

REVIEW OF *AESIOCOPA* ZELLER, 1877, WITH THE DESCRIPTIONS OF TWO NEW SPECIES  
(TORTRICIDAE: SPARGANOTHINI)

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**ABSTRACT.** The formerly monotypic genus *Aesiocopa* Zeller, 1877 is reviewed. Three species are included: *A. vacivana* Zeller, 1877 (type species) from Panama and Costa Rica; *A. necrofolia* Brown & Phillips, new species, from Mexico, Nicaragua, and Costa Rica; and *A. grandis* Brown, new species, from Costa Rica. The genus is recorded sparingly from Mexico to Panama. Although *A. vacivana* and *A. grandis* are known from only a handful of specimens, *A. necrofolia* has been reared from larvae numerous times in Costa Rica and from 15 different plant families: Asteraceae, Euphorbiaceae, Fabaceae, Hernandiaceae, Icacinaceae, Lauraceae, Magnoliaceae, Myrsinaceae, Myrtaceae, Piperaceae, Rubiaceae, Salicaceae, Sapindaceae, Smilacaceae, and Urticaceae. The abundance of rearing records suggests that the species is polyphagous, and the paucity of field-collected adults suggests that it may not be avidly attracted to light. The same may be true for its congeners.

**Additional key words:** Costa Rica, host plants, Mexico, new species, Panama

Sparganothini are among the most well-defined tribes in the family Tortricidae on the basis of both morphology and life history features (Powell 1986, Powell & Brown 2011). The tribe includes about 240 described species in 18 genera nearly restricted to the New World. Outside the Western Hemisphere, there are five species of *Sparganothis* Hübner, [1825] in the Palearctic region; two species of *Cenopsis* Zeller, 1875 in the Palearctic region; and two species of *Lambertiodes* Diakonoff, 1959 in the Oriental Region. Over the past decade or so our knowledge of the group has increased faster than that of any other tortricid tribe, with systematic revisions of *Sparganothis* Powell and Lambert, 1986 and relatives by Landry and Powell (2001); *Amorbia* Clemens, 1860 by Phillips-Rodriguez and Powell (2007); *Sparganothoides* Powell and Lambert, 1986 by Kruse and Powell (2009); and *Amorbimorpha* Kruse, 2011 by Kruse (2011); and a review of the entire North American (north of Mexico) fauna by Powell and Brown (2012). Although a stable generic-level classification has emerged for the North American members, many described species from the Neotropics still defy confident generic assignment, and a large portion of the fauna remains undescribed. Faunal surveys and rearing projects in the latter region, including those by Janzen and Hallwachs of Area de Conservación Guanacaste in northwestern Costa Rica (Janzen & Hallwachs 2012); the ALAS Project in Heredia Province, Costa Rica (ALAS 2012); efforts by Wojtusiak in Ecuador (e.g., Razowski & Wojtusiak 2006, 2008, 2010); and various other field work, have continued to reveal an array of undescribed sparganothine taxa. The purpose of this contribution is to review the formerly monotypic *Aesiocopa* Zeller, 1877, describe two new species in that genus, and

modify the description of the genus based on the new species.

## MATERIALS AND METHODS

Dissection methods follow those presented in Brown and Powell (1991). Images of adults and genitalia were captured using a Canon EOS 40D digital SLR (Canon U.S.A., Lake Success, NY) mounted on a Visionary Digital BK Lab System (Visionary Digital, Palmyra, VA). Terminology for genitalia structures and forewing pattern elements follows Powell and Brown (2012). The phallus of all dissected male genitalia was examined using a compound microscope to determine the presence/absence of cornuti and/or their associated sockets or scars.

Larvae were collected during an ongoing survey of the Lepidoptera of Area de Conservación Guanacaste (ACG) in northwestern Costa Rica (Janzen & Hallwachs 2012). Caterpillars discovered in the field were taken to “rearing barns” where they were placed in plastic bags with cuttings of the host upon which they are discovered. As adult moths emerged, they were dispatched, pinned, and labeled. Each specimen received a unique voucher number in the form of YY-SRNP-XXXX (e.g., 09-SRNP-15328), where the prefix is the last two digits of the year (e.g., 2009), “SRNP” refers to the project “call letters” assigned in 1977 (when the project site was referred to as Santa Rosa National Park), and the suffix is a unique number assigned within the year.

The following depositories are abbreviated in the text: American Museum of Natural History, New York, New York, U.S.A. (AMNH); The Natural History Museum, London, U.K. (BMNH); Essig Museum of Entomology, University of California, Berkeley, California, U.S.A.

(EME); Instituto Nacional de Biodiversidad, Santo Domingo de Heredia, Costa Rica (INBio); Los Angeles County Museum of Natural History, Los Angeles, California, U.S.A. (LACM); Museum für Naturkunde der Humboldt-Universität, Berlin, Germany (MNHU); and National Museum of Natural History, Washington, D.C., U.S.A. (USNM). Other abbreviations used in the text are as follows: em = emerged; GS = genitalia slide; P.N. = Parque Nacional; r.f. = reared from; TL = type locality.

Co-authorship of *Aesiocopa necrofolia*, n. sp., is shared with Eugenie Phillips-Rodriguez who discovered this new taxon and recognized that it was distinct from *Amorbia*.

#### RESULTS AND DISCUSSION

*Aesiocopa* belongs to a group of genera within Sparganothini that are characterized by a long crescent- or ribbon-shaped signum in the corpus bursae of the female genitalia that likely represents a synapomorphy for a clade. Genera that share this character state are *Aesiocopa* Zeller, 1877, *Amorbia* Clemens, 1860, *Amorbimorpha* Kruse, 2011, *Coelostathma* Clemens, 1860, *Lambertiodes* Diakonoff, 1959, *Paramorbia* Powell & Lambert, 1986, *Rhynchophyllus* Meyrick, 1932, *Sparganopseustis* Powell & Lambert, 1986, *Sparganothina* Powell, 1986, and *Sparganothoides* Lambert & Powell, 1986. The presence of secondary arms of the socii divide the group—they are present in *Aesiocopa*, *Amorbimorpha*, *Sparganopseustis*, and *Sparganothoides*, and absent in *Amorbia*, *Coelostathma*, *Lambertiodes*, *Paramorbia*, and *Sparganothina*. The male of *Rhynchophyllus* is unknown.

#### *AESIOCOPA* Zeller, 1877

Type species: *Aesiocopa vacivana* Zeller, 1877, by monotypy.

*Aesiocopa* was described by Zeller (1877) to accommodate the single species *A. vacivana* Zeller, known only from the holotype female from Chiriquí, Panama. Walsingham (1914) illustrated the female and discussed three specimens (1♂, 2♀) collected at Bugaba, Chiriquí, Panama. A small series of males from Costa Rica (INBio) appears to match Walsingham's description of the male, and two new species from Costa Rica appear to be congeneric with the type species. Based on these three species, the genus is redescribed below.

