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## **A new species of *Anthidium* bee with an armed sternum from Turkmenistan (Apoidea, Anthidiini)**

Max KASPAREK

**Abstract:** The males of many species of bees of the genus *Anthidium* are equipped with teeth, spines and lobes, usually located on the apical terga. A new species is described here, which has long spines, but they are on the underside of the abdomen, on the last visible sternum. Similar sternal structures are known only from a few other Palaearctic *Anthidium* bees, for which comparative descriptions are provided here. The new species, *Anthidium turkmenisticum* nov.sp., was found in the Murgab (Morghab) valley in the Karakum Desert, southern Turkmenistan.

**Key words:** Anthidiini, new species, Central Asia

### **Introduction**

The bee genus *Anthidium* FABRICIUS has an almost worldwide distribution and is found in both the eastern and western hemispheres. Of the about seven recognized subgenera (MICHENER 2007), the nominate subgenus is by far the most species-rich, and more than 150 species are attributed to it. Two-thirds of them are found in the New and one-third in the Old World (MICHENER 2007, ASCHER & PICKERING 2020).

Most of the members of the nominate subgenus *Anthidium* display in both sexes highly visible black and yellow stripes and other maculations which remember the appearance of wasps. Males are usually armed with teeth, spines and lobes to hold territory and aggressively defend them against intruders. The body structures that serve for defence are mostly located on the apical terga, while the ventral side of the metasoma usually plays only a subordinated role in this respect.

I found a species of *Anthidium* from Central Asia in which the male has extraordinarily enlarged spines on a ventral side of the metasoma. I compared it with the few other Old World *Anthidium* species that have also enlarged sternal spines. The Central Asian species turned out to be unknown so far and is described here.

### **Material and Methods**

The new species described here was compared with all other species of the subgenus *Anthidium* of the eastern hemisphere. For this purpose, material in the author's collection was examined and a comprehensive literature survey was carried out which included a comparison with the original species descriptions.

**Comparative Material examined:** The following material was used in Fig. 4:

*Anthidium spiniventre*, male, Jordan: Jordan valley Dayr Alla [Deir Alla], 27.iv.1996, Mi. Halada leg. (ms1463, coll. M. Kasperek). – *A. gussakovskiji neosyriacum*, male, Jordan: Jordan Valley, South Shuna, 25.-26.iv.1996, Ma. Halada leg. (ms4218, coll. M. Kasperek). – *A. caspicum*, male, Turkey: Hakkâri, 15 km SE, 1850 m, 23.vi.1977, F. Ressler & C. Holzschuh leg. (ms3906, coll. M. Kasperek).

Photographs were taken with a Canon MPE65/2.8 lens mounted on a Canon EOS 6D camera. A Canon Twin Lite MT24EX Macro Flash was used. The camera was moved between the shots with a Cognisys StackShot Rail and between 25 and 30 photographs were taken at different focal distances to give a resulting image with a greater depth of field than any of the individual source images. Subsequently, the pictures were processed with Helicon Focus (version 6.7.1) software to combine the pictures and to create one completely focused image from several partially focused images (image stacking). The resulting images were further processed with Adobe Photoshop Elements 15.

Terminology follows MICHENER (2007). T1, T2, ... tergum 1, tergum 2, ...; S1, S3, ... = sternum 1, sternum 2, ...

## Taxonomy

### *Anthidium turkmenisticum* nov.sp. (Figs 1-4)

**Material examined:** Holotypus. Male, "Turkmenia, Sandikatzi env., 3.-13.v.1993, J. Halada leg." [= Turkmenistan: Sandygacy, 36°32'N, 62°33'E] (coll. M. Kasperek, ms1906).

**Diagnosis** (male): A typical member of the genus *Anthidium*, characterized by a combination of the following features: apical margin of the clypeus smooth; longitudinal carina on hind tibia absent; all terga with broad, uninterrupted yellow bands; T7 with a small median tooth and large lateral lobes with straight outer sides; S6 with long lateral spine visible in dorsal habitus view; median projection of S6 with bifurcate apex.

