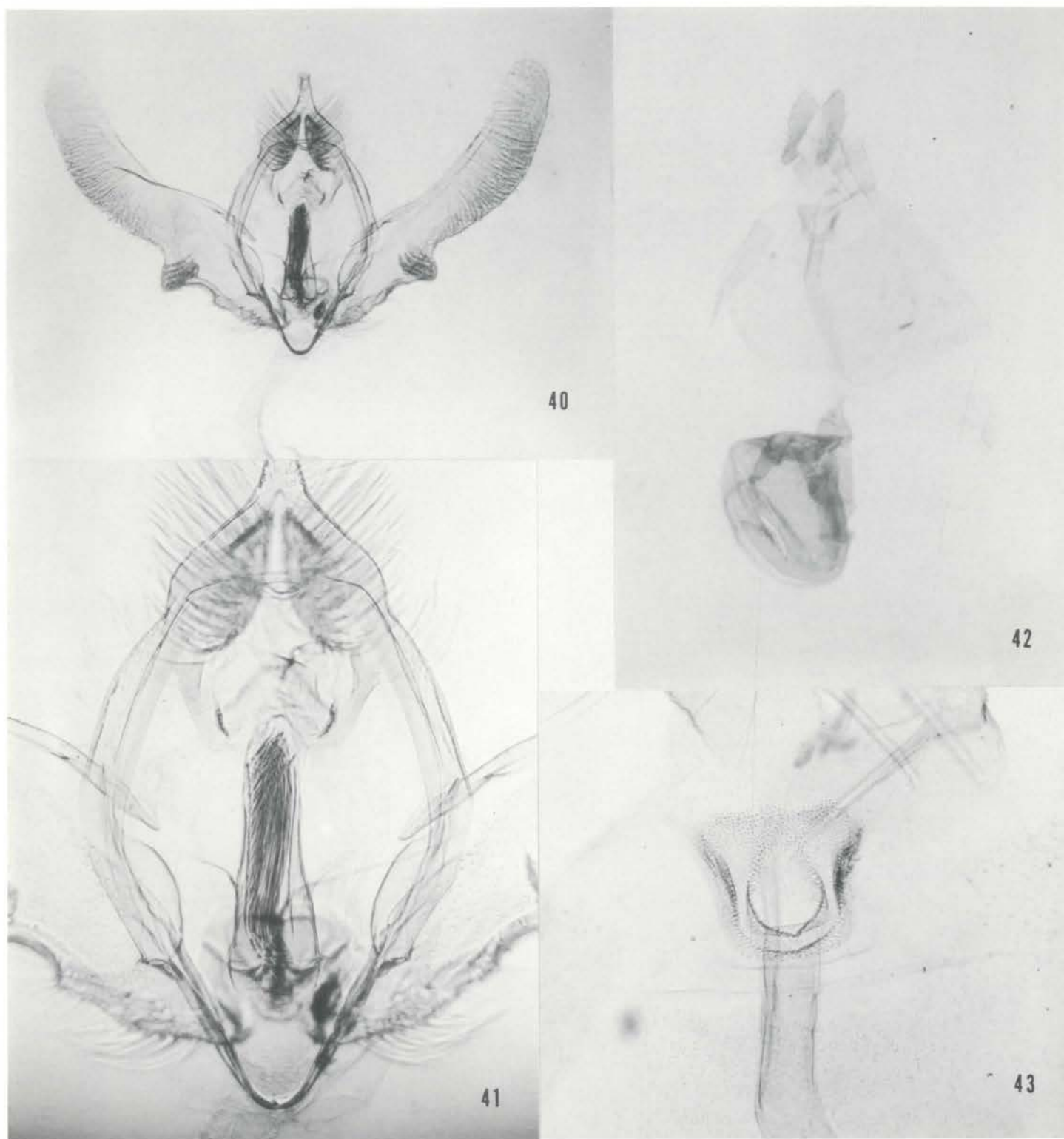


Fig. 40-43. Genitalia of *E. guiana*: 40) ♂, Tavernier, Key Largo, Monroe Co., FL (JBH 1506; 41) same (detail); 42) ♀, same locality (JBH 1563); 43) same (ostium detail).

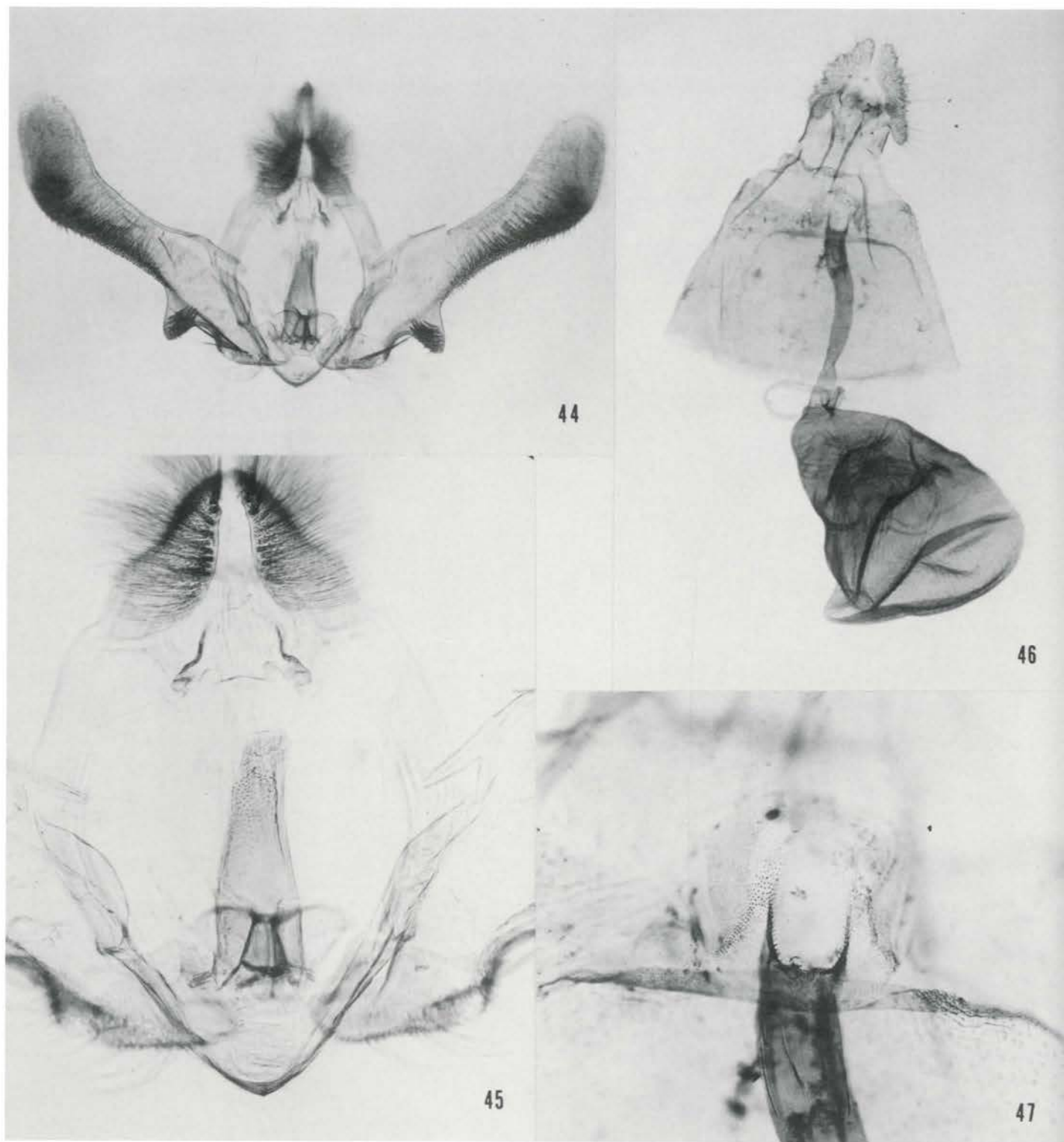


Fig. 44-47. Genitalia of *E. nesiotus*: 44) ♂, Siesta Key, Sarasota Co., FL (JBH 1664); 45) same (detail) [cornuti shed]; 46) ♀, same locality (JBH 1684); 47) same (ostium detail).



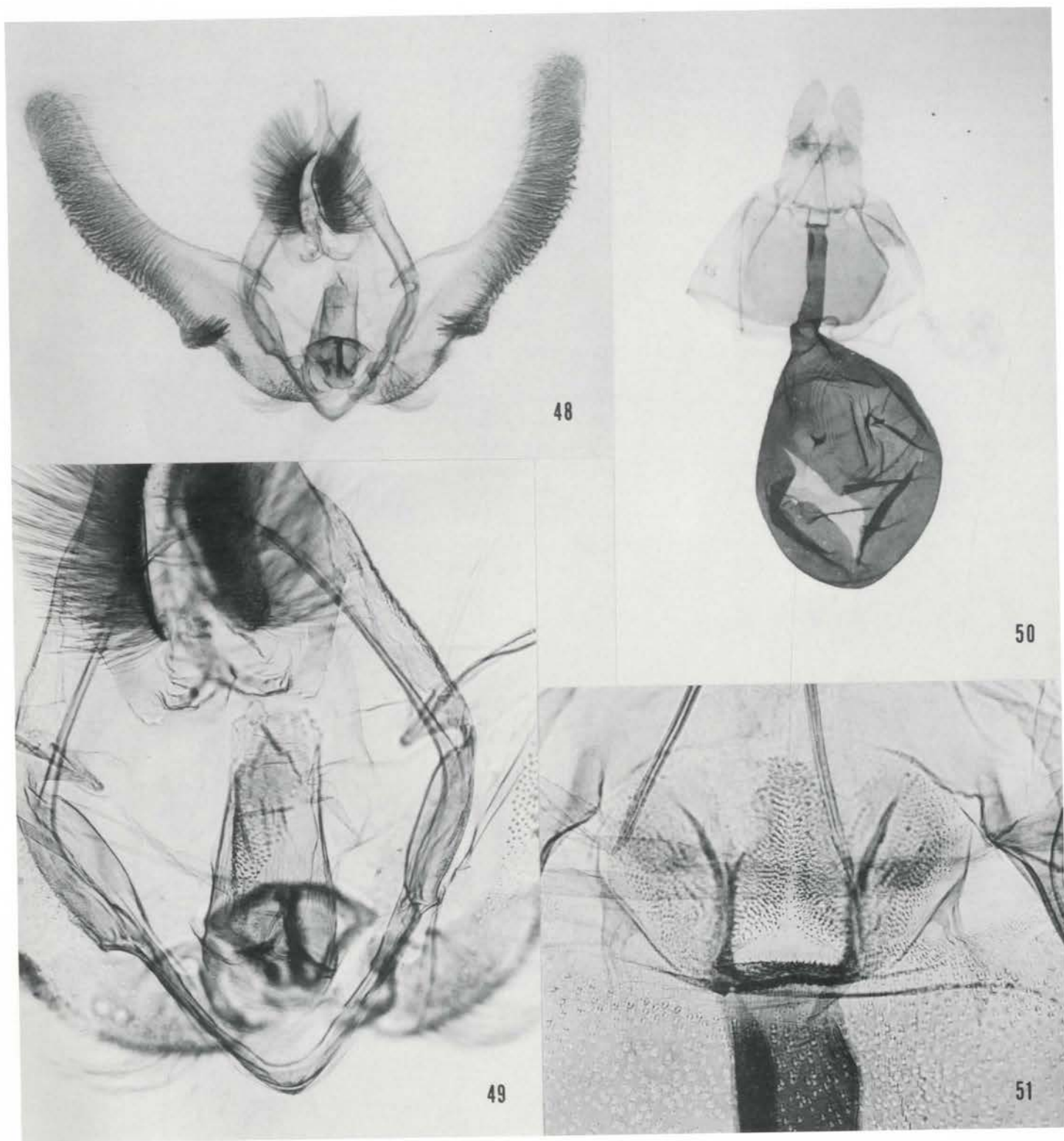


Fig. 48-51. Genitalia of *E. kimballi* n. sp.: 48) ♂ holotype, Islamorada, Monroe Co., FL (JBH 1717); 49) same (detail) [cornuti shed]; 50) ♀ allotype, No Name Key (JBH 1504); 51) same (ostium detail).

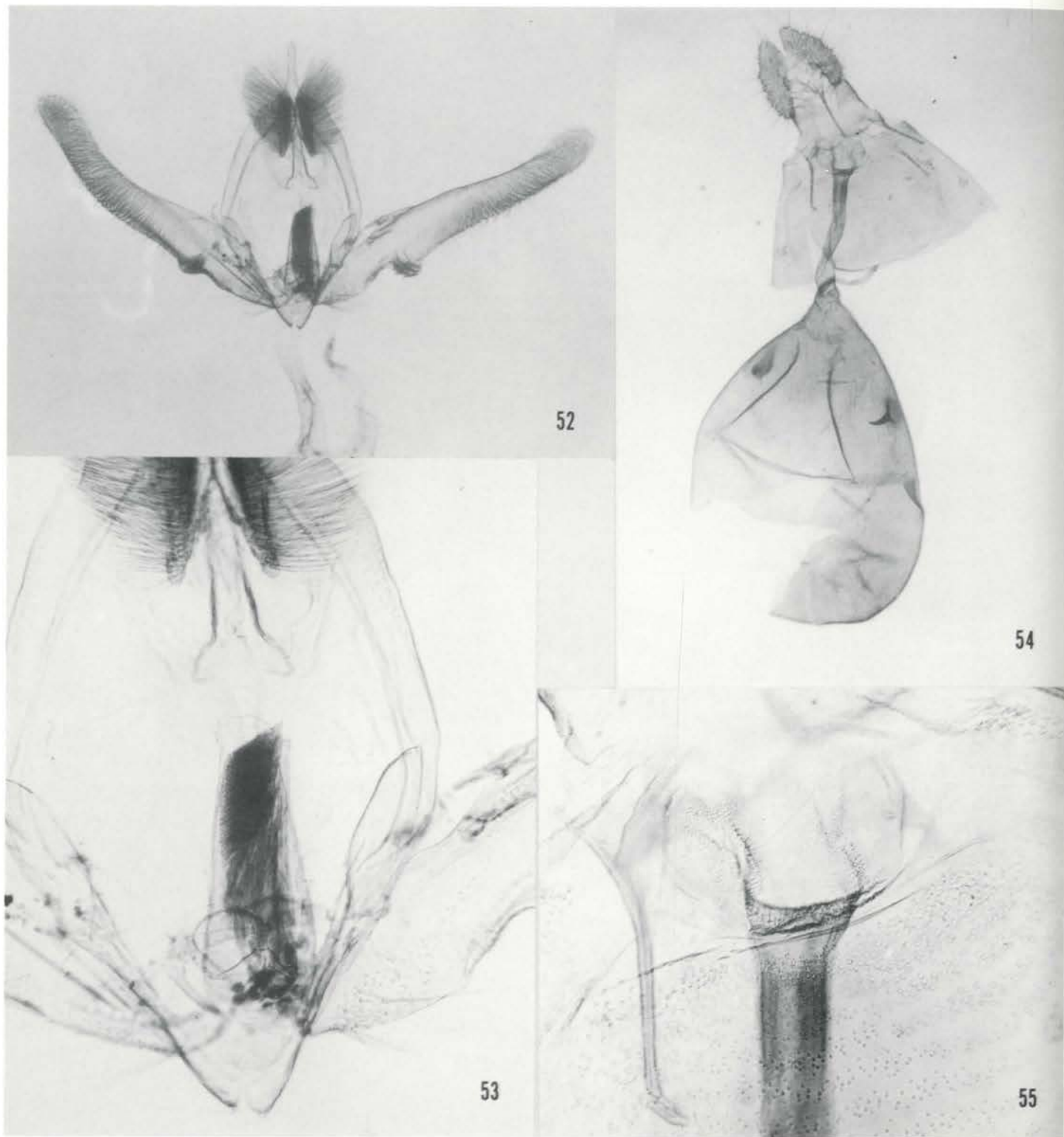


Fig. 52-55. Genitalia of *E. burserae* n. sp.: 52) ♂ holotype, No Name Key, Monroe Co., FL (JBH 1715); 53) same (detail); 54) ♀ allotype, Key Largo, Monroe Co., FL (JBH 1716); 55) same (ostium detail).

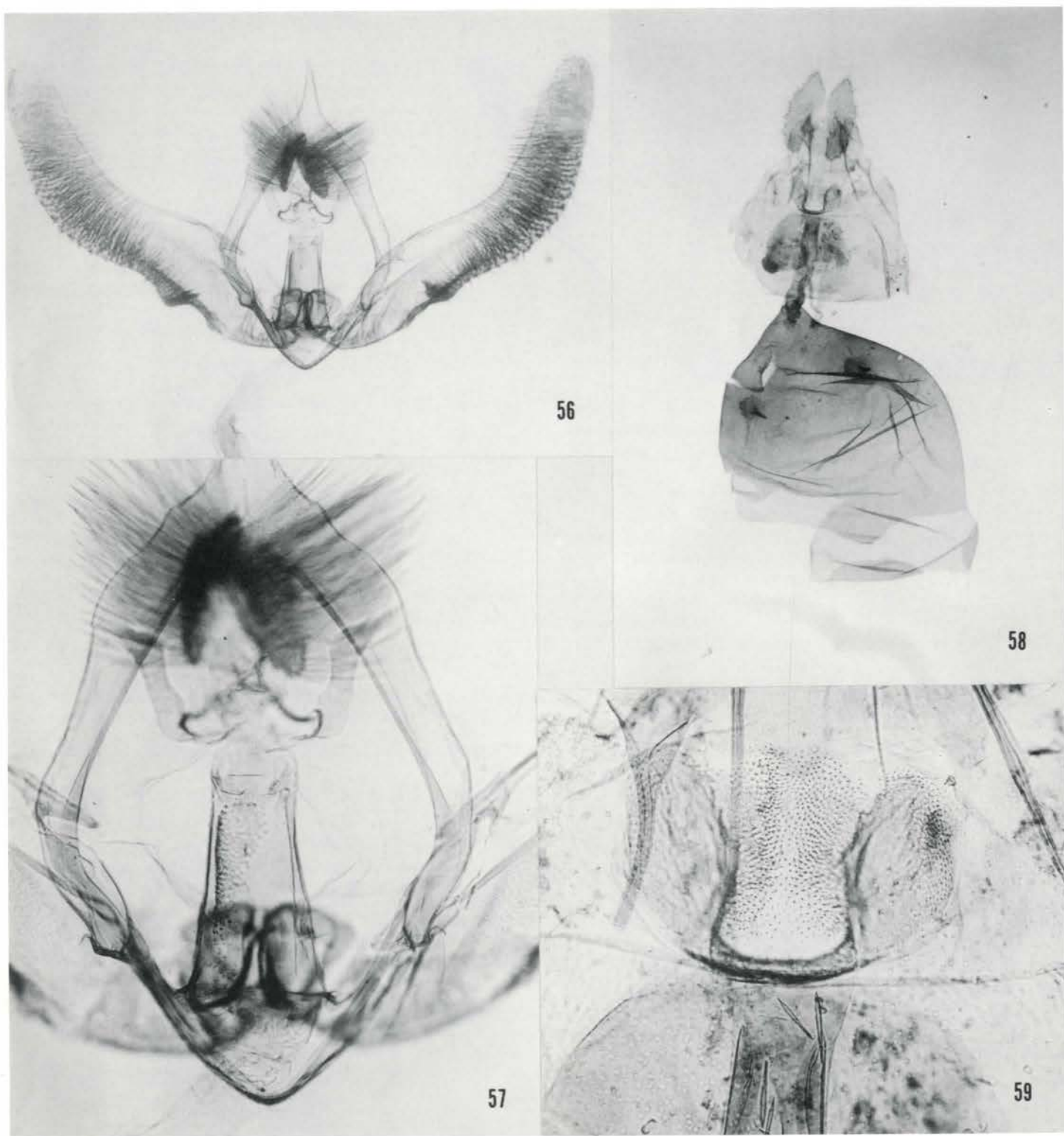


Fig. 56-59. Genitalia of *E. augmentanus*: 56) ♂, Big Pine Key, Monroe Co., FL (JBH 1714); 57) same (detail) [cornuti shed]; 58) ♀, Key Largo, Monroe Co., FL (JBH 1505); 59) same (ostium detail).