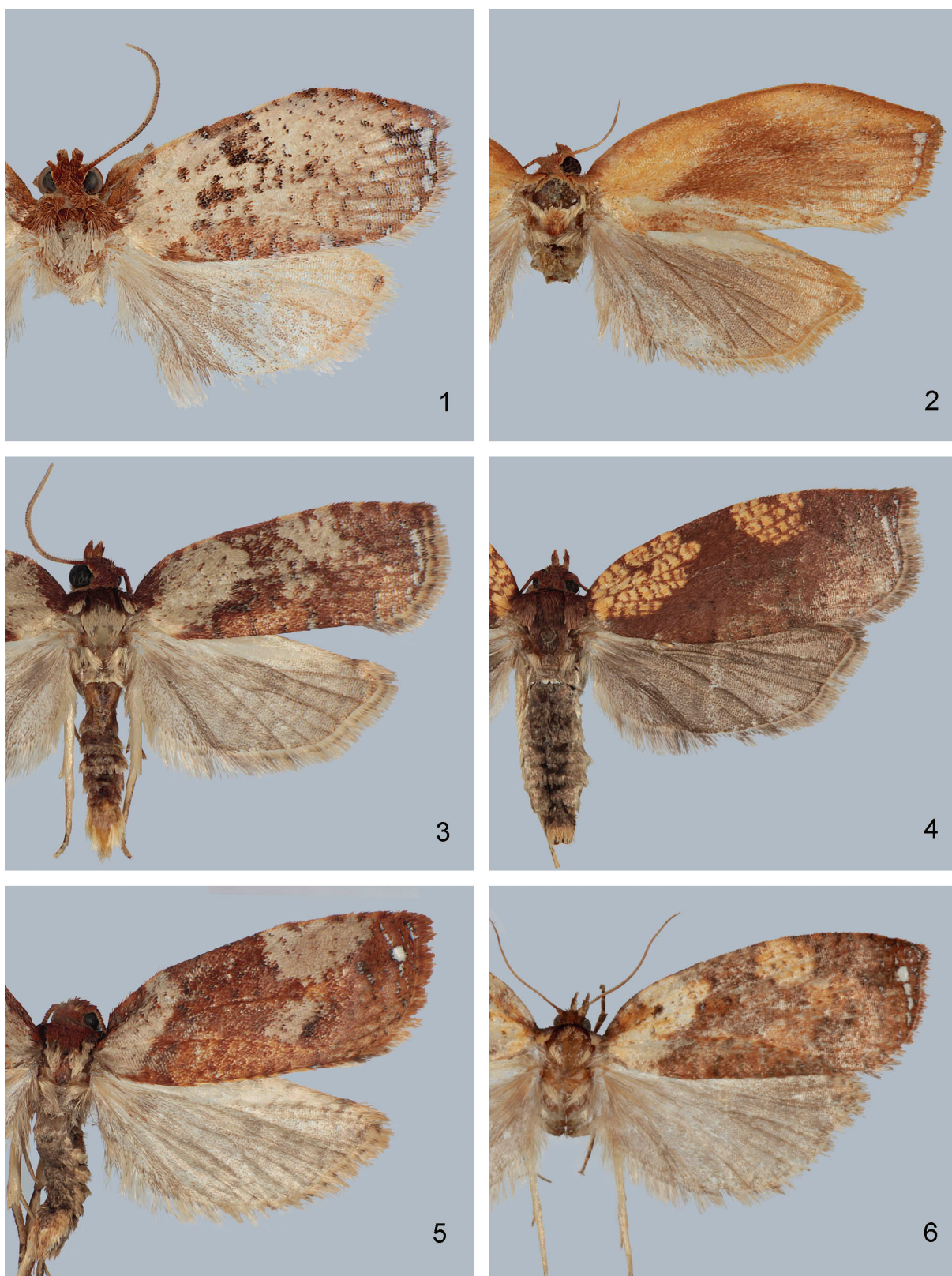
**Diagnosis.** *Aesiocopa* can be distinguished from all other sparganothine genera by facies alone. With the exception of the female of *A. vacivana*, the forewing pattern is somewhat reminiscent of a necrotic leaf—

mostly pale to dark brown with an ovoid pale region basally (orange or ochreous in the female and grayish tan in the male), with a similarly colored, semicircular patch (in the female) or blotch (in the male) just beyond mid-costa. There is a variably developed row of small bluish or silvery white dots in the subterminal region in both sexes. In the forewing of *A. vacivana* the distal 0.3 of the costa is angled downward at ca. 140° in both sexes; the costa is nearly evenly curved in the other two congeners. Adults of *Aesiocopa* are about the same size as those of *Amorbimorpha* Kruse, but sexual dimorphism is much more pronounced in the former (Figs. 1–6). Females are conspicuously larger than males and have conspicuously to subtly different forewing maculation. The labial palpi in both sexes of *Aesiocopa* are shorter and less densely scaled than in all other described genera of Sparganothini (Figs. 7, 8). Both sexes have a large mid-dorsal pit on the second and third abdominal segments, as do many *Amorbia*, *Coelostathma*, and some *Sparganopseustis*. Both sexes of *Aesiocopa* have a small patch of modified scales in a shallow pouch laterally on the first abdominal segment that is unique to the genus.

The male genitalia of *Aesiocopa* possess well-developed secondary arms of the socius, the basal portion of which is entirely fused with the socii, so that the only evidence of the secondary arms is the distal part that projects beyond the anteriormost edge of the socii.

**Description.** *Head:* Frons with or without complex hood of scales; labial palpus relatively short, weakly upcurved, all segments combined 1.5–1.6 times horizontal diameter of compound eye; ocellus minute; antennal scaling in two bands per segment, sensory setae 0.6–0.8 times flagellomere width in male, short, unmodified in female. *Thorax:* Not smooth scaled throughout; legs unmodified. Forewing length 9.0–16.0 mm; costa angled downward at ca. 140° in distal 0.35 (i.e., *vacivana*) or nearly evenly curved throughout (i.e., *necrofolia*, *grandis*); male lacking forewing costal fold, but base of costa with scaling slightly more dense; no raised scales on forewing; R<sub>4</sub> and R<sub>5</sub> stalked in basal 0.25 in males, basal 0.16 in females; chorda absent, m-stem weak though cell. Hindwing with Rs and M<sub>1</sub> approximate at base, CuA<sub>1</sub> and M<sub>3</sub> connate, and M<sub>2</sub> and M<sub>3</sub> approximate at base; cubital hair pecten well developed in both sexes. *Abdomen:* Single rounded mid-dorsal pit on A2 and A3 in both sexes (Fig. 12). Weakly developed lateral pouch bearing specialized scales laterally on A1 of both sexes. Female lacking enlarged corethrogynae scaling. Male genitalia with uncus long, but not exceedingly slender as in most *Sparganothis* and *Coelostathma*; socius large, elongate, densely covered with scales, and with conspicuous secondary arm extending from anterior lobe of socius, with small patch of setae in distal portion; gnathos weakly developed with slender lateral arms and weak, slender mesal process; transtilla a short, broad, densely spined band; pulvinus weakly developed compared to other sparganothines; valva large, subrectangular, simple, only slightly narrowed distally, lacking subapical notch at distal termination of costa (that is characteristic of *Amorbia*); sclerotized basal portion of transtilla extending toward sacculus as a slender line of sclerotization; sacculus ill-defined, restricted to basal 0.6 of valva. Phallus relatively small, 0.4–0.8 length of valva, slightly bent at 0.65 distance from base; vesica with dense bundle of 15–20 aciculate, subbasally attached, deciduous cornuti. Female genitalia with papillae anales simple, large, unmodified;





