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Palearctic *Chelostoma* bees of the subgenus *Gyrodromella* (Megachilidae, Osmiini): biology, taxonomy and key to species

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Abstract

Gyrodromella represents a subgenus of the osmiine bee genus *Chelostoma* (Megachilidae) containing eight species, which are confined to the Palearctic region. Analysis of female pollen loads, field observations and literature data suggest that all *C. (Gyrodromella)* species are oligolectic harvesting pollen exclusively on flowers of *Campanula* and possibly also closely related Campanulaceae genera. Preexisting linear cavities in dead wood or stems serve as nesting sites and mud partly combined with pebbles is used for the construction of cell partitions and nest plug. The taxonomic revision of *C. (Gyrodromella)* revealed the existence of two undescribed species: *C. clypeale* spec. nov. from central and eastern Turkey, and *C. tonsum* spec. nov. from eastern Turkey. *Chelostoma confusum* (Benoist, 1934) and *C. proximum* Schletterer, 1889 are newly synonymized with *C. rapunculi* (Lepeletier, 1841), and a lectotype of *C. handlirschi* Schletterer, 1889 is designated. Keys for the identification of all *C. (Gyrodromella)* species are given.

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

Introduction

Gyrodromella Michener is a species-poor subgenus of the osmiine bee genus *Chelostoma* Latreille (Megachilidae, Megachilinae, Osmiini). Originally confined to few species that are morphologically very similar to the type species *Chelostoma rapunculi* (Lepeletier) (Michener, 2007), the subgeneric concept of *C. (Gyrodromella)* has since been expanded to contain some additional species formerly treated as members of the subgenus *C. (Chelostoma)*, such as *Chelostoma nasutum* Pérez (Sedivy *et al.*, 2008). Including species newly described in the present publication, *C. (Gyrodromella)* in its expanded circumscription contains eight species, which are restricted to the Palearctic region.

Due to the rareness and the limited distribution range of several species, such as *C. handlirschi* Schletterer or *C. orientale* Schletterer, and the high intraspecific morphological variability in the most widespread species *C. rapunculi*, the taxonomy of *C. (Gyrodromella)* is in a poor state. This is exemplified by the recent discovery of a new *C. (Gyrodromella)* species restricted in its distribution to the Aegean islands and western Turkey (Müller, 2012) and by the relatively high proportion of misidentified *C. (Gyrodromella)* specimens in private and public entomological collections.

In the present publication, the subgenus *Gyrodromella* is morphologically diagnosed, the current knowledge on its pollen hosts and nesting biology is summarized, the species are revised, two new species are described and identification keys including all species 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, female scopal pollen contents were analysed by light microscopy applying the method of Sedivy *et al.* (2008).

- rarely fused to an uninterrupted transverse apical margin. Space between lateral teeth of tergum 7 narrower than to rarely as wide as maximal width of lateral tooth. Lower median tooth of tergum 7 as wide as space between upper lateral teeth or wider. Body length 7–9.5mm. *Chelostoma rapunculi*
- 3* Upper lateral teeth of tergum 7 more or less parallel-sided and of quadrate to broadly rectangular shape (Fig. 6, 9). Space between lateral teeth of tergum 7 distinctly wider than maximal width of lateral tooth (Fig. 6, 9). Lower median tooth of tergum 7 narrower than space between upper lateral teeth (Fig. 6, 9). 4
- 4 Distance between spots of black bristles at apical margin of sternum 3 distinctly narrower than maximal width of spot (Fig. 7). Sternum 4 lateroapically without small tuft of bristles. Pilosity along lower genal area more irregular and distinctly longer, hairs just behind mandibular base as long as length of first segment of labial palpus or longer. Upper lateral teeth of tergum 7 longer, projecting apex about as long as wide (Fig. 6). Lower median tooth of tergum 7 narrower and of roughly triangular shape (Fig. 6). Membranous appendage of sternum 4 shorter than length of tarsal segment 3 of hind leg. Body length 6–8mm. *Chelostoma clypeale*
- 4* Distance between spots of black bristles at apical margin of sternum 3 as wide as maximal width of spot or wider (Fig. 10). Sternum 4 lateroapically with small tuft of yellowish bristles. Pilosity along lower genal area nearly uniformly very short, hairs just behind mandibular base only half as long as length of first segment of labial palpus (Fig. 8). Upper lateral teeth of tergum 7 shorter, projecting apex slightly wider than long (Fig. 9). Lower median tooth of tergum 7 wider and of roughly trapezoidal shape (Fig. 9). Membranous appendage of sternum 4 about as long as to slightly longer than tarsal segment 3 of hind leg. Body length 6.5–8mm. *Chelostoma tonsum*
- 5 Apical margin of sternum 5 with comb of rather short yellowish bristles, which are usually hidden below sternum 4 except laterally. Lateral spots of black bristles on sternum 3 very small and restricted to apical margin. Sternum 3 laterobasally with two longitudinal ridges. Posterior surface of median elevation on sternum 2 concave, consisting of a small anterior part of half-elliptical shape and a larger posterior part of trapezoidal shape separated from each other by short lateral ridges (Fig. 15). Lateral teeth of tergum 7 narrowly triangular. Body length 9.5–10.5mm. *Chelostoma handlirschi*
- 5* Apical margin of sternum 5 with comb of long bristles, which distinctly project over apical margin of sternum 4. Lateral spots of black bristles on sternum 3 large, not restricted to apical margin. Sternum 3 laterobasally without longitudinal ridges. Median elevation on sternum 2 of other shape. Lateral teeth of tergum 7 broadly triangular or parallel-sided. 6
- 6 Lower surface of median elevation on sternum 2 almost horizontal, slightly concave and of roughly triangular shape (Fig. 18). Lateral spots of black bristles on sternum 3 reaching apical margin. Lateral teeth of tergum 7 parallel-sided and widely spaced basally. Body length 9–11mm. *Chelostoma nasutum*
- 6* Lower surface of median elevation on sternum 2 consisting of a sloping, strongly concave and roundish anterior part and an almost horizontal and slightly concave posterior part, which is constricted near its base and shallowly emarginate posteriorly (Fig. 16, 19). Lateral spots of black bristles on sternum 3 not reaching apical margin. Lateral teeth of tergum 7 broadly triangular or parallel-sided. 7
- 7 Lateral teeth of tergum 7 parallel-sided and widely spaced basally. Posterior side of antennal segments distinctly albeit shortly haired. Body length 8–11mm. *Chelostoma aegaeicum*
- 7* Lateral teeth of tergum 7 broadly triangular and close together basally. Posterior side of antennal segments only microscopically haired. Body length 7.5–9.5mm. *Chelostoma hebraeum*

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