Zootaxa 3765 (2): 161–174
www.mapress.com/zootaxa/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

http://dx.doi.org/10.11646/zootaxa.3765.2.4
http://zoobank.org/urn:lsid:zoobank.org:pub:02477E80-6B9A-44DB-83C2-80AE06A925A1

Palaearctic *Hoplitis* bees of the subgenera *Chlidoplitis* and *Megahoplitis* (Megachilidae, Osmiini): biology, taxonomy and key to species

ANDREAS MÜLLER
ETH Zurich, Institute of Agricultural Sciences, Biocommunication and Entomology, Schmelzbergstrasse 9/LFO, 8092 Zurich, Switzerland.
E-mail: andreas.mueller@usys.ethz.ch

Abstract

Chlidoplitis and *Megahoplitis* are closely related Palaearctic subgenera of the osmiine bee genus *Hoplitis* (Megachilidae) containing nine and two species, respectively. Analysis of female pollen loads and field observations suggest that all species are pollen specialists. Whereas the *H. (Chlidoplitis*) species are probably all narrowly oligolectic and exclusively collect pollen on *Allium* (Alliaceae), *Haplophyllum* (Rutaceae), *Reseda* (Resedaceae), *Teucrium* (Lamiaceae), *Trifolium* (Fabaceae) or Hedysareae (Fabaceae), the *H. (Megahoplitis)* species show a close affinity to Carduoideae (Asteraceae) as pollen hosts. The few data available suggest that the *H. (Chlidoplitis*) species nest in preexisting insect burrows in the ground and use either chewed leaves or mud as nesting material. The nesting biology of the subgenus *Megahoplitis* remains unknown. The taxonomic revision of the subgenera *Chlidoplitis* and *Megahoplitis* revealed the existence of two undescribed species: *H. (Chlidoplitis) haplophylli* spec. nov. from southeastern Central Asia and *Hoplitis (Chlidoplitis) allii* spec. nov. from the Levant. Identification keys for the species of both subgenera are given including the hitherto unknown male of *H. (Megahoplitis) bombiformis*.

Key words: Apiformes, host-plant choice, Hymenoptera, nesting behaviour

Introduction

Chlidoplitis Griswold and *Megahoplitis* Tkalců are species-poor subgenera of the osmiine bee genus *Hoplitis* Klug (Megachilidae, Megachilinae, Osmiini). Including species newly described in the present publication, the two subgenera contain nine and two species, respectively, which are restricted to the Palaearctic region. A recent molecular phylogenetic study of the genus *Hoplitis* suggests that the subgenera *Chlidoplitis* and *Megahoplitis* are sister taxa (Sedivy *et al*., 2013), which is unexpected at first sight as they show few morphological and biological similarities. The presumed sister-group relationship, however, is supported by two morphological characters shared by the males of most *H.* (*Chlidoplitis*) and *H.* (*Megahoplitis*) species but rarely found in other *Hoplitis* taxa, *i.e.* the form of sternum 6, which is medioapically prolonged into a triangular process of varying length (Figs. 2, 18, 20), and asymmetric midtarsal segments (Fig. 6), which are extended to spine-like processes in some species.

Over the last few years, a large amount of material of the subgenera *Chlidoplitis* and *Megahoplitis* has become available, which—in combination with the examination of the name-bearing type material—allowed the clarification of the taxonomy of the species and revealed the unknown male of the rare and enigmatic *Hoplitis (Megahoplitis) bombiformis* Zanden. This material also provided the opportunity to assess floral preferences by microscopically analysing the pollen contained in the scopal brushes of collected females.

In the present publication, the subgenera *Chlidoplitis* and *Megahoplitis* are morphologically diagnosed, the current knowledge on their pollen hosts and nesting biology is summarized, the species are revised, two new *H.* (*Chlidoplitis*) species are described and identification keys including all species of the two subgenera are given. Morphological terminology follows Michener (2007) including definitions for body measurements. Measurements to the nearest 0.1mm or 0.5mm (for body length) were taken using an ocular micrometer on an Olympus VMT stereomicroscope. Photomicrographs were taken with the digital microscope Keyence VHX-2000. To assess the pollen hosts of the species, scopal pollen contents of all available females were analysed by light microscopy applying the method of Sedivy *et al.* (2008).

Accepted by C. Rasmussen: 7 Jan. 2014; published: 17 Feb. 2014

Izmir, 19.6.1998; *Malatya:* Erkenek, 60km SW Malatya, 9.7.1997, 26.6.2000; *Van:* Bozyaka Köy, 22.7.1997; Tevekli, 23.7.1997.

