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On some *Myllaena* species in the East Mediterranean and Caucasus regions (Coleoptera: Staphylinidae: Aleocharinae)

Volker ASSING

A b s t r a c t : Two species of previously uncertain status of *Myllaena* ERICHSON, 1837 are revised, redescribed, and illustrated: *M. graeca* KRAATZ, 1858 (Greece, Turkey) and *M. caucasica* EPPELSHEIM, 1880 (Caucasus region). A neotype and a lectotype are designated for *M. graeca* and *M. caucasica*, respectively. Three species are described and illustrated: *M. mutabilis* nov.sp. (Greece: Corfu), *M. cretica* nov.sp. (Greece: Crete), and *M. ambulans* nov.sp. (Armenia). Eight first records of *Myllaena* species from Armenia (3), Nagorno-Karabakh (2), Russia (1), Azerbaijan (1), and Iran (1) are reported. The currently known distributions of *M. graeca*, *M. caucasica*, and of the three newly described species are mapped.

K e y w o r d s : Coleoptera, Staphylinidae, Aleocharinae, *Myllaena*, Palaearctic region, East Mediterranean, Caucasus region, Greece, Armenia, taxonomy, new species, neotype designation, lectotype designation, new records, distribution maps.

Introduction

SCHÜLKE & SMETANA (2015) list a total of 85 species of *Myllaena* ERICHSON, 1837 for the Palaearctic region. Two of the names are of highly doubtful status and most likely synonyms: *M. minuta* (MATTHEWS, 1838) and *M. fowleri* Matthews, 1883, both described from Great Britain. Fifteen species are distributed in the West Palaearctic region including Middle Asia, 64 in the East Palaearctic region, and four have been recorded from both the West and the East Palaearctic regions. Very recently, eight additional species were described from the Greek island Lesbos (one) and from China (seven) (ASSING 2016, PACE 2017). Seven species were previously known from Greece, one from Azerbaijan, and none from Armenia.

Aside from the keys to - and illustrations of - North and Central European species provided by STRAND (1967) and LOHSE (1974), there have been no genitalia-based revisions or other comprehensive articles on West Palaearctic *Myllaena*. As a consequence, the distributions of some West and trans-Palaearctic species as indicated in the Palaearctic Catalogue (SCHÜLKE & SMETANA 2015) are implausible or evidently incorrect. In the past, *Myllaena* species have often been identified based exclusively on external characters. However, recent studies have shown that a reliable identification is generally possible only based on the primary and secondary sexual characters, particularly so in the southern West Palaearctic and East Palaearctic regions.

A remarkable example is *Myllaena graeca* KRAATZ, 1858, a species described from Greece. Its identity has never been clarified, its sexual characters have never been

illustrated, but nevertheless it as been recorded not only from several European countries (France, Great Britain, Italy, Bulgaria, Azerbaijan) and North Africa (Morocco, Algeria, Tunisia), but also from Middle Asia and even China and Japan.

Aside from determining the identity of *M. graeca*, the purpose of the present paper is the revision of *M. caucasica* EPPELSHEIM, 1880, a species of uncertain identity described from the Caucasus, the description of additional species from the East Mediterranean and the Caucasus region, and providing new records of previously described species.

Material and methods

The material treated in this study is deposited in the following collections:

MNB ..... Museum für Naturkunde Berlin (incl. coll. Schülke; J. Frisch, M. Schülke)
NHMW ..... Naturhistorisches Museum Wien (H. Schillhammer)
SDEI..... Senckenberg Deutsches Entomologisches Institut, Müncheberg (L. Behne)
cAss..... author´s private collection
cFel ..... private collection Benedikt Feldmann, Münster
cWun..... private collection Paul Wunderle, Mönchengladbach

The morphological studies were conducted using a Stemi SV 11 microscope (Zeiss), a Discovery V12 microscope (Zeiss), and a Jenalab compound microscope (Carl Zeiss Jena). The images were created using a digital camera (Nikon Coolpix 995), Axiocam ERc 5s, and Picolay software. The maps were created using MapCreator 2.0 (primap) software.

Body length was measured from the anterior margin of the labrum to the posterior margin of abdominal tergite VIII, the length of the forebody from the anterior margin of the labrum to the posterior margin of the elytra, head length from the anterior margin of the clypeus (without ante-clypeus) to the posterior constriction of the head, elytral length at the suture from the apex of the scutellum to the posterior margin of the elytra, and the length of the aedeagus from the apex of the ventral process to the base of the aedeagal capsule. The "parameral" side (i.e., the side where the sperm duct enters) is referred to as the ventral, the opposite side as the dorsal aspect.

Results

The present study revealed an interesting phenomenon in two species groups. While in most aleocharine taxa a reliable identification at the species level usually primarily relies on the male sexual characters, the same is not always true of *Myllaena* species. In two species pairs treated below the aedeagus and the male secondary sexual characters are practically identical, whereas the shape of the spermatheca and in one species pair also the female secondary sexual characters are conspicuously different.

Myllaena intermedia ERICHSON, 1837

Material examined: Armenia: 3♂♂, 4♀♀, N Yerevan, NW Hrazdan, 40°34'N, 44°24'E, 2000 m, stream bank with gravel, 28.VI.2016, leg. Assing (cAss); 1♂, 1♀, S Martuni, Sulema Pass, 39°58'N, 45°14'E, 2340 m, slope with small stream and scattered bushes, litter and roots near stream sifted, 8.VII.2017, leg. Assing (cAss). Azerbaijan: 2♀♀, Lenkoran, leg. Leder (SDEI). Iran: 1♂, Gilan, Asalem, 37°40'N, 48°52'E, 1200 m, 10.VI.1975, leg. Senglet (cAss).

C o m m e n t : According to SCHÜLKE & SMETANA (2015), this common species has a trans-Palaearctic distribution ranging eastwards to East Siberia. The above specimens represent the first records from Armenia, Azerbaijan, and Iran.

***Myllaena graeca* KRAATZ, 1858** (Figs 1-7, Map 1)

Myllaena graeca KRAATZ, 1858: 54.

T y p e m a t e r i a l : Neotype ♀, present designation: "Greece: Arta, Athamánon Óros, 33 km N Arta, Straße Arta < Ágnanda, kl. Wasserfall, 340 m, 39°27'26"N, 21°02'37"E, Genist + Streu Gesiebe, 17.IV.2018, leg. M. Schülke [GR18-09] / Neotypus ♀ *Myllaena graeca* Kraatz, desig. V. Assing 2018 / *Myllaena graeca* Kraatz, det. V. Assing 2018" (MNB).

