Descriptions of four new species of fruit-feeding Tortricidae from Panama (Lepidoptera: Tortricidae)

John W. Brown

Department of Entomology, National Museum of Natural History, Washington, DC 20013-7012, USA (e-mail: tortricidae.jwb@gmail.com)

Date of issue online: 28 October 2019
Zoobank Registered: urn:lsid:zoobank.org:pub:105DA4A4-FB44-4074-B56C-6E30684F7666
Electronic copies (ISSN 2575-9256) in PDF format at: http://journals.fcla.edu/troplep; https://zenodo.org; archived by the Institutional Repository at the University of Florida (IR@UF), http://ufdc.ufl.edu/ufir; **DOI**: 10.5281/zenodo.3515363

Abstract: Four new species of Tortricidae reared from fruit in Panama are described and illustrated: *Histura panamana* **sp. nov.** (Chlidanotinae: Polyorthini); *Spinipogon triangularis* **sp. nov.** (Tortricinae: Cochylini); *Ricula croceus* **sp. nov.** (Olethreutinae: Grapholitini); and *Ricula lacistema* **sp. nov.** (Olethreutinae: Grapholitini). Additional field-collected specimens of *Spinipogon triangularis* from Costa Rica are included in the type series of that species.

Key words: Central America, Cochylini, Grapholitini, host plants, Polyorthini, seed-feeder

INTRODUCTION

Although our knowledge of the systematics and species richness of Neotropical Tortricidae has increased dramatically since the publication of the checklist part of the *Atlas of Neotropical Lepidoptera* (Powell *et al.*, 1995a, b), our knowledge of larval host plants has lagged behind and remains exceedingly poor. A recent study of fruit-feeding insects in Panama (Gripenberg *et al.*, 2019) yielded about 450 specimens of tortricid moths representing 20 or so putative species, providing new host plant records for virtually every species reared. However, because over half of the species are likely undescribed, the contribution to our knowledge of species-level host plant usage is somewhat compromised. Hence, the purpose of this paper is to describe four of the species for which adequate material is available and the taxonomic status relatively unambiguous. Where conspecific examples from Costa Rica are recognized, these specimens are included in the type series. The intention is to make these names available for subsequent publications focused on the insects reared during this survey.

MATERIALS AND METHODS

Collecting in Panama. Between July 2010 and November 2013, freshly fallen seeds and fruit of trees, shrubs, and lianas were collected primarily on Barro Colorado Island, Canal Zone, Panama. All seeds and fruits were brought to the laboratory where they were stored in pots under conditions resembling those of the ambient forest understory. During the rearing period, each pot was checked approximately twice a week during which all adult insects were removed. Specimens of Lepidoptera were pinned, spread, and dried. Tissue samples (one leg of an adult moth) were used to amplify a ~650 bp region of the mitochondrial gene cytochrome oxidase I (COI), commonly referred to as the DNA barcode, using standard Sanger sequencing procedures employed at the Biodiversity Institute of Ontario, University of Guelph (Hebert *et al.*, 2003; Craft *et al.*, 2010; Wilson, 2012). Barcode Index Numbers (BINs) using the RESL algorithm were used to help delineate groups that potentially represent species (Ratnasingham & Hebert, 2013).

Collecting in Costa Rica. An ongoing inventory by Daniel Janzen and Winnie Hallwachs of the caterpillars of Área de Conservación Guanacaste in northwestern Costa Rica began in 1977 (Janzen & Hallwachs, 2018). Currently, the bulk of collecting and rearing is done by local parataxonomists (Janzen & Hallwachs, 2011). Caterpillars discovered in the field are taken to "rearing barns" where they are placed singly in plastic bags or bottles with cuttings of the host plant species upon which they were discovered. As adults emerge, they are frozen, pinned, and labeled. Field-collected caterpillars are labeled with a unique voucher number in the form of YY-SRNP-X…… (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 initial project site was referred to as Santa Rosa National Park), and the suffix is a unique number assigned within the year. Over the past few years, collecting also has been conducted at a sheet with a black light, and these specimens are vouchered similarly. All of these specimens are barcoded following the protocol mentioned above.

Identifications and Images. Identifications were made using both morphology and DNA barcodes (BIN numbers are included for each species). Methods for dissecting the genitalia of adult moths followed those summarized by Brown & Powell (1991). Terminology for morphological structures follows Horak (1998, 2006). Forewing measurements include the fringe. In descriptions of the forewing, "hind margin" refers to the trailing edge of the wing, which frequently is referred to

as the "dorsum" in tortricid literature. Slide mounted genitalia were examined using dissecting and compound microscopes. Images of adults and genitalia were captured using a Canon EOS 40D digital SLR camera (Canon U.S.A., Lake Success, NY) mounted on a Visionary Digital BK Lab System (Visionary Digital, Palmyra, VA), and edited in Adobe Photoshop.

Specimen deposition and abbreviations. The specimens examined are deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C., USA (USNM). Additional reared conspecifics not included in the type series are deposited in the collection of the Smithsonian Tropical Research Institute, Barro Colorado Island, Panama. Abbreviations used in the data of specimens examined are as follows: ca. = circa (approximately); r.f. = reared from.

