

New records of *Paracrias* Ashmead (Hymenoptera, Eulophidae) as parasitoids on weevil larvae (Coleoptera, Curculionidae) in Brazil, with the description of a new species

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ABSTRACT. *Paracrias strii* Schauff, 1985 and *P. ceratophaga* Palmieri & Hansson sp. nov. are first record in Brazil and both are associated with *Ceratopus* Schoenherr larvae (Coleoptera, Curculionidae) reared from syconia of two species of fig-trees. Both *Paracrias* species are diagnosed and illustrated. Males of *P. ceratophaga* sp. nov. are described. The association of *Paracrias* with weevil larvae is briefly discussed.

KEYWORDS. *Ceratopus*, Entedoninae, *Ficus*, Neotropical region, taxonomy.

RESUMO. Novos registros de *Paracrias* Ashmead (Hymenoptera, Eulophidae) como parasitoides de larvas do gorgulho (Coleoptera, Curculionidae) no Brasil, com a descrição de uma nova espécie. *Paracrias strii* Schauff, 1985 e *P. ceratophaga* Palmieri & Hansson sp. nov. são registradas pela primeira vez para o Brasil, sendo associadas a larvas de *Ceratopus* Schoenherr (Coleoptera, Curculionidae) obtidas de sicônios maduros de duas espécies de figueiras. As espécies registradas foram ilustradas. Os machos de *P. ceratophaga* sp. nov. foram descritos. A associação do gênero *Paracrias* com besouros curculionídeos é discutida brevemente.

PALAVRAS-CHAVE. *Ceratopus*, Entedoninae, *Ficus*, Região Neotropical, Taxonomia.

Paracrias Ashmead, 1904 comprises 64 species and is predominantly distributed in the Neotropical region (HANSSON, 2002). They are recognized by having a lenticular head with upper occiput concave so that posterior ocelli is very close to or touching occipital margin; pronotum without transverse carina; propodeum with median carina smooth or partially reticulate and with reticulate submedian grooves; scutellum without median groove; forewing usually with continuous submarginal and marginal veins (HANSSON, 2002).

The genus was first described by SCHAUFF (1985) as belonging to Entedoninae (Eulophidae) and including six species. Later, six new species were included by GUMOVSKY (2001) in the first review of the genus. The number of *Paracrias* species was then considerably increased after the work of HANSSON (2002), who included 52 new species in the genus.

The biology of *Paracrias* species is very poorly known with only three species having a biological record, and all are parasitoids on weevil larvae. *Paracrias guatemalensis* Schauff, 1985 is a parasitoid on *Conotrachelus perseae* Barber, 1919 (SCHAUFF, 1985), *P. anthonomi* Woolley & Schauff, 1987 on *Anthonomus hunteri* Burke & Cate, 1979 (WOOLLEY & SCHAUFF, 1987); and *P. mirus* Girault, 1917 on *Lignyodes bischoffi* (Blatchley, 1916) (SCHAUFF, 1985). Here we add host information for two additional *Paracrias* species, *P. strii* Schauff, 1985 and *P. ceratophaga* sp. nov., which is described here. Both species are also parasitoids on weevil larvae.

MATERIAL AND METHODS

The specimens studied emerged from *Ceratopus* Schoenherr, 1843 (Curculioninae) larvae living in fruits of *Ficus* spp. (hereafter referred to as figs). Figs were collected from *F. obtusifolia* Kunth and *F. trigona* L. f. growing at Estação Ecológica dos Caetetus, a fragment of atlantic semideciduous forest in southeastern Brazil (22°24'S, 49°41'W). Between December 2010 and November 2011 the trees were checked monthly for ripe or near ripe figs. When available, approximately two hundred figs were collected and kept in glass vials of ~ 3 L under laboratory conditions (approx. 25°C and 12 hours of light) for up to two weeks. All emerging insects were collected and stored in 70% ethanol.

The specimens were subsequently critical point dried (GORDH & HALL, 1979) using BALTEC CPD 030' and card-mounted following NOYES (1982). Morphological terminology follows GIBSON (1997). Images were taken with auto-montage stereomicroscope. Leica Application Suite (LAS) V3.6 imaging software was used in order to merge image series comprising 15-20 focal planes and produce a single image with increased depth of field. The images were then edited using GIMP 2.8.0 (open software). The acronyms of museums, following ARNETT *et al.* (1993), are: BMNH, The Natural History Museum, London, England; MZSP, Museu de Zoologia, Universidade de São Paulo, São Paulo, Brazil; NMNH, National Museum of Natural History, Smithsonian Institution, Washington D.C., United States of America.