A d d i t i o n a l m a t e r i a l e x a m i n e d : Greece: 2♀♀, Thessalía, Pilion Oros, 4 km SW Zagora, 39°25'N, 23°05'E, 450 m, in wet moss, 3.IV.1998, leg. Assing & Schülke (cAss, MNB); 1♀, Lesbos, Skotino, 39°16'N, 26°12'E, 200 m, 18.III.2005, leg. Lompe & Meybohm (cAss). Turkey: 12 exs. [det. Feldmann], Istanbul, Belgrad Ormanı, 1 km N Bahçeköy, 41°11'N, 29°00'E, 160 m, mixed broadleaved forest, sifted, 21.III.2014, leg. Hetzel (cFel); 1♀, Samsun, 41 km W Samsun, 27 km S Bafra, 41°19'N, 35°51'E, 220 m, 21.VII.2008, leg. Assing (cAss); 7♂♂, 3♀♀, 2 exs., Ordu, 15 km S Ordu, S Kabaduz, 40°49'N, 37°54'E, 990 m, grassy roadside, 30.VII.2006, leg. Assing & Schülke (cAss, MNB); 7 exs. [det. Schülke], Ordu, 11 km W Gölköy, 40°41'N, 37°30'E, 1040 m, wet stream valley, 22.VII.2008, leg. Schülke (MNB); 1♂ [det. Schülke], Giresun, ca. 35 km S Giresun, 40°35'N, 38°27'E, 1250 m, spruce forest with rhododendron undergrowth, 29.VII.2006, leg. Schülke (MNB); 1♀ [det. Schülke], Trabzon, ca. 40 km S Trabzon, Altındere Milli Park, 1540 m, 40°40'N, 39°40'E, 26. VII.2006, leg. Schülke (MNB). Identification doubtful: 2♂♂ [teneral], "Creta", leg. v. Oertzen (NHMW).

C o m m e n t : The original description is based on an unspecified number of syntypes from "Zante (v. Kiesenwetter), Creta (Zebe)" (KRAATZ 1858). According to Lutz Behne (e-mail 22 Aug., 2018) there is no type material in the Kraatz collection at the SDEI. The collection of Gustav Zebe was moved to "Hartmann/Arnswalde" around 1870 (HORN et al. 1990); the Kiesenwetter collection is deposited in the Zoologische Staatssammlung München. It does not seem likely that the former collection will ever be located, and no type material was found in München (Michael Balke, e-mail 7 Sept., 2018).

According to SCHÜLKE & SMETANA (2015), *M. graeca* has a trans-Palaearctic distribution and been recorded from North Africa (Morocco, Algeria, Tunisia), West and South Europe (Great Britain, France, Italy, Bulgaria, Greece), the Caucasus region (Azerbaijan), Middle Asia ("Turkestan"), China, and Japan. The identity of *M. graeca*, however, has never been clarified based on a study (and illustrations) of the sexual characters.

Six specimens labelled as *Myllaena graeca* from Romania (one specimen), Azerbaijan (2), Algeria (1) and Tunisia (2) were found in the collections of the SDEI. They all belong to *M. intermedia* ERICHSON, 1837 (Romania, Azerbaijan) and *M. brevicornis* (MATTHEWS, 1838) (Algeria, Tunisia). Only two specimens labelled as *M. graeca*, both of them teneral males, originally on one pin, and collected in Crete, were found in the collections of the NHMW. They belong to the same species group as the species here interpreted as *M. graeca* and as *M. mutabilis*. However, whether they are conspecific with the original type material of *M. graeca* from Zakinthos, with *M. mutabilis* (see below), or whether they belong to yet another (unnamed) species can be clarified only when females are available. In view of the previous confusion regarding the identity of this species, a neotype designation is deemed indispensable. Therefore, a female from a locality in Arta, which is geographically not far from Zakinthos (Zante), is designated as the neotype. It is in agreement with the details given in the original description.

Redescription: Body length 2.6-3.8 mm; length of forebody 1.4-1.7 mm. Forebody as in Fig. 1. Coloration variable: head dark-reddish to blackish; pronotum and elytra bright-reddish to dark-brown with paler margins; abdomen reddish to blackish-brown, with the posterior margins of tergites III-VI, the posterior portion of tergite VII, and segments VIII-X reddish; legs yellow; antennae yellow to yellowish-brown, often with the middle more or less extensively and more or less distinctly darker. Other external characters similar to those of *Myllaena intermedia*.

♂: tergite VIII (Fig. 2) oblong, posterior margin acutely pointed; sternite VIII (Fig. 3) oblong and with convex posterior margin; median lobe of aedeagus (Figs 4-6) approximately 0.45 mm long, with long and slender, bisinuate (lateral view) ventral process.

♀: tergite VIII oblong, of similar shape as that of male; posterior margin of sternite VIII truncate in the middle; spermatheca (Fig. 7) of very conspicuous shape, proximal portion of capsule extremely long and with numerous coils.

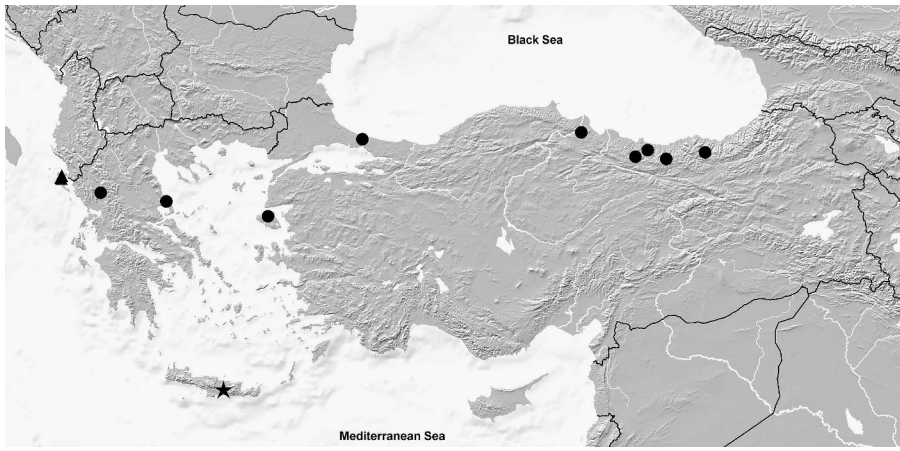
Comparative notes: This species is best identified based on the conspicuous shape of the spermatheca; no other West Palaearctic congener has a spermatheca of even remotely similar shape. In body size, habitus, and other characters, *M. graeca* is similar to *M. intermedia*. Aside from the primary sexual characters, it differs from this species by (mostly) paler coloration, less slender antennae with less oblong antennomeres IV-X, and the shape of the female sternite VIII (*M. intermedia*: posterior margin convex). The median lobe of the aedeagus somewhat resembles that of *M. dubia*, but differs by significantly smaller size (*M. dubia*: median lobe approximately 0.6 mm long), a sinuate basal portion of the ventral process in lateral view (straight in *M. dubia*), a much smaller crista apicalis, and internal structures of different shape. For characters distinguishing *M. graeca* from the closely related *M. mutabilis*, with which it shares not only a similar habitus and other external characters, but also an aedeagus of highly similar shape, see the comparative notes in the following section.

