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GIUSEPPE FABRIZIO TURRISI

DISCOVERY OF XIPHYDRIIDAE IN SICILY, INHABITING *BETULA AETNENSIS* RAFINESQUE WOODS OF ETNA (*Hymenoptera Xiphydroidea*)

SUMMARY

The family Xiphydriidae is recorded in Sicily for the first time. It is represented by *Xiphydria camelus* (Linnaeus, 1758), recently collected on high altitudes of Etna Volcano, in a wood of *Betula aetnensis* Rafinesque (Betulaceae). The biogeographic relevance of this new finding is briefly pointed out and some ecological implications are provided. The number of families belonging to "Symphyta" known to Sicily (including neighbouring islands) is raised up to nine.

RIASSUNTO

Prima segnalazione di Xiphydriidae per la Sicilia, vivente in aree forestali dell'Etna a Betula aetnensis *Rafinesque (Hymenoptera Xiphydroidea)*. Viene segnalata per la prima volta in Sicilia la presenza della famiglia Xiphydriidae. Questa è rappresentata da *Xiphydria camelus* (Linnaeus, 1758), recentemente scoperta sulle alte quote del vulcano Etna, in un'area forestale a *Betula aetnensis* Rafinesque (Betulaceae). Viene messa in evidenza la rilevanza biogeografica relativa alla presenza di questa specie in Sicilia e vengono fornite considerazioni su alcune implicazioni ecologiche. Con la presente, il numero di famiglie di "Symphyta" note per la Sicilia (isole circostanti comprese) viene elevato a nove.

INTRODUCTION

The family Xiphydriidae (woodwasps), belonging to the informal group of "Symphyta" (sawflies), has a worldwide distribution, excepting subsaharan Africa, and includes some 140 described species (SMITH, 1978, 2008; JENNINGS *et al.*, 2007, 2009a, 2009b; TAEGER & BLANK, 2008). In Europe

xiphydriids are more common in the northern territories where sometimes they play a relevant role in the forestry ecology, whereas in the southern border, namely in the Mediterranean area, they become very scattered and rare and consequently poorly represented. The species occurring in Europe belong to Xiphydriinae Ashmead (BENSON, 1954), the largest and widely distributed of the two currently recognized subfamilies (Derecyrtinae are Neotropical and Australian with 21 described species: SMITH, 2008; JENNINGS *et al.*, 2007, 2009a, 2009b), included within only one genus, *Xiphydria* Latreille, 1803, represented by seven species (TAEGER & BLANK, 2007, 2008). In Italy, six species are recorded: *X. camelus* (Linnaeus, 1758); *X. irrorata* F. Pesarini, 1995; *X. longicollis* (Geoffroy, 1785); *X. megapolitana* (Brauns, 1884); *X. picta* Konow, 1897; *X. prolongata* (Geoffroy, 1785), mostly distributed in the northern regions (MASUTTI & PESARINI, 1995; PESARINI, 1995; ALTENHOFER *et al.*, 2001).

Xiphydriid larvae are woodborers and have only vestigial legs (SMITH & MIDDLEKAUFF, 1987). In the northern Hemisphere, larvae are known to develop in the wood of angiosperms, usually in small branches of deciduous trees of Aceraceae, Betulaceae, Salicaceae, and Ulmaceae (KONOW, 1901, 1905; SMITH, 1976, 1978, 2008; KRAUS, 1997; SMITH & SCHIFF, 2001). The development of the larvae depends on symbiotic Fungi living in their tunnels, which render available the cellulose compounds as trophic source (KAJIMURA, 2000; ŠRŮTKA *et al.*, 2007).

During the entomological investigations carried out in woods of high altitudes of Etna Volcano, the family Xyphydriidae, previously unknown to Sicily (PESARINI & TURRISI, 2001; TURRISI, in press), has been discovered. The present note deals with brief biogeographic and ecological remarks related to this new finding.

MATERIAL AND METHODS

The specimens studied have been collected in the field, in their natural habitat, a scattered wood of *Betula aetnensis* Rafinesque. The specimens were identified by the author on the basis of several taxonomic papers: ANDRÉ (1881), ENSLIN (1912-18), KONOW (1901), BERLAND (1947), KRAUS (1997); the material is preserved in the Dipartimento di Biologia Animale dell'Università di Catania (G.F. Turrisi collection).