FIGS 1–6. Adults of *Aesiocopa*. 1. *A. vacivana* (male). 2. *A. vacivana* (female). 3. *A. necrofolia* (male). 4. *A. necrofolia* (female). 5. *A. grandis* (male). 6. *A. grandis* (female).

apophyses simple, posteriores only slightly longer than anteriores; sterigma a simple lateral band, slightly narrowed laterally; ductus bursae slightly longer than corpus bursae, gradually broadened anteriorly; corpus bursae round-oblong, densely and finely punctate; signum a slender crescent-shaped band near middle of corpus bursae; a tiny, knoblike process externally on corpus bursae near signum.

**Distribution and Biology.** *Aesicopa* is recorded from Mexico to Panama. The majority of specimens (71 of 88) of *Aesicopa necrofolia* were collected as larvae, and most specimens (5 of 9) of *A. grandis* were retrieved from malaise traps. Hence, it is assumed that adults are only weakly attracted to lights. *Aesicopa necrofolia* has been reared from 30 different species of vascular plants, encompassing 15 families, exhibiting polyphagy typical of most other genera of Sparganothini. The three known species of *Aesicopa* appear to replace each other over an elevation gradient in Central America—*A. vacivana* is known from ca. 0–300 m; *A. necrofolia* has been recorded primarily from ca. 300–1000 m; and *A. grandis* is known only from ca. 1950–2500 m.

*Aesicopa vacivana* Zeller, 1877

Figs. 1, 2, 9, 13

*Tortrix* (*Aesicopa*) *vacivana* Zeller, 1877: 106.

*Aesicopa vacivana*: Walsingham 1915: 207; Powell et al. 1995: 148; Brown 2005: 74.

**Diagnosis.** *Aesicopa vacivana* is easily distinguished from all other Sparganothini by the shape of the forewing; angled downward at ca. 140° in the distal 0.3 of the costa in both sexes. In the female the forewing is primarily ochereous, whereas in the male it is mostly pale beige and gray, with an ill-defined, incomplete, brown, median fascia. The bright ochereous color of the female easily distinguishes it from congeners. Forewing maculation and pattern of the male are very similar to those of *A. necrofolia*, but the two are easily distinguished by forewing shape.

**Description. Male** (Fig. 1). *Head*: Vertex rust, frons cream; labial palpus short, upcurved, nearly appressed to frons, with moderately short, pale ochereous brown scales (i.e., not conspicuously expanded distally on segment II); antennal scaling pale orange brown. *Thorax*: Anterior 0.25 of nota, including tegula, pale rust, posterior 0.75 mostly cream-gray; without modified scaling on legs. Forewing length 10.0–11.0 mm (mean 10.5;  $n = 5$ ); forewing costa angled downward at ca. 140° in distal 0.3; forewing ground color cream, with scattered small brown spots between veins in middle of wing and along veins in distal 0.3; basal 0.15 of costa and costo-apical region pale rust; faint, ill-defined, interrupted, brown median fascia from costa ca. 0.3–0.4 distance from base to apex, extending to dorsum ca. 0.15–0.25 distance from base to tornus; dorsum with faint, diffuse, pale rust patch from dorsal portion of median band, fading toward termen; row of round, pale bluish white dots along termen between veins; fringe cream at tornus, pale beige along termen. Hindwing pale ochereous, pale gray at base; fringe slightly paler. *Abdomen*: Cream. *Genitalia* (Fig. 9) with uncus rodlike, ca. as long as valva, from broadly rounded base; socius relatively slender with fine long scales, secondary arms arising from inner anterior portion of socius, moderately short, slightly dilated apically with patch of fine setae; transtilla bulbous mesially, slightly bilobed, densely covered with fine spines; valva simple, mostly parallel-sided, rounded apically, costa narrowly sclerotized to apex, sacculus sclerotized in basal 0.6; juxta a diamond-shaped plate; phallus ca. 0.85 length of valva, slightly swollen and curved near middle; vesica with 20–22 deciduous cornuti (represented by scars in genitalia preparations).

**Female** (Fig. 2). *Head*: Vertex pale orange brown, frons cream; labial palpus short, upcurved, nearly appressed to frons, with moderately short, ochereous, scales (i.e., not conspicuously expanded distally on segment II); antennal scaling pale orange brown. *Thorax*:

Anterior 0.25 of notum, including tegula, pale orange brown, posterior 0.75 cream. Forewing length 14.0 mm ( $n = 1$ ); forewing costa angled downward at ca. 140° in distal 0.3; forewing ground color ochereous; broad area of pale orange brown in middle of wing, extending from dorsum ca. 0.15–0.75 distance from base to apex, through discal cell; row of 3–4 roundish white dots along termen between veins; fringe pale cream orange at tornus, slightly darker along termen. Hindwing pale cream orange. *Abdomen*: Genitalia (Fig. 13) essentially as described for genus (single preparation in poor condition).

**Holotype** ♀, Panama, Chiriquí, Ribbe (MNHU).

**Additional Specimens Examined.** COSTA RICA: Puntarenas: Estación Sirena, 0–100 m, P. N. Corcovado, Nov 1989 (1♂), Dec 1989 (1♀), Oct 1990 (1♂), May 1991 (1♂), Sep 1991 (1♂), G. Fonseca (INBio). Rancho Quemado, Península de Osa, 200 m, Nov 1991 (1♂), F. A. Quesada (INBio). PANAMA: Bugaba, Chiriquí, 800–1500', [no date] (1♂, 2♀), G. C. Champion (BMNH, USNM).

**Distribution and Biology.** *Aesicopa vacivana* is recorded only from southwestern Costa Rica and adjacent Panama. Nothing is known of the early stages.

**Remarks.** Of the three known females, the genitalia slide is lost for the holotype (N. Obraztsov slide 1964, B.19), the abdomen is lacking from another (USNM), and the preparation is rather poor for the last (BMNH slide 5344).

