

Review of North American species of the genus *Bicristella* Townes, 1966 (Hymenoptera: Ichneumonidae: Cryptini)

Обзор североамериканских видов рода *Bicristella* Townes, 1966 (Hymenoptera: Ichneumonidae: Cryptini)

D.R. Kasparyan^{1, 2}, Enrique Ruíz-Cancino¹
Д.Р. Каспарян^{1, 2}, Энрике Руиц-Канцино¹

¹Centro de Investigación, UAM Agronomía y Ciencias, Universidad Autónoma de Tamaulipas, Cd. Victoria, Tam. 87149 México.

²Zoological Institute, Russian Academy of Sciences, Universitetskaya Nab., 1, St. Petersburg 199034 Russia.

²Зоологический институт РАН, Университетская наб., 1, Санкт-Петербург 199034 Россия.

KEY WORDS: Ichneumonidae, *Bicristella*, new species, key, North America, Mexico.

КЛЮЧЕВЫЕ СЛОВА: Ichneumonidae, *Bicristella*, новые виды, определитель, Северная Америка, Мексика.

ABSTRACT. Key to 13 North American species of *Bicristella* is given. Characters separating *Bicristella* from the closely related genus *Polycyrtus* are discussed. Five species are transferred for the first time from *Polycyrtus* to *Bicristella* (comb.n.): *Bicristella acerbus* (Cresson), *B. paululus* (Cresson), *B. bulbosa* (Cushman), *B. carinispinis* (Cushman), *B. infracta* (Cushman). Four new species are described (all from Mexico): *B. cedrella* sp.n., *B. delphini* sp.n., *B. epimeron* sp.n., and *B. hilaris* sp.n. 12 species (80% of the genus) are recorded for México; new data on their distribution are given. *Bicristella chontalensis* (Cameron) is considered as dark variation of *B. acerbus* (new synonym)

РЕЗЮМЕ. Дана определительная таблица 13 североамериканских видов *Bicristella*. Обсуждаются признаки, отделяющие *Bicristella* от эволюционно близкого рода *Polycyrtus*. 5 видов перенесены из рода *Polycyrtus* в род *Bicristella* (comb.n.): *Bicristella acerbus* (Cresson), *B. paululus* (Cresson), *B. bulbosa* (Cushman), *B. carinispinis* (Cushman), *B. infracta* (Cushman). Описываются 4 новых вида, все из Мексики: *B. cedrella* sp.n., *B. delphini* sp.n., *B. epimeron* sp.n. и *B. hilaris* sp.n. 12 видов (80% рода) отмечаются для Мексики; приведены новые данные об их распространении. Установлена новая синонимия: *Bicristella acerbus* (Cresson, 1873) = *Bicristella chontalensis* (Cameron, 1885), syn. n.

Introduction

Bicristella Townes is a moderately large genus of predominantly neotropical distribution, from Mexico to southern Brazil; one species, *B. texana* Porter, is described from the southern border of the USA [Townes, Townes, 1966; Townes, 1970; Porter, 1977; Yu, Horst-

mann, 1997]. In addition to 13 species of North America which are considered here, the other two species are known: *B. testacea* (Tashenberg), a genotype (Southern Brazil), and *B. tricolor* (Brullé) (Cuba). Mexican fauna of genus is the most diversified one. Twelve species (out of 15 known) are recorded here for Mexico.

The genus is closely related to the large neotropical genus *Polycyrtus*. H. Townes mentioned for *Bicristella* that «the only character in which it differs constantly from *Polycyrtus* is in the propodeal apophyses. Each of these is in form of an arched, transverse crests rather than a horn or tubercle» [Townes, Townes, 1966; Townes, 1970]. Here this genus is treated more widely. We transfer to *Bicristella* also those species of «*Polycyrtus*» which have a pair of median longitudinal carinae between crests (or apophyses) that bordered median elongate area usually partly rugose-punctate (Figs 2, 6) (these carinae sometimes strongly reduced but discernible); some species of *Bicristella* have short apophyses connected by a transverse carina (Fig. 1), but this character is sometimes present in *Polycyrtus*. Species of *Bicristella* may also be separated from *Polycyrtus* by the following additional characters which are present in various combinations in different species of *Bicristella* but are absent or very rare in *Polycyrtus*:

1. Concavity on cheek behind lower corner of mandible (*bicarinata*, *carinispina*, *cedrella*, *delfini*, *epimeron*, *infracta*, *univittata*) — Fig. 10.

2. White horn on frons (*bulbosa*, *carinispinis*, *delfini*, *epimeron*, *infracta*, *univittata*); horn often rather small, or entirely reduced in *hilaris*.

3. Epomia short, not closely extend to upper margin of pronotum, its upper end not turned mesad (most species) or epomia absent (*bulbosa*, *carinispinis*, *infracta*).

4. Lateral suture of mesoscutum often interrupted by callosity close to hind margin of tegula (*bicarinata*, *acerbus*, *carinispina*, *delfini*, *epimeron*, *texana*, *univittata*) — Figs 5, 8.

5. Metapleurum coarsely punctate (*acerbus*, *bulbosa*, *delfini*, *humerosa*, *paululus*, *texana*, *univittata*).

6. Nervellus usually opposite or slightly basad of basal vein (except only for *acerbus* and *texana*).

7. Areolet rather small, about 0.35–0.5 as long as abscissa of second recurrent vein above the bulla (more than 0.5 only in *delfini* and *epimeron*).

8. Black hind margin of tergites 2 and 3 in 60% species having black abdomen with white bands (*cedrella*, *delfini*, *paululus*, *texana*) — Figs 19, 21.

Some of these characters (1, 4, 6), together with crests or median longitudinal carinae of propodeum, especially important and their presence distinctly points to *Bicristella*.

B. infracta and *B. bulbosa* were earlier referred to *Polycyrtus*. They are not typical *Bicristella* species; their apophyses are not connected by carina and median longitudinal carinae are obsolescent (but partly present); propodeum (and metapleurum) polished in *B. infracta*, but scabrous behind apophyses in *B. bulbosa*. These species are autapomorphous in lacking epomia and differs from other *Bicristella* and *Polycyrtus* in having a central white spot on mesoscutum. However, these species included here in *Bicristella*, as both species habitually and in coloration are very similar to some typical *Bicristella* (*B. epimeron*, *B. univittata*), both have visible traces of median longitudinal parallel carinae on propodeum, and some of characters listed above are present in both. *B. infracta* is more distant from other *Bicristella* (and *Polycyrtus*) due to following autapomorphies: nervellus not intercepted, modification of lower end of occipital carina, deep slot on posterior margin of subtegular ridge; but it is very similar to *B. epimeron* (one typical of *Bicristella*) in many unusual characters of coloration and structure — cavity on cheek, short white horn, rather similar modification of subtegular ridge, polished metapleurum and propodeum, subquadrate areolet, etc.