**Description:** Length: 10 mm. – Head: Clypeus yellow, broader than long (length:width = 0.75), apical margin smooth, semi-transparent; punctation of clypeus coarse at base, finer towards apex; impunctate middle line in the anterior two thirds. Mandible yellow, tridentate. Maxillary palpus relatively long, one-segmented (fused segments?); supraclypeal area yellow alongside the epistomal and subantennal sutures; subantennal suture straight; preoccipital ridge sharp-edged; broad yellow preoccipital band enclosing the upper one-fourth of eye; ocelloccipital distance 3.76 ocellar diameters (1.58 times the ocellocular distance). – Legs: Tibiae and basitarsi of fore and mid leg with white pubescence with hairs up to 1.5 antennal diameters long; hind tibia rounded without longitudinal carina; hind basitarsus with white, dense, felt-like pubescence. – Mesosoma: Scutum black with fine, dense punctation; broad yellow antero-lateral boomerang-shaped band; pronotal lobe yellow, carina or lamella absent; scutellum black anteriorly and yellow posteriorly; median emargination at posterior margin. – Metasoma: T1–T6 with broad, uninterrupted yellow bands; punctures small and punctation scattered especially laterally on T1 (punctures up to several their diameters apart); T6 with flat lateral projection; T7 with lateral lobes and a median spine; length of spine about half the length of lateral lobes (as seen from the inner emargination); outer margin of lobes almost straight, lobes with a narrow transparent margin; S1 with a median longitudinal carina; apical margins of S1–S5 straight, sterna covered with long, dense pubescence; S6 with long, lateral spines tapering towards the apex and a median projection

with a bifurcated apex (Fig. 4). The lateral spines are more or less round in cross section, but with a carina on the outer side. – Genitalia (Fig. 3). The genitalia correspond to the general structure of *Anthidium*. The gonocoxit is broad and massive, and fused with the gonostylus at its apical end. The gonostylus is hairy with rather long hairs. Other than in many other species of the subgenus *Anthidium*, the volsella is relatively large, flat and disc-shaped, and inserted between the gonostylus and the penis valve. The penis valve is slender with a long horn-like apex. The "horns" are much longer than e.g. in *A. melanopygum* FRIESE, 1917 and *A. spiniventre* (KASPAREK & FATERYGA, 2022). – Hidden sterna: The hidden sternum S8 is almost rectangular, with slightly raised shoulders. The spiculum is relatively large; its width at base occupies almost one third of the width of the sternum. Shallow emargination at its apex (Fig. 3).

**Differential diagnosis** (male): One of the most striking traits of the new species are the long lateral spines of S6 which are visible in dorsal habitus view. Similar long spines also have *Anthidium caspicum* MORAWITZ, 1880; *A. flavotarsum* WU, 1982; *A. gussakovskiji* MAVROMOUSTAKIS, 1939; *A. sichuanense* WU, 1993; *A. spiniventre* FRIESE, 1899; and *A. thomsoni* MORAWITZ, 1894 (FRIESE 1898, KASPAREK 2022, NIU et al. 2020).

*Anthidium caspicum* (Turkey to Central Asia) is distinguished by its larger size (15 mm vs. 10 mm in *A. turkmenistanicum*), widely rounded outer sides of the lobes of T7 (almost straight in *A. turkmenistanicum*), and reduced yellow tergal bands (interrupted on T1 and often T2, with median wedge on following terga) (all yellow bands uninterrupted in *A. turkmenistanicum*). The lateral spines of S6 are black, have a triangular cross-section and are tapering towards the apex (Fig. 4).

*Anthidium flavotarsum* (China) is distinguished by the absence of yellow tergal bands (only small yellow maculation on T5) and the presence of long, ochreous pubescence on the terga, particularly on the apical ones (NIU et al. 2020), while *A. turkmenistanicum* has only short, inconspicuous hairs on the terga. S6 including its lateral spines black (NIU et al. 2020).

*Anthidium gussakovskiji* (Turkey to Central Asia) is distinguished by a conspicuous carina on the hind tibia (absent in *A. turkmenistanicum*), a minute median tubercle on T7 (small tooth in *A. turkmenistanicum*), and a long median extension of S6, widened at the apex with convex margin (apex bifurcate in *A. turkmenistanicum*). The lateral spines of S6 are yellow, have a triangular cross-section with acute edges, and are tapering towards the apex. The apex is brown (Fig. 4).