RESULTS

Chlidanotinae: Polyorthini

Histura Razowski, 1981

Histura was described by Razowski (1981) for the single species *Polyortha hirsuta* Walsingham, 1914, represented by the female holotype from Guatemala and a female paratype from Panama. Razowski & Becker (1981) subsequently added *H. xanthotypa* Razowski & Becker, *H. doriae* Razowski & Becker, and *H. chlorotypa* Razowski & Becker, all from Brazil. Razowski (1984) later described *H. bicornigera* Razowski from Colombia and *H. boliviana* Razowski from Bolivia, and transferred *Peronea limosa* Meyrick, 1912 to the genus. Powell *et al.* (1995) treated all these species in *Histura* and added *Peronea cuprata* Meyrick, 1917, a treatment followed by Brown (2005). Razowski and Pelz (2007) described *H. brunneotypa* Razowski & Pelz from Argentina, and Brown and Hoddle (2010) added *H. perseavora* Brown, from Guatemala. Most recently, Razowski and Becker (2011a) described *H. berylla* Razowski & Becker from Mexico and *H. luteochlora* Razowski & Becker from Brazil.

As currently defined, *Histura* includes the 12 described species listed above, distributed from Veracruz, Mexico to Tucumán, Argentina. The only species of *Histura* for which a larval host has been reported previously is *H. perseavora*, which is a fruit and stem borer in *Peresea americana* (Lauraceae) in Guatemala (Brown & Hoddle, 2010; Hoddle & Brown, 2011). During the study in Panama, a previously undescribed species of *Histura* was reared from *Beilschmiedia pendula* (Lauraceae), and that species is described below.

Histura panamana **sp. nov.**
(Figs. 1, 2, 9)

Diagnosis. *Histura panamana* can be distinguished from all congeners by its yellow orange forewing maculation (Fig. 1) and its exceedingly long labial palpi (ca. 4 times the diameter of the compound eye) with an upturned third segment. In nearly all other species of *Histura* the forewing is gray to brown with a variably developed, dark basal patch, the outer margin of which extends obliquely outward from the subbasal region of the costa to the hind margin, and the length of the labial palpi is usually 2–3 times the diameter of the compound eye. The male genitalia of *H. panamana* can be distinguished from all other congeners by the short, rounded socius bearing a dense fascicle of long, slender, hair-like scales (Fig. 2).

Description. Adult (Fig. 1). *Head*: Vertex and upper frons pale orange-yellow, lower frons cream colored; length of labial palpus (all segments combined) ca. 4.0 times diameter of compound eye, pale orange-yellow with a few brown scales, cream on inner surface and ventrally, third segment conspicuously upturned, extending well beyond scaling of second; ocellus small; antenna ca. 0.5 times length of forewing costa, with two rows of pale-yellow scales per flagellomere, sensory setae extremely short in both sexes. *Thorax*: Nota pale orange-yellow, tegula yellow. Legs unmodified. Forewing length 6.5–7.5 mm (n = 5); pattern complex (Fig. 1), ground color mostly mottled orange-yellow with some pale violet and brown scales, a narrow, oblique, brown dash from near middle of termen extending nearly to costa, arched basad at upper edge of discal cell, a similarly colored, irregular, interrupted band originating from hind margin near tornus, arching through lower basal part of wing, terminating near hind margin near forewing base, an area of pale yellow subbasally between arch and hind margin (Fig. 1); costal strigulae conspicuous; fringe mostly brown, slightly paler in apical region. Hindwing uniformly dark gray-brown throughout; frenulum with one spine in male, three in female. Fringe cream colored. *Abdomen*: Male with long paired hairpencils from invaginated pockets of segment eight. Male genitalia (Figs. 2) with tegumen subrectangular, narrowed and slightly rounded dorso-posteriorly; vinculum large, with rounded dilation at junction with tegumen (i.e., near point of attachment of costa of valva); saccus not developed; uncus moderately long, strongly sclerotized, rod-like, curved and flattened laterally in apical 0.3; socii short, rounded, with fascicle of long, fine, hair-like scales from a rounded patch near middle; gnathos arms slender, uniform in width throughout, united distally into a weak, mostly membranous terminal process; transtilla with large membranous subrectangular flap with narrow sclerotized margin; juxta small, shield-like; valva somewhat membranous, split longitudinally along costa typical of other polyorthines (to accommodate hairpencil), broadest at base, slightly attenuate distally, rounded apically, sacculus fairly broad, subrectangular, confined to basal 0.33 of valva, without free projection. Phallus straight, semi-membranous, without cornuti, small area of tiny teeth subapically. Female genitalia (Fig. 9) with ovipositor short; papillae anales narrow, slightly arched outwards; apophyses very slender, apophyses anteriores ca. 1.2 times length of apophyses posteriores; sterigma mostly membranous, with slender, crescent-shaped sclerite at posterior margin of lamella antevaginalis; ductus bursae slender, frail, membranous, from shallow antrum, slightly and gradually broadened to corpus bursae; corpus bursae narrow, membranous, with pair of tiny, plate-like signa.

DNA barcodes. There are seven sequences available for this species in BOLD (BIN ABV2176), with an average distance of 0.29% among them, and a distance of 7.92% to its nearest neighbor.

Types. Holotype ♀, Panama, Barro Colorado Island, r.f. *Beilschmiedia pendula*, 17 Mar 2011, em: 18 Apr 2001, I. Simón (USNM).

Paratypes (2♂, 2♀). Same locality, host, and collector as holotype: no date (2♀) (USNM); 2 Mar 2011, em: 4 Apr 2011 (1♂) (USNM); 29 Mar 2011, em: 18 Apr 2011 (1♂) (USNM).

Distribution and Biology. *Histura panamana* **sp. nov.** is known only from a series of specimens from Barro Colorado Island, Panama. It was reared from the fruit of *Beilschmiedia pendula* (Lauraceae).

Etymology. The specific epithet refers to the country of the type locality, Panama.