Literature records. ALGERIA*:* Sétif (Zanden, 1991b).

Distribution. Northern Africa (Morocco, Algeria); Greece to easternmost Turkey and southwestern Iran; Levant (Syria).

Pollen hosts. Probably oligolectic on Carduoideae (Asteraceae): all 11 pollen loads (7 localities, 4 countries) analyzed so far exclusively consisted of pollen of *Centaurea* and thistles. Flower records: *Centaurea diluta, C. solstitialis, C. spinosa* (label records).

Nesting biology. Unknown.

Key to the species of *Hoplitis* (*Megahoplitis*)

Females

1 Pilosity of body yellowish-brown to white (Fig. 16). Scopa orange. Marginal zones of terga 1–5 with cream-coloured to white hair bands, which may be interrupted on terga 1–3. Wings slightly darkened. Body length 12.5–15mm. ..... ***Hoplitis tigrina***

1* Pilosity of body dark brown to blackish (Fig. 19). Scopa black. Marginal zones of terga without hair bands. Wings strongly darkened. Body length 16–18mm. ***Hoplitis bombiformis***

Males

1 Third antennal segment of normal shape. Basal zone of propodeum shagreened. Tarsal segments 2–4 of middle leg only weakly asymmetric. Tergum 6 without lateral tooth and without longitudinal keel. Lateral tooth of tergum 7 well developed, one third to almost half as long as middle tooth, which is unkeeled and slightly longer than the maximal width at its base (Fig. 17). Tergal discs covered with yellowish-brown hairs, which are about as long as the yellowish-white hairs that form the distinct apical hair bands. Medioapical process of sternum 6 without long hairs on its ventral side (Fig. 18). Apex of gonoforceps and penis valve only microscopically haired. Body length 12.5–15mm. ..... ***Hoplitis tigrina***

1* Lower margin of third antennal segment slightly projecting basally. Basal zone of propodeum polished. Tarsal segments 2–4 of middle leg distinctly asymmetric, lateroapically prolonged into rounded spine-like process. Tergum 6 with short rounded lateral tooth and medioapically with short longitudinal keel. Lateral tooth of tergum 7 poorly developed, much shorter than middle tooth, which is distinctly keeled longitudinally and shorter than the maximal width at its base. Tergal discs covered with yellowish-brown hairs, which are longer than the yellowish-white hairs that form the rather indistinct apical hair bands. Medioapical process of sternum 6 covered with long hairs on its ventral side (Fig. 12). Apex of gonoforceps densely haired, penis valve laterally ciliated with long hairs. Body length 18mm..... ***Hoplitis bombiformis***

Acknowledgments

M. Schwarz (Ansfelden) and F. Gusenleitner (Oberösterreichisches Landesmuseum Linz) loaned a large amount of material of *Chlidoplitis* and *Megahoplitis* for study. C. Praz (University of Neuchâtel) and C. Sedivy (ETH Zurich) participated in excursions to Jordan and northern Africa. H. Baur (Natural History Museum Bern) kindly provided access to a digital imaging system for taking photomicrographs. C. Rasmussen and an anonymous reviewer made valuable comments on the manuscript.

Literature

Benoist, R. (1927) Hyménoptères mellifères nouveaux du Maroc. *Bulletin de la Société des Sciences Naturelles du Maroc,* 7, 169–174.

Benoist, R. (1934) Descriptions d'espèces nouvelles paléarctiques d'hyménoptères mellifères. *Bulletin de la Société Entomologique de France,* 39, 158–160.

Dours, L. (1873) Hyménoptères du bassin méditerranéen. *Andrena* (suite). *Revue et Magasin de Zoologie Pure et Appliqué*, Ser. 3, 1, 274–325.

Friese, H. (1899) Neue palaearktische Sammelbienen. *Entomologische Nachrichten,* 25, 321–346.

Griswold, T.L. & Michener, C.D. (1998) The classification of the Osmiini of the Eastern Hemisphere (Hymenoptera, Megachilidae*). Journal of the Kansas Entomological Society,* 70, 207–253.

Mauss, V., Müller, A. & Yildirim, E. (2010) First contribution to the bionomics of the pollen wasp *Ceramius palaestinensis* (Giordani Soika 1957) (Hymenoptera, Vespidae, Masarinae) in Turkey. *Entomological Science*, 13, 42–59. http://dx.doi.org/10.1111/j.1479-8298.2010.00370.x

Mavromoustakis, G.A. (1939) Some bees from Palestine (Hymenoptera, Apoidea). *The Annals and Magazine of Natural History (London)*, Ser. 11, 3, 225–230.

Michener, C.D. (2007) *The bees of the world* (second edition). Johns Hopkins University Press, Baltimore and London, 953 pp.

Morawitz, F. (1871) Neue suedeuropaeische Bienen. *Horae Societatis Entomologicae Rossicae*, 8, 201–231.

Morice, F.D. (1901) Illustrations of the 6th male ventral segment in 17 *Osmia*-species of the *adunca*-group, with a note on the synonymy of four species, and descriptions of four which seem new. *Transactions of the Entomological Society of London*, 1901, 161–178.

Müller, A. (2013) Palaearctic Osmiine Bees. ETH Zürich. Available from: http://blogs.ethz.ch/osmiini (accessed 22 December 2013)

Praz, C.J., Müller, A., Danforth, B.N., Griswold, T.L., Widmer, A. & Dorn, S. (2008) Phylogeny and biogeography of bees of the tribe Osmiini (Hymenoptera: Megachilidae). *Molecular Phylogenetics and Evolution*, 49, 185–197. http://dx.doi.org/10.1016/j.ympev.2008.07.005

Sedivy, C., Dorn, S. & Müller, A. (2013) Molecular phylogeny of the bee genus *Hoplitis* (Megachilidae: Osmiini) - how does nesting biology affect biogeography? *Zoological Journal of the Linnean Society*, 167, 28–42. http://dx.doi.org/10.1111/j.1096-3642.2012.00876.x

Sedivy, C., Praz, C.J., Müller, A., Widmer, A. & Dorn, S. (2008) Patterns of host-plant choice in bees of the genus *Chelostoma*: the constraint hypothesis of host-range evolution in bees. *Evolution*, 62, 2487–2507. http://dx.doi.org/10.1111/j.1558-5646.2008.00465.x

Tkalců, B. (1975) Sammelergebnisse der von RNDr. A. Hoffer geleiteten Algerien-Expedition in den Jahren 1971 und 1972 (Hymenoptera: Apoidea). 1. Teil: Megachilidae. *Acta Rerum Naturalium Musei Nationalis Slovaci Bratislava*, 21, 165–190.

Tkalců, B. (1993) Quatre nouveaux sous-genres paléarctiques de la tribu des Osmiini (Hym., Apoidea, Megachilidae). *Bulletin de la Société Entomologique de Mulhouse*, July-September, 55–56.

Ungricht, S., Müller, A. & Dorn, S. (2008) A taxonomic catalogue of the Palaearctic bees of the tribe Osmiini (Hymenoptera: Apoidea: Megachilidae). *Zootaxa*, 1865, 1–253.

Zanden, G. van der (1980) Beitrag zur Kenntnis der türkischen Bauchsammler (Hymenoptera, Aculeata, Megachilidae). *Faunistische Abhandlungen*, 7, 229–235.

Zanden, G. van der (1985) Ergebnisse der Untersuchungen der von R. Benoist beschriebenen *Osmia*-Arten mit Liste seiner Schriften (Hymenoptera, Apoidea, Megachilidae). *Reichenbachia,* 23, 47–72.

Zanden, G. van der (1990) Nomenklatorische Änderungen für einige paläarktische Arten der Familie Megachilidae (Insecta, Hymenoptera, Apoidea). *Reichenbachia*, 28, 51–54.

Zanden, G. van der (1991a) Neue oder wenig bekannte Arten der Osmiini aus dem paläarktischen Gebiet (Insecta, Hymenoptera, Apoidea: Megachilidae). *Reichenbachia*, 28, 163–171.

Zanden, G. van der (1991b) Neue Arten der paläarktischen Osmiini und einige neue Fälle von Synonymie (Hymenoptera, Aculeata, Apoidea, Megachilidae). *Linzer Biologische Beiträge*, 23, 345–363.

Zanden, G. van der (1992) Neue Arten der paläarktischen Osmiini (Insecta, Hymenoptera, Apoidea, Megachilidae). *Linzer Biologische Beiträge*, 24, 817–827.

Zanden, G. van der (1996) Neue Verbreitungsangaben zu einigen wenig bekannten paläarktischen Bienen-Arten (Insecta, Hymenoptera, Apoidea). *Linzer Biologische Beiträge*, 28, 387–390.