Multifocal images were taken using a Nikon Coolpix 4300 digital camera attached to a Wild M5A microscope and subsequently processed with Combine ZM software (HADLEY, 2008).

Results and discussion

Xiphydria camelus (Linnaeus, 1758) (Figs. 1-11)

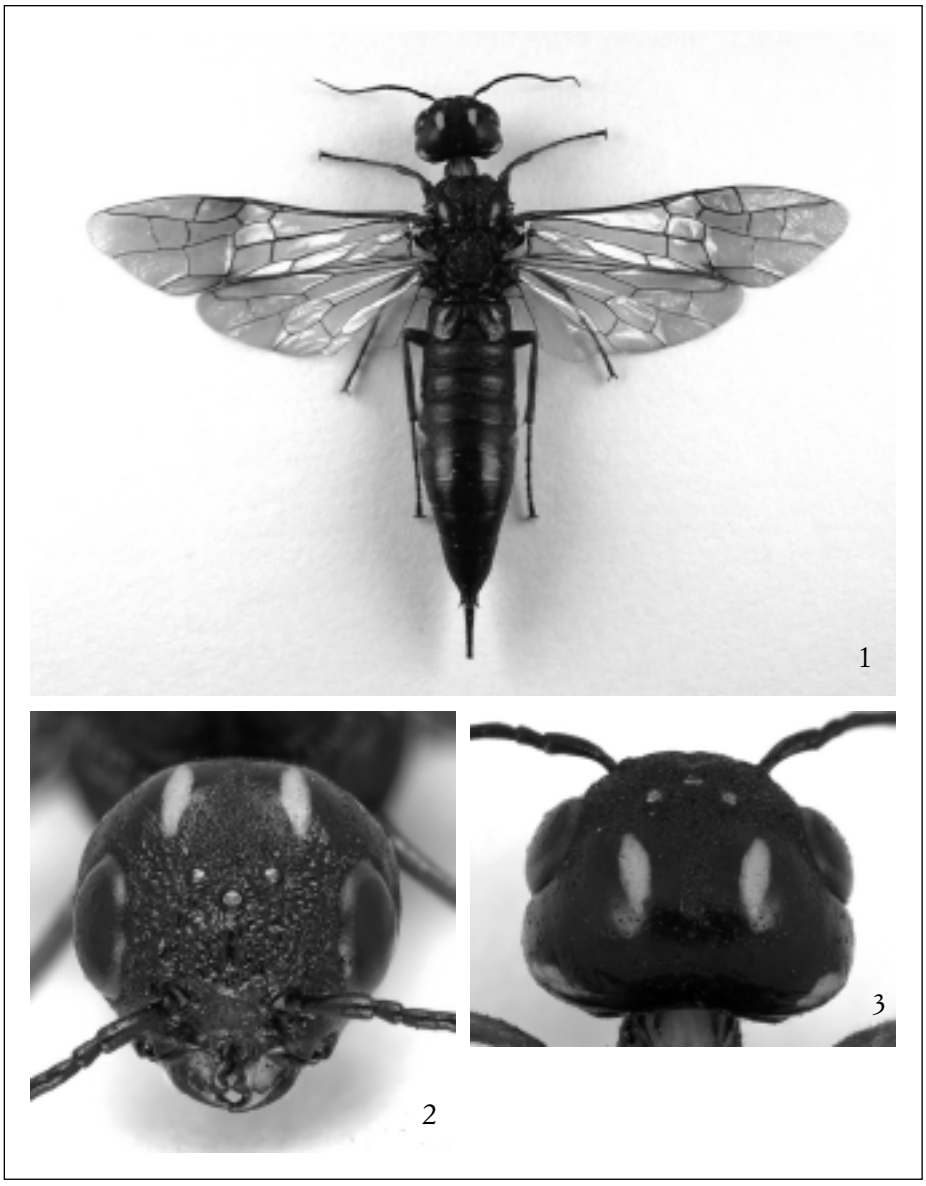
Tenthredo camelus Linnaeus, 1758, 1: 560.