Remarks. The assignment of the new species to *Histura* is somewhat provisional. It is easily excluded from *Pseudatteria* Walsingham, 1913, by its forewing shape and maculation (see Clarke 1958). The absence of a long, slender, scobinate signum in the female genitalia excludes it from *Polyortha*

Dognin, 1905, and the relatively shorter valvae exclude it from *Ardeutica* Meyrick, 1913 (see Razowski, 1984). The slender, mostly membranous corpus bursae, the shorter valvae, and the straight, slender, membranous phallus are all most similar to those of *Histura* (see Razowski & Becker, 2011a). However, the extremely long labial palpi with an upturned terminal segment is unlike that of any Polyorthini I have seen.

Tortricinae: Cochylini

Spinipogon Razowski, 1967

Spinipogon was described for *S. trivius* Razowski and *S. spinifera* Razowski from Brazil, and *S. signata* Razowski from Argentina (Razowski, 1967). Razowski and Becker (1983, 1986, 2002), Razowski (1986), and Metzler and Sabourin (2002) together described an additional 10 species in the genus. The male genitalia of the type species, *S. trivius* (Razowski, 1967: figs. 71, 72), deviate considerably from those of all other congeners, hence the genus is somewhat difficult to define. However, Razowski (1994) recognized two "groups of species," and the new species from Panama fits convincingly into one of those groups. *Spinipogon* is primarily Neotropical, ranging from Central America (Costa Rica, Mexico) and the Caribbean (British Virgin Islands) to South America (Argentina, Brazil); a single Nearctic species occurs in the midwestern U.S.A. (Metzler & Sabourin, 2002). During the study in Panama, a previously undescribed species of *Spinipogon* was reared from fruit, and that species is described below.

Spinipogon triangularis **sp. nov.**
(Figs. 3, 4, 10)

Diagnosis. Among congeners, *Spinipogon triangularis* is superficially most similar to *S. virginanus* Razowski & Becker, but it is also similar to many species of *Cochylis* as well. The male genitalia (Fig. 4) are easily distinguished by the narrow valva with a conspicuous triangular process at the middle of the venter that is present in no other species of *Spinipogon*. In the female genitalia (Fig. 11), the large, truncate, cone-like process from the corpus bursae confirms the assignment of the new species to *Spinipogon*.

Description. Adult (Fig. 3). *Head*: Vertex and upper frons tawny cream, paler on lower frons; length of labial palpus (all segments combined) ca. 1.2 times diameter of compound eye, mostly tawny cream, paler on inner surface and ventrally, third segment extending beyond scaling of second; ocellus minute; antenna extending to ca. middle of forewing costa, with two rows of tawny scales per flagellomere. *Thorax*: Nota with smooth appressed tawny cream scales, tegula tawny. Legs unmodified. Forewing length 5.0–6.5 mm (n = 6); forewing ground color cream and tawny, with weak yellowish suffusions and brownish streaks, circular blotch in tornal region with costal 0.5 dark brown and lower 0.5 olive-brown, a dark brown, slightly arched band in subterminal region beyond circular blotch, a small subrectangular blotch at costa ca. 0.7 distance from base to apex, a small brown blotch near middle of discal cell, encircled by a crescent-shaped patch of paler brown, an ill-defined semicircular patch near middle of hind margin; fringe concolorous with ground. Hindwing rather uniform brownish gray throughout; frenulum with one spine in male, three in female. Fringe pale gray-ocherous. *Abdomen*: Dorsum tawny cream with scattered dark brown scales. Male genitalia (Figs. 4) with tegumen somewhat rounded dorso-posteriorly, vinculum rounded V-shaped, arms fused distally; uncus absent; socius membranous, inconspicuous; transtilla well developed, with long, subrectangular, trough-shaped median process bifurcate distally; valva wide at base, narrowing throughout, costa sclerotized, rounded apically with a few long setae, sacculus a short triangular process, with a second triangular process near mid-venter. Phallus (Fig. 4a) large, ca. 1.2 times length of valva, abruptly narrowed near the middle, pointed apically; vesica without cornuti, but with patch of tiny scobinations. Female genitalia (Fig. 10) with papillae anales simple, slender, setose; apophyses long and somewhat broad, length of apophyses anteriores ca. equal that of apophyses posteriors; sterigma a lightly sclerotized shield, ostium surrounded by sclerotized collar; ductus bursae slender, membranous, well differentiated from corpus bursae, with small accessory bursa from frail ductus ca. midway between ostium and junction of corpus bursae; corpus bursae large, round, surface covered with minute spicules; a large, truncate, cone-like process emanating from near middle of corpus bursae with margins strengthened by slender, linear sclerites.

DNA barcodes. There are four sequences available for this species in BOLD (BIN AAA2890), with an average distance of 0.21% among them. They are the first sequences of this genus in BOLD.

Types. Holotype ♀, Panama, Barro Colorado Island, r.f. *Guapira standleyana*, 13 Jun 2013, S. Gripenberg (USNM).

Paratypes (5♂, 3♀). COSTA RICA: Cartago: Turrialba, 13–17 Mar 1965 (1♀), W. D. & S. S. Duckworth (USNM). Guanacaste: Área de Conservación Guanacaste, Sector Orosí, Casa Rafa, 579 m, 10.95884, -85.49539, 1 Jun 2011, S. Ríos & R. Franco, 11-SRNP-1034946 (1♀), 11-SRNP-103992 (1♂), 11-SRNP-103940 (1♂) (USNM). PANAMA: Barro Colorado Island: r.f. *Guapira standleyana* 16 May 2011 (1♂), I. Simón (USNM); 29 Mar 2011, r.f. *Tabebuia guayacan*, 27 May 2013 (1♂) (USNM); 18–28 Apr 1964 (1♂), 10–20 Apr 1965 (1♀), W. D. & S. S. Duckworth (USNM).