RESULTS

Only adults of the same species of *Ceratopus* and *Paracrias* wasps emerged from the figs, which allowed us to associate the wasps with their host. Both males and females of *P. strii* emerged from vials containing weevils on *F. obtusifolia*. Additionally, only two males of *P. ceratophaga* sp. nov. emerged from the vials containing weevils on *F. trigona*.

Paracrias ceratophaga Palmieri & Hansson sp. nov.

(Figs 1-6)

Diagnosis. Similar to *P. strii* through indistinct scrobes and frontal suture, noted only by changes in sculpturing (Fig. 3); rounded occipital margin (Fig. 4); short malar space, less 1/5 mouth width; *dorsellum* split by propodeal median carina (Fig. 5); propodeal *callus* with two *setae*. Differs from *P. strii* in that the male flagellomeres are cylindrical and symmetric (Fig. 2), in *P. strii* male flagellomeres are flattened and asymmetric.

Description. Male, measurements (mm): total length 3.0; width of mouth 0.41; malar space 0.04; height of eye 0.55; head height 1.01; scape 0.43; pedicel 0.11 length, 0.06 width; 1st funicule 0.13 length, 0.07 width; head width 0.33; postocellar distance 0.20; ocular-ocellar line 0.09; mesosoma 1.53 length, 0.84 width; propodeum length 0.47; gaster length 1.09; petiole 0.57 length, 0.25 width; hind tibia length 0.84; hind tibial spur length 0.17; hind tarsus length 0.66; forewing length 2.0.

Body predominantly black with metallic blue tinges (Figs. 1-5). Scape pale. Pedicel brown-black with metallic blue tinges. *Flagellum* yellow-brown (Fig. 2). Fore, mid and hind *coxae* with same color as mesosoma, other leg segments pale yellow; hind femur slightly brown in distal part. Metasoma brown-black (Fig. 1). Wings hyaline (Fig. 6). Antennal clava pointed, with three segments, without sensilla on ventral surface (Fig. 2). Head in lateral view 1.7x as high as long. Eyes bare. Frons reticulate and not protruding (Fig. 3). Frontal suture indistinct, V-shaped, indicated by changes in sculpturing only. Vertex partially reticulate (Fig. 3). Occipital margin rounded (Fig. 4). *Prepectus* reticulate medially. *Scutellum* strongly reticulate. Propodeal median *carina* reticulate (Fig. 5). Propodeal *callus* with two *setae*. Forewing costal cell bare. Postmarginal vein absent. Hind *coxa* with few scattered *setae*. Hind tibial spur 0.3x as long as hind tarsus. Petiole bare, without anteroventral *carina*. Petiole 1.6x as long as wide. Hind margin of 1st gastral tergite curved backwards, bare in anterolateral part. Hind margin of 2nd tergite incised.

Female. Unknown.

Distribution. State of São Paulo, Brazil.

Biology. Reared from ripe figs of *Ficus trigona* (Moraceae) containing *Ceratopus* sp. larvae.

Type material. Holotype ♂, BRAZIL, São Paulo: Gália (Estação Ecológica dos Caetetus, 22 K 635973 E 7524644 S, córrego Alegre, 659 m), 02.XII.2010, L. Palmieri col. (MZSP). FCA016 (EEC), Ex. *Ficus trigona* fase D. Paratype ♂, *Idem* (BMNH).

Etymology. From the Greek *keratos*, horn, and *phagein*, to eat, *i.e.* *ceratophaga*, in reference to the host genus.

Remarks. The paratype lacks both antennae and the right pair of wings.

Paracrias strii Schauff, 1985

(Figs 7-12)

Paracrias strii SCHAUFF, 1985:105, figs 3-16 (holotype ♀ from Barro Colorado Island, Canal Zone, Panama, X.1937, from *Ficus* fruit, deposited in NMNH type no. 101168, examined)

Material examined. BRAZIL, São Paulo: Gália (Estação Ecológica dos Caetetus, 22 K 635909 E 7524387 S, córrego Alegre, 649 m.), 2♂, 7♀, 09.IV.2011, L. Palmieri col. (MZSP, BMNH). EEC460 (EEC), Ex. *Ficus obtusifolia* fase D.

