

Description of *Ptychocroca*, a new genus from Chile and Argentina, with comments on the *Bonagota* Razowski group of genera (Lepidoptera: Tortricidae: Euliini)

JOHN W. BROWN¹ & JÓZEF RAZOWSKI²

¹ Systematic Entomology Laboratory, PSI, Agricultural Research Service, U.S. Department of Agriculture, c/o National Museum of Natural History, Washington, DC 20560-0168 (e-mail: jbrown@sel.barc.usda.gov)

² Institute of Systematics and Evolution of Animals, PAS, ul. Slawkowska 17, 31-016 Krakow, Poland (e-mail: razowski@isez.pan.krakow.pl)

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ABSTRACT

Ptychocroca, new genus, is described and illustrated. As presently defined, the genus includes eight species: *P. apenicillia*, new species, from Chile; *P. nigropenicillia*, new species, from Chile; *P. lineabasalis*, new species, from Chile; *P. keelioides*, new species, from Chile; *P. simplex*, new species, from Chile; *P. crocoptycha* (Meyrick), new combination, from Argentina and Chile; *P. wilkinsoni* (Butler), new combination, from Chile; and *P. galenia* (Razowski), new combination, from Chile. We present brief diagnoses for the related genera *Apotomops* Powell and Obratzsov, *Bonagota* Razowski, *Haemateulia* Razowski, and *Acmanthina* Brown, along with descriptions of two new species of *Apotomops* (*A. boliviana* and *A. spomotopa*, new species). We also propose two new combinations, *Apotomops carchicola* (Razowski and Becker) and *A. sololana* (Razowski), and the synonymy of *Bonagota cranaodes* (Meyrick) with *B. salubricola* (Meyrick).

Key words. Insecta, Lepidoptera, Tortricidae, Euliini, *Ptychocroca*, *Haemateulia*, *Acmanthina*, *Bonagota*, *Apotomops*, new taxa, male secondary characters, Neotropical, leafrollers, apple pest, pheromones

INTRODUCTION

The tortricid moth fauna of Chile and adjacent Andean Argentina is remarkably unique, characterized primarily by endemic or nearly endemic genera (Razowski 1995, 1999c, Brown and McPherson 2002). Our knowledge of the fauna has grown considerably over the last decade with the number of described species in the tribe Euliini (Tortricinae) now at about 60 (Razowski 1995, 1999c, Brown 1998, 2000a, 2000b, Brown and McPherson 2002), but at least half of the fauna remains undescribed or undocumented, and relationships among most of the described genera are virtually unknown.

As more material is studied from this region, a more stable generic framework is evolving, with the limits of the described genera becoming more clear. *Bonagota* Razowski and *Apotomops* Powell and Obratzsov are almost certainly sister groups (Brown and Powell 1991, Razowski and Becker 2000), and along with *Acmanthina* Brown, *Haemateulia* Razowski, and *Ptychocroca*, new genus, appear to form a monophyletic lineage. While the latter three appear to be endemic to Chile and Argentina, the former two range as far north as the United States (*Bonagota*) and Canada (*Apotomops*).

The purposes of this paper are to describe *Ptychocroca*, new genus, and its five new species, and propose three new combinations in the genus; briefly redefine and diagnose *Haemateulia* Razowski and *Acmanthina* Brown; and define the limits of *Apotomops* Razowski and *Bonagota* Powell and Obratzsov, describe two new species in the former, and propose the synonymy of *Bonagota salubricola* (Meyrick) and *B. cranaodes* (Meyrick) in the latter. The results of the taxonomic work are summarized in Table 2.

DEPOSITORIES. Specimens were obtained from or examined at the following institutions:

AMNH, American Museum of Natural History, New York, USA.

BMNH, The Natural History Museum, London, England.

MEM, Mississippi Entomological Museum, Mississippi State, Mississippi, U.S.A.

MNHNS - Museo Nacional de Historia Natural, Santiago, Chile.

NHMW, Naturhistorisches Museum, Wien, Austria.

UCB, Essig Museum of Entomology, University of California, Berkeley, U.S.A.

UCS, University of Chile, Santiago.

USNM, National Museum of Natural History, Smithsonian Institution, Washington, D.C., U.S.A.

ZMC, Zoological Museum, Copenhagen, Denmark.

SPECIMENS. We examined approximately 280 pinned individuals of *Ptychocroca*. Specimens were sorted by conspicuous male secondary characters (e.g., hindwing hairpencil and forewing scale tufts) and examined for differences in the male genitalia. Females were sorted by geographic location and associated with males by collecting localities. Genitalic preparations of representative individuals were made following the methods summarized in Brown and Powell (1991). Genitalic illustrations are of a single preparation. Terminology for wing venation and genitalia structures follows Horak (1984). Abbreviations are as follows: FW = forewing; HW = hindwing; DC = discal cell; ca. = circa (approximately); n = number of individuals or preparations examined; $\bar{x}$ = mean.

All species of *Ptychocroca* are superficially extremely similar, differing primarily in genital morphology (sometimes subtly) and male secondary structures of the fore- and hindwing. Females can be distinguished only by genitalia. Rather than repeating similar descriptions of the head and forewing pattern for each species, these details (usually considered species-level features) are presented in the description of the genus and are not mentioned in the species accounts, except where they deviate from that presented in the generic description. Forewing length likewise is fairly consistent among all species and is presented only for the genus. Measurements were made with an ocular micrometer mounted in a Leica MZ12 dissecting microscope.

SYSTEMATICS

***PTYCHOCROCA* Brown and Razowski, New Genus**

Type species: *Haemateulia galenia* Razowski, 1999.

Description. *Head*: Antenna slightly serrate in male, cilia dense, length of cilia ca. 0.7–1.0 times width of flagellomere; antenna unmodified in female, longer cilia extremely sparse, ca. 0.4 times width of flagellomere. Labial palpus whitish mesally, mostly brown laterally, all segments combined ca. 1.2–1.4 times horizontal diameter of compound eye, segment II weakly upturned, rough scaled, expanded distally by scaling, segment III ca. 0.2 times as long as II, smooth-scaled, tip only exposed. Maxillary palpus rudimentary. Dorsal portion of frons with short overhanging tuft of scales; lower portion smooth-scaled; lower frons white; upper frons with grayish scales tipped with white. Ocellus moderate in size. Chaetosema present. Proboscis present, presumably functional. *Thorax*: Smooth-scaled, mostly grayish brown. Legs unmodified, male foreleg hairpencil absent. Forewing length 6.8–8.0 mm ($\bar{x}$ = 7.4 mm; n = 20) in male, 7.0–8.2 mm ($\bar{x}$ = 7.5 mm; n = 20) in female; length ca. 1.8 times width; length of DC ca. 0.6 times FW length; width of DC ca. 0.18 times DC length; CuA₂ originates ca. 0.70 along length of DC; all veins separate beyond DC; chorda absent; M-stem absent; CuP present at margin; scaling gray black in basal half, with dark scaling extending to ca. 0.33 distance from base to apex along costa, and ca. 0.67 distance from base to tornus along dorsum; remainder white with variable grayish overscaling; a small black blotch at upper edge of DC ca. 0.75 distance from base to apex of DC; an ill-defined short, gray-black, rectangular, costal patch ca. 0.65 distance from base to apex; in some specimens forewing pattern obscured by grayish overscaling; upraised scale tuft at base of costa present (in *crocoptycha*, *galenia*, *simplex*) or absent (all others); male without costal fold. Hindwing with Sc+R and Rs approximate; Rs to costa before apex; Rs and M₁ connate or short-stalked; M₂ and M₃ approximate at base; M₃ and CuA₁ connate or short-stalked; CuP present; M-stem absent; patch of fine, slender, elongate, external scales from near base of 1A+2A in both sexes; male usually with variable patch of modified sex scaling (=hairpencil) concealed in deep fold of CuP, frequently with dense beige-orange or gray-black scaling adjacent to fold; HW scaling white, with faint gray marbling. *Abdomen*: Dorsal pits absent; no modified corethrogynae scaling in female. Male genitalia with uncus simple, moderately slender, rodlike, bent subbasally, naked. Socius moderate in size, ca. 1.2 times length of gnathos arms, pendant; not fused to gnathos; hairy and scaled. Gnathos complete, arms moderately narrow, joined distally into narrow, usually elongate, triangular plate. Subscaphium and hami absent. Transtilla band-shaped, broadest at base, with dorsoposterior fold medially. Valva moderately broad, attenuate distally, well sclerotized in distal 0.33; costa nearly straight, weakly differentiated; valva with (in *crocoptycha*) or without row or comblike teeth in discal area; venter of valva variably undulate-sinuate, with rounded concavity near middle; sacculus confined to basal 0.33, usually without free apical process, but with small, rounded lobe at lower base; short, blunt thorn from near middle of venter (in *crocoptycha* and *galenia*). Pulvinus absent. Vinculum complete, well developed. Juxta a large, sclerotized, subrectangular plate. Aedeagus moderately long, curved near middle; vesica with one or two dense patches of small, non-capitate cornuti extending nearly throughout; phallobase simple.

Female genitalia with papillae anales slender. Apophyses anteriores and posteriores moderately short, slender, anteriores slightly longer. Sterigma a broad, transverse, sclerotized band, usually with large, rounded mesal portion and curved lateral arms; a pair of elongate lateral lobes anteriorly. Antrum moderately large. Ductus bursae moderately broad, long. Well-developed, rounded accessory bursa from membranous ductus on left side of ductus bursae, usually arising just anterad of junction of ductus bursae and ostium. Corpus bursae rounded, finely punctate; signum lacking. Ductus seminalis from near junction of corpus bursae and ductus bursae.

Diagnosis. Adults of *Ptychocroca* are characterized by a distinct black-and-white forewing pattern, with a dark basal area and a light apical region. In a few species, the forewing is variably overscaled with gray, diminishing the contrast in markings or partially obscuring the pattern. Superficially, adults of *Ptychocroca* are most similar to *Apotomops* and *Bonagota*. Males of all species of *Ptychocroca* (except *P. apenicillia* and *P. wilkinsoni*) possess a distinct hairpencil and/or modified sex scales on the hindwing; neither *Bonagota* nor *Apotomops* has these structures; *Acmanthina* possesses a similar hairpencil of 17–20 extremely long, sex scales concealed in a deep fold along the basal 0.6 of hindwing vein CuP. Females of *Ptychocroca* have a well developed accessory bursa from the ductus bursae that is considerably more developed than the pouch of *Bonagota* and *Apotomops*. In *Bonagota* and *Apotomops* the aedeagus is short and broad, and the vesica bears one large capitate cornutus; in *Ptychocroca* the aedeagus is long, curved near the middle, and the vesica bears one or two rows of short, non-capitate, spinelike cornuti. In *Bonagota* and *Apotomops* the valva is broad throughout, with an upcurved costa and rounded apex; in *Ptychocroca* the valva is attenuate in the distal 0.33, and the costa is nearly straight. The female genitalia of *Ptychocroca* are characterized by a distinct rounded lobe at the middle of the sterigma.

Etymology. The generic name is an anagram of the specific name *crocoptycha*; it is interpreted as feminine in gender.

The assignment of *Ptychocroca* to Euliini is based on its hypothesized phylogenetic relationship with *Apotomops*, *Bonagota*, *Haemateulia*, and *Acmanthina*. The presence of a gnathos excludes *Ptychocroca* from Cochylini, which it resembles superficially.

Table 1 presents six male characters useful in discriminating the species. An examination of the genitalia usually is necessary for accurate determination. In the table, “costal tuft” refers to the small patch of erect scales near the base of the costa of the forewing; “HW pencil” refers to the dense hairpencil of scales concealed in the fold of vein CuP in the hindwing; “color of scales” refers to the scales adjacent to vein CuP in the region of the hindwing fold; “valva thorn” refers to a thornlike process in the basal 0.33 of the ventral margin of the valva; “valva comb” refers to the linear patch of thorns extending along the middle of the valva characteristic of *P. crocoptycha*; and “aedeagus keel” refers to the triangular subdistal process of the aedeagus characteristic of *P. keelioides*.

TABLE 1. Morphological characters for distinguishing males of *Ptychocroca*.