Distribution and Biology. *Spinipogon triangularis* **sp. nov.** is known from Panama and Costa Rica. It has been reared from the fruit of *Guapira standleyana* (Nictaginaceae) and *Tabebuia guayacan* (Bignoniaceae).

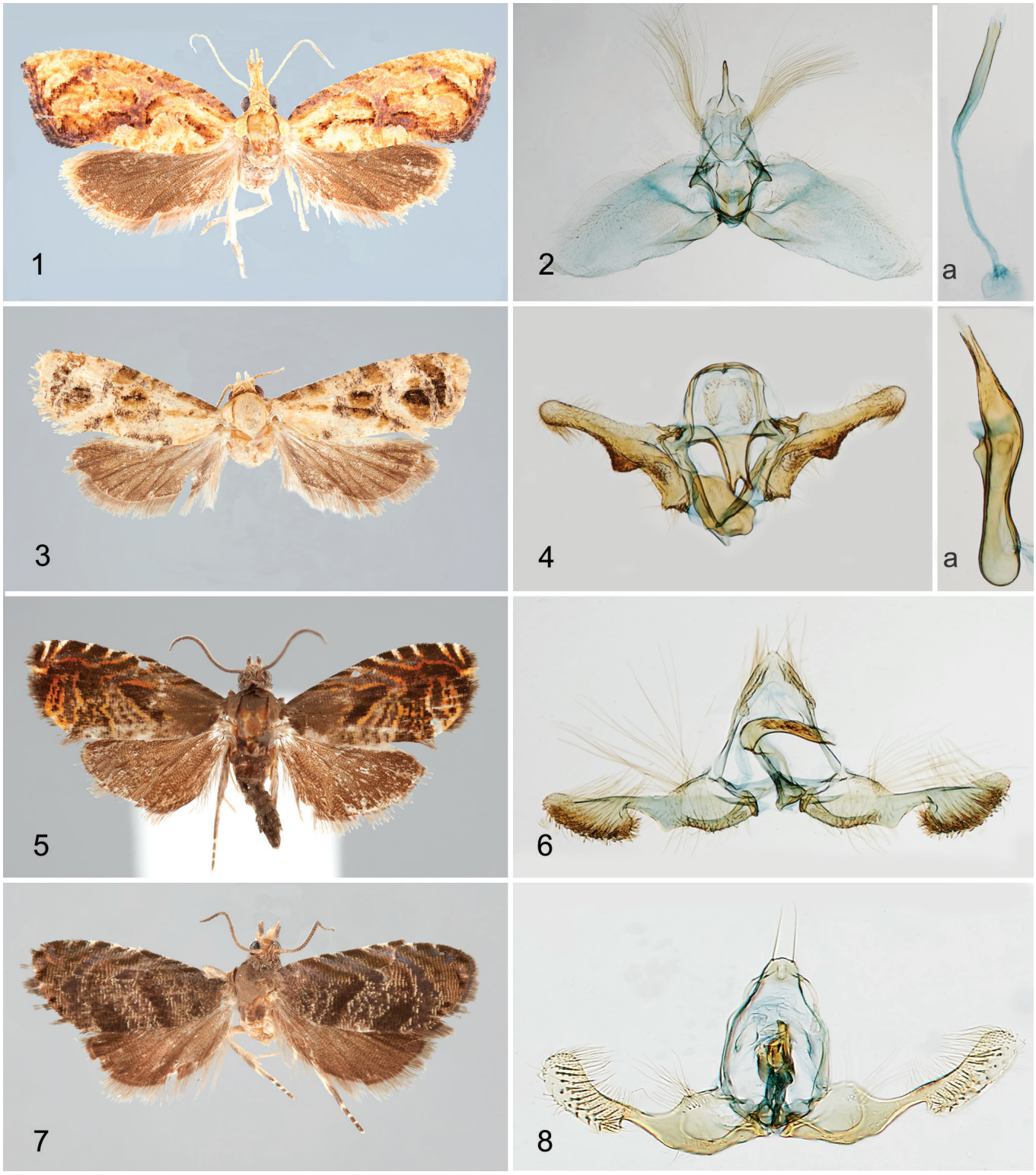
Etymology. The specific epithet refers to the triangular process of the valva in the male genitalia.