Distribution and natural history: This species has reliably been recorded only from Greece (mainland, Lesbos) and from North Turkey (Map 1). Previous records from other regions should be regarded as erroneous for the time being. Based on external characters and on the morphology of the aedeagus, the two teneral males from Crete may belong to *M. graeca*, too. However, females would be required to reliably confirm the presence of this species in Crete.

The examined material was collected from wet moss, sifted from wet litter and debris near streams and waterfalls, or sifted from debris on a grassy roadside. The altitudes range from 160 to 1540 m.

***Myllaena mutabilis* nov.sp.** (Figs 8-19, Map 1)

Type material: Holotype ♀: "GREECE: Corfu [19], Kilada Ropa, Gavrolimni 39°39'28"N, 19°48'06"E, 75 m, lake shore, sifted, 5.VI.2017, V. Assing / Holotypus ♀ *Myllaena mutabilis* sp. n., det. V. Assing 2018" (cAss). Paratypes: 12♂♂, 9♀♀: same data as holotype (cAss); 3 exs. [2 teneral]: same data as holotype, but leg. Schülke (MNB); 3♂♂, 95 exs. [many teneral]: "GREECE: Corfu [9a], Kilada Ropa, 39°40-41'N, 19°47-48'E, 70 m, car-net, 2.VI.2017, leg. Schülke & Assing" (cAss, cFel, MNB); 15 exs.: same data, but "31.V.2017 ... [KOR17-09]" (MNB); 36 exs.: same data, but "5.VI.2017 ... [KOR17-09b]" (MNB); 2 exs.: "Greece, S Kérkyra, NW Zigos, 39°44'N, 19°48'E, 280-310 m, stream valley, decid. forest, arable land, fallows, car-net, 3.VI.2017, leg. Schülke & Assing [KOR17-17]" (MNB).



Map 1: Distributions of *Myllaena graeca* (based on revised records) (circles), *M. mutabilis* (triangles), and *M. cretica* (star).

Etymology: The specific epithet (Latin, adjective: variable) alludes to the remarkably variable body size.

Description: Body length 2.4-3.7 mm; length of forebody 1.2-1.5 mm. Forebody as in Fig. 8. Coloration: forebody blackish-brown to blackish with the pronotal margins (especially the lateral margins) usually diffusely paler, partly also the posterior margins of the elytra paler; abdomen blackish with the posterior margins of segments III-VII and the posterior portion of segment VIII reddish to brown; legs yellow to reddish-yellow; antennae dark-brown to blackish-brown with antennomere I yellow and antennomere XI often pale-brown.

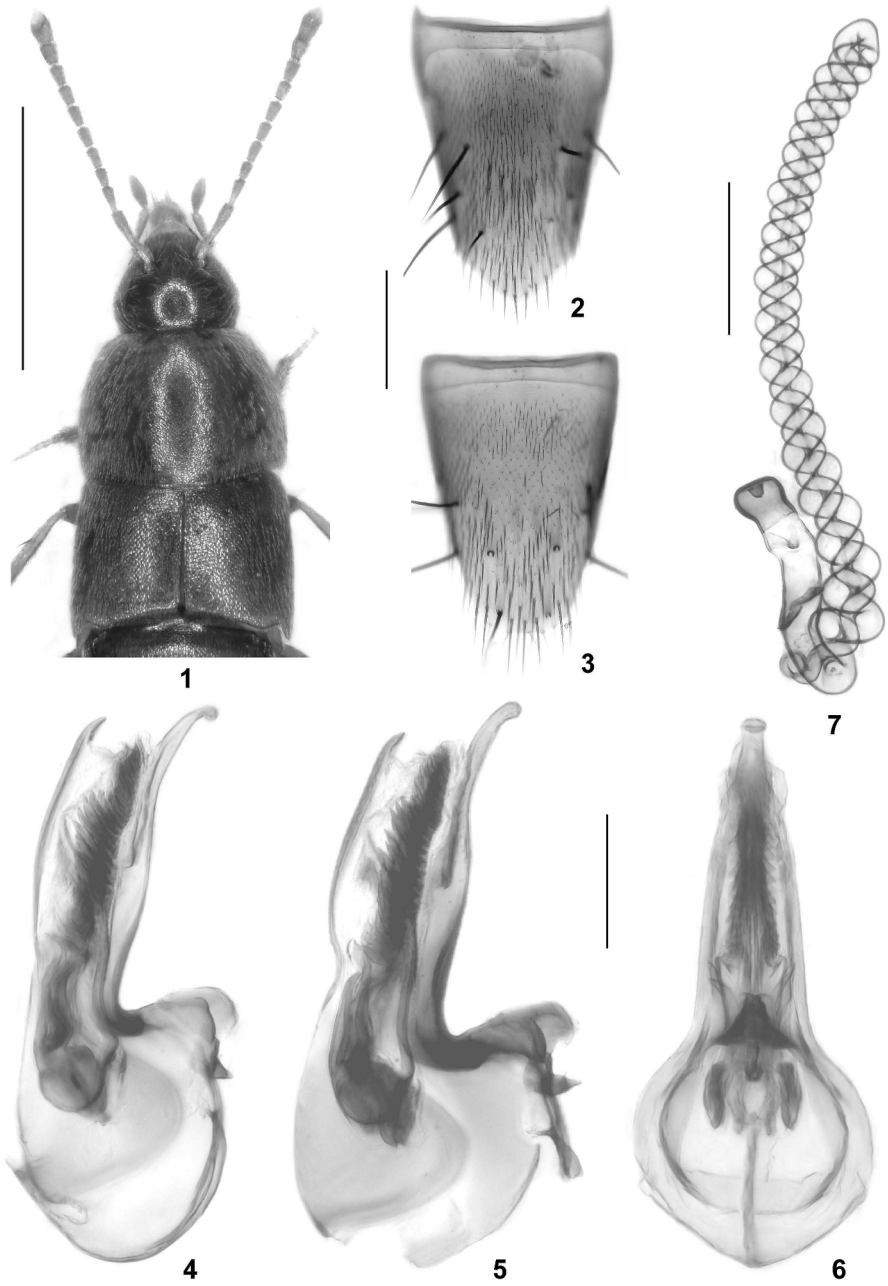
Other external characters similar to those of *M. intermedia* and *M. graeca*.

♂: tergite VIII (Fig. 9) oblong, posterior margin acutely pointed; sternite VIII (Fig. 10) oblong and with strongly convex posterior margin; median lobe of aedeagus (Figs 11-13) approximately 0.45 mm long, with long and slender bisinuate (lateral view) ventral process.

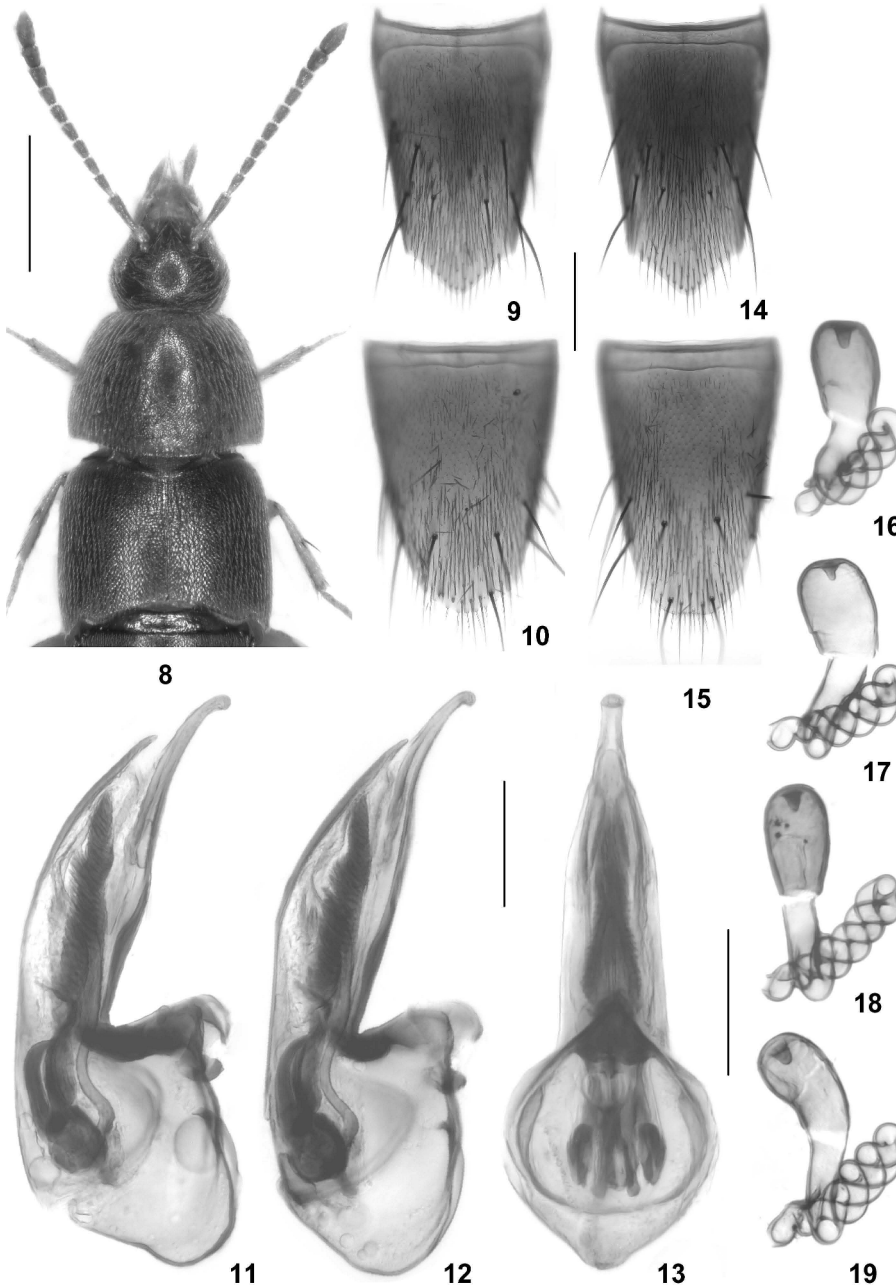
♀: tergite VIII (Fig. 14) oblong, posterior margin of similar shape as that of male; posterior margin of sternite VIII truncate in the middle (Fig. 15); spermatheca small, shaped as in Figs 16-19.

Comparative notes: As can be inferred from the highly similar external and secondary sexual characters and particularly from the practically identical morphology of the aedeagus, *M. mutabilis* is closely allied to *M. graeca*. Although *M. mutabilis* is of darker average coloration, a reliable separation from *M. graeca* is possible only based on the completely different shape of the spermatheca.

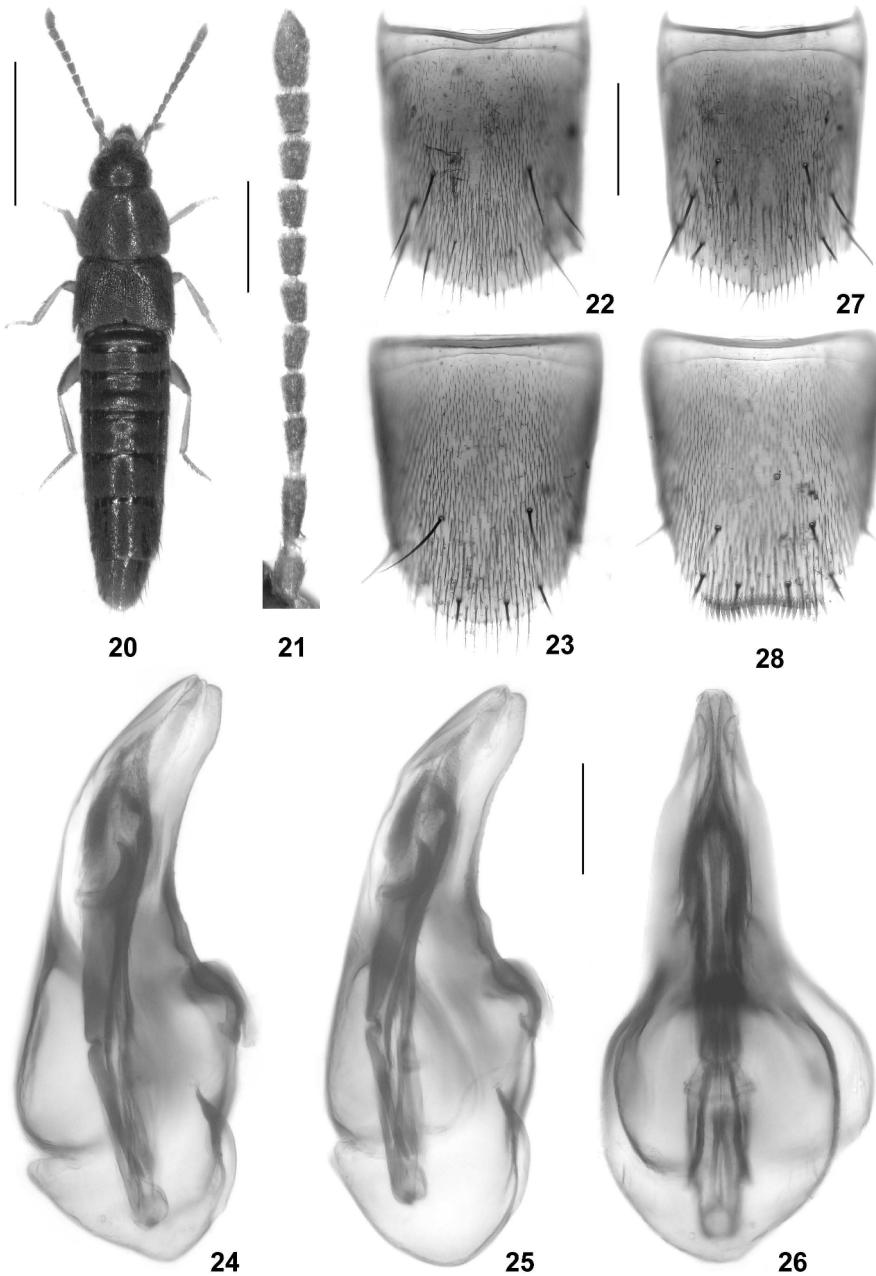
Myllaena graeca and *M. mutabilis* evidently belong to a group of species that is represented in the East Mediterranean by at least four species with a highly similar aedeagus. In the course of the present study, specimens of additional undescribed species belonging to this group from the Pelopónnisos (one male), Ikaría (one male), Bolu (one male), and Antalya (one female) were studied.



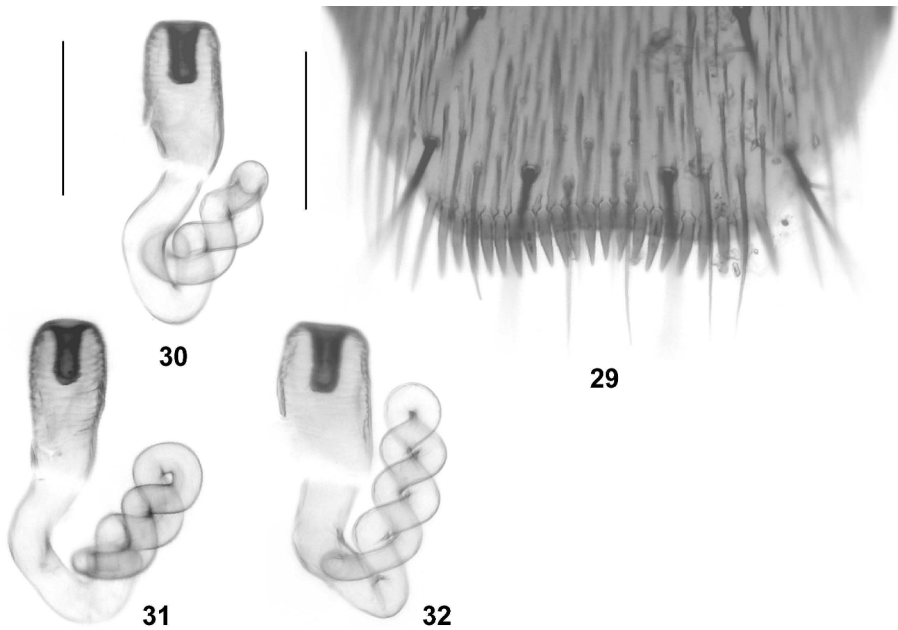
Figs 1-7: *Myllaena graeca*: (**1**) forebody; (**2**) male tergite VIII; (**3**) male sternite VIII; (**4-6**) median lobe of aedeagus in lateral and in ventral view; (**7**) spermatheca. Scale bars: 1: 1.0 mm; 2-3: 0.2 mm; 4-7: 0.1 mm.



Figs 8-19: *Myllaena mutabilis*: (**8**) forebody; (**9**) male tergite VIII; (**10**) male sternite VIII; (**11-13**) median lobe of aedeagus in lateral and in ventral view; (**14**) female tergite VIII; (**15**) female sternite VIII; (**16-19**) spermatheca. Scale bars: 8: 0.5 mm; 9-10, 14-15: 0.2 mm; 11-13, 16-19: 0.1 mm.



Figs 20-28: *Myllaena cretica*: (**20**) habitus; (**21**) antenna; (**22**) male tergite VIII; (**23**) male sternite VIII; (**24-26**) median lobe of aedeagus in lateral and in ventral view; (**27**) female tergite VIII; (**28**) female sternite VIII. Scale bars: 20: 1.0 mm; 21-23, 27-28: 0.2 mm; 24-26: 0.1 mm.



Figs 29-32: *Myllaena cretica*: (**29**) posterior portion of female sternite VIII; (**30-31**) spermatheca. Scale bars: 0.1 mm.

Distribution and natural history: *Myllaena mutabilis* is currently known only from the Greek island Corfu (Map 1). As can be inferred from the fact that numerous specimens were collected with a car-net, the species is an active flyer and most likely more widespread at least in the southern Balkans.

The specimens from the type locality were collected at the shore of a lake by sifting grass and debris in reed. The vast majority of the type specimens was collected with a car-net on a forest track passing lakes and wetland. Three specimens from the type locality and numerous specimens collected on the wing are teneral.

***Myllaena cretica* nov.sp.** (Figs 20-32, Map 1)

Type material: Holotype ♂: "GR - Crete [61], WSW Ag. Nikolaos, Katharo plateau, 1110 m, stream, 35°08'14"N, 25°34'15"E, 28.III.2018, V. Assing / Holotypus ♂ *Myllaena cretica* sp. n. det. V. Assing 2018" (cAss). Paratypes: 3♂♂, 6♀♀: same data as holotype (cAss).

Etymology: The specific epithet is an adjective derived from Crete.

Description: Body length 3.3-3.7 mm; length of forebody 1.3-1.6 mm. Habitus as in Fig. 20. Coloration: head and abdomen black; pronotum and elytra blackish-brown; legs dark-yellowish; antennae dark-brown, with antennomere I yellowish-brown.

Head weakly transverse, broadest behind eyes, wedge-shaped. Eyes approximately as long as postocular portion in dorsal view. Antenna (Fig. 21) approximately 1.1 mm long; all antennomeres distinctly oblong.

Pronotum approximately 1.3 times as broad as long and 1.5 times as broad as head; posterior margin not distinctly sinuate.

Elytra approximately 0.75 times as long as pronotum; punctation extremely fine and dense, slightly more distinct than that of head and pronotum.

Abdomen: tergite VIII and sternite VIII with pronounced sexual dimorphism.

♂: posterior margin of tergite VIII (Fig. 22) obtusely angled in the middle; posterior margin of sternite VIII convex (Fig. 23); median lobe of aedeagus approximately 0.53 mm long and shaped as in Figs 24-26.

♀: posterior margin of tergite VIII (Fig. 27) angled in the middle, more so than in male; posterior margin of sternite VIII (Figs 28-29) produced, somewhat truncate, in the middle weakly concave, with a conspicuous fringe of dense stout modified setae; spermatheca as in Figs 30-32.

Comparative notes: This species is most similar to *M. lesbia* ASSING, 2016 from Lesbos, not only in external characters, but also regarding the morphology of the aedeagus, suggesting that these species are closely related. They are distinguished, however, by the length of the elytra (*M. lesbia*: elytra 0.80-0.85 times as long as the pronotum), and especially by the completely different shapes of the female tergite VIII (*M. lesbia*: posterior margin acutely angled in the middle), of the female sternite VIII (*M. lesbia*: posterior margin strongly convex and without modified setae), and of the spermatheca. The aedeagus of *M. cretica* differs from that of *M. lesbia* only by the slightly less slender apex of the ventral process (lateral view), the shape of the base of the ventral process (more strongly curved in *M. lesbia* in lateral view), and by the shapes of the internal structures. For illustrations of *M. lesbia* see ASSING (2016).

Distribution and natural history: The absence of records from other East Mediterranean regions suggests that *Myllaena cretica* is probably endemic to Crete. The type locality is situated in the Katharo plateau in the Dikti range, to the southwest of Agios Nikolaos, East Crete (Map 1). The specimens were floated from gravel on the banks of a small stream surrounded by cultivated land at an altitude of 1110 m.

On the *Myllaena* fauna of Armenia and Nagorno-Karabakh

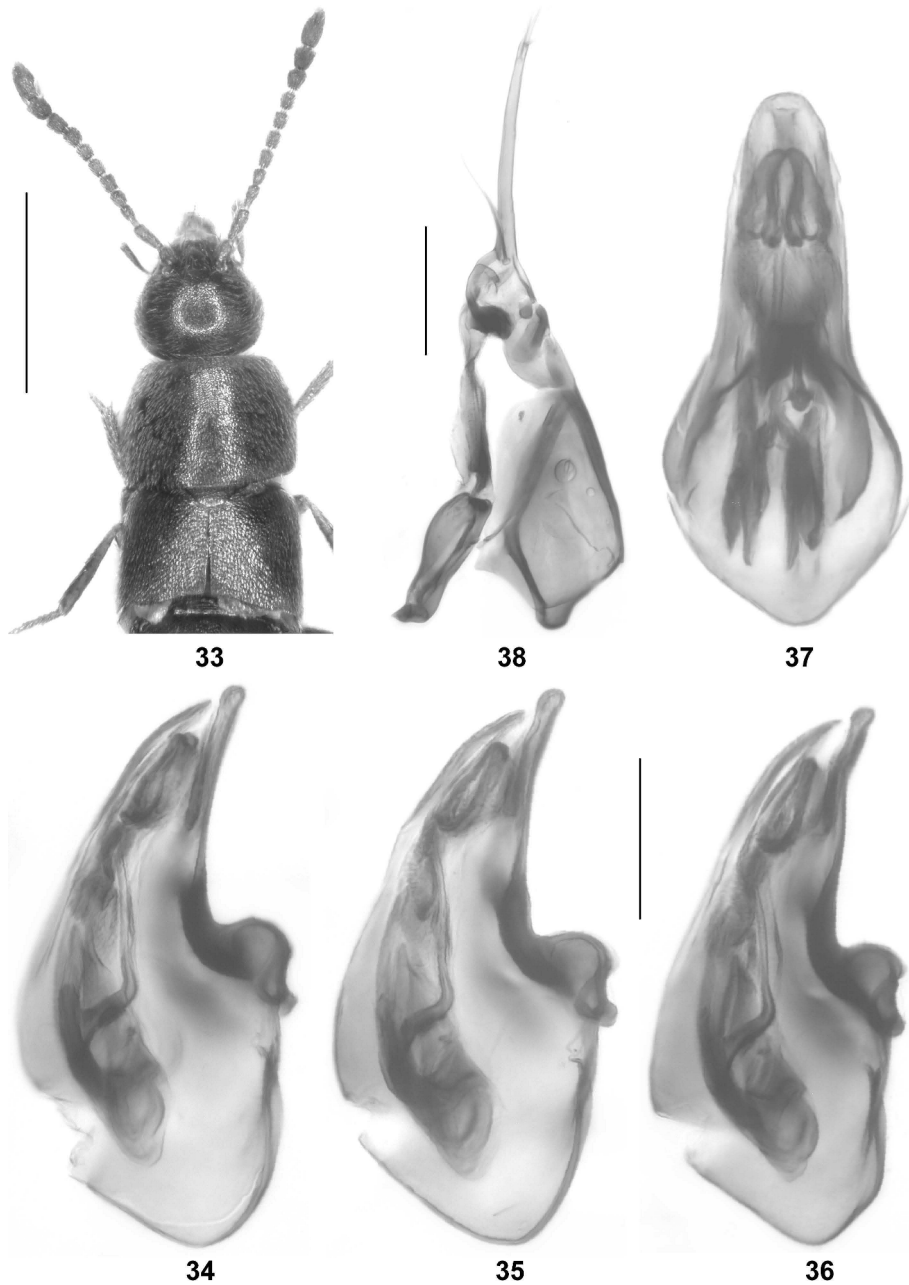
Species of *Myllaena* were previously unknown from Armenia and Nagorno-Karabakh. Based on the data available now, the fauna includes four species, all of which have been recorded from Armenia and two from Nagorno-Karabakh.

Myllaena caucasica EPPELSHEIM, 1880 (Figs 48-55, Map 2)

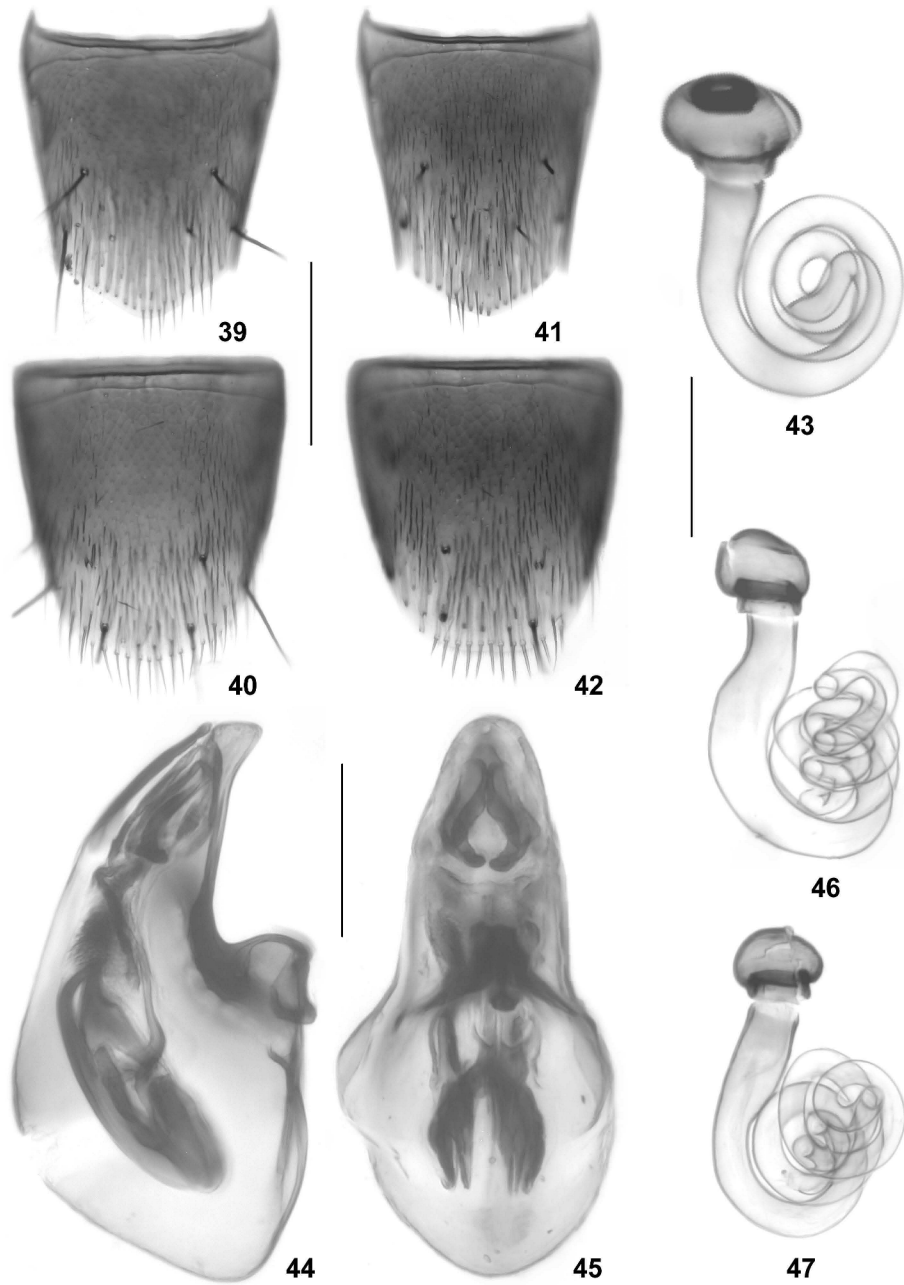
Myllaena caucasica EPPELSHEIM, 1880: 463.

Type material: Lectotype ♂, present designation: "Kaukas, Leder, Kasbek / *caucasica* Epp. Verh. zool. bot. Ges. Wien 1879, p. 463 / c. Epplsh. Steind. d. / Typus / Lectotypus ♂ *Myllaena caucasica* Eppelsheim, desig. V. Assing 2018 / *Myllaena caucasica* Eppelsheim, det. V. Assing 2018" (NHMW). Paralectotypes: 1♂, 1♀: same data as lectotype (NHMW); 1♀: "Kaukas, Leder, Hochgebirge östl. vom Kasbek / c. Epplsh. Steind. d. / Typus" (NHMW).

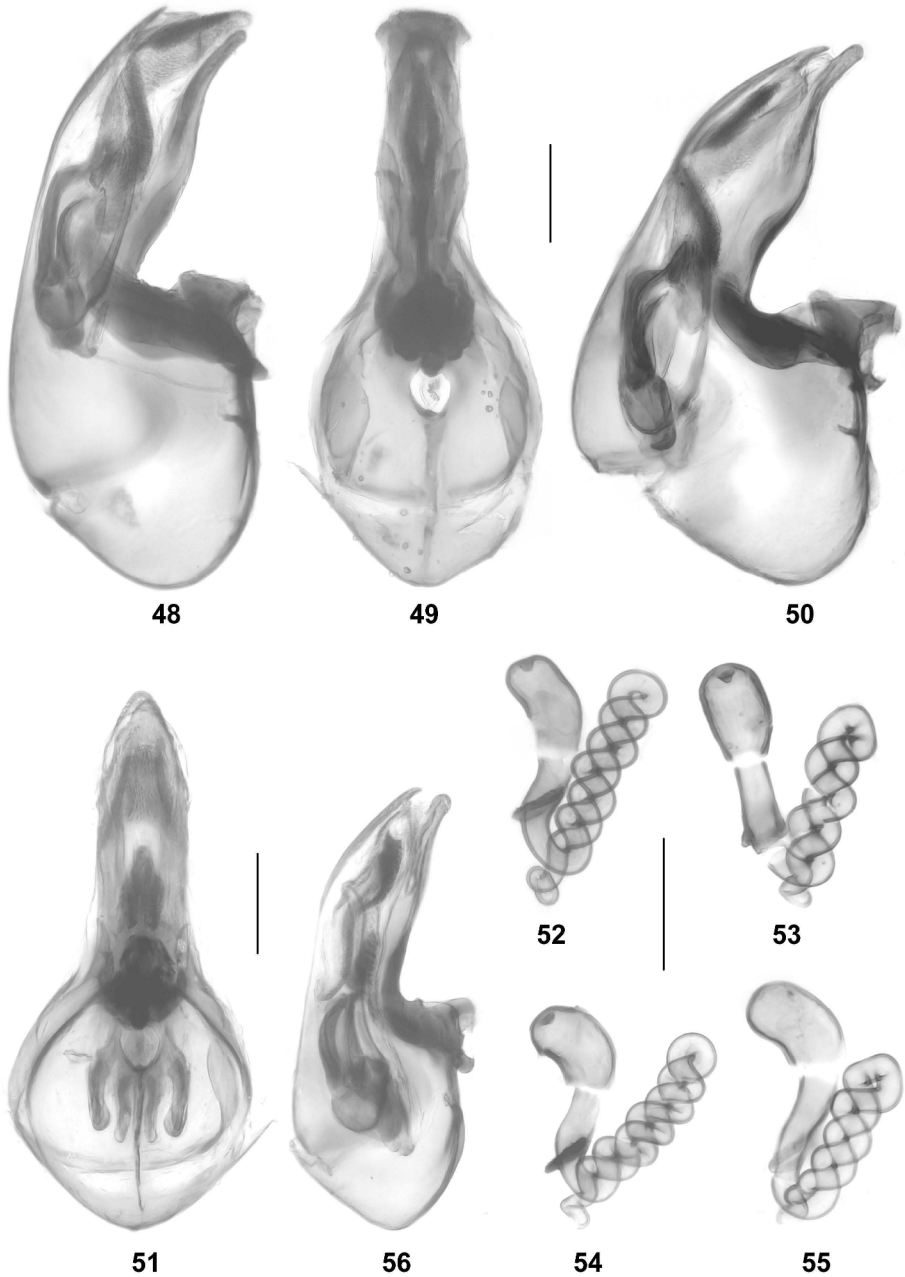
Additional material examined: Armenia: 2♂♂, 6♀♀, 4 exs., 35 km NW Sisian, 39°41'N, 45°47'E, 2080 m, swampy meadow, debris sifted, 3.VII.2016, leg. Assing & Schülke (cAss, MNB); 1♀, 35 km NW Sisian, 39°41'N, 45°47'E, 2080 m, litter and roots beneath bushes near small stream sifted, 3.VII.2016, leg. Assing (cAss); 1♂, N Yerevan, NW Hrazdan, 40°38'N, 44°28'E, 2110 m, stream valley, mixed deciduous forest, litter and grass roots sifted, 28.VI.2016, leg. Schülke (MNB); 1♀, 25 km SW Kapan, 39°04'N, 46°16'E, 2150 m, near stream,



Figs 33-38: *Myllaena ambulans*: (**33**) forebody; (**34-37**) median lobe of aedeagus in lateral and in ventral view; (**8**) paramere. Scale bars: 33: 0.5 mm; 34-38: 0.1 mm.



Figs 39-47: *Myllaena ambulans* (**39-43**) and *M. infuscata* from Armenia (**44-47**): (**39**) male tergite VIII; (**40**) male sternite VIII; (**41**) female tergite VIII; (**42**) female sternite VIII; (**43, 46-47**) spermatheca; (**44-45**) median lobe of aedeagus in lateral and in ventral view. Scale bars: 39-42: 0.2 mm; 43-47: 0.1 mm.



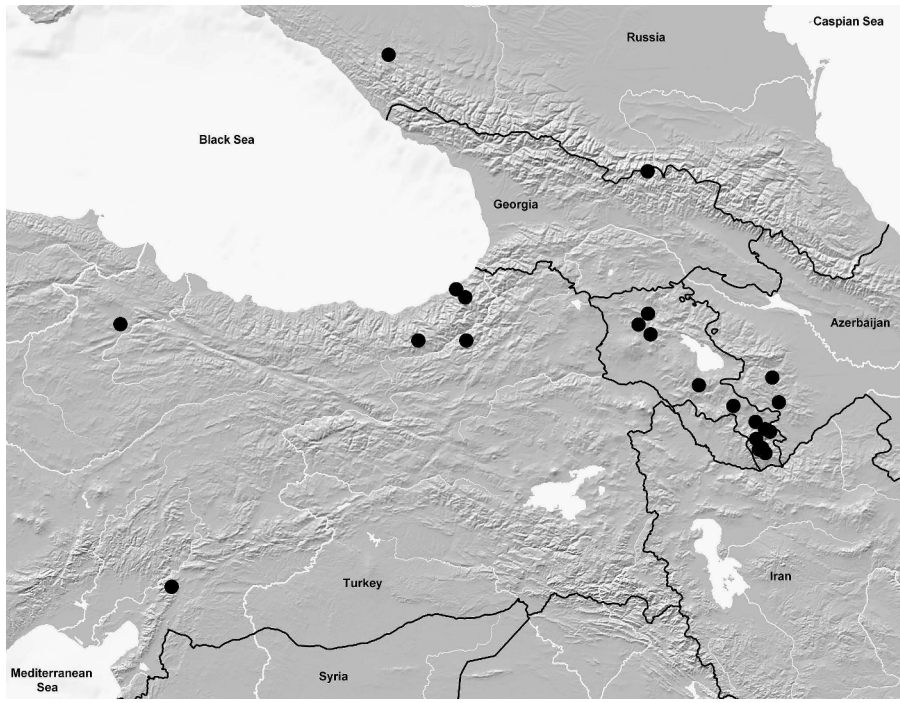
Figs 48-56: *Myllaena caucasica* (**48-55**; **48-49**: lectotype; **52-53**: paralectotypes) and *M. hyperborea* (**56**): (**48-51, 56**) median lobe of aedeagus in lateral and in ventral view; (**52-55**) spermatheca. Scale bars: 0.1 mm.

litter of *Salix* and debris sifted, 10.VII.2016, leg. Assing (cAss); 1♂, WSW Kapan, Meghri Pass, 39°07'N, 46°10'E, 2520 m, moist grassy slope with scattered bushes, litter and grass roots sifted, 6.VII.2016, leg. Schülke (MNB); 1♂, 1♀, 2 exs., N Vanadzor, S Pushkin pass, 40°54'N, 44°26'E, 1780 m, forest margin with *Quercus*, *Fagus*, *Sorbus*, etc., litter and roots near small stream sifted, 1.VII.2017, leg. Assing & Schülke (cAss, MNB); 5♂♂, 1♀, S Spitak, 40°46'N, 44°16'E, 2000 m, deforested stream valley, bank of small stream, roots and moss sifted, 7.VII.2017, leg. Assing (cAss); 1♂, S Martuni, Sulema Pass, 39°58'N, 45°14'E, 2340 m, slope with small stream and scattered bushes, litter and roots near stream sifted, 8.VII.2017, leg. Assing (cAss); 1♀, SW Goris, ESE Tatev, 39°22'N, 46°17'E, 1950 m, mixed deciduous forest (*Quercus*, *Carpinus*, *Acer*, etc.), stream valley, moist litter near small stream sifted, 13.VII.2017, leg. Assing (cAss); 1♂, 2♀♀, 4 exs., ca. 30 km W Kapan, 39°15'N, 46°08'E, 1680 m, N-slope with trickling water, moist litter and debris sifted, 11.VII.2018, leg. Assing & Schülke (cAss, MNB); 2♂♂, 3♀♀, same data, but river bank, litter and debris sifted (cAss); 9♂♂, 1♀♀, 3 exs., WSW Kapan, S Lernadzor, 39°08'N, 46°13'E, 2000 m, dark stream valley, litter and roots near stream sifted, 13.VII.2018, leg. Assing & Schülke (cAss, MNB); 1♂, 1 ex., 25 km SW Kapan, