# New species, new combinations, and new synonymies in Neotropical *Episimus* WALSINGHAM, 1892 (Lepidoptera: Tortricidae: Olethreutinae)

Józef RAZOWSKI and John W. BROWN

Received: 23 Nov. 2007 Accepted: 20 Feb. 2008

> RAZOWSKI J., BROWN J.W. 2008. New species, new combinations, and new synonymies in Neotropical *Episimus* WALSINGHAM, 1892 (Lepidoptera: Tortricidae: Olethreutinae). *Acta zoologica cracoviensia*, **51B**(1-2): 83-144.

> Abstract. Neotropical members of Episimus are reviewed, with 34 species described as new: E. aurobasis (Costa Rica), E. lavirgenanus (Costa Rica), E. runawavicus (Jamaica), E. rondoniae (Brazil), E. macropterus (Costa Rica), E. zunigae (Costa Rica), E. queposanus (Costa Rica), E. rufatus (Jamaica), E. varablancanus (Costa Rica), E. neblinanus (Venezuela), E. pitillae (Costa Rica), E. albidorsanus (Brazil), E. griseatus (Paraguay), E. limoyanus (Paraguay), E. albifrons (Costa Rica), E. mignonatus (Jamaica), E. armiferus (Costa Rica), E. paraisanus (Costa Rica), E. quintananus (Mexico), E. vixenus (Costa Rica), E. chica (British West Indies), E. jamaicanus (Jamaica), E. antiguanus (Antigua), E. curacaonus (Curacao), E. perencausticus (Costa Rica), E. dominicanus (Dominica), E. coleus (Virgin Islands), E. camacanus (Brazil), E. minas (Brazil), E. beckeri (Brazil), E. moderabilis (Costa Rica), E. sanjoseanus (Costa Rica), E. rufotegulus (Costa Rica), and E. exiguus (Costa Rica). Informal species groups are proposed for the genus, but these are for convenience only; most are unlikely to represent monophyletic lineages. Proposed new combinations include E. selectanus (WALKER), comb. n.; E. semicirculanus (WALKER), comb. n.; E. brunneomarginatus (RAZOWSKI & WOJTUSIAK), comb. n.; and E. intermissus (MEYRICK), comb. n.. Proposed new synonymies include Carpocapsa metaspilana WALKER and Grapholita condensatana ZELLER with E. semicriculanus; and Episimus utilis ZIMMERMAN with E. unguiculus CLARKE. These taxonomic and nomenclatural changes bring to 65 the number of species of Episimus recorded from the New World.

Key words: Lepidoptera, Tortricidae, Episimus, Neotropical, new species.

Józef RAZOWSKI,Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, 31-016 Kraków, Sławkowska 17, Poland. E-mail: Razowski@isez.pan. Krakow.pl John W. BROWN, Systematic Entomology Laboratory, USDA, National Museum of Natural History, Washington, DC 20013-7012, USA. E-mail: John.Brown@ars.usda.gov

# I. INTRODUCTION

The tortricid fauna of the New World tropics has received much attention over the past three decades, with the descriptions of over 1200 species and 230 genera published since about 1980. The

vast majority of this descriptive work has focused on Tortricinae and Chlidanotinae, with our knowledge of Neotropical Olethreutinae lagging far behind. However, this trend has begun to change recently, with revisions of Neotropical *Megalota*, *Cacocharis*, *Omiostola*, and *Cosmorrhyncha* (Olethreutini) all in progress (RAZOWSKI and BROWN in preparation).

Within Neotropical Olethreutini, *Episimus* WALSINGHAM, 1892 is likely one of the most species-rich genera. It includes 30 described species (BROWN 2005), and an equal number of undescribed species has accumulated in collections worldwide, primarily as a result of field work by Vitor BECKER in Brazil and three syngeristic efforts in Costa Rica: the parataxonomists program associated with Instituto Nacional de Biodiversidad, the NSF-funded ALAS (Arthropods of La Selva) project, and Daniel JANZEN's rearing project in Area de Conservacion Guanacaste. Together these efforts have resulted in hundreds of specimens of *Episimus*.

The purpose of this paper is to review the described Neotropical species of *Episimus* based on an examination of types, describe 34 new species, and proposed 4 new combinations, 3 new synonymies, and revised status in the genus.

### II. MATERIAL AND METHODS

Abbreviations of depositories are as follows: ANSP, Academy of Natural Sciences, Philadelphia, Pennsylvania, USA; BMNH, The Natural History Museum, London, United Kingdom; CUIC, Cornell University Insect Collection, Cornell University, Ithaca, New York, USA; FSCA, Florida State Collection of Arthropds, University of Florida, Gainesville, Florida, USA; INBio, Instituto Nacional de Biodiversidad, Santo Domingo de Heredia, Costa Rica; MCZ, Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA; MNHU, Museum fur Naturkunde der Humbolt-Universitat, Berlin, Germany; NHMV, Naturhistorisches Museum, Vienna, Austria; USNM, National Museum of Natural History, Smithsonian Institution, Washington, DC, USA; and ZMJU, Zoological Museum, Jagiellonian University, Kraków, Poland. Other abbreviations used in the materials examined include the following: ca. = circa (approximately); Est. = Estación; GS = genitalia slide number; P.N. = Parque Nacional; Z.P. = Zona Protection.

Dissection methods follow those presented in BROWN & POWELL (1991, 2000). Images of adults and genitalia were captured using a digital camera. Terminology for genitalia structures and wing venation follows RAZOWSKI (2003); however, interpretation of some parts of the genitalia is difficult, and a few explanations are necessary. The spine-covered lobe extending from the venter of the valva (Spc<sup>1</sup> sensu HEINRICH 1926) is interpreted to represent the ventral corner of the cucullus, and we refer to it as the submedian lobe. In many species it is a prominent triangular process, and it is difficult to interpret whether it is part of the sacculus or the cucullus. However, in several species the submedian lobe is rounded or weakly developed, confluent with the cucullus distally, and separated from the sacculus by a rounded or angled excavation basally. The sacculus in interpreted to represent the lower basal portion of the valva that typically bears 1-8 extremely elongate setae from large sockets; the setae often are lost in slide-mounted preparations. The rodlike, semi-sclerotized structure anterad of the aedeagus and extending between the base of the aedeagus and the gnathos, which represents a portion of the anellus, is referred to as the henion. The arms of the gnathos are divided into two parts, the broad, basal, membranous part (lateral arms) and the narrow, distally joined part (terminal plate). In the female genitalia we refer to the paired, weakly sclerotized processes extending anterad from the antrum into the ductus bursae as the sclerite of the antrum. There also is a variably-developed, distinctive sclerite near the junction of the ductus bursae and corpus bursae, which we refer to as the cingulum. This region of the ductus bursae frequently is swollen and slightly bulbous, and the cornuti from the male vesica frequenly accumulate there following mating. The shape of the cingulum is often species-specific, and its development helps define some species groups. In the forewing there usually is a well developed ocellar patch in the terminal region, and we refer to this as the ocellus. All species of *Episimus* we examined have a narrow region of the hindwing beneath the cubital pecten in both sexes devoid of scales, creating a "window" in the hindwing, but we are uncertain of the taxonomic value of this character state.

Males of *Episimus* have a variably-developed hairpencil extending from the lower edge of the tegula laterally along the thorax beneath the wings. The hairpencil typically consist of a dense fascicle of 25-30 fine, elongate scales, usually covered by a patch of shorter, more flattened scales in the anterior portion. The hairpencil is subtended by a patch of dark scales laterally on the meso- or metathorax in one species group, and concealed within a membranous sheath that extends well beyond the posterior end of the metathorax in two species groups. These character states are sometimes species-specific for many *Episimus*, but their observation usually requires removal of a hindleg. In some older specimens these features often are damaged or difficult to observe.

### III. SYSTEMATICS

### Episimus WALSINGHAM, 1892

*Episimus* WALSINGHAM, 1892: 501. Type species: *Carpocapsa transferrana* WALKER, 1863; HEINRICH 1926: 78; POWELL 1983: 31; HEPPNER 1994: 83; POWELL et al. 1995: 152; BROWN 2005: 306.

Antictenista MEYRICK, 1927: 337. Type species: Antictenista mesotricha MEYRICK, 1927.

Episemus; DYAR, 1901: 469 [misspelling of Episimus].

*Episimus* is a widespread genus of the New World tropics with several species ranging northward into the United States; *E. argutanus* is North American in distribution, ranging from coast to coast. Three North American species (i.e., *argutanus, augmentanus,* and *tyrius*) were treated by HEINRICH (1926) in his review of North American Olethreutinae; the same three were listed by POWELL (1983) in the Check list of the Lepidoptera of North America north of Mexico. HEPPNER (1994) revised the same fauna, providing the first U.S. records of three Caribbean species and describing three species from Florida as new. POWELL et al. (1995) recognized 30 species in the Neotropical fauna, and BROWN (2005) listed 33 for the world fauna. Of the 33 species listed by BROWN (2005), four likely do not belong in *Episimus* (see below), and four species included in other genera are transferred to *Episimus* below.

*Episimus* belongs to the *Oxysemaphora* group of genera to which HORAK (2006) assigned *Oxysemaphora* DIAKONOFF, 1973 (New Guinea), *Cnecidophora* HORAK, 2006 (Australia), *Dynatorhabda* DIAKONOFF, 1973 (New Guinea), *Episimus* WALSINGHAM, 1892 (New World plus one species from Africa), and *Episimoides* DIAKONOFF, 1957 (Reunion Island in the Afrotropical region). To this group we add the exclusively Neotropical genus *Omiostola* MEYRICK, 1922, which is closely related to *Episimus*. According to HORAK (2006), the *Oxysemaphora* group is defined by the following: (1) a large spine from the lower margin of the valva (absent in one or more genera); (2) a ring-shaped cingulum (modified in many species); (3) a long caulis; and (4) a large costal process. Because one or more of these character states is missing from each of the included genera, the monophyly of the group is not particularly convincing.

*Episimus* is the most species-rich genus of Neotropical Olethreutini; 60 species are recognized in the region, with four others known only from the U.S. The differences between species often are subtle, especially in the male genitalia, but features of forewing maculation and male secondary structures sometimes are useful in identifying species or species groups. Females of some species can be distinguished more easily than males, but this is not true for all species. In this treatment we propose 12 informal species groups. Unfortunately, because many species of *Episimus* are known from a single sex, as with many Neotropical microlepidoptera, assignment to species groups is not always convincing. Hence, many of the proposed groups do not represent monophyletic lineages and should be considered only as a starting point for future work.

#### Caveatus Species Group

The *caveatus* species-group includes four species: *caveatus*, *lavirgenanus*, *aurobasis*, and *runawayicus*. All are moderately large (forewing length 6.5-10.0 mm), usually with an elongatenarrow forewing with a squarish apex; *runawayicus* is known only from the female. The termination of the labial palpus in the male has a tiny black dot in *caveatus* and *lavirgenanus* but not in *aurobasis*. Males of the three species have the hairpencil concealed in a lanceolate sheath that extends far beyond the posterior end of the metathorax. In the male genitalia the socii are erect, crescent-shaped, and converge distally, and they bear a region of stout setae in addition to the typical fine hairs. The stout setae of the socii are shared with members of the albidorsana and kimballi species groups. In the caveatus species group there is a triangular membranous region between the socii that is homologous with the uncus. Members of the caveatus species group have the submedian lobe of the valva greatly reduced, represented by a conspicuous patch of strong setae. Females have the sclerotized part of the sterigma somewhat triangular or rounded-triangular, and a complex curved cingulum near the junction of the ductus bursae and corpus bursae.

### **Episimus caveatus** (MEYRICK)

(Figs 1, 31, 65)

Argyroploce caveata MEYRICK, 1912: 691 (description).

*Episimus caveatus*: CLARKE 1958: 335 (illustrations); POWELL et al. 1995: 152 (checklist); BROWN 2005: 307 (catalog).

D i a g n o s i s. As defined herein, it is possible that *E. caveatus* represents a complex of closely related species that can be distinguished only by subtle differences in the female genitalia; all males we examined have virtually identical genitalia and secondary sex characters. Members of the complex can be recognized by their large size (forewing length 6.5-9.5 mm) and distinctive grizzled orange forewing pattern with pinkish overtones and a diffuse dark orange-brown blotch just beyond mid-costa. The dorsum of the labial palpi and the lower frons are white, and the termination of the third segment in the male has a tiny black dot. Scaling from the posterior end of the abdomen in the male, covering the genitalia, is cream-orange, pinkish in fresh specimens.

The hairpencil is a dense fascicle of elongate scales, mostly dark gray to black covered in shorter cream scales, with a free distal portion concealed in a lanceolate sheath extending far beyond the posterior end of the metathorax.

In the male genitalia (Fig. 1) the uncus is represented by a triangular membranous region with a pointed apex that extends slightly beyond the distal ends of the apically-joined, irregularly semicircular socii; the socii have a narrow region of large, strong spines in addition to the typical fine hairs; and the valva lack a distinct submedian lobe at the point of the dense cluster of setae.

Because the holotype female (type locality: Palma Sola, Venezuela) lacks its abdomen, we are basing our concept of this species on a series of specimens from Rancho Grande, Venezuela.

The female genitalia (Fig. 31) have a rather large, triangular sterigma with rounded proximal corners and distinct submedian folds. The cup-shaped part of the sterigma is large, connected to the sclerite of the antrum which forms slender postmedian lobes. We examined the genitalia of three female specimens (Cerro de Neblina, Venezuela; Rancho Grande, Venezuela; and Limón Province, Costa Rica), and no two are identical; all have a slightly different shape of the triangular region of the sterigma.

Holotype female, Venezuela, [Yaracuy] Palma Sola, "D. .06" (no abdomen) (BMNH).

S p e c i m e n s e x a m i n e d. COSTA RICA: Cartago: Turrialba, 1-6 Mar 1965 (1 male), S. S. & W. D. DUCKWORTH, 2-5 Nov 1967 (1 male), E. TODD (all USNM). Heredia: La Selva SUR 900, 10°26'N, 84°01'W, 9 Mar 2004 (1 male), G. BREHM & J. ROTA (INBio). Limón: Cerro Torteguero, P.N. Torteguero, 0-120 m, Nov 1992 (1 male), R. DELGADO (INBio). Sector Cerro Cocori, Finca de E. Rojas, Apr 1991 (1 female), E. ROJAS (INBio), GS 126,249. Puntarenas: Rancho Que-

#### Neotropical Episimus

mado, Oso Peninsula, Nov 1990 (1 male), F. QUESEDA (INBio). Las Cruces Field Station-OTS, nr San Vito, 8-12 Mar 2001 (1 male), E. BUCKNER & P. OPLER (USNM). French Guiana: Rio Maroni, 1915 (1 female), 1916 (1 male) LeM. (BMNH), [no date] (1 male), W. SCHAUS (USNM). Guyana: Esseq., Plantain Is., 25-26 Mar 1969 (1 male), DUCKWORTH & DIETZ (USNM). Jamaica: St. Ann Parish, nr Runaway Bay Cave, 1-2 May 1973 (1 male), D. & M. DAVIS (USNM). Panama: Cabima, May 1911 (1 male), A. BUSCK (USNM). Barro Colorado Island, 20 Mar 1942 (1 male), J. ZETEK (USNM). Trinidad: Feb 1928 (2 males) (BMNH). Venezuela: Aragua: Rancho Grande, 1100 m, 11-15 Jan 1966 (7 males), 16-19 Jan 1966 (3 males), 21-25 Jan 1966 (7 males),16-23 Oct 1966 (6 males), 24-31 Oct 1966 (2 males), 1-5 Nov 1966 (1 male, 1 female), all S. S. & W. D. DUCKWORTH (USNM), 8-14 Aug 1967 (2 males), R. W. POOLE (USNM), 30-31 Mar 1978 (1 male), J. B. HEPPNER (USNM). T. F. Amazonas: Cerro de la Neblina, basecamp, 0°50'N, 66°9'44"W, 155 m, canopy, 1-10 Mar 1984 (1 female), D. DAVIS & T. MCCABE (USNM).

D i s t r i b u t i o n a n d b i o l o g y. *Episimus caveatus* is recorded from Central America (Costa Rica and Panama), the Caribbean (Jamaica), and northern South America (French Guiana, Guyana, Trinidad, and Venezuela), from sea level to ca. 1100 m elevation. The early stages are unknown.

#### Episimus aurobasis sp. n.

(Figs 2, 32, 66)

D i a g n o s i s. *Episimus aurobasis* is most similar to *E. caveatus* in forewing shape and size, but exhibits considerable dimorphism in forewing maculation. *Episimus aurobasis* can be distinguished by its darker, reddish brown forewing overlaid by fine yellow scales (most prevalent in the apical area) with an ill-defined darker patch just beyond mid-costa in males, and a distinctive maroon ground color with scattered yellow scales and a yellow orange base in females. Males lack the black dot at the termination of the third segment of the labial palpus. Males of *E. aurobasis* share with *E. caveatus* a lanceolate sheath along the postero-lateral portion of the thorax that harbors the hairpencil and extends beyond the end of the metathorax. The male genitalia of *E. aurobasis* can be distinguished from those of related species by the more rounded, lobelike dorsum of the tegumen. The female genitalia can be distinguished by the larger sclerite at the cup-shaped part of sterigma and the larger signa.

D e s c r i p t i o n. Head: Vertex red brown, frons cream in male, vertex and frons orange in female; labial palpus mostly white with some pale orange, termination of third segment without black dot in male. Thorax: Dorsum orange brown and red-brown. Hairpencil in male originating at anterior edge of prothorax, extending well beyond metathorax, distal portion enclosed within lanceolate sheath paralleling abdomen. Forewing length 7.8-8.2 mm; ground colour brownish violet with browner strigulae, spots, and costal divisions; base of wing yellow orange, in distal portion strigulate brown-violet; apical area, terminal line, and small parts of ocellus orange; refractive lines and inner spots of ocellus distinct. Cilia brownish orange to mid-termen, brownish violet to tornus. Hindwing greyish brown, orange in apical part. Cilia concolorous with wing. Abdomen: Venter of segment 7 in male with 2 pairs of deciduous brushes; elongate pink scaling overhanging male genitalia and attached to outer surface of valva.

Male genitalia (Fig. 2) with tegumen rounded, lobelike dorso-laterally; uncus represented by triangular membranous region between socii; socii, large, crescent-shaped, with pointed apical tip, covered with long, strong, spinaform setae; gnathos with squarish, inverted U-shaped process mesally; valva long, broadest at base, slightly narrowed at 0.7 distance from base, upcurved in distal 0.3; costa weakly undulate; ventro-basal portion (sacculus) with linear patch of 7-8 long setae; cluster of 6-8 short, stout, truncate-tipped setae on weak lobe about 0.3 distance from base to apex; lacking distinct triangular process, but with notch along venter of valva immediately basal of cluster; henion with large rounded-triangular base, basal 0.5 broad, distal 0.5 narrow; aedeagus rather long, broad; cornuti lacking (deciduous and lost). Female genitalia (Fig. 32) with sterigma rather small with distinct sclerite protecting ostium bursae; sclerite of antrum ca. 0.3 length of ductus bursae; cingulum weakly sclerotized with a shallow cleft; signa large.

Holotype male, Costa Rica, Heredia Province, Sarapaqui Magsaysay, Cantarana Refuge, 10E24'N, 84E03'W, 170 m, 21 Feb 2004, D. WAGNER (INBio).

Paratypes. Costa Rica: Heredia: Est. Biologica La Selva, 50-150 m, 10°26'N, 84°01'W, 6 Apr 1999 (2 males), Jan 1998 (1 female), INBio-OET (INBio). Limón Province: Sector Cerro Cocori, Finca de E. Rojas, 150 m, Aug 1991 (1 female), E. ROJAS (INBio). Sector Cocori, 30 km N Cariari, Finca de E. Rojas, 150 m, Jan 1994 (1 male), E. ROJAS (INBio). Cerro Tortuguero, P. N. Tortuguero, 0-120 m, Jun 1991 (5 males), J. SOLANO (INBio), Dec 1992 (1 male), R. DELGADO (INBio).

D i s t r i b u t i o n a n d b i o l o g y. This species is known from the lowlands of Costa Rica, from sea level to about 150 m elevation. It has been collected more commonly east of the central cordillera. The early stages are unknown.

E t y m o l o g y. The name refers to the colouration of the forewing of the female: Latin: au-reus - golden; basis - base.

R e m a r k s. Males and females of this species were associated by collecting locality, i.e., both sexes were collected at Estacion Biologica La Selva and Finca de E. Rojas.

### Episimus lavirgenanus sp. n.

(Figs 3, 33, 67)

D i a g n o s i s. *Episimus lavirgenanus* is similar to *E. caveatus* and *E. aurobasis* in forewing size and shape. The male shares with *E. caveatus* and *E. aurobasis* a lanceolate sheath along the lateral portion of the thorax that harbors the hairpencil; males share with *E. caveatus* a black dot at the termination of the third segment of the labial palpus. Superficially, *Episimus lavirgenanus* is easily distinguished by its forewing pattern: maroon in the basal portion of the dorsum, orange yellow in the costal region, and grayish purple in the broad subterminal region. The genitalia are distinguished by the slender base of the socii, the smaller group of spines at the position of the submedian lobe, and the small sterigma with slender submedian folds.

D e s c r i p t i o n. Head: Orange, vertex brown; dorsum and end of labial palpus white, male with tiny black dot at termination of third segment. Thorax: Dorsum brown, tegula orange. Hairpencil as in *caveatus*. Forewing length 8.0-8.2 mm; shape as in *caveatus*; costal area orange, tinged brown subapically; dorsal area rust brown; dorsoposterior part (from mid-dorsum to  $R_5$ ) greyish violet; median part of ocellus and line along costal half of termen orange; costal strigulae orange, divisions brown; refractive lines and inner spots of ocellus developed; pale, diffuse dots in dorsoterminal part of wing and along median edge of brown dorsal area. Cilia brown. Hindwing brown with indistinct rust admixture. Cilia brown.

Male genitalia (Fig. 3) with uncus a membranous triangular region between socii; socii broad, semicircular, hairy, spined marginally; base of socii rather slender; spines of submedian lobe rather small.

Female genitalia (Fig. 33) with sterigma broad, with weak submedian folds atrophying postmedially; cup-shaped part of sterigma moderate; sclerite of antrum ca. 0.35 length of ductus bursae; cingulum a sclerotized, irregularly U-shaped band; copus bursae with pair of moderate signa.

Holotype male, Costa Rica, Heredia Province, 11 km ESE La Virgen, 250-350 m, 10°21'N, 84°03'W, 22 Mar 2004, INBio-OET-ALAS (INBio).

Paratype. Costa Rica: Puntarenas Province: Est. Sirena, 1-100 m, Sep 1993 (1 female), G. FONSECA (INBio).

D i s t r i b u t i o n a n d b i o l o g y. This species is known only from Costa Rica. Nothing is known of the early stages.

E t y m o l o g y. The name refers to the type locality, La Virgen.

### Episimus runawayicus sp. n.

(Figs 34, 68)

D i a g n o s i s. *Episimus runawayicus* is represented by a single female from Jamaica that is similar to *E. caveatus*, but has a conspicuously larger forewing, lacks the ocellus, and has most of the pinkish overtones replaced by more somber brown maculation. In *E. runawayicus* the sclero-tized region surrounding the ostium is much broader anteriorly with more angled lateral corners than in *E. caveatus*, and one of the signa is smaller than the other.

D e s c r i p t i o n. Head: Cream, tinged brown, vertex darker brown, frons paler; labial palpus and lateral parts of head brown ochreous. Thorax: Dorsum cream, tinged brown, with brown marks. Forewing length 9.9 mm; wing shape as in *caveatus*; ground colour cream ferruginous, strongly suffused with rust, with violet grey refraction; strigulation rust brown; costal strigulae cream; divisions rust brown; ocellus pale rust ochreous with small inner spots and moderate refractive lines; markings incomplete, dark rust brown in form of costal part of median fascia accompanied by more medioposterior spot and suffusion at tornus; a line limiting basal area. Cilia rust-brown. Hindwing brown. Cilia greyish brown, ochreous cream beneath apex.

Male unknown.

Female genitalia (Fig. 34) with papilla analis bearing broad proximal lobe; sclerite of antrum asymmetrical, longer side nearly 0.5 length of ductus bursae; cingulum moderately bulbous; signa unequal in size, relatively small.

Holotype female, Jamaica, St. Ann Parish, nr Runaway Bay Cave, 50 ft [15 m], 1-2 May 1973, D. & M. DAVIS (USNM), GS 126,362.

D i s t r i b u t i o n a n d b i o l o g y. This species is known from a single female from Jamaica. The early stages are unknown.

E t y m o l o g y. The species name refers to the type locality of Runaway Bay, Jamaica.

R e m a r k s. A male from the type locality of *E. runawayicus* is much smaller and has a forewing pattern indistinguishable from that of *E. caveatus*; hence, it is included above under the latter species.

### Vermiculatus Species Group

The vermiculatus species group includes *vermiculatus*, *vittatus*, *macropterus*, *ortygia*, *rondoniae*, *religiosus*, and *selectanus*. Adults are medium to medium-large. Males usually have an ill defined, pale region along the forewing dorsum and a rounded dark blotch near the tornus; the female forewing is mostly checkered orange brown. In both sexes there is a small white to pale orange dot or dash at the end of the discal cell. Males lack the black dot at the termination of the labial palpus, and in most species there is a conspicuous patch of modified scales laterally on the metathorax along which the haripencil extends. Male genitalia have a broad, membranous, sparsely hairy, triangular uncus, similar to that in the caveatus group, but unlikely the caveatus species group, the uncus is not attached to the socii. The socii are erect, not joined mid-dorsally, and lack the strong spines characteristic of the caveatus species group; the submedian lobe of the valva is conspicuouly spined and much reduced as in the caveatus species group. The tegumen has a characteristic angle (or "shoulders") subdorsally. In the female genitalia the cingulum usually is a small, simple, semi-sclerotized ring.

### Episimus vermiculatus (MEYRICK)

(Figs 4, 35, 69, 70)

Argyroploce vermiculata MEYRICK, 1912: 690 (description).

*Episimus vermiculata*: CLARKE 1958: 339 (illustrations); POWELL et al. 1995: 152 (checklist); BROWN 2005: 308 (catalog).

D i a g n o s i s. *Episimus vermiculatus* is a moderately large species that exhibits a degree of variation throughout its rather broad geographic range. The male forewing pattern includes a pale area extending through the middle of the wing and an irregular dark patch at the tornus. The sheath of the hairpencil is a smooth, shiny white and gray, narrowly-ovate "purse" entirely attached to the postero-lateral part of the metathorax, similar to that of *E. vittatus*. All male *Episimus* that possess the distinctive purse are assigned to *E. vermiculatus*. The head and labial palpi are dark brown to reddish brown.

Male genitalia (Fig. 4) are distinguished by a large, basally broad, triangular, apically-rounded uncus; a distinctively angulate dorsum of the tegumen; erect socii without spines; a gnathos with a long, slender upturned terminal plate; and a moderately prominent submeidal lobe formed by a well defined concavity basad to the lobe. The henion is bottle-shaped.

In the female genitalia (Fig. 35) the sterigma is slightly pear-shaped, rounded anteriorly with the lateral sides slightly converging posteriorly; the ostium is round with a narrow, ill-defined trough extending posterad; this cingulum is a semi-sclerotized ring around the ductus bursae ca. 0.9 the distance from the ostium to the corpus bursae; the corpus bursae has two rather broad, thorn-shaped signa.

Holotype male, Colombia, San Antonio, 5800' [1800 m], Nov 1907 (BMNH).

S p e c i m e n s e x a m i n e d. Costa Rica: Heredia: 9 km NE Vara Blanca, 10°14'N, 84°06'W, 1450-1550 m, 14 Mar 2005 (1 male), INBio-OET-ALAS transect (INBio). San José: Est. Bijagual, Res. Biol. Carara, 500 m, Sep 1990 (1 male), Jan 1991 (1 female), R. ZUNIGA (INBio). Est. Bijagual, N Bijagualito, 600 m, Mar 1995 (1 male), J. C. SABORIO (INBio). Venezuela: Aragua: Rancho Grande, 1100 m, 11-15 Jan 1966 (1 female), 16-19 Jan 1966 (1 male, 5 females), 21-25 Jan 1966 (1 female), 16-23 Oct 1966 (1 male, 3 female), 24-31 Oct 1966 (1 female), 1-5 Nov 1966 (2 females), W. W. & S. S. DUCKWORTH, 21-31 Jul 1967 (1 female), 22-31 Jul 1967 (4 males, 3 females), 1-7 Aug 1967 (1 female), 15-21 Aug 1967 (1 male, 2 females), 1-7 Aug 1967 (1 male), 15-21 Aug 1966 (1 female), R. W. POOLE (all USNM). Lara: Yacumba National Park, 13 km SE Samare, 1560 m, 4-7 Mar 1978 (2 males, 1 female), 28-31 Jul 1981 (1 male), J. B. HEPPNER (USNM).

D i s t r i b u t i o n a n d b i o l o g y. This species is known from Colombia, Costa Rica, and Venezuela, from ca. 500-1600 m elevation. The early stages are unknown.

R e m a r k s. The specimens listed above from Venezuela and Costa Rica match the holotype of *E. vermiculatus* in facies, male genitalia, and male hairperncil, but are slightly smaller. Unfortunately, the hairpencil of the holotype of *E. vermiculatus* is damaged so the association of the specimens from Costa Rica and Venezuela with *E. vermiculatus* is equivocal.

### Episimus vittatus (WALSINGHAM)

(Fig. 71)

Enarmonia vittata WALSINGHAM, 1914: 238 (description).

Episimus vittata: POWELL et al. 1995: 152 (checklist); BROWN 2005: 308 (catalog).

D i a g n o s i s. *Episimus vittatus* is a medium-sized species, with sexual dimorphism typical of the vermiculatus group: the male has a dark blotch at the tornus, whereas the female forewing is more uniformly checkered orange brown or red brown. In the male genitalia the uncus is membranous, elongate-triangular, with a pointed apex, and moderately hairy throughout. The tegumen is squarish, with angulate shoulders. The socii lack large spines. The valva is broadest at the submedian lobe, narrowest in the middle, and round-elongate in the distal third. The poorly developed submedian lobe has a notch basally but is confluent with the venter of valva distally, with a very slight, short, gentle concavity. The sacculus has 4-5 long setae with distinct sockets. The henion is slender basally and broadens near the middle. The male genitalia of *E. vittatus* are similar to those *E. ortygia* but the uncus is longer and narrower in *E. vittatus*. The male genitalia of *E. vittatus* also are very

similar to those of *E. vermiculatus*, but those of *E. vittatus* have a narrower and more slender uncus. The male hairpencil of *E. vittatus* consists of a fascicle of long slender scales that extends along a pale gray region on the metathorax, extending into a crescent-shaped sheath that is mostly attached to the latero-posterior edge of the metathorax. The female genitalia of *E. vittatus* have an elongate U-shaped ostium; the ductus bursae is moderate in width, ca. 0.75 the length of the corpus bursae; the corpus bursae is irregularly oblong, with the signum on the right side very short, very broad at its base, not curved, and somewhat rounded distally.

Lectotype male (designated herein), Mexico, Veracruz, Atoyac, "IV.18," H. H. SMITH, WALSINGHAM Collection 1910-427 (BMNH), GS 5726.

Paralectotypes. Mexico: Veracruz, Atoyac, "IV.18" (1 female) (BMNH), GS 5727 (1 male, USNM), H. H. SMITH, WALSINGHAM Collection 1910-427, GS 78013.

D i s t r i b u t i o n a n d b i o l o g y. This species is known only from the type series from Veracruz, Mexico. Nothing is known of the early stages.

# Episimus ortygia (MEYRICK)

(Figs 5, 36, 72, 73)

Eucosma ortygia MEYRICK, 1917: 22 (description).

Episimus ortygia: CLARKE 1958: 339 (illustrations); POWELL 1995: 152 (checklist); BROWN 2005: 307 (catalog).

D i a g n o s i s. *Episimus ortygia* is most similar to *E. vermiculatus* and *E. rondoniae*, with dimorphism typical of the vermiculatus species group: a broad, ill-defined, pale area along the dorsum of the forewing in the male, and a nearly uniform reddish brown forewing in the female with a small cream dash at the end of the discal cell. The hairpencil in the male extends into a crescent-shaped distal sheath that is firmly attached to the latero-posterior end of the metathorax, similar to that in *E. rondoniae*. *Episimus ortygia* shares with *E. rondoniae* and *E. macropterus* a black-scaled, oval region on the metathorax over which the hairpencil extends; this patch is absent in *E. vermiculatus*.

In the male genitalia (Fig. 5) the uncus is membranous, elongate-triangular, broad at the base, and moderately hairy throughout. The dorsum of the tegumen is gradually sloped to angulate lateral corners. The socii are large and erect; the terminal plate of the gnathos is joined mesally, with short-digitate, upcurved processes. The valva is broadest at the submedian lobe, narrowed mesally, somewhat elongate-rounded distally; the lobe has a distinct notch basally, but is confluent with ventral edge of valva distally. The sacculus has 3-4 long straight setae from distinct sockets. The henion is bottle-shaped, with a long neck, with the distal and basal portions mostly uniform in width.

In the female genitalia (Fig. 36) the sterigma is parallel-sided, rectangular, rounded anteriorly; the ostium is round with a narrow, ill-defined trough extending posterad. The cingulum is a narrow semi-sclerotized ring around the ductus bursae ca. 0.9 the distance from the ostium to the corpus bursae; and the corpus bursae has a pair of thorn-shaped signa with rather broad bases.

Lectotype male, Guyana ["British Guiana"], Mallali, "3.13", PARISH (BMNH), designated by CLARKE (1958).

S p e c i m e n s e x a m i n e d. Guyana ["British Guiana"], Bartica, ".12.12" (2 male), ".2.13" (1 female), PARISH (BMNH); Mallali, ".3.13" (2 male), PARISH (BHNH). Costa Rica: Alajuela: Area de Conservacion, Rincon Rainforest, Rio Camino Francia, 410 m, 1 Aug 2000, 00-SRNP-14004, em: 21 Aug 2000 (1 male), 00-SRNP-14003, em: 19 Aug 2000 (1 female), r.f. *Vismia baccifera*, F. VARGAS (USNM). Area de Conservacion, Rincon Rainforest, Sendero Penya, 420 m, 6 Aug 2000, 00-SRNP-14103, em: 25 Aug 2000 (1 female), 00-SRNP-14103, em: 23 Aug 2000 (1 female), 00-SRNP-14098, em: 26 Aug 2000 (1 female), r.f. *Vismia baccifera*, all F. VARGAS (USNM), 03-SRNP-10755, 14 Apr 2003, em: 2 May 2003 (1 female), r.f. *Vismia baccifera*, C. Cano (USNM). Area de Conservacion, Sector San Cristobal, Sendero Vivero, 730 m, 29 Jan 2002, 02-SRNP-501, em: 20 Feb 2002 (1 female), r.f. *Vismia baccifera*, T. PRESCOTT (USNM). San Carlos, P.N. Arenal, Senderi Pilón, Rio Celeste, 700 m, 17-19 Oct 2001 (1 male, 2 females), G. RODRIGEZ (INBio). Guanacaste: Area de Conservacion, Sector Pitilla, Loaiciga, 445 m, 1 Jun 2004, 04-SRNP-33074, em: 19 Jun 2004 (1 female), r.f. Vismia baccifera, E. UMBACA (USNM). Z.P. Nosara, Sector de Mirador, 780 m, May 2002 (1 male), 1-10 Oct 2002 (1 male), H. MENDEZ (INBio). Estacion Pitilla, 9 km S Santa Cecilia, 700 m, Jul 1988 (1 male, 1 female), M. SCOBLE & S. BROOKS, 10 May 1988 (2 males), 18 May 1988 (2 males), Jun 1988 (1 male), D. JANZEN & W. HALLWACHS (all INBio), Mar 1989 (1 female), GNP Biodiversity Survey, Oct 1990 (1 male, 2 female), P. RIOS & C. MORAGA, 10 Sep-22 Oct 1990 (1 female), P. RIOS & C. MORAGA, Nov 1990 (1 male, 3 female), Dec 1990 (2 females), C. MORAGA & P. RIOS, 23-28 Jan 1991 (1 female), E. PHILLIPS, C. MORAGA & P. RIOS, 6-18 Aug 1993 (1 male), P. RIOS, Jan 1994 (1 female), C. MORAGA, Mar 1994 (1 female), P. RIOS, May 1994 (1 female), P. RIOS, Jan 1995 (1 female), C. MORAGA, Feb 1995 (1 female), P. RIOS, Apr 1995 (1 male), P. RIOS (all INBio). Est. Pitilla, Rio Orosi, 10.991EN, 85.428EW, 700 m, 19-20 Jun 1988 (1 female), C. M. & O. S. FLINT (USNM). Finca Pasmompa, Est. Pitilla, 5 km SW Santa Cecilia, Dec 1990 (1 female), P. RIOS & C. MORAGA (INBio). Heredia: Est. Biologica La Selva, 10°26'N, 84°01'W, 50-150 m, 19 May 1996 (1 male, 1 female), INBio-OET (INBio), 27 Jul 1996 (1 male), 25 Nov 1998 (1 female), 8 Sep 1998 (1 female), INBio-OET (INBio). 10 km SE La Virgen, 10°20'N, 84°05'W, 450-550 m, 14 Feb 2003 (1 male), 16-17 Feb 2003 (1 male), 19 Feb 2003 (1 male), 20 Feb 2003 (1 male, 1 female), 21 Feb 2003 (1 male), 22 Feb 2003 (1 male), 23 Feb 2003 (3 females), INBio-OET-ALAS transect (INBio). Puntarenas: Quepos, P.N. Manuel Antonio, 80 m, Oct 1990 (1 female), Jan 1991 (1 male, 2 females), Apr 1991 (2 females), R. ZUNIGA (INBio). P.N. Piedras Blanco, Alrededor de Est. Bonito, 100 m, 4-8 Oct 2002 (1 female), M. MORAGA (INBio).

D is tribution and biology. Described from Guyana, this species has been recorded throughout the lowlands of Costa Rica between about 50 and 750 m elevation. According to JANZEN & HALLWACHS (2007), the caterpillar is greenish yellow with white spots and an orange head. Eight specimens (spanning 4 years) have been reared from Area de Conservacion Guanacaste from *Vismia baccifera* (Clusiaceae).

R e m a r k s. CLARKE (1958) stated that 3 of the original 11 specimens of the type series were missing. However, during a visit to BMNH in March 2006, the six specimens from Guyana listed above were found. The other 5 specimens at BMNH included by MEYRICK are 2 males from R. Trombetas, 2 males from Para, and 1 female from Parintins (all Brazil) that most likely are conspecific with *E. rondoniae*.

#### Episimus rondoniae sp. n.

### (Fig. 6, 37, 74)

D i a g n o s i s. *Episimus rondoniae* is most similar to *E. ortygia* superficially and in the male genitalia. The hairpencil is in the form of a dense fascicle of long slender scales reaching the end of metathorax, extending along a large dark patch of scales as in *E. macropterus* and *E. ortygia*, but the patch is slightly larger in *E. rondoniae*, and the distal end of the sheath of the hairpencil has a free tip.

D e s c r i p t i o n. Head: Brown, mixed with cream distally; frons and distal portion of labial palpus white; termination lacking tiny black dot in the male. Thorax: Dorsum cream brown with darker proximal fascia. Hairpencil a dense fascicle of fine scales extending to end of metathorax, extending along large ovoid region of black scales on mesothorax. Forewing length 6.1-6.5 mm; ground colour of dorsal and basal areas whitish cream, sprinkled and strigulated brown; median area and costal part of median fascia brown; costal part of wing distinctly mixed with brown; costal strigulae and terminal line at ocellus white cream; divisions brown, followed by refractive lines partially on pale rust ground colour. Cilia pale ochreous, basal line at mid-termen dark brown. Hindwing greyish brown. Cilia slightly paler.

Female genitalia (Fig. 37) with sterigma small; sclerite of antrum short; cingulum proximal; signa small.

Male genitalia (Fig. 6) with uncus broad, strongly tapered in distal third; socius rather slender, erect; sacculus slender with small ventral incision and small posterior lobe; cucullus distincly narrowed postmedially; aedeagus small. Female unknown.

Holotype male, Brazil, Rondônia, Vilhena, 600 m, 9 Dec 1997, V. O. BECKER (USNM), GS 126,262.

Paratypes. Brazil: Rondônia: Vilhena, 600 m, 9 Dec 1997 (2 males), V. O. BECKER (USNM), GS 124,248. Parintins, Oct 1911 (1 female) PARISH (BMNH).

D is tribution and biology. This species is known only from Brazil.

E t y m o l o g y. The species name refers to the type locality of Rondônia, Brazil.

### Episimus macropterus sp.n.

(Figs 7, 39, 78)

D i a g n o s i s. *Episimus macropterus* is conspicuously larger than *E. vermiculatus* and other species in the vermiculatus species group; the ocellus has black dots rather than dashes; and the cream marking at the distal end of the discal cell in the forewing is a narrow, elongate dash. The hairpencil extends to the end of the metathorax and extends along an ovoid patch of black and lustrous white scales laterally on the mesothorax, similar to that of *E. rondoniae*. The male genitalia are similar to those of *E. vermiculatus*, but in *E. macropterus* the henion is gradually attenuate dorsally, whereas it is bottle-shaped in *E. vermiculatus*. The female genitalia of *E. macropterus* have a conspicuously larger, more complex cingulum than any other species of the vermiculatus species group.

D e s c r i p t i o n. Head: Red brown to dark brown; labial palpus reddish brown, with a few black scales, male lacking black dot at termination. Thorax: Dorsum mostly red-brown, darker anteriorly. Male with hairpencil extending to end of metathorax along ovoid patch of black and lustrous white scales laterally on mesothorax. Forewing length 9.0-11.0 mm; male with ground colour pale along dorsum half, much darker along costal half; an ill-defined rounded, black patch near tornus; costal strigulae whitish followed by orange lines, ocellus orange with blackish spots, edged brown towards tornus; refractive lines well developed; costal divisions brown; female with more uniform red-brown ground with markings less defined; a small cream dash at end of the discal cell in both sexes. Cilia brownish. Hindwing brown, cilia paler.

Male genitalia (Fig. 7) with broad, triangular, membranous uncus with short hairs; tegumen broad with angled shoulders; terminal plate of gnathos moderately broad; henion well developed, gradually attenuate from base of aedeagus to intersection with gnathos; submedian lobe well defined basally, confluent with ventral edge of valva distally, with a very small lobe at sacculus.

Female genitalia (Fig. 39) with sterigma subrectangular, rounded anteriorly, with lateral edges converging slightly posteriorly; sclerite of antrum very short, broad; ductus bursae ca. same length as corpus bursae, with well defined, curved cingulum; corpus bursae with two large, comparatively short signa with broad bases.

Holotype male, Costa Rica, Heredia, 9 km NE Vara Blanca, 1450-1550 m, 10°14'N, 84°06'W, 17 Mar 2005, INBio-OET-ALAS transect (INBio), GS 124,684.

Paratype. Costa Rica: Cartago: P.N. Tapanti-Macizo de la Muerte, Sector La Represa, 100 m SE del Rio Porras, 1600 m, Apr 2002 (1 male), R. DELGADO, GS 124,246. Heredia: 9 km NE Vara Blanca, 10°14'N, 84°06'W, 1450-1550 m, 14 Mar 2002 (1 female), INBio-OET-ALAS transect (INBio), GS 124,675.

D i s t r i b u t i o n a n d b i o l o g y. This species is known from the provinces of Cartago and Heredia, Costa Rica, between 1450 and 1600 m elevation.

E t y m o l o g y. The specific epithet refers to the large forewing length; from the Greek "macros" – large and "pteron" – wing.

# Episimus religiosus (MEYRICK)

Eucosma religiosa MEYRICK, 1917: 21 (description).

*Episimus religiosa*: CLARKE 1958: 339 (illustrations); POWELL et al. 1995: 152 (checklist); BROWN 2005: 307 (catalog).

D i a g n o s i s. *Episimus religiosus* can be distinguished superficially from all other members of the species group by its conspicuously smaller forewing length (5.0 mm) and the broad, well-defined pale area along the entire dorsum of the forewing, similar to some Caribbean species (e.g., *E. kimballi, E. nesiotes*). The male genitalia are most similar to those of *E. ortygia* and *rondoniae* but can be distinguished by the more rounded dorsum of the tegumen and the broader basal portion of the aedeagus. Males of *E. religiosus* lack the oval region of black scales present on the metathorax of *E. ortygia, E. macropterus*, and *E. rondoniae*; the terminal plate of the ganthos is extremely reduced in *E. religiosus*. The scaling of the labial palpi is whitish ochreous, and the hairpencil from the tegula is in the form of a fascicle of long, slender scales extending nearly to the posterior end of the metathorax.

The male genitalia are illustrated by CLARKE (1958). The uncus is slightly shorter and more rounded apically than in other species of the group; the teminal plate of the gnathos in inconspicuous; the valva is broadest at the lobe, which is defined basally by a distinct notch, but distally is confluent with venter of the valva; the valva is uniformly narrow in the distal half; and the henion has a long, broad basal portion and a slender distal portion that is only slightly attenuate apically.

Holotype, male, Guyana ["British Guiana"], Bartica, January, PARISH (BMNH), GS 6392. D i s t r i b u t i o n a n d b i o l o g y. This species is known only from the type.

#### Episimus selectanus (WALKER), new combination

Carpocapsa selectana WALKER, 1863: 400 (description).

Carpocapsa selectana: POWELL et al. 1995: 157 (checklist).

"Grapholitini Unplaced Species" selectana: BROWN 2005: 367 (catalog).

D i a g n o s i s. This species is represented only by the holotype female which lacks the head. It is medium-sized with a rather uniform orange and orange-brown pattern of longitudinally oriented elements similar to other females of the vermiculata species group. The ocellus is poorly defined with three short dark dashes. The hindwing is uniform pale brown with an elongate "window" totally lacking scales beneath the cubital pecten, similar to *E. semicirculanus*; and the fringe is orange. Superficially it is unlike any other *Episimus*, except females of *E. pitillae* from Costa Rica. The genitalia are typical of the genus: the papillae anales are slipper-shaped, the ostium is stout U-shaped with a slightly rounded anterior edge; the ductus bursae is comparatively broad, and about the same length as the corpus bursae, with the cingulum represented by a rounded swelling; and the corpus bursae is ovoid with a pair of relatively large, thorn-shaped signa.

Holotype female, Brazil, Amazonas, Ega (BMNH), GS 11776.

D i s t r i b u t i o n a n d b i o l o g y. This species is known only from the holotype collected at Ega, Brazil.

R e m a r k s. Superficially, this species does not conform to any of our specimens from Brazil. However, the facies and female genitalia indicate it is certainly a member of *Episimus*.

### Lupatus Species Group

The lupatus species group includes three species: *lupatus*, *mesotrichus*, and *brunneomarginatus*. Members of the group are the largest in the genus, with forewing lengths greater than 10.0 mm. The forewing has a characteristic pattern that includes a dark, narrow, linear band along the dorsum with a pair of subtriangular expansions, one near mid-dorsum and one near the tornus. Males lack the black dot at the termination of the labial palpus, and the hairpencil is an elongate fascicle of slender scales that extends to the end of (or beyond) the metathorax without a distal sheath or other modification. The uncus and socii are densely haired, and the valva lacks a distinct submedian lobe.

# Episimus lupatus (MEYRICK)

Argyroploce lupata MEYRICK, 1912: 690.

*Episimus lupata*: CLARKE 1958: 336 (illustrations); POWELL et al. 1995: 152 (checklist); BROWN 2005: 307 (catalog).

D i a g n o s i s. *Episimus lupatus* is similar to *E. mesotrichus* and *E. brunneomarginatus* in forewing shape and pattern, but it has a slightly greater forewing length than the other two (13.0 vs. 11.0 mm). The male genitalia of *E. lupatus* have a broad, rod-shaped uncus, slightly expanded and rounded distally, with dense dorsal and lateral hairs; the socii are digitate, dense hairy, and project posterad; the gnathos has a slender terminal plate that is joined distally by membrane; the valvae are somewhat *Eucosma*-like, strongly upcurved, with a shallow indentation along the venter immediately basad of the weak submedian lobe, which is densely spined; the spines of the lobe are not well differentiated from the spines of the cucullus; and the aedeagus is large and broad, the vesica with a dense patch of cornuti. The hairpencil is in the form of a long fascicle of slender, elongate, dark scales. The adult and male genitalia of the lectotype are illustrated by CLARKE (1958: 336).

Lectotype male, Colombia, San Antonio, 5800' [1800 m], Nov 1907 (BMNH), GS 6403.

Material Examined. Colombia: San Antonio, 5800' [1800 m], Nov 1907 (1 male) (USNM).

D i s t r i b u t i o n a n d b i o l o g y. This species is known from two specimens from San Antonio, Colombia. It is likely that it is restricted to the higher elevations of the Andes.

### Episimus mesotrichus (MEYRICK)

(Fig. 75)

Antictenista mesotricha MEYRICK, 1927: 337 (description); CLARKE 1958: 299 (illustrations).

Episimus mesotricha: POWELL et al. 1995: 152 (checklist); BROWN 2005: 307 (catalog).

D i a g n o s i s. *Episimus mesotrichus* is most similar to *E. lupatus*, but *E. mesotrichus* has a slightly smaller forewing length. The male genitalia of the two are very similar, but *E. mesotrichus* has a more squarish and broader dorsum of the tegumen; a longer, more slender terminal plate of the gnathos; and a slightly more distally-attenuate valva. The adult and male genitalia of *E. mesotrichus* are illustrated by CLARKE (1958: 299).

The head is brown with a rust hue; the labial palpus is rust brown dorsally; the antenna is cream brown. The thorax is brown, concolorous with the vertex of head proximally, and the tegula is brownish cream posteriorly. Forewing length is 11.0 mm; the forewing is pale ferruginous brown, strigulated with ferruginous in the basal half; the distal half is darker with stronger strigulation; the terminal area is more rust without strigulations; the costal strigulae are yellow; the divisions are rust brown; the ocellus is ochreous-ferruginous with brown inner spots and strong refractive lines; and the tornus is leaden grey. The forewing markings are dark brown with a purple admixture consisting of a dorsal fascia almost reaching the tornus and a triangular blotch at the tornus. Forewing cilia is rust brown, greyer at tornus. The hindwing is brown, the cilia paler and greyer.

Holotype male, Brazil, São Paulo (BMNH), GS 6404.

Distribution and biology. This species is known only from the holotype.

R e m a r k s. A female from Venezuela is associated with the holotype in the BMNH. However, based on specimens in the USNM, material from Venezuela does not appear to be conspecific with the holotype of *E. mesotrichus*.

# Episimus brunneomarginatus (RAZOWSKI & WOJTUSIAK), new combination

Epinotia brunneomarginata RAZOWSKI & WOJTUSIAK, 2006: 37 (description).

D i a g n o s i s. *Episimus brunneomarginatus* is most similar to *E. lupatus* in facies, with a dark longitudinal band along the dorsum that ends in small triangular patch just before the tornus. The male genitalia of the two also are similar but those of *E. brunneomarginatus* can be distinguished by the broader valva, the cucullus less hairy, with a few longer, stronger spines along the ventral edge of the valva, a slightly longer uncus, and a deeper subbasal excavation basad of the weakly developed submedian lobe. The adult and male genitalia are illustrated by RAZOWSKI & WOJTUSIAK (2006).

Holotype male, Ecuador, Prov. Morona-Santiago, Gualaceo–Limón road, east, 03E01'26"S, 78E35'07"W, 2200 m, 30 Aug 2003, WOJTUSIAK, PYRCZ & GARLACZ (ZMJU).

D i s t r i b u t i o n a n d b i o l o g y. *Episimus brunneomarginatus* is known only from the holotype.

Intermissus Species Group

This species group consists of the single, highly divergent species *E. intermissus*. With its black-and-white forewing pattern, it cannot be confused with any other species of *Episimus*. The male lacks the black dot at the termination of the labial palpus, and the distal end of the hairpencil lies within a large, well developed sheath.

### Episimus intermissus (MEYRICK), new combination

(Fig. 76)

Argyroploce intermissa MEYRICK, 1931: 139 (description).

Olethreutes intermissana: POWELL et al. 1995: 153 (checklist).

"Olethreutinae unplaced" intermissa: BROWN 2005: 447 (catalog).

D i a g n o s i s. *Episimus intermissus* is superficially unlike any other species in the genus. The white forewing ground color with black pattern elements and pale green overscaling, and moderately long forewing length (10.0 mm) are more reminiscent of those of *Lanacerta lacertana* (ZELLER) (Tortricinae: Euliini) than to any congener. In the male the distal end of the hairpencil is concealed in a broad sheath that extends well beyond the posterior end of the metathorax. The male genitalia are somewhat similar to those of the lupata species group, with large, parallel-sided, upturned valvae and a rod-shaped uncus.

Syntypes male, female, Brazil, São Paulo (NHMV).

S p e c i m e n s e x a m i n e d. BRAZIL: Est. do Rio, Itatiaia, (1 male), BARTH (USNM). Petropolis, 1881 (male), DOER (USNM).

# Semicirculanus Species Group

The semicirculanus species group is characterized by a variably developed semicircular patch near the middle of the forewing dorsum. The labial palpi have characteristic grayish longitudinal band along the outer surface of the second segment (except for *E. queposanus*); the third segment of the labial palpus is gray-ocherous or whitish, and males lack a black dot at the termination (except for *E. zunigae* an *E. queposanus*). Many species have a small, round patch of black scales at the base of the scape of the antennae in both sexes. Both males and females have an unscaled region in the hindwing beneath the pecten. Male genitalia of most species have a cluster of 2-4 blunt-tipped setae at the position of the submedian lobe; several species have an extra-long cornutus that is curved sub-distally.

### Episimus semicirculanus (WALKER), new combination

### (Figs 38, 77)

Carpocapsa semicirculana WALKER, 1863: 396 (description).

Cydia semicirculana: POWELL et al. 1995: 152 (checklist); BROWB 2005: 239 (catalog).

Carpocapsa metaspilana WALKER, 1863: 405 (description). New synonym.

Cydia metaspilana: POWELL et al. 1995: 157 (checklist).

Episimus metaspilana: BROWN 2005: 307 (catalog).

Grapholita condensatana ZELLER, 1877: 162 (description). New synonym.

Episimus condensatana: POWELL et al. 1995: 152 (checklist); BROWN 2005: 307 (catalog).

D i a g n o s i s. As defined herein, *Episimus semicirculanus* may be a complex of closely related species characterized by a distinctive, dark, somewhat incomplete and variably developed crescent-shaped patch near the middle of the forewing dorsum with the remainder of the wing grizzled, wood-grain brown. There is no sexual dimorphism in forewing pattern. In both sexes the venter of the pedicel has a roundish black patch of scales near the distal end, and this character, along with the forewing pattern, immediately distinguishes *E. semicirculanus* from all congeners. The lower frons and labial palpi are white, the palpus has a characteristic grayish band along the outer surface of the second segment, and the third segment is gray-ocherous without a black dot at the termination.

Based on the superficial features described above, *metaspilanus, semicirculanus*, and *condensatus* represent the same taxon. Unfortunately, the genitalia of the types are of less value: the female holotype of *semicirculanus* has no abdomen, and the female genitalia of the holotype of *metaspilanus* are on an old slide.

The female genitalia of specimen from Costa Rica are thus figured (Fig. 38).

Under this name we assign specimens from a broad geographic range in which males possess a bundle of long, slender cornuti in which one cornutus is longer than the rest and is bent at a ca. 80° angle subdistally and the superficial features described above.

Holotype female (semicirculana), Honduras (BMNH) [no abdomen].

Holotype female (metaspilana), Honduras (BMMH).

Holotype male (condensatana), Panama, Chiriqui (MNHU)

S p e c i m e n s e x a m i n e d. Brazil: Ega (1 female) (BMNH). Espirito Santo: Linhares, 40 m, 20-29 Feb 1992 (2 males, 1 female), V. O. BECKER (USNM). Costa Rica: Heredia: Est. Biologica La Selva, 10°26'N, 84°01'W, 50-150 m, 23-Nov 1998 (1 male), INBio-OET (INBio), 8-14 Mar 2004, J. ROTA (INBio), 23-29 Feb 2004 (1 female), D. L. WAGNER (INBio), Feb 1999 (1 female), INBio-OET (INBio), 27 Feb 2004 (1 female), SCHWEITZER & WAGNER (INBio), 23-29 Feb 2004 (1 male), D. L. WAGNER (INBio), 23-29 Feb 2004 (1 female), SCHWEITZER & WAGNER (INBio), 23-29 Feb 2004 (1 male), D. L. WAGNER (INBio). Dominica: 3 mi W Pont Casse, 26 Oct 1966 (1 female), E. L. TODD (USNM). Guyana ["British Guiana"]: Georgetown, ".4.13" (1 male), ".11.13" (1 female), ".4.13" (3 males). Bartica, ".1.13" (1 male), ".2.13" (3 females), ".12.12" (2 females), PARISH (BMNH). Honduras: [no further data] (2 males, 2 females) (BMNH). Nicaragua: El Recreo, Jul 1971 (1 male, 1 female), J. MALDONADO (USNM). Panama: Porto Bello, May 1911 (1 female), A. BUSCK (USNM). Barro Colorado Island, 1-9 May 1964 (1 male), 10-17 May 1964 (1 male), W. D. & S. S. DUCK WORTH (USNM). Peru: Jurimaguas, "3.20" (1 male), PARISH (BMNH). Iquitos, "3.20" (BM), PARISH (BMNH). Venezuela: Aragua: Rancho Grande, 1100 m, 16-23 Oct 1966 (5 males, 1 female), S. S. & D. W. DUCKWORTH (USNM), 26-30 Jun 1981 (1 male), J. HEPPNER (USNM).

D i s t r i b u t i o n a n d b i o l o g y. This species is recorded from Central America (Costa Rica, Honduras, Nicaragua, Panama), the Caribbean (Dominica) and northern South America (Brazil, Guyana, Peru, and Venezuela). The early stages are unknown.

R e m a r k s. Most recently (BROWN 2005), *semicirculanus* was assigned to *Cydia*, and *condensatanus* and *metaspilanas* considered distinct species of *Episimus*. An examination of the types revealed that all are uniform in several superficial features, in particular the forewing pattern and the black spot on the pedicel of the antenna.

### Episimus zunigae sp. n.

### (Figs 8, 40, 79)

D i a g n o s i s. *Episimus zunigae* is most similar to *E. queposanus*; the two share a forewing pattern in which the forewing mid-dorsal blotch is reduced to an oblique dash extending from the subbasal portion of the dorsum, and males have a black dot at the termination of the labial palpus. Both species possess an extra-long, distally bent cornutus in the vesica, similar to that of *E. semicirculanus*. *Episimus zunigae* and *E. queposanus* can be distinguished superficially by the outer sur-

face of the second segment of the labial palpus: white with a characteristic purplish gray longitudinal line, bent dorsad near the distal end of the segment in *E. zunigae*; pale brown without the characteristic line in *E. queposanus*. *Episimus zunigae* and *E. queposanus* share with *E. semicirculanus* a roundish black patch of scales near the distal end of the pedicel of the antenna in both sexes.

D e s c r i p t i o n. Head: Brown; frons cream brown, white in ventral part; antenna brownish cream, scape darker brown than flagellum, pedicel with rounded black dot; labial palpus cream with purplish gray longitudinal line along middle and pale brown terminal joint. Thorax: Dorsum brown with dark brown marks on tegula. Forewing length 6.0-7.0 mm; ground colour dark cinnamon, strongly suffused brown in basal half from base to ocellus, with some similarly coloured dashes and fine strigulae, orange in distal portion; costal strigulae white; divisions rust brown; ocellus brownish rust; inner spots brown; dorsal blotch brown, diffuse; costal half of termen finely edged with white. Cilia brownish, darker basally and at tornus. Hindwing brown. Cilia somewhat paler.

Male genitalia (Fig. 8) with uncus slender, short; socius large, densely hairy; valva gradually narrowed distally, submedian lobe weak with patch of four blunt-tipped setae; aedeagus short, vesica with a dense patch of cornuti with an extra-long cornutus bent subdistally.

Female (Fig. 40) with sterigma comprised of a pair of rectangular lateral plates attached to mesal, crescent-shaped antrum; sclerite of antrum short; ductus burase about the same length as corpus bursae, with large laterally-oriented, V-shaped cingulum; corpus bursae with a pair of moderately large, spine shaped cornuti with relative broad bases.

Holotype male, Costa Rica, Puntarenas, P.N. Manuel Antonio, Oct 1990, G. VARELA & R. ZUNIGA (INBio), GS 126,300.

Paratypes. Costa Rica: Guanacaste: Est. Pitilla, 9 km S Santa Cecilia, P.N. Guanacaste, 700 m, 27 Jul-14Aug 1992 (1 male), P. RIOS (INBio). Finca Pasmompa, Est. Pitilla, 5 km SW Santa Cecelia, 400 m, Dec 1990 (1 male), P. RIOS & C. MORAGA (INBio). Heredia: Est. Biologica La Selva, 10°28'N, 84°01'W, 50-150 m, 4 Mar 1998 (1 female), INBio-OET (INBio). Puntarenas: Quepos, P.N. Manuel Antonio, 80 m, Jan 1991 (1 female), G. VARELA (INBio), Jan 1991 (1 female), R. ZUNIGA (INBio). Area de Conservacion Guanacaste, 05-SRNP-21875, 21882, 21905 (3 females), D. JANZEN & W. HALLWACHS (USNM). Panama: Porto Bello, Sep 1912 (1 male), A. BUSCK (USNM). Canal Zone: Pipeline Road, Rio Aguas Salud, 8-12 Jul 1967 (1 female), FLINT & ORTIZ (USNM).

D i s t r i b u t i o n a n d b i o l o g y. This species is recorded from the Pacific slope of Costa Rica and Panama at elevations mostly below about 200 (n = 9) (one specimen from 400 m and one from 700 m).

E t y m o l o g y. The name refers to one of the collectors of the holotype, R. ZUNIGA.

#### Episimus queposanus sp. n.

### (Figs 9, 80)

D i a g n o s i s. *Episimus queposanus* is most similar to *E. zunigae*, sharing a similar forewing pattern and a black dot at the termination of the labial palpus in the male. Both species possess an extra-long, distally bent cornutus in the vesica. The two species can be distinguished superficially by the outer surface of the second segment of the labial palpus: rather uniform pale brown in *E. queposanus*; white with a characteristic purplish gray longitudinal line, bent dorsad near the distal end of the segment in *E. zunigae*. In *E. queposanus* there is a small round patch of black scales near the distal end of the pedicel of the antenna, and this character is shared with *E. zunigae* and *E. semicirculanus*.

D e s c r i p t i o n. Head: Vertex pale brownish cream, lower part of frons white, brownish transverse fascia before antennae; labial palpus cream and pale brown with darker brown and grey at anterior joints subdorsally. Thorax: Dorsum darker than head with brownish and cream fasciae. Forewing length 7.0 mm; termen convex postmedially, slightly concave beneath apex; ground colour pale brownish ferruginous in form of dots and two fasciae proximally and distally to ocellus; costal strigulae in basal half concolorous with ground colour, posterior half white, divisions brown;

ocellus rust orange with weak refractive elements and distinct inner spots. Cilia brown, orange rust before tornus. Hindwing brown. Cilia paler.

Male genitalia (Fig. 9) with uncus short; socii short, densely hairy, without stout setae; valva narrow, with submedian lobe bearing 3-4 blunt-tipped setae; aedeagus large, vesica with dense cluster of cornuti of equal length.

Female unknown.

Holotype male, Costa Rica, Puntarenas, P.N. Manuel Antonio, Quepos, 80 m, Dec 1990, (IN-Bio), GS 126,301.

Paratypes. Costa Rica: Puntarenas: P.N. Manuel Antonio, Quepos, 80 m, Dec 1990 (2 male), G. VARELA & R. ZUNIGA, (INBio).

D i s t r i b u t i o n a n d b i o l o g y. This species is known only from the type locality near the coast in southwestern Costa Rica.

E t y m o l o g y. The specific epithet refers to the type locality of Quepos, Costa Rica.

### Episimus rufatus sp. n.

(Fig. 10, 41, 81)

D i a g n o s i s. Superficially, *E. rufatus* is most similar to *E. selectanus*, with a nearly uniform orange-brown forewing with the only conspicuous marking being the ocellus. The female genitalia are typical of the semicirculana species group with a complex sclerotized region at the anterior portion of the ductus bursae and a long, semi-sclerotized cingulum immediately anterad of the ostium. *Episimus rufatus* is somewhat similar to *E. semicirculanus*, but *E. rufatus* differs by having a more rust colouration, a shorter sclerie of the antrum, and a more complex cingulum.

D e s c r i p t i o n. Head: Pale brown, labial palpus slightly darker terminally. Thorax: Dorsum brown with slight rust admixture. Forewing length 7.0 mm; ground colour brown with weak violet refraction; strigulation browner, diffuse; three pairs of white, small costal strigulae in postmedian area, divisions chestnut brown; distal portion of wing chestnut, partialy suffused brown; costal half of termen finely edged dark brown; ocellus brownish ochreous medially; inner spots and refractive lines moderate. Markings rust in form of costal part of median fascia and sumedian spot near dorsum. Cilia brownish; grey-brown at tornus. Hindwing rather pale, grey-brown with darker periphery and veins. Cilia tinged ochreous.

Male genitalia (Fig. 10) with uncus short, broad basally, very narrow apically; socii unmodified, densely hairy; valva gradually attenuate distally, with submedian lobe small, bearing 4 blunt-tipped setae; aedaegus large, vesica with dense patch of cornuti of equal length.

Female genitalia (Fig. 41) with sterigma moderate; sclerite of antrum one-third length of ductus bursae; cingulum fairly large, curved, complex; signa with small basal plates.

Holotype female, Jamaica, Portland Parish, 4 mi S Hartford, 8500' [2800 m], 26-27 Apr 1973, D. & M. DAVIS (USNM), GS 126,351.

Paratypes. Cuba: Santiago de las Vegas, E.E.A. de Cuba, 13 Aug 1931 (1 male, 2 females), A. OTERO, r.f. leaf of *Calophyllum* sp. (9615) (USNM).

D i s t r i b u t i o n a n d b i o l o g y. This species is known from Jamaica and Cuba. The three from Cuba were reared from *Calophyllum* sp. (Clusiaceae).

E t y m o l o g y. The specific epithet refers to the color of the forewing maculation; Latin: rufatus tinged with rust.

R e m a r k s. The association of the Cuban specimens with the female from Jamaica, is based on similar facies and female genitalia and is not entirely without question.

# Episimus strigulanus (WALKER)

Carpocapsa strigulana WALKER, 1863: 398 (description).

Episimus strigulana: POWELL et al. 1995: 152 (checklist); BROWN 2005: 307 (catalog).

D i a g n o s i s. *Episimus strigulanus* is a medium-sized species superficially indistinguishable from *E. queposanus*. Because the holotype is a female and the type series of *E. queposanus* is represented by three males, secondary male features (e.g., dot at end of the labial palpus, haripencil) and female genitalia cannot be compared between the two species. However, based on geography, it is unlikely that the two are conspecific.

Holotype female, Brazil, Amazonas, Ega (BMNH).

R e m a r k s. Although there are four specimens (one from Brazil and three from Peru) associated with the holotype in the BMNH, none appears to be conspecific with it.

### Episimus ligneanus (FELDER & ROGENHOFER)

Grapholitha ligneana FELDER & ROGENHOFER, 1875: pl. 138, fig. 6 (description).

Episimus ligneanus: POWELL et al. 1995: 152 (checklist); BROWN 2005: 307 (catalog).

D i a g n o s i s. *Episimus ligneanus* is known only from the holotype male which lacks an abdomen. It is a medium-sized species most similar to *E. semicirculanus* and *E. queposanus*. It can be distinguished from the latter in that the remnant of the semicircular patch is more maroon-colored rather than pale brown, and oriented more longitudinal rather than oblique, and the round spot at the lower edge of the ocellus is orange-brown, rather than leaden gray. The hindwing is uniform dark brown with orange cilia. The third segment of labial palpus has an extremely tiny black dot.

Holotype male, Brazil, Amazonas (no abdomen) (BMNH).

D is tribution and biology. This species is known only from Amazonas, Brazil. The early stages are unknown.

R e m a r k s. There are two specimens (Dutch Guiana, "E.", .9.92. 1 male, .8.92, 1 female) in the BMNH associated with the holotype, but we suspect they are not conspecific with it.

# Episimus varablancanus sp. n.

(Figs 11, 42, 82)

D i a g n o s i s. *Episimus varablancanus* can be distinguished superficially from all other members of the semicirculana species group by the expanded semicircular blotch of the forewing. In other species of the group the patch occupies the middle one-fourth of the dorsum, whereas in *E. varablancanus* in is considerably more elongate, occupying nearly the middle one-third of the dorsum. The genitalia are extremely similar to those of *E. semicirculanus*, but the extra-long cornutus is more strongly bent than in most other species of the group.

D e s c r i p t i o n. Head: Vertex brown to cream brown, lower part of frons white; labial palpus white dorsally, with characteristic gray brown longitudinal line along outer margin; third segment gray without black dot at termination in male. Thorax: Dorsum pale red brown to pale gray brown. Hairpencil short. Forewing length 7.5 mm; ground colour pale brown mixed with red brown, paler through middle of wing; dark brown, slightly curved, longitudinal patch, parallel to dorsum occupying middle one-third of dorsum. Cilia brown, orange rust before tornus. Hindwing brown. Cilia paler. Abdomen: Pale brownish gray, with patch of concolorous scales extending over genitalia.

Male genitalia (Fig. 11) with uncus slender, rodlike, curved; socii covered with fine hairs, stout setae absent; valva narrow, slightly narrower in distal one-third; cuculus densely spined, with a few larger spines along vertral margin; submedian lobe with patch of four large, blunt setae; aedeagus rather broad, vesica with dense patch of cornuti, one of which is longer and bent in distal one-fifth.

Female genitalia (Fig. 42) with sterigma comprised of a pair of irregularly rhomboidal lateral sclerites attached to a crescent-shaped antrum; sclerite of the antrum long, nearly half length of ductus bursae; cingulum weak, crescent-shaped, at slightly enlarge region near junction of ductus bursae and corpus bursae; corpus bursae rounded with a pair of moderate, curved, thorn-shaped signa.

Holotype male, Costa Rica, Cartago: P.N. Tapanti-Macizo de la Muerte, 300 m SE Puente del Rio Porras, 1660 m, Mar 2002, R. DELGADO (INBio), GS 126,329.

Paratypes. Costa Rica: Heredia: 9 km NE Vara Blanca, 10°14'N, 84°06'W, 1450-1550 m, 14-20 Mar 2005 (1 male, 1 female), INBio-OET-ALAS (INBio), GS 124,697.

D i s t r i b u t i o n a n d b i o l o g y. This species is recorded from the middle elevations (1450-1660 m) in the provinces of Cartago and Heredia, Costa Rica.

E t y m o l o g y. The specific epithet refers to the collecting locality of Vara Blanca, Costa Rica.

### Episimus neblinanus sp. n.

(Figs 43, 83)

D i a g n o s i s. *Episimus neblinanus* is known from a single female that is superficially indistinguishable from the female of *E. zunigae* with an ill-defined, oblique dash from the dorsum of the forewing on a reddish-brown ground color. The female genitalia of *E. neblinanus* can be distinguished by the longer sclerite of the antrum.

D e s c r i p t i o n. Head: Brownish cream, labial palpus edged greyish white. Thorax: Dorsum concolorous with head, paler posteriorly. Forewing length 6.5 mm; ground colour reddish brown suffused with yellow-brown, strigulated brown, brownish gray in dorsal third; costal strigulae cream, some white subapically along costa, divisions yellowish brown; ocellus pale orange cream, inner spots brown, refractive lines rather distinct; markings reduced: a rust brown mark with brown dorso-postbasal blotch. Cilia (worn) brown. Hindwing brown, paler basally. Cilia pale brownish.

Male unknown.

Female genitalia (Fig. 43) with sterigma comprised of a pair of rhomboidal lateral sclerites attached to a broad, mesal, crescent-shaped antrum; sclerite of antrum ca. 0.33 length of ductus bursae; cingulum large, complex; signa relatively small.

Holotype female, Venezuela, T.F. Amazonas, Cerro de la Neblina, base camp, 0°50'N, 66°9'44"W, 140 m, 13-20 Feb 1984, D. DAVIS & T. MCCABE.

D i s t r i b u t i o n a n d b i o l o g y. This species is known only from the type locality of Cerro de la Neblina, Venezuela.

E t y m o l o g y. The name refers to type locality, Cerro de la Neblina.

# Pitillae Species Group

This species group consists of the single spcies *E. pitillae*, which has features in common with both the semicirculana and vermiculatus species groups. In forewing pattern (e.g., dark tornal blotch in male) and male haripencil (e.g., lateral scale patch on metathorax), it is most similar to species of the vermiculatus species group. However, the female genitalia, with a complex cingulum, are virtually indistinguishable from those of members of the semicirculana species group and quite distinct fom those of vermiculatus species group. The characteristic longitundinal band of the labial palpus also is similar to that found in the semicirculana species group. The male genitalia, with an unusual flange covered with spines at the position of the sudmedian lobe, are unlike any other species in the genus.

# Episimus pitillae sp. n.

(Figs 12, 44, 84)

D i a g n o s i s. *Episimus pitillae* is distinguished superficially by a dark reddish brown forewing with the dark blackish brown blotch at the tornus in both sexes. The outer surface of the labial palpus is pale with a characteristic longitudinal gray or reddish gray band. In the male, the hairpencil extends along a distcinct patch of scales on the metathorax, but in *E. pitillae* the patch is pale orange with a black perimeter. The female genitalia, with a complex curved sclerite near the junction of the corpus and ductus bursae, are much more similar to those of the semicirculana speices group than to those of the vermiculatus species group.

D e s c r i p t i o n. Head: Dark brown, labial palpi cream on outer surface with longitudinal band of gray or reddish gray, male without black dot at termination. Thorax: Dorsum brown. Hairpencil a broad fascicle of long, slender scales, with pale orange, ovoid patch of scales on metathorax surrounded by a perimeter of black scales. Forewing length 7.0-8.0 mm; slender, costal half of termen almost straight, not oblique; ground colour brown, strigulated pale brown, strigulation well developed in dorsal half of wing and beyond median cell; base of wing browner; costal strigulae whitish followed by orange lines, ocellus orange with blackish spots, edged brown towards tornus; refractive lines well developed, costal divisions brown. Cilia brownish. Hindwing brown, cilia paler.

Male genitalia (Fig. 12) with uncus slightly expanded measlly, more slender in distal part; socius broad, densely hairy; valva broadest basally, narrowest near middle, submedian lobe flangelike, with dense patch of long spines directed proximad, bordered basally by distinct ventral incision; aedeagus broad, moderately long; henion long.

Female genitalia (Fig. 44) with papilla analis rather slender; sterigma moderate; sclerite of antrum very long, broadened proximally, ca. 0.4 length of ductus bursae; cingulum broad, complex, ringlike; signa broad with reduced basal plates.

Holotype male, Costa Rica, Guanacaste, Est. Pitilla, 9 km S Santa Cecilia, 700 m, Jan 1995, C. MORAGA (INBio), GS 124,725.

Paratypes. Costa Rica: Guanacaste: Est. Pitilla, 9 km S Santa Cecilia, 700 m, Jan 1995 (1 male, 1 female), Nov 1994 (1 female) P. RIOS, 10 May 1988 (1 female), D. JANZEN & W. HALLWACHS, 27 Jul-14 Aug 1992, P. RIOS (INBio). Heredia: 9 km NE Vara Blanca, 10E14'N, 84E06'W, 1450-1550 m, 14 Mar 2005 (1 female), 14-20 Mar 2005 (1 female), INBio-OET-ALAS transect (INBio). Puntarenas: Finca Cafrosa, Est. Las Mellizas, P.N. Amistad, 1300 m, Apr 1991 (1 female), M. RAMIREZ, Jan 1991 (1 female), M. CHAVARRIA & G. MORA (INBio).

D i s t r i b u t i o n a n d b i o l o g y. *Episimus pitillae* is known from the Costa Rican provinces of Guanacaste, Heredia, and Puntarenas between 700 and 1600 m elevation. Nothing is known of the life history.

E t y m o l o g y. The specific name refers to type locality, Estación Pitilla.

# Albidorsanus Species Group

Superficially, this group is rather heterogeneous, but both sexes of all species have a characteristic longitudinal band of gray to purple-gray scales along the labial palpus (as in the semicirculana species group), and there is a narrow band of leaden-gray scales bordering the ocellus of the forewing. The male genitalia of all species of the group possess a region of stout, strong setae on the socii in addition to the typical fine hairs (similar to the caveatus and kimballi species groups); a stout, rod-shaped uncus, frequently much broader at the base; and valva with a well-defined, triangular submedian lobe (as in the transferranus, mahaianus, tyrius, and kimballi species groups). Males of most (but not all) species have a tiny black dot at the termination of the labial palpus and an unmodified hairpencil.

### Episimus albidorsanus sp. n.

### (Figs 13, 45, 85, 86)

D i a g n o s i s. *Episimus albidorsanus* can be recognized by the distinctive male forewing pattern with a subquadrate white blotch near mid-dorsum that extends to the base of the forewing as a narrow white line. The blotch is obscured by dark scaling in the female. The scaling of the head also is sexually dimorphic, mostly white in males and mostly dark brown in females; males have a black dot it the termination of the labial palpus. The male genitalia are typical of the group with a slender uncus, socius with a patch of strong marginal spines, a narrow valva with a rounded apex, and a pronounced triangular submedian lobe bearing a dense patch of stout setae. *Episimus albidorsanus* is somewhat similar to *E. lagunculariae*, but males of *E. albidorsanus* are easily distinguished by the

102

white blotch on the dorsum of the forewing, the longer uncus, and the short marginal spines of the socius.

D e s c r i p t i o n. Head: Brown, vertex black in females, mostly white in males; antenna brown, darker in basal portion; labial palpus white with gray brown longitudinal band, termination with tiny black dot in male. Hairpencil unmodified. Thorax: Dorsum white, black proximally, densely scaled. Forewing length 6.5 mm; ground colour white in dorsal area of wing, edged with grey, strigulated blackish grey along dorsum, forming a large subtornal blotch in male; costal area grey with leaden grey patches, black strigulae and weak white scaling in basal third; costal strigulae grey white, fine, white in posterior half of wing, divisions dark brown; ocellus pale ochreous with small inner spots and large lines, partly white posteriorly; markings dark brown in form of spots in basal area and large median fascia edged with white posteriorly. Cilia pale brown, dark brown in median portion of termen, whitish rust in tornal third. Hindwing grey. Cilia paler.

Male genitalia (Fig. 13) with uncus short, broadened basally; socius broad with numerous stout marginal spines; valva narrow, slightly and evenly expanded distally from submedian lobe; submedian lobe prominent, triangular, with stout setae; aedeagus moderately long, vesica with dense patch of cornuti.

Female genitalia (Fig. 45) with sterigma weakly sclerotized, subquadrate; rim of ostium square; sclerite of antrum very short; cingulum U-shaped; corpus bursae with a pair of moderately broad, crescent-shaped signa.

Holotype male, Brazil, Distrito Federal, Planaltina, 1100 m, 5 Jun 1989, V. O. BECKER (USNM), GS 126,312.

Paratypes. Brazil: Distrito Federal: Planaltina, 1100 m, 5 Jun 1989 (1 male), V. O. BECKER (USNM), 18 Mar 1999 (4 females), GS 126,274, 124,261, 5 Jun 1989 (1 female), GS 126,273, 22 Aug 1996 (1 female), GS 124,244, V. O. BECKER (VBC). Goiás: Teresina, 500 m, 29 May 1994 (4 males, 2 females), GS 126,313, 124,255, V. BECKER & K. SATTLER (VBC), 22 Aug 1996 (1 female), V. O. BECKER (VBC). Bahia: Jequle, 600-750 m, 11-22 Nov 1995 (1 male), V. O. BECKER (VBC).

A d d i t i o n a l s p e c i m e n e x a m i n e d. Colombia: Meta, La Macarena, 26-27 Jan 1969 (1 male), R. E. DITZ (USNM).

E t y m o l o g y. The name refers to the colouration of the forewing dorsum; Latin: albus – white.

# Episimus griseatus sp. n.

# (Figs 14, 46, 87)

D i a g n o s i s. *Episimus griseatus* is similar to *E. albidorsanus*; males share a subquadrate white blotch near mid-dorsum of the forewing, which is obscured by dark scaling in females. Scaling of the head also is sexually dimorphic in both species, the upper frons white in males and mostly red-brown in females; males have a black dot at the termination of the labial palpus in both species. The male genitalia are typical of the group with a slender uncus, socius with a patch of stout setae, and a narrow valva with a rounded apex and a pronounced triangular submedian lobe bearing a dense patch of stout setae. Although males of *E. griseatus* and *E. albidorsanus* are nearly indistinguishable, the female genitalia of *E. griseatus* are easily distinguished by the extremely broad blades of the signa, which are the broadest in the genus.

D e s c r i p t i o n. Head: Red brown, slightly tinged ferruginous; upper frons white in male, mostly pale red-brown in females, male with tiny black dot at termination of labial palpus. Thorax: Prothoracic collar paler than head; median part of thorax brownish grey, tegula browner proximally. Forewing length 5.0-6.0 mm; ground colour greyish brown, suffused and sprinkled brown, brown in costal and basal area; costal strigulae whitish, divisions brown; subterminal fascia brownish rust; ocellus cream with moderate inner spots and lines; markings indistinct, diffuse brown. Cilia (worn) pale brownish. Hindwing rather pale, greyish brown. Cilia (worn) paler.

Male genitalia (Fig. 14) with uncus slender, tapering terminad; socii with region of stout strong setae in addition to fine hairs; valva nearly parallel-sided in distal half, only slightly broadened; submedian lobe rounded-triangular, large, with dense patch of short spines.

Female genitalia (Fig. 46) with sterigma small, somewhat broadened posteriorly, rounded proximally; sclerite of antrum rather slender, almost as long as sterigma; cingulum simple, narrow, ringlike; blades of signa relatively large, broad.

Holotype female, Paraguay, Depto. Amambay, Parque Nacional Cerro Cora, 22E39'S, 56E01'W, 7-10 Apr 1986, M. POGUE & M. SOLIS (USNM), GS 126,345.

Paratypes. Paraguay: Depto. Amambay: P.N. Cerro Cora, 22E39'S, 56E01'W, 7-10 Apr 1986 (3 males), M. POGUE & M. SOLIS (USNM), GS 126,346. SE Maranjal, Alto Parana, 20-24 Aug 1988 (1 female), M. POGUE & M. SOLIS (USNM).

E t y m o l o g y. The name refers to the colouration of female forewing: Latin: griseatus – mixed grey.

### Episimus limoyanus sp.n.

(Fig 47)

D i a g n o s i s. *Episimus limoyanus* is similar to *Episimus griseatus*, but *E. limoyanus* is slightly larger, the labial palpus is cream rather than red-brown, and the signa are much smaller.

D e s c r i p t i o n. Head: Brown and cream, frons paler, vertex darker brown; labial palpus cream, distal half of median joint with large grey-brown spot. Thorax: Greyish cream, brown proximally, tegula brown at base. Forewing length 6.0 mm; basal third of wing greyish cream, spotted brown-grey, postmedian area suffused grey with slight violet hue; dorsum grey in form of a large triangle reaching tornus; terminal area grey with ochreous, termen edged cream; ocellus small, cream ochreous with broad refractive lines; costal strigulae numerous, greyish cream to middle, pale cream to apex, divisions brown. Cilia pale ochreous brown, cream in tornal portion. Hindwing pale brownish grey. Cilia cream.

Male unknown.

Female genitalia (Fig. 47) with papilla analis slender; anteostial part of sterigma rather broad; sclerite of antrum short, ca. 0.25 length of dustus bursae; cingulum ringlike; blades of signa small.

Holotype female, Paraguay, Depto., Alto Parana, Res. Biol. Limoy, 24E47'S, 54E26'W, 17-20 Apr 1986, M. POGUE & M. SOLIS (USNM), GS 126,342.

Paratypes. Paraguay, Depto. Alto Parana, Res. Biol. Limoy, 24E47'S, 54E26'W, 17-20 Apr 1986 (1 male, 1 female), M. POGUE & M. SOLIS (USNM).

D is tribution and biology. This species is known only from the holotype from Paraguay.

E t y m o l o g y. The name refers to the type locality, Biological Research Station at Limoy.

# Episimus guiana (BUSCK)

Olethreutes guiana BUSCK, 1913: 92 (description).

Episimus guiana: HEPPNER, 1994: 91 (revision); POWELL et al. 1995: 152 (checklist); BROWN 2005: 307 (catalog).

D i a g n o s i s. As defined herein, *E. guiana* may represent a complex of closely related species. In size and forewing pattern, *E. guiana* is typical of the albidorsanus species group, but it lacks conspicuous sexual dimorphism in forewing pattern; males have a black dot at the termination of the labial palpus. In the male genitalia the triangular submedian lobe of the valva is pronounced, with the distal edge of the lobe representing the narrowest point in the valva. *Episimus guiana* can be distinguished by a combination of the following features of the male: termination of the labial palpus with tiny black dot; distal portion of the hairpencil without sheath or other modification; and sudmedian lobe of the valva broadly triangular. HEPPNER (1994) compared *E. guiana* with *E. argu-*

104

*tanus* and illustrated the adult (figs 7, 8), male genitalia (figs. 40, 41), and female genitalia (figs. 42, 43). *Episimus guiana* differs from all members of the transferranus and tyrius species groups by the possession of stout setae on the socii in the male genitalia.

Syntypes 2 females, Guyana ["British Guiana"], Georgetown (USNM).

S p e c i m e n s e x a m i n e d. Brazil: Bahia: Barra Grande, 5-10 Jan 1999 (1 male, 2 females), V. O. BECKER (VBC). Cuba: Santiago de las Vegas, 8 Sep 1932 (1 female), A. OTERO (USNM). Dominica: Manets Gutter, 10 Mar 1965 (1 male), W. W. Wirth (USNM). 0.5 mi W Pont Casse, 22-24 Jul 1963 (1 female), O. S. FLINT (USNM). Mouth of Loyou River, 20 Jan 1965 (1 female), J. F. G. & T. CLARKE (USNM). Panama: Porto Bello, Mar 1911 (1 male), A. BUSCK (USNM). Puerto Rico: Route 115, 12.2 km S Rincon, 22-28 Feb 1971 (2 males, 1 female), C. P. KIMBALL (USNM). Isla Maguyes, off Parguera, 3-4 Feb 1971 (1 male), C. P. KIMBALL (UNSM). Maricao Lt., Jul 1960 (1 male), J. MALDONADO (USNM). Trinidad: Simla, Arima Valley, 6-12 Feb 1966 (1 male), S. S. & W. D. DUCK WORTH (USNM). Venezuela: Aragua: Rancho Grande, 1100 m, 1-5 Nov 1966 (5 males, 5 females), 24-31 Oct 1966 (14 males, 8 females), 16-23 Oct 1966 (17 males, 12 females), S. S. & W. D. DUCKWORTH (USNM).

D i s t r i b u t i o n a n d b i o l o g y. *Episimus guiana* was described from Georgetown, Guyana, and it is widely distributed throughout the Caribbean; HEPPNER (1994) records it from Florida, USA. We have examined specimens from Brazil, Cuba, Dominica, Guyana, Panama, Puerto Rico, Trinidad, and Venezuela that seem to represent this species.

R e m a r k s. Contrary to HEPPNER (1994), there is no "holotype male"; the type series consists of 2 syntype females. One of the syntypes bears the following label: Lectotype/*Olethreutes Guiana* BSK./ By HEPPNER '07.

#### Episimus albifrons sp. n.

(Figs 15, 48, 88)

D i a g n o s i s. *Episimus albifrons* has a white frons, a contrasting dark brown or black vertex, and an ill-defined white blotch near mid-dorsum of the forewing. Males have a moderately short hairpencil and a dense patch of piliform cream-colored scales laterally and latero-posteriorly on the metathorax. Although superficially dissimilar, *E. albifrons, E. mignonanus*, and *E. armiferus* share similar male genitalia. All have suboval, erect socii with an irregular patch of strong setae along the perimeter with the remainder densely hairy; a moderately large uncus that is broad basally and gradually attenuate distally; and a poorly developed henion. Superficially, *E. albifrons* has a much smaller mean forewing length (6.0 vs. 7.5 mm) and much darker forewing maculation than *E. mignonanus*; the male of *E. armiferus* has a tiny black dot at the termination of the labial palpus that is lacking in *E. albifrons*.

D e s c r i p t i o n. Head: Vertex and frons dark grayish brown to black in female; vertex grayish brown to black in male, frons white; labial palpus white with dark grey mark along ventral part of median joint; termination lacking black dot in male. Thorax: Dorsum grey, white distally, blackish proximally; posterior half of tegula white; small patch of light brown, pilose scales along lateral portion of mesothorax over which hairpencil extends. Forewing length 5.8-6.2 mm; termen weakly convex below middle; ground colour white in dorsal half, suffused grey along dorsum, with some black-grey spotlike convexities along CuP; remaining area suffused grey, spotted with dark grey; large refractive grey area at ocellus; terminal and apical regions ochreous brown, costal strigulae minute, greyish, white in distal half of costa, followed by brown and grey lines; median fascia blackish brown, preserved in costal half of wing. Cilia grey tinged brown at mid-termen, white before grey tornal portion. Hindwing greyish brown, paler basally. Cilia more cream.

Male genitalia (Fig. 15) with moderately large uncus, broad at base, gradually tapered distally; socius suboval, erect, with irregular patch of strong spines along perimeter, remainder covered with fine hairs; gnathos membranous with very slender, sclerotized terminal plate; valva slender, elongate, narrower in mesal 0.5, sudmedian lobe large, triangular, densely spined, subtended by deep,

rounded excavation; sacculus ill defined with 4 long, strong setae from conspicuous sockets; henion narrow, semi-sclerotized; aedeagus relatively stout, vesica with 25-30 long, slender cornuti.

Female genitalia (Fig. 48) with sterigma short; sclerite of antrum rather weak; signa slender.

Holotype male, Costa Rica, Heredia, 10 km SE La Virgen, 10°20'N, 84°05W, 450-550 m, 22 Feb 2003, INBio-OET-ALAS transect (INBio), GS 126,280.

Paratypes. Costa Rica: Heredia: Est. Biologica La Selva, 10°26'N, 84°01'W, 50-150 m, 18 Feb 2004 (1 male), D. WAGNER (INBio). 10 km SE La Virgen, 10°20'N, 84°05W, 450-550 m, 20 Feb 2003 (1 male), 21 Feb 2003 (1 male), 11 Apr 2003 (1 male), INBio-OET-ALAS transect (INBio). 11 km ESE La Virgen, 10°21'N, 84°03'W, 250-350 m, 16 Mar 2004 (2 males), INBio-OET-ALAS transect (INBio). San Ramon, road above Finca Murillo, 10°23'N, 84°11'W, 11 Feb 2005 (1 female), D. WAGNER (INBio). Limón: Sector Cocori, Finca de E. Rojas, 150 m, Nov 1991 (1 male), E. ROJAS (INBio).

D i s t r i b u t i o n a n d b i o l o g y. This species is known only from the Costa Rican provinces of Heredia and Limón, at elevations below ca. 350 m.

E t y m o l o g y. The name refers to the colouration of the frons; Latin: albus – white.

# Episimus mignonatus sp. n.

(Figs 16, 49, 89)

D i a g n o s i s. *Episimus mignonatus* is a relatively large species characterized by a pale cream beige forewing that is considerably paler than that of most congeners, more similar to species of the kimballi species group. In the male the frons is white and the termination of the labial palpus has a tiny black dot. The male genitalia are most similar to those of *E. albifrons*, sharing with them large, suboval, erect socii with an irregular patch of strong setae along the perimeter with the remainder typically densely haired; a moderately large uncus that is broad basally and gradually attenuate distally; and a poorly developed henion.

D e s c r i p t i o n. Head: Vertex and frons mostly black in female; vertex black, lower and upper frons white in male; labial palpus brown in female; brown basally; labial palpus white in male with tiny black dot at termination. Thorax: Dorsum alternating blackish brown and pale cream; male with hairpencil extending from prothorax to beyond end of metathorax, without sheath. Forewing length 7.0-8.0 mm; ground color pale cream with irregular sparse lateral strigulae; brown in costal region with narrow, ill-defined costa blotch just distad of middle.

Male genitalia (Fig. 16) with moderately large uncus, broad at base, gradually tapered distally; socius suboval, erect, with irregular patch of strong spines along perimeter, remainder covered with fine hairs; gnathos membranous with very slender, sclerotized terminal plate; valva slender, elongate, narrower in mesal 0.5, submedian lobe large, triangular, densely spined, subtended basally by deep, rounded excavation; sacculus ill defined with 4 long, strong setae from conspicuous sockets; henion, narrow, semi-sclerotized; aedeagus relative stout, veisca with 25-30 long, slender cornuti.

Female genitalia (Fig. 49) with sterigma broadly rhomboidal, expanded posterad; ostium round with region of dense punctation immediately posterad; ductus bursae ca. one-half length of corpus bursae, sclerite of antrum relatively short; cingulum a moderately broad ring; corpus bursae oblong, with weak parallel wrinkles in posterior one-fourth; signa a pair of large, weakly curved, sickle-shaped sclerites.

Holotype male, Jamaica, St. Catherine Parish, Mt. Diablo, Hollymount, 2754' [850 m], 21-24 Apr 1973, D. & M. DAVIS (USNM).

Paratype. Jamaica: St. Catherine Parish, Mt. Diablo, Hollymount, 2754' [850 m], 21-24 Apr 1973 (1 female), D. & M. DAVIS (USNM).

D i s t r i b u t i o n a n d b i o l o g y. This species is known only from the type locality on the island of Jamaica.

E t y m o l o g y. The species name is a patronym for Mignon DAVIS.

### Episimus armiferus sp. n.

(Figs 17, 50, 90)

D i a g n o s i s. *Episimus armiferus* exhibits slightly greater sexual dimorphism in forewing length than other species, with females averaging slightly larger. *Episimus armiferus* is similar to *E. albifrons*, but males of *E. armiferus* are easily distinguished by the termination of the labial palpus: a black dot is present in *E. armiferus* that is lacking in *E. albifrons*. In addition, *E. armiferus* has a smaller forewing length. In both species the male genitalia have characteristic suboval, erect socii with an irregular patch of strong setae along the perimeter with the remainder densely hairy; a moderately large uncus that is broad basally and gradually attenuate distally; and a poorly developed henion. In *E. armiferus* the uncus is longer and the stout spines of the socii are more pronounced. The female genitalia of *E. armiferus* are similar to those of *E. curacaonus* and *E. argutanus*, but in *E. armiferus* the blades of the signa are much smaller.

D e s c r i p t i o n. Head: Vertex ferruginous cream, brown between antennae in male, brown with violet pink hue in female; front white, scape of antenna dark brown in anteriort portion; labial palpus in male with tiny black dot at termination. Thorax: Dorsum brown to gray, blackish proximally; tegula white, cream brown posteriorly. Forewing length 7.0 mm; termen not convex medially; ground colour in dorsal area of wing whitish grey in male, suffusions and strigulation grey, remaining areas of wing darker, grey, with some whitish dots along middle and basally; costal strigulae minute, white and grey, divisions blackish brown followed by grey and ferruginous lines; termen edged with cream ferruginous; ocellus pale ochreous cream with black inner spots; proximal refractive line fused with large leaden grey area extending from tornus to before costa; ground colour cream ochreous in female, suffused with leaden grey, especially in dorsal and terminal portions of wing; costal area brown; costal strigulae minute, white, followed by brown and grey lines; termen and ocellus cream ochreous with white-cream lines at apex and distally to outer refractive line of ocellus. Cilia ferruginous cream, cream brown near mid-termen, grey at tornus. Hindwing grey-ish brown. Cilia grey, mixed cream at apex of wing.

Male genitalia (Fig. 17), with uncus long, broad at base, otherwise slender; socius rather slender with strong stout spines; incision short at base of triangulasr submedian lobe.

Female genitalia (Fig. 50) with sterigma broadened posteriorly with submedian projections of posterior edge; sclerite of antrum fairly short; cingulum a moderately broad, ringlike band; blades of signa small.

Holotype male, Costa Rica, Heredia, 10 km SE La Virgen, 10°20'N, 84°05'W, 450-550 m, 21 Feb 2003, INBio-OET-ALAS transect (INBio), GS 126,381.

Paratype. Costa Rica: Guanacaste: Est. Pitilla, 9 km S Santa Cecilia, 700 m, Apr 1991 (1 male), C. MORAGA (INBio), Nov 1992 (1 male), P. RIOS, 6-18 Aug 1993 (1 male), P. RIOS, Dec 1991 (1 male), E. ROJAS, Jul 1988 (2 males, 1 female), M. SCOBLE & S. BROOKS, 19 May-3 Jun 1993 (2 males, 1 female), C. MORAGA, 3 Jun 1993 (1 male), P. RIOS, May 1991 (1 male), C. MORAGA, 27 Jun-14 Jul 1992 (1 male), P. RIOS, 4-18 Dec 1988, C. MORAGA (all INBio). Finca Pasmompa, Est. Pitilla, 5 km S Santa Cecilia, 400 m, Dec 1990 (1 male), P. RIOS & C. MORAGA (INBio). Heredia: 10 km SE La Virgen, 10°20'N, 84°05W, 450-550 m, 14 Feb 2003 (1 female), GS 126,277, 19 Feb 2004 (1 female), 22 Feb 2003 (1 male), 23 Feb 2003 (1 male), INBio-OET-ALAS transect (all IN-Bio), GS 126,277. Limón: R. B. Hitoy Cerere, Cerro Bitarkaru, Sector el Rancho, 900-1025 m, 13 Mar 2002 (1 female), M. MORAGA & L. CHAVARRIA (INBio), GS 126,278. Sector Cedrales de la Rita, 3 km N del Puente Río Suerte, Ruta Puerto Lindo, 10 m, Apr 1996 (1 male), E. ROJAS (INBio). Sector Cerro Cocori, Finca de E. Rojas, Jan 1991 (1 male), Jan 1992 (1 female), E. ROJAS (INBio). Puntarenas: P.N. Piedras Blancas, Sector Rivito, 10 m, 12-13 May 2002 (1 male), M. MORAGA (IN-Bio). Bosque Esquinas, Peninsula Oso, 200 m, Mar 1994 (1 female), M. SEGURA (INBio). Finca Cafrosa, Est Las Mellizas, P.N. Amistad, 1300 m, Nov 1990 (1 female), M. RAMIREZ & G. MORA (INBio).

D i s t r i b u t i o n a n d b i o l o g y. This species is known from the provinces of Cartago, Guanacaste, Limón, and Heredia, Costa Rica, between sea level and 1300 m elevation. The early stages are unknown.

E t y m o l o g y. The name refers to the armature of the socii; Latin: arma – weapon, ferro – I carry.

R e m a r k s. Although the association of males and females is equivocal, the occurrence of both sexes at Estacion Pitilla, 10 km SE La Virgen, and Finca de E. Rojas all provide circumstantial evidence in support of the similar facies.

### Episimus paraisanus sp. n.

(Figs 51, 91)

D i a g n o s i s. *Episimus paraisanus* is a relatively large, dark colored species, superficially most similar to *E. albifrons* and *E. armiferus* but with a conspicuously greater forewing length.

D e s c r i p t i o n. Head: Dark brown with reddish violet admixture, paler laterally; labial palpus ochreous cream in terminal third. Thorax: Dorsum grey, brown proximally; tegula white postbasally. Forewing length 8.0-9.0 mm; slender, median part of termen strongly convex; ground colour in dorsal half of wing grey, forming spots limited by brown lines and edged white, in part; median and costal areas dark brown dotted with orange (remnants of ground colour) limited by dark brown median fasciae; terminal area brown ochreous; costal strigulae cream (to mid-costa) and white, divisions dark brown; ocellus ochreous with some black inner spots and refractive leaden grey lines; posterior line slender, anterior very broad, reaching end of median cell. Cilia ochreous cream, brown in apical third, brown-grey at middle of termen and at tornus, cream before tornus. Hindwing brown, paler in basal half. Cilia brown.

Male unknown.

Female genitalia (Fig. 51) with sterigma shield-shaped, broadened posteriorly with submedian projections of posterior edge; sclerite of antrum fairly long; cingulum broadly ring-shaped; blades of signa small.

Holotype female, Costa Rica, Cartago, Paraiso, P.N. Tapanti-Maczio de La Muerte, Quebrada Segunda, May 2002, R. DELGADO (INBio), GS 126,279.

Paratype. Costa Rica: Cartago: Paraiso, P.N. Tapanti-Maczio de La Muerte, Quebrada Segunda, May 2002 (1 female), R. DELGADO (INBio), GS 124,245.

D i s t r i b u t i o n a n d b i o l o g y. This species is known only from the type locality in Costa Rica.

E t y m o l o g y. The name refers to the type locality of Paraiso, Costa Rica.

# Episimus quintananus sp. n.

(Figs 18, 52, 92)

D i a g n o s i s. *Episimus quintananus* is among the smallest species in the genus. Males have a white frons and a tiny black dot at the termination of labial palpus. The male genitalia are relatively unmodified, with a rodlike uncus, typical socius, a narrow valva with a large triangular submedian lobe, and a stout aedeagus with numerous cornuti. Females of *E. quintananus* can be distinguished from their congeners by the signa: one signum is long and slender from a narrow sclerotized base and the other is slightly broader and lacks the narrow sclerotized base. *Episimus quintananus* is similar to *E. nesiotes*, but in *E. quintananus* the signa are much smaller, and in the male the cucullus is longer and more narrowed proximally. Also, *E. quintananus* is much smaller.

D e s c r i p t i o n. Head: Cream brown; vertex cream; distal segment of labial palpus cream, male with tiny black dot at termination. Thorax: Dorsum white with brown prothoracic collar and two postmedian spots; two brown spots beyond middle of tegula. Hairpencil unmodified. Forewing

length 5.0 mm; ground colour whitish cream, sprinkled and strigulated brown, suffused brown in costal area; paler, broad blotch at mid-dorsum; costal strigulae distinct, white, divisions brown; ocellus pale ochreous with brown inner spots and well developed proximal refractive fascia (posterior fascia in form of a slender cream line). Cilia yellowish brown, greyer posteriorly. Hindwing pale brown, slightly tinged with rust on periphery, with white basally. Cilia yellowish cream, paler in anal area of wing.

Male genitalia (Fig. 18) with uncus broadened terminally; socius broad, hairy; valva with prominent subtriangular submedian lobe; aedeagus short.

Female genitalia (Fig. 52) with proximal part of sterigma slender, rounded, distal part expanded posteriorly; sclerite of colliculum short, delicate; cingulum a semi-sclerotized band; sigma small, slender, straight.

Holotype male, Mexico, [Quintana Roo], Cozumel Island, Espirito Santo Bay, 5 Apr 1960, J. F. G. CLARKE (USNM), GS 126,354.

Paratype. Mexico: Quintana Roo: Allen Point, Ascension Bay, 11 Apr 1960 (2 males, 1 female), 15 Apr 1960 (1 male), J. F. G. CLARKE (USNM), GS 126,343. Cozumel Island, Espirito Santo Bay, 5 Apr 1960 (1 female), J. CLARKE (USNM), GS 126,357.

D i s t r i b u t i o n a n d b i o l o g y. This species is known only from the lowlands of the Mexican state of Qunitana Roo.

E t y m o l o g y. The species name refers to the state of Quintana Roo, Mexico.

# Kimballi Species Group

The kimballi species group includes 7 species that are Caribbean in distribution: *E. kimballi, E. vixenus, E. chica, E. jamaicanus, E. antiguanus, E. nesiotes*, and *E. curacaonus*. Adults are characterized by a pale brown to reddish brown forewing with a variably defined, but usually prominent white to cream longitudinal region along the dorsum. Males of all species but *E. kimballi* have a tiny black dot at the termination of the labial palpus. In the male genitalia, the submedian lobe is triangular and densely spined, and the socius has an irregular patch of short strong setae in addition to the typical long slender hair. The male genitalia of this group are very similar to those of the albidorsanus species group; the kimballi species group is distinguished primarily on the basis of the relatively homogeneous forewing pattern.

# Episimus kimballi HEPPNER

Episimus kimballi HEPPNER, 1994: 91 (description and illustrations); BROWN 2005: 307 (catalog).

D i a g n o s i s. Adults of *E. kimballi* are characterized by forewing maculation that includes a pale beige to pale red-brown ground colour with a prominent white to cream longitudinal region along the dorsum, frequently interrupted near the middle by a narrow, transverse bar or triangle (see HEPPNER 1994: fig. 11); in females the pale patch is variably obscured by ground color. The primary elements of the forewing pattern are shared with *E. vixenus*, *E. chica*, *E. antiguanus*, and *E. jamaicanus*. Among the five species, *E. chica* and *E. vixenus* can be distinguished by their small size, and *E. jamaicanus* and *E. antiguanus* by the ill-defined cream patch along the dorsum, frequently heavily overscaled with pale brown. The female genitalia of *E kimballi* (HEPPNER 1994: fig. 50) have a square ostium; a uniform, evenly sclertoized colliculum; and signa with strongly sclerotized basal regions.

Holotype (male): USA, Florida, Monroe Co., Upper Matecumbe Key, 1.6 km SW Islamorada, 23 Jun 1974, J. B. HEPPNER (FSCA).

D i s t r i b u t i o n a n d b i o l o g y. According to HEPPNER (1994), *E. kimballi* is apparently a Florida endemic, ranging through the subtropical portion of the state from Miami south to the Keys. We examined no specimens from south of Florida.

### Episimus vixenus sp. n.

(Figs 19, 53, 93)

D i a g n o s i s. *Episimus vixenus* is superficially most similar to *E. kimballi*, but *E. vixenus* is much smaller, the forewing pattern elements are more clearly defined (apparently without sexual dimorphism), and the male has a tiny black dot the termination of the labial palpus, which is lacking in *E. kimballi*. The male genitalia of *E. vixenus* are most similar to those of *E. kimballi*, with the triangular sudmedian lobe with a more rounded apex than in other species of the group. The female genitalia of *E. vixenus* can be distinguished by the larger signa.

D e s c r i p t i o n. Head: Vertex and frons cream; antenna brown; labial palpus cream, brown along middle, male with tiny black dot at termination. Thorax: Cream, tegula yellowish brown. Hairpencil extending into densely scaled fold on mesothorax. Forewing length 5.5-6.6 mm; dorsal half from base to median line cream, partially mixed with yellow; costal area pale brown with some cream scales; costal strigulae white, divisions yellowish brown; median fascia, dorso-submedian mark, weak subapical line, and vicinity of ocellus all brown; inner spots of ocellus fine; female with slightly darker brown forewing than male, with markings more clearly defined. Cilia brownish yellow, with brownish grey terminations. Hindwing whitish cream, mixed with brown on periphery. Cilia cream, tinged yellow at apex.

Male genitalia (Fig. 19) with uncus relatively short, rounded apically, with subtriangular base; socius short, broad, hairy and spiny; valva broad, not constricted beyond submedian lobe, with slender spines; submedian lobe broad, with rather weakly convex area basad; aedeagus comparatively large, vesica with dense patch of cornuti.

Female genitalia (Fig. 53) with sterigma expanded posteriorly, rather weakly sclerotized proximally; sclerite of antrum moderate, uniformly broad; cingulum slender; signa large, slender.

Holotype male, British Virgin Islands, Prickley Pear Island, Virgin Gorda, Vixen Point, 14 Apr 1956, J. CLARKE (USNM), GS 126,302.

Paratypes. WEST INDIES: British Virgin Islands: Prickley Pear Island, Virgin Gorda, Vixen Point, 14 Apr 1956 (2 males, 1 female), J. CLARKE (USNM), GS 126,303 (female), 124,217 (male).

D i s t r i b u t i o n a n d b i o l o g y. Known only from Prickley Pear Island in the British Virgin Islands.

E t y m o l o g y. The specific epithet refers to the type locality – Vixen Point.

### Episimus chica sp. n.

(Figs 20, 94)

D i a g n o s i s. *Episimus chica* is superficially similar to *E. vixenus* and *E. kimballi*, but is distinguished from those two species by the semicircular white blotch along the dorsum being slightly distad of the middle. It also is conspicuously smaller than either (i.e., forewing length less than 5.0 mm). The male genitalia are most similar to those of *E. nesiotes*, with a more pointed-triangular submedian lobe on the valva.

D e s c r i p t i o n. Head: Vertex white; labial palpus tinged pale brownish grey to middle, male with tiny black dot at termination; antenna pale brownish. Thorax: Dorsum white, tegula pale brownish grey. Hairpencil extending into densely scaled fold on mesothorax. Forewing length 4.5 mm; dorsal half of wing white with traces of brown markings; costal area pale brown with darker brown spots and strigulae; costal strigulae white, divisions brown; ocellus white, tinged yellowish towards costa, with weak inner spots; remnants of markings (median fascia) brown. Cilia (worn) white. Hindwing greyish, whiter basally. Cilia (worn) white.

Male genitalia (Fig. 20), with uncus slender, fairly long; socius rather small, with stout spines and long hairs; basal part of valva broad, with prominent triangular submedian lobe. Female unknown.

D i s t r i b u t i o n a n d b i o l o g y. This species is known only from the holotype collected on Anegada Island in the British West Indies. The life history is unknown.

E t y m o l o g y. The species name is a Spanish word meaning small, referring to the diminutive size of this species.

# Episimus jamaicanus sp. n.

(Figs 21, 54, 95)

D i a g n o s i s. *Episimus jamaicanus* is superficially most similar to *E. kimballi*, but *E. jamaicanus* has a slightly smaller forewing length, the vertex of the head is reddish brown rather than white or cream, and the male has a black dot at ther termination of the labial palpus. The male genitalia of *E. jamaicanus* are most similar to those of *E. nesiotes*, with a pointed-triangular submedian lobe of the valva; the uncus of *E. jamaicanus* is nearly twice as long as that of *E. nesiotes. Episimus jamaicanus* also is similar to *E. griseatus*, but *E. jamaicanus* can be distinguished from the latter by its longer uncus (similar to that of *E. descriptanus*) and its distinctly expanded submedian lobe of the valva; also, the signa of *E. jamaicanus* are smaller than those of *E. griseatus*.

D e s c r i p t i o n. Head: Brown, frons ferruginous cream, vertex darker than frons; labial palpus brown, male with tiny black dot at termination. Thorax: Dorsum grey, whiter posteriorly; basal part of tegula rust brown. Hairpencil a fascicle of long slender scales extending free to end of metathorax, where there it extends above a dense patch of cream and grey pilose scales laterally on the metathorax. Forewing length 10.0 mm; ground color of dorsal part whitish grey, paler basally, with weak, dark grey strigulae; costal area chestnut brown; ocellus white marbled with grey proximally, with a few brown inner spots; costal strigulae minute, white, divisions rust brown; termen finely edged with white; markings reduced to rust brown shades. Cilia whitish grey at apex, white in tornal third, dark grey otherwise. Hindwing dark brown. Cilia paler more grey cream.

Male genitalia (Fig. 21) with uncus very long, slender; socius hairy with marginal spines; valva with deep verntral incision basad of large, triangular submedian lobe; distal part of cucullus broad; aedeagus moderately large.

Female genitalia (Fig. 54) with sterigma relatively small; sclerite of antrum short; cingulum short; blades of signa moderate.

Variation. The head and the base of the tegula rust and thorax grey-white in one paratype. Colouration variably intense; a few strigulae in postbasal part of dorsal area distinct. Cilia pale brown, darker brown at mid-termen. In male paratype head and thorax grey, frons mixed cream; forewing pale, brownish grey; costal area (worn) brown.

Holotype female, Jamaica, St. Catherine Parish, Mt. Diablo, Hollymount, 2754' [850 m], 23-24 Apr 1973, D. & M. DAVIS (USNM), GS 126,315.

Paratypes. Jamaica: St. Catherine Parish: Mt. Diablo, Hollymount, 2754' [850 m], 23-24 Apr 1973 (1 male), D. & M. DAVIS (USNM). Clarendon Parish: Mason River Station, 6 mi NW Kellits, 2200', 16-19 Apr 1973 (1 male, 2 females), D. & M. DAVIS (USNM).

D i s t r i b u t i o n a n d b i o l o g y. *Episimus jamaicanus* is known only from 850 m elevation in the mountains of Jamaica, where it apparently is endemic.

E t y m o l o g y. The specific epithet refers to the island of Jamaica.

# Episimus antiguanus sp. n.

### (Figs 22, 55, 96, 97)

D i a g n o s i s. *Episimus antiguanus* is superficially most similar to *E. nesiotes*; in both species the forewing has a pair of poorly developed, usually incomplete, transverse fasciae from the

dorsum to the costa. In the male of both species a conspicuous cream-colored semicircular blotch is present near mid-dorsum, defining the lower half of the distal edge of the basal fascia; in the female this patch is usually obscured by reddish brown ground color in both. The male genitalia of *E. anti-guanus* are easily distinguished from those of *E. nesiotes* by the following: more and larger stout spines along the edge of the socius; uncus slightly dilated apically, (attenuate in *E. nesiotes*); and much broader base of the triangular submedian lobe of the valva. *Episimus antiguanus* also is similar to *E. quintananus*, but *E. antiguanus* has a larger uncus, a shorter aedeagus, and a broader submedian lobe.

D e s c r i p t i o n. Head: Pale ferruginous, vertex tinged cream; antenna brownish; labial palpus cream ferruginous, male with tiny black dot at termination. Thorax: Dorsum whitish cinnamon, tegula cinnamon. Hairpencil extending into densely scaled fold on mesothorax. Forewing length 5.0-6.0 mm; dorsum white with some brown strigulae (remnants of markings); costal area pale ferruginous with darker areas and broad refractive diffuse leaden marks; costal strigulae white and cream, subapical streak and partial terminal line white; ocellus white with some rust brown scales and weak inner spots; strigulation brown; markings rust brown. Cilia concolorous with suffusions with brown terminations, white at tornus. Hindwing grey, darker on periphery. Cilia greyish white.

Male genitalia (Fig. 22) with uncus strong, slender; socius rather small, densely hairy, with stout marginal setae; submedian lobe broad, triangular; cucullus moderate; aedeagus short.

Female genitalia (Fig. 55) with sterigma relatively short, rather broad proximally; sclerite of antrum relatively short; cingulum slender; signa large, long.

Holotype male, British West Indies, Antigua, English Harbor, 2 Apr 1956, J. F. G. CLARKE (USNM), GS 126,305.

Paratypes. British West Indies: Antigua, English Harbor, 20 Apr 1956 (4 males, 1 female), J. F. G. CLARKE (USNM), GS 126,304 (male). 0.5 mi N airport, Winthropes Bay, 28-30 Nov 1975 (3 females), E. L. TODD (USNM), G S 124,708 (male), 124,709 (female).

D i s t r i b u t i o n a n d b i o l o g y. This species is known only from the island of Antigua, British West Indies.

E t y m o l o g y. The species name refers to the island of Antigua.

# Episimus nesiotes WALSINGHAM

*Epsimus nesiotes* WALSINGHAM, 1897: 123 (description); HEPPNER 1994: 90 (revision); POWELL et al. 1995: 152 (checklist); BROWN 2005: 307 (catalog).

D i a g n o s i s. *Episimus nesiotes* is a medium-sized species, slightly smaller than *E. kimballi* and about the same size as *E. antiguanus*. The forewing has a pair of poorly developed, incomplete, transverse fasciae; the male has a conspicuous cream-colored semicircular blotch near mid-dorsum, defining the lower half of the distal edge of the basal fascia; in the female this pale patch is overscaled with reddish brown (see HEPPNER 1994: figs. 9, 10). *Episimus nesiotes* can be distinguished from *E. kimballi*, *E. vixenus*, and *E. chica* by the poorly demarcated lighter area along the dorsum, which in the latter three species is well defined. At mid-dorsum on tergite-8 in the male there is a small, slcerotized rounded-triangular process that is absent in congeners. Differences in the male genitalia are detailed above in the diagnosis of *E. antiguanus*.

Syntypes (male, female), Virgin Islands, St. Croix, 4 May-15 Jun, GODMAN, HEDEMANN & PONTOPPIDAN (BMNH).

D i s t r i b u t i o n a n d b i o l o g y. This species is reported from Florida south of Miami and throughout much of the West Indies (HEPPNER 1994). According to HEPPNER (1994), *E. nesio-tes* has been reared from *Ardisia escallonioides* (Myrsinaceae) in Florida and *Hippomane manci-nella* (Euphorbiaceae) (FORBES 1930; MACKAY 1959) and *Euphorbia hypericifolia* (Euphorbiaceae) (WALSINGHAM 1897) on St. Croix. HEPPNER (1994) reports successive generations, from February-March, April-May, June-July, and November-December.

### Episimus curacaonus sp. n.

(Figs 56, 98)

D i a g n o s i s. This species, described from two females, is indistinguishable superficially from *E. nesiotes* but *E. curacaonus* has much larger signa.

D e s c r i p t i o n. Head: Vertex white, slightly tinged brown; antenna pale grey; labial palpus rust, tinged red terminally. Thorax: White with rust transverse bands in proximal area. Forewing length 7.5 mm; ground colour white in mediopostbasal and submedian areas, distinctly suffused grey mainly along dorsum, with pale rust postmedially; strigulation weak, grey; costal strigulae white, divisions brown; ocellus white with grey suffusions and weak inner spots, with broad leaden grey anterior line, white posteriorly; markings as fine rust red lines postbasally and subtornally. Cilia pale ferruginous, white at tornus. Hindwing grey. Cilia grey.

Male genitalia unknown.

Female genitalia (Fig. 56) with stergima relatively large, convex in middle proximally; sclerite of antrum small, ca. 0.15 length of ductus bursae; cingulum small with a narrow line of sclerotization; signa with broad blades.

Holotype female, Curacao, Coral Specht, 3 km E Willemstad, 8-15 Feb 1987, W. E. STEINER & J. M. SWEARINGEN (USNM), GS 126,306.

Paratype. West Indies: Curacao: Coral Specht, 3 km E Willemstad, 8-15 Feb 1987 (1 female), W. E. STEINER & J. M. SWEARINGEN (USNM), GS 126,307.

E t y m o l o g y. The name refers to the type locality – Curacao.

### Mahaianus Species Group

The mahaianus species group consists of two species: *E. mahaianus* and *E. perencausticus*. The two share nearly identical facies and similar female genitalia. The male genitalia are somewhat similar to males of the transferranus species group, with a rod-shaped uncus, socius without stout spines, and a well defined, triangular submedian lobe from the valva.

# Episimus mahaianus (FELDER & ROGENHOFFER)

(Figs 23, 57, 99)

Paedisca mahaiana FELDER & ROGENHOFFER, 1875: pl. 137, fig. 40 (description).

Eucosma encaustica MEYRICK, 1922: 518 (description).

Episimus mahaianus: POWELL et al. 1995: 152 (checklist).

Epinotia mahaianus: BROWN 2005: 296 (catalog).

D i a g n o s i s. Among described species of *Episimus*, *E. mahaianus* can be confused only with *E. paraencausticus*. The two share a distinct forewing pattern that includes a well defined, maroon, semicircular patch at the middle of the dorsum, an arched field of gray with tiny yellowish around the maroon patch, and the costal and apical regions mostly reddish brown. In contrast to many congeners, the forewing pattern of *E. mahaianus* exhibits no sexual dimorphism; only females are known of *E. paraencausticus*. The small irregularly oblong region beneath the basal portion of the hindwing cubital pecten is unscaled in both sexes of *E. mahaianus*.

Male genitalia (Fig. 23)have a moderate, rod-shaped uncus; the tegumen has rounded shoulders; the socii are arranged mesally; the gnathos has an elongate slender terminal plate that does not appear to be joined distally; the valva is long and slender, the submedian lobe is rounded-triangular with a dense patch of spines; the sacculus is short with 1-3 long strong setae; the aedeagus is stout, with a weak, membranous henion ca. as long as the aedeagus; and the vesica has ca. 50 or more slender cornuti in a dense patch.

The female genitalia (Fig. 57) have a squarish sclerotized area around the ostium, a weak cingulum, and a pair of relatively small, slender, weakly curved, thornlike signa.

Holotype female (mahaianus), "New Zealand" [Brazil] (BMNH).

Lectotype male (encaustica), Brazil, Manaus, 11.19, PARISH (BMNH), GS 6397.

S p e c i m e n s e x a m i n e d. Brazil: Santarem, Parish, 8-19 (2 females, no abdomen), 10-19 (1 female, no abdomen) (BMNH). Espírito Santo: Linhares, 40 m, 25-30 Jan 1998 (1 male, 2 females), V. BECKER (USNM), GS 126,321, 124,156 (females), GS 126,322 (male). Rondônia: Cacaulandia, 140 m, Dec 1991 (male), V. BECKER (USNM), GS 124,155. Rio Grande do Norte: Pipa, 20 m, 28-31 Mar 1994 (1 male), V. BECKER (VBC). Mato Grosso: Chapada dos Guimaraes, 800 m, 20 Nov 1994 (1 male), V. BECKER (USNM), GS 126,323.

D i s t r i b u t i o n a n d b i o l o g y. This species is recorded only from Brazil below ca. 800 m elevation. Nothing is known of the life history.

R e m a r k s. The holotype of *E. mahaiana* is badly damaged and the pieces have been glued back together. However, the forewing pattern and color is identical to that of the lectotype of *E. encaustica*, and based on that feature the two are considered synonyms. Although POWELL et al. (1995) assigned *mahaianus* (along with its synonym *encaustica*) to *Episimus*, BROWN (2005) incorrectly transferred it to *Epinotia* without comment.

# Episimus parencausticus sp. n.

(Figs 58, 100)

D i a g n o s i s. As indicated above, the forewing maculation of *E. parencausticus* is identical to that of *E. mahaianus*. *Episimus parencausticus* has a slightly greater forewing length, and its female genitalia are distinguished by the presence of a pair of sclerotized rounded lobes of the sterigma immediately posterad of the ostium that is absent in *E. mahaianus*.

D e s c r i p t i o n. Head: Purple brown; antenna brown, labial palpus purple brown, male without black dot at termination. Thorax: Dorsum with purple brown anterior portion, grey median portion, white posterior portion. Forewing length 8.0 mm; ground colour white basally, strigulated grey, dark grey along costa with purple suffusion; median and dorsal areas leaden grey resulting from fusion of strigulae marked with white spots; costal area from middle to apex strongly suffused reddish; costal strigulae in median and in part posterior portion of costa white, divisions brown, some followed by reddish brown lines; ocellus pinkish in costal half, grey in dorsal half, with a few blackish brown spots, white edged (chiefly proximally) edged; markings consisting of a rounded, purple brown blotch at mid-dorsum, edged with white. Cilia rust brown. Hindwing brown. Cilia paler.

# Male unknown.

Female genitalia (Fig. 58) with papilla analis broad; anteostial part of sterigna slender, postostial part with large lateral lobes; sclerite of antrum moderate; cingulum a weakly sclerotized band just before junction of ductus bursae and corpus bursae; blades of signa large.

Holotype female, Costa Rica, Cartago, P.N. Barbilla, R.F. Río Pacuare, Turrialba, Est. Barbilla, 500 m, Nov 2001, L. CHAVARRIA (INBio), GS 126,320.

Paratype. Costa Rica: Limón: Sector Cerro Cocori, Finca de E. Rojas, 150 m, Jan 1992 (1 female), E. ROJAS (INBio), GS 332929 INBio.

D i s t r i b u t i o n a n d b i o l o g y. The species is known only from the provinces of Limón and Cartago, Costa Rica. Nothing is known of the early stages.

E t y m o l o g y. The name refers to the external similarity to *encausticus*; Greek: par – near, related.

114

# Transferranus Species Group

The two species included in the transferranus species group, *E. transferranus* and *E. burserae*, share a similar forewing pattern with a distinct semicircular blotch at mid-dorsum and a narrow, elongate valva that is slightly and gradually attenuate from the base to the apex. Male genitalia also feature a simple, usually rod-shaped uncus, socii without stout spines, and a valva with a rounded submedian lobe. The most conspicuous character state that unites the two species group is the extremely slender valvae with a short rounded spiny lobe at the base of the cucullus.

# Episimus transferranus (WALKER)

Carpocapsa transferrana WALKER, 1863: 398 (description).

*Episimus transferranus*: HEINRICH 1926: 78 (revision); HEPPNER 1994: 93 (revision); POWELL et al. 1995: 152 (checklist); BROWN 2005: 308 (catalog).

Episimus transferrana var. vincentana WALSINGHAM, 1892: 502 (description).

D i a g n o s i s. *Episimus transferranus* is one of the most easily recognized species in the genus. It is medium-sized (forewing length 5.0-5.5 mm in males, 7.0-8.0 mm in females) with a pale forewing that bears a conspicuous dark semicircular patch near mid-dorsum and silvery-gray striations extending from the costa to the dorsum throughout much of the wing. Scaling on the vertex of the head is pale gray brown, between the bases of the antennae dark brown, between the compound eyes cream or white, and that of the frons is white. The labial palpi are cream on the inner surface, pale cream orange externally, and the third segment lacks a black tip in the male. The male hairpencil is in the form of a short fan of broad, flattened, white scales appressed to the prothorax and a fascicle of long, slender cream colored scales that extends free almost to the posterior end of the metathorax. Male genitalia are characterized by a long slender uncus with long fine lateral hairs in the basal two-thirds; rounded, densely haired socii, without stout spines; gnathos with the terminal plate moderately long and united distally; narrow valva with a well-defined, rounded, spiny, submedian lobe; and aedeagus short and stout. HEPPNER (1994) diagnosed the species and included it in a key to North American members of the genus.

Holotype male (transferrana), Brazil, Amazonas, Ega (no abdomen) (BMNH).

Holotype male (vincentana), West Indies, St. Vincent, H. H. SMITH (BMNH).

Specimens examined. Brazil: Distrito Federal: Planaltina, 1100 m, 5 Jun 1989 (1 male), V. O. BECKER (USNM). Goias: Ipameri, 10 Oct 1988 (2 males), V. O. BECKER (USNM). Minas Gerais: Nova Lima, 850 m, 8-9 Oct 1985 (1 male), S. E. MILLER (USNM). Colombia: La Cumbre, 6600' [2030 m], ?5-14" (1 male) (BMNH). Costa Rica: "HS.", .35 (BMNH). Cartago: Turrialba, 13-17 Mar 1965 (male), S. S. & W. D. DUCKWORTH (USNM). Guanacaste: Santa Rosa National Park, 1-3 Jun 1979 (1 male), D. JANZEN (USNM). Area de Conservacion Guanacaste, Sector Santa Rosa, Bosque San Emilio, 24 Jul 1981 (1 male), em: 15 Aug 1981, r.f. Spondias mombin, D. JANZEN, 81-SRNP-1001 (USNM), Sector Santa Rosa, Area Administrativa, 295 m, 8 Nov 1983 (1 female), em: 28 Nov 1983, r.f. Spondias mombin, D. JANZEN, 83-SRNP-1159 (USNM). Area de Conservacion Guanacaste, Sector Cacao, Sendero Maritza, 760 m, 10 Feb 2002 (1 male), em: 15 Mar 2003, r.f. Mosquitoxylum jamaicense, M. PEREIRA, 02-SRNP-8130 (USNM). Area de Conservacion Guanacaste, Sector Cacao, Sendero Maritza, 760 m, 10 Feb 2002 (1 female), em: 16 Mar 2003, r.f. Mosquitoxylum jamaicense, M. PEREIRA, 02-SRNP-8131 (USNM). Area de Conservacion Guanacaste, Sector del Oro, Quebrada Raiz, 280 m, 25 Sep 2004 (1 female), em: 9 Oct 2004, r.f. Bursera simaruba, E. Cantillano, 04-SRNP-24951 (USNM). Heredia: Est. Biologica La Selva, 10°26'N, 84°01'W, 50-150 m, 29 Jun 1994 (1 male), INBio-OET (INBio), 22-29 Jan 2000 (1 male), D. WAGNER (INBio), 7 Feb 2002 (1 male), D. WAGNER, J. ROTA & A. KAWAHARA (INBio). Las Cruces, nr San Vito, 19-20 Mar 1965 (1 male), 24 Apr 1965 (1 male), S. S. & W. W. DUCKWORTH (USNM). Dominica: Clarke Hall, 9 May 1964 (1 female), 8 May 1964 (1 female), O. S. FLINT (USNM), 19-20 Feb 1965 (1 male), J. F. G. & T. CLARKE (USNM). Tragalgar, 7.iii.1988 (1 male), bred from mangifera, A. WHITEWELL (BMNH). Guyana ("British Guiana"): Bartica, ".1.13" (1 female), ".2.13" (2 male) (BMNH). Mexico: Veracruz: Atoyac, "IV 18" (1 male), H. H. SMITH (BMNH). Cordoba, 2 Jul 1965 (1 male), P. SPANGLER (USNM). Tabasco: Teapa, "III 18" (1 male), H. H. SMITH (USNM). Panama: Canal Zone, Barro Colorado Island, 1-9 May 1964 (1 female), 10-17 May 1964 (2 males), S. S. & W. W. DUCKWORTH (USNM). Madden Dam, 10-13 Jul 1967 (1 female), O. S. FLINT (USNM). Corozal, Jul [no year] (3 females), J. ZETEK (USNM), Aug 1912 (1 male, 1 female), C. R. Craft (USNM). Porto Bello, Dec 1912 (1 female), A. BUSCK (USNM). Puerto Rico: Lagna Guajataca, Boy Scout Camp, 205 m, 2-5 Apr 1971 (1 male), C. P. KIMBALL (USNM). Trinidad: "12.28" (1 male) (BMNH). Venezuela: Aragua: Rancho Grande, 1100 m, 11-15 Jan 1966 (4 males, 1 female), 16-19 Jan 1966 (1 male, 2 females), 21-25 Jan 1966 (1 male, 1 female), 16-23 Oct 1966 (7 males), 24-31 Oct 1966 (1 male, 1 female), S. S. & W. D. DUCKWORTH (USNM). West Indies: Grenada, Windward side, Balthazar, H. H. SMITH (2 males) (BMNH).

D i s t r i b u t i o n a n d b i o l o g y. This species is among the most widespread in the genus, ranging from southern Florida, Texas, and Mexico (HEPPNER 1994) south through Central America (Costa Rica, Panama) and the Caribbean (Dominica, Grenada, Puerto Rico, St. Vincent) to South America (Colombia, Brazil, Trinidad, Venezuela), usually below ca. 1100 m elevation. HEPPNER (1994) reports rearings from Brazilian pepper-tree (*Schinus terebinthifolius*; Anacardiaceae) and indicates that rearings reported by CASSANI et al. (1989) for *E. augmentanus* actually refer to this species. A specimen from Dominica cited above is labeled "bred from mangifera," mango (Anacardiaceae). JANZEN & HALLWACHS (2007) successfully reared this species from *Spondias mombin*, *Mosquitoxylum jamaicense* (both Anacardiaceae), and *Bursera simaruba* (Burseraceae) at Area de Conservacion Guanacaste in Costa Rica.

#### Episimus burserae HEPPNER

*Episimus burserae* HEPPNER, 1994: 91 (description); POWELL et al. 1995: 152 (checklist); BROWN 2005: 307 (catalog).

D i a g n o s i s. *Episimus burserae* has a reddish brown forewing with an angular mark on the dorsum, somewhat reminiscent of *E. transferranus* and *E. augmentanus*. The forewing pattern alone distinguishes it from its congeners. The male genitalia are characterized by a slender, rod-shaped uncus; socii without stout spines; and a very narrow valva with the submedian lobe more rounded than triangular, with a distinct excavation basally. The long, narrow valvae are most similar to those of *E. transferranus*.

Holotype male, USA, Florida, Monroe Co., No Name Key, 20 Jun 1974, J. B. HEPPNER (FSCA).

D is tribution and biology. According to HEPPNER (1994), this species is known only from southern Florida, mainly the Keys, apparently restricted to costal areas. Larvae have been reared from *Bursera simaruba* (Burseraceae) (HEPPNER 1994).

### Tyrius Species Group

The four species included in the tyrius species group are heterogeneous in forewing pattern and maculation. However, they all share an elongate, narrow-triangular submedian lobe of the valva; males lack the black dot at the termination of the labial palpus; and males have the distal portion of the hairpencil concealed in a lanceolate sheath, similar to members of the caveatus species group.

# Episimus tyrius HEINRICH

*Episimus tyrius* HEINRICH, 1923: 107 (description); KIMBALL 1965: 255 (faunal survey); HEPPNER 1994: 86 (revision); BROWN 2005: 308 (catalog).

D i a g n o s i s. *Episimus tyrius* is rather distinct superficially, with a forewing pattern that includes a large subtriangular red-brown patch from the basal two-thirds of the costa, the basal one-half of the dorsum with an area of pale scales, and the distal portion of the wing orange. Scaling on the vertex of the head is cream, brick red between the bases of the antennae and the compound eyes,

and white or cream on the frons. The labial palpus is orange cream on the outer surface, cream on the inner surface, and the third segment lacks a black dot at the termination. The distal half of the male hairpencil is concealed in a lanceolate sheath that extends free slightly beyond the posterior end of the metathorax. The male genitalia are characterized by a rather short uncus with a broad base; rounded, densely scaled socii; and narrow valva with an elongate, pointed submedian lobe.

Holotype (male): USA, New York, Long Island, Queens Co., Westbury Station (CUIC).

S p e c i m e n s e x a m i n e d. Bermuda: Botanic Gardens, Paget. 16 Oct 1987 (1 male), 13 Oct 1987 (1 male), D. FERGUSON (USNM), 14 May 1988 (1 male), 12 Nov 1987 (1 male), 23 Aug 1988 (1 male), 25 Jul 1988 (1 male), D. J. HILBURN (USNM). Costa Rica: Heredia: Est. Biologica La Selva, 10°26'N, 84°01'W, 13 Mar 2004 (1 female), black light in canopy, G. BREHM & J. ROTA (INBio), 22 Feb 2002 (1 female), mercury vapor light, D. L. WAGNER (INBio), 18 Feb 2004 (1 male), D. WAGNER (INBio). 11 km SE La Virgen, 450-550 m, 10°20'N, 84°04'W, 21 Feb 2003 (1 female), INBio-OET-ALAS transect (INBio). 11 km ESE La Virgen, Cantarrana Refuge, 300 m, 10°21'N, 84°03'W, 18 Feb 2004 (1 male), D. WAGNER (INBio). Limón: Sector Cerro Cocori, Finca de E. Rojas, 150 m, Jan 1992 (1 male), E. ROJAS (INBio).

D i s t r i b u t i o n a n d b i o l o g y. HEPPNER (1994) reported this species from the Atlantic and Gulf states of the United States; FERGUSON et al. (1991) reported it from Bermuda. We have examined specimens from New York to Florida, east to Texas, and south to Costa Rica. Specimens from Costa Rica are slightly smaller that those from the U.S. According to KIMBALL (1965) and HEPPNER (1994), the larvae of this species feed mainly on maples (*Acer* spp.; Aceraceae), which is moderately divergent from that of other species, which feed mostly on Anacardiaceae, Burseraceae, Combretaceae, and Clusiaceae. HEPPNER (1974) also reports *Gordonia lasianthus* (Theaceae) and *Prunus* spp. (Roascaeae) as host plants in Florida.

### Episimus lagunculariae HEPPNER

Episimus lagunculariae HEPPNER, 1994: 87 (description); BROWN 2005: 307 (catalog).

D i a g n o s i s. Males of *E. lagunculariae* can be distinguished from those of *E. tyrius* by two features of forewing maculation: in *E. lagunculariae* the white area along the dorsum is less distinct, and the termen is less intense yellow-orange. The genitalia in both sexes of *E. lagunculariae* are similar to those of *E. tyrius*. We did not see specimens of this species from anywhere other than Florida. HEPPNER (1994) provides detailed diagnoses, illustrations, and an identification key.

Holotype male, USA, Florida, Pinellas Co., Honeymoon Island State Park, 14 Dec 1988, L. C. DOW (FSCA), GS 2008.

D i s t r i b u t i o n a n d b i o l o g y. According to HEPPNER (1994), this species is found only in coastal areas of southern Florida where white mangrove (*Lagucularia racemosa*; Combretaceae), the only reported larval host plant, grows.

# Episimus dominicanus sp. n.

(Figs 24, 59, 101)

D i a g n o s i s. In facies and genitalia, *E. dominicanus* is similar to many congeners. However, males of this species are easily distinguished from all other *Episimus* but the presence of a small, oblong patch of cream colored, modified sex scales along the costa at the base of the forewing. *Episimus dominicanus* is the only member of the genus with male secondary scales on the upper surface of the forewing. The long, narrow submedian lobe of the valva is reminiscent of that of *E. transferranus* and *E. burserae*.

D e s c r i p t i o n. Head: Vertex brown, lateral portions cream at base; upper frons brown, lower frons cream; labial palpus cream on inner surface, dark brown on vertral surface, mostly pinkish orange on outer surface; male lacking black dot at termination. Thorax: Dorsum cream brown to orange brown; male with hairpencil extending beyond distal end of metathorax, covered by a weak sheath in middle and distal portion. Forewing length 7.0-7.5 mm; cream-orange to pale brown, with ill-defined oblique mesal fascia extending from ill-defined costal patch just distad of middle to dorsum just posterad of middle; small, ill-defined brown blotch near tornus; male with small, oblong patch of cream sex scales surrounding by gray scales near base of costa. Abdomen: Pale grayish brown.

Male genitalia (Fig. 24) with slender, relatively long uncus; socius subrectangular with dense, uniform, long hairs; gnathos membranous, somewhat W-shaped; valva narrow, parallel-sided, with elongate, narrow-triangular submedian lobe; sacculus short, subrectangular, with 3 strong setae from conspicuous sockets; henion inconspicuous; aedeagus ca. 0.4 length of valva, vesica with dense patch of 25-30 slender cornuti.

Female genitalia (Fig. 59) with papilla analis simple, unmodified; sterigma square, ostium narrow-oblong; ductus bursae ca. half as long as corpus bursae; sclerite of antrum moderate, ca. 0.4 length of ductus bursae; cingulum incomplete, ringlike; corpus bursae with a pair of hollow, slender, thornlike signa of similar shape and size.

Holotype male, Jamaica, Pont Casse, 7 Jun 1965, D. & M. DAVIS (USNM), GS 124,698.

Paratypes. Jamaica: Pont Casse, 18 May 1964 (1 male), O. S. FLINT, Jr. (USNM), 19 May 1965 (1 female), 5 Jun 1965 (1 female), 6 Jun 1965 (1 female), 7 Jun 1965 (1 female), D. & M. DAVIS (USNM). 1.3 mi E Pont Casse, May 1964 (1 female), O. S. FLINT, Jr. (USNM). 0.3 mi E Pont Casse, 6 May 1964 (1 female), O. S. FLINT, Jr. (USNM). 1.6 mi E Pont Casse, 6 May 1964 (1 female), O. S. FLINT, Jr. (USNM). 2.2 mi E Pont Casse, 6 May 1964 (2 female), 7 May 1964 (1 female), O. S. FLINT, Jr. (USNM), GS 124,699. 1 mi E Pont Casse, 1800', 29 Jan 1965 (1 female), J. F. G. & T. CLARKE (USNM), GS 126,353. 0.5 mi W Pt. Lolo, 31 Jan 1965 (1 female), J. F. G. & T. CLARKE (USNM), GS 126,361.

# Episimus descriptanus (WALKER)

Carpocapsa descriptana WALKER, 1863: 399 (description).

Episimus descriptana: POWELL et al. 1995: 152 (checklist); BROWN 2005: 307 (catalog).

D i a g n o s i s. *Episimus descriptanus* is a small species with a pale whitish cream forewing nearly even striated with dark brown, with an ill-defined, small brown blotch at the tornus. In the male, the frons and labial palpus are white, and the hairpencil is concealed in an ill-defined sheath that extends along the metathorax. *Episimus descriptanus* is superficially most similar to *E. beckeri*, but the genitalia of the two are not similar. The male genitalia of *E. descriptanus* are most similar to those of *E. tyrius* and *E. lagunculariae*.

Holotype male, Brazil, Amazonas, Ega (BMNH).

S p e c i m e n s e x a m i n e d: Guyana ["British Guiana"]: Bartica, "3.13" (1 male), PARISH (BMNH). Brazil: Para, "7-19" (1 male), PARISH (BMNH). Manaus, "11-19" (1 female), PARISH (BMNH). Bahia: Barra Grande, 5-10 Jan 1999 (1 male), V. O. BECKER (USNM), GS 126,333.

# Episimus coleus sp. n.

(Figs 25, 60, 102)

D i a g n o s i s. *Episimus coleus* is assigned to the tyrius species group on the basis of the long, narrow-triangular sudmedial lobe of the valva and the sheath covering the distal end of the hairpencil in the male. The species is easily distinguished from other members of the group by its small forewing length. In facies and sexual dimorphism, it is similar to species of the kimballi species group. However, *E. coleus* lacks the area of stout setae of the socii and the black dot at the termination of the labial palpus, both of which are fairly characteristic of species of the latter group. Also, species of the kimballi species group lack the lanceolate sheath of the hairpencil.

D e s c r i p t i o n. Head: Brownish ferruginous; labial paplus in male without tiny black dot at termination. Thorax: Dorsum pale brown in male, reddish brown and pink in female. Hairpencil in male concealed in lanceolate sheath in distal portion, extending parallel to abdomen. Forewing length 5.0 mm; ground colour cream ferruginous, sprinkled and suffused with ferruginous with darker dots and strigulae; suffusion along costa distinct; costal strigulae small, cream, divisions rust brown; ocellus concolorous with ground colour, inner spots indistinct, refractive lines weak; markings diffuse rust brown: costal part of median fascia and oblique mark extending from 1/3 of dorsum to before middle of wing; suffusion at tornus dark rust brown. Cilia rust brown. Hindwing brownish grey. Cilia cream grey.

Male genitalia (Fig. 25) with uncus mostly rodlike, but with small subbasal enlargement and weakly curved at tip; socii unmodified, densely covered with fine hairs, stout setae absent; gnathos with slender terminal plate with arms separated distally; valva long, narrow, slightly upcurved in distal 0.4, with elongate-triangular submedian lobe bearing dense patch of stout spines; sacculus with 2 long setae from conspicuous sockets; henion weak; aedeagus comparatively large (cornuti lost).

Female genitalia (Fig. 60) with subrectangular sterigma bearing U-shaped ostium; sclerite of antrum weak; ductus bursae ca. 0.5 length of corpus bursae; cingulum a weakly sclerotized ring; corpus bursae oblong with a pair of nearly-straight signa with broadly sclerotized area at their bases.

Holotype male, American Virgin Islands, St. Johns, 25 Mar 1958, J. F. G. CLARKE (USNM), GS 126,338.

Paratype. American Virgin Islands: St. Johns, 25 Mar 1958 (1 female), J. F. G. CLARKE (USNM), GS 126,339.

D i s t r i b u t i o n a n d b i o l o g y. This species is known only from the type locality of St. Johns in the Virgin Islands.

E t y m o l o g y. The specific epithet refers to the sheath or covering of the hairpencil.

# Unassigned to species group

# Episimus augmentanus (ZELLER)

Grapholitha augmentana ZELLER, 1877: 160 (description).

Episimus augmentus: KIMBALL 1965: 255 (faunal survey), [misspelling of augmentana].

*Episimus augmentanus*: HEPPNER 1994: 92 (revision); POWELL et al. 1995: 152 (checklist), BROWN 2005: 307 (catalog).

D i a g n o s i s. *Episimus augmentanus* is superficially quite similar to *E. transferranus*, with a conspicuous dark semicircular patch near the mid-dorsum, but *E. transferranus* has a much lighter ground color with silver-gray striations. The two also can be distinguished by the color of the scaling of the vertex the head: tan in *augmentanus* and dark brown in *transferranus*. The male genitalia of *E. augmentanus* are characterized by a short uncus; relatively small socii; and large valvae that are somewhat abruptly angled toward the apex, bearing a short rounded-triangular submedian lobe (see HEPPNER 1994: figs. 56, 57). In the female genitalia the sterigma is subrectangular, rounded anteriorly, the antrum is simple, and the ductus bursae is short (see HEPPNER 1994: figs. 58, 59).

D i s t r i b u t i o n a n d b i o l o g y. According to HEPPNER (1994), this species occurs in Cuba and subtropical south Florida, with successive generations throughout the year. Larval hosts include *Metopium toxiferum* (Anacardiaceae) (DYAR 1901) and *Spondias* sp. (Anacardiaceae) (HEPPNER 1994).

Holotype male, Cuba (MNHU).

S p e c i m e n s e x a m i n e d. West Indies: Nassau, Bahamas, 1900 (1 female), CARTER (BMNH).

### Episimus argutanus (CLEMENS)

Bactra? argutana CLEMENS, 1860: 358 (description).

Grapholitha allutana ZELLER, 1875: 295 (description).

Catastega hamameliella CLEMENS, 1861: 87 (description).

*Episimus argutanus*: HEINRICH 1926: 79 (revision); MACKAY 1959: 145 (larva); KIMBALL 1965: 254 (faunal survey); POWELL 1983: 152 (checklist); HEPPNER 1994: 88 (revision); POWELL et al. 1995: 152 (checklist); BROWN 2005: 306 (catalog).

D i a g n o s i s. *Episimus argutanus* is a moderately small species with a forewing pattern that is mottled brown to dark brown, most resembling that of *E. guiana*. Males have a tiny black dot at the termination of the labial palpus and a short hairpencil. Male genitalia are characterized by a relatively short uncus; the absence of stout spines on the socii; and elongate, narrow, nearly parallel-sided valvae with a small, triangular submedian lobe. Female genitalia have a U-shaped sterigma with a small cingulum at the junction of the ductus burase and corpus bursae.

Lectotype female (argutana), USA, Pennsylvania, Northampton Co. (ANSP).

Lectotype female (allutana), USA, Texas/New York (MCZ).

No type (hamameliella), USA, Pennsylvania (description based on larval damage).

D i s t r i b u t i o n a n d b i o l o g y. This is a common and widespread species in North America, ranging across the continent from southern Canada to Texas, and from the Atlantic coast to the Pacific (HEPPNER 1994). The larva was described by CLEMENS (1861); MACKAY (1959) presented illustrations and details and the chaetotaxy; and ZIMMERMAN (1978) compared it to that of *E. unguiculus* (as *E. utilis*). We examined no specimens of this species south of the U.S. border.

### Episimus terminanus (WALKER)

Carpocapsa terminana WALKER, 1863: 396 (description).

Episimus terminana: POWELL et al. 1995: 152 (checklist); BROWN 205: 308 (catalog).

D i a g n o s i s. *Episimus terminanus* is a medium-small species with a narrow orange terminal band and orange cilia giving the aspect of a broad orange termen, and a much darker basal portion with subtle banding. The male has a narrow patch of white scales at the base of the forewing and a tiny black dot at the termination of the labial palpus. Because the holotype lacks the abdomen, comparisons of the genitalia are impossible.

Holotype male, Brazil, Amazonas, Ega (BMNH) (lacking tip of abdomen).

Specimen examined. Brazil: Para, "7.19" (1 female), PARISH (BMNH).

Distribution and biology. This species is known only from the type locality.

R e m a r k s. A series of specimens in BMNH are extremely similar to *E. terminanus*, but they are not conspecific with the holotype. For example, a male and a female from Bartica, Guyana, are almost certainly conspecific with each other and are virtually indistinguishable superficially from the holotype of *E. terminanus*. However, the male from Bartica has conspicuous white scaling at the base of the forewing and a tiny black dot at the tip of the third segment of the labial palpus, neither of which is consistent with the holotype of *E. terminanus*.

### Episimus camacanus sp. n.

(Figs 26, 103)

D i a g n o s i s. Superficially, *E. camacanus* is similar to *E. planaltinae*, *E. bahiae*, and females of *E. albidorsanus*. The frons is white, but unlike the latter species, the termination of the labial palpus of *E. camacanus* lacks the tiny black dot in the male. The male genitalia of *E. camacanus* are easily distinguished from all congeners by the laterally extended socii giving the dorsum of the tegumen a somewhat broad, square-shouldered aspect. D e s c r i p t i o n. Head: Vertex cream grey, upper part of frons brown, lower part white; labial palpus grey, cream white ventrally and terminally, male lacking tiny black dot at termination. Thorax: Dorsum brownish grey. Forewing length 7.0 mm; forewing slender, termen convex near middle, weakly concave beneath apex; ground colour cream, mixed with small amount of ochreous, especially in dorso-subterminal region, densely strigulated and dotted with leaden grey; costal strigulae minute, white, divisions brown, followed by orange lines, leaden grey inside; ocellus concolorous with ground colour of posterior portion of wing with black inner spots; markings dark brown consisting of slender postbasal fascia and median fascia (pale dorsally and medioproximally) with submedian sharp process of posterior edge; terminal markings darker brown. Cilia cream, brown at median part of termen. Hindwing greyish brown. Cilia dirty cream.

Male genitalia (Fig. 26) with uncus long, slender, pointed apically; socius broad, with tiny marginal spines; valva long, parallel-side in distal two-thirds, submedian lobe relatively short, rounded-triangular, with stout spines; sacculus short, setae asymmetrically distributed with two on left side and none on right; aedeagus stout, relatively long (cornuti lost).

Female unknown.

Holotype male, Brazil, Bahia, Camaca, 400-700 m, 13-14 Apr 1992, V. O. BECKER (USNM), GS 126,275.

D i s t r i b u t i o n a n d b i o l o g y. This species is known only from the holotype male collected between 400 and 700 m elevation in the state of Bahia, Brazil.

E t y m o l o g y. The specific epithet refers to the type locality, Camaca.

### Episimus minas sp. n.

(Figs 27, 104)

D i a g n o s i s. *Episimus minas* is distinguished superficially from all other congeners by the large crescent-shaped patch of bluish gray scales in the outer line of the ocellus of the forewing. Males have a white frons, and the termination of the labial palpus has a tiny black dot. The male genitalia of *E. minas* are most similar to those of the transferranus species group, with a somewhat rounded submedian lobe of the valvae and densely hairy, unmodified socii.

D e s c r i p t i o n. Head: Vertex pale brown with some cream lateroposteriorly, upper and lower frons white; labial palpus white, male with black dot at termination. Thorax: Dorsum mixed brown and cream; hairpencil short, unmodified. Forewing length 6.5 mm; ground colour ground colour cream, mixed with ochreous, densely strigulated and dotted with leaden grey; costal strigulae minute, white, divisions brown; ocellus with relatively large, crescent-shape metallic bluish gray distal part; markings dark brown consisting of incomplete postbasal fascia and median fascia. Cilia cream brown with gray brown basal band. Hindwing grey brown. Cilia dirty cream.

Male genitalia (Fig. 27) with uncus long, slender, attenuate apically; gnathos with extremely slender terminal plate; socius unmodified, densely hairy, without stout spines; valva long, mostly parallel-side in distal two-thirds, but slightly narrower in middle, submedian lobe relatively short, rounded, densely covered with spines; sacculus short, with 2-4 long setae; henion somewhat bottle-shaped; aedeagus stout, relatively short, vesica with dense bundle of cornuti.

Female unknown.

Holotype male, Brazil, Minas Gerais, Caraça, 1300 m, 25 Oct 1994, V. O. BECKER (UNSM), GS 124,243.

D i s t r i b u t i o n a n d b i o l o g y. *Episimus minas* is known only from the type locality. E t y m o l o g y. The specific epithet refers to the state of Minas Gerais, Brazil.

### Episimus prudens (MEYRICK)

Eucosma prudens MEYRICK, 1917: 23 (description).

*Episimus prudens*: CLARKE 1958: 339 (illustrations); POWELL et al. 1995: 152 (checklist); BROWN 2005: 307 (catalog).

D i a g n o s i s. The forewing maculation of *E. prudens* includes a blackish brown transverse dash in the basal one-third with a pale area beyond (see CLARKE 1958: 339). Males have a tiny black dot at the termination of the third segment of labial palpus and an unscaled region beneath the pecten in the hindwing. Male genitalia (see CLARKE 1958: 339) have a short, rodlike uncus with a few short hairs; a pear-shaped tegumen; short socii without stout spines; short gnathos arms with no conspicuous terminal plate; and narrow valvae with a broad triangular submedian lobe with a dense patch of spines.

Lectotype male, Peru, Lima, 500' [150 m], 8-14, PARISH (BMNH), GS 6401.

Additional specimens examined: Peru, Lima, 500' [150 m], "8-14" (1 male), PARISH (BMNH).

#### Episimus unguiculus CLARKE

Episimus unguiculus CLARKE, 1951: 297 (description).

*Episimus utilis* ZIMMERMAN, 1978: 637 (description); POWELL et al. 1995: 152 (checklist); BROWN 2005: 308 (catalog). New synonymy.

D i a g n o s i s. The male forewing of A. unguiculus has a conspicuous pale cream or whitish region along the dorsum in the basal two-thirds similar to that of male E. albidorsanus. In the female the pale area is obscured by dark scaling. The male of E. unguiculus lacks the black dot at the termination of labial palpus. The male genitalia of A. unguiculus are somewhat similar to those of E. transferranus, especially in the arrangement of the uncus and socii, but the two are easily separated by the shape of the submedian lobe of the valva, which is conspicuously more elongate-triangular in E. transferranus. In the female genitalia the cingulum is a complete sclerotized ring.

Holotype female (unguiculatus), Argentina, Tigre, USNM.

Holotype male (utilis), Hawaiian Islands, Hawaii, Oahu, Wailupe Valley (BMNH).

S p e c i m e n s e x a m i n e d: Argentina: Misiones Province: Rd 12, 2 km N Libertad, 2 Aug 2006 (5 males, 5 females), r.f. *Schinus terebinthofolius*, MCKAY & OLEIRO (USNM). Brazil: Pegueta Island, Rio de Janeiro, Jun 1954 (1 male), r.f. *Schinus terebinthifolius*, N. L. H. KRAUSS (USNM). USA: Hawaii: Oahu, Honolulu, Jan 1960 (2 males), r.f. *Schinus terebinthifolius* (USNM).

D i s t r i b u t i o n a n d b i o l o g y. *Episimus unguiculus* is native to Brazil and Argentina and was intentionally introduced into Hawaii in 1954 from Rio de Janeiro and Salvador, Bahia, as a potential biological control agent against Brazilian pepper-tree (*Schinus terbinthifolius*; Anacardiaceae) (ZIMMERMAN 1978). KRAUSS (1963) and BEARDSLEY (1959) chronicled its release and spread in Hawaii. It is known to feed only on Brazilian pepper-tree; ZIMMERMAN (1978: 639) provides descriptions and illustrations of the larva and pupa of the synonym, *Episimus utilis*.

R e m a r k s. The synonymy of *Episimus utilis* with *E. unguiculus* is based on the similarity in facies, male genitalia, and female genitalia between the two nominal taxa.

# Episimus beckeri sp. n.

(Figs 28, 105)

D i a g n o s i s. *Episimus beckeri* is superficially most similar to *E. descriptanus*. However, the two are easily separated by the male genitalia: in *E. beckeri* the submedian lobe of the valva is poorly developed and somewhat rounded, whereas in *E. descriptanus* it is represented by an elongate, narrow-triangular projection characteristic of the tyrius species group.

D e s c r i p t i o n. Head: Pale cream, with the scales tipped with brown; frons pale cream; labial palpus pale cream, with brownish grey at intersection of segments, black dot absent at termination. Thorax: Dorsum with middle portion mostly brown with two ill-defined pale cream lateral bands and some brownish grey spots; laterally mostly pale cream. Male hairpencil extending laterally below wings, concealed in an ill-defined sheath along metathorax, with sheath attached to metathorax. Forewing length 7.5-8.0 mm; forewing ground colour cream, tinged orange in the costal area, densely strigulated with grey-brown (glossy before ocellus), suffused with same colour along dorsum; costal strigulae distinct, cream white, divisions greyish brown; ocellus orange cream without an anterior refractive line and with broad posterior line and small spot near the tornus. Cilia brown with groups of cream scales. Hindwing brown. Cilia paler than wing.

Male genitalia (Fig. 28) with uncus fairly long, slender postmedially; socii large, without stout spines; valva narrow with short, rounded, strongly spined submedian lobe; henion long, broad basally; aedeagus short. Female genitalia unknown.

Holotype male, Brazil, Rondônia, Porto Velho, 180 m, 24 Apr-12 May 1989, V. BECKER (USNM), GS 124,233.

Paratypes. Brazil: Rondônia: Porto Velho, 180 m, 24 Apr-12 May 1989 (7 male), V. BECKER (USNM), GS 126,296.

D i s t r i b u t i o n a n d b i o l o g y. This species is known only from the type locality in Rondônia, Brazil.

E t y m o l o g y. The name is a patronym for Vitor O. BECKER.

# Episimus moderabilis sp. n.

### (Figs 29, 61, 106, 107)

D i a g n o s i s. This species exhibits moderate sexual dimorphism in maculation. Males are distinguished by a diffuse patch of white scales subbasally along the dorsum of the forewing, a dark gray to blackish brown head, a large black dot at the termination of the gray to black labial palpus, and the absence of a hairpencil from the prothorax. Females lack the white forewing patch and have a reddish brown head. The male genitalia are somewhat similar to those of *E. transferranus*, but in *E. moderabilis* the uncus is much shorter and the socius is more erect and truncate dorsally.

D e s c r i p t i o n. Head: Vertex and frons mixed brown and maroon in female, brown in male; labial palpus dark gray and maroon in female, dark gray to blackish brown in male, with a black dot at termination. Thorax: Dorsum mostly blackish brown to blackish grey with a few pale scales; tegula two-toned, black at base, distal part whitish grey. Forewing length 5.5-7.5, females slightly larger; costa convex; termen straight to middle where convex; ground colour white in dorso-postbasal half of wing, pinkish ochreous across the wing postmedially where densely dotted with grey-brown; costal half of wing suffused with blackish with sparse dots of ground colour; terminal area, including ocellus, ochreous cream; apical area cream rust. Costal strigulae white, divisions brown followed by brownish rust; postbasal blotch rust brown extending from dorsum to costal part of median cell, where pointed; median fascia dark brown, mixed rust proximally, preserved in costal third of wing. Cilia brownish to mid-termen, otherwise concolorous with ocellus. Hindwing greyish brown, paler basally. Cilia brownish grey. Abdomen: Dorsum shiny grayish brown; male with patch of grayish brown scales extending over genitalia.

Male genitalia (Fig. 29) with uncus small with slender terminal portion; socius rather large, subquadrate, flaplike, truncate dorsally; gnathos membranous in basal portion with narrow sclerotized terminal plate; valva narrow, elongate, most slender in mesal 0.5, with rounded, spiny submedian lobe; sacculus weakly sclerotized with 5-6 long setae from conspicuous sockets angle of sacculus rounded followed by a shallow concavity and broad posterior lobe; cucullus slender, somewhat broadening terminally; henion long, with blunt, rounded termination; aedeagus moderately large.

Female genitalia (Fig. 61) with papilla analis broad medially; sterigma broad, square, sclerotized region surrounded ostium, ostium large, squarish; sclerite of antrum weak but rather long; ductus bursae ca. 0.5 as long as corpus bursae; cingulum a broad, ill-defined, ring; a pair of large, sicklelike signa from broad basal plates.

Holotype male, Costa Rica, Heredia, 11 km ESE La Virgen, Cantarrana refuge, 10°21'N, 84°03'W, 300 m, 18 Feb 2004, D. L. WAGNER (INBio), 126,283.

Paratypes. Costa Rica: Guanacaste: Est. Pitilla, 9 km S Santa Cecilia, P.N. Guanacaste, 700 m, 19 May-3 Jun 1993 (1 female), P. RIOS (INBio). Heredia: 10 km Se La Virgen 10E20'N, 84E05'W, 450-550 m, 19 Mar 2003 (1 male), 11 Apr 2003 (1 male), INBio-OET-ALAS (INBio). Est. Biol. La Selva, 50-150 m, 10E26'N, 84E01'W, 27 Apr 1999 (1 female), INBio-OET (INBio). Puntarenas: Rancho Quemado, Peninsula de Osa, 200 m, Dec 1991 (1 male), M. CHAVARRIA (INBio).

D i s t r i b u t i o n a n d b i o l o g y. *Episimus moderabilis* is recorded from the Costa Rican provinces of Guanacaste, Heredia, and Puntarenas, between ca. 50 and 700 m elevation. Nothing is known of the early stages.

E t y m o l o g y. The name refers to facies of the moth; Latin: moderabilis – moderate.

#### Episimus sanjoseanus sp. n.

(Figs 62, 108)

D i a g n o s i s. This species is easily distinguished by its relatively small forewing length and forewing maculation, which includes a dark ground color with a darker, small, ill-defined rounded spot near mid-dorsum and a similar spot near mid-costa. In facies *E. sanjosea* is similar to *E. bahiae* and *E. rufotegula*. *Episimus sanjoseanus* can be distinguished from *E. bahiae* by the rust apex of forewing and from *E. rufotegula* by its smaller size. The female genitalia are extremely simple, with an ill-defined, ringlike cingulum.

D e s c r i p t i o n. Head: Blackish brown with violet hue, labial palpus brownish terminally; antenna blackish. Thorax: Dorsum blackish with violet grey gloss. Forewing length 6.0 mm; slender; ground colour pinkish cream, strongly suffused with leaden grey in the form of strigulae and spots; larger areas of ground colour in posterior portion of wing and inside ocellus; costal strigulae small, white, divisions blackish brown, pale rust in distal third of wing; markings ochreous with blackish brown edges consisting of basal blotch, postbasal blotch at costa, submedian blotch at dorsum, and costal half of median fascia. Cilia ochreous, browner at median part of termen, cream towards tornus. Hindwing brown. Cilia paler. Female paratype with paler forewing than holotype, with larger areas of ground colour and darker brown markings.

Male unknown.

Female genitalia (Fig. 62) with sterigma broad, weakly convex proximally; sclerite of antrum weak; cingulum an ill-defined, ringlike; basal sclerites of signa large, blades slender.

Holotype female, Costa Rica, San José, P.N. Braulio Carrillo, Est. Carrillo, 700 m, Jul 1990, I Curso Microlepidoptera (INBio), GS 126,266.

Paratype. Costa Rica: Heredia: 11 km ESE La Virgen, 10°21'N, 84°03'W, 250-350 m, 8 Apr 2004 (1 female), D. DAVIS (USNM), GS 126,265.

D i s t r i b u t i o n a n d b i o l o g y. This species is recorded from San José and Heredia provinces, Costa Rica, between 250 and 700 m elevation.

E t y m o l o g y. The species name refers to the province of San José, Costa Rica.

