

A REVISION OF THE VESPIDAE (HYMENOPTERA,  
DIPLOPTERA) OF CHILE. PART I. SUBFAMILIES GA-  
YELLINAE AND ZETHINAE

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The wasp fauna of Chile is of more than ordinary interest for several reasons. It is relatively rich in species for a continental area of moderate size (about 750,000 square kilometers or 300,000 square miles) for the most part with a temperate climate. It contains some peculiar endemic genera (*Gayella* and *Ctenochilus*), testifying to its very old age. The absence of many widespread Neotropical types, particularly of all social wasps (Polistinae and Polybiinae), further emphasizes its isolation. Several of the species are highly variable in color, possibly in response to environmental changes due to their wide north to south range or to their altitudinal distribution in the Andean Cordillera. Finally, the Chilean wasps exhibit, perhaps to a degree not known elsewhere, the phenomenon of "homeochromy" or color convergence. They may be arranged into three or four groups of species with a similar color pattern but different structural characters. The dominant color group, comprising over half of the species, may almost be dubbed the "Chilian garb or livery", although it extends in the Andes of Perú and Ecuador. These wasps are jet-black and often black-haired, with (usually) two creamy-white abdominal cross-bands, reddish legs and extensively ferruginous wings.

The similarity in color of distinct species and the frequent color variation within specific limits have led to the customary confusion of names. The final unravelling of the synonymy will have to be done by local entomologists, who alone can gather extensive material throughout the entire range of the species and supplement it with reared specimens. The present revision is a first attempt in that direction. It is based in major part on material submitted by the junior author (F. R. P.), to the senior author (J. B.). The latter (J. B.)

also studied many Chilian wasps in North American museums, particularly an extensive collection acquired some years ago from Mr. Edwyn P. Reed by the Museum of Comparative Zoology.

We are under obligation to Prof. Dr. Carlos E. Porter for the interest he has taken in our work, which he has agreed to publish in his widely-known "Revista Chilena de Historia Natural". In order to assure prompt publication, we divide our paper into a number of instalments. The second and third of these will cover the subfamily Eumeninae. In the third part, we intend also to review the classification, give a key to the Chilian genera, and discuss the species which, we believe, have been included by error in the Catalogues, as Chilian insects.

### Subfamily Gayellinae

#### *Gayella* Spinola

**Gayella** pinol:JJ 1851, in Gay, Historia Fis. Pol. Chile, Zool., VI, p. 328 (monotypic for **Gayella eumenoides** Spinola, 1851).

The genus is peculiar to Chile and the Andean part of Argentina. *Gayella pulchella* Smith, of Borneo, does not belong here, but in Zethinae.

As E. C. Reed (1893, An. Univ. Chile, LXXXIV, Mem. Cient. Lit., p. 877) pointed out, some of the statements in Spinola's description are contradictory.

#### **Gayella eumenoides** Spinola

**Gayella eumenoides** Spinola, 1851, in Gay, Historia Fis. Pol. Chile, Zool., VI, p. 333; Atlas, Him., Pl. II, figs. 2-2d (female-male; Chile: "en las provincias del Norte y sobre todo en Santa Rosa). H. de Saussure, 1852, Et. Fam. Vesp., I, p. 6, Pl. III, figs. 2a-d, and Pl. VIII, figs. 4-4a (female-male). Smith, 1857, Cat. Hym. Brit. Mus., V, p. 8 H. de Saussure, 1875, Smithson. Misc. Coll., N.o 254, p. 13. E. C. Reed, 1893, An. Univ. Chile, LXXXIV, Mem. Cient. Lit., p. 878 (female-male; Baños de Cauquenes); 1894, Proc. Zool. Soc. London, (1893), p. 685. Dalla Torre, 1894, Cat. Hym., IX, p. 8; 1904; Gen. Insect., Vesp., p. 13, Pl. II, figs. 3-3c. Brèthes, 1903, An. Mus. Nac. Buenos Aires, IX, p. 249 (female; Argentina: Mendoza; Pampa de Boque, between Mendoza and Paramillos, 3300 m.). A. v. Schulthess, 1910, Deutsch. Ent. Zeitschr., p. 189. Zavattari, 1912, Arch. f. Naturg., LXXVIII, Abt. A. Heft 4, p. 7 (saw Spinola's types). Jörgensen, 1912, An. Mus. Nac. Buenos Aires, XXII, p. 295. F. Claude-Joseph (H. Janvier), 1930, Ann. Sci. Nat., Zool., (10) XIII,

pt. 2, p. 350, figs. 70-71 (Andes of Chile, between 800 m. and 3000 m.: "dans la vallée du Maipo, le ravin de Macul et celui de Ramon, en face de Santiago, ainsi que sur les pentes le Peñalolén").