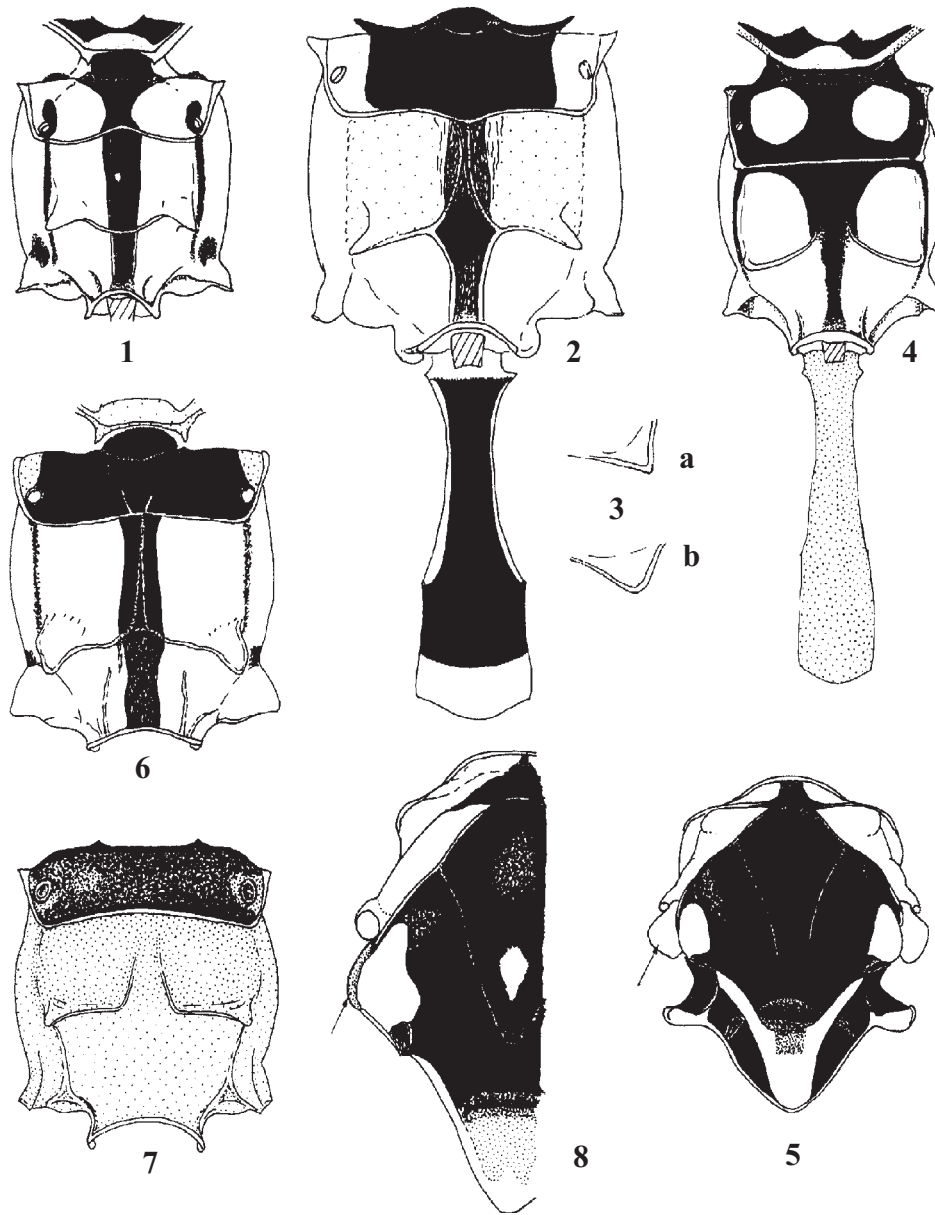
Types of all North American species (except *B. humerosa* Cushman) have been examined by senior author. Types of new species (except of *B. hilaris*) and all materials (with especially noted exceptions) are deposited in the Insect Museum, UAT, in Cd. Victoria, Tamaulipas, México.

The following abbreviations have been used for collections containing types of Mexican and neotropical species. AEI — American Entomological Institute, Gainesville, Florida, U.S.A., Mus. London — Natural History Museum, London, U.K., Mus. Philadelphia — Philadelphia Academy of Natural Sciences, Philadelphia, U.S.A., Mus. Washington — U.S. National Museum of Natural History, Washington D.C., U.S.A., Other abbreviations: «des.» — description, «design.» — designated, SMSC — «selva mediana subcaducifolia», SMSP — «selva mediana superperennifolia».

In «Material», we cited Spanish words like in labels.

KEY TO NORTH-AMERICAN SPECIES OF *BICRISTELLA*

1. Metasoma rufous 2
— Metasomal tergites black with whitish apical or subapical bands 7
2. Head entirely black (only palpi rufous). Body entirely reddish. Cheeks just beyond mandible with deep concavity. Mesoscutum with callosity on lateral suture behind tegula (same colour as mesoscutum). Carinae bordering propodeal crests proximally turn anteriorly and extend to basal transverse carina. Frontal horn strong, black, with two lateral pits at base. — Panamá
..... 2. *B. bicarinata* (Cushman)
— Head black and white. At least pronotum and mesoscutum predominantly black. Horn usually (not always) white, small, sometimes absent 3
3. Frons without horn. Front tegulae brownish and almost entirely hidden under the broad white lateral callosity of mesoscutum (Fig. 8). Lower end of occipital carina as high as hypostomal carina (Fig. 11). Pronotum with complete vertical white bands on its lateral sides (cf. fig. 14). Mesoscutum with a small central white spot (or sometimes spot absent). Mesopleurum entirely pale rufous or whitish. Propodeum uniform before basal transverse carina — from entirely black to entirely fulvous (Fig. 7). Legs fulvous with front coxae white 8. *B. hilaris* sp.n.
— Frons with horn. Front tegula white, not covered above with lateral margin of mesoscutum or covered only at base (Fig. 5). Most other characters not as above (except *B. infracta*) 4
4. Mesoscutum black with white callosity on lateral suture just behind the level of hind margin of front tegulae (Fig. 5). Prepectus and upper margin of mesopleurum black (except for subtegular ridge). Cheek between base of mandible and lower end of occipital carina deeply concave 5
— Mesoscutum black with a central white spot, without analogous marking on lateral suture close to tegula 6
5. Mesepimeron and propodeum before basal transverse carina (except two round submedian yellow spots) black (Figs 4, 13). Subtegular ridge with posterior tooth (Fig. 12). Metapleurum and propodeum entirely polished
..... 7. *B. epimeron* sp.n.
— Mesepimeron only partly blackish; propodeum pale rufous before basal transverse carina, except for median black band. Subtegular ridge without tooth. Metapleurum of female coarsely and densely punctate, in male punctures much sparser. Propodeum longitudinally striato-rugose between crests 13. *B. univittata* (Cresson)
6. Nervellus not intercepted, discoidella absent. Frontal horn small, conical, acute and white at apex. Cheek with deep concavity behind mandible; occipital carina high, joints hypostomal carina and partly covers the concavity above (cf. Fig. 11). Pronotum white with a black spot on collar and another one on hind margin (Fig. 14). Subtegular ridge narrow, black, its hind slope with a deep slot. Whole prepectus, upper margin of mesopleurum and mesepimeron black. Propodeum entirely black before basal transverse carina. Metapleurum polished
..... 10. *B. infracta* (Cushman)
— Nervellus intercepted, discoidella present. Frontal horn white, large, bulbous at apex (Fig. 9). Cheek slightly impressed behind mandible; occipital carina low and indistinctly joints hypostomal carina. Pronotum with complete black band between hind margins. Subtegular ridge not as above. Mesopleurum and propodeum entirely pale rufous with white spots. Metapleurum coarsely rugose-punctate 3. *B. bulbosa* (Cushman)