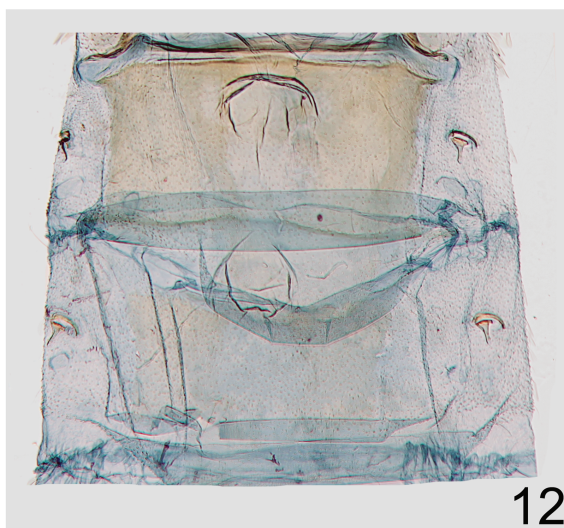
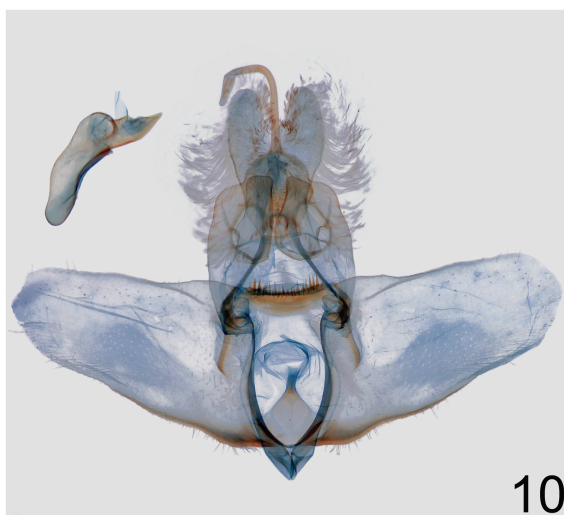
*Aesicopa necrofolia* Brown and Phillips,  
new species

Figs. 3, 4, 7, 8, 11, 12, 15

**Diagnosis.** Superficially, *A. necrofolia* is similar to the male of *A. vacivana* and both sexes of *A. grandis*. It can be distinguished from *A. vacivana* by the more uniformly rounded costa of the forewing (bent in the distal 0.3 in *A. vacivana*), and from *A. grandis* by its conspicuously smaller size (mean forewing length 9.9 vs 12.2 mm in males and 12.5 vs. 16.0 mm in females). Males have a narrow, slightly curved band of tiny pale bluish white dots paralleling the termen which in *P. grandis* is usually replaced by a single (or infrequently a second tiny), isolated silver-white dot near the termen subapically; and the scaling on the head of males is more complex in *P. necrofolia* than in either *P. grandis* or *A. vacivana*, with the frons scaling comprised of a shallow bowl-shaped ring beneath the overhanging scales of the vertex. The male genitalia of the three species are easily distinguished by the shapes of distal end of the socius and the transtilla, but the female genitalia are nearly identical.

**Description. Male** (Fig. 3). *Head*: Vertex dark rust, with smooth, ventrally-projecting tuft of scales, frons with a shallow bowl-like depression covered in smooth cream colored scales; labial palpus short, segment II nearly straight, with short, smooth, rust scales, segment III well exposed (Figs. 7, 8); antennal scaling rust. *Thorax*: Anterior 0.25 of nota, including tegula, dark rust, posterior 0.75 pale gray; without modified scaling on legs. Forewing length 9.0–10.0 mm (mean 9.9;  $n = 10$ ); forewing costa nearly evenly curved throughout; forewing ground color pale reddish brown, isolating two broad patches of pale gray, one in basal portion of wing extending from basal 0.15 of dorsum to costa ca. 0.4 distance from base to apex, second less defined, near middle of costa, often with a small concolorous blotch immediately below; a conspicuous white dot in the terminal area subapically; fringe red-brown in apical 0.7 of termen, pale in





FIGS 7–12. Head, male genitalia, and dorsal pits of *Aesiocopa*. **7.** Head of *A. necrofolia* (male). **8.** Head of *A. necrofolia* (female). **9.** Male genitalia of *A. vacivana* (USNM slide 142,206). **10.** Male genitalia of *A. grandis* (USNM slide 142,026). **11.** Male genitalia of *A. necrofolia* (USNM slide 142,033). **12.** Dorsal pits of *A. necrofolia*.

remainder (i.e. tornus). Hindwing gray-ocherous, weakly mottled with gray; fringe cream. *Abdomen*: Pale gray. Genitalia (Fig. 11) with uncus rodlike, ca. 0.75 as long as valva, from broadly rounded base; socius long, extending posteriorly nearly half length of uncus, relatively slender with fine long scales, secondary arms arising from inner anterior portion of socius, moderately short, slightly dilated and rounded apically with patch of fine setae; transtilla short, rectangular, slightly arched posteriorly, densely covered with fine spines; valva simple, somewhat parallel-sided, rounded apically, costa and sacculus sclerotized in basal 0.5; juxta a diamond-shaped plate; phallus ca. 0.7 length of valva, and curved near middle; vesica with 20–22 cornuti.