# Episimus rufotegulus sp. n.

(Figs 30, 63, 109)

D i a g n o s i s. Superficially, *E. rufotegulus* can be distinguished from its congeners by the forewing maculation which includes a reddish-brown area in the costal region in the basal 0.25, an ill-defined black blotch near the end of the discal cell with a tiny white dot at its distal end, and orange scaling in the terminal area. In the male the distal half of the hairpencil is concealed within a scaled sheath and extends free well beyond the posterior end of the metathorax, similar to that found in the caveatus and tyrius species group. The male genitalia are unique in that the top of the tegumen is flattened, bearing a dense patch of long, fine hairs that nearly conceal the short, stout, uncus. The valva is narrow, with a dense patch of 20-25 stout setae at the position of the submedian lobe. The aedeagus is short and stout, with a semi-sclerotized henion. D e s c r i p t i o n. Head: Vertex orange, frons purple brown; labial palpus dark brownish grey, male without dot at termination. Thorax: Dorsum brownish grey, tegula purple brown basally, orange cream terminally. Hairpencil with distal half concealed within scaled sheath that extends free well beyond posterior end of metathorax Forewing length 8.0 mm; ground colour orange, strigulated dark brown, costal divisions dark brown, costal edge of ocellus brown; median fascia black with orange-spotted median region; dorsum black; refractive grey fasciae bordering median fascia, similarly coloured costal lines and spots in dorsal and tornal areas. Cilia orange, mixed with brown at mid-termen, more cream at tornus. Hindwing brown. Cilia greyer, tinged orange at apex.

Male genitalia (Fig. 30) with uncus short, slender, surrounded by dense hairs; socius rather broad, hairy; sacculus weakly convex, angulate, with small, rounded concavity followed by short posterior lobe; valva long, slender, slightly attenuate distally, submedian lobe rounded, densely spined, with rounded excavation basally.

Female genitalia (Fig. 63) with sterigma rather large, broad proximally; sclerite of antrum weak but long; cingulum small; signa very large with flat, broad blades.

Holotype male, Costa Rica, Heredia, 11 km ESE La Virgen, 10°21'N, 84°03'W, 250-350 m, 19 Mar 2004, INBio-OET-ALAS (INBio), GS 126,253.

Paratypes. Costa Rica: Heredia: 11 km ESE La Virgen, 250-350 m, 10°21'N, 84°03'W, 250-350 m, 16 Mar 2004 (1 male), 19 Mar 2004 (1 male), 20 Mar 2004 (2 females), INBio-OET-ALAS (IN-Bio). El Ciebo, 10 km SE La Virgen, 10°20'N, 84°05'W, 450-550 m, 20 Feb 2003 (1 female), INBio-OET-ALAS transect (INBio), 14 Mar 2003 (1 male), M. EPSTEIN (INBio), 14 Apr 2003 (1 male), INBio-OET-ALAS transect (INBio). Puntarenas: Bosque Esqinas, Peninasula Oso, 200 m, Mar 1994 (1 male), M. SEGURA (INBio). Golfito, P.N. Piedras Blancas, Est. El Bonito, 100 m, Jan-Feb 2002 (1 female), M. MORGA (INBio).

D i s t r i b u t i o n a n d b i o l o g y. *Episimus rufotegulus* is recorded from the lowlands of Costa Rica

E t y m o l o g y. The name refers to the reddish-brown colour of the basal portion of the tegulae; Latin: rufus - rust.

# Episimus atrorufanus (WALKER)

Carpocapsa atrorufana WALKER, 1863: 397 (description).

Carpocapsa conclusana WALKER, 1863: 402 (description).

Episimus atrorufana: POWELL et al. 1995: 152 (checklist); BROWN 2005: 307 (catalog).

D i a g n o s i s. *Episimus atrorufanus* is most similar to *E. dignus*. Both have the vertex, froms and labial palpus brown, and males lack the tiny black dot at the termination. The forewing is characterized by an abundance of orange scaling throughout, with a distinct darker crescent-shaped patch from the basal one-third of dorsum and dark semicircular patch from the distal two-thirds of the costa. The male genitalia are similar to those of *E. dignus* with only subtle differences: in *E. dignus* the terminal plate of gnathos is slender and elongate and apparently lacking in *atrorufanus*; and in *E. dignus* the aedeagus henion a shorter distal part. The holotype of *conclusanus* is bigger than other specimens of *atrorufanus*. The female genitalia have slipper-shaped papilla analis; the ostium is U-shaped with extended lateral portions; the ductus bursae is slightly shorter than the corpus bursae; and the corpus bursae has a shallow lobe on left side just after intersection with ductus bursae; and the corpus bursae bears two small thorn-shaped signa.

Holotype male (*atrorufana*), Brazil, Amazonas (BMNH), GS 11750. This specimen is most likely an undesignated lectotype because the species was described from three specimens.

Holotype female (conclusana), Brazil, Amazonas, Ega (BMNH), GS 11777.

A d d i t i o n a l s p e c i m e n s: Brazil, Teffe, "12.19" (3 males, 4 females), PARISH (BMNH). Brazil, Parintins, "10-19" (1 male), PARISH (BMNH).

### **Episimus dignus** (MEYRICK)

Eucosma digna MEYRICK, 1917: 22 (description).

*Episimus digna*: CLARKE 1958: 336 (illustrations); POWELL et al. 1995: 152 (checklist); BROWN 2005: 307 (catalog).

D i a g n o s i s. *Episimus dignus* is a very small species superficially similar to *Olethreutes faceta*, with a more orange aspect to the forewing pattern than other species of *Episimus*. The two species also are similar in forewing length but *E. dignus* has a more defined pattern of darker scales. The male genitalia have a moderate rodlike uncus; unmodified socii; a gnathos with an extremely elongate, slender terminal plate united distally; moderately narrow valvae, slightly upcurved in the distal third, with the lobe well defined bearing a small patch of setae; and the sacculus with a single long seta. The head, vertex, and labial palpi are orange, and the termination of the third segment lacks a black dot. The hairpencil is a fascicle of long slender scales extending to end of metathorax.

Lectotype male, Guyana ["British Guiana"], Bartica, 12.12, PARISH (BMNH), GS 6402.

# Episimus leucomesanus (WALKER), revised status

Carpocapsa leucomesana WALKER, 1863: 404 (description).

Episimus leucomesana: BROWN 2005: 307 (as synonym of strigulana).

D i a g n o s i s. *Episimus leucomesanus* is a distinguished by the white head; white labial palpus with a tiny black dot at the termination in the male; a small white patch at the base of the forewing; and relatively small size. Male genitalia are unremarkable, with a moderately short, rodlike uncus, slightly attenuate distally; unmodified socii; gnathos with a moderately long, membranous terminal plate attached distally; valva extremely long, slender, uniform in width, with the submedian lobe well defined bearing a dense patch of spines and no other large spines on the valva; and a stout aedeagus.

Holotype male, Brazil, Amazonas (BMNH), GS 11753.

S p e c i m e n s e x a m i n e d. Guyana: Bartica, "1.13" (2 males, 3 females), "12.12"? (3 females), PARISH (BMNH). Brazil: Para, "7.19" (1 male), "6.19" (1 female), PARISH (BMNH). Teffe, 12.19 (1 female), PARISH (BMNH).

#### Episimus exiguus sp. n.

(Figs 64, 110)

D i a g n o s i s. *Episimus exiguus* is one of the smallest species in the genus; it is superficially similar to *E. guiana*. The male has a black dot at the tip at the termination of the labial palpus and a long hairpencil without a distal sheath or other modification. The female genitalia have the sclerite of the antrum asymmetrical, with the left side nearly twice as long as the right, and over half the length of the ductus bursae. The latter character is unique within the genus.

D e s c r i p t i o n. Head: Vertex cream, labial palpus white, male with tiny black dot at termination. Thorax: Dorsum cream with pale borwn areas. Forewing length 4.5 mm; ground colour cream with pale brown markings; costal strigulae white, divisions pale brown; ocellus yellow cream with spot brak brown inner spots; markings consisting of costal portion of median fascia and subtornal suffusion. Cilia concolorous with suffusions of wing. Hindwing grey-brown. Cilia paler.

Male not yet dissected.

Female genitalia (Fig. 64) with sterigma small with short, rounded proximal part and slender lateral lobes; sclerite of antrum asymmetrical, left side nearly twice as long as right, over 0.5 length of ductus bursae; ductus brusae relatively broad, widening anteriorly, cingulum a bulbous, weakly sclerotized swelling; signa short, rather broad basally.

Holotype female, Costa Rica, Heredia, El Ceibo, 10 km SE La Virgen, 10E20'N, 84E05'W, 450-550 m, M. EPSTEIN (INBio), GS 126,334.

Paratype. Costa Rica: Puntarenas, P.N. Manual Antonio, Quepos, 80 m, Oct 1993 (1 male), G. VARELA (INBio).

D i s t r i b u t i o n a n d b i o l o g y. *Episimus exiguus* is known from the Costa Rican provinces of Heredia and Puntarenas, at elevations between 80 and 550 m. Nothing is known of the early stages.

E t y m o l o g y. The specific epithet refers to its small size.

### *Episimus phaedra* (MEYRICK)

Antictenistis phaedra MEYRICK, 1931: 142 (description).

Episimus phaedra: POWELL et al. 1995: 152 (checklist); BROWN 2005: 307 (catalog).

D i a g n o s i s. We have not seen this species.

Holotype male, Brazil, Santa Catarina, Blumenau (NMHV).

# REFERENCES

- BROWN J. W. 2005. World catalogue of insects. Volume 5: Tortricidae (Lepidoptera). Apollo Books, 741 pp.
- BROWN J. W., POWELL J. A. 1991. Systematics of the *Chrysoxena* group of genera (Lepidoptera: Tortricidae: Euliini). *University of California Publications in Entomology*, **111**, 87 pp.
- BROWN J. W., POWELL J. A. 2000. Systematics of *Anopina* OBRAZTSOV (Lepidoptera: Tortricidae: Euliini). University *University of California Publications in Entomology*, **120**, 128 pp.
- BUSCK A. 1913. New Microlepidoptera from British Guiana. Insecutor Inscitiae Menstruus, 1: 1-88.
- CLARKE J. F. G. 1951. New species of Olethreutidae from Argentina (Lepidoptera). *Journal of the Washington Academy of Sciences*, **41**: 296-299.
- CLARKE J. F. G. 1958. Catalogue of the type specimens of microlepidoptera in the British Museum (Natural History) described by Edward Meyrick, Vol **3**. Trustees of the British Museum, London. 600 pp.
- CLEMENS B. 1860. Contributions to American Lepidopterology No. 6. Proceedings of the Academy of Natural Sciences, Philadelphia, 12: 345-362.
- CLEMENS B. 1861. Micro-Lepidopterous larvae. Notes on a few species, the imagos of which are probably undescribed. *Proceedings of the Entomological Society of Philadelphia*, 1: 75-87.
- DYAR H. 1901. Notes on the winter Lepidoptera of Lake Worth, Florida. Proceedings of the Entomological Society of Washington, 4: 446-485.
- FELDER R., A. F. ROGENHOFER A. F. 1875. [In:]C. FELDER, R. FELDER, A. F. ROGENHOFER (eds) Reise der osterreichischen Fregatte Novara um die Erde in den Jahren 1857, 1858, 1859 unter den Behilfen des Commodore B. von Wullerstorf-Urbair. Zoologischer Theil. Zweiter Band. Zweite Abtheilung: Lepidoptera. Vienna. 20 pp. female plates 108-140.
- HEINRICH C. 1923. New Olethreutinae from eastern United States (Lepidoptera). Proceedings of the Entomological Society of Washington, 25: 105-122.
- HEINRICH C. 1926. Revision of the North American moths of the subfamilies Laspeyresiinae and Olethreutinae. United States National Museum Bulletin, 132: 1-216.
- HEPPNER J. B. 1994. *Episimus* moths of North America (Lepidoptera: Tortricidae). *Holarctic Lepidoptera*, 1: 83-107.
- HORAK M. 2006. Olethreutinae moths of Australia (Lepidoptera: Tortricidae). *Monographs on Australian Lepidoptera*, **10**, 522 pp.
- JANZEN D. H., HALLWACHS W. 2007. Dynamic database for an inventory of the macrocaterpillar fauna, and its food plants and parasitoids, of Area de Conservacion Guanacaste (ACG), northwestern Costa Rica (nn-SRNP-nnnnn voucher codes) ttp://janzen.sas.upenn.edu male.
- KIMBALL C. P. 1965. The Lepidoptera of Florida: an annotated checklist. [In:] Arthropods of Florida and neighboring land areas, vol. 1. Florida Department of Agriculture, Division of Plant Industry, Gainesville, 363 pp.
- MACKAY M. R. 1959. Larvae of the North American Olethreutidae (Lepidoptera). Canadian Entomologist Supplement, 338 pp.
- MEYRICK E. 1912. Descriptions of South American Microlepidoptera. *Transactions of the Entomological Society of London*, **1911**: 673-718.
- MEYRICK E. 1917. Descriptions of South American Microlepidoptera. Transactions of the Entomological Society of London, 1917: 1-52.
- MEYRICK E. 1922. Exotic Microlepidoptera, 2(17): 513-544.

MEYRICK E. 1927. Exotic Microlepidoptera, 3(11): 321-352.

- MEYRICK E. 1931. Exotic Microlepidoptera, 4(5): 129-160.
- POWELL J. A. 1983. Tortricoidea, pp. 31-42. [In] R. W. HODGES (ed.) Check list of the Lepidoptera of America north of Mexico. E. W. Classey, Ltd., and Wedge Entomological Research Foundation, London.
- POWELL J. A., RAZOWSKI J., R. L. BROWN. 1995. Tortricidae: Olethreutinae. [In:] J. B. HEPPNER (ed.) Atlas of Neotropical Lepidoptera, Checklist Part II: Hyblaeoidea - Pyraloidea - Tortricoidea. Association for Tropical Lepidoptera, Scientific Publishers, Gainesville, Florida, pp. 151-15.
- RAZOWSKI J. 2003. Tortricidae of Europe. Volume 2. Olethreutinae. Frantisek Slamka, Bratislava. 304 pp.
- RAZOWSKI J., WOJTUSIAK J. 2006. Tortricidae (Lepidoptera) from the Valley of Rio Gualaceo, East Cordillera in Ecuador, with descriptions of new taxa. *Acta zoologica cracoviensia*, **49**(B): 17-53.
- WALKER F. 1863. List of specimens of lepidopterous insects in the collection of the British Museum, vol. 28, Tortricites and Tineites, London: 287-561.
- WALSINGHAM, Lord T. DE GREY. 1892. On the Micro-lepidoptera of the West Indies. Proceedings of the Zoological Society of London, 1891: 492-549.
- WALSINGHAM, Lord T. DE GREY. 1897. Revision of the West-Indian Microlepidoptera with descriptions of new species. *Proceedings of the Entomological Society of London*, **1897**: 54-183.
- WALSINGHAM, Lord T. de GREY. 1914. Lepidoptera-Heteroptera, vol. 4. Tineina, Pterophorina, Orneodina, and Pyralidina and Hepialidina (part). [In:] GODMAN F. D., O. SALVIN (eds) – Biologia Centrali-Americana, Insecta, 482 pp. 10 color plates.

ZELLER P. C. 1877. Exotische Microlepidoptera. Horae Societatis Entomologicae Rossicae, 13: 3-493.

ZIMMERMAN E. C. 1978. Insects of Hawaii, Volume 9, Microlepidoptera, Part 1. University of Hawaii Press, Honolulu, Hawaii, 881 pp.



Figs 1-8. Male genitalia of *Episimus* WALSINGHAM: 1 – *E. caveatus* (MEYRICK), La Selva, Costa Rica, 2 – *E. aurobasis* sp.n., paratype, 3 – *E. lavirgenanus* sp.n., holotype, 4 – *E. vermiculatus* (MEYRICK), Rancho Grande, Venezuela, 5 – *E. ortygia* (MEYRICK), Costa Rica, 6 – *E. rondoniae* sp.n., holotype, 7 – *E. macropterus* sp.n., holotype, 8 – *E. zunigae* sp.n., holotype.



Figs 9-16. Male genitalia of *Episimus* WALSINGHAM: 9 – *E. queposanus* sp.n., holotype, 10 – *E. rufatus* sp.n., paratype, Cuba, 11 – *E. varablancanus* sp.n., holotype, 12 – *E. pitillae* sp.n., paratype, 13 – *E. albidorsanus* sp.n., holotype, 14 – *E. griseatus* sp.n., paratype, Parque Nacional Cerro Cora, 15 – *E. albifrons* sp.n., holotype, 16 – *E. mignonatus* sp.n., holotype.











Figs 17-24. Male genitalia of *Episimus* WALSINGHAM:, 17 – *E. armiferus* sp.n., paratype, Estacion Pitilla, Costa Rica, 18 – *E. quintananus* sp.n., holotype, 19 – *E. vixenus* sp.n., holotype, 20 – *E. chica* sp.n., holotype, 21 – *E. jamaicanus* sp.n., paratype, Setting Point, British Virgin Islands, 22 – *E. antiguanus* sp.n., paratype, Antigua, West British Indies, 23 – *E. mahaianus* (FELDER & ROGENHOFER), Linhares, Brazil, 24 – *E. dominicanus* sp.n., holotype.







Figs 25-30. Male genitalia of *Episimus* WALSINGHAM: 25 – *E. coleus* sp.n., holotype, 26 – *E. camacanus* sp.n., holotype, 27 – *E. minas* sp.n., holotype, 28 – *E. beckeri* sp.n., holotype, 29 – *E. moderabilis* sp.n., holotype, 30 – *E. rufote gulus* sp.n., holotype.



Figs 31-36. Female genitalia of *Episimus* WALSINGHAM: 31 – *E. caveatus* (MEYRICK), Cerro de Neblina, Venezuela, 32 – *E. aurobasis* sp.n., paratype, Finca de E. Rojas, Costa Rica, 33 – *E. lavirgenanus* sp.n., paratype, Estacion Biologica La Selva, Costa Rica, 34 – *E. runawayica* sp.n., holotype, 35 – *E. vermiculatus* (MEYRICK), Rancho Grande, Venezuela, 36 – *E. ortygia* (MEYRICK), Rancho Guemada, Puntarenas, Costa Rica.



Figs 37-42. Female genitalia of *Episimus* WALSINGHAM: 37 – *E. rondoniae* sp. n., paratype, Parintins, Brazil, 38 – *E. semicirculanus* (WALKER), La Selva, Costa Rica, 39 – *E. macropterus* sp.n., paratype, 9 km NE Vara Blanca, Costa Rica, 40 – *E. zunigae* sp.n., paratype, Manuel Antonio, Quepos, Costa Rica, 41 – *E. rufatus* sp.n., holotype, 42 – *E. varablancanus* sp.n., paratype, 9 km NE Vara Blanca, Costa Rica.



Figs 43-48. Female genitalia of *Episimus* WALSINGHAM: 43 - E. *neblinanus* sp.n., holotype, 44 - E. *pitillae* sp.n., paratype, 45 - E. *albidorsanus* sp.n., paratype, 46 - E. *griseatus* sp.n., holotype, 47 - E. *limoyanus* sp.n., holotype, 48 - E. *albifrons* sp.n., paratype, San Ramon, Costa Rica.



Figs 49-54. Female genitalia of *Episimus* WALSINGHAM: 49 – *E. mignonatus* sp.n., paratype, Mt. Diable, Hollymount, Jamaica 50 – *E. armiferus* sp.n., paratype, SE La Virgen, Costa Rica, 51 – *E. paraisanus* sp.n., holotype, 52 – *E. quintananus* sp.n., paratype, Cozumel I sland, Mexico, 53 – *E. vixenus* sp.n., paratype, Vixen Point, British Virgin I slands, 54 – *E. jamaicanus* sp.n., holotype.



Figs 55-59. Female genitalia of *Episimus* WALSINGHAM: 55 – *E. antiguanus* sp.n., holotype, 56 – *E. curacaonus* sp.n., holotype, 57 – *E. mahaianus* (FELDER & ROGENHOFER), Linhares, Brazil, 58 – *E. parencausticus* sp.n., holotype, 59 – *E. dominicanus* sp.n., paratype, Point Casse, Dominica.



Figs 60-64. Female genitalia of *Episimus* WALSINGHAM: 60 – *E. coleus* sp.n., paratype, 61 – *E. moderabilis* sp.n., paratype, Estacion Biologica La Selva, Costa Rica, 62 – *E. sanjoseanus* sp.n., holotype, 63 – *E. rufotegulus* sp.n., paratype, 11 km ESE La Virgen, Costa Rica, 64 – *E. exiguus* sp.n., holotype.



Figs 65-72. Adults of *Episimus* WALSINGHAM: 65 - E. *caveatus* (MEYRICK), male, Costa Rica, 66 - E. *aurobasis* sp.n., paratype, 67 - E. *lavirgenanus* sp.n., holotype, 68 - E. *runawayicus* sp. n., holotype, 69 - E. *vermiculatus* (MEYRICK), male, Venezuela, 70 - E. *vermiculatus* (MEYRICK), female, Venezuela, 71 - E. *vittatus* WALSINGHAM, co-type, Mexico, 72 - E. *ortygia* (MEYRICK), male, Costa Rica.



Figs 73-80. Adults of *Episimus* WALSINGHAM: 73 – *E. ortygia* (MEYRICK), female, Costa Rica, 74 – *E. rondoniae* sp.n., holotype, 75 – *E. mesotrichus* MEYRICK, male, Venezuela, 76 – *E. intermissus* (MEYRICK), male, Brazil, 77 – *E. semicirculanus* (WALKER), female, Costa Rica, 78 – *E. macropterus* sp.n., holotype, 79 – *E. zunigae* sp.n., holotype, 80 – *E. queposanus* sp.n., holotype.



Figs 81-88. Adults of *Episimus* WALSINGHAM: 81–*E. rufatus* sp.n., holotype, 82–*E. varablancanus* sp.n., holotype, 83– *E. neblinanus* sp. n., holotype, 84–*E. pitillae* sp.n., holotype, 85–*E. albidorsanus* sp.n., paratype, 86–*E. albidorsanus* sp.n., female, paratype, 87–*E. griseatus* sp.n., holotype, 88–*E. albifrons* sp.n., holotype.



Figs 89-96. Adults of *Episimus* WALSINGHAM: 89 – *E. mignonatus* sp.n., holotype, 90 – *E. armiferus* sp.n., holotype, 91 – *E. paraisanus* sp.n., holotype, 92 – *E. quintananus* sp.n., holotype, 93 – *E. vixenus* sp.n., holotype, 94 – *E. chica* sp.n., holotype, 95 – *E. jamaicanus* sp.n., holotype, 96 – *E. antiguanus* sp.n., male, paratype.

# Neotropicaal Episimus





Figs 97-104. Adults of Episimus WALSINGHAM: 97 - E. antiguanus sp.n., holotype, 98 - E. curacaonus sp.n., female, paratype, 99 – *E. mahaianus* (FELDER & ROGENHOFER), male, Brazil, 100 – *E. parencausticus* sp.n., holotype, 101 – *E. dominicanus* sp.n., male paratype, 102 – *E. coleus* sp.n., female, paratype, 103 – *E. camacanus* sp.n., holotype, 104 – *E.* minas sp.n., holotype.



Figs 105-110. Adults of *Episimus* WALSINGHAM: 105 – *E. beckeri* sp.n., male, paratype, 106 – *E. moderabilis* sp.n., male, paratype, 107 – *E. moderabilis* sp.n., female, paratype, 108 – *E. sanjoseanus* sp.n., holotype, 109 – *E. rufotegulus* sp.n., female, paratype, 110 – *E. exiguus* sp.n., male, paratype.