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Description of two gynandromorphic Eumenidae (Hymenoptera Vespoidea)

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A b s t r a c t : Two gynandromorphic specimens of Eumenidae belonging to two taxa, *Gymnomerus laevipes* (SHUCKARD 1837) and *Eumenes coarctatus lunulatus* FABRICIUS 1804, are described and illustrated. The two gynandromorphs have a general female-like appearance, with mixed female-male characters located only on head. Based upon the classification proposed by DALLA TORRE & FRIESE (1899), the deviant specimen of *Gymnomerus laevipes* is a mixed gynandromorph belonging to the group IV, with the general appearance of the head female-like, and some male characters (only on clypeus and antenna) located on the left side. The gynandromorph specimen of *Eumenes coarctatus lunulatus* belongs to the group I, due to the bilateral asymmetric distribution of the characters, with the left side of the head female-like, and the right side male-like. A brief discussion on the occurrence of the phenomenon of gynandromorphism within the family Eumenidae is provided. Based on available data, the documented cases of individuals showing deviant expression of sexual characters have been recorded for only ten species within Eumenidae.

K e y w o r d s : Eumenidae, gynandromorphs, description.

Introduction

Gynandromorphs are sexually abnormal individuals that show deviant phenotypes in the expression of female and male characters, exhibited in the same tagmata or part of them. They are normally rare or very rare in nature, thus not frequently collected. This phenomenon is known in a wide number of animal groups, both invertebrates (e.g., Araneae, Crustacea, and many orders of Insecta) and Vertebrata (Aves and Mammalia).

Among Hymenoptera, the phenomenon of gynandromorphism has been most frequently documented in Formicidae (see for instances WHEELER 1903; ADLERZ 1908; SCUPOLA 1994), and less frequently in several other groups, e.g., Diprionidae (MARTINI et al. 1999), Siricidae (NEUMANN 1970), Tenthredinidae (PEACOCK 1925), Trichogrammatidae (BESERRA et al. 2003), Encyrtidae (ZHANG & ZHU 2007), Scelionidae (HUGGERT 1977), Chalcididae (HALSTEAD 1988), Agaonidae (PEREIRA et al. 2003), Ichneumonidae (TARASCO 1996), Braconidae (WHITING & WHITING 1927), Mutillidae (MAEKLIN 1956; TURRISI 1999), Eumenidae (COOPER 1959), Sphecidae (SCHNEIDER & FEITZ 2003), and Apoidea (e.g., ORNOSA et al. 2001; WCISLO et al. 2004).

While revising material belonging to several museum and private collections for some ongoing researches on faunistics and taxonomy of Eumenidae (BORSATO & TURRISI

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2004; BORSATO & TURRISI unpubl.), two gynandromorphs were recognized. Considering the rarity of this phenomenon within Eumenidae, it seems interesting to describe and illustrate the main features of these aberrant specimens.

Material and Methods

The description of the two recognized gynandromorphs, belonging to two different species, includes only the deviant mixed female-male features. Terminology for morphology follows GAULD & BOLTON (1996); the classification of the gynandromorphs is based on DALLA TORRE & FRIESE (1899) and BALAZUC (1958). The two specimens are deposited in the collection of Museo Civico di Storia Naturale di Venezia (Italy).

Description of gynandromorphs

Gymnomerus laevipes (SHUCKARD 1837) (Fig. 1)

Material examined: 1 specimen from Greece: Messinia, Artemissia, Nédoussa, 15.VI.1995, P.L. Scaramozzino leg.

Description. Length: 11.5 mm; fore wing length: 9.7 mm. General appearance female-like, metasoma bearing a normally developed sting, without traces of male genital capsule structures, with male traits located exclusively on head (fig. 1). *Clypeus* moderately asymmetric in shape due to the presence of mixed male and female characters, moderately convex, with medial lobe deeply emarginated, thus resulting in two acute teeth; right half female-like, extensively black with a wide transverse yellow stripe close to fronto-clypeal suture, and tooth weakly shorter than left one; left half male-like, yellow except margins, black. Right antenna female-like, entirely black, quite shorter than left one, stout, moderately clavate, 12-segmented, with scape 3.3 × longer than wide, and antennomeres 4-12 transverse (about as long as wide). *Left antenna* male-like, black with a longitudinal dorso-lateral yellow stripe on scape, 13-segmented; scape 2.7 × longer than wide, apex (last three antennomeres) not curved (as normal for male); antennomeres shape intermediate between female and male, less elongate and slender than a normal male antenna; last antennomere incompletely developed and not clearly separated from previous one.

Eumenes coarctatus lunulatus FABRICIUS 1804 (Fig. 2)

Material examined: 1 specimen from Italy: Sardinia, Stagno di Molentargius (Cagliari), 15.VIII.1991, C. Meloni leg.

Description. Length: 12.8 mm; fore wing length: 8.8 mm. General appearance female-like, metasoma bearing a normally developed sting, without traces of male genital capsule structures, with male traits located exclusively on head (fig. 2). Clypeus weakly asymmetric in shape due to the presence of mixed male and female characters, strongly convexes, moderately emarginated medially; right half male-like, longer than left female-like half, entirely lemon-yellow, with apical margin testaceous; left half female-like, mostly lemon-yellow except the outer margin black, and apical margin testaceous. *Right*

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eye male-like, wider than left one, with medial margin very close to homolateral antennal socket. Left eye female-like, with medial margin less close to homolateral antennal socket than right half male-like. Right antenna male-like, blackish except ventral surface of scape yellow, antennomeres 11-12 blackish brown, last antennomere yellow-orange, 13-segmented, curved apically (last antennomere). Left antenna female-like, blackish except ventral surface of scape yellow (less extensively than right scape), 12-segmented, not curved apically. Right mandible male-like, slightly longer than clypeus length, inner margin (the "cutting edge") with weak teeth. Left mandible female-like, quite longer than clypeus length, inner margin with well developed teeth.

Remarks

As within our knowledge, only COOPER (1959) provided a detailed discussion on the occurrence of the gynandromorphism phenomenon in Eumenidae, recording seven documented cases in literature, and an additional doubtful case. Furthermore, he provided a detailed description of a very interesting, nearly perfectly bilateral gynandromorph of a Chilean species, *Hypodynerus tuberculiventris* (SPINOLA 1851). According to COOPER (1959), the other cases of gynandromorphism have been documented in the following seven species of Eumenidae: *Brachymenes wagnerianus* (SAUSSURE 1875), *Nesodynerus acoelogaster* (PERKINS 1899), *Ancistrocerus nigricornis* (CURTIS 1826), *Parancistrocerus pedestris* (SAUSSURE 1856), *Odynerus reniformis* (GMELIN 1790), *Stenodynerus chevrieranus* (SAUSSURE 1856), *Ancistrocerus parietum* (LINNAEUS 1758).

Additionally, in a more general context of teratology, excluding sexual deviants, only a case of micropterism has been recorded for Eumenidae, namely for *Ancistrocerus nigricornis* (CURTIS 1791) (SCHNEIDER & FEITZ 2003).

According to the classification proposed by DALLA TORRE & FRIESE (1899), based on the topology of mixed female-male characters, gynandromorphs are classified in 4 main groups (divided in 14 subgroups), namely: 1) lateral deviants (group I), with each side of one or more tagmata showing different sexual traits; 2) frontal deviants (group II), having different sexual characters along sagittal axis; 3) transverse deviants (group III), having different sexual characters on dorsal and ventral surfaces; 4) mixed deviants (group IV), having combinations of the previous deviant patterns.

The described gynandromorphic specimen of *Gymnomerus laevipes* belongs to the group IV, due to the incomplete lateralization of the sexual characters, with general appearance of the head capsule female-like, and some male characters (only clypeus and antenna) located on the left side.

Differently, the described gynandromorphic specimen of *Eumenes coarctatus lunulatus* belongs to the group I, due to the bilateral asymmetric distribution of the characters. The mixed female-male features are located on head only, with the left side female-like, and the right side male-like. Thus, the deviant specimen is better defined as partial lateral gynandromorph. Within the group II, three subgroups are distinguished on the basis of the position, left or right side, of female-male characters. This gynandromorph clearly belongs to the subgroup II, due to the presence of male traits on the right side and female traits on the left side.