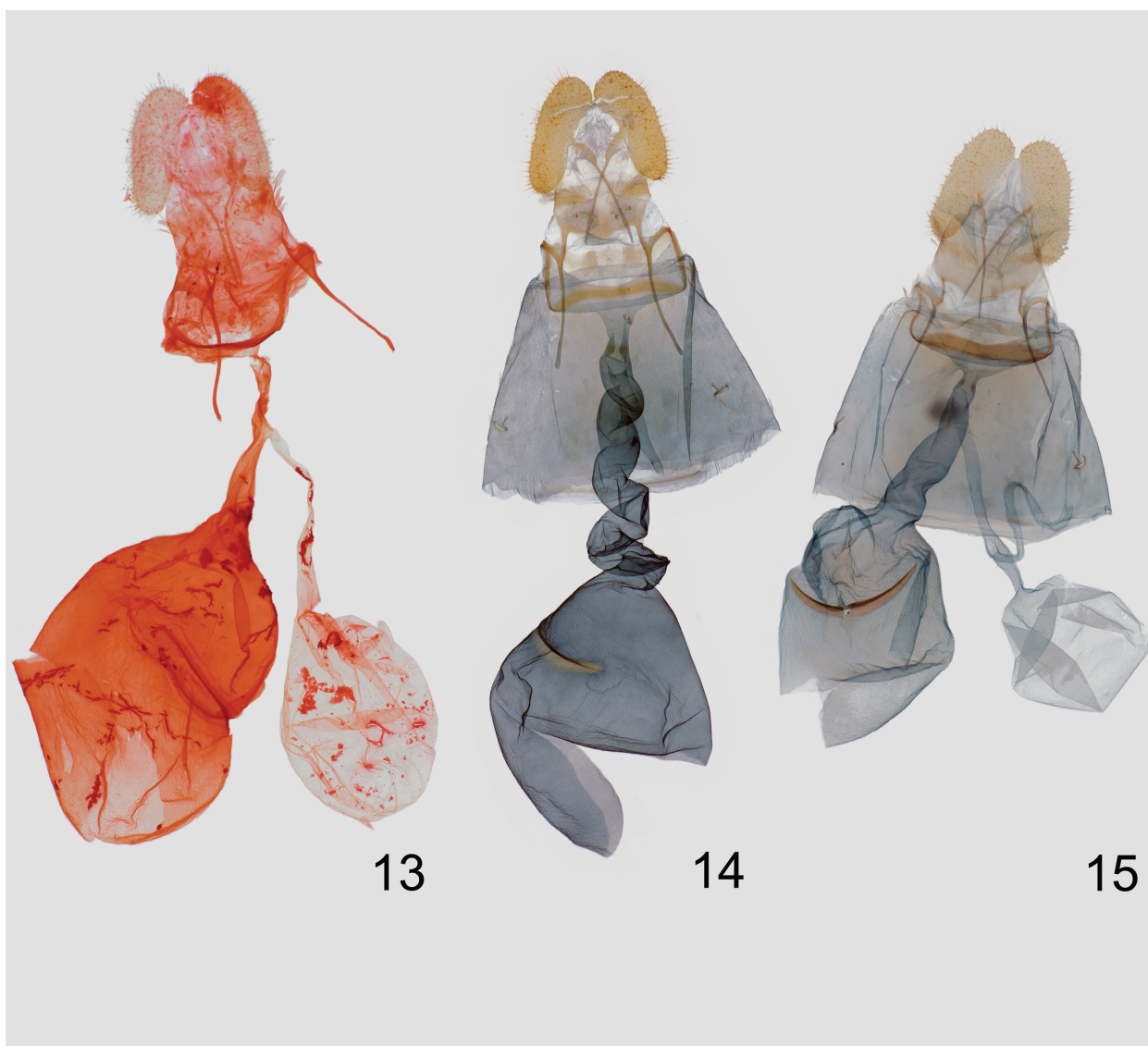
**Female** (Fig. 4). *Head*: Vertex dark rust, with tuft of ventrally-projecting scales, frons unmodified, pale brown; labial palpus short, segment II nearly straight, with short, smooth, rust scales, paler on inner surface, segment III well exposed; antennal scaling rust. *Thorax*: Dark rust, with a pair of cream sublateral patches on posterior 0.2; legs without modified scaling. Forewing length 12.0–14.0 mm (mean 12.6;  $n = 10$ ); forewing costa nearly evenly curved throughout, apex weakly falcate; forewing ground color dark rust brown, isolating two broad patches of pale ocherous orange, reticulated with fine rust net-like pattern, one patch in basal 0.33 of wing, margined by ground color along dorsum, and second much smaller patch, semicircular, just apical of middle of costa; variably developed row of 6–8 tiny, narrow, contiguous, pale silver-white dashes along termen; fringe brown with narrow line of cream along inner edge. Hindwing pale gray brown; fringe slightly paler. *Abdomen*: Pale gray brown. Genitalia (Fig. 15) with papillae anales simple, large, unmodified; apophyses simple, posteriores only slightly longer than anteriores; sterigma a simple lateral band, slightly narrowed laterally; ductus bursae slightly longer than corpus bursae, gradually broadened anteriorly; corpus bursae round-oblong, densely and finely punctate; signum a slender crescent-shaped band near middle of corpus bursae.

**Holotype** ♂, Costa Rica, Guanacaste, Area de Conservación Guanacaste, Sector San Cristobal, Finca San Gabriel, 645 m, 10.87766N, -85.39343W, 26 Nov 2009, E. Araya, em: 26 Dec 2009, r.f. *Eugenia basilaris* (09-SRNP-6362) (USNM).

**Paratypes** (31♂, 48♀): COSTA RICA: Alajuela: Area Conservación Guanacaste: Sector Rincon Rain Forest, Sendero Parcelas, 375 m, 10.90777N, -85.29137W, 1 Feb 2003, M. Carmona, em: 16 Feb 2003 (1♀), r.f. *Myriocarpa longipes* (03-SRNP-10239); 25 May 2010, J. Perez, 11 Jun 2010 (1♂), r.f. *Calatola costaricensis* (10-SRNP-41930). Sector Rincon Rain Forest, Camino Río Francia, 410 m, 10.90425N, -85.28651W, 1 Aug 2000, F. Vargas, em: 18 Aug 2000 (1♀), r.f. *Piper auritum* (00-SRNP-14022). Sector Rincon Rain Forest, Flecha, 491 m, 10.94741N, -85.31501W, 7 Jul 2009, N. Castillo, em: 18 Jul 2009 (1♀), r.f. *Hernandia stenura* (09-SRNP-69456); 17 Sep 2009, N. Castillo, em: 29 Sep 2009 (1♂), r.f. *Hernandia stenura* (09-SRNP-80067); 31 Mar 2010, N. Castillo, em: 15 Apr 2010 (1♂), r.f. *Piper imperiale* (10-SRNP-69464). Sector Rincon Rain Forest, Camino Albergue Oscar, 560 m, 10.87741N, -85.32363W, 29 Dec 2011, E. Araya, em: 16 Jan 2012 (1♂), r.f. *Nectandra hihua* (11-SRNP-5229); 20 May 2010, G. Sihezar, em: 18 Jun 2010 (1♂), r.f. *Acalypha diversifolia* (10-SRNP-2523); 16 May 2011, G. Sihezar, em: 3 Jun 2011 (1♂), r.f. *Ardisia auriculata* (11-SRNP-1999). Sector Rincon Rain Forest, Selva, 410 m, 10.92291N, -85.3187709W, 6 Oct 2009, M. Catillo, em: 26 Oct 2009 (1♀), r.f. *Calatola costaricensis* (SRNP-80438). Sector Rincon Rain Forest, San Lucas, 320 m, 10.91847N, -85.30338W, 22 July 2012, A. Cordoba, 8 Aug 2012 (1♀), r.f. *Ardisia auriculata* (10-SRNP-42605). Sector Rincon Rain Forest, Sendero Rincon, 430 m, 10.8962N, -85.27769W, 31 Aug 2010, A. Cordoba, em: 18 Sep 2010 (1♂), r.f. *Calatola costaricensis* (10-SRNP-43105). Sector San Cristobal, Puente Palma, 460 m, 10.9163N, -85.37869W, 4 Sep 2009, C. Cano, em: 20 Sep 2009 (1♀), r.f. *Ardisia auriculata* (09-SRNP-4628); 4 Sep 2009, C. Cano, em: 7 Sep 2009 (1♂), r.f. *Ardisia auriculata* (09-SRNP-4629). Sector San Cristobal, Sendero Carmona, 670 m, 10.87621N, -85.38632W, 21 Jan 2003, G. Sihezar, em: 10 Feb 2003 (1♀), r.f. *Piper cenocladum* (03-SRNP-5129). Sector San Cristobal, Sendero Huerta, 527 m, 10.9305N, -85.37223W, 23 Jul 2007, E. Araya, em: 8 Aug 2007 (1♀), r.f. *Calatola costaricensis* (07-SRNP-3175); 29 Sep 2009, E. Araya, em: 19 Nov 2009 (1♀), r.f.