*Gayella sicheliana* "Saussure" A. v. Schulthess, 1910, Deutsch. Ent. Zeitschr., p. 189 (as a synonym of *eumenoides*).

We have seen many specimens from Chile: Hacienda Las Mercedes; Peñalolén; Baños de Cauquenes; Río Blanco. It is apparently restricted to Central Chile and the adjoining Mendoza Province of Argentina.

The interesting habits were fully described by Hermano Claude-Joseph (1930). The female builds free clay nests of up to a dozen cells. An egg is suspended on a thread from the ceiling of the cell, which is then stored with fluid bee-bread. H. Claude-Joseph says only honey is stored, but no doubt pollen-grains are mixed with it. Most of the females we examined had grains of pollen stuck to the mouthparts. The favorite flower seems to be *Quillaja saponaria* Molina (Fam. Rosaceae); but the wasps have also been observed visiting *Schinus dependens* Ortega (Fam. Anacardiaceae) and *Baccharis* sp. (Fam. Compositae).

The color of the first abdominal segment varies from ferruginous-red with black base and apex to entirely black, with transitional stages. These variants occur in the same locality, so that it would be purposeless to name them. In the male, the clypeus is ivory-white with narrow black borders; in the female, it is either wholly black or with a more or less extensive median ferruginous area.

In all specimens seen, the second abdominal tergite is black, usually with two transverse ivory-white bands (the apical band continuous; the subbasal band either continuous or more or less interrupted medially). In one male the subbasal spots are reduced to barely visible dots. The junior author (F. R. P.) has seen specimens (unfortunately now lost) in which the second segment was entirely red.

### *Gayella mutilloides* H. de Saussure

*Gayella mutilloides* H. de Saussure, 1855, Et. Fam. Vesp., III, p. 114 (female; Chile). F. Smith, 1857, Cat. Hym. Brit. Mus., V, p. 9. Dalla Torres, 1894, Cat. Hym., IX, p. 8; 1904, Gen. Insect., Vesp., p. 13. J. Bequaert, 1928, Ann. Mag. Nat. Hist., (10) II, p. 145 (female; type).

*Gayella odyneroides* "Saussure" A. v. Schulthess, 1910, Deutsch. Ent. Zeitschr., p. 189 (lapsus for *mutilloides*)

According to the type and only known specimen, seen by the senior author (J. B.) at the British Museum, this is specifically distinct from *G. eumenoides*. It should be recognized by the much larger size, and the black, densely hairy first abdominal segment.

### Sufamily Zethinae

#### **Discoelius** Latreille

**Discoelius** Latreille, 1809, Gen. Crust. Insect., IV, p. 140 (monotypic for **Vespa zonalis** Panzer, 1801).

**Discaelius** Leach, 1815, Article "Entomology" in Edinburgh Encyclop., IX, pt. 1, p. 153 (Misspelling of **Discoelius**).

**Dicoelius** Haliday, 1836, Trans. Linn. Soc. London, XVII, p. 325 (misspelling of **Discoelius**).

**Discoelius** group **Tritodiscoelius** Dalla Torre, 1904, Gen. Insect., Vesp., p. 18 (for de Saussure's Division III of 1852, Et. Fam. Vesp., I, p. 26; type by present designation: **Vespa zonalis** Panzer, 1801).

**Discoelius** group **Protodiscoelius** Dalla Torre, 1904, Gen. Insect., Vesp., p. 18 (for de Saussure's Division I of 1852, Et. Fam. Vesp., I, p. 24; type by present designation: **Epipona chilensis** Spinola, 1851 = **Discoelius merulla** Haliday, 1836).

In *Discoelius* and *Zethus* the shape of the first abdominal segment varies so much from one species to another, that it is of little value as a generic character. Brèthes (1906, An. Mus. Nac. Buenos Aires, XVI, p. 2) proposed to include in *Zethus* the species with one spur to the mid tibiae, and in *Discoelius* those with two spurs. But, as Zavattari points out, this places in different genera species which are otherwise closely related. Zavattari (1912, Arch. f. Naturg., LXXVIII, Abt. A. Heft 4, p. 6) defines *Discoelius* as having "the second abdominal segment entirely sessile, without peduncle"; and *Zethus* as having "the second abdominal segment more or less, but always very distinctly pedunculate". According to him, *D. merula* is the only South American species of *Discoelius*; but some of the species he places in *Zethus* are no more pedunculate at the base of the second segment than *D. merula*. The genus *Discoelius* is only recognized here because it has been the custom to do so in Chilean literature.