Figs 1–8. *Bicristella* spp: 1 — *B. cedrella* sp.n., propodeum; 2–3 — *B. delphini* sp.n., propodeum and first tergite (2), propodeal crests, dorsal view (a, b — variations) (3); 4–5 — *B. epimeron* sp.n., propodeum and first tergite (4), pronotum and mesoscutum, dorsal view (5); 6 — *B. paululus* Cress. (type), propodeum; 7–8 — *B. hilaris*, sp.n., propodeum (7), pronotum and mesonotum, dorsal view (8). Tegula is indicated by arrow.

Рис. 1–8. *Bicristella* spp: 1 — *B. cedrella* sp.n., проподоум; 2–3 — *B. delphini* sp.n., проподоум и 1-й тергит (2), апофизы проподоума, вид сверху (a, b — вариации) (3); 4–5 — *B. epimeron* sp.n., проподоум и 1-й тергит (4), пронотум и мезоскутум, вид сверху (5); 6 — *B. paululus* Cress. (type), проподоум; 7–8 — *B. hilaris*, sp.n., проподоум (7), пронотум и мезонотум, вид сверху (8). Тегула обозначена стрелкой.

7. Mesoscutum black with two large white callosities on lateral sutures partly covering the base of front tegulae at their posterior 0.5; hind margin of tegulae fuscous. Scape black. Scutellum black with apex and lateral carinae white. Mesopleurum and metapleurum pale rufous; mesopleurum with black elongate spot at hind half of upper margin. Metapleurum coarsely and densely punctate, partly rugose. Propodeum basally between spiracles with a pair of fuscous submedian spots, behind basal transverse carina

with three longitudinal blackish bands. First segment whitish with ventro-lateral fuscous lines, and black dorsally at apical 0.4 except for hind white margin. Tergites 2 and 3 black at basal 0.7, with subapical white band and black apical margin (Fig. 19). 2nd tergite of female with subbasal white spot (absent in male). Hind coxa pale, without dorsal black band 12. *B. texana* Porter — Mesoscutum black with two median yellow stripes, and sometimes with white callosity on lateral suture 8

8. Epomia absent. Second metasomal tergite of three colours: pale rufous or brownish at basal half, black behind the middle and white apically (Fig. 18). Propodeum without a median longitudinal fuscous band, with two brownish submedian spots before basal transverse carina, without any carinae and polished between crests. Mesoscutum with white lateral callosity close to tegula. Mesopleurum (and metapleurum) entirely pale. Metapleurum of female polished. Cheeks with deep concavity beyond base of mandible. Hind coxa pale, without dorsal black band
..... 4. *B. carinispina* (Cushman)
- Epomia present. Second metasomal tergite black and white. Propodeum with median longitudinal fuscous band, between apophyses (or crests) with coarse sculpture on black band, which usually bordered laterally with carinae. Mesoscutum usually without white callus on lateral suture or the callus is either small or black. Mesopleurum pale, black above and under subtegular ridge. Metapleurum of female entirely or partly rugose-punctate 9
9. Tergite 2 white basally and apically (Fig. 20). Hind coxa pale, without dorsal fuscous band. Cheeks not concave. Occipital carina distinctly joints hypostomal carina; hypostomal carina high. Mesoscutum without white callosity on lateral suture. Scutellum white, laterally black. Epomia short. Mesopleurum pale with black spot on pit behind subtegular ridge, or sometimes partly also under subtegular ridge. Metapleurum pale, with moderately coarse punctures. Propodeum pale rufous, only median longitudinal band and weak pleural ones are black or brownish. Crests strong; black band between crests anteriorly bordered with carinae which meet before basal transverse carina. Petiole whitish, black ventrally. Ovipositor sheath about 0.9–1.0 as long as hind tibia 9. *B. humerosa* (Cushman)
- Tergite 2 black basally and sometimes also at apical margin. Hind coxa with dorsal black band or sometimes with rather weak dorsal pale brown mark (Fig. 15). Other characters not entirely as above 10
10. Tergites 2 and 3 white at hind margin. Hind coxa rufous with distinct blackish dorsal band. Petiole whitish dorsally at basal half. Nervellus intercepted about at lower 0.2; nervellus strongly antefurcal. Mesoscutum with weak white callus on lateral suture close to tegula. Black spot of mesopleurum usually expands from hind part of subtegular ridge to mesopleural fovea along oblique groove (before speculum) 11
- Tergites 2 and 3 with hind margin black (beyond subapical white band). Hind coxa with rather weak dorsal pale brown mark. Petiole black dorsally. Nervellus intercepted at lower 0.3–0.5; nervellus weakly antefurcal 12
11. Femora rufous, pale brownish dorso-posteriorly in the type. Hind coxa with complete dorsal black band. Sternaulus not darkened 1. *B. acerbus* (Cresson)
- Front femora entirely brownish, hind femora brownish-black dorsally. Hind coxa with dorsal black band interrupted medially (in the type). Sternaulus blackish
..... *B. acerbus* var. *chontalensis* (Cameron)
12. Propodeum black medially before basal transverse carina only on 20%. Cheek concave beyond lower corner of mandible; concavity bordered with carina that extending from base of mandible (Fig. 10). Scutellum white dorsally and apically. Apophyses not flattened, but connected by carina bending medially downwards (Fig. 1). Scape black. Lateral suture of mesoscutum not interrupted with callus. Hind coxa pale with weak dorsal brownish stripe (Fig. 15). First segment black, white laterally and on hind margin. Tergites 2 and 3 with rather sparse hairs
..... 5. *B. cedrella* sp.n.
- Propodeum predominantly black before basal transverse carina between spiracles. Cheeks not concave behind base of mandible. Scutellum black dorsally with yellow apex and lateral carinae. Apophyses strongly flattened, connected or not connected by carina. First segment white, dorsally black (with apical or subapical white band) 13
13. Apophyses not connected by carina; apophyses rather narrow; propodeal basal black spot not expands laterally to spiracles (Fig. 2). Scape with ventral white spot. Collar and hind corner of pronotum black. Hind coxa pale, almost whitish, with very weak apical pale brownish marks dorsally. Tergites 2 and 3 with rather wide apical black band (Fig. 21) (all tergites, except tergite 1, with moderately dense long blackish hairs) 6. *B. delphini* sp.n.
- Apophyses connected by distinct carina; apophyses wide; propodeum before basal transverse carina entirely black between spiracles (Fig. 6). Scape brown ventrally in the type (with very unclear whitish spot basally in male paratype). Collar and hind corner of pronotum widely yellow. Hind coxa rufous with distinct dorsal median blackish line from base to apex and with pale dorsal spot close to this line (thus, coxa dorsally of three colours). All tergites with apical black margin (in type tergite 1 with median black apical spot. Occipital carina at lower end strongly bent to hypostomal carina, but does not reach it more than half way 11. *B. paululus* (Cresson)

