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AN ILLUSTRATED GUIDE TO THE *ORTHOCOMOTIS* DOGNIN (TORTRICIDAE) OF COSTA RICA, WITH SUMMARIES OF THEIR SPATIAL AND TEMPORAL DISTRIBUTION

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ABSTRACT. Ten species of *Orthocomotis* Dognin are reported from Costa Rica: *O. ochracea* Clarke; *O. herbacea* Clarke (=*O. subolivata* Clarke, **new synonymy**); ***O. longicilia* Brown, new species;** *O. magicana* (Zeller); *O. chaldera* (Druce); *O. herbaria* (Busck) (=*O. cristata* Clarke, **new synonymy;** = *O. uragia* Razowski & Becker, **new synonymy**); *O. phenax* Razowski & Becker; ***O. similis* Brown, new species;** *O. nitida* Clarke; and ***O. altivolans* Brown, new species.** *Orthocomotis herbacea* has been reared from avocado (*Persea americana*) and *O. herbaria* from *Nectandra hihua*, both in the Lauraceae, suggesting that this plant family may act as the larval host for other species of *Orthocomotis*. A portion of a preserved pupal exuvium associated with the holotype of *O. herbacea* suggests that the pupae of *Orthocomotis* are typical for Tortricidae, with the abdominal dorsal pits conspicuous in this stage. Adults and genitalia of all species are illustrated, and elevational occurrence is graphed. *Orthocomotis herbaria* and *O. nitida* are species of the lowlands (ca. 0–800 m); *O. altivolans* is restricted to the highest elevations (ca. 2000–3000 m); the remainder of the species occupy the middle elevations (ca. 800–1800 m). Five of the 10 species documented from Costa Rica appear to be restricted to this Central American country.

Additional key words: Neotropical, systematics, identification, elevation, morphology, biodiversity, avocado, Lauraceae.

The genus *Orthocomotis* Dognin includes 34 described species restricted to the New World tropics, ranging from central Mexico and the Caribbean (Clarke 1956, Razowski 1999) south to Argentina (Razowski & Becker 1990, Powell et al. 1995); numerous undescribed species are present in the major entomological collections worldwide. The monophyly of the group (i.e., *Orthocomotis* plus the monotypic *Paracomotis* Razowski) is well supported by the presence of paired subdorsal pits on abdominal segments 2 and 3 in both sexes (Brown 1989), a greatly expanded patch of chaetosemata that extends in a narrow band across the entire vertex of the head in both sexes (Brown 1989), a finely and densely spined anellus that is firmly attached to the dorsum of the aedeagus in the male genitalia (Razowski 1982), and dense, long scales on the dorsum of the abdomen. In contrast, the tribal assignment has remained enigmatic. Clarke (1956) treated *Orthocomotis* as a member of Tortricinae without specific tribal placement. Razowski initially considered the group as Archipini but later (Razowski 1982) transferred it to Polyorthini on the basis of the minutely spined dorsal portion of the anellus and the presence of a dorsal sclerite in the distal, membranous portion of the aedeagus. Powell (1986) assigned *Orthocomotis* and *Paracomotis* to Euliini (Tortricinae). Brown (1989) then transferred them to Schoenotenini on the basis of an unusual modification of the chaetosemata, and Razowski and Becker (1990) again argued for their placement in Polyorthini. Powell et al. (1995) followed Brown (1989) in the checklist of the Neotropical Lepidoptera, placing the group in Schoenotenini. Horak (1999) questioned this placement, stating that the absence of the band of chaetosemata in the more primitive Schoenotenini argued against the homology of the structure between *Orthocomotis* plus *Paracomotis* and the more advanced schoenotenines that possess it. Currently there is no consensus, and Horak (1999) provisionally has returned the group to Euliini.

Adults of *Orthocomotis* are relatively large and colorful; nearly all species have patches of metallic green or blue-green scales on the upper surface of the forewing. In facies and size they are similar to many large Neotropical Chlidanotini (Chlidanotinae), particularly larger species of *Auratonota* Razowski; the two genera frequently are mixed in collections of Neotropi-

TABLE 1. Diagnostic morphological characters and summary of elevational distribution. Unique features in bold.

	HW pecten	Haripencil	Cornuti	HW color	Frons	FW length ♂	FW length ♀	Cilia	Elevation
ochracea	absent	absent	large	dark brown	tan	9.6–11.0	12.3–13.3	short	1000–1750
herbacea	absent	absent	large	brown	tan	9.2–12.5	12.0–12.8	short	1000–1750
longicilia	absent	absent	medium	brown	tan	10.5–11.5	11.7	**long**	1000–2000
magicana	absent	absent	small	brown	**white**	10.1–11.0	11.0–13.0	short	500–1500
chaldera	absent	present	minute	gray	tan	**13.1–15.5**	**16.5–19.5**	short	1000–2750
herbaria	**present**	present	small	dark brown	tan	10.0–11.1	11.6–12.8	short	**0–750**
phenax	absent	present	small	brown	tan	10.5–11.2	12.4–12.8	short	500–1750
similis	absent	present	small	dark brown	tan	10.5–12.5	12.5–16.0	short	1000–1750
nitida	absent	present	**absent**	dark brown	tan	9.7–10.1	11.6–12.5	short	**0–750**
altivolans	absent	present	**absent**	**white**	tan	12.0–13.5	13.3–15.0	short	**2250–3000**

cal Tortricidae. However, adults of *Orthocomotis* always can be separated from similar appearing taxa by the conspicuous band of chaetosemata mentioned above.

Although the genus is widely distributed throughout the New World tropics, little is known of the biology or the temporal and geographic distributions of the species. One species has been recorded from avocado (*Persea americana* Mill.; Lauraceae) on at least two occasions in Costa Rica and a second from *Nectandra hihua* (Ruiz & Pav.) Rohwer (Lauraceae) once, suggesting that other species of *Orthocomotis* may use Lauraceae as well. No other hosts are known for the genus. The relatively thorough sampling of the genus in Costa Rica provides the opportunity to examine spatial and temporal distributions of species in this country. The purposes of this paper are to present a survey of the genus in Costa Rica, provide illustrations of adults and genitalia to facilitate identifications, resolve a number of taxonomic difficulties, identify preliminary temporal and geographic distributions of the species in Costa Rica, and describe three new species that appear to be restricted to Costa Rica.

MATERIALS AND METHODS

Specimens of *Orthocomotis* from Costa Rica were borrowed from or examined at the following institutions: BMNH, The Natural History Museum, London, England; INBio, Instituto Nacional de Biodiversidad, Santo Domingo de Heredia, Costa Rica; UCB, Essig Museum of Entomology, University of California, Berkeley, California, U.S.A.; USNM, National Museum of Natural History, Washington, D.C., U.S.A.; and VBC, Vitor Becker personal collection, Planaltina, Distrito Federal, Brazil.

Specimens were sorted by forewing pattern and sex. The resulting groups then were examined for differences in male and female genitalia, which have been shown to provide the most reliable morphological features for distinguishing among related species of Tortricidae. Types of all species were examined to verify identifications. Preparation of genitalia follows the methodology summarized in Brown and Powell (1991). Because of the large size of *Orthocomotis* adults, an attempt was made to evert the vesica of the aedeagus by extracting it from the distal end with a pair of fine forceps. Adult specimens were examined using a Wild M3Z™ dissecting microscope; genitalia were examined using the dissecting microscope and a Zeiss™ compound microscope. Illustrations of genitalia were drawn with the aid of a Ken-A-Vision™ microprojector (model X1000-1). Unless indicated otherwise, genitalia illustrations are of a single preparation. Text descriptions of all taxa are composite, based on all available specimens. Measurements of forewing were made with the aid of an ocular micrometer mounted in a dissecting microscope under low power (×10–16). Forewing length was measured in a straight line from the base of the wing to the apex, including the fringe.

Terminology for wing venation and genitalia structures follows Horak (1984). Abbreviations and symbols are as follows: HT = holotype; PT = paratype; ca. = circa (approximately); n = number of individuals examined; $\bar{x}$ = arithmetic mean; N, E, S, W = compass points; P.N. = Parque Nacional; Est. Biol. = Estación Biológica; Fca. = Finca; ALAS = Arthropods of La Selva (parataxonomists). In the "specimens examined" sections, months of the year are abbreviated using the first three letters.

A histogram illustrating elevational occurrence was developed for each species based on the available label data. The number of specimens collected at intervals of 250 m, starting at sea level (i.e., 0–250, 250–500, 500–750, etc.), was tallied. Where ranges in elevation are given on the specimen labels (e.g., 1400–1700 m), 0.5 specimen was used for each of the two elevation categories (i.e., 0.5 specimen for the 1400–1650 m category, and 0.5 specimen for the 1650–1900 m category). A comparable method was used for species that were collected at the category "break-point" (i.e., 250 m, 500 m, etc.).

TABLE 2. Species distribution by province. ALA = Alajuela; CAR = Cartago; GUA = Guanacaste; HER = Heredia; LIM = Limón; PUN = Puntarenas; SAN = San José.

Species	Provinces	# of provinces
ochracea	ALA, CAR, HER, PUN	4
herbacea	CAR, GUA, HER, PUN, SAN	5
longicilia	ALA, CAR, GUA, HER, PUN, SAN	6
magicana	ALA, CAR, GUA, HER, PUN	5
chaldera	CAR, GUA, HER, PUN, SAN	5
herbaria	ALA, GUA, HER, LIM, PUN, SAN	6
phenax	GUA, HER, PUN, SAN	4
similis	CAR, GUA, SAN	3
nitida	ALA, GUA, HER, LIM, PUN	5
altivolans	ALA, CAR, HER, LIM, SAN	5

A brief list of morphological characters useful in distinguishing the species is presented in Table 1; details are presented below. For most species, comparison with the photographs of adults (Figs. 1–12) will provide accurate identifications, which can be confirmed using Table 1. For worn or damaged specimens, genitalia dissections usually are required, and comparison with the illustrations of genitalia should provide accurate determinations.

Table 1 includes nine of the most conspicuous features for distinguishing the species of *Orthocomotis* treated herein. Hindwing pecten ("HW pecten") refers to a dense row of somewhat stiff, erect scales at the base of the hindwing along vein CuP. This character separates *O. herbaria* from all other species. "Hairpencil" refers to the presence of a dense fascicle of elongate scales that extends from the metathorax to an unusual lateral pouch bearing scent scales in the second abdominal segment in males only. This character may define a species group within *Orthocomotis*; it is present in 6 of the 10 species treated. "Cornuti" refers to the size of cornuti in the vesica of the aedeagus in the male genitalia. Although the categories are qualitative (large, medium, small), the cornuti of *O. ochracea* and *O. herbacea* are comparatively long, needle-like spines, while those of most other species are short and thorn-like, less than half as long as those of *O. ochracea* and *O. herbacea*; the cornuti are absent nearly altogether in *O. nitida* and *O. altivolans*. Hindwing color ("HW color") refers to the color of the scales on the dorsal surface of the hindwing. While the categories (gray, brown, dark brown, white) are somewhat subjective, the hindwing of *O. herbaria*, *O. nitida*, *O. similis*, and *O. ochracea* is darker than that of other species, and the hindwing of *O. altivolans* is nearly white. "Frons" refers to the color of the scaling on the upper portion of the frons, which is variable: tan, cream, or brownish. However, two species are relatively distinct in this feature: the frons of *O. magicana* is white and that of *O. nitida* is bicolored (yellow and red-brown). Forewing length ("FW length ♂" and "FW length ♀") provides a general range to help distinguish relatively large from relatively small species. "Cilia" refers to the relative length of the cilia from the male antenna. It is moderately uniform and short (ca. 0.4–0.6 times the diameter of the flagellomere) in all species except *O. longicilia*, which has conspicuously longer cilia (ca. 1.0–1.2 times the diameter of the flagellomere). "Elevation" refers to the general range in elevation (excluding outliers) occupied by each species based on collection records. While most species occupy a relatively broad elevational range, *O. herbaria* and *O. nitida* are clearly species of the lowland, and *O. altivolans* is restricted to the highest elevations.

Table 2 presents data on the spatial distribution of Costa Rican *Orthocomotis* species by Province. No single species has been recorded from all seven provinces, and no province supports more than 8 of the 10 known species of *Orthocomotis*. Eight species are known from Guanacaste, Heredia, and Puntarenas provinces, 7 species from Cartago and San José provinces, 6 species from Alajuela Province, and three species from Limón Province. Of the 10 species of *Orthocomotis* documented from Costa Rica, five appear to be restricted to Costa Rica.