<i>Ptychocroca</i> species	Forewing costal tuft	Hindwing hairpencil	Color of scales	Valval thorn	Valval comb	Aedeagus keel
<i>wilkinsoni</i>	absent	absent	absent	unknown	unknown	unknown
<i>apenicillia</i>	absent	absent	absent	absent	absent	absent
<i>nigropenicillia</i>	absent	present	black-gray	absent	absent	absent
<i>lineabasalis</i>	absent	present	orange	absent	absent	absent
<i>keelioides</i>	absent	present	orange	absent	absent	present
<i>simplex</i>	present	present	orange	absent	absent	absent
<i>galenia</i>	present	present	orange	present	absent	absent
<i>crocoptycha</i>	present	present	orange	present	present	absent

***Ptychocroca apenicillia* Brown and Razowski, new species**

Figs. 1, 16, 28

Diagnosis. Based on our sample (n = 26), *P. apenicillia* appears to be a moderately variable species in both facies and male genitalia. Although more than one species may be involved, continuous variation is present in specimens from the same locality, suggesting a single, variable species. The forewing pattern can be either well defined (with the typical black-and-white contrasting pattern) or variably obscured with gray overscaling, and the venter of the valva can be weakly to moderately sinuate. The latter may be partially an artifact of slide mounting. Males of *P. apenicillia* are distinguished from males of congeners by the absence of the hindwing hairpencil.

Description. Male forewing (Fig. 28) without tuft of upraised scales at base of costa. Male hindwing without hairpencil in fold of vein CuP, but with small patch of cream scales adjacent to vein. Male genitalia (Fig. 1) with uncus, socii, and gnathos as described for the genus. Transtilla with moderate medial lobe. Valva widest near middle immediately beyond distinct rounded excavation near mid-venter, triangular in distal 0.33; ventral margin variably undulate. Aedeagus as described for genus; vesica with larger cornuti near middle and smaller cornuti in distal 0.25. Female genitalia (Fig. 16) with sterigma bearing large, dorsally rounded, mesal portion, strongly sclerotized along dorsal edge; invaginated, membranous area anterad of sterigma with a pair of shallow, sublateral, V-shaped pockets; antrum well defined, with narrow split ventrally and patch of irregular sclerotization in anterior portion.

Holotype, ♂, Chile, Aconcagua Province, 38 km E Los Andes, 13 Dec 1982, R. Brown (USNM).

Paratypes. Chile: Aconcagua Province: Same data as holotype (4♂, 5♀) (MEM). Los Molles, ca 10 km S Pichidanguí, 25 m, 15–17 Nov 1981 (5♂), D. and M. Davis (USNM). 10 km E San Felipe, 14 Dec 1982 (1♂, 2♀), R. Brown (MEM). Río Blanco, 10 Mar 1968 (5♂, 1♀), Flint and Peña (USNM). San Felipe, “Inst. Padag,” [no date] (1♂) (USNM). Coquimbo, 1 Jul–19 Oct 1883 (2♂), Walker (BMNH). Santiago Province: Santiago, 28 Feb 1987 (1♀), R. L. Zuparko (UCB).

Distribution and biology. *Ptychocroca apenicillia* is known only from Aconcagua and Santiago provinces in Chile. Nothing is known of the early stages. The capture of two males from “1 July–19 Oct” is somewhat unusual for the genus, as most species appear to fly from November to February.

Etymology. The specific epithet refers to the absence of the hindwing hairpencil.

***Ptychocroca nigropenicillia* Brown and Razowski, new species**

Figs. 2, 17, 29

Diagnosis. Males of *P. nigropenicillia* can be distinguished from their congeners by the gray-black patch of sex scales on each side of hindwing vein CuP. The male genitalia are similar to those of *P. apenicillia*, with a somewhat undulate ventral edge of the valva, but the apex of the valva is less attenuate.

Description. Male forewing (Fig. 29) without patch of upraised scales near base of costa. Male hindwing with hairpencil concealed in fold of vein CuP, with patch of gray-black scales on each side of vein adjacent to hairpencil. Male genitalia (Fig. 2) with uncus, socii, and gnathos as described for the genus. Transtilla with large median lobe. Valva widest near middle, immediately beyond rounded excavation of venter, broadly triangular in distal 0.33; venter variably undulate; disc with weak trace of comb; large area of plication basally; angulation of sacculus weak. Aedeagus as described for genus; vesica with proximal group of cornuti not differentiated. Female genitalia (Fig. 17) with sterigma bearing slightly elongate lamella antevaginalis; anterior portion with a pair of triangular, membranous lobes; internal ventral sclerites in colliculum situated medially.

Holotype, ♂, Chile, Santiago Province, El Portezuelo, 7 km N Santiago, 22–25 Oct 1981, D. and M. Davis (USNM).

Paratypes. Chile: Santiago Province: Same data as holotype (2♂, 7♀), D. and M. Davis (USNM). El Alfalfal, 29 Feb 1968 (1♂, 1♀), O. Flint and L. Peña (USNM).

Distribution and biology. *Ptychocroca nigropenicillia* is known from two localities in Chile: El Portezuela and El Alfalfal. Specimens have been collected in late October and late February. Nothing is known of the early stages.

Etymology. The specific epithet refers to the black scaling surrounding the hindwing hairpencil.

***Ptychocroca keelioides* Brown and Razowski, new species**

Figs. 3, 18, 30

Diagnosis. Like *P. apenicillia*, *P. keelioides* is considerably more variable in forewing maculation than most of its congeners; in many specimens the gray overscaling of the forewing diminishes the contrast between the dark basal area and the white or pale distal portion. *Ptychocroca keelioides* is one of five species in there is a patch of beige-orange scaling on each side of the pouch that conceals the hindwing hairpencil (see Table 1). Males of *P. keelioides* can be distinguished from those of *P. crocoptycha*, *P. galenia*, and *P. simplex* by the absence of the tuft of upraised scales near the base of the costa. They can be distinguished from those of *P. lineabasilis* by a single conspicuous feature of the genitalia: the aedeagus of *P. keelioides* has a conspicuous triangular process ventrally near the distal end lacking in *P. lineabasilis*.

Description. Male forewing (Fig. 30) without patch of upraised scales near base of costa. Male hindwing with hairpencil concealed in fold of vein CuP, with a patch of beige-orange scales on each side of vein adjacent to hairpencil. Male genitalia (Fig. 3) with uncus, socii, and gnathos as described for the genus. Transtilla with weakly developed mesal lobe. Valva broadest at base, ventral edge of basal 0.33 relatively straight, followed by short, distinct concavity between angular termination of sacculus and ventro-caudal prominence of cucullus; disc with small plicate area. Aedeagus as described for genus, except with short, rounded-triangular keel subdistally on venter. Female genitalia (Fig. 18) with sterigma bearing large, dorsally rounded, lamella antevaginalis, strongly sclerotized along dorsal edge; invaginated, membranous area anterad of sterigma with a pair of shallow, sublateral, V-shaped pockets; antrum well defined, with narrow split ventrally and patch of irregular sclerotization in anterior portion; sclerites of colliculum lateral.

Holotype, ♂, Chile, Santiago Province, nr. Punta Yeso, ca. 70 km SE Santiago, 27–28 Oct 1981, D. and M. Davis (USNM).

Paratypes. Chile: Santiago Province: Same data as holotype (34♂, 27♀) (USNM, PAS, BMNH). Guayacan, 1100 m, 25 Jan 1951 (1♂), L. Peña (USNM), Oct 1952 (1♂, 2♀), L. Peña (BMNH). El Alfalfal, 29 Feb 1968 (5♂), O. Flint and L. Peña (USNM). Río Colorado, ca 40 km SE Santiago, 1100 m, 29–31 Oct 1981 (1♂), D. and M. Davis (USNM). Centro-Austral, Jan-Mar 1898 (1♂), V. Izquierdo (USNM).

Distribution and biology. *Ptychocroca keelioides* is known only from Santiago Province. Adults have been collected from October through February. The early stages are unknown.

Etymology. The specific epithet refers to the keellike process of the aedeagus.

***Ptychocroca lineabasalis* Brown and Razowski, new species**

Figs. 4, 19, 31

ZOOTAXA

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Diagnosis. The male genitalia of *Ptychocroca lineabasalis* are most similar to those of *P. keelioides* in the overall shape of valva. They can be distinguished from the latter by the absence of the subdistal keel of the aedeagus.

Description. Male forewing (Fig. 31) without patch of upraised scales at base of costa. Male hindwing with hairpencil concealed in fold of vein CuP, with a patch of beige-orange scales on each side of vein adjacent to hairpencil. Male genitalia (Fig. 4) with uncus, socii, and gnathos as described for the genus. Transtilla with moderately small mesal fold. Valva broadest basally, venter nearly straight in basal 0.25, followed by short, distinct ventro-caudal convexity; disc of valva without comb; plicate area large. Aedeagus as described for genus, infrequently with dorso-median spines; vesica with cornuti forming a single row. Female genitalia (Fig. 19) with sterigma fairly long, bearing rounded sclerotized lobe at middle immediately posterad of ostium; a pair of slender, membranous, V-shaped pockets laterally; sclerite in colliculum situated laterally, adjacent to a second medially situated sclerite.

Holotype, ♂, Chile, Santiago Province, 7 km N Santiago, 500 m, 19–20 Nov 1981, D. and M. Davis (USNM).

Paratypes. Chile: Santiago Province: 6 km W Til-til, 15 Dec 1982 (3♂), R. Brown (MEM). Til-til, La Dormida 600–800 m, 16–17 Nov 1982 (2♂), L. Peña (USNM). 7 km N Santiago, 500 m, 22–25 Oct 1981 (3♂, 3♀), 19–20 Nov 1981 (1♂, 2♀), D. and M. Davis (USNM). Pilay, Río Pueco, ca. 45 km S Santiago, 800 m, 23–24 Nov 1981 (3♂), D. and M. Davis (USNM). Quebrada de la Plata, 775 m, 6–7 Oct 1976 (1♂), M. E. Erwin (UCB). Quillota, 1886 (2♂), Paulson (BMNH).

Distribution and biology. *Ptychocroca lineabasalis* is known only from Santiago Province, Chile, from about 500 to 1250 m elevation. Adults have been collected from October through December. The early stages are unknown.

Etymology. The specific epithet refers to the short linear portion of the ventral margin of the valva.

***Ptychocroca galenia* (Razowski), new combination**

Figs. 5, 6, 20, 34

Haemateulia galenia Razowski, 1999c: 71.

Diagnosis. Males of *P. galenia* have the tuft of erect scales near the base of the costa characteristic of *P. crocoptycha* and *P. simplex* (see Table 1). The male genitalia of *P. galenia* are somewhat variable (Figs. 5, 6) but usually can be distinguished from those of *P. simplex* by the presence of a thorn from the venter of the valva at about 0.4 the distance from

the base to the apex of the valva, a blunt thorn at the distal end of the aedeagus, and the longer, more slender valva (Figs. 5, 6); they can be separated from those of *P. crocoptycha* by the absence of the longitudinal comb in the disc of the valva, although a trace of the latter is weakly developed in some specimens (Fig. 5).

Description. Male forewing (Fig. 34) with tuft of erect scales near base of costa. Male hindwing with hairpencil in fold of vein CuP, with dense beige-orange scaling on both sides of fold. Male genitalia (Figs. 5, 6) with uncus, socii, and gnathos as described for the genus. Transtilla with small mesal lobe. Valva similar to *crocoptycha*, weakly attenuate nearly from base to apex; venter with sacculus near straight, followed by small convexity with variably developed thorn near middle; disc without comb, but with weakly developed, linear patch of tiny, blunt bumps. Aedeagus as described for genus, with small blunt, curved process extending beyond distal end; vesica with two groups of cornuti: a long, dense patch of short, spinelike cornuti and a basal group of longer spines. Female genitalia (Fig. 20) with lamella antevaginalis short; proximal corners developed, lacking V-shaped membranous pockets; colliculum membranous, twisted.

Holotype, ♂, Chile, Ñuble Province, Shangri-la, Las Trancas, SE Recinto, 1600 m, 15–17 Dec 1983, L. Peña (AMNH).

Paratypes. Chile: Concepcion, Mercado el Dibyuo, March [no year] (1♂) (MNHNS); Reg. Metropolitana, Maipu, 10 Nov 1994 (1♂), M. Algueta (MNHNS).