1. *Bicristella acerbus* (Cresson, 1873) **comb.n.**

Cresson, 1873: 144, ♀ [*Mesostenus (Polycyrtus)*]; type: ♀, Mexico: Mirador]. Cushman, 1931: 57 (*Polycyrtus*; key). — *chontalensis* Cameron, 1885: 236, ♂ (*Polycyrtus*; type: ♂, Nicaragua: Chontale), **syn.n.**

MATERIAL. Mexico. Tamaulipas: Cd. Victoria, La Libertad, Los Troncones, 25.IX.1988 (R. Thompson), ♂; Cd. Victoria, canyon Novillo, 8.VI–13.VII.1985 (A. del Valle), 3 ♀♀; Gomez Farias, 3.VII.1981 (E. Ruiz C.), 1 ♀ 1 ♂. Veracruz: Mirador, type of *B. acerbus* (Mus. Philadelphia). Veracruz, Tuxpan: Chacoaco, Higueral, Juana Moza, Ojite, Tihuatlan, citricos, 17.X–9 XI.1995 (R.C. Azuara, R. Herrera, M. Molina), 4 ♀♀ 7 ♂♂. Nayarit, Vic. Compostela, VI.1934 (*Bicristella chontalensis* Cam., det. H. Townes), ♀ (AEL). Yucatan: Corral (SMSC) and Sudzal Chico (SMSP), I–VIII.1999 (Hugo Delfin), ♂. Nicaragua, type of *B. chontalensis* (Mus. London).

DISTRIBUTION. Mexico: Tamaulipas, Veracruz, Nayarit, Yucatan. Nicaragua.

REMARKS. *B. chontalensis* is considered here as a dark variation of *B. acerbus*; differences are given in the key.

2. *Bicristella bicarinata* (Cushman, 1931)

Cushman, 1931 : 48(des.), 54 (key), ♀ [*Polycyrtus (Polycyrtus)*]; type: ♀, Panamá]. Townes, Townes, 1966 : 108 (*Bicristella*). **MATERIAL.** Type: «Panamá, 4. 5. 23» (Mus. Washington). Venezuela: 2 ♀♀ 1 ♂ (det. H. Townes) (AEL).

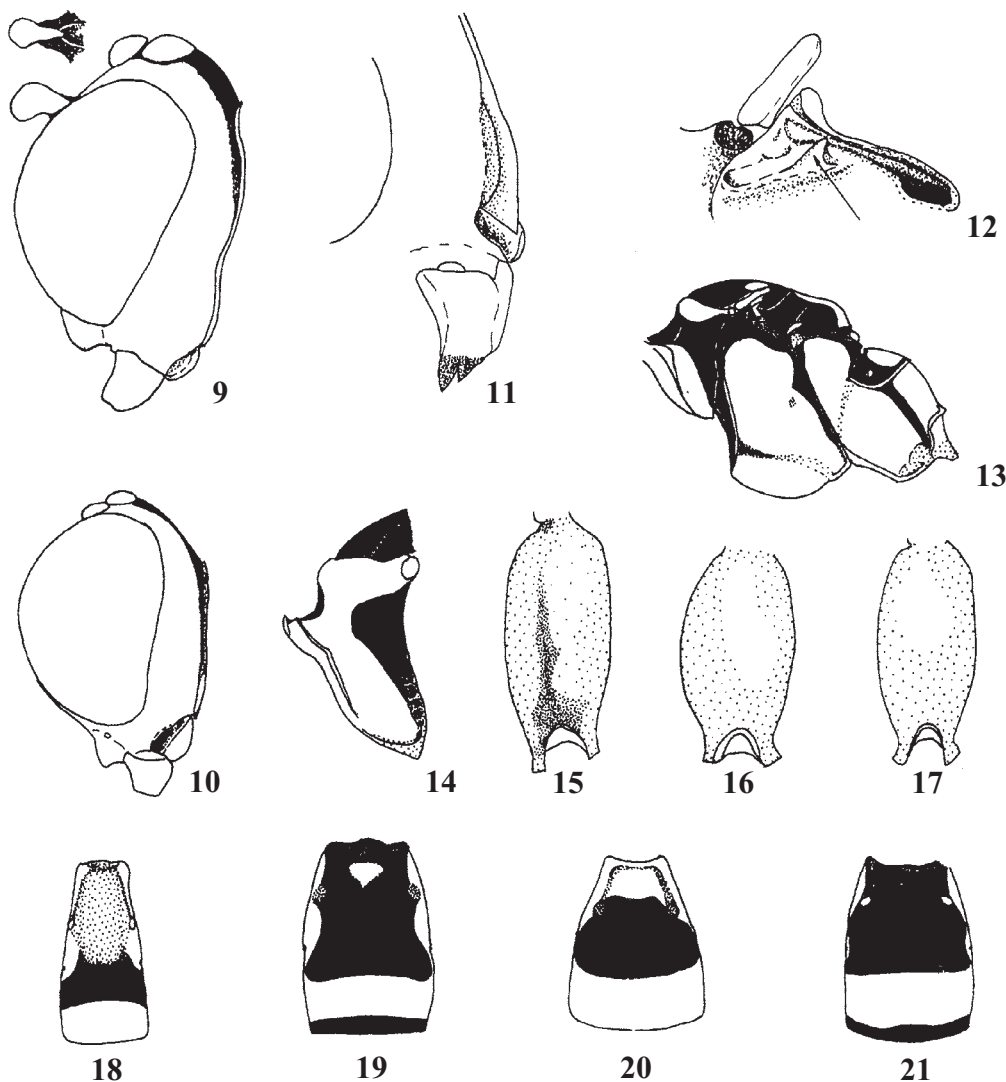
DISTRIBUTION. Panamá, Venezuela.

3. *Bicristella bulbosa* (Cushman, 1931) **comb.n.**

Fig. 9.

Cushman, 1931 : 46 (des.), 3, 55 (keys), ♀; [*Polycyrtus*]; type: ♀, Mexico]. Townes, Townes, 1966 : 110.