Olethreutinae: Grapholitini

Ricula Heinrich, 1926

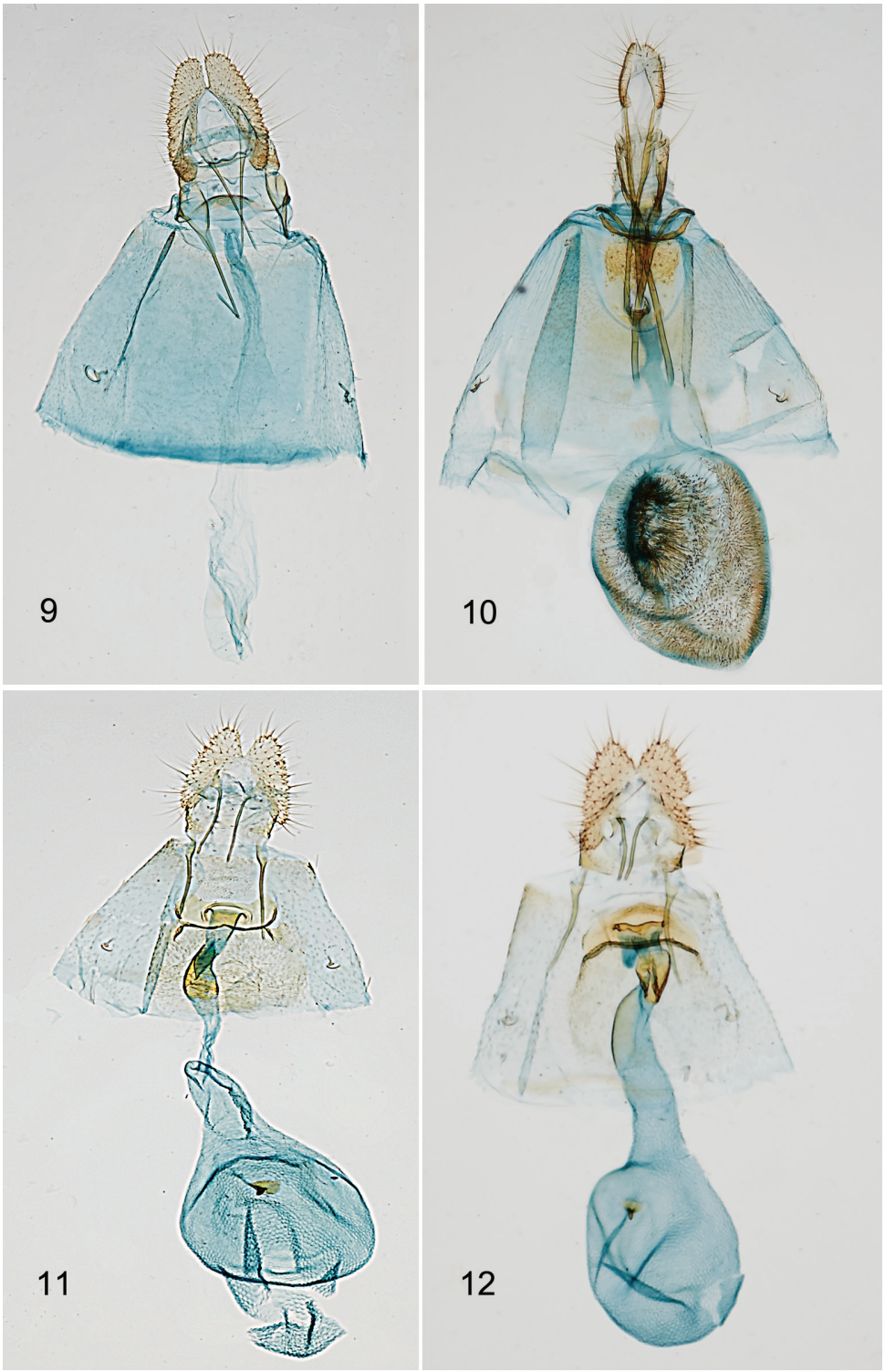
Ricula was proposed by Heinrich (1926) for the single North American species *Lipoptycha maculana* Fernald, 1901 (type locality: USA, Florida). Brown (2005) included two species in the genus, the type species and *R. dubitana* Kuznetsov, 1992 from Vietnam. Razowski (2011) synonymized the monotypic *Riculoides* Pastrana, 1952 (type locality: Argentina), described four new species, and transferred two previously described species (i.e., *Carpocapsa comptana* Walker, 1863 and *Hemimene limenita* Meyrick, 1922) to the genus. Most recently, Razowski & Becker (2011b) described an additional 31 species from the Neotropics, and transferred *Grapholita figurana* Zeller, 1877 to the genus, resulting in a total of 41 species. With the exception of *R. dubitana* from Asia, the genus is restricted to the New World tropics from southern Florida to Argentina.

Heinrich (1926) indicated that *Ricula* is most similar to *Talponia* but "…differs chiefly in the more approximate condition of veins 6 and 7 of the hindwing, the convexity of the termen, and the absence of one signum from the corpus bursa of the female." Razowski (2011) further refined the definition of the genus, mentioning that "The female of *Ricula* has a broader and shorter ductus bursae than other genera of the *Dichrorampha*-



Figs. 1–8. Adults and male genitalia of new species. **1**. Holotype female of *Histura panamana*. **2**. Male genitalia of *H. panamana*, (a) phallus to right, USNM slide 150,638. **3**. Holotype female of *Spinipogon triangularis*. **4**. Male genitalia of *S. triangularis*, (a) phallus to right, USNM slide 144,559. **5**. Holotype male of *Ricula croceus*. **6**. Male genitalia of *R. croceus*, USNM slide 144,609. **7**. Female paratype of *Ricula lacistema*. **8**. Male genitalia of *R. lacistema*, USNM slide 144,595.

group, and the corpus bursae has a single signum. The male genitalia of *Ricula* have a pair of setae at the top of the tegumen and long sender socii of variable length." The male genitalia of most species of *Ricula* and *Talponia* have remarkably long and digitate socii. Although they are somewhat variable in length, they are much shorter (or fused to the tegumen) in about half the species currently placed in *Ricula*. Hence, although features of the male genitalia do not convincingly separate the two genera, the number of signa in the female genitalia is less ambiguous, one in *Ricula*, two in *Talponia*.



Figs. 9–12. Female genitalia of new species. **9**. *Histura panamana*, USNM slide 144,886. **10**. *Spinipogon triangularis*, USNM slide 144,606. **11**. *Ricula croceus*, USNM slide 144,610. **12**. *Ricula lacistema*, USNM slide 144,596.