#### **Discoelius merula** Haliday

**Dicoselius merula** Haliday, 1836, Trans. Linn. Soc. London, XVII, p. 325 (female; Chile).

**Discoelius merula** H. de Saussure, 1855, Et. Fam. Vesp., III, p. 124. F. Smith, 1857, Cat. Hym. Brit. Mus., V, p. 18. H. de Saussure, 1875, Smithsonian, Miscell. Coll., No. 254, p. 59. E. C. Reed, 1893, An. Univ. Chile, LXXIV, Mem. Cient. Lit., p. 880 (Baños de Cauquenes); 1894, Proc. Zool. Soc. London, (1893), p. 685. Dalla Torre, 1894, Cat. Hym., IX, p. 15. Brèthes, 1903, An. Mus. Nac. Buenos Aires, IX, p. 23 (Argentina: Chubut; Tinogasta, Prov. Catamarca). Schrottky, 1903, An. Soc. Cient. Argentina, IV, p. 178. Dalla Torre, 1904, Gen. Insect., Vesp., p. 18, Pl. II, fig. 12; Porter, 1904, Rev. Chilena Hist. Nat., VIII, p. 194; Schrottky, 1909, An. Soc. Cient. Argentina, LXVIII, p. 242. Zavattari, 1912, Arch. f. Naturg., LXXVIII, Abt. A. Heft 4, p. 74, Pl. I, fig. 40 (Longavi). A. de Winkelried Bertoni, 1918, An. Cientif. Paraguayos, (2) No. 3, p. 205 (Asunción, Paraguay). Herbst, 1921, Stettin. Ent. Zeitg., LXXXII, p. 106 (Provinces of Valparaíso, Aconcagua, Santiago, Colchagua, Linares, Concepción, Malleco, Cautín and Valdivia). J. Bequaert, 1928, Ann. Mag. Nat. Hist., (10) II, p. 158 (female; type). Ruiz, 1934, Revista Universitaria, Santiago de Chile, An. XIX, No. 3, p. 288 (Calbuco; Ancud; Castro; Prov. Valdivia to Prov. Ñuble; North Chile).

**Discaelius merula** F. Claude-Joseph, 1930, Ann. Sci. Nat. Zool., (10) XIII, pt. 2, p. 349, fig. 69 (Santiago; Temuco; Ñuñoa).

**Epipona chilensis** Spinola, 1851, in Gay, Historia Fis. Pol. Chile, Zool., VI, p. 248 (female; Chile: "en varias partes de la República"; according to Zavattari, Spinola's type, now in Turin, is labelled "S. Rosa").

**Discoelius merula** var. **chilensis** J. Bequaert, 1928, Ann. Mag. Nat. Hist., (10) II, p. 158:

**Discoelius chilensis** Gribodo, 1895, Actes Soc. Scient. Chili, IV, (1894), p. 206 (female-male; Parral).

**Discoelius chiliensis** H. de Saussure, 1852, Et. Fam. Vesp., I, p. 25, Pl. IX, fig. 3 (female). F. Smith, 1857, Cat. Hym. Brit. Mus., V, p. 18.

**Discoelius spinolae** H. de Saussure, 1852, Et. Fam. Vesp., I, p. 25 (female; Chile).

**Discoelius merula** var. **spinolae** Dalla Torre, 1894, Cat. Hym., IX, p. 15; 1904, Gen. Insect., Vesp., p. 18. J. Bequaert, 1928, Ann. Mag. Nat. Hist., (10) II, p. 158.

A common species throughout Chile and in neighboring parts of Argentina and Paraguay. We have seen specimens from Marga-Marga; Penco; Concepción; Limache; Baños de Cauquenes; San Rosendo (Concepción); Ancud (Isla Chiloé); Ensenada (Lago Llanquihue); Angol; Valdivia; Prov. Valparaíso; Cuesta de lo Prado; Temuco; and Panguipulli.

Herbst (1921) discussed the variation of the number of ivory-white bands on the abdomen: they may be entirely lacking or present on first tergite only, or on second tergite only, or on both first and second tergites. Variations may occur in the same locality; but, as a rule, the specimens of South Chile are entirely black, those of Central Chile have one band and those of North Chile have two bands. As pointed out by the senior author (J. B.) in 1928, if one wishes to distinguish these variants by name, typical *D. merula* is the form with entirely black abdomen; var. *chilensis* has two white abdominal bands; var. *spinolae* has a band on the second segment only; and no published name is available for the form with a band on the first segment only.