MATERIAL. Mexico: type, «Mex. 1785» (Mus. Washington). Tamaulipas: Cd. Victoria, canyon Novillo, 8.VI.1985 (A. del Valle), ♀; 15 km N Cd. Victoria, Rancho Nuevo, 21.II.1999 (Kasparyan), ♀; Gomez Farias, Los Cedros, 300 m, 12.X, 16.XII.1998 (Kasparyan), 3 ♀♀ 1 ♂; same, locality, tr. Malaise, 19.XII.1998–8.V.1999 (S. Hernández), 32 ♀♀ 22 ♂♂, same



Figs 9–21. *Bicristella* spp.: 9 — *B. bulbosa* Cush., head lateral view, and horn, dorsal view; 10 — *B. cedrella* sp.n., head laterally; 11 — *B. bilaris*, lower part of temple, and mandible; 12–13 — *B. epimeron* sp.n., subtegular ridge (12), mesosoma, lateral view (13); 14 — *B. infracta* Cush., pronotum, lateral view; 15–17 — hind coxa, dorsal view, *B. cedrella* sp.n. (15), *B. epimeron* sp.n. (16), *B. infracta* Cush. (17); 18–21 — metasomal tergite 2, *B. carinispinis* Cush. (18), *B. texana* Porter (19), *B. humerosa* Cush. (20), *B. delphini* sp.n. (21).

Рис. 9–21. *Bicristella* spp.: 9 — *B. bulbosa* Cush., голова, вид сбоку, и рог, вид сверху; 10 — *B. cedrella* sp.n., голова, вид сбоку; 11 — *B. bilaris* sp.n., нижняя часть виска и мандибула; 12–13 — *B. epimeron* sp.n., субтегулярный валик (12), грудь, вид сбоку (13); 14 — *B. infracta* Cush., пронотум, вид сбоку; 15–17 — задний тазик, вид сверху, *B. cedrella* sp.n. (15), *B. epimeron* sp.n. (16), *B. infracta* Cush. (17); 18–21 — метасомальный тергит 2, *B. carinispinis* Cush. (18), *B. texana* Porter (19), *B. humerosa* Cush. (20), *B. delphini* sp.n. (21).

data, 26.VI–3.VII.1999, 1 ♂. Chiapas, Palenque, selva alta, 3.IV.1997 (A. Martínez et al.), 2 ♀♀.

DISTRIBUTION. Mexico: Tamaulipas, Chiapas.

4. *Bicristella carinispinis* (Cushman, 1931) **comb.n.**

Fig. 18.

Cushman, 1931 : 47 (des.), 3, 59 (keys), ♀ [*Polycyrtus* (*Polycyrtus*); type: ♀, Honduras: La Ceiba]. Townes, Townes, 1966 : 111.

MATERIAL. Mexico. Veracruz, Tuxpan, Tihuatlan, citrus, 27.X.1995 (R.C. Azuara), ♀. Yucatan, Corral (SMSC), Enero, 1999 (Hugo Delfin), ♀. Honduras: type, «La Ceiba, Honduras, X. 24. 16» (Mus. Washington).

DISTRIBUTION. Mexico, Honduras.

5. *Bicristella cedrella* sp.n.

Figs 1, 10, 15.

MATERIAL. Holotype: ♂, Mexico, Tamaulipas, Gomez Farias, 300 m, Los Cedros, trampas amarillas, 26.II.1995 (S. Niño, J. Coronado, C. Hernández). Paratype: Yucatan, Ticul, Yotholin 30.III.1997 (A. Martínez et al.), ♂.

DESCRIPTION. *B. cedrella* resembles *B. paululus* in coloration and in having apical transverse carina, but base of propodeum in *B. cedrella* black only at median 0.25 (Fig. 1), petiole black ventrally, dorsal dark band of hind coxa very weak and incomplete (Fig. 15). Structurally it differs from *B. paulu-*

lus and from *B. delphini* in having obvious deep concavity on cheek beyond lower corner of mandible (Fig. 10).

Male (holotype). Fore wing 6.5 mm long. Antenna with 28 flagellar segments; segments 13 to 18 with a tyloid. Frontal horn of moderate size, acute at apex. Cheek deeply concave just beyond lower corner of mandible (Fig. 10); concavity partly bordered anteriorly (on cheek) with fine carina that arise directly from lower corner of mandible. Hypostomal carina high, borders this concavity; occipital carina interrupted before concavity and projects above it as a small tooth (Fig. 10). Epomia distinct, but does not reach thickened (white) upper margin of pronotum. Mesoscutum without lateral callosity close to hind margin of tegula. Mesosoma polished; metapleurum with scarce and rather fine punctures. Propodeum between apophyses with distinct apical transverse carina that bent downward medially, and with two weak median parallel carinae extending from apical transverse carina to apex (Fig. 1); apophyses rather short (about 0.8 as long as basal width), almost not flattened and not bordered with carina. Hairs on propodeum long and sparse, pale. Areolet small, about 0.66 as long as wide and about 0.5 as long as abscissa of 2nd recurrent vein above the bulla. Nervulus opposite basal vein; nervellus intercepted at lower 0.44. Metasomal tergites 2–3 with sparse, rather long pale hairs.

A predominately black and white species. Antenna black with flagellar segments (7)8–14(15) white. Head white; frons and vertex (except for orbits), hind margin of temple at upper 0.5 and occiput except for lower 0.2 black; horn black with obscure small pale mark before apex. Propleurum white; pronotum black, front and upper margins laterally broadly white; its hind corners before tegulae entirely whitish. Mesoscutum black with two median yellow stripes. Scutellum white, black on basal groove (except white lateral carinae) and laterally, its hind margin white. Metanotum black, its hind margin and postscutellum white. Mesopleurum pale rufous; tegulae, subtegular ridge, apex of mesepimeron white; subalar prominence and line under subtegular ridge black. Metapleurum pale rufous with brown spot before base of hind coxa. Propodeum pale rufous with three longitudinal black bands (Fig. 1). Legs pale, front and mid coxae whitish, front and mid trochanters, femora and tibiae paler (almost whitish) anteriorly; small dorsoapical spot on mid coxa, all trochanters I posteriorly, tarsal segments 3–5 of front and mid tarsi brown. Hind coxa pale rufous with dorsal brownish stripe and whitish spot just behind of this stripe (Fig. 15). Hind femur pale rufous, very light brownish at dorsal 0.4 and with pale yellow line from base to apex. Hind tibia yellowish with small basal brown marks laterally. Hind tarsus entirely whitish. First metasomal segment blackish, white laterally and at apex (dorsal view similar to *B. delphini* — Fig. 2). Tergites 2–6 black basally, with broad white subapical band (hind margin black) (tergites 2 and 3 black at basal 0.6 and 0.4 correspondingly, tergites 4–6 black at about basal 0.25); tergite 7 white at apical 0.7, black basally; parameres and sternites white (except for sternite 1).