Material examined. 2♀♀, Sicily: Etna Volcano, Sant'Alfio (Catania), Monti Sartorius, 1720 m a.s.l., 5.VII.2009, G.F. Turrisi leg.

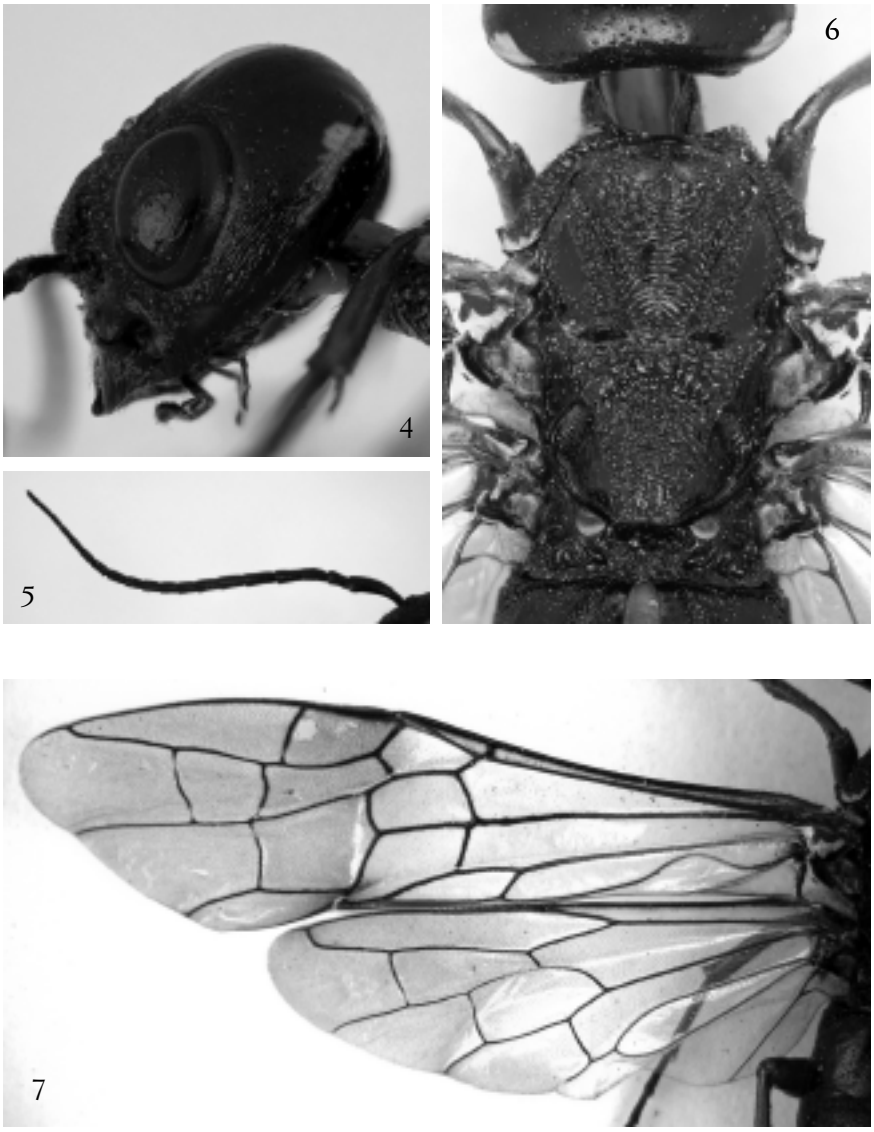
Distribution. Widely distributed throughout Eurasia (André, 1881; Konow, 1901; Enslin, 1912-18; Berland, 1947; Smith, 1978; Taeger & Blank, 2006, 2007, 2008). Recorded for Austria, Belgium, Bulgaria, China (only one record by Maa, 1949 from "Kirin: Kao-Lin-Tze"), Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Hungary, Japan (only recorded by Watanabe, 1956), Italy, Latvia, Norway, Poland, Romania, Russia (including Siberia; east to Kamčatka and Kurili Islands), Slovakia, Spain, Sweden, Switzerland, The Netherlands, Ukraine (see Smith, 1978 for extensive literature on distribution). A doubtful record from Greece is reported by Pesarini (2002) on the basis of a specimen (female) observed in the field on *Quercus* sp.; it has not been ascertained whether it belongs to *Xiphydria camelus* or *X. longicollis*, thus the presence in Greece of the former species requires further investigations.

Biology. The larvae of *Xiphydria camelus* feed primarily on Betulaceae (*Alnus* spp., *Betula* spp.) (Konow, 1901; Enslin, 1912-18; Smith, 1978; Kraus, 1997), but it has been recorded on additional host plants belonging to other Betulaceae (*Ostrya carpinifolia* Scop.), Aceraceae (*Acer* sp.), Fagaceae (*Quercus* spp.; *Fagus* spp.), Salicaceae (*Populus* spp., *Salix* sp.), Ulmaceae (*Ulmus* sp.), Sapindaceae (*Aesculus turbinata* Blume) and generically to "pine" and "spruce" (see Smith, 1978; Taeger *et al.*, 1998).

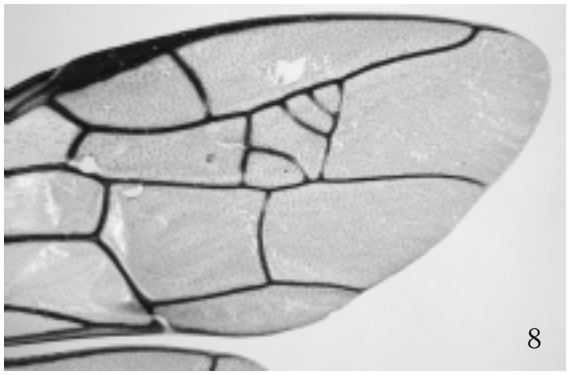
Remarks on biogeography and ecology. *Xiphydria camelus* is newly recorded for Sicily; it is also the first species of the family Xiphydriidae known for this island. In Italy it has previously been recorded only for northern regions (Masutti in Masutti & Pesarini, 1995) where it is relatively uncommon, with a few scattered findings, and for Tuscany (only one record, quoted by Costa, 1894; a previous record by Rossi, 1790, quoted also in Berlese, 1890, cannot be referred to this species according to Costa, 1894). Records for Italy are provided by Bezzi (1891) (Lombardy: Bereguardo), Costa (1894) (Alps, Tuscany), Zavattari (1912) (Piedmont), Zangheri (1969) (Emilia-Romagna: Pineta di S. Vitale), Zombori & Bibolini (1980) (Valle d'Aosta: Valpelline), Zombori (1981) (Trentino-Alto Adige: M. Sagron), Battisti & Covassi (1991) (Friuli-Venezia Giulia: Muzzana d. Turgnano, several localities: Bosco Bando, Baredi, Selva Arvonchi; Castion di Strada loc. Bosco Boscat), Hellrigl *et al.* (1996) (Trentino-Alto Adige:



Figs. 1-3 — *Xiphydria camelus* (Linnaeus, 1758), female specimen, Italy: Sicily, Etna Volcano. 1, habitus; 2, head, frontal; 3, head, dorsal.



Figs. 4-7 — Xiphydria camelus (Linnaeus, 1758), female specimen, Italy: Sicily, Etna Volcano. 4, head, lateral; 5, antenna; 6, thorax, dorsal; 7, wings.



Figs. 8-11 — *Xiphydria camelus* (Linnaeus, 1758), female specimen, Italy: Sicily, Etna Volcano. 8, teratology of the second submarginal cell on the right fore wing; 9, abdomen, dorsal; 10, abdomen, lateral; 11, apex of abdomen with ovipositor, lateral.

Atzwang [Campodazzo]), HELLRIGL (1997) (Trentino-Alto Adige: Atzwang [Campodazzo], Bressanone), ALTENHOFER *et al.* (2001) (Trentino-Alto Adige: Bressanone-Neustift [Novacella]), HELLRIGL (2007a, 2007b) (Trentino-Alto Adige: Vahrn).

The new record of *Xiphydria camelus* shifts to south not only its known Italian range, but also the general distribution, rendering Sicily the southernmost territory of its presence.

The presence of this species in Sicily is probably restricted to only high altitudes of Etna Volcano. It clearly represents a true "glacial relict" deriving from invasion during Quaternary (LA GRECA, 1984).