*Hernandia stenura* (09-SRNP-4978); 17 Sep 2006, G. Siheza, em: 5 Oct 2006 (1♀), r.f. *Calatola costaricensis* (06-SRNP-7618); 13 Apr 2009, O. Espinoza, em: 18 May 2009 (1♀), r.f. *Calatola costaricensis* (09-SRNP-1414), em: 29 Apr 2009 (1♂), (09-SRNP-1413); 28 Nov 2009, E. Araya, em: 15 Dec 2009 (1♂), r.f. *Calatola costaricensis* (09-SRNP-6443); 29 Sep 2009, E. Araya, em: 30 Sep 2009 (1♂), r.f. *Cupania juglandifolia* (09-SRNP-4979); 13 May 2009, G. Sihezar, em: 26 May 2009 (1♂), r.f. *Calatola costaricensis* (09-SRNP-1924), em: 23 May 2009 (1♂) (09-SRNP-1925); 31 Oct 2011, C. Cano, em: 25 Nov 2011 (1♀), r.f. *Calatola costaricensis* (11-SRNP-4245), em: 26 Nov 2011 (1♂) (11-SRNP-4246); 9 Jan 2010, O. Espinoza, em: 12 Feb 2009 (1♀), r.f. *Lepidaploa tortuosa* (10-SRNP-282). Sector San Cristobal, Finca San Gabriel, 645 m, 10.87766N, -85.39343W, 11 Feb 2010, E. Araya, em: 6 Mar 2010 (1♀), r.f. *Ardisia calycosa* (10-SRNP-912); 26 Jan 2010, E. Araya, em: 1 Mar 2010 (1♀), r.f. *Ardisia auriculata* (10-SRNP-610); 1 Sep 2008, E. Araya, em: 19 Sep 2008 (1♂), r.f. *Ardisia compressa* (08-SRNP-5025); 13 Jul 2011, E. Araya, 4 Aug 2011 (1♀), r.f. *Hernandia stenura* (11-SRNP-2832); 13 Aug 2011, G. Sihezar, em: 2 Sep 2011 (1♀), r.f. *Piper umbricola* (11-SRNP-3208). Sector San Cristobal, Sendero Perdido, 620 m, 10.8794N, -85.38607W, 27 Jul 2007, E. Ayara, em: 18 Aug 2007 (1♀), r.f. *Calatola costaricensis* (07-SRNP-3244). Sector Rincon Rain Forest, Quebrada Escondida, 420 m, 10.89928N, -85.27486W, 1 Feb 2010, J. Perez, em: 4 Mar 2010 (1♀), r.f. *Calatola costaricensis* (10-SRNP-40387); 26 Jan 2003, J. Perez, em: 9 Feb 2003 (1♀), r.f. *Calatola costaricensis* (03-SRNP-10191); 25 Nov 2009, A. Cordoba, em: 9 Dec 2009 (1♀), r.f. *Piper fimbriulatum* (09-SRNP-43300); 9 July 2009, A. Cordoba, em: 18 July 2009 (1♂), r.f. *Ardisia auriculata* (09-SRNP-41646); 9 Jul 2009, A. Cordoba, em: 29 July 2009 (1♂), r.f. *Ardisia auriculata* (09-SRNP-41653); 11 Nov 2011, J. Hernandez, em: 26 Nov 2011 (1♂), r.f. *Piper thomasi* (Piperaceae) (11-SRNP-44832); 10 Aug 2010, A. Cordoba, em: 29 Aug 2010 (1♂), r.f. *Calatola costaricensis* (10-SRNP-42830). Sector Rincon Rain Forest, Sendero Albergue Crater, 980 m, 10.84886N, -85.3281W, 14 Oct 2009, E. Araya, em: 7 Nov 2009 (1♀), r.f. *Ardisia compressa* (09-SRNP-5368), em: 5 Nov 2009 (1♂) (09-SRNP-5369); 23 Aug 2010, C. Cano, 12 Sep 2010 (1♀), r.f. *Ardisia calycosa* (10-SRNP-4761). Sector Rincon Rain Forest, Jacobo, 461 m, 10.94076N, -85.3177W, 25 Nov 2009, N. Castillo, em: 12 Dec 2009 (1♀), r.f. *Piper phytolaccaefolium* (09-SRNP-80714); 17 Jul 2009, N. Castillo, em: 25 Jul 2009 (1♀), r.f. *Vernonia patens* (09-SRNP-69542); 26 Aug 2009, N. Castillo, em: 16 Sep 2009 (1♀), r.f. *Inga* sp. (09-SRNP-69859); 18 Sep 2009, M. Castillo, em: 25 Sep 2009 (1♂), r.f. *Piper fimbriulatum* (09-SRNP-80110). Sector San Cristobal, Sendero Colegio, 520 m, 10.89296N, -85.3788W, 11 Oct 2006, G. Sihezar, em: 27 Oct 2006 (1♀), r.f., *Ardisia auriculata* (06-SRNP-8402). Sector Rincon Rain Forest, Río Francia Arriba, 400 m, 10.89666N, -85.29003W, 23 Jun 2009, P. Calderon, em: 26 Jul 2009 (1♀), r.f. *Calatola costaricensis* (09-SRNP-41458); 25 Oct 2011, P. Umaña, em: 24 Nov 2011 (1♀), r.f. *Piper imperiale* (Piperaceae) (11-SRNP-44720); 27 Oct 2010, A. Cordoba, 23 Nov 2010 (1♀), r.f. *Ocotea cernua* (10-SRNP-43860); 27 Oct 2010, A. Cordoba, em: 1 Dec 2010 (1♂), r.f. *Ocotea cernua* (10-SRNP-43859). Cartago: Turrialba, 7–25 Feb 1965 (2♂), 1–6 Mar 1965 (4♂, 2♀), S. S. & W. D. Duckworth (USNM); 24–26 Jun 1974 (1♀), Harding & Donahue (LACM). Guanacaste: Sector Santa Rosa, Cafetal, 280 m, 10.85827N, -85.61089W, 29 Jun 2005, R. Franco, em: [date not given] (1♀), r.f. *Casearia nitida* (05-SRNP-1835). Sector Pitilla, Sendero Evangelista, 660 m, 10.98680N, -85.42083W, 8 Oct 2009, P. Rios, em: 1 Nov 2009 (1♀), r.f. *Calatola costaricensis* (09-SRNP-32674); 21 May 2004, J. Victor, em: 15 Jun 2004 (1♀), r.f. *Calatola costaricensis* (04-SRNP-32903). Sector Santa Rosa, Arboles Via, 305 m, 10.86081N, -85.60828W, 7 Jun 2010, D. Janzen, em: 29 Jun 2010 (1♀), r.f. *Alibertia edulis* (10-SRNP-129). Sector Pitilla, Sendero Naciente, 700 m, 10.98705N, -85.42816W, 2 Oct 2009, C. Moraga, em: 19 Oct 2009 (1♀), r.f. *Parathesis trichogyne* (09-SRNP-32633). Sector Pitilla, Sendero Laguna, 680 m, 10.98880N, -85.42336W, 4 Jan 2010, C. Moraga, em: 24 Jan 2010 (1♀), r.f. *Smilax mollis* (10-SRNP-30029). Sector Pitilla, Sendero Memos, 740 m, 10.98171N, -85.42785W, 12 May 2009, C. Moraga, em: 25 May 2009 (1♀), r.f. *Piper glabrescens* (09-SRNP-31591). Sector Cacao, Sendero Derrumbe, 1220 m, 10.92918N, -85.46426W, 12 Aug 1997, R.