DISTRIBUTION. Mexico: Tamaulipas, Yucatan.

6. *Bicristella delphini* sp.n.

Figs 2, 3, 21.

MATERIAL. Holotype: ♀, Mexico, Yucatan, Corral (SMSC), Julio 1999 (Hugo Delfin). Paratypes: same data as holotype, I–VI.1999 1 ♀, 3 ♂♂; Mexico, Yucatan, Sudzal Chico (SMSP), Febrero 1999 (Hugo Delfin), 1 ♂.

DESCRIPTION. *B. delphini* differs from other species of the genus with median yellow stripes on mesoscutum in having broad median black spot at base of propodeum (Fig. 2), and black

hind margin of tergites 2 and 3 (Fig. 21). Both these characters present also in *B. paululus*, from which *B. delphini* may easily be distinguished by characters given in the key.

Female (holotype). Fore wing 7.2 mm long. Antenna with 31 flagellar segments; segments 12–27 on lower flattened side with about 30–40 small whitish dots (sensillae) more or less assembled in 4–5 transverse rows. Frontal horn robust, but rather short and obtuse, white at apex. Hypostomal carinae moderately high; occipital carina strong, sharply bent to hypostomal carina, but does not reach it. Epomia distinct, moderately long, does not expand on thickened (white) upper margin of pronotum. Lateral sutures of mesoscutum on the level of hind margin of the tegulae slightly interrupted by small callosity (black on left side and somewhat pale on right side of mesoscutum). Mesosoma polished; mesopleurum with sparse and moderately coarse punctures; metapleurum coarsely and densely rugose-punctate; propodeum distad of apophyses with rather coarse punctures, before and beyond apophyses with fine and sparse punctures. Apophyses short, flattened, triangular, bordered with carinae which reach two submedian longitudinal parallel carinae in hind part of propodeum (Fig. 2). Hairs on propodeum beyond basal transverse carinae long, rather sparse, blackish. Areolet rather small, about 0.35 as long as abscissa of second recurrent vein above the bulla. Nervulus opposite or slightly basad of basal vein; nervellus intercepted on lower 0.34. Metasomal tergites 2–8 with moderately long, sparse blackish hairs. Ovipositor sheath 1.1 as long as hind tibia. Ovipositor with distinct nodus; upper valve distad of nodus 1.45 as long as segment 2 of hind tarsus.

A predominantly black and white species. Antennae black; scape with white ventral spot; flagellar segments 6–11 (partly segments 5 and 12) white. Head white; lower margin of clypeus, frons and vertex (except for orbits), hind margin of temple at upper 0.4, upper half of occiput — black; frontal horn black, at apex whitish. Propleurum white; pronotum black, laterally with two broad white spots — on front and upper margin (collar and hind corner of pronotum black). Mesoscutum black with two median yellow stripes. Scutellum black, its lateral carinae, apex and hind margin white. Metanotum black with postscutellum, hind margin and small spot before hind tegula white. Tegulae white, hind plates at base of front wing brown. Mesopleurum, mesosternum, metapleurum and propodeum pale (almost whitish); prepectus partly brown on acetabular carinae and between them; subalar prominence and line under subtegular ridge black, mesopleural pit brownish; metapleurum with small wedge-like spot on anterior suture; propodeum before basal transverse carinae at about median 60% entirely black; that behind basal transverse carina with a median and two lateral black bands (Fig. 2). Front and mid coxae white; front and mid trochanters, femora and front tibia whitish anteriorly, pale brownish posteriorly; mid tibia pale brownish, paler anteriorly; tarsi brownish, darker on apex. Hind coxa and trochanters pale, whitish ventrally; coxa with very indistinct dorsal pale brownish markings which are paler to base; trochanters dorso-ventrally with brownish stripes. Hind femur pale brownish at dorsal half with dorsal white line, white on lower half. Hind tibia light yellowish with small lateral brownish marks at base. Hind tarsus white, apical half of last segment brown. Pterostigma yellowish-rufous.

First metasomal segment white, black dorsally, except for apical white band (Fig. 2). Tergite 2 black dorsally at basal 0.65 (except for thyridium) and at apical 0.1; laterally and on subapical 0.25 white. Tergite 3 black dorsally at basal 0.4 and on apical 0.1, laterally and on subapical 0.5 white. Tergites 4–7 black at basal 0.3–0.4 and white laterally and apically with

very narrow blackish line on hind margin. Tergite 8 white laterally, black dorsally to hind margin.

Male. Fore wing 7–8 mm long. Flagellum with approximately 30 segments; segments 8–15 white; segments 14–20(21) with a tyloid. Coloration and sculpture as in female, but mesopleural suture and hind part of speculum sometimes brownish.

Variability. Second female (paratype) is larger, fore wing 9.5 mm long, flagellum also 31-segmented.

DISTRIBUTION. Mexico: Yucatan.

7. *Bicristella epimeron* sp.n.

Figs 4, 5, 12, 13, 16.

MATERIAL. Holotype: ♀, Mexico, Tamaulipas, Gomez Farias, 300 m, Los Cedros, tr. Malaise (1), 30.I–6.II.1999 (S. Hernández, C. Covarrubias). Paratypes. Mexico, Gomez Farias: Gomez Farias, 29.VII.1989, 25.V.1990 (L. Hernandez, E. Ruiz C.), 2 ♂♂; El Nacimiento, 100 m, 24.I.1999 (Kasparyan), ♀; same data as holotype, 6.II–8.V.1999 (S. Hernandez), 4 ♀♀ 3 ♂♂; same locality, tr. amarillas, 25.II.1995 (J. Coronado et al.), ♀; Alta Cima, 940 m, tr. Malaise, 13.II–19.VI.1999 (S. Hernández), 6 ♀♀ 2 ♂♂; same locality, tr. Malaise, 4.VIII–23.IX.2000 (Kasparyan), 4 ♂♂. Veracruz, Tuxpan, Chacoaco, citrus, 9.II.1995 (M. Molina), ♀. Tabasco, Macuspana, herba- cea, 25.III.1997 (A. Martínez), ♂. Quintana Roo, Othon P. Blanco, Ej. Allende, 31.III.1997 (A. Martínez et al.), ♀ ♂. Costa Rica, Monteverde, Feb. 1963 (Rettenmeyer), ♀ (AEI).

DESCRIPTION. *B. epimeron* is distinguished from other species by distinct peculiarities of coloration: mesopleurum widely bordered with black (except from below) (Fig. 13), mesoscutum black with a pair of white lateral spots (Fig. 5) and propodeum basally black with two submedian white spots (Fig. 4), hind coxa rufous with dorsal white spot at basal 0.6 (Fig. 16), metasoma rufous. *B. epimeron* differs structurally in having an autapomorphy — unusual modification of subtegular ridge, a tooth on its hind margin (Fig. 12).

Female (holotype). Fore wing about 6 mm long. Antenna with 27 flagellar segments. Frontal horn small, conical, white. Cheek just beyond lower corner of mandible concave (like *B. cedrella* — Fig. 10), but concavity not bordered anteriorly with carina, black along hypostoma. Hypostomal carina high; occipital carina before concavity abruptly bent to hypostomal carina, but does not reach it. Epomia distinct, does not expand on the anteriorly very thickened white part of upper margin of pronotum (Fig. 5); the carina on front margin of pronotum also stronger elevated dorsolaterally than in other species. Lateral suture of mesoscutum interrupted by large white callosity which partly covers base of tegula (Fig. 5). Subtegular ridge rather flat, with tooth on posterior margin and a long slot on hind slope; the slot and tooth covered with dense whitish hairs. Mesosoma polished, with small scarce punctures. Apical transverse carina of propodeum present, shortly interrupted medially (Fig. 4); its lateral ends strong and reach hind margin of propodeum close to base of hind coxa (Fig. 4), median ends turned anteriorly and extend to half distance to basal transverse carina; crests strong, bordered with carina. Hairs on propodeum pale, fine, rather long and sparse. Areolet small, about 0.66 as long as wide and about 0.45 as long as abscissa of 2nd recurrent vein above the bulla. Nervulus opposite basal vein; nervellus intercepted on lower 0.45. Metasomal tergites 2 and 3 with rather short and moderately dense hairs. Ovipositor sheath 1.05 as long as hind tibia. Ovipositor with distinct nodus; upper valve distad of nodus 1.23 as long as segment 2 of hind tarsus.

Head and mesosoma black and ivory (or white), metasoma fulvous or rufous. Antenna black with flagellar segments 6–11

(12) white. Head ivory with frons and vertex (except for orbits), hind part of temple at upper 0.3, occiput entirely, hypostomal and occipital carinae, and partly concavity on cheek black. Propleurum white; pronotum black, its front and upper margins broadly white except for narrow black gap on collar (Fig. 5). Coloration of thorax as on Fig. 5, 13. Legs rufous; front coxa entirely, mid coxa dorsally, spot on hind coxa (Fig. 16) white; front and mid tarsi brownish on segments 2–5 (darker dorsally); hind tarsus pale rufous with segment 5 infusate apically. Pterostigma brownish-yellow. Metasoma rufous with epipleura and sternites 2–6 whitish.

Male similar to female, but antenna with about 29 flagellomeres, flagellar segments 9–13 white and segments 13–18 with a tyloid.

Variation. Fore wing length 4–6 mm. Antenna of female with 25–27 flagellomeres. Two specimens have an entirely black horn and the horn is longer than usual in one of them. Sometimes median longitudinal black band of propodeum absent in its apical half; hind tarsal segments 2–5 often almost white.

DISTRIBUTION. Mexico: Tamaulipas, Veracruz, Tabasco, Quintana Roo. Costa Rica.

8. *Bicristella hilaris* sp.n.

Figs 7, 8, 11.

MATERIAL. Holotype: ♂, Mexico, Oaxaca, Metate, 65.5 km SW of Tuxtepec, 900 m, 20.X.1962 (H. et M. Townes). Paratypes: same data as holotype, 19–21.X.1962, 1 ♀ 1 ♂ (all material in AEI).

DESCRIPTION. *B. hilaris* may easily be distinguished from all other Mexican species by reduced frontal horn, light coloration, and very wide lateral callosity of mesoscutum which covers most part of tegula (Fig. 8). It closely resembles *B. infracta* by having similar modification of occipital carina (Fig. 11), a white median spot on mesoscutum, similar coloration (rather unusual for genus) of scapus, pronotum (Fig. 14), and base of propodeum (Fig. 7).

Female. Fore wing about 6 mm long. Antenna with 26 flagellar segments. Frontal horn almost entirely reduced. Mandibles rather strong tapered to apex; teeth small, lower tooth much smaller than the upper tooth. Hypostomal carina high behind mandible. Occipital carina joining hypostomal carina, the former being as high as hypostomal carina on the line of their connection (Fig. 11). Cheeks between these carinae moderately impressed, a concavity not bordered with keel anteriorly. Epomia strong. Callosity on lateral margin of mesoscutum very broad, covers most part of front tegula (Fig. 8). Mesosoma polished; metapleurum with obvious, rather sparse punctures. Propodeum with moderately strong crests (Fig. 7), polished. Pubescence beyond basal transverse carina rather long and sparse. Areolet subquadrate, small, about 0.35 as long as abscissa of 2nd recurrent vein above the bulla. Nervulus opposite the basal vein; nervellus intercepted about on lower 0.3. Ovipositor missing.

A predominantly pale rufous and fulvous species. Antenna brownish-black; scape white except narrow dorsal part, flagellar segments 5–12 white. Head white with frons and vertex (except orbits), hind margin of temple at upper 0.35, and upper 0.4 of occiput brownish-black. Mesoscutum, prescutellar groove and lateral parts of scutellum and postscutellum black; mesoscutum with large lateral white mark (Fig. 8) and with very small central whitish mark (almost invisible in female, but distinct in male). Apex of scutellum, prescutellar carinae, apex of postscutellum white; scutellum at basal 0.7 fulvous dorsally (Fig. 8). Mesopleu-

rum and metapleurum entirely pale rufous with white sub-regular ridge. Propodeum light fulvous, entirely blackish-brown before basal transverse carina. Legs fulvous with white anterior coxae. Metasoma entirely fulvous.

Male (holotype). Fore wing about 7 mm. Antenna with 29 flagellomeres; flagellar segments 8–14 white; segments 14–19 with a tyloid. Coloration of mesoscutum and lateral parts of scutellum and postscutellum dark reddish-brown; central white spot on mesoscutum distinct (Fig. 8). Propodeum entirely fulvous although basal part a little darker. Areolet of the same size as in female, but 2nd recurrent vein joins the areolet close to its distal corner. Other characters as in description of female.

DISTRIBUTION. Mexico: Oaxaca.

9. *Bicristella humerosa* (Cushman, 1931)
Fig. 20.

Cushman, 1931: 51 (des.), 4 (fig.), 7, 58 (keys), ♀ [*Polycyrtus* (*Polycyrtus*); type: ♀, Mexico, Orizaba (Mus. Paris)]. Townes, Townes, 1966: 108 (*Bicristella*).

MATERIAL. Mexico. Tamaulipas: Cd. Victoria, canyon Novillo, 23.IX.1986 (A. del Valle), ♀; Cd. Victoria, Los Troncones, 25.IX.1986 (A. del Valle). Gomez Farias: Los Cedros, 300 m, tr. amarillas, 25.II.1995 (S. Niño, J. Coronado), ♀; same locality, tr. Malaise, 6–20.III.1999 (S. Hernandez), 2 ♀♀; Gomez Farias, Alta Cima, 900 m, tr. Malaise, 17.IV–3.VII.1999 (S. Hernandez), 5 ♀♀. Campeche, Champoton, Hoo, selva baja, 27.III.1997 (A. Martínez et al.), ♀. Morelos, Cuautla, Cuautlixco, 28.II.1995 (J. Flores), ♀. Guatemala, «Angraud 9–55», ♀ (paratype) (Mus. Washington).