The habitat where the species has been discovered is a scattered wood of the Etnean endemic *Betula aetnensis*. The two specimens were collected under the trees, flying on decaying wood (Fig. 12). In Europe xiphydriids have as main host-targets weakened trees, and they are able to become locally abundant causing massive dieback within forestry areas. In particular, *Xiphydria camelus* locally causes damages on trees of *Alnus glutinosa* (L.) Gaertn. that had been weakened by physiological stress (e.g. paucity or excess of soil water level) or other factors including parasites e.g., Fungi (ŠRŮTKA *et al.*, 2007).

The investigated birch woods of the north-eastern part of Etna are char-

Fig. 12 — Habitat of *Xiphydria camelus*, Sicily: Etna Volcano, Sant'Alfio, Monti Sartorius, 1720 m a.s.l.

acterized by a sandy soil having a south or south-east exposition. The ecological abiotic factors (De Martonne Index, *Ia*: >40; yearly average precipitation: 1200-1400 mm; yearly average temperature: 9-10 °C, DRAGO, 2005) easily permit to identify this as a true Mediterranean-montane zone (according to POLI MARCHESE, 1991). However, the structure of the soil determine marked edaphic aridity causing physiological water stress to the birch woods. My recognitions in these woods have permitted to ascertain a very relevant amount of sick or already decaying or otherwise damaged trees, caused also by weathering, e.g. gravitative action of snow, as well as fungal pathocenosis.

Xiphydria spp. females carry xylariaceous symbiotic Ascomycetes Fungi inside their mycangia, that are inoculated within the wood during oviposition (ŠRŮTKA *et al.*, 2007). These mycetes permit partial pre-digestion of cellulose and thus metabolites become promptly ready for xiphydriid-larvae. A recent research has identified the symbiotic Fungi linked to *Xiphydria camelus*, belonging to *Daldinia decipiens* Wollweber et Stadler (Xylariaceae) (ŠRŮTKA *et al.*, 2007), living as saprotrophic on Betulaceae, namely on both *Betula* (STADLER *et al.*, 2001) and *Alnus* (ŠRŮTKA *et al.*, 2007). *Daldinia decipiens* is a latent pathogen inside trees, delaying its development until climatic stress or fire occur, causing wood sick, decay or other damages. On the basis of its ecological traits, *Xiphydria camelus* may be considered another important component of the saproxylic fauna, due to its role in died wood masses degradation and thus soil improvement of the organic rate.

The very peculiar ecological traits of the investigated Etnean birch woods, having true features of "pioneers" on sandy lavic soil (POLI MARCHESE, 1991), as well as their local diffusion, have a putative important role affecting population dynamics of *Xiphydria camelus*, of sure interest for further scientific investigations as well as for a correct management of these cenosis.

Additional notes. It is interesting to note a teratology in the right fore wing of one specimen. It affects the submarginal cell 2 and consists of its fragmentation into four small closed subcells due to the presence of three oblique additional veins (Fig. 8).

CONCLUDING REMARKS

With the present new record, the number of families belonging to the informal group of "Symphyta" is now raised up to nine (cfr. PESARINI & TURRISI, 2001; TURRISI, in press). The presence in Sicily of *Xiphydria camelus* increases the number of species strictly occurring only in refugia areas, on high altitudes of Etna Volcano. In recent years several other

species of Hymenoptera representing "glacial relicts" have been discovered (TURRISI & BELLA, 1999; PESARINI & TURRISI, 2001, 2006; NOBILE & TURRISI, 2004; TURRISI, 2007, 2009; TURRISI *et al.*, 2007; TURRISI & TURRISI, 2007). Within the Mediterranean insular context, only one Xiphydriidae has been previously recorded, *Xiphydria picta* (with larvae feeding on *Alnus* spp.) known for Sardinia and Corsica (ALTENHOFER *et al.*, 2001; TAEGER *et al.*, 2006; TURRISI, in press).

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Address of the author — G.F. TURRISI, Dipartimento di Biologia Animale "Marcello La Greca", Università di Catania, via Androne, 81 - 95124 Catania (I); e-mail: turrisifabrizio@yahoo.it