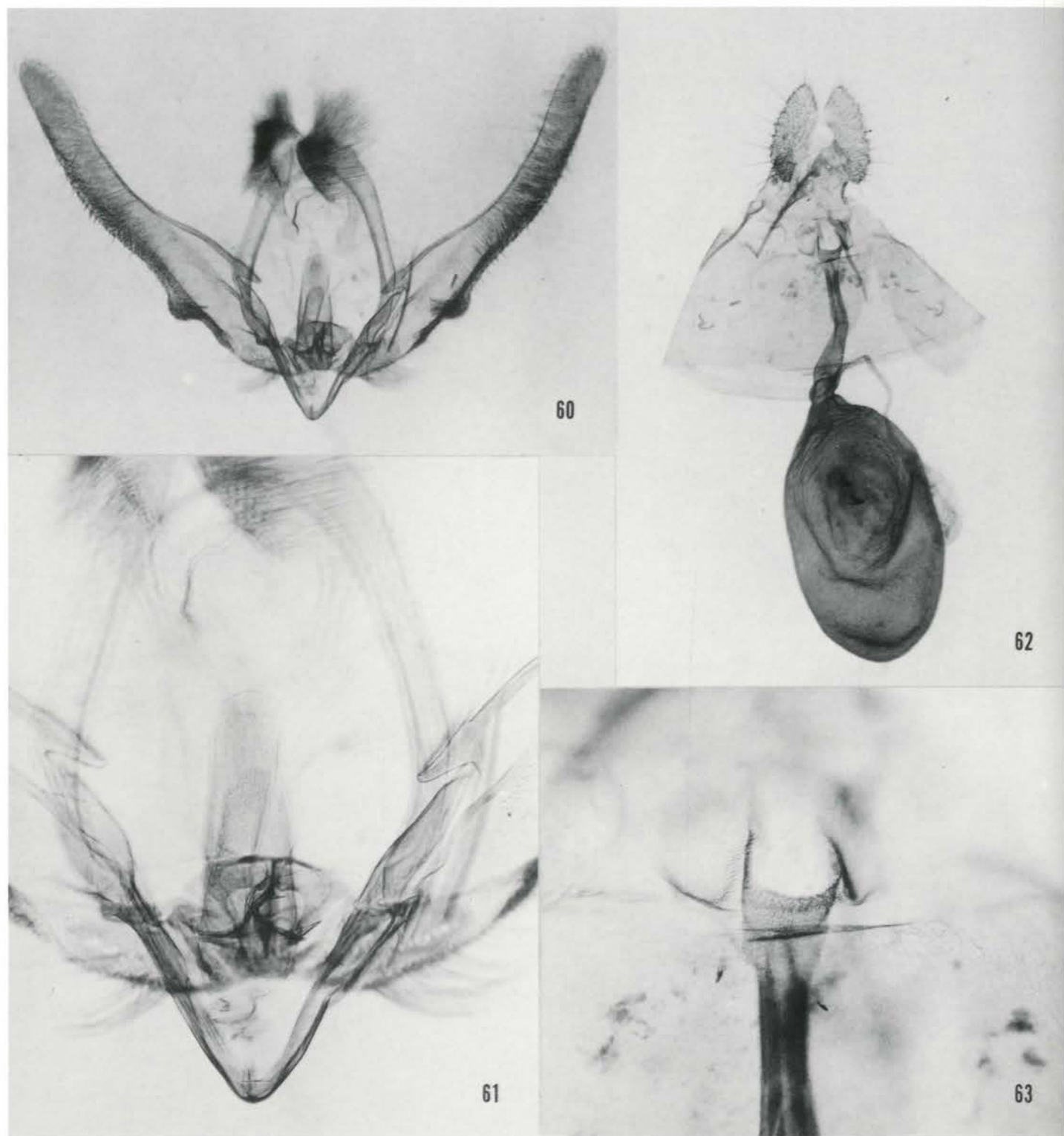


Fig. 60-63. Genitalia of *E. transferranus*: 60) ♂, Rancho Grande, Edo. Aragua, Venezuela (JBH 1648); 61) same (detail) [cornuti shed]; 62) ♀, same locality (JBH 1651); 63) same (ostium detail).

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AEB	A. E. Brower, Augusta, ME (records from Brower, 1983)
AMNH	American Museum of Natural History, New York, NY
ANSP	Academy of Natural Sciences, Philadelphia, PA
BM	Bryant Mather, Clinton, MS
BMNH	British Museum (Natural History), London, England (now popularly called The Natural History Museum)
CNC	Canadian National Collection, Ottawa, ON, Canada
CU	Cornell University, Ithaca, NY
DEI	Deutsches Entomologisches Institut, Eberswalde, Germany
DJW	Donald J. Wright, Cincinnati, OH
DPI	Division of Plant Industry (see FSCA)
ECK	Ed C. Knudson, Houston, TX
EHM	Eric H. Metzler, Columbus, OH
FSCA	Florida State Collection of Arthropods, DPI, FDACS, Gainesville, FL
INHS	Illinois Natural History Survey, Champaign, IL
JSK	John S. Kutis, Belleview, FL
LCD	Linwood S. Dow, Dunedin, FL
MCZ	Museum of Comparative Zoology, Harvard University, Cambridge, MA
MEM	Mississippi Entomological Museum, Mississippi State, MS
NSM	Nova Scotia Museum, Halifax, Nova Scotia, Canada
RG	Rick Gillmore, Lake Havasu City, AZ
SP	Steven Passoa, Reynoldsburg, OH
TSD	Terhune S. Dickel, Homestead, FL
UCB	Essig Museum of Entomology, University of California, Berkeley, CA
UD	University of Delaware, Newark, DE
UF	University of Florida, Gainesville, FL (D. H. Habeck coll.)
UMi	University of Michigan, Ann Arbor, MI
UMn	University of Minnesota, St. Paul, MN
USDA	U. S. Dept. Agric., APHIS, Reynoldsburg, OH
USNM	U. S. National Museum, Smithsonian Institution, Washington, DC
ZMHU	Zoologisches Museum, Humboldt Univ., Berlin, Germany

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## ABBREVIATIONS

Biol. Sta.	- Biological Station	Jct	- Junction
Co.	- County	Lk.	- Lake
Coll.	- Collection	Natl. For.	- National Forest
coll.	- collector	Natl. Pres.	- National Preserve
Co. Pk.	- County Park	N. P.	- National Park
Cpgd.	- Campground	nr.	- near
Cr.	- Creek	NWR	- National Wildlife Refuge
Cyn.	- Canyon	Par.	- Parish
em.	- emerged	R.	- River
ex	- from	Ref.	- Refuge
Exp. Sta.	- Experiment Station	Res.	- Reserve
For. Sta.	- Forest Station	Res. Sta.	- Research Station
Hwy	- Highway	St. For.	- State Forest
I-	- Interstate [hwy]	S. P.	- State Park
Id.	- Island	WMA	- Wildlife Management Area

## APPENDIX: LOCALITY DATA

*Episimus tyrius* Heinrich

**FLORIDA**—*ALACHUA Co.*: Gainesville, 20 Apr 1982 (1), 20 May 1982 (1), S. Passoa (SP); 26 Apr 1925 (1♂), D. M. Bates (USNM); 12 May 1976 (1♂), 21 May 1973 (1♀) ex *Prunus caroliniana* (em. 11 Jun 1973), J. B. Heppner (FSCA); 16 May 1974 (3♂, 2♀), ex red maple [*Acer rubrum*], D. Mays (FSCA); 16 Aug 1980 (1♂), ex *Prunus caroliniana*, E. Menezes (USNM); 3 Sep 1947 (2♂), A. N. Tissot (FSCA). [*Micanopy*] (Edgecliff), 1 Apr 1990 (1♂), ex *Acer rubrum* (A-5464b, em. 23 Apr 1990), D. H. Habeck (UF). *ESCAMBIA Co.*: Pensacola, 7 Jul 1961 (1♀), S. Hills (USNM). *FLAGLER Co.*: Crescent Lake, 20 May 1990 (1♂), H. D. Baggett (FSCA). *HIGHLANDS Co.*: Avon Park, 10 Dec 1991 (1♂, 1♀), ex *Gordonia lasianthus*, K. Hibbard (FSCA). *Lake Placid*, 30 Apr 1964 (1♀), R. W. Hodges (USNM). *Archbold Biol. Sta.*, 8-15 May 1964 (1♀), R. W. Hodges (USNM). *INDIAN RIVER Co.*: Vero Beach, 15 Oct-15 Nov 1940 (1♂), J. R. Malloch (USNM). *JEFFERSON Co.*: Monticello, 27 Aug 1965 (2♂, 1♀), ex *Prunus caroliniana* (em. 10-13 Sep 1965), R. H. Miller (FSCA). *LAKE Co.*: [Astor] (Blue Cr. Lodge), 11 Apr 1990, ex *Gordonia lasianthus* (A-5478, em. 30 Apr 1990, 1♂, 2♀; 3 May 1990, 1♀), D. H. Habeck & J. Gillmore (UF). *LEON Co.*: Tall Timbers Res. Sta. (nr. Iamonia), 30 Sep 1989 (1♀), L. C. Dow (LCD); 30 Sep 1989 (1♂), H. D. Baggett (FSCA). *LEVY Co.*: Otter Creek, 17 Mar 1990 (1♂), R. Gillmore (RG). *MARION Co.*: Ft. McCoy, 18 Mar 1985, ex *Acer rubrum* (A-3697, em. 2 Apr 1985, 1♀; 6 Apr 1985, 1♂; 8 Apr, 1♀; 10 Apr 1985, 1♂; 15 Apr 1985, 1♂), M. Plagens (UF). *NASSAU Co.*: Ft. Clinch S. P., 13 Jun 1986 (1♂, 6♀), J. B. Heppner & J. A. Powell (FSCA). *ORANGE Co.*: 7 Jun 1962 (1♀), ex *Acer rubrum*, H. A. Denmark (FSCA). *Orlando*, 27 Feb 1986 (1♂, 1♀), 4 Mar 1986 (2♂, 2♀), 9 Mar 1983 (1♂), 15 Mar 1983 (1♂), 21 Mar 1986 (1♂, 3♀), 28 Apr 1984 (1♀), 22 Sep 1982 (1♀), L. C. Dow (LCD). *Rock Springs*, 29 Jul 1983 (1♀), L. C. Dow (LCD). *Winter Park*, 28 Jul 1939 (1♀), H. T. Fernald (USNM). *PINELLAS Co.*: Dunedin (Hammock Park), 22 Feb 1986 (1♂), 1 Mar 1988 (1♀), 9 Mar 1987 (2♀), 20 Apr 1986 (1♀), 23 Apr 1987 (1♀), 29 Apr 1987 (1♀), 7 Dec 1986 (1♀), L. C. Dow (LCD). *Sawgrass Lake Pk.*, 13 Jun 1986 (4♂, 1♀), L. C. Dow (LCD). *PUTNAM Co.*: Palatka, 28 Feb 1991 (1♀), 19 Mar 1991 (1♀), 24 Mar 1991 (1♂), 8 May 1990 (2♀), 28 May 1990 (1♀), H. D. Baggett (FSCA). *Welaka* (UF For. Sta.), 17-21 Mar 1985 (2♂), 9-10 Jun 1986 (1♂, 2♀), 28-31 Jul 1986 (2♂), J. B. Heppner (FSCA). *SUWANNEE Co.*: Suwannee River S. P., 21-23 May 1986 (1♂), H. D. Baggett (FSCA). *VOLUSIA Co.*: Blue Springs S. P., 10 Jun 1986 (3♀), J. B. Heppner & J. A. Powell (FSCA).

**GEORGIA**—*GLYNN Co.*: St. Simon's Id., 5 Sep 1944 (2♂), 6 Sep 1944 (1♂), 7 Sep 1944 (1♀), 9 Sep 1944 (1♀), 12 Sep 1944 (1♂, 1♀), ex *Prunus caroliniana*, [coll.?] (USNM); [no date] (1♂), (FSCA).

**LOUISIANA**—*CALCASIEU Par.*: S. H. Jones S.P., 19-23 May 1976 (2♀), R. L. Brown (MEM). *E. BATON ROUGE Par.*: Baton Rouge, 15 May 1971 (1♀), 30 May 1971 (1♀), G. Strickland (UCB); 28 Apr 1971 (1♀), G. Strickland (FSCA). *ORLEANS Par.*: New Orleans, 11 Jul 1940 (4♂, 1♀), ex cherry laurel [*Prunus laurocerasus*], [coll.?] (USNM).

**MARYLAND**—*MONTGOMERY Co.*: Silver Springs, 12 Aug 1975 (1♀), ex red maple [*Acer rubrum*], P. Bystrak (USNM).

**MISSISSIPPI**—*FRANKLIN Co.*: McGehee Cr., 29 Jun 1992 (1♀), T. Schiefer (MEM). *Porter Cr.*, 29 Jun 1992 (1♀), T. Schiefer (MEM). *HANCOCK Co.*: Bay St. Louis, 24 May 1979 (1), 1 Jun 1979 (1), 8 Jun 1979 (3), 14 Jun 1979 (1), 18 Jun 1979 (1), 7 Oct 1971 (1), 8 Oct 1971 (1), R. Kergosien (BM). *HARRISON Co.*: Biloxi, [see types]; 20 May 1972 (1), R. Kergosien (BM). *LINCOLN Co.*: Brookhaven, 2 Aug 1928 (1), ex cherry laurel [*Prunus laurocerasus*], N. D. Peets (USNM). *OKTIBBEHA Co.*: Dorman Lk., 16 Apr 1990 (1♂), P. Porter (MEM). *Starkville*, 6 mi SW, 23 Apr 1987 (1♂), 1 Jul 1986 (1♀), 16 Jul 1986 (1♂), R. L. Brown (MEM). *WARREN Co.*: Bovina, 28 Apr 1975 (1♂), B. Mather (BM).

**NEW HAMPSHIRE**—*ROCKINGHAM Co.*: Hampton, 21 Jun (1), A. E. Brower (AEB).

**NEW JERSEY**—*BURLINGTON Co.*: Wharton St. For., Godfrey Bridge Cpgd., 21-23 Jul 1976 (1♀), R. L. Brown (MEM).

**NEW YORK**—[see types].

**NORTH CAROLINA**—*CARTERET Co.*: [Beaufort, N.] (Jct. Hwy. 101/181), 8 Dec 1978 (1♀), J. B. Sullivan (FSCA).

**SOUTH CAROLINA**—*CHARLESTON Co.*: Charleston, 6 Jul 1952 (5 larvae), J. A. Berly (USNM). *McClellanville*, Wedge Plantation, 22 Nov 1967 (1♂), D. C. Ferguson (USNM). *GREENVILLE Co.*: Greenville, 3 Aug 1975 (1♀), R. S. Peigler (FSCA).

**TEXAS**—*ANDERSON Co.*: Engeling Wildlife Ref., 12 Jun 1980 (1♂), E. C. Knudson (ECK). *HARRIS Co.*: Bellaire, 18 Mar 1980 (1♀), E. C. Knudson (ECK); 20 Mar 1984 (1♂), 12 Dec 1984 (1♀), E. C. Knudson (FSCA). *MONTGOMERY Co.*: Conroe, 9 Mar 1971 (1♀), 22 Mar 1972 (1♀), A. & M. E. Blanchard (USNM).

**VIRGINIA**—*CHESTERFIELD Co.*: Richmond, 26 Aug 1922 (2♂), em. 25 Sep 1992 ex maple [*Acer* sp.], W. Mitchell (USDA). *FAIRFAX Co.*: Alexandria (Rose Hill), 10 Aug 1976 (1♀), P. A. Opler (USNM). *MONTGOMERY Co.*: Blacksburg, 16 Jul 1931 (1♂, 4♀), ex maple [*Acer* sp.], W. J. Schoene (FSCA). *VIRGINIA BEACH Co.*: Virginia Beach, 10 Sep 1993 (1♀), W. Mitchell (SP).

*Episimus argutus* (Clemens)

**ALABAMA**—*BARBOUR Co.*: Blue Springs S. P., 17 Apr 1976 (2♂), J. B. Heppner (FSCA). *COVINGTON Co.*: Open Pond Cpgd. (20 mi. [32km] S. Andalusia), 18 Apr 1976 (1♀), J. B. Heppner (FSCA). *MADISON Co.*: Gurley, 14 Jun 1900 (2♂), [no coll.] (USNM).

**ARIZONA**—"Arizona", 1882, H. K. Morrison (BMNH). *COCHISE Co.*: Carr Cyn., Huachuca Mts. (5000ft [1540m]), 2 Sep 1978 (1♀), R. S. Wielgus (USNM). *Palmerlee*, 1-7 Aug [1902?] (1♀), [1902?] (8♂, 1♀), [O. C. Poling?] (USNM). *Portal* (4 mi. W), Chiricahua Mts. (5300ft [1630m]), 3-6 Aug 1964 (1♀), D. R. Davis (USNM). [*NAVAJO Co.*?]: *Apache Indian Res.*, White Mts. (7000ft [2150m]), 5-30 Jun 1925 (1♂), O. C. Poling (USNM). *SANTA CRUZ Co.*: Madera Rita Mts. (4880-5100ft [1500-1570m]), 8 Apr 1963 (1♂), 7 Jul 1959 (1♂), J. G. Franclemont; 10-26 Jul 1964 (1♀), D. R. Davis (USNM); 31 Aug 1959 (2♀), 1 Sep 1959 (1♀), R. W. Hodges (USNM); 3-5 Sep 1969 (1♂, 1♀), J. A. Powell (UCB); 5 Sep 1959 (1♂), 11 Sep 1959 (2♀), R. W. Hodges (USNM).

**ARKANSAS**—*SEBASTIAN Co.*: Hartford, 8 Jun 1966 (1), R. W. Hodges (USNM). *WASHINGTON Co.*: Devil's Den S. P., 22 May 1966 (1♂), 4 Jun 1966 (1♂), 23 Jun 1966 (1♂), 25 Jun 1966 (2♂), 5 Jul 1966 (1♀), 11 Jul 1966 (1♂), 13 Jul 1966 (1♀), R. W. Hodges (USNM). *Fayetteville*, 10-17 Jul 1975 (3♀), H. N. Greenbaum (FSCA).

**CALIFORNIA**—*DEL NORTE Co.*: Siskiyou Mts., 7-16 Jun 1872, T. G. Walsingham (BMNH). *HUMBOLDT Co.*: Bair's Ranch, Redwood Cr., 6 Oct 1903 (1♀), H. S. Barber (USNM). *LOS ANGELES Co.*: Claremont, [no date] (1), Baker (USNM). *Pasadena*, 21 Jun 1902 (1♀), W. G. Dietz (MCZ). *Santa Catalina Id.*, Middle Cyn. (500ft), 1-2 May 1978 (1♂), J. A. Powell; 1-3 May 1978 (1♂), J. A. Chemsak (UCB). *Santa Cruz Id.*, Prisoner's Harbor, 7 Jun 1966 (3♂, 4♀), ex *Rhus diversiloba* [= *Toxicodendron diversilobum*] em. 3-11 Jul 1966; 28-29 Jun 1966 (3♂, 1♀), ex *Rhus diversiloba* [= *Toxicodendron diversilobum*] (JAP 66F2), J. A. Powell (UCB). *MENDOCINO Co.*: *Noyo River*, 8-11 Jun 1871, T. G. Walsingham (BMNH). *MONTEREY Co.*: Big Cr. Res., 7 mi. [11.2km] N. Lucia, 21 Mar 1981 (1♂), J. B. Whitfield (UCB). *Carmel*, Apr [1900?] (1♂, 1♀), A. H. Vachell (USNM). *Ft. Ord*, 15 Jul 1976 (1♀), ex *Arctostaphylos punila*, J. A. Powell & P. A. Opler (UCB). *PLACER Co.*: 1 May [1900?], A. H. Vachell (USNM). *SAN LUIS OBISPO Co.*: San Luis Obispo, Santa Rita Mt. [1900?] (4♂), A. H. Vachell (USNM). *SISKIYOU Co.*: Shasta Retreat, 1-7 Jun [1900?] (1♀), 16-23 Jun [1900?] (1♂), [Dyar?] (USNM). *TULARE Co.*: Potwisha, 3 mi. [4.8km] NE Ash Mt. (2000ft), 4 May 1979 (1♂), J. A. Powell (UCB).

**CONNECTICUT**—"East River", 29 Apr 1901 (1♂), W. G. Dietz (MCZ). *FAIRFIELD Co.*: Jul 1993 (1), pheromone trap CBT-CT-20 (USDA). *MIDDLESEX Co.*: Middletown, 4 mi. [6.4km] W, Higby Mtn., 22 Aug 1963 (1♂, 1♀), 23 Aug 1963 (1♀), J. M. Burns (UCB). *NEW HAVEN Co.*: Bethany Ctr., 1 mi. [1.6km] SW, 17 May 1968 (3♂), D. C. Ferguson (USNM). *Hamden*, 14 Jun 1967 (1♂), D. C. Ferguson (USNM).

**DELAWARE**—*NEWCASTLE Co.*: Newark, Glen Farms, 20 Aug 1980 (1♀), D. F. Bray (UD).

**DISTRICT OF COLUMBIA**—*Washington*, 20 May 1902 (1♂), A. Busck; 10 Jul 1899 (2♂), 14 Sep 1898 (1♂), [H. G. Dyar] (USNM); 31 Jul 1882 (1♂), 11 Aug 1882 (1♂, 1♀), [C. V. Riley] (USNM).

**FLORIDA**—*ALACHUA Co.*: Gainesville, 25 Feb 1975 (4♂), R. C. Wilkerson; 2 Mar 1975 (1♀), 7 Oct 1974 (1♀), 11 Oct 1974 (1♀), 13 Oct 1974 (1♂, 1♀), 14 Oct 1974 (1♀), 20 Nov 1974 (1♀), H. N. Greenbaum (FSCA); 2 Mar 1975 (1♀), 23 May 1973 (1♂), 15 Sep 1972 (1♀), 20 Sep 1975 (1♀), 2 Oct 1972 (1♀), 7 Oct 1974 (1♀), 10-11 Oct 1975 (1♂), 23 Oct 1975 (1♂), 20 Nov 1974 (1♀), 30 Nov 1975 (1♂), J. B. Heppner (FSCA); 25 Apr 1969 (1♂), 7 Oct 1968 (1), F. W. Mead; 8 May 1972 (1♀), ex *Rhus copallina* (em. 28 May 1972), D. H. Habeck (FSCA); 14 May 1982 (1), 30 Aug 1992 (2), em. 20 Sep 1982 ex winged sumac [*Rhus* sp.], S. Passoa (SP). (UF Exp. Sta.) [N. Gainesville], [no date] (1), JRW (FSCA). (UF Honey Plant), 7 Apr 1983 (1♂), J. Gillmore (UF). *BAKER Co.*: Olustee, 5-8 May 1978 (2♀), G. B. Fairchild & H. V. Weems (FSCA). *BAY Co.*: Mexico Beach, 19 May 1971 (3♂), ex sumac [*Rhus* sp.] (em. 8 Jun 1971), D. H. Habeck (UF). *CITRUS Co.*: Floral City, 10 May 1986 (1♂), L. C. Dow (LCD). *COLLIER Co.*: Collier-Seminole S. P., 25 Jan 1986 (1♂), L. C. Dow (LCD). *Marco*, 16-23 Apr [1912?] (1♀), [J. H. McDunnough?] (Barnes Coll.) (USNM). *DADE Co.*: Homestead (Subtropical Res. Sta.), 9 Jun 1974 (1♀), J. B. Heppner (FSCA). *Royal Palm [Hammock]*, [Everglades Natl. Pk.], Mar 1930 (1♀), W. S. Blatchley (USNM). *FLAGLER Co.*: Crescent Lake, 12 May 1990 (2♀), H. D. Baggett (FSCA). *HERNANDO Co.*: Richland WMA, 21 May 1986 (1♂, 1♀), L. C. Dow (LCD). *Withlacoochee St. For.*, 3 Oct 1989 (2♀), L. C. Dow (LCD). *HIGHLANDS Co.*: Archbold Biol. Sta., 23 Apr 1975 (1♂), 1 May 1975 (1♂), 9 Jun 1974 (1♀), J. B. Heppner (FSCA); 15-31 Jul 1948 (2♀), A. B. Klots (AMNH). *HILLSBOROUGH Co.*: [Tampa?], 22 Jun 1944 (1♀), 23 Jun 1944 (1♀) ex *Poinsettia cyathophora* [= *Euphorbia cyathophora*], [coll.?] (USNM). *LAKE Co.*: [Astor] (Blue Cr., 7 mi. [11.2km] W at Hwy 40), 15 Sep 1989 (1♀), ex *Rhus copallina* (berries) (em. 6 Oct 1989), D. H. Habeck & J. Gillmore (UF). *LEE Co.*: Ft. Myers, 8-15 Apr [1912?] (2♂), 24-30 Apr [1912?] (2♂, 3♀), 8-15 May [1912?] (1♀), 16-23 May [1912?] (1♂), [J. H. McDunnough?] (Barnes Coll.) (USNM). *Koreshan S. P.*, 23 Apr 1975 (1♂), J. B. Heppner (FSCA). *LIBERTY Co.*: Bristol (1 mi. W), 27 Sep 1986 (1♂), L. C. Dow (LCD). *MONROE Co.*: Key Largo, 11 Mar 1992 (1♀), 11 Nov 1985 (1♀), T. S. Dickel (TSD). *ORANGE Co.*: Ocoee, 8 Feb 1986 (1♀), L. C. Dow

(LCD). *Winter Park*, May 1946 (1♀), A. B. Klots (AMNH). *PALM BEACH Co.: Lake Worth*, May 1945 (4♀), ex poinsettia [= *Euphorbia heterophylla*], [coll.?] (USNM). *PINELLAS Co.: Honeymoon Id. S. P.*, 20 May 1990 (1♀), 5 Oct 1986 (2♀), H. D. Baggett (FSCA); 5 Oct 1986 (1♂, 4♀), 9 Nov 1986 (1♀) L. C. Dow (LCD). *POLK Co.: Lake Alfred*, 6 May 1929 (1♀), L. J. Bottimer (USNM). *PUTNAM Co.: Palatka*, 19 Feb 1990 (1♂), 10 May 1990 (1♀), H. D. Baggett (FSCA). *Welaka* (UF For. Sta.), 28-31 Jul 1986 (1♂, 2♀), J. B. Heppner (FSCA); 19 Sep 1987 (2♀), L. C. Dow (LCD). *SANTA ROSA Co.: FAMU Biol. Sta.* (nr. Holt), 25-28 Aug 1986 (2♂, 2♀), J. B. Heppner (FSCA). *VOLUSIA Co.: Glenwood*, [no date] (1), (Kearfott Coll.) (AMNH). *WAKULLA Co.: Ochlockonee River S. P.*, 22-24 Apr 1991 (1♂), J. B. Heppner (FSCA).

**ILLINOIS.**— *COOK Co.: Chicago*, 17 Aug 1954 (1♀), H. E. Woodcock (FSCA). *MACON Co.: Decatur*, 1-7 Aug (2♂), [no coll.] (USNM). *Oconee*, 24-30 Jun (1♂), 1-7 Aug (1♂), [Barnes Coll.] (USNM). *PUTNAM Co.: [Magnolia]* (3-6 mi. W., nr. Sandy Cr.), 21 May 1936 (1), M. O. Glenn (INHS); 22 May 1944 (1♂), M. O. Glenn (FSCA); 30 May 1953 (1), 2 Jun 1940 (1), 2 June 1943 (1), 2 Jun (1) ex *Ambrosia trifida*, 8 Jun 1939 (1), 8 Jun 1960 (1), 9 Jun 1954 (1), 9 Jun 1973 (1), 12 Jun (1), 17 Jul (1), 13 Jul (1), 19 Jul (1), 26 Jul (1) ex *Hamamelis virginiana*, 29 Jul (1) ex *Hamamelis virginiana*, 28 Aug (1) ex *Rhus*, M. O. Glenn (INHS); 31 Aug 1976 (1♂), M. O. Glenn (USNM).

**KENTUCKY.**— *BARRETT Co.: Cave City*, 5 mi. W, 3-4 Aug 1971 (4♀), J. A. Powell (UCB). *JEFFERSON Co.: Valley Station*, Waverly Park, 18 May 1975 (1♂), A. J. Brownell (USNM).

**LOUISIANA.**— "Vowells Mill", Apr 1902 (1♀), W. G. Dietz (MCZ).

**MAINE.**— *KENNEBEC Co.: Augusta*, 10 Jun 1940 (1♂), ex sumac, A. E. Brower (USNM). *PENOBSCOT Co.: Orono*, [no date] (1), [Fernald Coll.] (USNM). *SOMERSET Co.: Smithfield*, 1 Jun 1940 (1♂) 7 Jun 1940 (2♀), ex *Rhus toxicodendron* [= *Toxicodendron toxicarium*], [A. E. Brower] (USNM); 5 Jun 1940 (1♂, 1♀), 7 Jun 1940 (1♂, 1♀), "leaf roller *Rhus toxicodendron*" [= *Toxicodendron toxicarium*], [A. E. Brower] (MCZ). [see also Brower, 1983, for other Maine records, 24 May-26 Aug]

**MARYLAND.**— *ANNE ARUNDAL Co.*: Aug 1992 (1), pheromone trap MDAA-6 (USDA). *MONTGOMERY Co.: Plummer's Id.*, Jun 1903 (1♂), A. Busck (USNM). *Silver Spring*, 18 May 1937 (1♀), ex *Rhus copallina*, A. Busck (USNM). *PRINCE GEORGES Co.: Beltsville*, 17 Jun 1968 (1♀), P. A. Opler (UCB). *Hyattsville*, 1907 (5♂), 9 Jul 1899 (1 larva) ex poison ivy [*Toxicodendron radicans*], A. Busck (USNM). *Oxon Hill*, 30 Jun 1971 (1♀), G. F. Hevel (USNM).

**MASSACHUSETTS.**— [locality?], 27 Jun 1991 (1), pheromone trap BOSNB-391 (USDA). *BARNSTABLE Co.: Barnstable*, 1 Aug 1979 (1♀), C. P. Kimball (FSCA). *Dukes Co.: Martha's Vineyard*, 22 Jul [1939] (1), 25 Jul [1939] (1♂), 28 Jul 1939 (1♀), F. M. Jones (USNM). *HAMPDEN Co.: Springfield*, [no date] (1♀), A. Dimmock (USNM). *SUFFOLK Co.: Revere* (Gypsy Moth Lab), 22 Jul 1930 (1♂, 1♀), ex *Rhus*, [no coll.] (USNM).

**MICHIGAN.**— *ALLEGAN Co.: Allegan*, 11 Jun 1990 (1), pheromone trap 5-90 (USDA). *LIVINGSTON Co.: George Res.*, 5 Jun 1943 (1), 7 Aug 1943 (♀), S. Moore (UMi). *OAKLAND Co.: Bloomfield*, 24 Jul 1943 (1), S. Moore (UMi). *OCEANA Co.*: May-Jun 1991 (1), pheromone trap MDAR3-01 (USDA); (same) (1), pheromone trap MDAR5-13 (SP).

**MINNESOTA.**— [*CLEARWATER Co.*]: *Itasca Park*, LaSalle Valley, 9 Jul 1940 (2), C. E. Mickel (UMn).

**MISSISSIPPI.**— *CHOCTAW Co.: Choctaw Lake Cpgd.* (5 mi. SE Ackerman), 22 Apr 1976 (2♂), J. B. Heppner (FSCA). *FRANKLIN Co.: Clear Springs Cpgd.* (10 mi. SW Meadville), 20 Apr 1976 (3♂, 3♀), J. B. Heppner (FSCA). *SCOTT Co.: Roosevelt S. P.*, 20 Aug 1974 (1♂), J. B. Heppner (FSCA).

**MISSOURI.**— [no location], 22 May 1887 (1), 20 Jun 1883 (1), C. V. Riley (USNM). "C. Mo.", 14 Jun 1888 (1), M. E. Murtfeldt (USNM). *BENTON Co.: Warsaw*, 5 Aug 1971 (1♀), J. R. Heitzman. *JACKSON Co.: Independence*, 15 Jul 1971 (1♂), 27 Jul 1971 (1♀), J. R. Heitzman (FSCA).

**NEVADA.**— AMNH records.

**NEW JERSEY.**— *BERGEN Co.: Oakland*, 26 Jul 1947 (1♂), 27 Jul 1947 (2♂), 12 Aug 1948 (1♂), 13 Aug 1948 (2♂), C. P. Kimball (CNC). *BURLINGTON Co.: Medford*, Lake Pine, 16 Aug 1974 (1♀), D. C. Rentz (USNM). *ESSEX Co.: Caldwell*, 11 May 1903 (1♀), 17 May 1903 (1♂, 2♀), May 1910 (1♂), W. D. Kearfott (USNM). *Essex Co. Pk.*, 18 May 1903 (1♂), 24 May 1904 (1♀), 20 May [1904?] (1♀), W. D. Kearfott (USNM). *Montclair*, 18 Jul [1903?] (1♂), 25 Jul [1903?] (1♂), W. D. Kearfott (USNM).

**NEW MEXICO.**— *CATRON Co.: Gilita Cpgd.* (18 mi. E. Mogollon) (8300ft), 12 Jul 1977 (1♂), J. B. Heppner (FSCA). Other records at AMNH.

**NEW YORK.**— [locality?], 14 Jun 1990 (1), pheromone trap CAE16 (USDA). *BRONX Co.: Van Cortland Pk.*, 22 May 1970 (2♂), E. Jäckh (USNM). *CAYUGA Co.: Fillmore Glen S. P.*, 12 Aug 1973 (1♀), J. B. Heppner (FSCA). *MONROE Co.*: 9 Jun 1948 (1♂), C. P. Kimball (FSCA); 2 Jul 1948 (1♂), 7 Sep 1948 (1♂), C. P. Kimball (CNC). *ONONDAGA Co.: Tulli*, 28 Jan 1974 (2♂, 1♀), 13 Feb 1974 (4♂, 1♀), 6 Sep 1973 (1♀), 10 Sep 1973 (4♀), 12 Sep 1973 (2♀), 14 Sep 1973 (3♀), 16 Sep 1973 (1♂, 1♀), 17 Sep 1973 (1♂, 1♀), 18 Sep 1973 (1♂, 1♀), 21 Sep 1973 (1♂, 1♀) 24 Sep 1973 (2♂), ex *Rhus typhina*, E. Jäckh (USNM). *ONTARIO Co.: Canandaigua*, 18 Jun 1932 (1♂), [A. B. Klots?] (DEI). *Geneva*, 2 Jun 1970 (1♂), [no coll.] (USNM). *SUFFOLK Co.: Eatons Neck*, Long Is., 7 Jun 1971 (1♀), 8 Jun 1971 (1♂), 9 Jun 1971 (3♂, 1♀), 10 Jun 1971 (1♂, 1♀), 10 Jun 1971 (1♂, 1♀), E. Jäckh (USNM). *TOMPKINS Co.:*

*Ithaca*, 5 Jun 1930 (1♂), [A. B. Klots?] (DEI); (Six Mile Cr.), 7 May 1957 (3♂), 23 May 1957 (2♂, 1♀), 25 May 1957 (4♂), 31 May 1957 (3♂, 2♀), 4 Jun 1957 (1♂), 12 Jun 1957 (2♀), 14 Jun 1957 (1♀), 26 Jul 1957 (1♂), 10 Aug 1956 (1♂), 11 Aug 1957 (1♀), J. G. Franclemont (USNM); 14 May 1961 (1♂), 26 May 1959 (2♂), 29 May 1959 (2♂), R. W. Hodges (USNM); 17 May 1958 (1♂), D. R. Davis (USNM); (Cornell Campus), 9 Jun 1957 (1♂), 12 Jun 1957 (1♀), 15 Jun 1957 (1♀), 16 Jun 1957 (1♂, 1♀), 21 Jun 1957 (1♀), D. R. Davis (USNM). *Newfield*, 27 May 1959 (2♂), R. W. Hodges (USNM). *ULSTER Co.: W. Shokan*, 10 Aug 1987 (1♂), 15 Aug 1987 (2♂), L. C. Dow (LCD).

**NORTH CAROLINA.**— *MACON Co.: Highlands* (3865ft), 24 Jun 1958 (2♂), 30 Jun 1958 (2♂), 2 Jul 1958 (1♀), 3 Jul 1958 (1♀), 9 Jul 1958 (1♀), R. W. Hodges (USNM); 25 Jun 1958 (1♀), 10 Aug 1958 (1♀), 20 Aug 1958 (1♀), 21 Aug 1958 (1♀), 22 Aug 1958 (1♀), J. G. Franclemont (USNM). *MOORE Co.: Southern Pines*, [no date] (1♂), [Barnes Coll.] (USNM).

**OHIO.**— [locality?], 27 May 1988 (1), pheromone trap (USDA); 15 Jun 1988 (1), 17 Jun 1988 (1), 30 Jun 1988 (1), pheromone traps (SP). *ERIE Co.: Resthaven NWR*, 24 May 1992 (1), D. J. Wright (DJW). *HAMILTON Co.: Cincinnati*, 25 May 1906 (1♂), 12 Jun 1906 (1♂), A. F. Braun (DEI); 18 Jun 1904 (1♂), A. F. Braun (CNC); 22 Jun 1905 (1♂), 23 Jun 1905 (1♀), [no date] (4♂, 3♀), A. F. Braun (USNM). *JACKSON Co.: Jul-Aug 1992* (1), pheromone trap (SP). *SCIOTO Co.: Shawnee St. For.*, 25 May 1990 (1), D. J. Wright (DJW); 26 May 1990 (2), E. H. Metzler (EHM).

**OKLAHOMA.**— *OKLAHOMA Co.: Oklahoma City*, 5 Jun 1952 (1♀), 24 Jul 1956 (1♀), 12 Aug 1956 (1♂), D. R. Davis (USNM). *SEQUOYAH Co.: Tenkiller Lk.*, nr. Cookson (3 mi. W. Blackgum), 6-9 Jul 1979 (1♀), 30 Jul 1955 (1♂), 16-19 Aug 1962 (1♀), D. R. Davis (USNM).

**PENNSYLVANIA.**— "Penn.", [no date] (1♀), [no coll.] (USNM). *ADAMS Co.: Floradale*, Aug 1917 (1♂), [no coll.] (USNM). *ALLEGHENY Co.: Oak Station*, 27 May 1906 (1♂), 10 Jun 1907 (1♂), 1 Jul 1906 (1♂), 13 Jul 1906 (1♂), F. Marloff (USNM). *Pittsburgh*, 9 Jun 1907 (2♀), H. Engel (USNM). *BEAVER Co.: New Brighton*, 26 May 1907 (1♂), 14 Jun 1907 (1♀), 4 Sep 1901 (1♀), [no coll. (H. Engel?)], ex Merrick Museum] (USNM). *LUZERNE Co.: Hazeltown*, 28 Apr 1897 (♂), 30 Apr 1898 (1♂, 1♀), 8 May 1898 (♀) ex *Nyssa multiflora*, 30 May 1906 (3♂), 3 Jun 1898 (1), 5 Jun [1898?] (1♀), W. G. Dietz (MCZ); 8 May 1897 (1♂), W. G. Dietz (USNM).

**SOUTH CAROLINA.**— *CHARLESTON Co.: McClellanville*, Wedge Plantation, 14 Apr 1974 (1♂), 19 Apr 1974 (1♂), R. B. Dominick (USNM); 27 Apr 1981 (2♂), R. W. Hodges (USNM).

**SOUTH DAKOTA.**— *HARDING Co.: Slim Buttes, Custer Natl. For.*, 10 May-4 Jun 1975 (2), 25 Jun-20 Jul 1975 (2), [no coll.] (UMn). *Cave Hills, Custer Natl. For.*, 25 Jun-20 Jul 1975 (1♂), [no coll.] (USNM).

**TENNESSEE.**— *SEVIER Co.: Great Smoky Mts. N. P.*, Newfound Gap (5040 ft [1550m]), 1 Sep 1986 (1♂), R. L. Brown (MEM).

**TEXAS.**— *ANDERSON Co.: Tennessee Colony*, 23 Aug 1978 (1♂), A. & M. E. Blanchard (USNM). *BOSQUE Co.*: 30 Apr-5 May 1876, 26 Jul [1876], 11 Oct 1876, G. W. Belfrage (BMNH). *Laguna Park*, 5 Jun 1970 (4♂, 1♀), A. & M. E. Blanchard (USNM). *BRAZORIA Co.: Churchill Bridge*, 25 May 1982 (1♂, 2♀), E. C. Knudson (ECK). *BREWSTER Co.: Alpine*, 10-15 Aug 1926 (1♂), O. C. Poling (USNM). *Big Bend N. P.*, Basin (Chisos Mts.), 7 Apr 1967 (1), A. & M. E. Blanchard (USNM); 27 May 1974 (3♂), J. R. Powers (UCB). *BROWN Co.: Lake Brownwood*, 9 Apr 1969 (2♂), 21 Apr 1966 (1♀), 8 Jul 1967 (1♂), A. & M. W. Blanchard (USNM). *FREESTONE Co.: Buffalo*, 5 mi. [8km] W, 26 Jun 1978 (1♀), E. C. Knudson (ECK). *HARRIS Co.: Houston*, 18 Aug 1966 (1♂), A. & M. E. Blanchard (USNM). *KERR Co.: Kerrville*, Jun 1908 (1♀), H. Lacy (USNM). *MONTGOMERY Co.: Camp Strake*, 4 Apr 1976 (1♀), 9 Sep 1975 (2♂), 14 Oct 1977 (1♂), A. & M. E. Blanchard (USNM). *TARRANT Co.: Benbrook*, 30 Apr 1978 (1♂), E. C. Knudson (ECK). *Ft. Worth*, 29 Mar 1963 (1♂, 1♀), E. Jäckh (USNM). *WASHINGTON Co.: Brenham*, 8 Apr 1978 (1♀), E. C. Knudson (ECK).

**VERMONT.**— *BENNINGTON Co.: Hapgood Pond Camp* (nr. Peru), 1 Jun 1963 (1♀), J. M. Burns & E. D. Hanson (UCB).

**VIRGINIA.**— [?], [no date] (5♂, 7♀), H. G. Dyar, USNM. *FAIRFAX Co.: Alexandria* (Rose Hill), 30 May 1976 (1♂, 1♀), 11 Jun 1976 (2♂, 1♀), 13 Jun 1976 (1♂), 17 Jun 1976 (1♀), 20 Jul 1976 (1♂, 2♀) 24 Jul 1976 (1♂, 2♀), 28 Jul 1976 (1♂, 4♀), 30 Jul 1976 (2♀), 4 Aug 1976 (3♀), 10 Aug 1976 (2♀), P. A. Opler (USNM). *Franconia* (Dogue Cr.), 30 May 1981 (1♂), P. A. Opler & J. A. Powell (UCB). *Falls Church*, 16 Jun 1920 (1♀) ex sumac [*Rhus* sp.], A. Busck (USNM). *Glencarlynn*, 22 May 1914 (1♀), 28 May 1914 (1♂), 1 Jun 1914 (1♂), 10 Jun 1914 (1♂, 1♀), ex *Rhus copallina*, C. Heinrich (USNM).

**WASHINGTON.**— [locality?], [date?] (1), pheromone trap 254-007, E. LaGasa (USDA). **CANADA: BRITISH COLUMBIA.**— *Seton Lake*, Lillooet, 7 Jun 1926 (1♂), J. H. McDunnough (CNC).

**MANITOBA.**— *Aweme*, 29 May 1921 (1♂), 31 May 1921 (1♀), 1 Jun 1921 (1♂), 3 Jun 1921 (1♀), 11 Jun 1921 (1♀), N. Criddle (CNC).

**NEW BRUNSWICK.**— (see Prentice, 1966).

**NOVA SCOTIA.**— *Halifax*, 27 Feb-10 Apr 1951 (17), J. H. McDunnough (NSM); 2 Mar 1951 (1♂), 9 Mar 1951 (1♂), 18 Apr 1952 (1♀), 19 Apr 1952 (1♀), J. H. McDunnough (CNC). *Lake Rossignol*, 18-31 May 1952 (3), ex *Hamamelis*, [J. H. McDunnough] (NSM). *S. Milford*, 21 Jun 1934 (1♀), 27 Jun 1934 (1♂), 4 Jul 1934 (1♂), J. H.



McDunnough (CNC). *Waverly*, 28 Feb 1957 (1♂), [J. H. McDunnough] (CNC); 1 Mar 1951 (1), J. H. McDunnough (NSM).

**ONTARIO.**— *Grand Bend*, 27 Feb 1940 (1♀) ex sumac [*Rhus* sp.], T. N. Freeman (CNC). *Islington*, Jul 1935 (1♂), H. S. Parrish (USNM). *London*, [1890?], J. A. Moffat (CNC?). *Merivale*, 23 Feb 1935 (1♀) ex sumac [*Rhus* sp.], G. S. Walley (CNC). *Mt. Pelee*, 17 Jun 1927 (1♂), 21 Jun 1927 (4♀), 28 Jul 1927 (1♂) ex *Rhus*, 1 Aug 1927 (1♂) ex *Rhus*, F. P. Ide (CNC). *Ottawa*, 21 Feb 1971 (1♀) ex sumac [*Rhus* sp.], [no coll.] (CNC); 19 Mar 1928 (3♀), 1927 (1♀), J. H. McDunnough (CNC); 20 Apr 1934 (1♀) ex sumac [*Rhus* sp.], 14 Jul 1905 (1♂), C. H. Young (CNC). *Port Colborne*, 17 Aug 1934 (1♀), D. Gray (CNC). *Port Roman*, 1 Jun 1934 (3♂, 1♀), T. N. Freeman (CNC). *St. Davids*, 1 Jun 1934 (1♀), 4 Jun 1934 (1♀), 9 Aug 1934 (1♂) ex *Rhus typhina*, W. L. Putnam (CNC). *Severen*, 15-21 Jun 1925 (1♂), J. H. McDunnough (CNC). *Simcoe*, 9 Jul 1939 (1♂), 14 Jul 1939 (1♀), 5 Aug 1939 (2♂, 1♀), ex sumac [*Rhus* sp.], T. N. Freeman (CNC). *Toronto*, Aug 1935 (1♀), H. S. Parrish (USNM). *Vineland Station*, 1 Jun 1936 (1♂), 10 Jun 1936 (1♂), 11 Jun 1936 (1♂) ex *Rhus typhina*, W. L. Putnam (CNC). (See also Prentice (1966) for records from western Ontario).

**QUEBEC.**— *Alcove*, 4 Jul 1935 (2♀), F. A. Urquhart (CNC). *Montreal*, 3 Jun 1936 (1♂, 1♀), A. C. Shepard (CNC).

### *Episimus guiana* (Busck)

**FLORIDA.**— *DADE Co.*: *Homestead*, 8 May 1959 (1♂), 14 Oct 1958 (1), D. O. Wolfenbarger (FSCA); (Fuch's Hammock), 13 Jun 1979 (1♀), 20 Oct 1979 (1♀), T. S. Dickel (TSD). *HIGHLANDS Co.*: *Archbold Biol. Sta.*, 30 Jul 1978 (1♂), H. Weems & S. Halkin (FSCA). *INDIAN RIVER Co.*: *Vero Beach*, Apr 1941 (1♂), Apr 1942 (1♂), May 1942 (2♂, 1♀), 1-20 Aug 1941 (1♂), J. R. Malloch (USNM). *MANATEE Co.*: *Terra Ceia*, 14 Jun 1986 (1♂), L. C. Dow (LCD). *MONROE Co.*: *Big Pine Key*, 19 Jun 1973 (1♂), J. A. Powell (UCB). *Garden Key*, Dry Tortugas, 13 Jul 1963, G. W. Rawson (FSCA). *Key Largo*, 14 Mar 1973 (1♂) ex *Euphorbia* sp., D. H. Habeck (FSCA); 29 Mar 1986 (1♂, 1♀), 24 May 1986 (1♂, 1♀), 30 Aug 1986 (1♀), 21 Nov 1987 (1♀), L. C. Dow (LCD); 19 Jun 1973 (1♂, 2♀) em 9-16 Jul. J. A. Powell (UCB); (9 mi. [14.4km] NE Key Largo City), 18 Jun 1973 (1♂), J. B. Heppner & J. A. Powell (USB); (13 mi. 20.8km] NE Key Largo City), 22 Jun 1974 (1♀), J. B. Heppner (FSCA); 14 Jul 1967 (2♂), S. Kemp (USNM); 12 May 1966 (1♂), 30 Jul 1971 (1♀), S. Kemp (AMNH); 11 Aug 1978 (1♂), 2 Sep 1978 (1♂), S. Kemp (FSCA); 17 Aug 1965 (1♂), 9 Oct 1964 (1♂), S. Kemp (CNC); 11 Nov 1985 (1♂), T. S. Dickel (TSD). *Key West*, 14 Apr 1945 (1♀) ex *Chamaesyce hypericifolia* [= *Euphorbia hypericifolia*], [coll.?] (USNM); 19 May 1945 (1♂) ex *Euphorbia*, [coll.?] (USNM); 25 Jul 1972 (1♂), H. R. Dodge (FSCA). *Loggerhead Key*, Dry Tortugas, 21 Apr 1993, ex *Euphorbia* (A-6561), em. 30 Apr 1993, 1♀; 5 May 1993, 1♂, 3♀, D. H. Habeck (UF); (A-6562, em 5 May 1993, 1♀), D. H. Habeck (UF). *Marathon*, [Vaca Key], 12 Aug 1967 (1♀), R. Silberglied (USNM). *Tavernier* (2 mi. [3.2km] NE), 17 Jun 1974 (5♂, 1♀), J. B. Heppner (FSCA); 20 Jun 1973 (1♂), J. B. Heppner & J. A. Powell (UCB). *ORANGE Co.*: *Winter Garden*, 7 Dec 1980 (1♂), L. C. Dow (LCD). *PALM BEACH Co.*: *Lake Worth*, [1895?], (1♀), A. T. Slosson (AMNH). *PINELLAS Co.*: *St. Petersburg*, 1 Jul 1914 (1♂), R. Ludwig (USNM). *SARASOTA Co.*: *Siesta Key*, 11 May 1960 (1♂), C. P. Kimball (UCB).

### *Episimus nesiotis* Walsingham

**FLORIDA.**— *COLLIER Co.*: *Collier-Seminole S. P.*, 2 May 1987 (1♀), 2 Aug 1986 (1♀), 20 Nov 1987 (1♂), L. C. Dow (LCD). *Fakahatchee Strand*, 29 Apr 1986 (1♂), L. C. Dow (LCD). *DADE Co.*: *Homestead*, 11 Apr 1987 (1♀), J. B. Heppner (FSCA); 21 May 1963 (2♀), D. O. Wolfenbarger (UCB). *Long Pine Key*, Everglades N. P., 28 Apr 1975 (3♂), J. B. Heppner (FSCA). *Paradise Key*, [Royal Palm Hammock, Everglades Natl. Pk.], 21 Feb 1919 (1♀), Schwarz & Barber (AMNH). *S. Miami*, 10 Jul 1976 (1♂) ex *Ardisia escallonioides*, D. H. Habeck (FSCA). *INDIAN RIVER Co.*: *Vero Beach*, May 1942 (1♂, 1♀), J. R. Malloch (AMNH). *MANATEE Co.*: *Terra Ceia*, 28 Apr 1986 (3♂), 14 Jun 1986 (1♂), 25 Jun 1987 (1♂), 26 Jul 1986 (1♂), L. C. Dow (LCD). *MONROE Co.*: *Big Cypress Natl. Pres.*, 26 Mar 1992 (1♂, 1♀), T. S. Dickel (TSD). *Big Pine Key*, 4 Mar 1992 (2♂), D. Matthews, D. H. Habeck, & J. Gillmore (UF); 3 May 1983 (1♂), J. B. Heppner (FSCA). *Key Largo* (N.), 25 Jan 1992 (1♀), 30 Jan 1992 (1♀), T. S. Dickel (TSD). *No Name Key*, 19 Feb 1992 (1♂), T. S. Dickel (TSD); 30 Mar 1986 (1♂), L. C. Dow (LCD); 31 Mar 1986 (1♂), H. D. Baggett (FSCA). *PINELLAS Co.*: *St. Petersburg*, [no date] (1♀), [Barnes coll.] (USNM). *SARASOTA Co.*: *Siesta Key*, 11 Feb 1954 (1♂), 12 Feb 1954 (1♀), 3 Apr 1952 (1♂), 4 Apr 1952 (1♂), 11 Apr 1953 (1♂), 15 Apr 1953 (1♂), 16 Apr 1953 (1♂, 1♀), 18 Apr 1953 (1♂, 1♀), 23 Dec 1953 (1♂), C. P. Kimball (AMNH); 11 Feb 1954 (1♂), 23 Feb 1954 (1♀), 1 Dec 1952 (1♀), C. P. Kimball (UCB); 26 Mar 1952 (1♂), 11 Apr 1953 (1♀), 18 Apr 1953 (2♀), 9 Nov 1953 (1♂), 14 Nov 1953 (1♀), C. P. Kimball (FSCA); 23 Nov 1953 (1), C. P. Kimball (UCB).

**TEXAS.**— *BREWSTER Co.*: *Alpine*, Jul 1941 (1♀), O. C. Poling (USNM).

### *Episimus augmentanus* (Zeller)

**FLORIDA.**— *DADE Co.*: *Everglades N. P.*, 27 Mar 1983 (1♂), R. M. Baranowski (FSCA). *Homestead*, 4 Feb 1979 (1♀), T. S. Dickel (TSD); 14 May 1978 (1♂), C. V.

Covell, Jr. (FSCA). *Miami*, 11 Jul 1988 (1♀), ex *Metopium toxiferum* (A-4468, em. 2 Aug 1988), D. H. Habeck (UF). [*Miami?*], 25 Feb 1900 (1♂), 27 Feb 1900 (1♂), [A. Busck?] (USNM). *MONROE Co.*: *Big Pine Key*, 3 May 1983 (2♂), J. B. Heppner (FSCA); 3-4 May 1983 (1♂), T. S. Dickel (TSD); 19 May 1988, ex *Metopium toxiferum* (A-4408, em. 17 Jun 1988, 1♂; 18 Jun 1988 1♀; 20 Jun, 1♀), D. H. Habeck (UF); 26 Nov 1976 (2♂), D. C. Ferguson (USNM). *Key Largo*, 1 Jan 1968 (1♂), 2 Jan 1965 (1♂), 5 Jan 1968 (1♂), 17 Jan 1968 (1♂), 17 Feb 1966 (1♀), 27 Feb 1966 (1♂), 26 Nov 1967 (1♂), 8 Dec 1967 (1♂), 14 Dec 1965 (1♂, 1♀), 16 Dec 1966 (1♂), S. Kemp (USNM); 3 Jan 1965 (1♂), 16 Jan 1975 (1♂), 22 Jan 1966 (1♂), 26 Jan 1967 (1♂), 30 Jan 1967 (1♂), 5 Feb 1967 (1♂), 7 Feb 1965 (1♂), 9 Feb 1967 (1♂), 17 Feb 1966 (1♂), 18 Feb 1966 (1♂), 21 Feb 1967 (1♂), 23 Feb 1966 (1♀), 27 Feb 1966 (1♀), 29 Feb 1968 (1♂), 14 Mar 1972 (1♂), 16 Apr 1967 (1♂), 30 Apr 1966 (1♂), 3 Aug 1967 (1♂), 29 Aug 1965 (1♂), 26 Sep 1966 (1♂), 10 Oct 1964 (1♂), 26 Oct 1964 (1♀), 6 Nov 1964 (2♂), 7 Nov 1965 (1♂), 9 Nov 1965 (1♂), 26 Nov 1967 (2♂), 6 Dec 1965 (2♂), 7 Dec 1965 (2♂), 8 Dec 1966 (2♂), 13 Dec 1965 (2♂), 14 Dec 1965 (1♀), 15 Dec 1965 (1♂), 28 Dec 1964 (1♂), S. Kemp (AMNH); 25 Mar 1983 (1♂), R. M. Baranowski (FSCA); 25 Jan 1992 (2♂, 1♀), 8 Feb 1992 (2♀), 22 Feb 1992 (1♂), 28 Feb 1992 (1♂, 1♀), 11 Mar 1992 (1♀), 25 Mar 1983 (1♂), 27 Mar 1992 (1♀), 3 Apr 1992 (10♂, 6♀), T. S. Dickel (TSD); 30 Mar 1986 (4♂), H. D. Baggett (FSCA); 30 Aug 1986 (2♂, 1♀), L. C. Dow (LCD); (10 mi. [16km] NE), 17 Jan 1974 (1♂, 1♀), J. B. Heppner (FSCA). *Long Key*, 12 Jan 1985 (2♂), T. D. Dickel (TSD); 11 Mar 1986 (12♂, 4♀), 29 Mar 1986 (7♂, 1♀), 24 May 1986 (2♂, 3♀), L. C. Dow (LCD); 31 Mar 1984 (7♂, 3♀), H. D. Baggett (FSCA). *Marathon*, [Vaca Key], 24 Jul 1967 (1♀), R. Silberglied (USNM). *No Name Key*, 25 May 1986 (1♀), L. C. Dow (LCD); 30 Dec 1972 (2♂), H. R. Dodge (FSCA). *Windy Key*, 16 Mar 1989 (1♂), 11 Jun 1982 (1♀), T. S. Dickel (TSD).

### *Episimus transferranus* (Walker)

**FLORIDA.**— *BREVARD Co.*: *Melbourne*, 14 Jan 1983 (1♀), F. A. Smith (FSCA); 19 Dec 1988, ex *Schinus terebinthifolius* (A-4666a, em. 9 Jan 1989, 1♂), D. H. Habeck & W. Klerks (UF). *Merritt Island*, 26 Dec 1988, ex *Schinus terebinthifolius* (A-4687, em. 12 Jan 1989, 1♀; 17 Jan 1989, 2♂, 4♀; 23 Jan 1989, 1♂; [Jan 1989], 1♀), D. H. Habeck (UF). *BROWARD Co.*: *Pompano Plaza* [turnpike], 11 Mar 1989, ex *Schinus terebinthifolius* (A-4845b, em. 11 Jun 1989, 1♀), D. H. Habeck & J. Gillmore (UF). *CHARLOTTE Co.*: [*Punta Gorda*] (mi. 170 [Km 272] on I-75), 4 Feb 1991, ex *Schinus terebinthifolius* (A-5820, em. 4 Mar 1991, 1♀; 26 Apr 1991, 4♂, 1♀; 27 Apr 1991, 1♂; 28 Apr 1991, 2♂; 1 May 1991, 1♀), D. H. Habeck (UF). *DADE Co.*: *Florida City*, 20 Dec 1988, ex *Schinus terebinthifolius* (A-4670a, em. 9 Jan 1989, 1♂), D. H. Habeck & W. Klerks (UF). *Frog City* (Hwy 41), 14 Nov 1992, ex *Schinus terebinthifolius* (A-6425, em. 21 Dec 1992, 1♂), D. H. Habeck (UF); 13 Dec 1989, ex *Schinus terebinthifolius* (A-5372, em. 16 Jan 1990, 1♀), J. Gillmore & J. DeNicola (UF). *Homestead* (Fuch's Hammock), 1 Jan 1992 (1♀), T. S. Dickel (TSD). *LEE Co.*: *Captiva Id.*, 7 Jan 1988 (1♂), J. B. Heppner (FSCA). *Ft. Myers*, 14 Sep 1988, ex *Schinus terebinthifolius* (A-4542a, em. 3 Oct 1988, 1♂; 7 Oct 1988, 1♂), D. H. Habeck & F. D. Bennett (UF); (Hwy 854 & I-75), 20 Dec 1988, ex *Schinus terebinthifolius* (A-4672b, em. 17 Jan 1989, 1♀), D. H. Habeck & W. Klerks (UF). *Sanibel Id.*, 29 Jun 1984 (1♀), H. D. Baggett (FSCA). *MANATEE Co.*: *Bradenton* (at I-75), 5 Oct 1990, ex *Schinus terebinthifolius* (A-5733, em. 22 Oct 1990, 1♂, 3♀; 23 Oct 1990, 1♀; 25 Oct 1990, 1♀), D. H. Habeck & C. Teixeira (UF); 8 Nov 1992, ex *Schinus terebinthifolius* (A-6416, em. 7 Dec 1992, 2♀; 9 Dec 1992, 1♀; 11 Dec 1992, 1♀), F. D. Bennett (UF). *Manatee Riv.*, 8 May 1989, ex *Schinus terebinthifolius* (A-4829, 1♂), D. H. Habeck & J. Gillmore (UF). *Terra Ceia*, 12 Mar 1988 (1♀), 4 Nov 1989 (1♂), L. C. Dow (LCD); 4 Nov 1989 (2♂), J. S. Kutis (JSK). *MARTIN Co.*: *Jupiter [Inlet]*, 4 Nov 1988, ex *Schinus terebinthifolius* (A-4603, em. 7 Dec 1988, 1♀), D. H. Habeck (UF). *MONROE Co.*: *Big Cypress Natl. Pres.*, 26 Mar 1992 (1♂), T. S. Dickel (TSD). *PALM BEACH Co.*: (Turnpike, mi. 104 [Km 166]), 15 Nov 1992 (1♂), ex *Schinus terebinthifolius* (A-6421), D. H. Habeck (UF). (Turnpike, mi. 110 [Km 176]), 18 Sep 1989, ex *Schinus terebinthifolius* (A-5244, em. 12 Oct 1989, 1♀), D. H. Habeck & J. Gillmore (UF). *PINELLAS Co.*: [*Big Island*] (I-275 exit 18 [nr Franklin Bridge]), 9 Nov 1991, ex *Schinus terebinthifolius* (A-6158, em. 15 Nov 1991, 1♀; 26 Nov 1991 1♂; 13 Dec, 1♀), D. H. Habeck & P. Habeck (UF). *Ft. DeSoto Co. Pk.*, 24 Jan 1989, ex *Schinus terebinthifolius* (A-4702a, em. 9 Feb 1989, 1♂; 13 Feb 1989, 1♂; 16 Feb 1989, 1♂), D. H. Habeck & J. Gillmore (UF); 4 Feb 1987, ex *Schinus terebinthifolius* (A-4726b, em. 20 Feb 1987, 1♀), F. D. Bennett & W. Klerks (UF); 28 Feb 1987, ex *Schinus terebinthifolius* (A-4750a, em. 18 Mar, 1♂), K. Faitcloth & J. Gillmore (UF); 4 Apr 1989, ex *Schinus terebinthifolius* (A-4786a, em. 17 Apr 1989, 1♂; 28 Apr 1989, 1♂; 26 Jun 1989, 1♀), D. H. Habeck (UF). *Honeymoon Id. S. P.*, 6 Jan 1989 (1♂), 25 Oct 1988 (2♂), 1 Nov 1986 (1♀), 9 Nov 1988 (2♂), 14 Dec 1988 (2♂), L. C. Dow (LCD). *St. Petersburg*, 22 Apr 1990, ex *Schinus terebinthifolius* (A-5507, em. 8 May 1990, 1♀), D. H. Habeck (UF); (I-275 exit 15), 3 Jan 1993, ex *Schinus terebinthifolius* (A-6451, em. 3 Jan 1993, 1♀; 25 Jan 1993, 2♂; 1 Feb 1993 1♂, 1♀), R. Goodson (UF). *SARASOTA Co.*: *Sarasota*, 7 Nov 1992, ex *Schinus terebinthifolius* (A-6415, em. 16 Dec 1993, 1♀), F. D. Bennett (UF).

**TEXAS.**— *KIMBLE Co.*: *Harper* (7 mi. [11.2km] W), 18 Sep 1975 (1♂), J. A. Powell & J. A. Chemsak (UCB).