DISTRIBUTION. Mexico: Tamaulipas, Veracruz, Campeche, Morelos. Guatemala.

REMARKS. The type (from Mexico) has not been studied; the original description mentions that the occipital carina «obsolete on lower end». In all our material from Mexico and in the studied paratype from Guatemala occipital carina strong on lower end and distinctly reaching hypostomal carina.

10. *Bicristella infracta* (Cushman, 1931) **comb.n.**
Figs 14, 17.

Cushman, 1931: 45 (des.), 4 (fig.), 3, 55 (keys), ♀ [*Polycyrtus* (*Polycyrtus*); type: ♀, Panamá: Alhajueta]. Townes, Townes, 1966: 114.

MATERIAL. Mexico, Tamaulipas: 25 km SSW of Cd. Victoria, El Madroño, 1400 m, bosque encino, 20.I.2000 (A. Martínez R.), ♀; km 68, E Cd. Victoria to Soto la Marina, 14.IV.1987 (H. Ruiz C.), ♂; Gomez Farias, Canindo, 1400 m, tr. Malaise, 20–21.VII.1994 (J.B. Wooley), ♂; Gomez Farias, Los Cedros, 300 m, tr. Malaise, 15–22.V.1999 (S. Hernandez), ♀; Gomez Farias, Alta Cima, 900 m, tr. Malaise, 8–15.V and 10–17.VIII.1999 (S. Hernandez), 2 ♀♀; same locality, 9–16.IX.2000 (Kasparyan), ♀. Panamá: type (Mus. Washington).

DISTRIBUTION. Mexico: Tamaulipas. Panamá.

11. *Bicristella paululus* (Cresson, 1873) **comb.n.**
Fig. 6.

Cresson, 1873: 145, ♀ [*Mesostenus* (*Polycyrtus*); type: ♀, Mexico: Cordoba]. Cushman, 1931: 50 (des.), 7, 58 (keys), *Polycyrtus* (*Polycyrtus*). Townes, Townes, 1966: 118.

MATERIAL. Mexico: type (Mus. Philadelphia).

DISTRIBUTION. Mexico: Veracruz.

12. *Bicristella texana* Porter, 1977
Fig. 19.

Porter, 1977: 49, ♀ [holotype: ♀, USA, Texas, Hidalgo County, Bentsen Río Grande Valley State Park.

MATERIAL. USA, Texas: holotype (AEI). Mexico, Tamaulipas: Villa de Casas, Rancho El Cimarron (68 km E Cd. Victoria), 28.XII.1986 (H. and E. Ruiz C.), 6 ♂♂; 30 km S Cd Victoria, Alberca, matorral, 5.VIII.1989 (E. Ruiz C.), ♂; 33 km S Cd Victoria, Trópico de Cáncer, matorral, tr. Malaise, 28.X–4.XI.2000 (Kasparyan), 2 ♀♀; 44 km S Cd Victoria (10 km N Llera), matorral, tr. Malaise, 9.IX–18.XI.2000 (Kasparyan), ♀ 2 ♂♂; Gomez Farias, Alta Cima, 900 m, selva baja, tr. Malaise, 10.IV–8.V.1999 (S. Hernández), 5 ♀♀.

DISTRIBUTION. U.S.A.: Texas. Mexico: Tamaulipas.

13. *Bicristella univittata* (Cresson, 1873)

Cresson, 1873: 148, ♀ ♂ [*Mesostenus* (*Polycyrtus*); lectotype: ♀, Mexico]. Cresson, 1916: 61 (lectotype design., *Polycyrtus*). Cushman, 1931: 49 (des.), 55 (key). Townes, Townes, 1966: 109 (*Bicristella*).

MATERIAL. Mexico. Tamaulipas: Cd. Victoria, cañon de La Libertad, 1000 m, bosque pino-encino, 8.III.1988 (J. De León), ♀; Gomez Farias, Los Cedros, 350 m, tr. Malaise 93/020, 27–30.VII.1993 (J. Wooley, M. Quinn), ♀; same place, 26.XII.1998–8.V.1999 (S. Hernández), 6 ♀♀ 1 ♂♂; Gomez Farias, Alta Cima, 900 m, tr. Malaise, 27.III–10.VII.1999 — 8 ♀♀, 31.VII–21.VIII.1999 — 3 ♂♂ (S. Hernández). Veracruz, Tuxpan: Juana Moza and Coloman, 13.X.1995 and 5.III.1996 (R. Herrera), 4 ♀♀ 2 ♂♂.

DISTRIBUTION. Mexico: Tamaulipas, Veracruz.

ACKNOWLEDGEMENTS. The authors are very grateful to CONACYT project «Taxonomía de cuatro familias de Hymenoptera Parasítica importantes en el control biológico de plagas en México» and UAT for financial support to this work. We heartily thank the curators of ichneumonid collections, Dr. D. Azuma (Philadelphia), Dr. R. Carlson and Dr. D. Furth (Washington), Dr. D. Wahl (Gainesville), Dr. M. Fitton, Dr. I. Gauld and Sondra Ward (London) for their kindness, benevolence and co-operation.

References

- Cameron P. 1885. Hymenoptera, Ichneumonides // F. D. Godman O. Salvin (eds): Biologia Centrali-Americana. Vol.1. P.145–240.
- Cameron P. 1886. Hymenoptera, Ichneumonides // F. D. Godman O. Salvin (eds): Biologia Centrali-Americana. Vol.1. P.241–328.
- Cresson E. T. 1873. Descriptions of Mexican Ichneumonidae // Proceedings of the Academy of Natural Sciences of Philadelphia. P.104–176.
- Cushman R. A. 1931. Notes on Ichneumon-flies of the genus *Polycyrtus* with descriptions of new species // Proceed. US Nation. Mus. Vol.78. Art.14. P.1–62.
- Porter C. C. 1977. Ecology, Zoogeography and Taxonomy of the Lower Rio Grande Valley Mesostenines (Hymenoptera, Ichneumonidae) // Psyche. Vol.84. No.1 (March). P.28–91.
- Townes H. K. 1970. The genera of Ichneumonidae. Part 2 // Mem. Amer. Entomol. Inst. No.12 (1969). 537 pp.
- Townes H. K., Townes M. 1966. A catalogue and reclassification of the Neotropical Ichneumonidae // Mem. Amer. Entomol. Inst. No.8. 367 pp.
- Yu D. S., Horstmann K. 1997. A catalogue of world Ichneumonidae (Hymenoptera) // Mem. Amer. Entomol. Inst. Vol.58. Pt.1. P.1–763. Pt.2. P.764–1558.