Additional Specimens Examined. Chile: Linares Province: Emb. Bullileo, 36°18'S, 71°25'W, 11–12 Jan 1994 (1♂), C. and O. Flint (USNM). Tranque de Bullileo, 800 m, 10–12 Jan 1979 (1♀), D. and M. Davis and B. Akerbergs (USNM). Malcho, E Parral, 450 m, 7–8 Jan 1988 (1♂), L. E. Peña (USNM). Maule Province: Pelluhue, 600 m, 2 Dec 1953 (2♂), L. Peña (USNM). Rio Teno, ca. 40 km E Curico, 25–27 Nov 1981 (1♂), D. R. Davis (USNM). Milipilla Province: La Viluma, SE Milipilla, 15–17 Dec 1987 (1♂), L. E. Peña (USNM). Ñuble Province: Alto Tregualemu, ca. 20 km SE Chovellen, 500 m, 26–27 Jan 1979 (1♂, 1♀), D. and M. Davis and B. Akerbergs (USNM). Shangri-la, SW side Volcan Chillan, 1600 m, 19–21 Jan 1979 (1♂), D. and M. Davis and B. Akerbergs (USNM). Piedra de la Iglesia, 8 km N Cobquecura, 5 m, 24 Jan 1979 (1♂), D. and M. Davis and B. Akerbergs (USNM). Recinto, 800 m, 22–23 Jan 1979 (1♀), D. and M. Davis and B. Akerbergs (USNM). Talca Province: 6 km E Molina, 3 Dec 1982 (1♂, 1♀), R. Brown (MEM); Teno, 12 km NW Curico, 1 Dec 1982 (1♂), R. Brown (MEM); Potrero Grande, 25 km SE Curico, 35°125.'S, 71°W, 6 Dec 1982 (1♂, 1♀), R. Brown (MEM); Curico, El Coigo, E Potrero Grande, 950 m, 6–7 Jan 1988 (8♂), L. Peña (USNM). Temuco Province: Fundo Chacamo, 35 km NW Nueva Imperial, 600 m, 5–8 Dec 1981 (1♂, 2♀), D. Davis (USNM).

Distribution and biology. *Ptychocroca galenia* is recorded from Talca to Malleco provinces (from about 35° to 39° S latitude) in Chile, ranging from near sea level to about 1600 m. It has been collected from November through January (with a single March record), suggesting a single generation annually.

***Ptychocroca simplex* Brown and Razowski, new species**

Fig. 7, 35

Diagnosis. The male of *P. simplex* is superficially most similar to those of *P. crocoptycha* and *P. galenia*; all three species have a tuft of erect scales near the base of the costa of the forewing, and a patch of dense beige-orange scales on each side of the pouch concealing the hairpencil in the hindwing. The male genitalia of *P. simplex* can be distinguished from those of *P. galenia* and *P. crocoptycha* by the absence of the conspicuous thorn from the venter of the valva about 0.4 the distance from the base to the apex of the valva and the shorter, stouter valva.

Description. Male forewing (Fig. 35) with tuft of upraised scales near base of costa. Male hindwing with hairpencil in fold of vein CuP, with patch of dense beige-orange scales on each side of pouch. Male genitalia (Fig. 7) with uncus, socii, and gnathos as described for the genus. Transtilla with mesal fold well developed. Valva moderately broad throughout basal portion; rounded concavity between angular termination of sacculus and ventro-caudal convexity relatively weak; comb of the disc rudimentary; region of plication small. Aedeagus similar to congeners; vesica with patches of cornuti more limited than in congeners. Female genitalia unknown.

Holotype, ♂, Chile, Valparaiso, 30 Sep–8 Oct 1883, Walker 3076 (BMNH).

Paratype. Chile: Valparaiso, 1884, Walker (BMNH).

Distribution and biology. This species is known only from Valparaiso.

Etymology. The specific epithet refers to the somewhat simple valva of the male genitalia.

***Ptychocroca crocoptycha* (Meyrick), new combination**

Figs. 8, 9, 21, 32, 33

Peronea crocoptycha Meyrick, 1931a: 383.

Acleris crocoptycha: Clarke, 1958: 4 (illustration of adult and male genitalia).

“Eulia” crocoptycha: Powell et al., 1995: 146.

Diagnosis. *Ptychocroca crocoptycha* is one of three species (along with *P. galenia* and *P. simplex*) in which the male has a rounded tuft of erect scales near the base of the costa of the forewing. The male genitalia of *P. crocoptycha* can be distinguished from those of *P. galenia* and *P. simplex* by the upraised, longitudinal “comb” across the disc of the valva.

Redescription. Male forewing (Figs. 32, 33) with tuft of erect scales near base of costa. Male hindwing with hairpencil in fold of vein CuP, with patch of dense beige-orange scales on each side of fold. Male genitalia (Figs. 8, 9) with uncus, socii, and gnathos as described for genus. Transtilla with small mesal lobe. Valva attenuating distally more evenly than congeners; venter only slightly undulate, with convexity extremely weak; small thorn ca. 0.4 distance from base to apex; disc of valva with an upraised, delicate,

longitudinal comb in distal 0.67, weak plication in basal 0.33. Aedeagus as described for genus, but with rather short lateral thorn at distal end; vesica with long, dense row of short, spinelike cornuti near middle and a group of smaller cornuti in distal 0.33. Female genitalia (Fig. 21) with sterigma a broad transverse band, dilated mesally, anteostial part large, rounded proximally; lateral arms weakly angulate dorsally; portion around ostium large, rounded, weakly spiculate; antrum ill-defined, membranous, giving rise to rounded accessory sack from moderately broad ductus; lateral sclerite of colliculum well developed.

Holotype, ♂, Argentina, Territory Río Negro, Lake Gutierrez, 3–14 Nov 1926 (BMNH).

Additional Specimens Examined. Argentina: Chubut Province: El Bolsón, Lago Puelo, 220 m, 17 Nov 1978 (1♀), Mision Cientifica Danesa (ZMC), 22–23 Oct 1981 (8♂, 2♀), Nielsen and Karsholt (ZMC). Neuquén Province: Lago Lacar-Nonthue, 640 m, 2 Dec 1983 (6♂, 1♀), M. and P. Gentili (USNM). San Martín de los Andes, 640 m, 15 Oct 1979 (1♂), 25 Nov 1979 (1♀), 30 Oct 1980 (1♂), 30 Oct 1982 (1♀), M. Gentili (USNM), 10 Oct–6 Nov 1981 (5♂, 2♀), Karsholt and Neilsen (ZMB). San Martín Andes, Tr. Kura, 1000 m, 28 Nov 1987 (1♂), M. and P. Gentili (USNM), 900 m, 6 Nov 1996 (2♂), M. Gentili (USNM). Llao Llao Peninsula, Río Negro, bamboo-coihue forest, 12 Dec 1991 (1♂), O. Pearson (UCB). Río Negro Province: San Carlos de Bariloche, Colonia Suiza, 800–810 m, 15 Nov–9 Dec 1978 (15♂, 5♀), Mision Cientifica Danesa (ZMC), 11 Nov–7 Dec 1981 (11♂, 8♀), Karsholt and Neilsen (ZMB). Chile: Cautín Province: 3 km NE Tolten, 3 m, 26 Feb 1979 (1♂), D. and M. Davis and B. Akerbergs (USNM). Malleco Province: Angol, Los Alpes, 650 m, 17 Mar 1979 (1♂), Mision Cientifica Danesa (ZMC). Talca Province: Laguna del Maule La Mina, 1000 m, 25 Mar 1979 (1♂), Mision Cientifica Danesa (ZMC).

Distribution and biology. *Ptychocroca crocoptycha* occurs primarily in Argentina (we have seen only 3 specimens from Chile), with captures from near sea level to about 1000 m in the Andes. Most specimens examined were collected between October and December, suggesting a single flight season in Argentina. The three specimens from Chile were collected in February and March.

Remarks. The male genitalia of our specimens (Fig. 8) differ from those of the holotype (Fig. 9) in two conspicuous features: the valva are less attenuate and broader apically and the “comb” of the disk of the valva is slightly less developed. It is likely that these differences are partially an artifact of the slide-mounted genitalia preparations, and we assume that they also are at least partially attributable to intraspecific variation. Alternatively, it is possible that our specimens are not conspecific with the holotype.

***Ptychocroca wilkinsoni* (Butler), new combination**

Sericoris wilkinsoni Butler, 1883: 41.

Bonagota wilkinsoni: Brown, 1989: 320; Powell, et al. 1995: 143; Razowski, 1999c: 87; Razowski and Becker, 2000: 68.

Diagnosis. In general facies, the holotype of *P. wilkinsoni* (BMNH) looks most like *P. nigropenicillia*, however, it has a slightly greater forewing length. The identity of *P. wilkinsoni* is enigmatic because the holotype lacks the abdomen and the hindwings are in poor condition.

Redescription. Male forewing without tuft of erect scales near base of costa. Male hindwing without hairpencil in fold of vein CuP. Male genitalia unknown (abdomen missing). Female genitalia unknown.

Holotype ♂, Chile, Valparaiso, Nov–Dec 1881, T. Edmondo (BMNH).

Remarks. Based entirely on external features, Brown (1989) transferred this species provisionally to *Bonagota*, where it remained (Powell et al. 1995, Razowski 1999c, Razowski and Becker 2000); however, *Bonagota*, *Apotomops*, and *Ptychocroca* are extremely similar in facies. Because the hindwing of the single specimen (holotype) is slightly damaged, the presence of male secondary characters is not clear. It is possible that this species is conspecific with one of the species of *Ptychocroca* we describe above; however, we have no evidence of which one. Although *P. simplex* has the same type locality as *P. wilkinsoni* (Valparaiso, Chile), the former has a conspicuous tuft of erect scales on the costa of the forewing which is lacking in *P. wilkinsoni*. Alternatively, *P. wilkinsoni* may belong in *Bonagota*. Because we have seen no specimens of the latter genus from Chile where *Ptychocroca* is widespread and abundant, we suspect that *P. wilkinsoni* is placed more appropriately in *Ptychocroca*.

ACMANTHINA Brown, 2000

Acleris; Clarke, 1958: 3 (in part) (illustration of adult and male genitalia of *acmanthes*).

Haemateulia; Razowski, 1999c: 72 (in part) (illustration of male genitalia of *acmanthes*).

Acmanthina Brown, 2000b: 106 (illustration of adults and male genitalia of *acmanthes* and *albipuncta*).

Type species: *Peronea acmanthes* Meyrick, 1931a, by original designation.

Diagnosis. *Acmanthina* includes two species, *A. acmanthes* (Meyrick) and *A. albipuncta* Brown, both of which are recorded from Chile and Argentina. Adults are moderately small, with a dark forewing bearing variable white patch(es) and/or band(s), superficially most similar to some species of *Apotomops* and *Bonagota* (see Brown 2000b for photographs of adults). Males can be distinguished from those of related genera by the absence of the fine, elongate scales along the basal portions of hindwing veins CuP and 1A+2A, the possession of a long, slender hairpencil of setiform scales concealed in a deep fold of hindwing vein CuP, and the deeply excavated mesal portion of the juxta, all of which are interpreted as synapomorphies for the two included species (*A. acmanthes* and *A. albipuncta* Brown). Male genitalia are illustrated in Figs. 12 and 13. Females of *Acmanthina*

lack the accessory pouch from the ductus bursae that is present in *Bonagota* and *Apotomops* (Fig. 24).

The hindwing hairpencil consists of a fascicle of 20–24 long, fine, slender, setiform scales, unlike the distally spatulate scales of the hairpencil of male *Ptychocroca*.

***HAEMATEULIA* Razowski, 1999**

Haemateulia Razowski, 1999c: 70; Brown, 2000b: 110; Brown and McPherson, 2002: 137; Razowski and González, 2003: 61.

Type species: *Eulia haematitis* Meyrick, 1931, by original designation.