FIGS 13–15. Female genitalia of *Aesiocopa*. **13.** *A. vacivana* (BMNH slide 5344). **14.** *A. grandis* (USNM slide 142,027). **15.** *A. necrofolia* (USNM slide 118,831).

Moraga, em: 4 Sep 1997 (1♀), r.f. *Piper* sp. (97-SRNP-1658). Sector San Cristobal, Sendero Corredor, 620 m, 10.87868N, -85.38963W, 25 Jun 2009, E. Araya, em: 17 July 2009 (1♀), r.f. *Ocotea tenera* (09-SRNP-2984); 26 Aug 2008, E. Araya, em: 15 Sep 2008 (1♂), r.f. *Ocotea whitei* (08-SRNP-4912). Sector San Cristobal, Río Blanco Abajo, 500 m, 10.90037N, -85.37254W, 16 Nov 2009, G. Sihezar, em: 7 Dec 2009 (1♀), r.f. *Smilax vanilliodora* (09-SRNP-6046); 3 Dec 2009, C. Cano, em: 28 Dec 2009 (1♀), r.f. *Calatola costaricensis* (09-SRNP-6561). Sector San Cristobal, Tajo Angeles, 540 m, 10.86472N, -85.41531W, 17 May 2010, E. Araya, em: 12 Jun 2010 (1♂), r.f. *Talauma gloriensis* (10-SRNP-2491). Heredia: Estación Biología La Selva, 150 m, Jan 1998 (1♀), J. Powell (EME), 24–25 Feb 2004 (1♀), D. Wagner (INBio), 26 Feb 2004 (1♂), D. Wagner (INBio). Puntarenas: Estación Biología Las Alturas, 22–24 Jan 1993 (1♀), r.f. understory plant, J. Powell (EME). Limón: Haciendas La Suerte/Tapezco, 29 air km W Tortuguero, 40 m, 13031 Aug 1979, J. P. Donahue et al. (LACM). MEXICO: Veracruz: Estación Biología Los Tuxtlas, 1–9 Jul 1988 (1♀), J. Chemsak (EME).

**Additional specimens examined.** NICARAGUA: “Through D. Denning, Univ. Farm, St. Paul, Minn” (1♂) (USNM). COSTA RICA: Area de Conservacion Guanacaste [no further data], reared from unknown food plant (3♂) (USNM).

**Distribution and Biology.** This species is recorded from Mexico to Costa Rica, from about 40 to 980 m, but primarily between 300–700 m. Field-collected larvae have been discovered and reared on the following plants in Area de Conservación Guanacaste: *Lepidaploa tortuosa* (Asteraceae) (n = 1), *Vernonia patens* (Asteraceae) (n = 1), *Acalypha diversifolia* (Euphorbiaceae) (n = 1), *Inga* sp. (Fabaceae) (n = 1), *Hernandia stenura* (Hernandiaceae) (n = 4), *Calatola costaricensis* (Icacinaceae) (n = 20), *Nectandra hihua* (Lauraceae) (n = 1), *Ocotea cernua* (n = 2) (Lauraceae), *Ocotea tenera* (n = 1), *Ocotea whitei* (n = 1), *Talauma gloriensis* (Magnoliaceae) (n = 1), *Ardisia auriculata* (Myrsinaceae) (n = 7), *Ardisia calycosa* (n = 2), *Ardisia compressa* (n = 2), *Parathesis trichogyne* (Myrsinaceae) (n = 1), *Eugenia basilaris* (Myrtaceae) (n = 1), *Piper* sp. (Piperaceae) (n = 1), *Piper auritum* (n = 1), *Piper cenocladum* (n = 1), *Piper*

*fimbriatum* (n = 2), *Piper glabrescens* (n = 1), *Piper imperiale* (n = 2), *Piper phytolaccaefolium* (n = 1), *Piper thomasi* (n = 1), *Piper umbricola* (n = 1), *Alibertia edulis* (Rubiaceae) (n = 1), *Casearia nitida* (Salicaceae) (n = 1), *Cupania juglandifolia* (Sapindaceae) (n = 1), *Smilax mollis* (Smilacaceae) (n = 1), *Smilax vanilliodora* (n = 1), and *Myriocarpa longipes* (Urticaceae) (n = 1). According to Janzen and Hallwachs (2012), the larva is pale translucent green with a pale head bearing a black genal band and black mandibles, and constructs a shelter between two leaves of the host.

**Etymology.** The specific epithet refers to the resemblance of the wing pattern to a necrotic leaf.

### *Aesiocopa grandis* Brown, *new species*

Figs. 5, 6, 10, 14

**Diagnosis.** *Aesiocopa grandis* is superficially most similar to *A. necrofolia*, but the former has a conspicuously greater forewing length (mean 12.2 vs. 10.5 mm in males, 16.0 vs. 14.0 in mm females), and males have a more isolated silver-white dot subapically in the subterminal region; in *A. necrofolia* there is a narrow line of smaller and paler spots subterminally. In the male genitalia, the distal portion of the secondary arm of the socius is rectangular oar-shaped in *A. grandis*, whereas it is more rounded in *A. necrofolia*. The sterigma of the female genitalia of the two species is very similar, but based on limited dissections, the ductus bursae is coiled in *A. grandis* (n = 2) and nearly straight in *A. necrofolia* (n = 3). However, the latter feature may be an artifact of mating.

**Description. Male** (Fig. 5). *Head*: Vertex dark rust, with short, rough, ventrally-projecting tuft of scales, frons unmodified, covered in smooth grayish cream scales; labial palpus short, segment II nearly straight, with short, smooth, rust scales, segment III well exposed; antennal scaling rust. *Thorax*: Anterior 0.25 of nota, including tegula, dark rust, middle 0.5 with a pair of sublateral cream patches, posterior 0.25 rust; legs unmodified. Forewing length 12.0–13.0 mm (mean 12.2; n = 5); forewing costa nearly evenly curved throughout; forewing ground color rust brown, isolating two irregular patches of pale gray, one in basal 0.2 portion of wing, extending from dorsum to costa, narrowly border by rust along costa, second less defined, in distal 0.5 of wing, semicircular at costa, extending toward dorsum as a smaller, subrectangular blotch; roundish, silvery white dot subapically in subterminal area; fringe dark rust in apical 0.7 or termen, pale in lower 0.3 (tornus). Hindwing dirty white with faint pale grayish marbling; fringe concolorous with wing, but with ocherous hue. *Abdomen*: Pale brownish gray. Genitalia (Fig. 10) with uncus rodlike, ca. 0.75 as long as valva, from broadly rounded base; socius relatively slender with fine long scales, secondary arms arising from inner anterior portion of socius, moderately short, dilated apically into subrectangular, paddle-shaped processes bearing patch of fine setae; transtilla subrectangular mesially, densely covered with long slender spines; valva simple, broadest basally, slightly narrowed distally, rounded apically, costa and sacculus sclerotized in basal 0.75; juxta a diamond-shaped plate with slender terminal process for attachment of phallus; phallus ca. 0.75 length of valva, slightly swollen and curved near middle, with narrow rounded sclerite subdistally; vesica with 20–22 cornuti.

**Female** (Fig. 6). *Head*: Vertex pale brown with some rust scales rough, with ventrally-projecting tuft, frons unmodified, pale brown; labial palpus slightly longer than in male, segment II nearly straight, somewhat porrect, with short, smooth, pale brown scales, paler on inner surface, segment III well exposed; antennal scaling pale brown. *Thorax*: Pale brown with paired sublateral patches of yellow ocherous

in posterior 0.75; without modified scaling on legs. Forewing length 16.0 mm (n = 2); forewing costa evenly curved throughout, apex weakly falcate; forewing ground color pale brown with tiny, evenly spaced, pale bluish white specks, particularly in apical region; pale ocherous patch in basal 0.33 of wing, margined by ground color in basal 0.25 of costa, with a small brown dot near middle; second ocherous patch near middle of costa small, faint, ill-defined; row of 4 tiny, subrectangular, pale bluish white dots in terminal region between R-veins; fringe rust, paler at tornus. Hindwing dirty white with faint, pale grayish brown mottling; fringe concolorous with wing. *Abdomen*: Genitalia (Fig. 14) with papillae anales simple, large, unmodified, mostly parallel-sided; apophyses simple, posteriores ca. as long as anteriores; sterigma a simple, narrow, transverse band, slightly concave mesially; ductus bursae slightly longer than corpus bursae, gradually and slightly broadened anteriorly, coiled ca. four revolutions; corpus bursae round-oblong, densely and finely punctate; signum a slender crescent-shaped band near middle of corpus bursae.

**Holotype** ♂, Costa Rica, Heredia, 6 km ENE Vara Blanca, 1950–2050 m, 12–21 Feb 2002, flight trap (INBio).

**Paratypes** (5♂, 2♀). COSTA RICA: Alajuela: Volcan Poás, 2350 m, 15 Dec 1982 (1♂), D. H. Janzen & W. Hallwachs (INBio). Cartago: Tuis, 2400', Coll. Wm. Schaus (1♂) (USNM). Heredia: 6 km ENE Vara Blanca, 1950–2050 m, 12–21 Feb 2002 (3♂), flight trap; 17 Mar 2002 (1♀) (INBio). Cerro Chompipe, Biol. Chompipe, 2100 m, 9 Oct 1991, J. F. Corrales (1♀) (INBio). San José: P.N. Cirripó, Llano Bonito, 2492 m, 20–21 Feb 2009 (1♂), K. Nishida (USNM).

### ACKNOWLEDGMENTS

I thank Jack Longino, co-PI of the NSF-funded ALAS Project, Evergreen State College, Olympia, Washington, for the opportunity to conduct field work in Costa Rica and visit Instituto Biología de Biodiversidad (INBio) in Santo Domingo de Heredia, Costa Rica. I acknowledge Eugenie Phillips-Rodriguez, Jerry Powell, and James Kruse for discussions about Costa Rican Sparganothini; Phillips-Rodriguez provided access to the collection at INBio and Powell access to the collection at EME. I am especially grateful to Daniel Janzen and Winnie Hallwachs for making available for study reared specimens from Costa Rica. The illustrations were skillfully prepared by Taina Litvak and Gary Ouellette, USDA, Systematic Entomology Laboratory, National Museum of Natural History, Washington, DC. The project was completed with the support of the U.S. Department of Agriculture, an equal opportunity provider and employer. James Kruse and Eugenie Phillips-Rodriguez provided helpful reviews that increase the clarity and quality of the manuscript.

### LITERATURE CITED

- ALAS. 2012. Project ALAS, Arthropods of La Selva. Website: <http://viceroy.eeb.uconn.edu/ALAS/ALAS.html> [Accessed 15 October 2012]
- BROWN, J. W. AND J. A. POWELL. 1991. Systematics of the *Chrysoxena* group of genera (Lepidoptera: Tortricidae: Euliini). Univ. Cali. Pub. Entomol. 111, 87 pp. + figs.
- JANZEN, D. H., AND W. HALLWACHS. 2012. Area de Conservacion Guanacaste (ACG), northwestern Costa Rica, caterpillars, pupae, butterflies & moths. Website: <http://janzen.bio.upenn.edu/caterpillars/database.lasso> [accessed 1 November 2012]
- KRUSE, J. J. 2012 Description of *Amorbimorpha* Kruse, new genus, from Mexico and the southern United States (Lepidoptera: Tortricidae: Sparganothini). Zootaxa 3177: 33–42.
- KRUSE, J. J. AND J. A. POWELL. 2009. Systematics of *Sparganothoides* Lambert and Powell, 1986 (Lepidoptera: Tortricidae: Sparganothini). Zootaxa 2150: 1–78.
- LANDRY, B. AND J. A. POWELL. 2001. Systematics and phylogeny of *Sparganothina* and related taxa (Lepidoptera: Tortricidae: Sparganothini). Univ. Cali. Pub. Entomol. 121, 82 pp. + figs.
- PHILLIPS-RODRIGUEZ, E. AND J. A. POWELL. 2007. Phylogenetic relationships, systematics, and biology of the species of *Amorbia*

- Clemens (Lepidoptera: Tortricidae: Sparganothini). Zootaxa 1670: 1–109.
- POWELL, J. A. 1986. Synopsis of the classification of Neotropical Tortricinae, with descriptions of new genera and species (Lepidoptera: Tortricidae). Pan-Pacific Entomol. 62: 372–398.
- POWELL, J. A. AND J. W. BROWN. 2012. Tortricoidea, Tortricidae (part): Tortricinae (part): Sparganothini and Atteriini. In Hodges, R. W. (ed.), The Moths of North America, fascicle 8.1. Wedge Entomological Research Foundation, Washington, DC, 230 pp.
- RAZOWSKI, J. AND J. WOJTUSIAK. 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.
- RAZOWSKI, J. AND J. WOJTUSIAK. 2008. Tortricidae from the mountains of Ecuador. Part III. Western Cordillera. Genus 19: 497–575.
- RAZOWSKI, J. AND J. WOJTUSIAK. 2010. Some Tortricidae from the East Cordillera in Ecuador reared from larvae in Yanayacu Biological Station in Ecuador (Insecta: Lepidoptera). Genus 21: 585–603.
- WALSINGHAM, LORD T. DE GREY. 1913–1914. 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.

*Submitted for publication 25 January 2013; revised and accepted 2 April 2013.*