Based on the synopsis provided by COOPER (1959), of the documented cases of gynan-

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dromorphism in Eumenidae, one is doubtfully ascribed to the group II (*Brachymenes wagnerianus*); four belong to the group IV (*Nesodynerus acoelogaster*, *Ancistrocerus nigricornis*, *Parancistrocerus pedestris*, *Ancistrocerus parietum*); and three to the group I (*Odynerus reniformis*, *Stenodynerus chevrieranus*, *Hypodynerus tuberculiventris*).

In conclusion, up to now, the documented cases of individuals showing deviant expression of sexual characters have been recorded for only ten species of Eumenidae, including those newly recorded in the present paper.

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Zusammenfassung

Zwei gynandromorphe Eumenidae derArten *Gymnomerus laevipes* (SHUCKARD 1837) und *Eumenes coarctatus lunulatus* FABRICIUS 1804 wurden beschrieben und hinsichtlich Kopfmorphologie abgebildet. Bei beiden Tieren entspricht der Habitus einem Weibchen mit teilweise männlichen Merkmalen am Kopf. Der Klassifikation von DALLA TORRE & FRIESE (1899) folgend gehört das abweichende Weibchen von *Gymnomerus laevipes* zur Gruppe 4, einem Weibchenkopf mit männlichen Merkmalen nur im linken Bereich des Clypeus und des Fühlers. *Eumenes coarctatus lunulatus* wiederum gehört zur Gruppe 1 mit bilateral asymetrischer Verteilung der Gechlechtsmerkmale, die linke Seite entspricht dem Weibchen, die rechte dem Männchen. Das Phänomen der Gynandromorphie innerhalb der Eumenidae wurde besprochen und festgehalten, dass bisher innerhalb der Familie erst bei zehn Arten Gynandromorphie festgestellt wurde.

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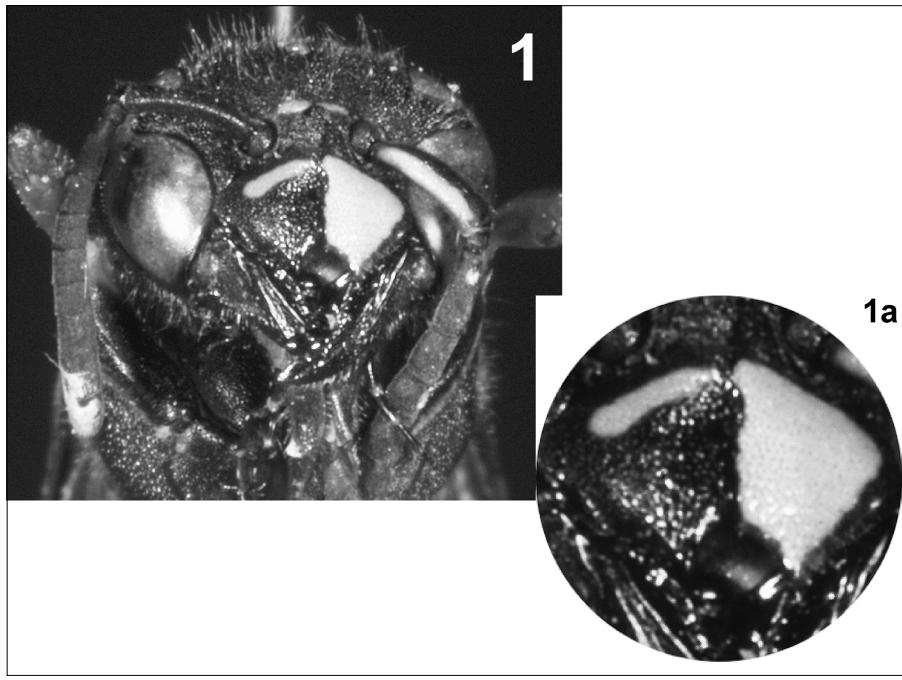

Fig. 1: *Gymnomerus laevipes* (SHUCKARD 1837) gynandromorph specimen, head in frontal view. (**1a**) detail of clypeus.

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Fig. 2: *Eumenes coarctatus lunulatus* FABRICIUS 1804, gynandromorph specimen, head in frontal view. (**2a**) detail of clypeus; (**2b**) detail of tip of male-like antenna; (**2c**) detail of tip of female-like antenna.

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