*Anthidium sichuanense* (China) is distinguished from *A. turkmenistanicum* by the absence of yellow bands on the terga (only small yellow spots on apical terga) and the presence of long ochreous hairs on the terga (NIU et al. 2020) (only inconspicuous hairs on the terga in *A. turkmenistanicum*). The lateral spines of S6 are shorter and less pointed as in *A. turkmenistanicum* (see photograph in NIU et al. 2020).

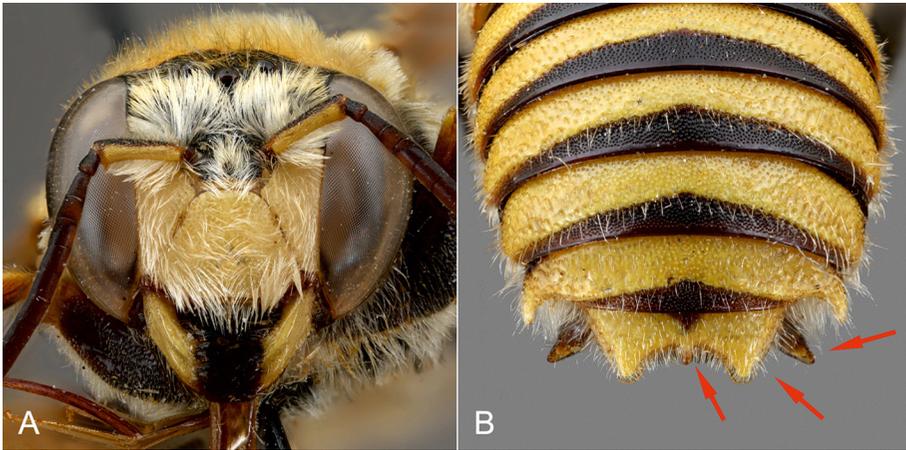
*Anthidium spiniventre* (sensu *A. spiniventre spiniventre*; see KASPAREK & FATERYGA 2022). (Turkey to Central Asia) is distinguished by a truncate median protrusion of S6 (protruding with a bifurcate apex in *A. turkmenistanicum*), an interrupted yellow band on T1 (uninterrupted in *A. turkmenistanicum*), a crenulate apical margin of the clypeus (smooth in *A. turkmenistanicum*) and the presence of a conspicuous carina on the outer face of the hind tibia (absent in *A. turkmenistanicum*).



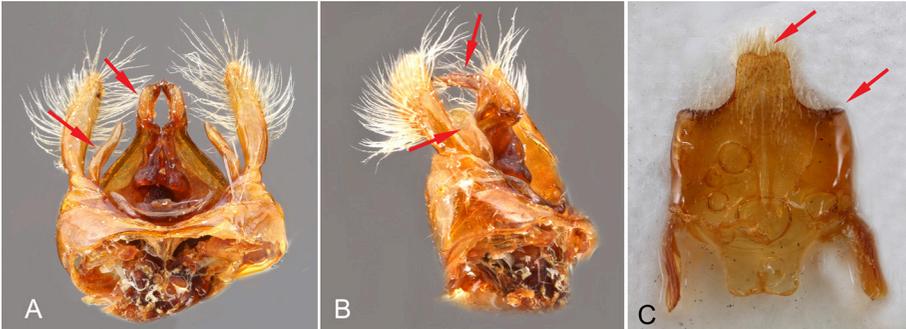
Fig. 1. *Anthidium turkmenisticum* nov.sp. Habitus of male, holotype.

*Anthidium thomsoni* (Central Asia) is distinguished by the shape of the lateral lobes of T7 which are spiniform and pointed rather than lobiform and obtuse as in *A. turkmenisticum* (MORAWITZ 1894; see Figure in FRIESE 1898). The lateral spines of S6 are thin and pointed (stronger and less pointed in *A. turkmenisticum*).

**Derivatio nominis:** Named after the country Turkmenistan, in which the type location is situated.



**Fig. 2.** *Anthidium turkmenisticum* nov.sp., male, holotype. A. Face; B. Apical terga.



**Fig. 3.** *Anthidium turkmenisticum* nov.sp. Male genitalia in dorsal and lateral view (A, B) and S8 (C).



**Fig. 4.** Sternum 6 of the males of four West Palaearctic *Anthidium* species with long-spined sterna: A. *Anthidium turkmenisticum* nov.sp., B. *A. spiniventre*, C. *A. gussakovskiji*, and D. *A. caspicum*.

### Identification Key

A modern identification key which includes the Central Asian Anthidiini is not available, and despite the need for updating, the key of WARNCKE (1980) is therefore still widely used. WARNCKE's key leads to couplet 49, which should be amended and an additional couplet (49a) should be inserted:

- 49 S6 with long, lateral spines which are visible in dorsal habitus view .....49a  
 - Lateral spine on S6 absent or short (not visible in dorsal habitus view).....50  
 49a Large species (15 mm); median spine of T7 strong and almost as long as lateral lobes; outer sides of lateral lobes convexly rounded; apical margin of S6 with a short median protrusion ..... *A. caspicum* Morawitz  
 - Medium-sized species (10 mm); median tooth of T7 short, less than half as long as lateral lobes; S6 medially widely protruding with a bifurcate apex .....  
 .....*A. turkmenistanicum* nov.sp.

### Discussion

Long spines on the underside of the mesosoma are quite unusual for anthidiine bees and have been found only in a few species within the subgenus *Anthidium*. As far as can be understood, such spines do not indicate close relationship among these species: For example, a presence/absence of a longitudinal carina on the outer face of the hind tibia is regarded as relevant for understanding the taxonomic relationships among anthidiine bees (e.g., KASPAREK & GRISWOLD 2021). Such a carina is present neither in the new species nor in *A. caspicum*, but it is present in *A. gussakovskiji* and *A. spiniventre*. Long lateral spines on S6 are found both in *A. flavotarsum* and *A. sichuanense*, two closely related species. On the other hand, *A. spiniventre* has long lateral spines, but its closest relative, *A. melanopygum*, has only relatively small flat projections on S6 (*A. melanopygum* was treated as subspecies of *A. spiniventre* until recently; KASPAREK & FATERYGA 2022). It thus seems that the presence of lateral spines on S6 do not necessary indicate close relationship and that the long spines of S6 seem to have evolved in evolution independently a few times.

The function of these ventral spines is not understood. While they could be part of the male's defensive system, it may also be considered that they have a role in the mating behaviour. It is conceivable that the spines are used, for example, by the male when it holds the female when it is curled around the apical part of the female's metasoma during mating.

The maxillary palpi of *Anthidium* were described by MICHENER (2007: 492) as "minute" and "two-segmented". Actually, the maxillary palpi of *A. turkmenistanicum* were found to be relatively long and consisting of a single segment, as it was found also in other members of the *Anthidium* genus (KASPAREK, unpubl.). Considering this observation, it needs to be clarified what MICHENER understood as "minute" and whether he also counted a possibly existing nonvisible basal segment.

### Acknowledgement

I would like to thank Maximilian Schwarz, Ansfelden (Austria) who provided me with the material described here.

## Zusammenfassung

Die Männchen vieler Arten der Bienengattung *Anthidium* sind mit Zähnen, Stacheln und Lappen ausgestattet, die sich in der Regel auf den apikalen Terga befinden. Hier wird eine neue Art beschrieben, die lange Stacheln hat, die sich aber auf der Unterseite des Hinterleibs, auf dem letzten sichtbaren Sternum, befinden. Ähnliche Sternumstrukturen sind nur von einigen wenigen anderen paläarktischen *Anthidium*-Bienen bekannt, für die hier verglichen werden. Die neue Art, *Anthidium turkmenistanicum* nov.sp., wurde im Murgab (Morghab)-Tal in der Karakum-Wüste, Südturkmenistan, gefunden.

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Anschrift des Verfassers: Dr. Max KASPAREK  
Mönchhofstr. 16, 69120 Heidelberg, Germany  
E-mail: [Kasperek@t-online.de](mailto:Kasperek@t-online.de)

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