The habits were described by Hermano Claude-Joseph (1930). The female stores caterpillars in a series of cells, separated by plugs of chewed leaves, placed in old insect burrows of dead branches; the main entrance is finally closed with mud.

### **Didymogastra** Perty

**Didymogastra** Perty, 1833, Delectus Animal. Brasil., p. 114 (monotypic for **Didymogastra fusca** Perty, 1833).

Although some species are on the border line of *Zethus*, *Didymogastra* seems to form a natural group, restricted to the New World.

### **Didymogastra dicomboda** (Spinola)

**Epipona dicomboda** Spinola, 1851, in Gay, Historia Fis. Pol. Chile, Zool., VI, p. 250 (female-male; Chile: Sa. Rosa).

**Zethus (Didymogastra) dicomboda** H. de Saussure, 1852, Et. Fam. Vesp., I, p. 21 (female-male); 1875, Smithsonian. Miscell. Coll., No. 254, p. 50 (female-male). Zavattari, 1912, Arch. f. Naturg., LXXVIII, Abt. A, Heft 4, p. 71 (female-male; Santiago).

**Zethus dicomboda** F. Smith, 1857, Cat. Hym. Brit. Mus., V, p. 16. E. C. Reed, 1893, An. Univ. Chile, LXXXIV, Mem. Cient. Lit., p. 879 (female-male; Valparaíso; Prov. Colchagua); 1894, Proc. Zool. Soc. London (1893), p. 685 (Baños de Cauquenes). Dalla Torre, 1894, Cat. Hym., IX, p. 10; 1904, Gen. Insect., Vesp., p. 15 (misspelled **dicomba**); Porter, 1899, Rev. Chilena Hist. Nat., III, p. 36 (Quillota); 1904, **Op. cit.**, VIII, p. 194 (Quilpie; misspelled **dicomba**). Herbst, 1921, Stettin. Ent. Zeitg., LXXXII, p. 111. F. Claude-Joseph, 1930, Ann. Sci. Nat., Zool., (10) XIII, pt. 2, p. 341, figs. 66-68 (Santiago). Ruiz, 1937, Rev. Chilena Hist. Nat., XL, (1936), p. 164 (Vicuña, Prov. Coquimbo; common from Concepción northward).

**Discoelius dicomboda** Brèthes, 1910, Rev. Chilena Hist. Nat., XIV, p. 145 (Santiago).

This species is common in Central and North Chile. We have seen it from S. Christobal; Baños de Cauquenes; Olmué; Limache; and Prov. Valparaíso.

The habits were studied by Hermano Claude-Joseph (1930). The female stores caterpillars in a series of cells, separated by partitions of cut up leaves, in old insect burrows in dead wood; the entrance to the whole nest is closed finally with a thick plug of pieces of leaves.

### **Ctenochilus** H. de Saussure

**Pterochilus** division (or genus) **Ctenochilus** H. de Saussure, 1856, Et. Fam. Vesp., III, p. 323 (for **Pterocheilus** IIIe Division of 1853, Et. Fam. Vesp., I, p. 247; monotypic for **Epipona pilipalpa** Spinola, 1851).

As was recognized by Brèthes (1903, An. Mus. Nac. Buenos Aires, IX, p. 233), this interesting genus belongs in Zethinae, not in Eumeninae. The venation, mandibles, clypeus, thorax and first abdominal segment are as in *Zethus* and *Discoelius*; and the mid tibiae bear two well-developed spurs. As is often the case in Zethinae, the notauli of the mesonotum are very deep and complete, extending from fore to hind margins. The flattened and laterally plumose labial palpi of the female, of four distinct segments, are an interesting parallel development in a stock not otherwise related to *Pterocheilus*. *Ctenochilus* occurs only in Chile and southern Argentina (Patagonia).

### **Ctenochilus pilipalpus** (Spinola)

**Epipona pilipalpa** Spinola, 1851, in Gay, Historia Fis. Pol. Chile, Zool., VI, p. 252 (female; Chile: "las partes centrales de la República").

**Pterochilus pilipalpus** H. de Saussure, 1853, Et. Fam. Vesp., I, p. 247, Pl. VII, fig. 4, Pl. XX, figs. 8-8a-b (female). F. Smith, 1857, F. Smith, 1857. Cat. Hym. Brit. Mus., V, p. 88.

**Ctenochilus pilipalpus** H. de Saussure, 1875, Smithson. Miscell. Coll., No. 254, p. 372 (female). E. C. Reed, 1893, An. Univ. Chile, LXXXIV, Mem. Cient. Iit., p. 897; 1894, Proc. Zool. Soc. London, (1893), p. 690. Zavattari, 1912, Arch. f. Naturg. LXXVIII, Abt. A. Heft 4, p. 261.

*Ctenochilus pilipalpis* Dalla Torre, 1894, Cat. Hym., IX, p. 108; 1904, Gen. Insect., Vesp., p. 59, Pl. IV, fig. 8 (female). Porter, 1904, Rev. Chilena Hist. Nat., VIII, p. 197. Ruiz, 1933, *Op. cit.*, XXXVII, p. 159; 1934, *Op. cit.*, XXXVIII, p. 167 (Paihuano; Marga-Marga, Prov. Aconcagua); 1937, *Op. cit.*, XL, (1936), p. 164 (Lliu-Lliu; Cuncumén, valley of Choapa, 2000 m.).

A very rare wasp, of which we have seen three specimens only, from Cuncumén (female), Marga-Marga (female) and Lliu-Lliu (male), all localities in Central Chile. The habits are unknown. Only the female was described thus far.

*Male* (undescribed).— Similar to the female, except for sexual differences. Clypeus with the sides of the straight apical margin projecting as short, sharp triangular teeth. Antennae of 13 segments, most of the segments of the flagellum broader than long, twelfth segment short and narrow, thirteenth hook-like, thumb-shaped, straight, narrowed to a blunt point, extending to about mid-way the tenth segment when folded under the tip. Legs, thorax and abdomen as in female. Labial palpi of cylindrical segments, with a few scattered hairs, but not feathered; first segment gradually thickened from base to apex; mouthparts otherwise as in female. Allotype, Lliu-Lliu (F. Ruiz P. Collection).

Spinola's description was based on a single female which had the first abdominal segment black; most of pronotum, tegulae, a spot on mesopleura, hind margins of scutellum and postscutellum, apical margins of first, second and third tergites, apical margin of second sternite, and a postbasal cross-band on second tergite, white. This is almost exactly the color of the female seen from Cuncumén, except that there are large white spots on the sides of the propodeum also; the clypeus is black in the lower half, russet with broad white lateral spots in the upper half.

The female from Marga-Marga has the first abdominal segment ferruginous-red (except at base), but the white markings are as described by Spinola, the clypeus being black with ferruginous center (without white spots) and the propodeum entirely black; the postbasal white cross-band of the second tergite is shorter and narrower than in the Cuncumén female. This female agrees with *C. argentinus* var. *bimaculatus* Zavattari, except for the fusion of the subbasal spots of the second tergite into a cross-band, the white tegulae, white spots on mesopleura, white margin on postscutellum, and white apical margin of third tergite.

The male from Lliu-Lliu is colored like the Marga-Marga female, except for the yellow clypeus (a sexual difference)



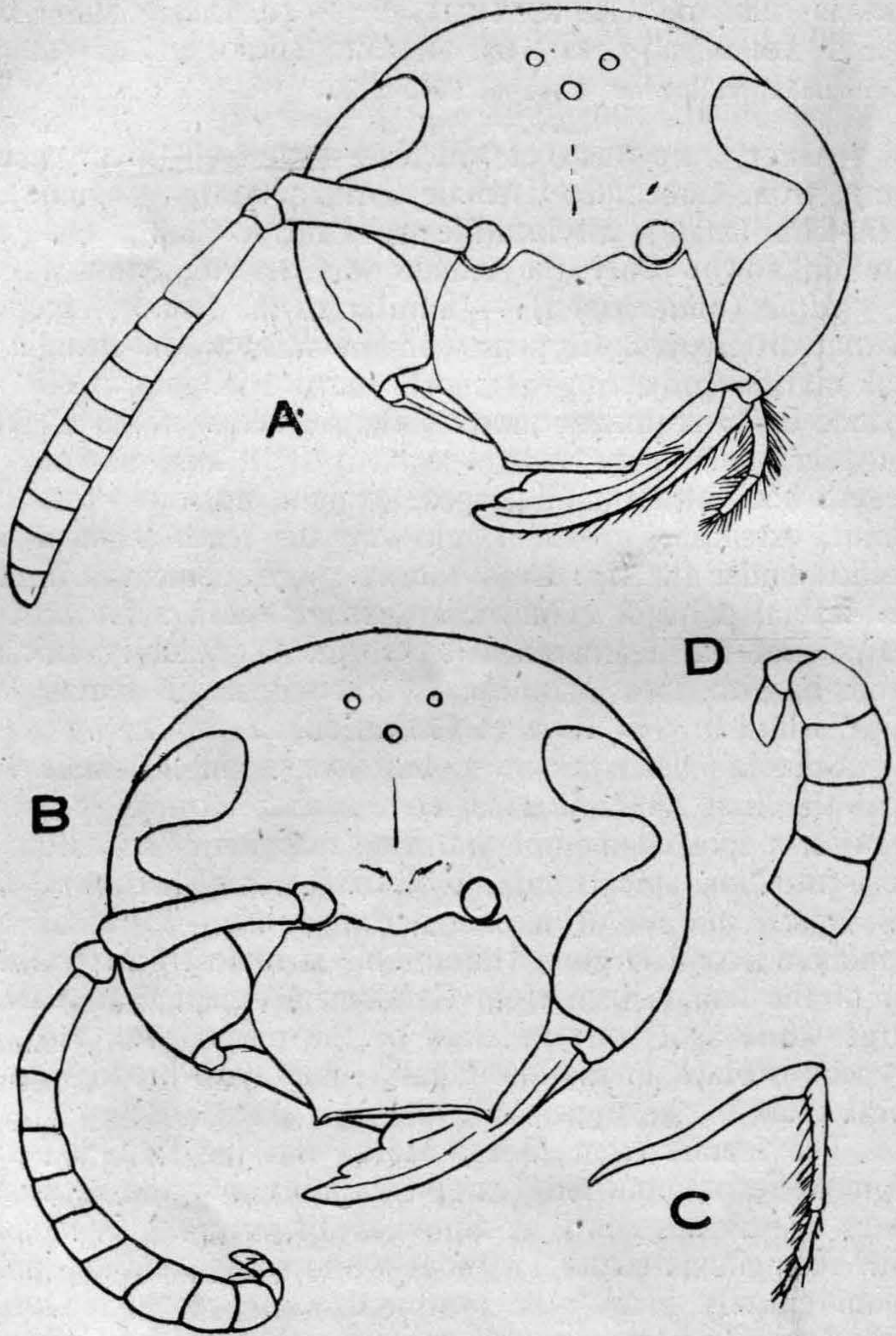


Fig. 1. *Ctenochilus pilipalpus* (Spinola): A, head of female; B, head of male; C, labial palpus of male; D, tip of male antenna.

and the division of the subbasal white fascia of the second tergite into two transverse spots. It differs from *C. argentinus* var. *bimaculatus* Zavattari only in the presence of white mesopleural spots, white tegulae, a postscutellar white band, and the white apical margin of third tergite.

A most careful comparison of the two females from Cuncumén and Marga-Marga fails to disclose any structural difference and we feel certain that our three specimens belong to one and the same species, notwithstanding the striking difference in color of the first abdominal segment. From a study of Brèthes' description of his *C. argentinus*, we suspect that this was based on the variant of *C. pilipalpus* with red first segment, for which his name (var. *argentinus*) may then be available. A final decision must, however, be delayed until specimens from Patagonia and Chile can be compared.

### **Ctenochilus argentinus** Brèthes

**Ctenochilus argentinus** Brèthes, 1903, An. Mus. Nac. Buenos Aires, IX, p. 232 (female; doubtfully from Argentina, probably Patagonia). Zavattari, 1912, Arch. f. Naturg., LXXVIII, Abt. A, Heft 4, pp. 261 and 262.

**Ctenochilus argentinus** var. *bimaculatus* Zavattari, 1912, Arch. f. Naturg., LXXVIII, Abt. A, Heft 4, pp. 261 and 262 (female; Río Santa Cruz, Patagonia, Argentina).

Brèthes' type is at the Museo Nacional de Buenos Aires and Zavattari's types are at the Genoa Museum.

As stated above, this is most probably only a color variant of *C. pilipalpus*, with red first abdominal segment.

Brèthes' type differed also from all four known Chilean specimens of *pilipalpus*, in lacking white markings on tegulae, mesopleura, postscutellum, hind margin of third tergite, as well as the postbasal fascia of second tergite; apparently the white apical margin of second sternite was also absent.

Zavattari's var. *bimaculatus* differed from typical *argentinus* only in having two small postbasal white spots on the second tergite.