Diagnosis. Razowski (1999c) initially included three species in *Haemateulia*: *haematitis* (Meyrick), *galenia* Razowski, and *acmanthes* (Meyrick). Brown (2000b) transferred *acmanthes* to *Acmanthina*, and above we transferred *galenia* to *Ptychocroca*. As defined herein, *Haemateulia* consists of *H. haematitis* (Meyrick) and *H. barrigana* Razowski and González. Male genitalia of the two are characterized by a moderately short uncus, long, broad socii (extending beyond the gnathos tip), a rounded-rectangular valva, and a long, slender, curved aedeagus without cornuti (Figs. 10, 11). A short process subdistally from the venter of the gnathos arms and a moderately large, rectangular membranous region at the base of the valva appear to represent synapomorphies for the genus. Males of the two species are easily distinguished by the shape of the antenna (strongly serrate in *H. haematitis* and simple in *H. barrigana*), the weakly undulate venter and costa of the valva in *H. haematitis* (both of which are nearly evenly curved in *H. barrigana*), and the finely setose sacculus of *H. haematitis* (smooth in *H. barrigana*). Females are characterized by a broad, evenly sclerotized plate surrounding the ostium and a deep notch at the posterior edge of tergum 8, both of which appear to represent synapomorphies for the genus (Figs. 22, 23).

***Haemateulia barrigana* Razowski and González**

Figs. 11, 23, 37, 38

Haemateulia barrigana Razowski and González, 2003: 61.

Diagnosis. As mentioned above, males of *H. barrigana* can be distinguished from those of *H. haematitis* by the absence of the distinctly serrate antenna, the longer valva with a naked sacculus, and a weakly dilated apex of the uncus. Males of *H. barrigana* are variable in forewing maculation — one form is virtually indistinguishable from *H. haematitis*, with a dark forewing bearing limited pattern elements. Another form (Fig. 38) has a distinct forewing pattern that includes a pale red-brown basal patch, followed by a region of pale scaling, with the distal 0.5 of the wing dark red-brown. We take this opportunity to provide additional records of this species.

Holotype, ♂, Chile, Zapallar, 15 km E Curico, 14–23 Feb 1998, malaise trap, J. E. Barriga (UCS).

Additional Specimens Examined. Argentina: Neuquén: Lago Lacar, Trompul, 1000 m, 6 Jan 1983 (4♂), M. and P. Gentili (USNM). Lacar, Quechuquina, 900 m, 14 Jan 1983 (7♂), M. and P. Gentili (USNM). Ao. Pilpil, nr San Martín de los Andes, 22 Feb 1978 (1♂), C. and O. Flint (USNM). Chile: Cautín Province: Cerro Nielo, Temuco, 200 m, 9 Feb 1979 (1♂), D. and M. Davis and B. Akerbergs (USNM). Fundo el Coidua, 27 km NE Villarrica, 500 m, 28 Feb–3 Mar 1979 (1♂), D. and M. Davis and B. Akerbergs (USNM). Ñuble Province: Recinto, 800 m, 22–23 Jan 1979 (1♂), D. and M. Davis and B. Akerbergs (USNM). Alto Tregualemu, ca. 20 km SE Chovellen, 26–27 Jan 1979 (1♂), D. and M. Davis and B. Akerbergs (USNM). Las Trancas, 21 km E Recinto, nr high waterfall, 1300 m, 17 Jan 1979 (1♂), D. and M. Davis and B. Akerbergs (USNM).

***Haemateulia haematitis* (Meyrick)**

Figs. 10, 22, 36

Eulia haematitis Meyrick, 1931a: 381; Clarke, 1958: 127 (illustration of adult and male genitalia). *Haemateulia heamatitis*: Razowski, 1999c: 71 (illustration of male genitalia); Brown, 2000b: 110; Brown and McPherson, 2002: 137.

Diagnosis. The differences between *H. haematitis* and *H. barrigana* are described above. Because *H. haematitis* previously was known only from the holotype, we take this opportunity to present new distributional data and illustrate the female genitalia for the first time (Fig. 22). We provide an illustration of the male genitalia (Fig. 10) for purposes of comparison with those of *H. barrigana* (Fig. 11).

Holotype, ♂, Chile, Llanquihue Province, Casa Pangué, 4–10 Dec 1926, F. and M. Edwards (BMNH).

Specimens Examined. Argentina: Chubut Province: Esquel, Lago Menéndez, El Segrario Puerto, 600 m, 2–4 Jan 1982 (3♂), Nielsen and Karsholt (ZMC). Nuequén Province: Lago Lacar, Pucará, 25 Nov 1978 (2♂), Mision Cientifica Danesa (ZMC), 26–27 Dec 1981 (1♂), Nielsen and Karsholt (ZMC). Lago Lacar, 5 km E Hua-Hum, 25 Nov 1981 (3♂), Nielsen and Karsholt (ZMC). San Martín de los Andes, Cerro Chapelco, 1400–1600 m, 20–25 Dec 1981 (1♂), Nielsen and Karsholt (ZMC). 2 km SE Va. La Angostura, 13 Jan 1987 (1♂), C. and O. Flint (USNM). Río Negro Province: San Carlos de Bariloche, Colonia Suiza, 800 m, 9 Dec 1979–13 Jan 1979 (12♂), Mision Cientifica Danesa (ZMC), 29 Nov 1981–7 Jan 1982 (45♂, 6♀), Nielsen and Karsholt (ZMC). Lago Nahuel Huapi, Puerto Blest, 770 m, 3 Dec 1981 (1♀), Nielsen and Karsholt (ZMC). Chile: Malleco Province: Nahuelbuta Natl. Park, Pichinahuel, 1350 m, 31 Jan–5 Feb 1979 (1♂), D. and M. Davis and B. Akerbergs (USNM). Nahuelbuta Natl. Park, near Los Gringos Camp, 1300 m, 29 Jan–5 Feb 1979 (1♂), D. and M. Davis and B. Akerbergs (USNM). Ñuble Province:

La Trancas, 21 km E Recinto, near waterfall, 1300 m, 17 Jan 1979 (1♂), D. and M. Davis and B. Akerbergs (USNM). Shangri-la, SW side Volcan Chillan, 1600 m, 19–21 Jan 1979 (1♂), D. and M. Davis and B. Akerbergs (USNM). Osorno Province: Parque Nacional Puyehue, Anticura, 350 m, 19 Nov 1981 (1♀), Nielsen and Karsholt (ZMC).

***APOTOMOPS* Powell and Obraztsov, 1986**

Apotomops Powell and Obraztsov, in Powell 1986: 396; Brown, 1989: 320; Brown and Powell, 1991: 4; Brown, 2000b: 108; Razowski and Becker, 2000: 75.

Type species: *Olethreutes wellingtoniana* Kearfott, 1907, by original designation.

Diagnosis. *Apotomops* is superficially and genitally most similar to *Bonagota*. Although the relationship between them is not entirely resolved, the two appear to represent monophyletic sister groups. Under present concepts, *Apotomops* can be defined by the reduced socii that are mostly fused to the tegumen, the development of teeth along the dorsal edge of the sacculus, and the reduced cilia and rounded aspect of the male antennal flagellomeres. Powell (1986) included two species in the genus: *A. wellingtoniana* (Kearfott) and *A. texasana* (Blanchard and Knudson). We add *A. carchicola* (Razowski and Becker), new combination, *A. sololana* (Razowski), new combination, *A. boliviana*, new species, and *A. spomotopa*, new species. Although all species of *Apotomops* and *Bonagota* are similar in facies, *A. wellingtoniana* and *A. texasana* are most similar to each other superficially, while *A. carchicola* and *A. boliviana* are more similar to species of *Bonagota*.

Distribution. *Apotomops* is one of very few genera in Euliini that occurs north of Mexico (e.g., *Eulia* Linnaeus, *Dorithia* Powell, *Anopina* Obraztsov). *Apotomops wellingtoniana* occurs across Canada from British Columbia (type locality) to Nova Scotia (USNM), and south through the Rocky Mountains to the Mexican states of Durango (UCB), Nuevo Leon, Distrito Federal, and Veracruz (Razowski and Becker 2000). In eastern North America, it ranges as far south as the Great Smoky Mountains in Tennessee (USNM). It is possible that specimens from Mexico are not conspecific with northern *A. wellingtoniana*, but we could find no characters to convincingly separate the two. *Apotomops texasana* is known only from Texas; *A. carchicola* and *A. sololana* are known only from Ecuador; *A. boliviana* is known only from Bolivia; and *A. spomotopa* is known only from Peru.

***Apotomops boliviana* Brown and Razowski, new species**

Figs. 14, 25, 39

Diagnosis. *Apotomops boliviana* is indistinguishable superficially from most congeners. Sexual dimorphism in forewing pattern is subtle as in most *Apotomops*, although the single

female is considerably larger than either of the two males. The white hindwings of *A. boliviana* may be unique in the genus. The male genitalia are similar to those of *A. carchicola*, but can be distinguished easily by the single pointed tooth from the dorsum of the sacculus compared to the dense row of teeth present in *A. carchicola*.

Description. *Head:* White scaled; antenna simple, flagellomeres rounded, male with extremely short cilia. *Thorax:* Forewing (Fig. 39) length 7.5 mm in males, 11.0 mm in female; ground color white, overscaled and faintly mottled with gray in distal 0.5; slender black oblique bar from costa ca. 0.15 distance from base to apex; small semicircular blotch near middle of costa; costal portion of basal half of forewing blackish brown, with scaling extending nearly to costal blotch, isolating a subrectangular white patch in basal 0.5; hindwing white, pale beige in apical region, lacking male secondary structures. *Abdomen:* Male genitalia (Fig. 14) with uncus short, stout, dilated near middle; socii short; gnathos unmodified; transtilla a simple bridge; valva uniform in width, curved dorsally throughout, rounded apically, sacculus with a single attenuate tooth at dorsal edge, followed distally by a short, weakly serrate region; aedeagus complex, with an extremely long, slender curved spine from phallobase; phallobase with two large asymmetrical lobes. Female genitalia (Fig. 25) with papillae anales simple; anterior portion of sterigma forming a large pocket with deep V-shaped lateral lobes; accessory bursa poorly defined; ductus bursae comparatively narrow; corpus bursae oblong, without spicules or signum.

Holotype, ♂, Bolivia, Cochabamba, Incachaca, tropical cloud area, 2100 m, 27 Aug–5 Sep 1956, L. Peña (USNM).

Paratypes. Bolivia: Same data as holotype (1 ♀) (USNM). Cochabamba, Chapare, El Limbo, 2000 m, April 1954 (1 ♂), F. Steinbach (USNM).

Etymology. The specific epithet is derived from the country, Bolivia.

***Apotomops spomotopa* Brown and Razowski, new species**

Figs. 15, 26, 40

Diagnosis. *Apotomops spomotopa* is superficially similar to other species of *Apotomops*. The male genitalia are most similar to those of *A. carchicola*, but can be distinguished by the shorter, broader digitate process at the distal end of the aedeagus.

Description. *Head:* White scaled; antennal flagellomeres somewhat rounded, male with extremely short cilia. *Thorax:* Forewing (Fig. 40) length 7.5 mm in male, 10.0 mm in female; ground color white, faintly mottled with gray overscaling in distal 0.5; slender black oblique bar from costa ca. 0.15 distance from base to apex; small semicircular blotch near middle of costa; dorsal half of basal half of forewing blackish brown, with scaling extending nearly to costal blotch, isolating a subrectangular white patch in basal 0.5; hindwing white, pale beige in apical region, lacking male secondary structures. *Abdomen:* Male genitalia (Fig. 15) with uncus short, stout, somewhat spindle-shaped; socii short, relatively broad; gnathos unmodified, with long distal process at junction of arms; transtilla a

simple bridge, slightly folded at middle; valva uniform in width, arched dorsally throughout, rounded apically, sacculus with irregular row of spines along dorsal edge; aedeagus complex, with a stout curved spine from near phallobase. Female genitalia (Fig. 26) with papillae anales simple; sterigma a large rounded pocket; ductus bursae short, broad, with large complex accessory bursa; corpus bursae round-oblong, with extremely faint spiculae.

Holotype, ♂, Peru, Divisoria, 5200', 20–23 Jun 1982, C. V. Covell, Jr. (USNM).

Paratype. Peru: Same data as holotype (1♀) (USNM).

Etymology. The specific epithet is the genus name spelled backwards, creating a palindrome.

BONAGOTA Razowski, 1986

Bonagota Razowski, 1986: 22; Powell, 1986: 397; Brown, 1989: 320; Powell et al. 1995: 143; Razowski 1999a: 308, 1999b: 324, 1999c: 87; Razowski and Becker, 2000: 65.

Type species: *Sciaphila bogotana* Walker, 1863, by original designation (Razowski 1986).

Diagnosis. As indicated above, *Bonagota* is most similar in facies and genitalia to *Apotomops*. The genus is defined by the extremely elongate socii, the extremely broad valva (usually slightly broadened near middle), and the extreme sexual dimorphism in forewing pattern and size (except for *B. arizonae* Razowski and Becker). The male antennae range from weakly serrate (e.g., *B. salubricola* (Meyrick)) to nearly pectinate (e.g., *B. dominicana* Razowski).

Remarks. Razowski and Becker (2000) augmented the original description of the genus (Razowski 1986), including 12 species, 5 of which were described as new. We transfer *Sericoris wilkinsoni* Butler from *Bonagota* to *Ptychocroca* (above); we transfer *B. carchicola* Razowski and Becker and *B. sololana* from *Bonagota* to *Apotomops* (above); and we synonymize *Phtheochroa cranaodes* Meyrick with *Eulia salubricola* Meyrick (below). Based on these changes, as presently defined, *Bonagota* includes 8 described species (Table 2) distributed throughout the New World tropics from Uruguay (Chambon et al. 1997), Argentina, and Brazil (Razowski 1986, Brown and Passoa 1998), north through Central America to Arizona, U.S.A. (Razowski and Becker 2000). It also has been recorded from the Dominican Republic in the Caribbean (Razowski 1999a). *Bonagota* has become one of the best known genera in Euliini because of the recent systematic treatment (Razowski and Becker 2000), the growing list of larval host plants documented for the genus (Brown and Passoa 1998), and the synthesis of the male sex pheromone of “*B. cranaodes*” (Park et al. 1998, Coracini et al. 1999, Eiras et al. 1999, Yadav and Reddy 2000). *Bonagota salubricola* (reported as its junior synonym, *B. cranaodes*) is an important pest of apples in Brazil. We also take this opportunity to present an illustration of the female of *B. arizonae* because it has not previously been figured elsewhere (Fig. 27).

TABLE 2. Species' assignments to genera in the *Bonagota* Group.

<i>Ptychocroca</i> Brown and Razowski, new genus
<i>apenicillia</i> Brown and Razowski, new species
<i>crocoptycha</i> (Meyrick, 1931), new combination
<i>galenia</i> (Razowski, 1999), new combination
<i>keelioides</i> Brown and Razowski, new species
<i>lineabasis</i> Brown and Razowski, new species
<i>nigropenicillia</i> Brown and Razowski, new species
<i>simplex</i> Brown and Razowski, new species
<i>wilkinsoni</i> (Butler, 1883), new combination
 <i>Acmanthina</i> Brown, 2000
<i>acmanthes</i> (Meyrick, 1931)
<i>albipuncta</i> Brown, 2000
 <i>Haemateulia</i> Razowski, 1999
<i>barrigana</i> Razowski and Gonzalez, 2003
<i>haematitis</i> (Meyrick, 1931)
 <i>Apotomops</i> Powell and Obraztsov, 1986
<i>boliviana</i> Brown and Razowski, new species
<i>carchicola</i> (Razowski and Becker, 2000), new combination
<i>sololana</i> (Razowski, 1999), new combination
<i>spomotopa</i> Brown and Razowski, new species
<i>texasana</i> (Blanchard and Knudson, 1984)
<i>wellingtoniana</i> (Kearfott, 1907)
 <i>Bonagota</i> Razowski, 1986
<i>arizonae</i> Razowski and Becker, 2000
<i>bogotana</i> (Walker, 1863)
= <i>penthinella</i> (Zeller, 1877)
<i>chiapasana</i> Razowski and Becker, 2000
<i>costaricana</i> Razowski and Becker, 2000
<i>dominicana</i> Razowski, 1999
<i>melanecta</i> (Meyrick, 1917)
<i>mexicana</i> Razowski and Becker, 2000
<i>salubricola</i> (Meyrick, 1931)
= <i>cranaodes</i> (Meyrick, 1937), new synonymy

***Bonagota salubricola* (Meyrick)**

Fig. 41

Eulia salubricola Meyrick, 1931b: 153.*Phtheochroa cranaodes* Meyrick, 1937: 149; Clarke, 1963: 32. New Synonymy.

Bonagota salubricola: Razowski, 1986: 23; Razowski and Becker, 2000: 67.

Bonagota cranaodes: Razowski, 1986: 23; Park et al., 1998: 2583; Coracini et al., 1999: 43; Eiras et al. 1999: 595; Razowski and Becker, 2000: 67.

Discussion. *Eulia salubricola* was described from one male and one female from Buenos Aires, Argentina (“unpublished” lectotype male in NHMW) and *Phtheocroa cranaodes* from a single female from Tigre, Argentina (holotype in BMNH). Although the synonymy of the two has been suspected (e.g., specimen labels by J. Clarke; unpublished studies by J. Pastrana; Razowski and Becker 2000), it has not been investigated thoroughly. In addition to the types cited above, we have examined 7 males and 5 females of *Bonagota* from Argentina (with males and females associated by collecting localities), and all are within the range of variation one would expect at the species level (Fig. 41). The females are similar to the holotype of *P. cranaodes*, and the males are similar to the lectotype of *E. salubricola*; on this basis we synonymize the two. Because *E. salubricola* has priority the correct name is *Apotomops salubricola*.

This species has become an important pest of apples in Brazil. Work on the sex pheromones has been conducted by Park et al. (1998), Coracini et al. (1999), Eiras et al. (1999), and Yadav and Reddy (2000); limited investigations on parasitoids have been reported by Querino et al. (2002).

Types. Lectotype ♂ (*salubricola*), Argentina, Buenos Aires, Aug 1920 (NHMW). Holotype ♀ (*cranaodes*), Argentina, Tigre, Mar, on *Mimosa*, F. Bourquin (BMNH).

Specimens Examined. Argentina: Buenos Aires, Aug 1920 (1♀) (NHMW). Salta, Rosaria de la Fontera, Los Baños, 6–11 Apr 1979 (4♂, 1♀), Mision Cientifica Danesa (ZMC). Buenos Aires, Río Santiago, Palo Blanco, Berisso, 3 Dec 1979 (3♂), 19 Dec 1979 (1♀), C. M. and O. Flint (USNM). Buenos Aires, Tigre, Paraná de las Palmas, 29 Oct 1979 (1♀), Mision Cientifica Danesa (ZMC). Tigre, reared from apple, Jan 1939 (1♀), J. A. Pastrana (USNM), “Comp. with type *Eulia salubricola* Meyrick = *cranaodes* Meyr. det. J. F. G. Clarke 1948.” Tigre, reared from apple 4–1940 [Apr 1940] (1♀), J. Pastrana (USNM).

Distribution. In addition to the Argentine specimens cited above, we have examined specimens referable to this species from Brazil, Paraguay, and Uruguay (Razowski and Becker 2000; USNM).

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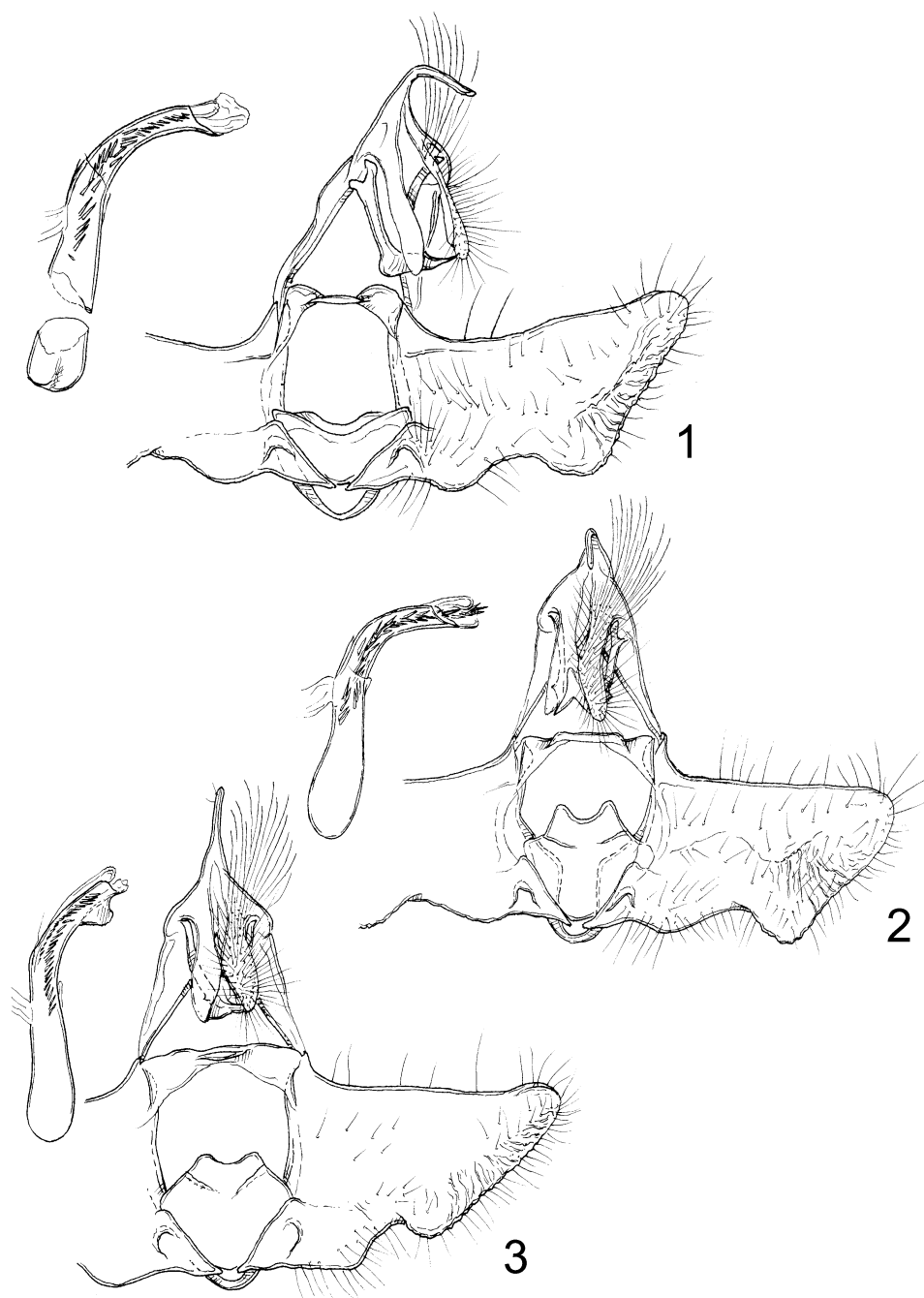
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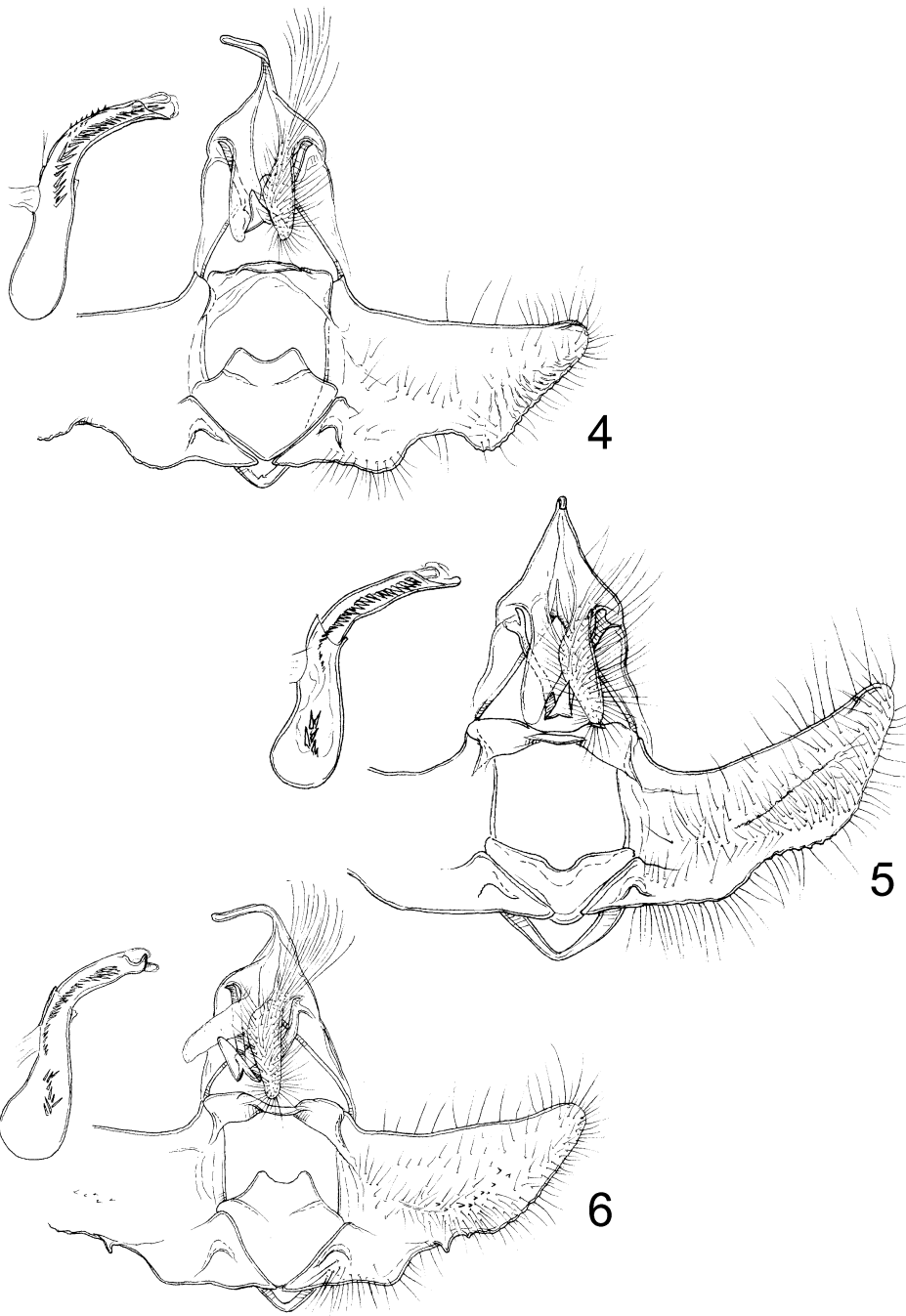
LITERATURE CITED