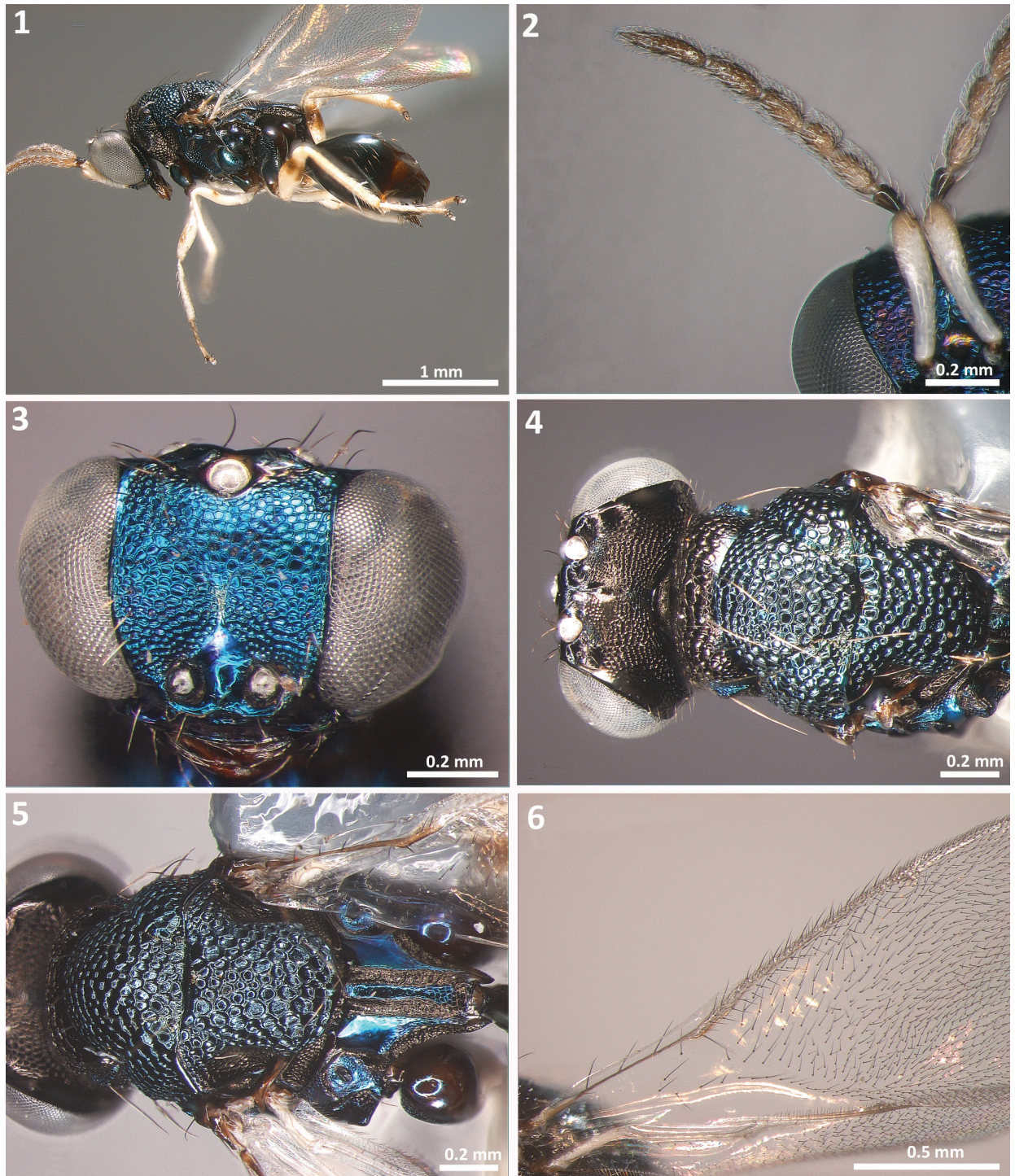
Diagnosis. Male flagellomeres flattened and asymmetric (Fig. 10); antennal scrobes and frontal suture indistinct, noted only by changes in sculpturing (Fig. 8); occipital margin rounded (Fig. 11); malar space short (Fig. 8), less 1/5 mouth width; *dorsellum* split by propodeal median carina; propodeal *callus* with two *setae* (Fig. 12).

Distribution. Panama and state of São Paulo, Brazil (new record).

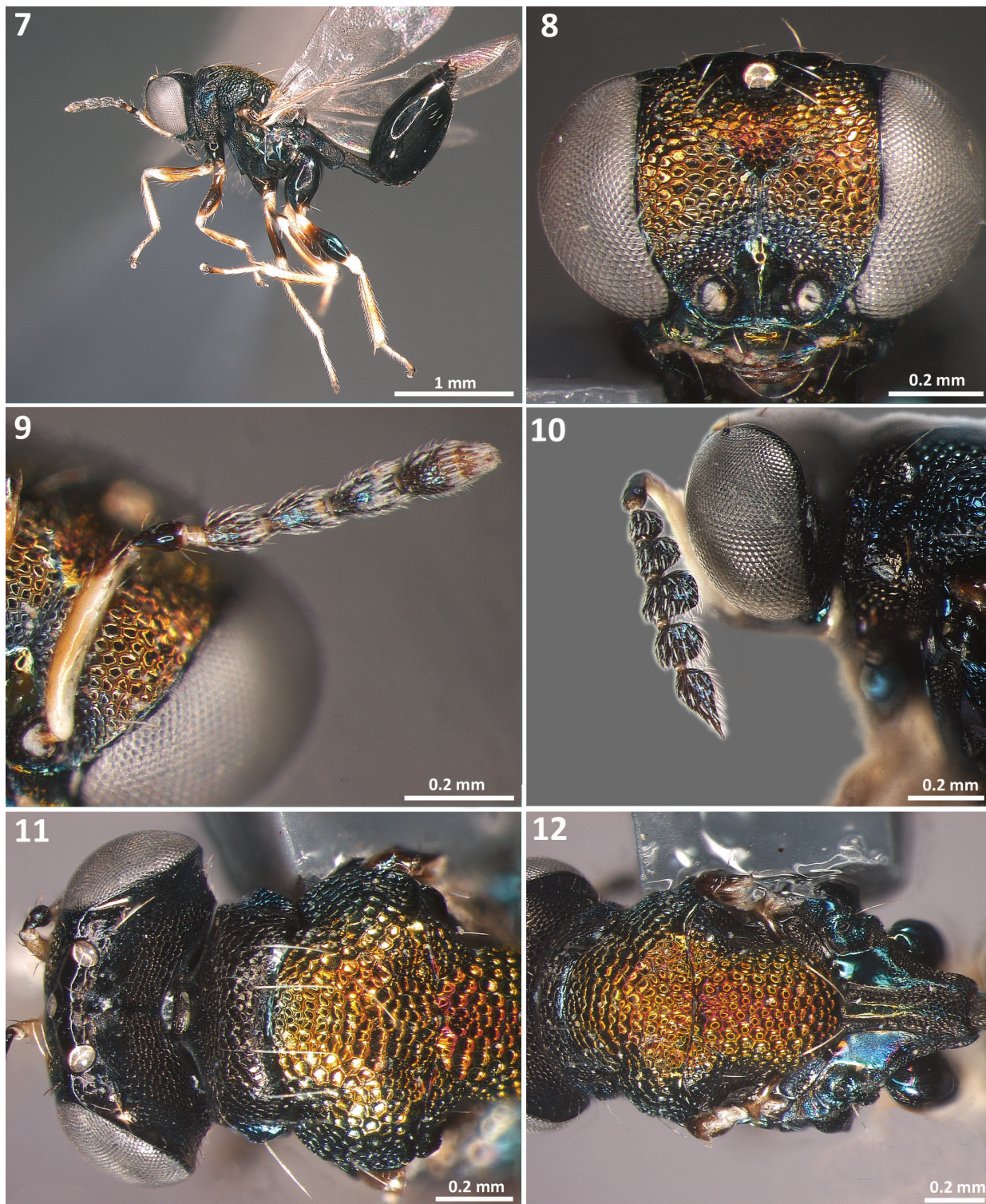
Biology. Reared from ripe figs of *Ficus obtusifolia* (Moraceae) containing *Ceratopus* sp. larvae.

DISCUSSION

Prior to this research only three host records for *Paracrias* species were known, and all three were associated with weevil larvae. We found that two additional species of *Paracrias* wasps were also associated with weevils. It seems that this genus of parasitoid wasps is specialized on curculionid beetle larvae. Since *Ceratopus* beetles seem to breed specifically on fig trees in the Neotropics (PAKALUK & CARLOW, 1994), and the two plant species studied here have a large distribution, *F. obtusifolia* from southern Mexico to southeast Brazil and *F. trigona* all over tropical South-America (BERG & VILLAVICENCIO, 2004), we cannot reject the hypothesis that both *Paracrias* species have the same large distribution. This assumption is indicated by *P. strii*, which is found in Panama and southeast Brazil. However, it is a matter to be tested for *P. ceratophaga*.



Figs 1-6. *Paracrias ceratophaga* Palmieri & Hansson sp. nov., male: 1, lateral *habitus*; 2, antennae; 3, head, frontal; 4, head and anterior part of mesosoma in dorsal view; 5, propodeum; 6, forewing venation.



Figs 7-12. *Paracrias strii* Schauff, 1985: 7, lateral habitus, female; 8, frons, female; 9, antenna, female; 10, antenna, male; 11, head and anterior part of mesosoma, dorsal view; 12, mesosoma.

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