Ricula croceus **sp. nov.**
(Figs. 5, 6, 11)

Diagnosis. The male genitalia of *Ricula croceus* are most similar to those of *R. excavata* Razowski & Becker, 2011, with a relatively narrow valva, broad in the basal half, with an abrupt excavation between the sacculus and the cucullus creating a narrow neck; and socii that are about 0.35 times the length of the tegumen. The genitalia of *R. croceus* can be distinguished from those of the latter by the more oblique excavation of the valva, similar to that of *R. trachalea* Razowski & Becker, 2011 (that of *R. excvata* is more rounded), by the triangular termination of the sacculus (more rounded in *R. excavata*), and the much shorter cucullus. The new species is assigned to *Ricula* on the

basis of the long digitate socii in the male genitalia and a single signum in the corpus bursae of the female genitalia.

Description. Adult (Fig. 5). *Head*: Vertex and upper frons with shaggy, pale gray brown scales, lower frons with white appressed scales; length of labial palpus (all segments combined) ca. 2.0 times diameter of compound eye, white scaled, with slightly shiny, gray scales at distal end of segment II, third segment exposed; ocellus large; antenna thickened, short, ca. 0.4 times length of forewing costa, with extremely short sensory setae in both sexes, with pale brown scales. *Thorax*: Nota and tegula brown, venter white. Hindleg of male with compact patch of pale orange-ocherous secondary scales (hairpencil) along tibia, originating near trochanter, fitting into receptacle along abdominal plueron. Forewing length 4.0–4.5 mm (n = 5), costa gently arched throughout, termen mostly convexly rounded, with extremely shallow, subapical notch, male costal fold absent; ground color brown with irregular lines and small blotches of orange in distal 0.5 of wing, mostly in form of three slender oblique fascia from costa with basal two intersecting four slender straight orange lines originating near middle of hind margin, and an orange patch in speculum; middle of hind margin with broad pale patch encompassing four slender orange lines extending to ca. lower margin of discal cell, innermost curving distally at discal cell; five conspicuous white costal strigulae from distal 0.5 of wing, with two fainter pairs more basal. Fringe dark gray brown. Hindwing nearly uniform brown; frenulum with one spine in male, two in female. Fringe brown. *Abdomen*: Male genitalia (Fig. 6) with tegumen triangular, a pair of long setae near top; socius long, ca. 0.35 length of tegumen, slender, with fine setae; basal 0.5 of valva broadest, with weakly convex costa, valva narrowed at short neck by oblique excavation along venter between sacculus and oblong cucullus, latter with dense patch of spines along lower margin; termination of sacculus triangular. Phallus long, curved, only slightly larger basally, with 30–40 small cornuti. Female genitalia (Fig. 11) with papillae anales unmodified; apophyses slender; sterigma a broadly U-shaped, lightly sclerotized plate, weakly bilobed posteriorly, with a slender, linear sclerite from each antero-lateral corner of sclerotized edge; ductus bursae ca. 0.7 length of corpus bursae, with sclerite near middle; corpus bursae pear-shaped with posterior lobe; a single small, thorn-like signum.

DNA barcodes. There are six sequences available for this species in BOLD (BIN ABV2186), with an average distance of 0.15% among them, and a distance of 8.03% to its nearest neighbor, an undescribed species of *Talponia* from Costa Rica.

Types. Holotype ♂, Panama, Barro Colorado Island, 9 Mar 2011, larva on *Heisteria concinna*, em: 2 Apr 2011, ID 1348, I. Simón (USNM).

Paratypes (5♂, 2♀). PANAMA: Barro Colorado Island: 5 Feb 2011, em: 28 Feb 2011 (1♂); 21 Mar 2011 (1♂); 1 Feb 2011, em: 28 Feb 2011 (1♀); 28 Mar 2001, em: 13 Apr 2011 (2♂), larva on *H. accuminata*; 16 Feb 2011, em: 8 Mar 2011 (1♀); 13 Jul 2011 (1♂), larva on *H. accuminata*, all I. Simón (USNM).

Distribution and Biology. *Ricula croceus* **sp. nov.** is known only from Panama, where it has been reared from the fruit of *Heisteria concinna* (Olacaceae) and *H. acuminata*.

Etymology. The specific epithet refers to the golden color of the secondary scales (hairpencil) on the hindleg of the male.

Ricula lacistema **sp. nov.**
(Figs. 7, 8, 12)

Diagnosis. Based on the male genitalia, *Ricula lacistema* is most closely related to *R. deflexa* Razowski & Becker, 2011, and *R. amethysina* Razowski & Becker, 2011. The three species are characterized by a somewhat pear-shaped tegumen bearing a pair of long setae from the top; a broad, rhomboidal basal half of the valva followed by a deep concavity of the costa immediately before a very slender neck separating the sacculus and the cucullus; and long, slender socii that are 0.3–0.4 the length of the tegumen. The male genitalia of *R. lacistema* can be distinguished from those species by the more distant origin of the pair of setae on the top of the tegumen; by a deeper excavation of the venter of the valva between the sacculus and the cucullus (shallow in *R. deflexana*); and a more rounded outer margin of the cucullus (slightly angled in *R. amethystina*). Most other species of *Ricula* have a more elongate-triangular tegumen similar to that of *Talponia*. The species is assigned to *Ricula* on the basis of the long, digitate socii in the male genitalia and a single signum in the corpus bursae of the female genitalia.

Description. Adult (Fig. 7). *Head*: Vertex and upper frons with brown scales, lower frons with pale brown appressed scales; length of labial palpus (all segments combined) ca. 2.0 times diameter of compound eye, outer surface pale brown basally, dark gray brown distally, inner surface cream; ocellus large; antenna thickened, short, ca. 0.4 times length of forewing costa, with extremely short sensory setae in both sexes, with pale brown scales. *Thorax*: Nota and tegula brown, venter cream. Legs in male unmodified. Forewing length 3.5–4.0 mm (n = 4), costa gently arched throughout, termen mostly convexly rounded, with barely discernible trace of subapical notch, male costal fold absent; ground color brown with faint, ill-defined, broad band of sparse individual yellow scales in middle portion of wing and in subapical region; faint trace of two or three slender metallic bluish lines obliquely from costa; three conspicuous white costal strigulae from distal 0.5 of wing, with two fainter pairs more basal. Fringe dark gray brown. Hindwing nearly uniform brown; frenulum with one spine in male, two in female. Fringe brown. *Abdomen*: Male genitalia (Fig. 8) with tegumen somewhat pear-shaped, with a pair of long setae near top; socius ca. 0.3 length of tegumen, slender, with fine setae; basal 0.33 of valva broad, rhombodal, followed by deep rounded concavity in costa creating narrow neck separating sacculus and cucullus; costal margin of cucullus weakly curved, ventral margin demarcated basally by abrupt notch, lower half of cucullus with long spines. Phallus short, curved, with 30–40 small deciduous cornuti (lost in illustrated genitalia). Female genitalia (Fig. 12) with papillae anales unmodified; apophyses slender; sterigma a somewhat broad, inverted, crescent-shaped plate, with strong line of sclerotization along anterior margin; antrum sclerite restricted to posterior 0.15 of ductus bursae, with ductus seminalis originating at anterior end of sclerite; ductus bursae comparatively broad throughout, slightly broadened anteriorly, ca. 1.4 times as long as corpus bursae; corpus bursae round, surface somewhat dimpled but without distinct spiculae or anterior lobe; a single tiny, thorn-like signum with blunt tip.

DNA barcodes. There are 10 sequences available for this species in BOLD (BIN AAY4670), with an average distance of 0.81% among them, and a distance of 9.95% to its nearest neighbor.

Types. Holotype ♂, Panama, Barro Colorado Island, 3 Jun 2011, r.f. *Lacistema aggregatum*, I. Simón (USNM).

Paratypes (3♀). Same locality data as holotype, 24 May 2012 (1♀), S. Gripenberg; 31 May 2012 (1♀), S. Gripenberg; 13 Jun 2011 (1♀), S. Gripenberg (all USNM).

Distribution and Biology. *Ricula lacistema* **sp. nov.** is known from a series of specimens reared from the fruit of *Lacistema aggregatum* (Lacistemataceae) (n = 10) on Barro Colorado Island, Panama.

Remarks. The generic assignment of *Ricula lacistema*, *R. deflexa*, *R. amethysina* and related species with a somewhat pear-shaped tegumen (rather than dorso-posteriorly attenuated tegumen) is somewhat uncertain. Although the presence of long socii and a single signum in the corpus bursae argue for their assignment to *Ricula*, the relatively broad, rounded dorso-posterior portion of the tegumen is more similar to that of *Riculorampha* Rota & Brown, which also has a single signum in the corpus bursae. In addition, barcodes place *R. lacistema*

closer to *Riculopampha* than to *Ricula+Talponia*. In the absence of more conclusive evidence, these species are retained provisionally in *Ricula*.

Etymology. The specific epithet refers to the genus of the host plant.

ACKNOWLEDGMENTS

I thank Sofia Gripenberg and Yves Bassett for allowing me to examine specimens of Tortricidae reared from fruit in Panama. I thank Daniel Janzen and Winnie Hallwachs for providing access to specimens and their barcodes from Área de Conservación Guanacaste, Costa Rica. Paul Hebert, Jeremy deWaard, Allison Brown, and others at the Biodiversity Institute of Ontario, University of Guelph, provided access to sequence data and produced neighbor-joining trees. Mark Metz, USDA, ARS, assisted with the capture of images, and the final plates were prepared by David Adamski, USNM. I thank Todd Gilligan and two anonymous reviewers for helpful comments that enhanced the quality and clarity of the manuscript.

LITERATURE CITED

Brown, J. W., Hoddle, M. C. 2010. A new species of *Histura* (Lepidoptera: Tortricidae: Polyorthini) from Guatemala attacking avocados (*Persea americana*) (Lauraceae). *Proceedings of the Entomological Society of Washington* 112: 10–21.

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. + figs.

Clarke, J. F. G. 1958. *Catalogue of the Ttype Specimens of Microlepidoptera in the British Museum (Natural History) Described by Edward Meyrick*, *Volume* 3. London, Trustees of the British Museum. 600 pp.

Craft, K. J., Pauls, S. U., Darrow, K., Miller, S. E., Hebert, P. D. N., Helgen, L. E., Novotny, V., Weiblen, G. D. 2010. Population genetics of ecological communities with DNA barcodes: An example from New Guinea Lepidoptera. *Proceedings of the National Academy of Sciences*, *U.S.A.* 107: 5041–5046.

Gripenberg, S., Basset, Y., Lewis, O. T., Terry, J. T. D., Wright, S. J., Simón, I., Fernandez, D. C., Cedeño, M., Rivera, M., Barrios, H., Brown, J. W., Calderón, O., Cognato, A. I., Miller, S., Morse, G. E., Pinzon-Navarro, S., Quicke, D. L. J., Robbins, R. K., Salminen, J.-P., Vesterinen, E. 2019. A highly-resolved food web for insect seed predators in a species-rich tropical forest. *Ecology Letters* 2019: 1–12. doi: 10.1111/ele.13359.

Hebert, P. D. N., deWaard, J. R., Zakharov, E. V., Prosser, S. W. J., Sones, J. E., McKeown, J. T. A., Mantle, B., La Salle, J. 2013. A DNA 'Barcode Blitz': Rapid digitization and sequencing of a natural history collection. *PLoS One* 8 (7): e68535.

Heinrich, C. 1926. Revision of the North American moths of the subfamilies Laspeyresiinae and Olethreutinae. *United States National Museum Bulletin* 132: 1–216.

Hoddle, M., Brown, J. W. 2011. Lepidoptera associated with avocado fruit in Guatemala. *Florida Entomologist* 93: 649–650.

Horak, M. 1998. *Tortricoidea*, pp. 199–215. *In*: Kristensen, N. (Ed.), *Lepidoptera, Moths and Butterflies. Volume 1: Evolution, Systematics, and Biogeography*. *Handbook of Zoology 4 (35), Arthropoda: Insecta*. Berlin & New York, Walter de Gruyter.

Horak, M. 2006. Olethreutine moths of Australia (Lepidoptera: Tortricidae). *Monographs on Australian Lepidoptera* 10. 522 pp.

Janzen, D. H., Hallwachs, W. 2011. Joining inventory by parataxonomists with DNA barcoding of a large complex tropical conserved wildland in northwestern Costa Rica. *PLoS One* 6(8): e18123. doi:10.1371/journal.pone.0018123

Janzen, D. H., Hallwachs, W. 2018. *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).* http://janzen.bio.upenn.edu/caterpillars/database.lasso. [accessed 11 September 2018]

Metzler, E., Sabourin, M. 2002. A new species of *Spinipogon* Razowski, 1967 from two remnant prairies in Ohio (Lepidoptera: Tortricidae, Cochylini). *Fabreries* 27: 69-76.

Powell, J. A., Razowski, J., Brown, J. W. 1995a. *Tortricidae: Tortricinae, Chlidanotinae*, pp. 138–151. *In*: Heppner, J. B. (Ed.), *Atlas of Neotropical Lepidoptera*, *Checklist Part II: Hyblaeoidea - Pyraloidea - Tortricoidea*. Gainesville, Association for Tropical Lepidoptera, Scientific Publishers.

Powell, J. A., J. Razowski, Brown, R. L. 1995b. *Tortricidae: Olethreutinae*, pp. 151–157. *In* Heppner, J. B. (Ed.), *Atlas of Neotropical Lepidoptera*, *Checklist Part II: Hyblaeoidea - Pyraloidea - Tortricoidea*. Gainesville, Association for Tropical Lepidoptera, Scientific Publishers.

Ratnasingham, S., Hebert, P. D. N. 2013. A DNA-based registry for all animal species: The barcode index number (BIN) system. *PLoS One*: doi.org/10.1371/journal.pone.0066213.

Razowski, J. 1967. South American Cochylidae (Lepidoptera) from the collection of the British Museum (Natural History). *Acta Zoologica Cracoviensia* 12: 163–210.

Razowski, J. 1981. Notes on the system of Polyorthini (Lepidoptera, Tortricidae). *Acta Zoologica Cracoviensia* 25: 309–318.

Razowski, J. 1984. Polyorthini (Lepidoptera, Tortricidae) in the collection of the Smithsonian Institution, Washington, D.C. *Acta Zoologica Cracoviensia* 27: 211–234.

Razowski, J. 1986. New and little known Neotropical Cochylidii (Lepidoptera, Tortricidae). *Acta Zoologica Cracoviensia* 29: 373–396.

Razowski, J. 1994. Synopsis of the Neotropical Cochylini (Lepidoptera: Tortricidae). *Acta Zoologica Cracoviensia* 37: 121–320.

Razowski, J., Becker, V. O. 1981. Brazilian Polyorthini (Lepidoptera: Tortricidae). *Acta Zoologica Cracoviensia* 25: 389–404.

Razowski, J., Becker, V. O. 1983. Brazilian Cochylidii (Lepidoptera: Tortricidae). *Acta Zoologica Cracoviensia* 26: 421–464.

Razowski, J., Becker, V. O. 1986. Cochylidii (Lepidoptera: Tortricidae) collected in Central America and Mexico. *Acta Zoologica Cracoviensia* 29: 441–500.

Razowski, J., Becker, V. O. 2002. Systematic and faunistic data on Neotropical Cochylini (Lepidoptera: Tortricidae), with description of new species. Part 1. *Acta Zoologica Cracoviensia* 45: 287–316.

Razowski, J., Becker, V. O. 2011a. Systematic and faunistic data on Neotropical Tortricidae: Phricanthini, Tortricini, Atteriini, Polyorthini, Chlidanotini (Lepidoptera: Tortricidae). *SHILAP Revista de Lepidopterología* 39: 161–181.

Razowski, J., Becker, V. O. 2011b. Systematics and faunistics of Neotropical Grapholitini, 1: *Ricula* Heinrich and its allies (Lepidoptera: Tortricidae). *Acta Zoologia Cracoviensia* 54B(1-2): 129–168.

Wilson, J. J. 2012. *DNA Barcodes for Insects*, pp. 17–46. *In*: Kress, W. J., Erickson, D. L. (Eds.), *DNA barcodes: Methods and Protocols.* New York, Springer.