- Brown, J.W. (1989) Generic reassignments for Neotropical tortricid moths (Tortricidae). *Journal of the Lepidopterists' Society*, 43, 313–322.
- Brown, J.W. (1998) A new genus of tortricid moths from Chile and Argentina related to *Varifula* Razowski (Lepidoptera: Tortricidae). *Journal of the Lepidopterists' Society*, 52, 177–181.
- Brown, J.W. (2000a) A new genus of tortricid moths injurious to grapes and stone fruits in Chile (Lepidoptera: Tortricidae). *Journal of the Lepidopterists' Society*, 53, 60–64.
- Brown, J.W. (2000b) *Acmanthina*: a new genus of tortricid moths (Lepidoptera: Tortricidae) from Chile and Argentina. *Journal of the New York Entomological Society*, 108, 106–113.
- Brown, J.W. & McPherson, T. (2002) Review of *Rebinea* Razowski and *Eliachna* Razowski (Lepidoptera: Tortricidae: Euliini) — sister genera endemic to Chile and Argentina. *Journal of the Lepidopterists' Society*, 55 (2001), 129–139.
- Brown, J.W. & Passoa, S. (1998). Larval foodplants of Euliini (Lepidoptera: Tortricidae): From *Abies* to *Vitis*. *Pan-Pacific Entomologist*, 74, 1–11.
- 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.
- Butler, A. G. (1883) Heterocerous Lepidoptera collected in Chili by Thomas Edmonds, Esq. *Transactions of the Entomological Society of London*, 1883, 49–90.
- Chambon, J.-P., Basso, C. & Scatoni, I.B. (1997) Présence de *Bonagota cranaodes* (Meyrick) en Uruguay (Lep., Tortricidae). *Bulletin de la Société Entomologique de France*, 102, 455–456.
- Clarke, J.F.G. (1958) *Catalogue of the TYPE SPECIMENS of Microlepidoptera in the British Museum (Natural History) Described by Edward Meyrick*, Volume 3. Trustees of the British Museum, London. 600 pp.
- Clarke, J.F.G. (1963) *Catalogue of the Type Specimens of Microlepidoptera in the British Museum (Natural History) Described by Edward Meyrick*, Volume 4. Trustees of the British Museum, London, 521 pp.
- Coracini, M.S.A., Reckziegel, A., Bengtsson, M., Lofqvist, J., Eiras, A.E., Vilela, E.F. & Witzgall, P. (1999) Sex pheromone of the Brazilian leafroller, *Bonagota cranaodes* (Lepidoptera: Tortricidae): effect of geometric isomers on male attraction to (E,Z)-3-5-dodacadenyl acetate. *IOBC-WPRS Bulletin*, 22, 43–47.
- Eiras, A.E., Kovaleski, A., Vilela, E.F., Chambon, J.-P., Unelius, C.R., Borg-Karlson, A.-K., Liblikas, I., Mouzuraitis, R., Bengtsson, M. & Witzgall, P. (1999) Sex pheromone of the Brazilian leafroller, (*Bonagota cranaodes* Meyrick) (Lepidoptera: Tortricidae). *Zeitschrift für Naturforschung (C) Journal of Nioscience*, 54, 595–601.
- Horak, M. (1984) Assessment of taxonomically significant structures in Tortricinae (Lep., Tortricidae). *Bulletin Société Entomologique Suisse*, 57, 3–64.
- Meyrick, E. (1931a) Micro-Lepidoptera from south Chile and Argentina. *Annales Museo Nacional Historio Natural, Buenos Aires*, 36, 377–415.
- Meyrick, E. (1931b) *Exotic Microlepidoptera*, 4(5), 129–160.
- Meyrick, E. (1937) *Exotic Microlepidoptera*, 5(5), 129–160.
- Park, C. P., Gil, J. M., Sung, J.-W. & Oh, D.-Y. (1998) A concise synthesis of the sex pheromone of *Phtheochroa cranaodes* (Lepidoptera: Tortricidae). *Tetrahedron Letters*, 39, 2583–2584.
- Powell, J. A. (1986) Synopsis of the classification of Neotropical Tortricinae, with descriptions of

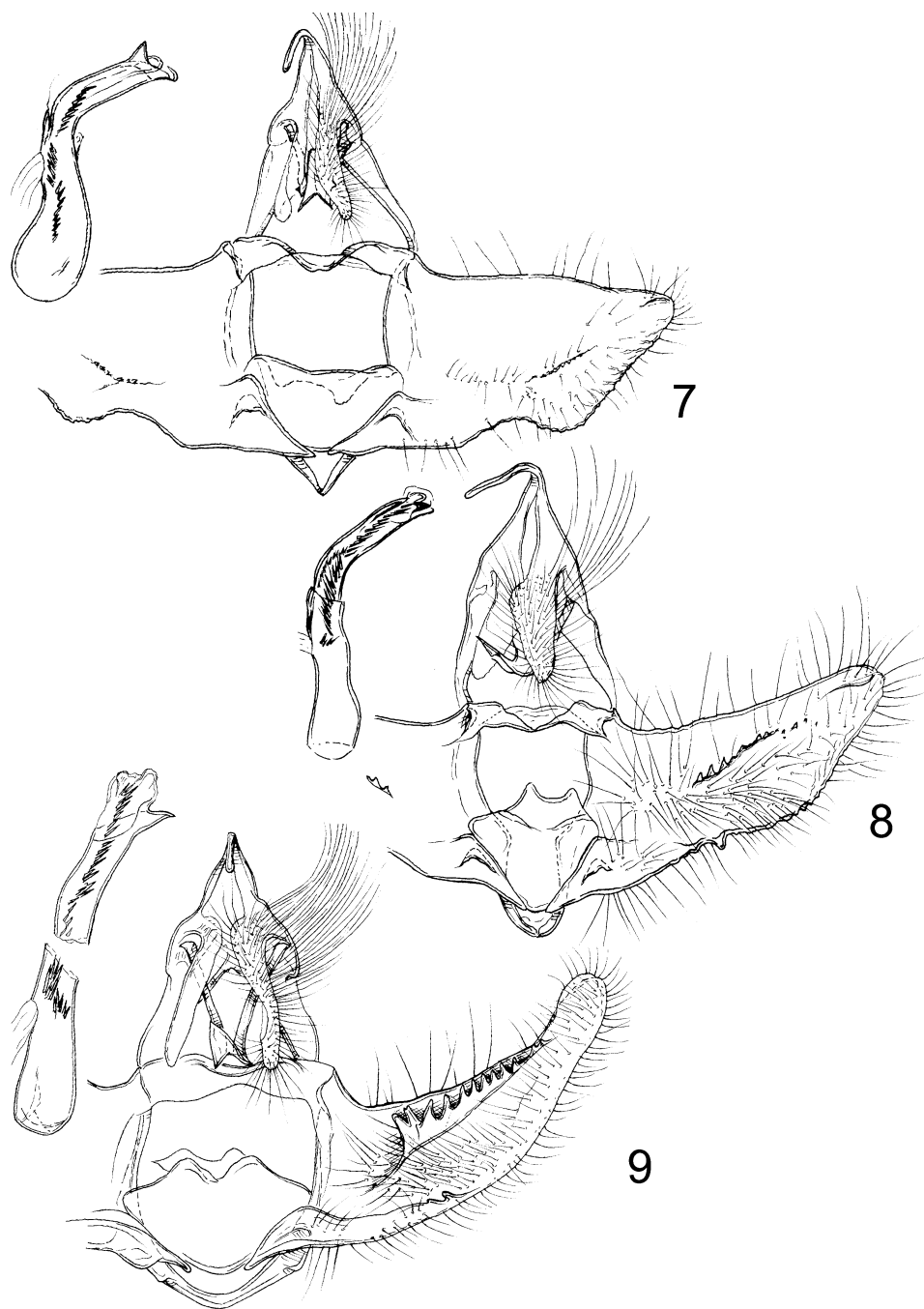
- new genera and species (Lepidoptera: Tortricidae). *Pan-Pacific Entomologist*, 62, 372–398.
- Powell, J.A., Razowski, J. & Brown, J.W. (1995) Tortricidae: Tortricinae, Chlidanotinae. In: Heppner, J. B. (ed.), *Atlas of Neotropical Lepidoptera, Checklist Part II: Hyblaeoidea - Pyraloidea - Tortricoidea*. Association for Tropical Lepidoptera, Scientific Publishers, Gainesville, Florida, pp. 138–151.
- Querino, R.B., Moraes, R.C.B. & Zucchi, R.A. (2002) Relative warp analysis to study morphological variations in the genital capsule of *Trichogramma pretiosum* Riley (Hymenoptera: Trichogrammatidae). *Neotropical Entomology*, 31, 217–224.
- Razowski, J. (1986) Descriptions of new Neotropical genera of Archipini and rectification of the *Deltinea* problem (Lepidoptera: Tortricidae). *Sciences Nat*, 52, 21–25.
- Razowski, J. (1995) *Proeulia* Clarke, 1962, the western neotropical Tortricidae genus (Lepidoptera), with descriptions of five new species and two allied genera. *Acta Zoologica Cracoviensia*, 38, 271–283.
- Razowski, J. (1999a) Tortricidae (Lepidoptera) from the Dominican Republic. *Acta Zoologica Cracoviensia*, 42, 307–319.
- Razowski, J. (1999b) Tortricidae (Lepidoptera) from Ecuador. *Acta Zoologica Cracoviensia*, 42, 321–342.
- Razowski, J. (1999c) Euliini (Lepidoptera: Tortricidae) of Chile. *Polskie Pismo Entomologiczne*, 68, 69–90.
- Razowski, J. & Becker, V.O. (2000) Revision of the New World Euliini — genus *Bonagota* Razowski, with notes on *Apotomops* Powell et Obraztsov (Lepidoptera: Tortricidae). *Polskie Pismo Entomologiczne*, 69, 65–76.
- Razowski, J. & González, R.H. (2003). Descriptions of two Chilean Euliini species (Lepidoptera: Tortricidae). *SHILAP Revista Lepidopterologia*, 31, 61–64.
- Yadav, J.S. & Reddy, E.J. (2000) Synthesis of (3E,5Z)-3,5-dodecadienylacetate, the sex pheromone of *Phtheochroa cranaodes* (Lepidoptera, Tortricidae). *Bioscience, Biotechnology and Biochemistry*, 64, 1713–1721.



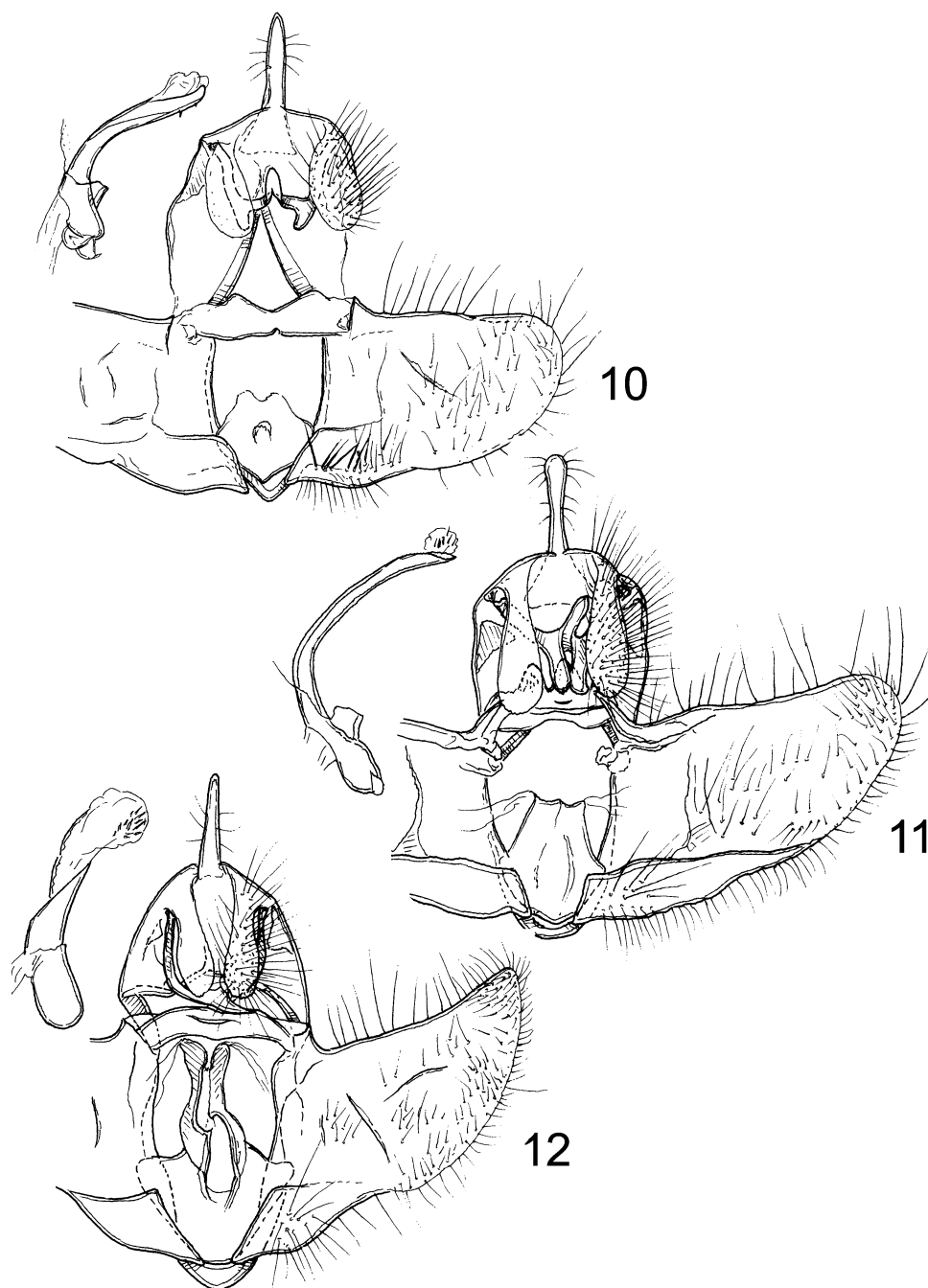
FIGURES 1–3. Male genitalia of *Ptychocroca*; valvae spread, aedeagus removed (to left of capsule). 1, *P. apenicillia*; 2, *P. nigropenicillia*; 3, *P. keelioides*.



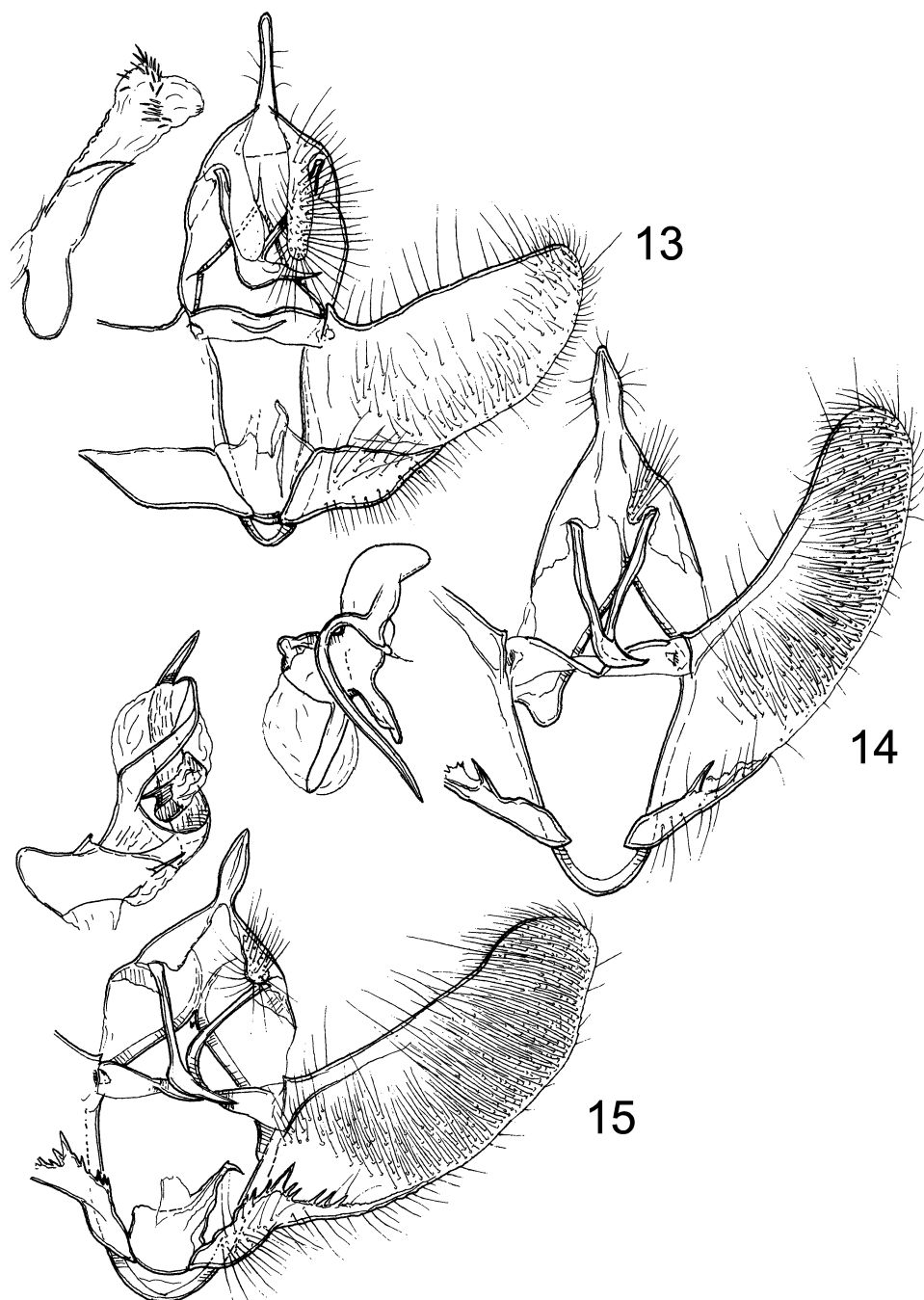
FIGURES 4–6. Male genitalia of *Ptychocroca*; valvae spread, aedeagus removed (to left of capsule). 4, *P. lineabasalidis*; 5, *P. galenia*; 6. *P. galenia*.



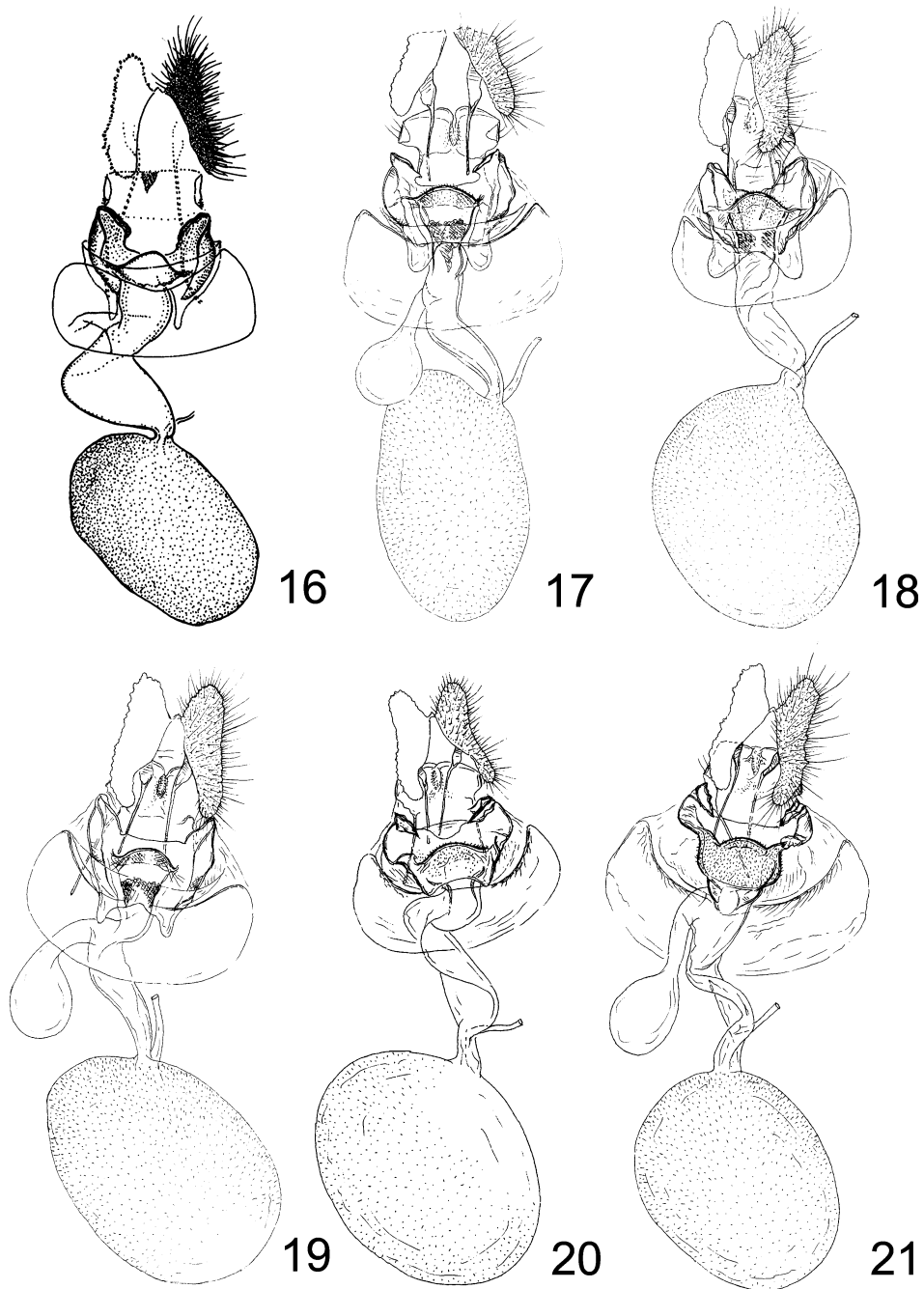
FIGURES 7–9. Male genitalia of *Ptychocroca*; valvae spread, aedeagus removed (to left of capsule, except for 9). 7, *P. simplex*; 8, *P. crocoptycha*; 9, *P. crocoptycha*.



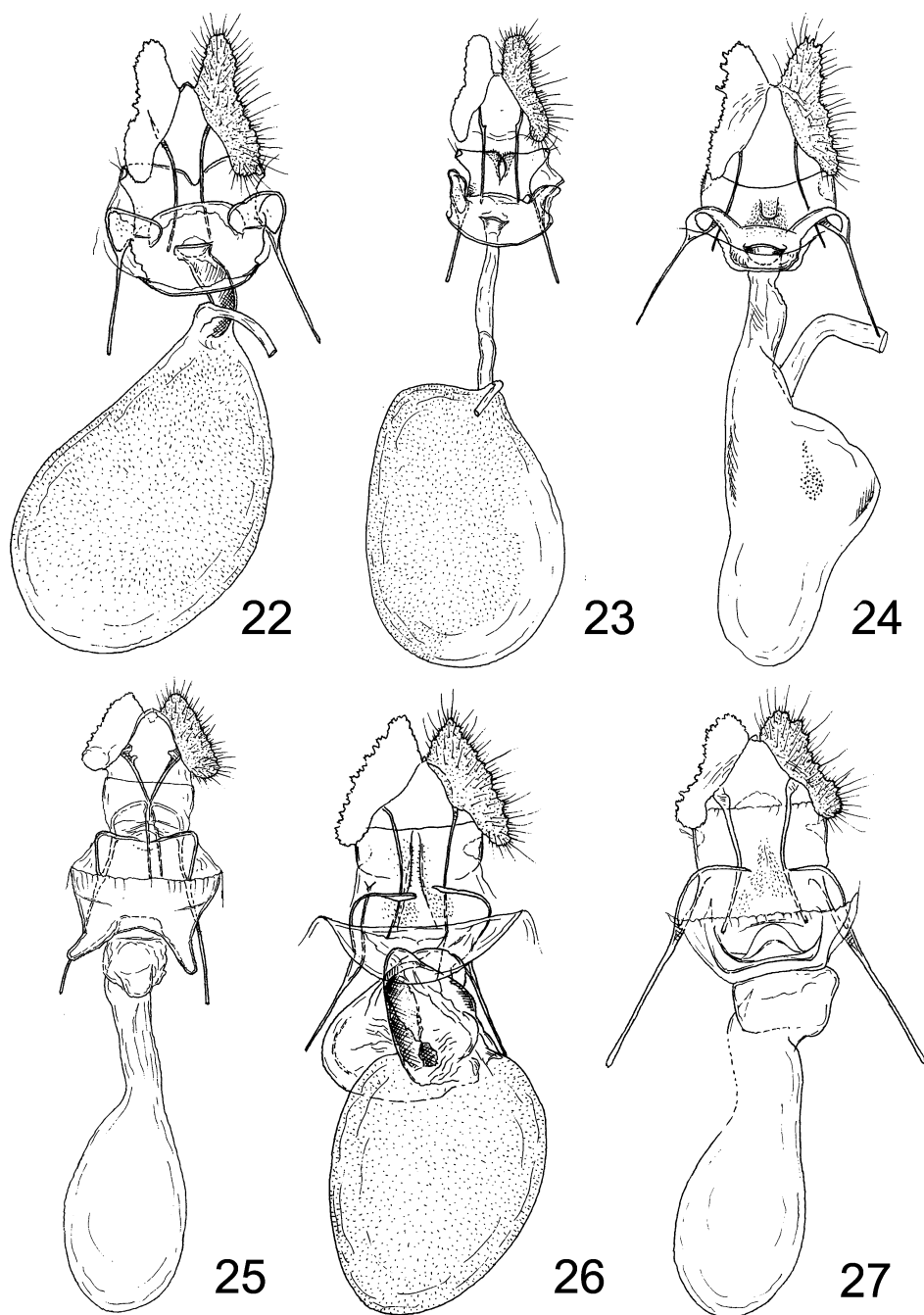
FIGURES 10–12. Male genitalia of *Haemateulia* and *Acmanthina*; valvae spread, aedeagus removed (to left of capsule). 10, *H. haematitis*; 11, *H. barrigana* 12, *A. albipuncta*.



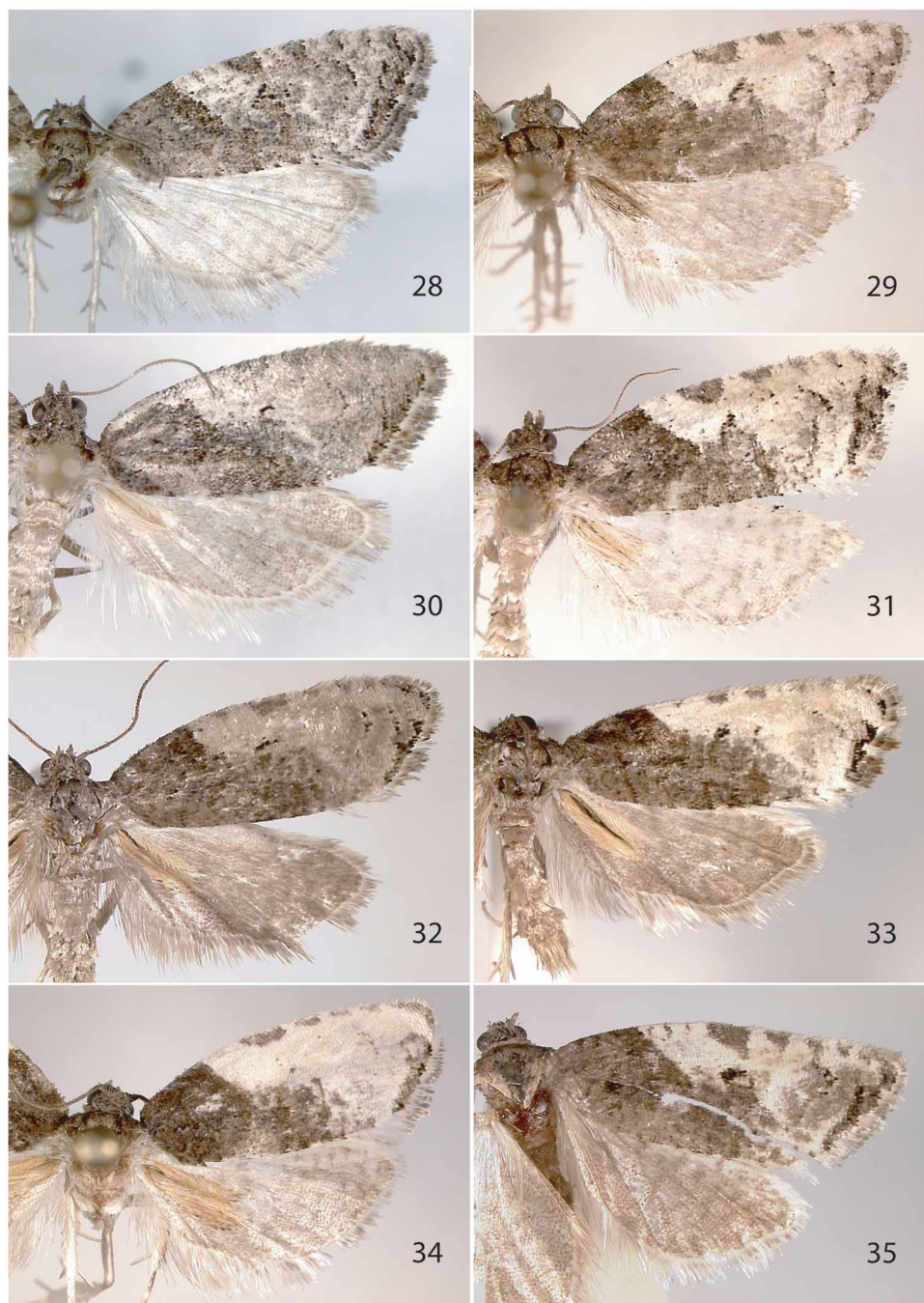
FIGURES 13–15. Male genitalia of *Acmanthina* and *Apotomops*; valvae spread, aedeagus removed (to left of capsule). 13, *Acmanthina acmanthes*; 14, *Apotomops boliviana* 15, *Apotomops spomotopa*.



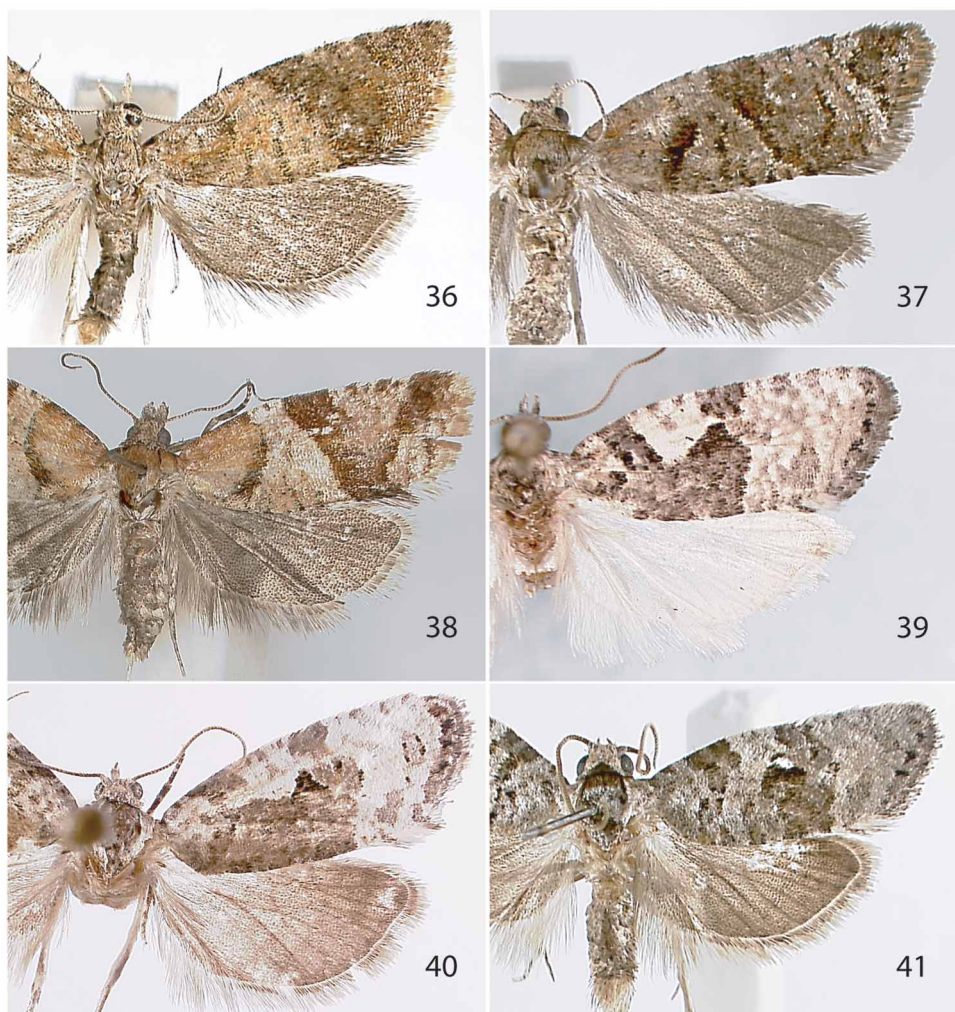
FIGURES 16–21. Female genitalia of *Ptychocroca* and *Haemateulia*. 16, *P. apenicillia*; 17, *P. nigropenicillia*; 18, *P. keelioides*; 19, *P. lineabasalis*; 20, *P. galenia*; 21, *P. crocoptycha*;



FIGURES 22–27. Female genitalia of *Haemateulia*, *Acmanthina*, *Apotomops*, and *Bonagota*. 22, *H. haematitis*. 23, *H. barrigana*; 24, *Acmanthina acmanthes*; 25, *Apotomops boliviana*; 26, *Apotomops spomotopa*; 27, *Bonagota arizonae*.



FIGURES 28–35. Adult males of *Ptychocroca*. 28, *P. apenicillia*; 29, *P. nigropenicillia*; 30, *P. keelioides*; 31, *P. lineabasalis*; 32, *P. crocoptycha*; 33, *P. crocoptycha*; 34, *P. galenia*; 35, *P. simplex*.



FIGURES 36–41. Adults of *Haemateulia*, *Apotomops*, and *Bonagota*. 36, *H. haematitis*; 37, *H. barrigana*; 38, *H. barrigana*; 39, *A. boliviana*; 40, *A. spomotopa*; 41, *B. salubricola*.