SPECIES ACCOUNTS

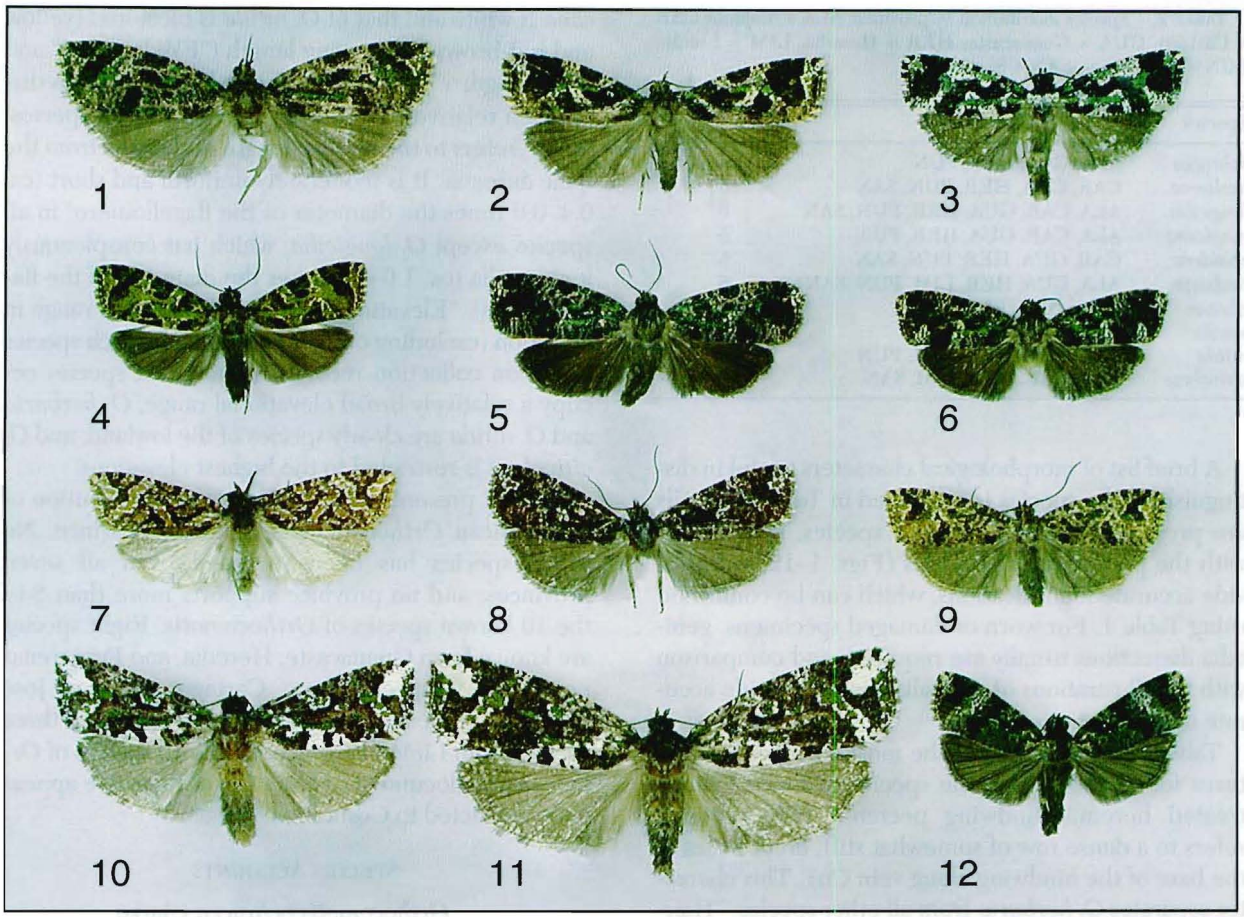
Orthocomotis ochracea Clarke (Figs. 8, 13, 23, 33)

Orthocomotis ochracea Clarke, 1956:144; Razowski & Becker 1990:350.

Holotype ♀, Costa Rica, Cartago Province, Juan Viñas, Wm. Schaus, USNM.

Diagnosis. The absence of the male abdominal hairpencil and the presence of a patch of large cornuti in the vesica of the aedeagus (Fig. 13) suggest that *O. ochracea* may be most closely related to *O. herbacea* (Fig. 14). The male genitalia are characterized by extremely broad, pendant socii and a short, wide, hook-shaped distal portion of the gnathos. *Orthocomoits ochracea* is distinguished superficially from all other congeners by the red-brown forewing reticulation, the darker brown hindwing, and the comparatively small forewing size of males (Table 1).

Specimens examined. Alajuela Province: Río Sarapiquí, 6 air km S San Miguel, 800 m, 7 Jun 1988 (1 ♂), J. Brown & J. Powell (UCB). Río Sarapiquí, 2 km SE Casablanca, 700 m, 28 Mar 1992 (1 ♂), J. McCarty & J. Powell (UCB). **Cartago Province:** Turrialba, Monumento Nacional Guayabo, 1100 m, Jul 1994 (1 ♂), Sep 1994 (1 ♂), G. Fonseca (INBio). Río Aquiares, nr Santa Cruz, 9 km NW Turrialba, 1500 m, 31 May 1985 (1 ♂), J. Powell (UCB). Paraíso, P.N. Tapantí-Macizo de la Muerte, 300 m N & 100 m W Mirador, 1350 m, Jan 2000 (2 ♂), R. Delgado (INBio). Paraíso, P.N. Tapantí, Sect. La Represa, 300 m SE Puente del Río Porras, 1660 m, Sep 1999 (1



FIGS. 1–12. Adults of *Orthocomotis*. **1,** *O. similis* (♀); **2,** *O. herbacea* (♀); **3,** *O. magicana* (♂); **4,** *O. nitida* (♂); **5,** *O. herbaria* (♀); **6,** *O. herbaria* (♂); **7,** *O. altivolans* (♂); **8,** *O. ochracea* (♀); **9,** *O. longicilia* (♂); **10,** *O. chaldera* (♂); **11,** *O. chaldera* (♀); and **12,** *O. phenax* (♂).

♂), R. Delgado (INBio). Tapantí, Río Grande de Orosi, 1300–1400 m, 9°46′N, 83°50′W, 23 Jan 1985 (1 ♀), D. Janzen & W. Hallwachs (INBio). Juan Viñas, [no date] (HT ♂), Wm. Schaus (USNM). **Heredia Province:** El Angel Waterfall, 8.2 km downhill Vara Blanca, 1350 m, 5 Aug 1981 (1 ♀), D. Janzen & W. Hallwachs (INBio). 16 km SSE La Virgen, 10°16′N, 84°05W, INBio-OET-ALAS transect, 1050–1150 m, 12 Feb 2001 (2 ♂), M. Epstein (INBio), 15–21 Mar 2001 (1 ♂), 18 Mar 2001 (1 ♂), D. Wagner & J. Rota (INBio), 10 Apr 2001 (1 ♂), blacklight trap, 11 Apr 2001 (1 ♂), 12 Apr 2001 (1 ♂), 13 Apr 2001 (1 ♂), D. Davis (INBio), 17 Apr 2001 (2 ♂), J. Brown (INBio). **Puntarenas Province:** Est. Biol. Las Alturas, 12 air km NE San Vito, 1550 m, 22–24 Jan 1993 (3 ♂), J. Powell (UCB). Coto Brus, Est. Biol. Las Alturas, 1550, 15–24 Mar 1999 (5 ♂, 1 ♀), G. Rodríguez (INBio). Coto Brus, Zona Prot. Las Tablas, Est. Biol. Las Alturas, 1550 m, 16–23 Mar 1999 (3 ♂), E. Phillips (INBio). A.C.L.A.P. Coto Brus, Zona Prot. Las Tablas, Est. Biol. Las Alturas, 1550 m, 15–24 Mar 1999 (3 ♂), R. Delgado (INBio). Fca. Cafrosa, Est. Las Mellizas, P.N. Amistad, 1300 m, Jan 1991 (1 ♂), M. Chavarría & G. Mora (INBio). Las Cruces, nr San Vito, 24 Apr 1965 (1 ♂), S. S. & W. D. Duckworth (USNM). **Unknown Province:** Palo Verde, 5200′, ".20" [1920] (1 ♂), [no collector] (BMNH).

Geographic and temporal distribution. *Orthocomotis ochracea* is known only from Costa Rica where it ranges from about 700 to 1500 m (Fig. 33) in the central and western portions of the country. It has been collected in January (n = 7), February (n = 2), March (n = 16), April (n = 5), May (n = 1), June (n = 1), July (n = 1), August (n = 1), and September (n = 2).

Remarks. This species was described from a single female erroneously identified as a male. Associated with the holotype female is a slide which has the male genitalia of *O. chaldera*. Based on the incorrectly associated slides, Clarke (1956) concluded that "The male genitalia of *ochracea* and *chaldera* are almost indistinguishable . . ." Actually, the male genitalia are most similar to those of *O. longicilia*.

Orthocomotis herbacea Clarke
(Figs. 2, 15, 24, 34)

Orthocomotis herbacea Clarke, 1956:151.

Holotype ♂ (*herbacea*), Costa Rica, San José Province, San Pedro de Montes de Oca, ex-larva, 22 Dec 1932, em: 15 Jan 1933, r.f. avocado [*Persea americana*], C. H. Ballou, USNM.

Orthocomotis subolivata Clarke, 1956:148; Razowski & Becker 1990:350, **new synonymy**

Holotype ♂ (*subolivata*), Costa Rica, Tuis, 5800′ [elevation probably in error; Tuis is ca. 2400′], 28 Aug 1908, Wm. Schaus, USNM.

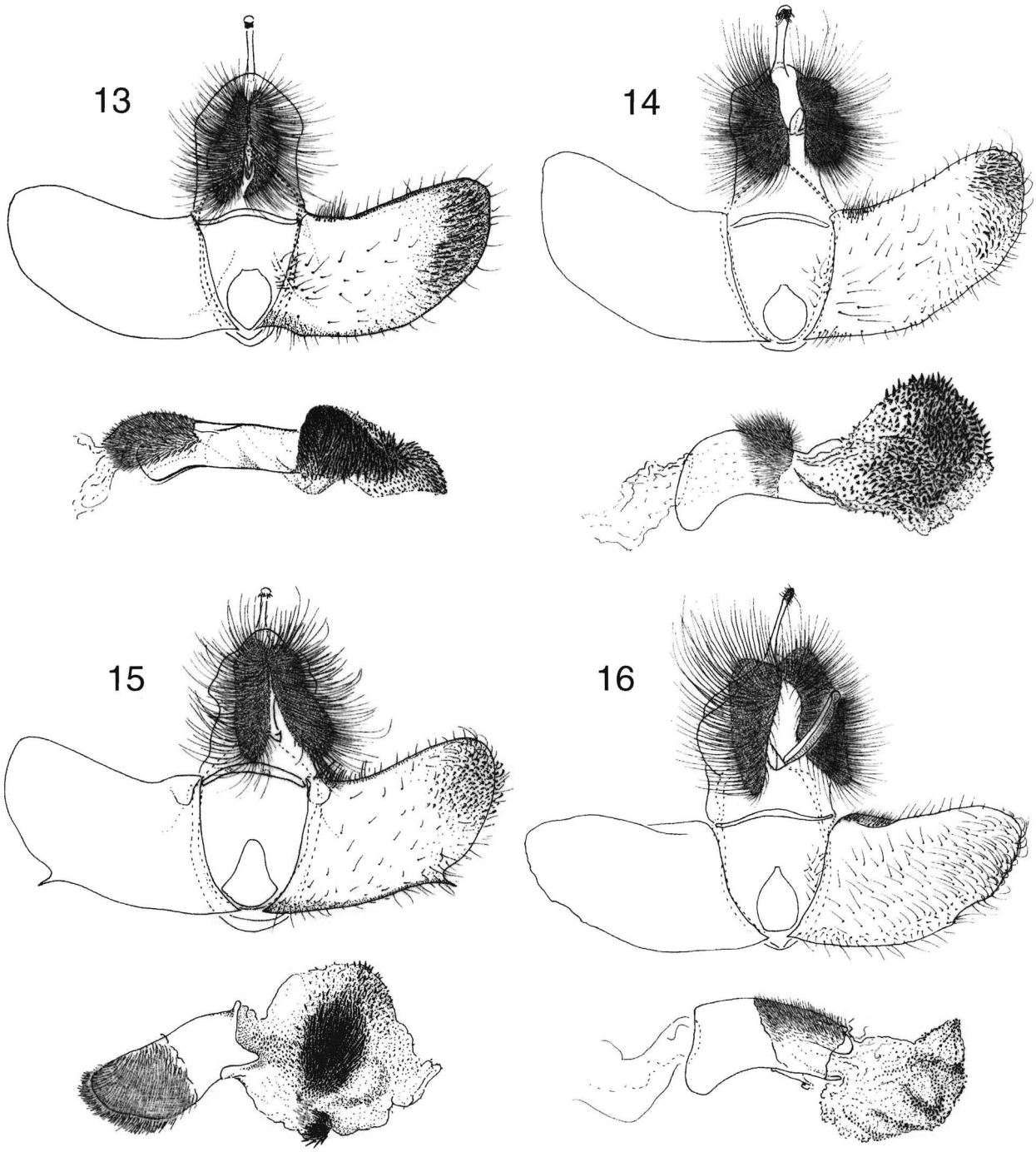
Diagnosis. The forewing pattern (Fig. 2), with a large dark brown or black patch in the distal third of the wing and a distinct, small, dark brown semicircular patch near the middle of the costa, distinguishes *O. herbacea* from other species, except possibly *O. magicana*, which has considerably more greenish metallic scaling. The triangular process representing the termination of the sacculus in the male genitalia of *O. herbacea* is extremely variable, ranging from a rounded nub to an elongate spine. The illustration in Fig. 15 represents the extreme in spine development; an additional illustration can be found in Clarke (1956) for *O. subolivata*. The aedeagus of *O. herbacea* is characterized by an extensive patch of large spinelike cornuti, similar to that of *O. ochracea*.

Specimens examined. Cartago Province: R. Grande de Orosi, desde Puente Río Dos Amigos, hasta la represa, 1400–1800 m, Mar 1996 (1 ♂), R. Delgado (INBio). Monumento Nacional Guayabo, 1100 m, Oct 1994 (1 ♂), G. Fonseca (INBio), Jul 1994 (1 ♂), G. Fonseca (INBio). Paraíso, P.N. Tapantí, Sect. La Represa, 300 m SW Puente del Río Porras, 1660 m, May 1999 (1 ♂), Nov 1999 (2 ♂), R. Delgado (INBio). Paraíso, P.N. Tapantí-Macizo de la Muerte, 300 m SE Río Porras, 1660 m, Jan 2000 (6 ♂), Feb 2000 (2 ♂), May 2000 (4 ♂), Jun 2000 (2 ♂), Nov 2000 (1 ♂), Aug 2001 (1 ♂), R. Delgado (INBio). Paraíso, P.N. Tapantí, Sect. La Represa, 300 m SW Puente del Río Porras, 1660 m, Feb 2000 (1 ♀), May 1999 (1 ♂), Nov 1999 (1 ♂), Aug 2001 (1 ♂), Nov 2001 (3 ♂), R. Delgado (INBio). Paraíso, P.N. Tapantí-Macizo de la Muerte, 300 m N & 100 m W del Mirador, 1350 m, Jan 2000 (1 ♂), R. Delgado (INBio). P.N. Tapantí-Macizo de la Muerte, Est. Quebrada Segunda, al costado Ofic., 1200 m, Dec 1999 (1 ♂), R. Delgado (INBio). P.N. Tapantí, Est. Quebrada Segunda, 1200 m, Oct 2000 (1 ♀), R. Delgado (INBio). Turrialba, Tayutic, P.N. Barbilla, Sector Cerro Tigre, 1617 m, Jan 2002 (1 ♂), L. Chavarría (INBio). Tapantí, 1200–1700 m, 20 Aug–15 Sep 1999 (4 ♂, 1 ♀), V. Becker (VBC). P.N. Tapantí, 1200–1700 m, 20 Aug–15 Sep 1999 (5 ♂), V. Becker (USNM). Tapantí, 1500 m, 30–31 Aug 2000 (3 ♂), V. Becker (VBC). Santa Cruz, Turrialba, 1500 m, Aug 1981 (1 ♀), V. Becker (VBC). Volcán Turrialba, 1800 m, 13 Aug 1972 (1 ♂), V. Becker (VBC). Villa Mills, 2840 m, 26–28 Oct 2000 (1 ♂), V. Becker (VBC). Tuis, 5800′ [elevation probably in error; Tuis is ca. 2400′], 28 Aug 1908 (HT ♂ of *subolivata*), W. Schaus (USNM). **Guanacaste Province:** Est. Cacao, S side Volcán Cacao, P.N. Guanacaste, 1000–1400 m, 8–29 Jul 1991 (1 ♂), C. Chaves (INBio). Est. Cacao, 1100 m, 17–18 Feb 1995 (1 ♂), E. Alfaro (INBio). Sector Las Pailas, 4.5 km SW Volcán Rincón de la Vieja, 800 m, 24 Jun–10 Jul 1995 (1 ♂), 23 Jul–6 Aug 1995 (1 ♂), K. Taylor (INBio). Sector Las Pailas, P.N. Rincón de la Vieja, 1400 m, 6–26 Jun 1994 (1 ♂), K. Taylor (INBio). Faldas, SW Volcán Cacao, 1150–1250 m, Jun 1996 (1 ♂), I. Villegas & C. Moraga (INBio). Derrumbe, Est. Mengo, W side Volcán Cacao, 1400 m, 5 Jun 1988 (1 ♂), 11 Jul 1988 (1 ♀), D. Janzen & W. Hallwachs (INBio). **Heredia Province:** El Angel Waterfall, 8.2 km downhill Vara Blanca, 1350 m, 3 Jan 1981 (2 ♀), D. Janzen & W. Hallwachs (INBio). Mount Poás [2350 m], [no date] (PT ♂ of *herbacea*), W. Schaus (USNM). 16 km SSE La Virgen, 10°16′N, 84°05′W, INBio-OET-ALAS transect, 1050–1150 m, 12 Feb 2001 (1 ♂), M. Epstein (INBio). 6 km ENE Vara Blanca, Braulio Carrillo Nat. Park, 10°11′N, 84°07′W, INBio-OET-ALAS transect, 2000 m, 14 Feb 2002 (1 ♀), 16 Feb 2002 (2 ♂), 19 Feb 2002 (1 ♂), 20 Feb 2002 (1 ♂), J. Brown & J. Powell (INBio). 6 km ENE Vara Blanca, 2000 m, 7 Oct 2002 (1 ♂), K. Nishida, MV light (USNM). Cerro Chompipe, Res. Biol. Chompipe, R. F. Cord. Vol. Cent., 2100 m, 11 Jul 1991 (1 ♂), J. F. Corrales (INBio). **Puntarenas Province:** Est. Pittier, 1670 m, 22 Sep–9 Oct 1995 (1 ♂), M. Moraga (INBio), 23 Aug–13 Sep 1995 (2 ♂), 23–27 Oct 1995 (1 ♂), 26 Sep–10 Oct 1995 (1 ♂), E. Navarro (INBio). Sector Altamira, 1 km S Cerro Biolley, A.C. Amistad, 1300 m, 2–20 Apr 1995 (1 ♂), L. Angulo (INBio). Las Cruces, nr. San Vito, 19–20 Mar 1965 (1 ♂), 24 Apr 1965 (1 ♂, 1 ♀), S. S. & W. D. Duckworth (USNM). Fca. Cafrosa, Embalse, N Tigra, 800 m, 13–21 May 1996 (1 ♂), E. Navarro (INBio). Est. Biol. Las Cruces, 6 km SE San Vito, Río Jaba, 1150 m, 20–21 Jan 1993 (1 ♂), J. Powell (UCB). Buenos Aires, La Amistad, Sector Altamira, Nov 1993 (1 ♂, 1 ♀), R. Delgado (INBio). Est. Altamira, Buenos Aires, 15 Sep–14 Oct 1993 (1 ♀), R. Delgado (INBio). A.C.L.A.P. Coto Brus, Zona Prot. Las Tablas, Est. Las Alturas, 1550 m, 16–23 Mar 1999 (3 ♂), M. Moraga (INBio), 16–23 Mar 1999 (1 ♂), E. Phillips (INBio). Coto Brus, Est. Las Alturas, 1550 m, Aug 1991 (1 ♂), M. Ramírez (INBio), Oct 1997 (1 ♂), B. Gamboa (INBio), 15–24 Mar 1999 (1 ♂), G. Rodríguez (INBio). Est. Biol. Las Alturas, 1500 m, Aug 1991 (2 ♂), M. Ramírez (INBio), 1540 m, 28–30 Oct 1997 (1 ♂), B. Gamboa (INBio). Est. Biol. Las Alturas, 12 air km SE San Vito, 1550 m, 22–24 Jan 1993 (9 ♂) J. Powell (UCB). Monteverde, 1500 m, 29–30 Jul 1978 (1 ♀), 10–11 Dec 1979 (1 ♂), D. Janzen (INBio), 15–16 May 1980 (1 ♂), D. Janzen & W. Hallwachs (INBio), 1–4 Sep 1999 (3 ♂) V. Becker (VBC), 1–4 Sep 1999 (1 ♂), V. Becker (USNM). Las Nubes, 11 km NW Monteverde, 10–11 Dec. 1979 (1 ♂), D. Janzen (INBio), 31 Jul 1981 (1 ♀), D. Janzen & W. Hallwachs (INBio). Fila Esquinas, 35 km S Palmar Norte, 8°45′N, 83°20′W, 150 m, 7–8 Jan 1983 (1 ♀), D. Janzen & W. Hallwachs (INBio). **San José Province:** San Gerardo de Dota, 7200–7500′, 20 Feb 1996 (1 ♂), D. & J. Powell (UCB). Est. Zurquí (el Tunel), P.N. Braulio Carrillo, 1500 m, 10°04′N, 84°01′W, Nov 1985 (1 ♂), I. & A. Chacón (INBio). Est. Santa Elena, Viejo, Santa Elena, Las Nubes, 1210 m, 21–24 Nov 1995 (1 ♂), E. Alfaro (INBio). San Pedro de Montes de Oca, ex-larva, 22 Dec 1932, em: 15 Jan 1933 (HT ♂ of *herbacea*), r.f. avocado [*Persea americana*], C. H. Ballou (USNM).

Geographic and temporal distribution. This species ranges from Guatemala (VBC) south through Costa Rica to Ecuador (VBC). In Costa Rica it is known from P.N. Guanacaste to Juan Viñas, from ca. 800 to ca. 2840 m elevation, with the majority of specimens from 1200–1700 m (Fig. 34). Captures range throughout the year: January (n = 22), February (n = 5), March (n = 7), April (n = 3), May (n = 8), June (n = 6), July (n = 6), August (n = 5), September (n = 6), October (n = 5), November (n = 7), and December (n = 1).

Orthocomotis herbacea has been reared twice in Costa Rica from avocado (*Persea americana*; Lauraceae). The anterior portion (head, thorax, and abdominal segments 1–3) of a pupal exuvium is pinned beneath the reared holotype. From the exuvium it is clear that the abdominal dorsal pits are conspicuous on the pupa, as in other genera that possess dorsal pits in the adult stage (e.g., *Amorbia* Clemens, *Archips* Hübner), and the rows of dorsal spines on the abdomen are typical for Tortricidae, at least on segment 3.

Remarks. *Orthocomotis subolivata* was described from a single male that is almost certainly conspecific with *O. herbacea*. It is likely that Clarke (1956) did not recognize this because of the paucity of material and mislabeled slides (see remarks under *O. herbaria* below). The male genitalia figured in Clarke (1956) as *O. herbacea* belong to a different species.



FIGS. 13–16. Male genitalia of *Orthocomotis* with valvae spread, aedeagus removed and shown in lateral aspect, and vesica everted. **13,** *O. ochracea*; **14,** *O. longicilia*; **15,** *O. herbacea*; **16,** *O. magicana*.

***Orthocomotis longicilia* Brown, new species**
(Figs. 9, 14, 25, 35)

Diagnosis. Superficially, *O. longicilia* can be distinguished from other species of *Orthocomotis* by its forewing pattern and color, with considerably less metallic pale green overscaling. Males are distinguished from congeners by the conspicuously longer antennal cilia (1.0–1.2 times the width of the flagellomere). The stout, strong, thorn-like cornuti of the aedegus are somewhat intermediate between the long spine-like cornuti of *O. herbacea* and *O. ochracea* and the smaller thorns of *O. chaldera* and *O. magicana*.

Description. Male. Head: Upper frons light beige with red brown, lower frons dingy whitish. Labial palpus light beige on inner

surface, pale brown on outer surface. Antenna with elongate cilia, 1.0–1.2 times width of flagellomere. **Thorax:** Light beige with red brown, with small patch of white scales at posterior end of dorsal tuft. Metathorax without hairpencil. Forewing length 10.5–11.5 ($\bar{x}$ = 11.2; n = 8) (Fig. 9); ground color whitish, in fresh specimens entirely overscaled with irregular patches of gold and steel gray which are lost when worn; pattern elements dark reddish brown, overscaled with metallic green; a pair of faint, parallel, oblique fascia from costa near base, the outer of which bends 90° at discal cell, extending toward apex; a small semicircular patch near mid-costa; a narrow, sinuate band in apical portion of subtermen; a dash from near mid-dorsum extending toward middle of costa, reaching ca. halfway across wing. Hindwing dark brown. **Abdomen:** Densely clothed with long, fine, pale brown scales; second segment without lateral pouches; dorsum of segments 2 and 3 with paired subdorsal pits. Genitalia as in Fig. 14 (drawn from JWB slide 1269; n = 5). Uncus slightly expanded and weakly flattened in distal two-fifths, with dense patch of fine hairs from venter in apical one-fourth. Socius large, pendant, with limited lobe dorsad of attachment. Gnathos simple, narrow, with relatively short pointed process at distal junction of arms. Transtilla a simple slender arch. Valva relatively broad, nearly parallel-sided, gently arched dorsad throughout, densely covered with short scales in distal one-half of inner side; costa differentiated; sacculus not developed. Aedeagus short, stout, curved immediately distad of ductus ejaculatoris; vesica densely covered with large, thornlike cornuti.

Female. Head and thorax: Essentially as described for male. Forewing length 11.7 mm (n = 1); pattern as described for male. **Abdomen:** Densely clothed with long, fine, pale brown scales; second segment without lateral pouches; dorsum of segments 2 and 3 with paired subdorsal pits. Genitalia as in Fig. 25 (drawn from JWB prep. 1287; n = 1). Sterigma unsclerotized; ostium large, rounded. Ductus bursae extremely short. Corpus bursae ovoid, with broad wrinkles; slender accessory bursae arising near junction with ductus bursae; spicules absent.

Holotype ♂, Costa Rica, Cartago Province, Tapantí, 1200–1700 m, 20 Aug–15 Sep 1999, V. O. Becker (USNM).

Paratypes. COSTA RICA: **Alajuela Province:** Río Saripiqui, 6 air km S San Miguel, 800 m, 7 Jun 1988 (1 ♂), J. Brown & J. Powell (UCB). **Cartago Province:** Río Grande de Orosi, Puente Río Dos Amigos, hasta represa, 1400–1800 m, 22 Aug–15 Sep 1995 (1 ♂), R. Delgado (INBio). Paraíso, P.N. Tapantí, Sector La Represa, 300 m S del Puente del Río Porras, 1660 m, Jun 2000 (1 ♂), Jul 2002 (1 ♂), R. Delgado (INBio), Jul 1999 (1 ♂), Feb 2000 (2 ♂), L. Chavarría (INBio). Paraíso, P.N. Tapantí-Macizo de la Muerte, 300 m SE Río Porras, 1660 m, Sep 1999 (3 ♂), Nov 1999 (1 ♂), May 2000 (1 ♂), Jan 2000 (4 ♂), Oct 2002 (1 ♂, 1 ♀), R. Delgado (INBio). Paraíso, P.N. Tapantí-Macizo de la Muerte, Costado de Casa Admin., 1200 m, Nov 1999 (1 ♂), Jun 2000 (1 ♂), L. Chavarría (INBio). P.N. Tapantí-Macizo de la Muerte, 300 m N & 100 m S Mirador, 1350 m, Oct 1999 (1 ♂), R. Delgado (INBio). Paraíso, P.N. Tapantí-Macizo de la Muerte, 300 m N Mirador, 1830 m, Jul 2000 (1 ♂), R. Delgado (INBio). Paraíso, P.N. Tapantí, Est. Quebrada Segunda, Sendero Catarata, 1450 m, May 1999 (1 ♂), R. Delgado (INBio). La Represa, Tapantí, 1800 m, Apr 1995 (1 ♂), R. Delgado (INBio). Tapantí, 1200–1700 m, 20 Aug–16 Sep 1999 (3 ♂), V. Becker (USNM). **Guanacaste Province:** Río San Lorenzo, Tierras Morenas, 1050 m, Sep 1993 (1 ♂), G. Rodríguez (INBio). Río San Lorenzo, R.F. Cord., 1050 m, Jun 1991 (1 ♂), C. Alvarado (INBio). Tapantí, 1200–1700 m, 20 Aug–15 Sep 1999 (8 ♂), V. Becker (VBC, USNM). Tapantí, 1500 m, 30–31 Aug 2000 (4 ♂), V. Becker (VBC). Z.P. Tenorio, Secto Also Los Masís, 1100 m, 10–14 Jan 2002 (1 ♂), L. Chavarria (INBio). **Heredia Province:** El Angel Waterfall, 8.2 km downhill Vara Blanca, 1350 m, 3 Jan 1981 (2 ♂), 5 Aug 1981 (1 ♀), D. Janzen & W. Hallwachs (INBio). 8 km N Vara Blanca, 25 Jul 1990 (1 ♂), J. Powell (INBio). 16 km SSE La Virgen, 10°16′N, 84°05′W, INBio-OET-ALAS transect, 1050–1150 m, 8 Feb 2001 (1 ♂), 12 Feb 2001 (1 ♂), 13 Feb 2001 (1 ♀), M. Epstein (INBio), 10 Apr 2001 (1 ♂), 15 Apr 2001 (1 ♂), 20 Apr 2001 (1 ♂), J. Brown (INBio). **Puntarenas Province:** La Amistad, Sect. Altamira, Buenos Aires, Dec 1993 (1 ♂), R. Delgado (INBio). Coto Brus, Zona Prot. Las Tablas, Est. Biol. Las Alturas, 1550 m, 16–23 Mar 1999 (1 ♂), E. Phillips (INBio). Est. Biol. Las Alturas, 12 air km NE San Vito, 22–24 Jan 1993 (4 ♂), J. Powell (UCB). Sendero a Cerro Pittier, 600 m N Estac., 1750 m, 15 Jul 1996 (2 ♂), M. Moraga (INBio). Est. Altamira, 1 km S Cerro Biolley, 1300–1450 m, 12–30 Aug 1996 (1 ♂), R. Villalobos (INBio). Fca. Cafrosa, Embalse, 800 m N Tigra, 1280 m, 8–10 Feb 1997 (1 ♂), A. Picado (INBio). **San José Province:** Est. Zurquí, 50 m antes de tunel, 1600 m, 26 Sep–Oct 1990 (1 ♂), G. Maass (INBio).

Geographic and temporal distribution. *Orthocomotis longicilia* occupies the middle elevations of the central cordillera from about 800 to about 1800 m (Fig. 35). It has been recorded only from Costa Rica. Captures range throughout the year.

Etymology. The specific epithet refers to the elongate cilia of the male antenna.

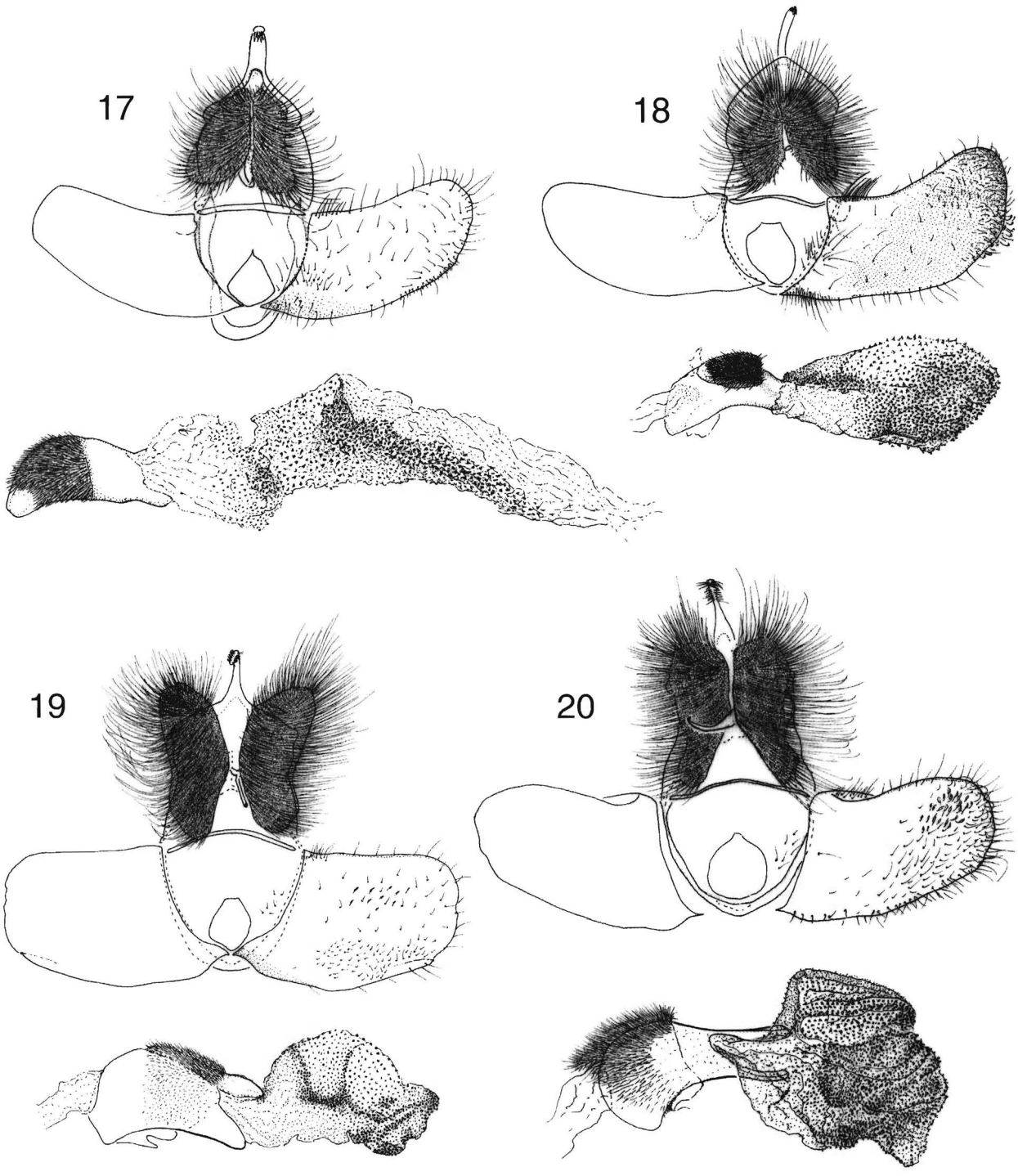
Orthocomotis magicana (Zeller)
(Figs. 3, 16, 26, 36)

Penthina (Sericoris) magicana Zeller, 1866:150.
Eulia magicana: Meyrick 1926:249.
Orthocomotis magicana: Clarke 1956:151; Razowski & Becker 1990:351.

Holotype ♀, Colombia, Bogotá, [no date], BMNH.

Diagnosis. *Orthocomotis magicana* has a bold black patch in the apical region of the forewing similar to *O. herbacea* but has considerably more metallic green overscaling in the white regions between the darker patches (Fig. 3); the maculation is somewhat variable. *Orthocomotis magicana* is recognized most easily by the immaculate white scaling of the frons (infrequently with a few scattered pale brown scales) in both sexes, contrasting with a patch of dark somewhat metallic scales on the vertex, and the extensive white scaling of the tegulae. The male lacks both the hindwing pecten and the thoracic hairpencil (see Table 1).

Specimens examined. Alajuela Province: Upala, Bijagua, Albergue Heliconias, 700 m, Apr 2000 (1 ♂), G. Rodríguez (INBio). Fca. San Gabriel, 16 km ENE de Queb. Grande, 11–15 Jun 1986 (1 ♀), I. Gauld & J. Thompson (INBio). **Cartago Province:** Monumento Nacional Guayabo, Turrialba, 1100 m, Jul 1994 (2 ♂), Sep 1994 (4 ♂), Oct 1994 (2 ♂), Nov 1994 (1 ♂), G. Fonseca (INBio). Paraíso, P.N. Tapantí-Macizo de la Muerte, al Castado de Casa Admin., 1200 m, Jun 2000 (1 ♀), R. Delgado (INBio). Turrialba, 600 m, 25 Oct 1971 (1 ♂), V. Becker (VBC). Juan Viñas, [no date] (1 ♀), W. Schaus (USNM), [no date] (1 ♀), W. Schaus (BMNH). **Guanacaste Province:** Est. Pitilla, 9 km S Sta. Cecilia, P.N. Guanacaste, 700 m, Jun 1991 (1 ♀), Apr 1991 (1 ♂), Aug 1991 (1 ♂), 2–15 May 1992 (1 ♀), C. Moraga (INBio). Hda. Santa María, 750 m, Sep 1996 (1 ♂), D. Briceño, A. Solís, E. Araya, F. Quesada & C. Moraga (INBio). 4 km E Casetilla, P.N. Rincón, 750 m, 6 Jun 1981 (1 ♂), 25 Jan 1982 (1 ♂), 22 May 1982 (1 ♀), 27 Dec 1981 (3 ♂), D. Janzen & W. Hallwachs (INBio). **Heredia Province:** Sarapiquí, Zona Prot. La Selva, Est. Biol. La Selva, 50–100 m, 6 Feb 1987 (2 ♂), I. Chacón (INBio). Braulio Carrillo Natl. Park, 6 km E Vara Blanca, 10°11′N, 84°07′W, INBio-OET-ALAS transect, 2000 m, 16 Feb 2002 (1 ♂), ALAS (INBio). **Puntarenas Province:** Est. Altamira, Buenos Aires, 15 Sep–14 Oct 1993 (1 ♂), R. Delgado (INBio). Sector Altamira, Buenos Aires, PILA, 1400 m, Jun 1994 (2 ♀), Jul 1994 (1 ♂), R. Delgado (INBio). Est. Altamira, 1 km S Cerro Biolley, 1300–1450 m, 20–30 Oct 1996 (1 ♂), R. Villalobos (INBio). Buenos Aires, PILA, Sector Altamira, A.C. Amistad, 1150–1400 m, May 1994 (1 ♂), R. Delgado (INBio). Buenos Aires, La Amistad, Sector Altamira, Nov 1993 (1 ♀), R. Delgado (INBio). Buenos Aires, Parque Internacional Amistad, Sendero Gigantes, 1450 m, Sep 2001 (1 ♀), R. Delgado (INBio). Fca. Cafrosa, Est. Las Mellizas, P. N. Amistad, 1300 m, Oct 1989 (1 ♂), M. Ramírez (INBio). Fca. Cafrosa, Embalse, 800 m N Tigra, 1280 m, 13–21 May 1996 (2 ♂), E. Navarro (INBio). Buen Amigo, San Luis



FIGS. 17–20. Male genitalia of *Orthocomotis* with valvae spread, aedeagus removed and shown in lateral aspect, and vesica everted. **17,** *O. chaldera*; **18,** *O. herbaria*; **19,** *O. phenax*; **20,** *O. similis*.

Monteverde, 1000–1350 m, Sep 1994 (1 ♂), Z. Fuentes (INBio). Est. Biol. Las Alturas, Coto Brus, 1500 m, Aug 1991 (1 ♂, 1 ♀), M. Ramírez (INBio). Humedal San Joaquin, 1000 m, 10–12 Sep 1996 (1 ♂), A. Maroto, M. Moraga, L. Angulo & E. Navarro (INBio). Coto Brus, Zona Prot. Las Tablas, Est. Biol. Las Alturas, 1550 m, 16–23 Mar 1999 (1 ♀). E. Phillips (INBio).

Geographic and temporal distribution. The holotype (BMNH) is from Colombia; however, all subsequently reported specimens (i.e., Clarke 1965, Razowski & Becker 1990) are from Costa Rica. In Costa Rica this species occurs from the Central Cordillera west, from

about 700 to 1500 m elevation (Fig. 36). It has been collected in all months: January (n = 1), February (n = 3), March (n = 1), April (n = 2), May (n = 5), June (n = 6), July (n = 3), August (n = 3), September (n = 8), October (n = 6), November (n = 2), and December (n = 3).

Remarks. Clarke (1956) referred to specimens of *O. magicana* collected by William Schaus from Juan Viñas, Mount Poás, and Cachí. I examined the specimen from Juan Viñas (above); the specimen from Mount Poás may be the one I refer to *O. herbacea* (above); and the location of the specimen from Cachí is unknown to me.

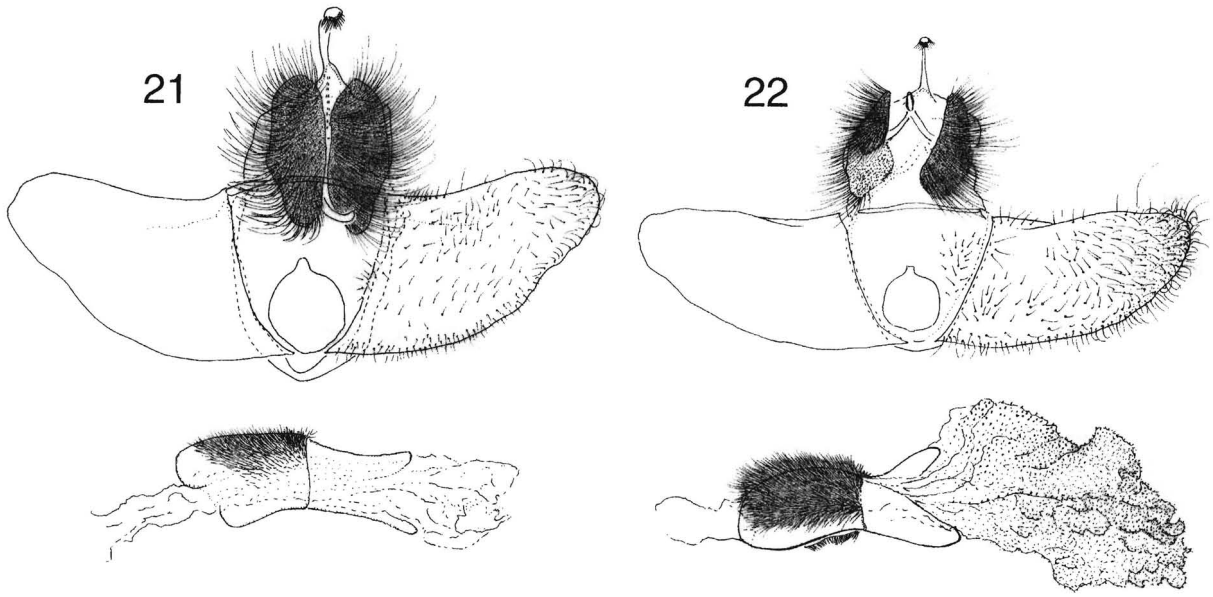
Orthocomotis chaldera (Druce)
(Figs. 10, 11, 17, 27, 37)

Grammophora chaldera Druce, 1889:259.
Tortrix chaldera: Walsingham 1914:278.
Eulia chaldera: Meyrick 1912:38, 1913:38, 1926:249.
Orthocomotis chaldera: Clarke 1956:145; Razowski & Becker 1990:351.

Holotype ♂, Costa Rica, San José Province, Volcan de Irazú, 6–7000′, [no date], Godman-Salvin Collection, H. Rogers, BMNH.

Diagnosis. *Orthocomotis chaldera* is the largest and most commonly collected *Orthocomotis* in Costa Rica. It can be distinguished from all other Costa Rican congeners by its large size (i.e., mean FW length = 14.3 mm in the male, 18.0 mm in the female) and distinct forewing pattern, with a large white blotch in the apical region. A few male specimens from Estación Mengo, Estación Cacao, and Turrialba are smaller and darker, with less white scaling, approaching *O. euchaldera* Clarke (from Venezuela) in general aspect. However, the genitalia of these specimens are indistinguishable from those of other *O. chaldera*. Hence, I am provisionally including them under this name. Male genitalia are characterized by a relatively short, stout uncus, and socii that have a limited dorsal arch beyond their point of attachment to the tegumen. The female genitalia, with an extremely broad ductus bursae immediately posterior to the region of bifurcation, also are fairly distinct.

Specimens examined. Cartago Province: Río Grande de Orosi, desde Puerte Río Dos Amigos, hasta la Represa, 1400–1800 m, 22 Aug–15 Sep 1995 (1 ♀), R. Delgado (INBio). Tapantí, Río Grande de Orosi, 1300–1400 m, 23 Jan 1985 (2 ♂), D. Janzen & W. Hallwachs (INBio). Orosi, 4000′, ".15" [1915] (1 ♀), [no collector] (BMNH). Paraíso, P.N. Tapantí-Macizo de la Muerte, 300 m SE del Refugio Porras, 1660 m, May 2000 (1 ♂), R. Delgado (INBio). Paraíso, P.N. Tapantí, Sect. La Represa, 300 m S del Puente del R. Porras, 1660 m, Nov 1999 (1 ♂), R. Delgado (INBio), Feb 2000 (1 ♂), I. Chavarría (INBio). Paraíso, P.N. Tapantí-Macizo de la Muerte, al costado de Oficina [or casa] Admin., 1200 m, Nov 1999 (1 ♀), Jan 2000 (1 ♂), R. Delgado (INBio). Paraíso, P.N. Tapantí-Macizo de la Muerte, Est. Quebrada Segunda, 1300 m, Jul 2000 (1 ♀), R. Delgado (INBio). Paraíso, P.N. Tapantí-Macizo de la Muerte, Est. Quebrada Segunda, al costado Ofic., 1200 m, Dec 1999 (1 ♂), R. Delgado (INBio). P.N. Tapantí-Macizo de la Muerte, 300 m N & 100 m S del Mirador, 1350 m, Oct 1999 (2 ♂), Dec 1991 (1 ♂), R. Delgado (INBio), Nov 2000 (1 ♂, 1 ♀), R. Delgado (INBio). P.N. de la Muerte, 300 m N Mirador, 1480 m, Feb 2000 (1 ♀), R. Delgado (INBio). Tapantí, 1500 m, 30–31 Aug 2000 (1 ♂), V. Becker (VBC). Volcán Turrialba, 1800 m, 13 Aug 1972 (2 ♂), V. Becker (VBC). Santa Cruz, Turrialba, 1500 m, Aug 1981 (1 ♀), V. Becker (VBC). Juan Viñas, [no date] (1 ♂), W. Schaus (USNM). **Guanacaste Province:** Derrumbe, Est. Mengo, W side Volcán Cacao, 1400 m, 5 Jun 1988 (1 ♂), 11 Jul 1988 (4 ♂), 26–27 May 1992 (1 ♂), D. Janzen & W. Hallwachs (INBio). Est. Cacao, S side Volcán Cacao, 1000–1400 m, Jul–Aug 1991 (1 ♂), A. Guadamuz (INBio). Estac. Pitilla, 9 km S Santa Cecilia, 700 m, Feb 1989 (1 ♂), GNP Biodiversity Survey (INBio). Est. Mengo, SW side Volcán Cacao, 1100 m, Feb 1989 (2 ♂), GNP Biodiversity Survey (INBio). Sector Las Pailas, 4.5 km SW Volcán Rincón de la Vieja, 800 m, 23 Jul–6 Aug 1995 (1 ♂, 1 ♀), K. Taylor (INBio). **Heredia Province:** Est. Barva, P.N. Braulio Carrillo, 2500 m, Jan 1990 (1 ♀), G. Rivera (INBio), Mar 1990 (1 ♂), May 1990 (2 ♂, 1 ♀), A. Fernández (INBio), Jun 1990 (1 ♀), B. Apu & G. Varela (INBio). El Angel Waterfall, 8.2 km downhill Vara Blanca, 1350 m, 3 Jan 1981 (1 ♂), 5 Aug 1981 (1 ♂), D. Janzen & W. Hallwachs (INBio). Mount Poás [2350 m], [no date] (1 ♂, 1 ♀), W. Schaus (USNM). 16 km SSE La Virgen, 10°16′N, 84°05′W, INBio-OET-ALAS transect, 1050–1150 m, 11–12 Feb 2001 (1 ♂), M. Epstein (INBio), 15 Apr 2001 (1 ♂), 16 Apr 2001 (1 ♂), J. Brown (INBio). Cerro Chompipe, Res. Biol. Chompipe, R. F. Cord. Vol. Cent., 2100 m, 11 Jul 1991 (1 ♂), Oct 1991 (1 ♂), J. Corrales (INBio). **Puntarenas Province:** La Amistad, Sector Altamira, Cerro Biolley, A.C. Amistad, 1800 m, Dec 1993 (1 ♂), Jan 1994 (2 ♂), R. Delgado (INBio), 13–26 May 1996 (1 ♂), R. Villalobos (INBio). Est. Altamira, Buenos Aires, 1400 m, 15 Sep–14 Oct 1993 (2 ♂), R. Delgado (INBio), Jul 1994 (1 ♂) R. Delgado (INBio). Buenos Aires, PILA, Sector Altamira, A.C. Amistad, 1150–1400 m, Jun 1994 (1 ♂), R. Delgado (INBio). La Amistad, Sect. Altamira, Buenos Aires, Dec 1993 (1 ♂), R. Delgado (INBio). Est. Altamira, 1 km SE Cerro Biolley, PILA-ACLA, 1450 m, 26 Feb–10 Mar 1995 (1 ♂), M. Segura (INBio). Est. Altamira, 1 km S Cerro Biolley, 1300–1450 m, 28 Jul–7 Aug 1995 (1 ♀), R. Villalobos (INBio). Est. Pittier, PILA-ACLA, 1670 m, 5–18 Jan 1995 (1 ♂), M. Moraga (INBio), 23 Aug–9 Sep 1995 (1 ♂), M. Moraga (INBio), 23 Aug–13 Sep 1995 (1 ♂), E. Navarro (INBio), Sep 1995 (1 ♂), E. Navarro (INBio), 13–26 May 1996 (1 ♂), R. Villallobos (INBio). Est. Pittier, 1670 m, 22 Sep–9 Oct 1995 (1 ♂), M. Moraga (INBio). Est. Pittier, Alrededor de la Estación, 1670 m, 18–20 Jan 1996 (1 ♀), M. Moraga (INBio). Est. Biol. Las Alturas, Coto Brus, 1500 m, Aug 1991 (3 ♂, 2 ♀), M. Ramírez (INBio). ACLAP, Coto Brus, Zona Prot. Las Tablas, Est. Biol. Las Alturas, 1550 m, 16–24 Mar 1999 (1 ♀), B. Espinoza (INBio). Sendero a Cerro Pittier, 1 km N Estación, 1800–2000 m, 11–25 May 1997 (1 ♂), M. Moraga (INBio). Sendero a Cerro Pittier, 600 m NE Estación, 1750 m, 5–11 Mar 1997 (1 ♂), M. Moraga (INBio). Fca. Cafrosa, Est. Las Mellizas, P.N. La Amistad, 1800 m, Oct 1989 (1 ♂), M. Ramírez & G. Mora (INBio), May 1991 (1 ♂, 1 ♀), M. Ramírez (INBio). Fca. Cafrosa, Embalse, 800 m N Tigra, 1280 m, 15 Jul 1996 (1 ♂), L. Angulo (INBio), 10–29 Jul 1996 (1 ♀), E. Navarro (INBio). Monteverde, 1400 m, 22–24 Jul 1990 (1 ♂), S. Meredith & J. Powell (UCB), 29–31 Mar 1992 (1 ♂), J. McCarty & J. Powell (UCB), 30 Mar 1992 (1 ♂), J. Powell (UCB). 2 km E Monteverde, 1500 m, 31 Mar 1992 (2 ♂), J. McCarty & J. Powell (UCB). Buen Amigo, San Luis Monteverde, 1000–1350 m, Apr 1995 (1 ♂), Z. Fuentes (INBio). Monteverde area, 1400–1700 m, 6–14 Jun 1973 (1 ♂), T. Erwin & G. Hevel (USNM). Monteverde, 1500 m, 1–4 Sep 1999 (3 ♂), V. Becker (USNM). Monteverde, 1400 m, 12–15 Jun 1974 (2 ♂), A. Watson (BMNH), 25–26 Jun 1979 (1 ♂), D. Janzen (INBio), 15–16 May 1980 (3 ♂), 30–31 Jul 1981 (1 ♀), 3 Jan 1984 (1 ♀), D. Janzen & W. Hallwachs (INBio). 2 km E Monteverde, 1460 m, 13 Jun 1988 (1 ♂), J. Brown & J. Powell (INBio), 31 Mar 1992 (1 ♂), J. McCarty & J. Powell (UCB). Est. La Casona, Res. Biol. Monteverde, 1520 m, Mar 1991 (1 ♂), Aug 1991 (1 ♂), N. Obando (INBio), 30 Jan–18 Feb 1995 (1 ♂), K. Martinez (INBio). Las Nubles, 11 km NW Monteverde, 31 Jul 1981 (2 ♂), D. Janzen & W. Hallwachs (INBio). Monteverde, 1500 m, 1–4 Sep 1999 (6 ♂), V. Becker (VBC). Alturas de Cotón, 1500 m, 15 Sep 1999 (1 ♂), V. Becker (VBC). **San José Province:** Est. Zurquí (el tunel), P.N. Braulio Carrillo, 1500 m, Aug 1985 (3 ♂), Oct 1985 (2 ♂), I. & A. Chacón (INBio). Est. Santa Elena Viejo, Santa Elena, Las Nubes, 1210 m, 29 Sep 1995 (1 ♂), A. M. Mardo (INBio). Irazú, 6–7000′, [no



FIGS. 21–22. Male genitalia of *Orthocomotis* with valvae spread, aedeagus removed, and vesica everted. **21,** *O. nitida*; **22,** *O. altivolans*.

date] (HT ♂), Godman-Salvin Collection, H. Rogers (BMNH). **Unknown Province:** Sixola River, [no date] (1 ♂), W. Schaus (USNM). Cascajal, ex. Janson, Jan 1924 (1 ♀), [no collector] (BMNH).

Geographic and temporal distribution. *Orthocomotis chaldera* ranges from Tamaulipas, Mexico (VBC) south to Ecuador (VBC) and Perú (BMNH). In Costa Rica it has been collected throughout the western half of the country, from 800 to 2500 m, but primarily from 1100–1800 m. It has been recorded throughout the year: January (n = 11), February (n = 7), March (n = 9), April (n = 3), May (n = 13), June (n = 8), July (n = 14), August (n = 18), September (n = 16), October (n = 7), November (n = 4), and December (n = 4).

Remarks. Druce (1889) described this species from Volcán Irazú, Costa Rica (ca. 2000 m). According to Clarke (1956), the type should be in BMNH, but he was unable to find it. However, I believe that the specimen cited above and labeled "Irazu, 6–7000′, H. Rogers, Godman-Salvin Coll.," which I discovered in the undetermined collection at the BMNH, is the type.

Orthocomotis herbaria (Busck)
(Figs. 5, 6, 18, 28, 38)

Sociphora herbaria Busck, 1920:85.
Orthocomotis herbaria: Clarke 1956:144.

Holotype ♂ (*herbaria*), Guatemala, Cayuga, Wm. Schaus, USNM.

Orthocomotis cristata Clarke 1956:155; Razowski & Becker 1990: 346 (map only), **new synonymy**

Holotype ♂ (*cristata*), Costa Rica [unknown province], Cachí, [no date], W. Schaus, USNM.

Orthocomotis uragia Razowski & Becker, 1990:352, **new synonymy**

Holotype ♂ (*uragia*), Costa Rica, Puntarenas Province, Buenos Aires, 200 m, 25 Nov 1975, V. Becker, VBC.

Diagnosis. *Orthocomotis herbaria* is superficially most similar to *O. nitida* because of their small size, similar forewing pattern, and dark brown hindwing (Figs. 4–6). However, both sexes of *O. herbaria* can be distinguished from all other species by the presence of the hindwing pecten (see Table 1); male genitalia (Fig. 18) can be distinguished by the rounded-triangular process that represents the termination of the sacculus. The male possesses a thoracic hairpencil and has small cornuti in the vesica.

Specimens examined. Alajuela Province: Cerro Campaña, E slope Volcán Cacao, 650 m, 15 Jun 1988 (1 ♀), J. Brown & J. Powell (UCB). Area de Conservación Guanacaste, Sector San Cristóbal, Río Blanco Abajo, ex-larva on *Nectandra hihua*, 23 May 2001, em: 14 Jun 2001 (1 ♂), "01-SRNP-1776," D. Janzen & W. Hallwachs (USNM). **Guanacaste Province:** Est. Pitilla, 9 km S Sta. Cecilia, P.N. Guanacaste, 700 m, 19–23 Jun 1993 (1 ♂), Jun 1991 (1 ♂), C. Moraga (INBio). **Heredia Province:** La Selva Biol. Sta., Puerto Viejo de Sarapiquí, 40 m, Sep 1987 (1 ♀), M. Chavarría (INBio). Est. Biol. La Selva, 50–150 m, 10°26′N, 84°01′W, 17 Mar 1993 (1 ♂), 3 Jul 1994 (1 ♀), ALAS (INBio), Jan 1996 (1 ♂), J. Powell (UCB), 6 Feb 1996 (1 ♂), 10 Feb 1996 (1 ♀), 11 Feb 1996 (1 ♂), 13 Feb 1996 (1 ♀), 16 Jan 1998 (1 ♂), Jan 1998 (1 ♀), 26 Jan 1998 (1 ♀), 15 Apr 1998 (1 ♀), 16 Mar 1999 (1 ♂), ALAS (INBio). **Limón Province:** Res. Biol. Hitoy Cerere, Est. Hitoy Cerere, Cerro Bobocara, 770 m, Jun 1999 (1 ♀), R. Barton (INBio). Manzanillo, RNFS, Gandoca y Manzanillo, 0–100 m, 22 Oct–12 Nov 1992 (1 ♂), F. Quesada (INBio). Sector Cerro Cocori, Fca. de E. Rojas, Jan 1991 (1 ♂), Apr 1991 (1 ♀), E. Rojas (INBio). **Puntarenas Province:** P.N. Manuel Antonio, Quepos, 80 m, May 1991 (1 ♂), R. Zuñiga (INBio), Aug 1991 (1 ♂), Oct 1992 (1 ♂), Nov 1992 (3 ♂), Oct 1993 (2 ♂), G. Varela (INBio), Feb 1991 (1 ♂), R. Zuñiga (INBio). Est. Sirena, P.N. Corcovado, 0–100 m, Mar 1991 (1 ♂), G. Fonseca (INBio). Sirena, Corcovado Nat. Park, Osa Península, 1 May 1984 (1 ♂), D. Janzen & W. Hallwachs (INBio). Est. Río Bonito, 2.3 km W Cerro la Gamba, 110 m, 7–10 Nov 1996 (1 ♂), E. Fletes (INBio). Rancho Quemado, Península Osa, Nov 1990 (1 ♂, 1 ♀), F. Quesada (INBio). A.C.O. Golfito, Reserva Ftal. Golfo Dulce, Proyecto Zamia, Playa Cacao, 130 m, 8–12 Oct 1999 (1 ♀), 6–11 Nov 1999 (1 ♂), M. Moraga (INBio). Golfito, 25–28 Apr 1965 (1 ♂), S. S. & W. D. Duckworth (USNM). Fila

Esquinas, 35 km S Palmar Norte, 150 m, 7–8 Jan 1983 (1 ♀), D. Janzen & W. Hallwachs (INBio). Buenos Aires, 200 m, 25 Nov 1975 (1 ♂, HT ♂ of *uragia*), V. Becker (VBC). **San José Province:** Est. Bijagual, Res. Biol. Carara, 500 m, Sep 1990 (1 ♂), G. Varela (INBio). **Unknown Province:** Cachí, [no date] (HT ♂ of *cristata*), W. Schaus (USNM).

Geographic and temporal distribution. This species ranges from Guatemala (HT of *herbaria*, USNM) to Costa Rica but is restricted to the lowlands (i.e., from sea level to about 700 m elevation) (Fig. 38). It has been recorded nearly throughout the year: January (n = 6), February (n = 5), March (n = 3), April (n = 3), May (n = 2), June (n = 4), July (n = 1), August (n = 1), September (n = 2), October (n = 5), and November (n = 9).

Janzen and Hallwachs (2002) report rearing this species from *Nectandra hihua* (Lauraceae) in Area de Conservación Guanacaste in northern Costa Rica. According to the rearing notes, the caterpillar is brilliant green with white setae and a black and brown head.

Remarks. Two slides made by August Busck (USNM) were mixed, apparently based on mislabeling by Clarke or Busck. The slide belonging to the holotype of *O. herbaria* (A.B. 1 Feb 1920) was associated incorrectly with a paratype of *O. herbacea*, and the slide belonging to the *O. herbacea* paratype (A.B. 18 Feb 1920) was associated incorrectly with the holotype of *O. herbaria*. Although Clarke's holotype of *O. cristata* matched the holotype of Busck's *O. herbaria*, including the presence of the unique hindwing cubital pecten, the genitalia were clearly different, i.e., the genitalia of Clarke's specimen were correctly associated, while those of the Busck specimen were *O. herbacea*. On the basis of the genitalic differences, Clarke described *O. cristata*, stating that the holotype male of *O. cristata* is "remarkable for the presence of the cubital pecten," a feature also present in the holotype of *O. herbaria*. On this basis I synonymize the two.

Orthocomotis uragia was described from a single extremely worn specimen from Buenos Aires, Costa Rica. A second male taken on the same date was identified correctly by Becker as *O. herbaria*; apparently Razowski did not see the latter. The genitalia of the holotype match those of *O. herbaria*, and the presence of cubital pecten provides convincing evidence of their conspecificity.

Orthocomotis phenax Razowski & Becker
(Figs. 12, 19, 29, 39)

Orthocomotis phenax Razowski & Becker, 1990:354.

Holotype ♂, Costa Rica, San José Province, [Parque Nacional] Braulio Carrillo, 1100 m, Jul 1981, V. Becker, VBC.

Diagnosis. Males of *O. phenax* are most similar to those of *O. herbacea*. They can be distinguished from all other congeners, except *O. similis*, by the narrow uncus with fine lateral setae throughout the apical third and the elongate tip of the gnathos. *Orthocomotis phenax* can be distinguished from *O. similis* by its smaller size, its brighter green forewing overscaling, and the presence of a pale subapical forewing fascia bordered basally by a dark fascia.

Specimens examined. Guanacaste Province: Est. Pitilla, 9 km S Sta. Cecilia, P. N. Guanacaste, 700 m, May 1991 (1 ♂), 4–13 Dec 1991 (1 ♂), C. Moraga (INBio), 6–19 Sep 1993 (1 ♂), Feb 1993 (1 ♀), Jan 1994 (1 ♂), Nov 1994 (1 ♂), P. Ríos (INBio). **Heredia Province:** 16 km SSE La Virgen, 10°16′N, 84°05′W, INBio-OET-ALAS transect, 1050–1150 m, 16 Mar 2001 (1 ♂), 18 Mar 2001 (1 ♂), 19 Mar 2001 (1 ♂), D. Wagner & J. Rota (INBio) **Puntarenas Province:** Fca. Cafrosa, Est. Las Mellizas, P. N. Amistad, 1300 m, Jan 1991 (1 ♂), M. Chavarría & G. Mora (INBio). A.C.L.A.P. Coto Brus, Zona Prot. Las Tablas, Est. Biol. Las Alturas, 1550 m, 15–24 Mar 1999 (1 ♂), R. Delgado (INBio). Coto Brus, Est. Biol. Las Alturas, 1550 m, 15–24 Mar 1999 (1 ♂), G. Rodríguez (INBio). La Escuadra, P.N. Amistad, 1340 m, 14 Apr 1989 (1 ♂), M. Ramírez & G. Mora (INBio). **San José Province:** Braulio Carrillo, 1100 m, Jul 1981 (5 ♂, HT ♂), V. Becker (VBC). Est. Carrillo, P.N. Braulio Carrillo, 700 m, Jul 1984 (1 ♂), I. Chacón (INBio).

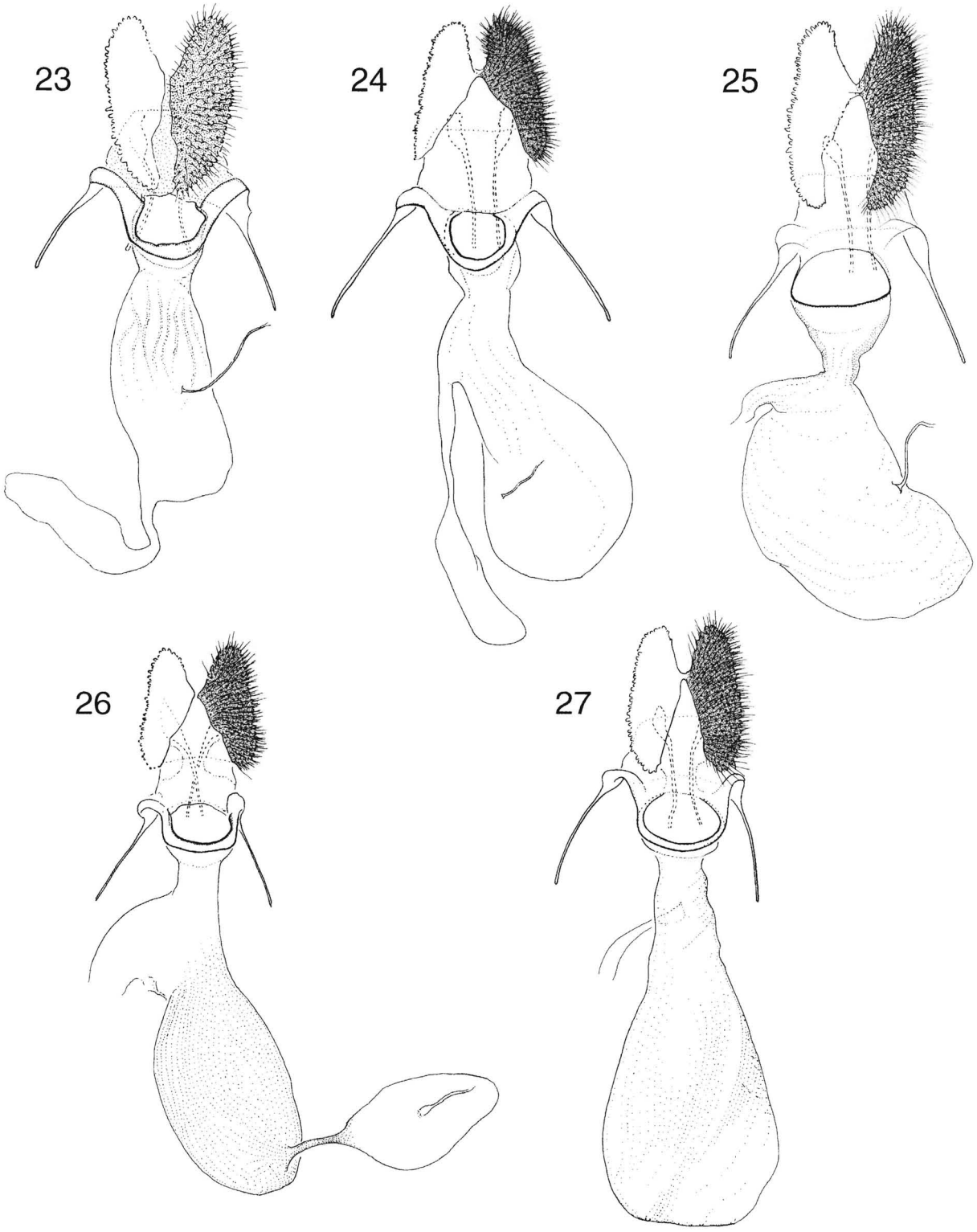
Geographic and temporal distribution. *Orthocomotis phenax* is known only from Costa Rica, occurring from the Central Cordillera westward, from 700–1550 m elevation (Fig. 39). Capture records are scattered throughout the year.

***Orthocomotis similis* Brown, new species**
(Figs. 1, 20, 30, 40)

Diagnosis. Superficially, *O. similis* resembles *O. exolivata* from Brazil. However, the genitalia of both the male and female of the former (Figs. 20, 30) are virtually indistinguishable from those of *O. phenax*. *Orthocomotis similis* can be separated from *O. phenax* by its larger size (mean FW length = 11.5 mm and 14.2 mm for males and females of *similis*, respectively, vs. 10.8 mm and 12.9 mm for *phenax*), the more subdued green overscaling of the forewing, the presence of an oblong dark spot from the forewing dorsum near the tornus, and the more pale brown scaling of the hindwing.

Razowski and Becker (1990) described *O. phenax phobetica* from Veracruz, Mexico, and commented that although described as a subspecies because of its similarity to *O. phenax*, it "probably represents a distinct species, very close to the proceeding [*O. phenax*]." It is possible that *O. phenax*, *O. phenax phobetica*, and *O. similis* together represent a complex of closely related species. Alternatively, the three may represent variation within *O. phenax*. For the present, I prefer the former hypothesis.

Description. Male. Head: Upper frons cream with a pair of lateral red-brown tufts; lower frons pale cream. Labial palpus mostly cream on inner surface, mostly brown on outer surface. Antenna with brown scales on dorsum of basal two-thirds; cilia ca. 0.5–0.6 times width of flagellomere. **Thorax:** Mostly pale brown and cream with a few red-brown scales; cream tuft at posterior end. Hairpencil of 20–30 pale cream to white elongate scales originating near base of



FIGS. 23–27. Female genitalia of *Orthocomotis*. **23,** *O. ochracea*; **24,** *O. herbacea*; **25,** *O. longicilia*; **26,** *O. magicana*; **27,** *O. chaldera*.

hindwing, extending to second abdominal segment. Forewing length 10.5–12.5 mm ($\bar{x}$ = 11.5; n = 4) (Fig. 1); ground pale brown with irregular patches of metallic green and darker brown overscaling; ground color interrupted by variously defined, pale fascia; subapical fascia from tornus, bifurcating near the upper edge of the DC with one bifurcation extending to costa about 0.65 distance from base to apex, and the other bifurcation curving to costa ca. 0.2 distance from base to apex. Hindwing pale brown, lacking cubital pecten. **Abdomen:** Densely clothed with long, fine, pale brown scales; second segment with a pair of shallow lateral pouches, each bearing two rows of dense secondary sex scales; dorsum of segments 2 and 3 with paired subdorsal pits. Genitalia as in Fig. 20 (drawn from JWB preps. 1255 and 1258; n = 4). Uncus comparatively long, broad at base, slender in distal two-thirds, straight, with dense, short, somewhat evenly spaced, lateral setae, ca. 15 on each side. Socius large, densely scaled. Gnathos slender, with long terminal portion ending in narrow, slightly hooked tip. Transtilla a slender, gently arched band. Valva short, broad, subrectangular, with rounded distal portion; neither costa nor sacculus developed. Aedeagus short, stout, curved just beyond ductus ejaculatoris, with a pair of subdorsal, apical, sclerotized prongs, one larger, separated from remainder of coecum by membranous region; vesica densely covered by small, short cornuti.

Female. Head and thorax: Essentially as described for male, except antennal cilia shorter, more sparse, and hairpencil absent. Forewing length 12.5–16.0 mm ($\bar{x}$ = 14.2; n = 3); pattern essentially as described for male. **Abdomen:** Genitalia as in Fig. 30 (drawn from JWB prep. 1159; n = 3). Sterigma simple with huge, ovoid ostium. Ductus bursae moderately broad, moderately long, with accessory sac from left side immediately posterad junction with corpus bursae. Corpus bursae an ovoid sac; signum absent.

Holotype ♂, Costa Rica, Est. Cacao, S side Volcán Cacao, 1000–1400 m, 8–29 Jul 1991, C. Chaves (INBio).

Paratypes. **Cartago Province:** P.N. Tapantí-Macizo de la Muerte, 300 m N & 100 m S Mirador, 1350 m, Oct 1999 (1 ♂), R. Delgado (INBio). Paraíso, P.N. Tapantí-Macizo de la Muerte, 300 m SE Río Porras, 1600 m, Nov 2000 (1 ♂), R. Delgado (INBio). Tapantí, 1200–1700 m, 20 Aug–15 Sep (1 ♂), V. Becker (VBC). **Guanacaste Province:** Derrumbe, Est. Mengo, W side Volcán Cacao, 1400 m, 5 Jun 1988 (1 ♀), D. Janzen & W. Hallwachs (INBio). Est. Mengo, SW side Volcán Cacao, 1100 m, Feb 1989 (1 ♀), GNP Biodiversity Survey (INBio). Est. Cacao, S side Volcán Cacao, 1000–1400 m, Jun 1990 (1 ♂), II Curso Paratoxonomia (INBio), 8–29 Jul 1991 (1 ♀), C. Chaves (INBio). **Heredia Province:** Braulio Carrillo Nat. Park, 6 km ENE of Vara Blanca, 10°11′N, 84°07′W, INBio-OET-ALAS transect, 2000 m, 16 Feb 2002 (1 ♀), J. Brown & J. Powell (INBio). **San José Province:** Est. Zurquí, 50 m antes de tunel, 1600 m, 26 Sep–Oct 1990 (1 ♀), G. Maass (INBio).

Geographic and temporal distribution. *Orthocomotis similis* is known only from the Central Cordillera of Costa Rica; captures range from 1000–1600 m elevation. Adults have been collected in February, June, July, August, September, October, and November.

Etymology. The specific epithet refers to the similarity between the genitalia of the new species and those of *O. phenax*.

Orthocomotis nitida Clarke
(Figs. 4, 21, 31, 41)

Orthocomotis nitida Clarke, 1956:143; Razowski & Becker 1990:346 [referred to in legend of map, but no locations given].

Holotype ♂, Guatemala, Cayuga, "4", Schaus & Barnes, USNM.

Diagnosis. *Orthocomotis nitida* is one of the smallest members of the genus. It can be distinguished from its congeners by the moderately large, dark, rectangular blotch from near the middle of the forewing costa; the distinctly bicolored frons: cream yellow in the lower half and red brown in the upper; and the color of the scaling of the labial palpi: dark cream yellow, except for the outer edge which is fawn brown. The capitate, strongly spined uncus and the shape of the valva in the male genitalia are characteristic of this species (Fig. 21).

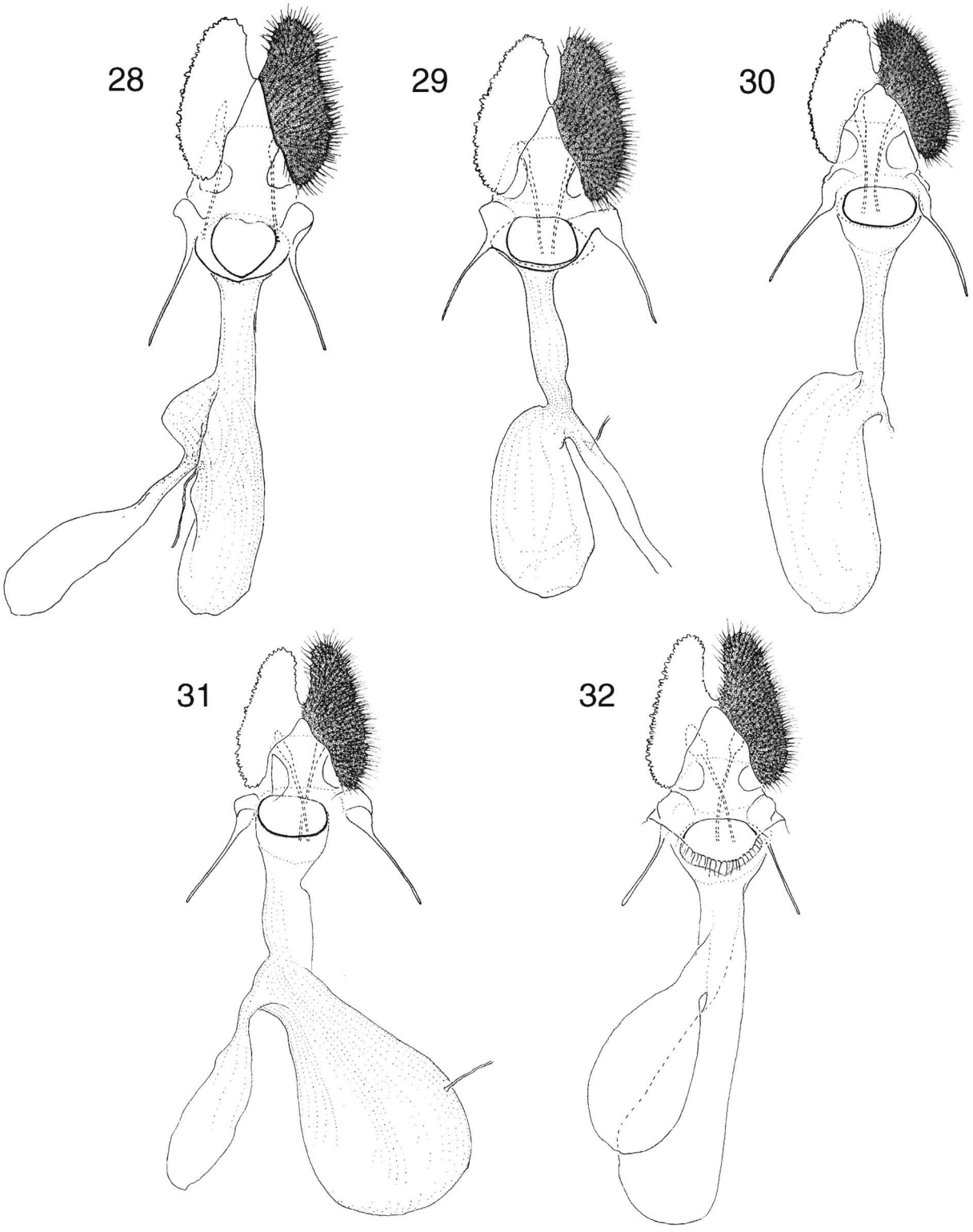
Specimens examined. Alajuela Province: Cerro Campaña, E side Volcán Cacao, 6 km NW Dos Ríos, 650 m, 15 Jun 1988 (1 ♂), D. Janzen & W. Hallwachs (INBio). **Guanacaste Province:** Derrumbe, Est. Mengo, W side Volcán Cacao, 1400 m, 11 Jul 1988 (1 ♂), D. Janzen & W. Hallwachs (INBio). **Heredia Province:** Est. Biol. La Selva, Puerto Viejo de Sarapiqui, 50–150 m, 10°26′N, 84°01′W, 11 Jan 1986 (1 ♀), D. Janzen & W. Hallwachs (INBio), 7 Feb 1996 (1 ♀), 10 Feb 1996 (1 ♂), 17 Feb 1996 (1 ♂), 11 Mar 1996 (1 ♀), 17 Apr 1996 (1 ♂), 14 Jan 1998 (1 ♂), 20 Jan 1998 (1 ♂), 20 Feb 1998 (1 ♂), 3 Mar 1998 (2 ♂), 5 Mar 1998 (1 ♂), 16 Mar 1998 (1 ♂), 9 Feb 1999 (1 ♂), ALAS (INBio), Jan 1998 (1 ♂), J. Powell (UCB). **Limón Province:** 9.4 km W Bribri, Suretka, 200 m, 9–11 Jun 1983 (1 ♂), D. Janzen & W. Hallwachs (INBio). **Puntarenas Province:** Est. Sirena, P. N. Corcovado, 0–100 m, Mar 1991 (1 ♂), Jul 1991 (1 ♂), Mar 1993 (1 ♂), G. Fonseca (INBio). Est. Sirena, A.C.O. Golfito, P.N. Corcovado, 0–100 m, 13–22 Mar 1980 (1 ♂), D. Janzen (INBio). Fca. Cafrosa, Est. Las Mellizas, P.N. La Amistad, 1300 m, Nov 1990 (1 ♂), M. Ramírez & G. Mora (INBio). Golfito, P.N. Piedras Blancas, Est. El Bonito, 100 m, Jan–Feb 2002 (1 ♂), M. Moraga (INBio). **Unknown Province:** V. Neilly, 800 m, 26 Nov 1973 (1 ♂), V. Becker (VBC).

Geographic and temporal distribution. This species ranges from Guatemala (HT, USNM) to Ecuador (BMNH). It appears to be confined to lower elevations with a majority of the captures from 200 m or below, but there are single records from 800, 1300, and 1400 m. Captures range from January through July, with two records from November. The majority of records (14 of 23 specimens examined) are from La Selva Biological Station, from January through March.

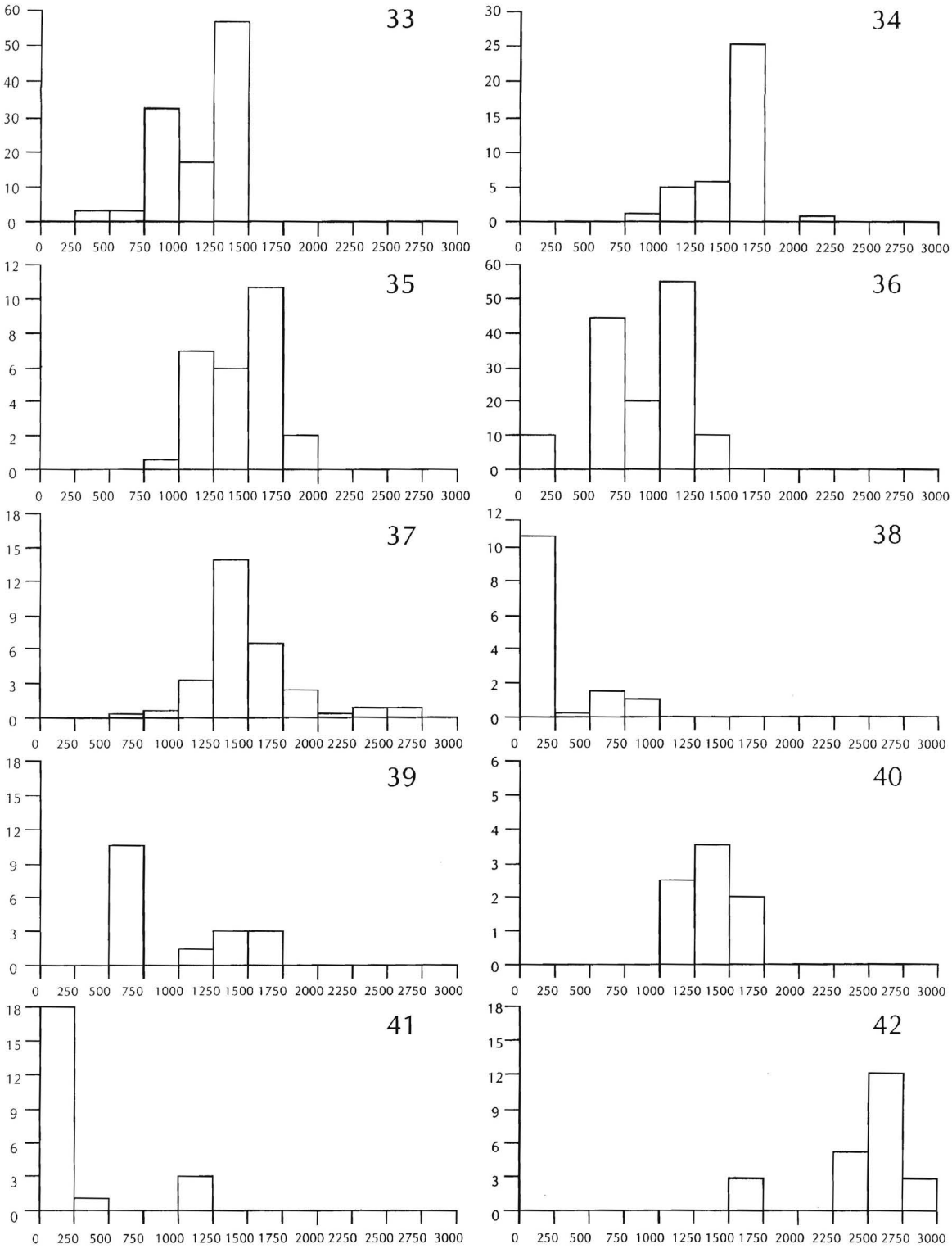
***Orthocomotis altivolans* Brown, new species**
(Figs. 7, 22, 32, 42)

Diagnosis. *Orthocomotis altivolans* can be distinguished from its congeners by its forewing color and pattern: copper to cinnamon, with irregular yellow gold to pale green gold (rather than metallic green or blue) bands and spots surrounded by white scaling (Fig. 7). Also, the white hindwing of *O. altivolans* is unusual in the genus. The valvae are extremely simple and more attenuate than in most other *Orthocomotis*, reminiscent of those in males of *Argentulia* Brown. The aedeagus lacks cornuti on the vesica.

Description. Male. Head: Upper frons copper to cinnamon, lower frons pale orange. Labial palpus pale cinnamon on inner surface, slightly darker on outer surface. Antennal cilia 0.8–0.9 times width of flagellomere. **Thorax:** Dorsum copper to cinnamon, slightly paler at posterior end, with weakly developed tuft; metathorax with dense hairpencil of 25–30 elongate pale cream scales extending to pouch in second abdominal segment. Forewing length 12.0–13.5 mm ($\bar{x}$ = 12.6; n = 8) (Fig. 7); ground color copper to cinnamon, divided by a group of variably connected, narrow, sinuous,



FIGS. 28–32. Female genitalia of *Orthocomotis*. **28,** *O. herbaria*; **29,** *O. phenax*; **30,** *O. similis*; **31,** *O. nitida*; **32,** *O. altivolans*.



FIGS. 33–42. Elevational distribution of *Orthocomotis*; x-axis = elevation in meters, y-axis = number of individuals examined. **33,** *O. ochracea*; **34,** *O. herbacea*; **35,** *O. longicilia*; **36,** *O. magicana*; **37,** *O. chaldera*; **38,** *O. herbaria*; **39,** *O. phenax*; **40,** *O. similis*; **41,** *O. nitida*; **42,** *O. altivolans*.

white fascia with yellow gold to pale green gold overscaling. Pattern usually including a complete fascia extending from costa ca. 0.65 distance from base to apex, to tornus; frequently with less defined incomplete fascia from costa ca. 0.33 distance from base to apex, and a sinuate fascia from costa at base, extending to dorsum ca. 0.25 distance from base to tornus, then angled toward apex of discal cell. Hindwing whitish with scattered pale gray overscaling, cubital pecten absent. **Abdomen:** Dorsum less densely scaled than in most congeners; second segment with a pair of shallow lateral pouches, each bearing two rows of dense secondary sex scales; dorsum of segments 2 and 3 with paired subdorsal pits; venter of segments 1–2 with strongly sclerotized V-shaped region; dorsum of segment 8 with narrow, sclerotized crescent-shaped ridge. Genitalia as in Fig. 22 (drawn from USNM slide 92702 and JWB prep. 1267; n = 3). Uncus broad in basal 0.33, slightly flattened dorsoventrally and densely setose in 0.66, strongly curved at ca. 0.33 distance from base to apex. Gnathos narrow, with fine, pointed process at distal junction of arms. Socius large, parallel-sided, with long dense scaling; lateral edge conspicuously sclerotized. Valva extremely simple, costa mostly straight, ventral edge evenly curved, apex rounded; sacculus not developed; costa sclerotized. Transtilla a narrow, simple, sclerotized bridge. Anellus with large bristly portion between transtilla and aedeagus, strongly attached to dorsum of aedeagus. Juxta teardrop-shaped. Aedeagus simple, weakly curved just beyond ductus ejaculatoris; vesica with cornuti represented by tiny punctations.

Female. Head and thorax: Essentially as described for male, except antennal cilia short, sparser, and thorax without hairpencil. Forewing length 13.3–15.0 mm ($\bar{x}$ = 14.2; n = 5); pattern as is male. **Abdomen:** Densely clothed with long, fine pale brown scales; dorsum of segments 2 and 3 with paired subdorsal pits, without lateral pouches. Genitalia as in Fig. 32 (drawn from JWB prep. 1268; n = 3). Sterigma simple, weakly sclerotized; ostium ovoid-rounded. Ductus bursae relatively broad, short, gradually widening into corpus bursae; an oblong accessory bursae originating from junction of corpus bursa and ductus bursa. Corpus bursae pear-shaped, without spicules; a small rounded accessory sac arising near middle of corpus.

Holotype ♂, Costa Rica, San José Province, Est. Cuericí, por Quebrada Los Leones, 4.5 km E Villa Mills, 2600 m, 7–10 Dec. 1996, A. Picado (INBio).

Paratypes. Alajuela Province: Mount Poás, 2350 m, [no date] (1 ♀), W. Schaus (USNM), 15 Dec 1982 (1 ♀), D. Janzen & W. Hallwachs (INBio). Paraíso, P.N. Tapantí-Macizo de la Muerte, 300 m SE Río Porras, 1660 m, Feb 2000 (1 ♂), Nov 2000 (1 ♂), R. Delgado (INBio). **Cartago Province:** Fca. Los Lagos, 2600 m, 8 Jun 1994 (1 ♂), M. Chavarría (INBio). P.N. Tapantí, El Guarco, San Isidro, Est. Esperanza, 2450–2700 m, Mar 2000 (1 ♂), May 2000 (1 ♂), 28 Feb 2001 (1 ♂), May 2001 (1 ♂), R. Delgado (INBio). El Guarco, Villa Mills-CATIE, 2840 m, 26–28 Oct 2000 (3 ♂), R. Delgado (INBio). El Guarco, Macizo de la Muerte, Sector de la Esperanza, 2600 m, Jun 2001 (1 ♂), Jul 2001 (1 ♀), May 2002 (2 ♂), R. Delgado (INBio). Villa Mills, 2840 m, 26–28 Oct 2000 (2 ♂), V. Becker (VBC). Paraíso, P.N. Tapantí-Macizo de la Muerte, 300 m SE Río Porras, 1660 m, Jan 2000 (1 ♂), R. Delgado (INBio). R.F. Río Macho, El Guarco, 500 m E Est. de la Esperanza, 2600 m, 13–14 May 2002 (2 ♂), J. Jiménez & E. Phillips (INBio). R.F. Río Macho, El Guarco, Macizo de la Muerte, Sector de la Esperanza, 2600 m, Aug 2001 (1 ♂), R. Delgado (INBio). R.F. Río Macho, El Guarco, Macizo de la Muerte, 2600 m, Oct 2001 (3 ♂), R. Delgado (INBio). P.N. Tapantí-Macizo de la Muerte, Est. de la Esperanza, 2600 m, Sep 2002 (1 ♀), R. Delgado (INBio). P.N. Tapantí, 1200–1700 m, 20 Aug–15 Sep 1999 (1 ♂), V. Becker (VBC). **Heredia Province:** Est. Barva, P.N. Braulio Carrillo, 2500 m, Nov 1989 (1 ♂), A. Fernández (INBio). Braulio Carrillo Nat. Park, 6 km ENE of Vara Blanca, 10°11′N, 84°07′W, INBio-OET-ALAS transect, 2000 m, 20 Feb 2002 (1 ♀), malaise trap (UCB). 6 km ENE Vara Blanca, 2000 m, 7 Oct 2002 (1 ♂), K. Nishida, MV light (USNM). **Limón Province:** Batsi, Valle del Silencio, 2472 m, 11–12 Oct 2000 (1 ♀), R. Delgado (INBio). **San José Province:** Est. Cuericí, 4.6 km E Villa Mills, 2600 m, 21–25 Sep 1995 (1 ♂), A. Picado (INBio). Est. Cuericí, Sendero al Mirador, 4.6 km E Villa Mills, 2640–2700 m, 19–20 Apr 1996 (1 ♀), B. Gamboa (INBio), 21 Jun 1996 (1 ♂), A. Picado (INBio), 20–22 Jan 1996 (1 ♂), B. Gamboa (INBio). Est. Cuericí, por Quebrada Los Leones, 4.5 km E Villa Mills, 2600 m, 7–10 Dec. 1996 (1 ♀), A. Picado (INBio). **Unknown Province:** Cascajal, ex. Janson, Jan 1924 (1 ♂), [no collector] (BMNH).

Geographic and temporal distribution. *Orthocomotis altivolans* occupies the highest elevations of any of the Costa Rican *Orthocomotis*, ranging primarily from 2500 to 2700 m; there are a few records from 1600 m (Fig. 42). Captures are scattered throughout the year, with no evidence of a defined flight period. During a week of collecting near Vara Blanca (Heredia Province) in February 2002, we saw no specimens of this species at mercury vapor light or in blacklight traps, but found numerous individuals in malaise traps.

Etymology. The species name refers to the fact that the species occurs in high elevations.

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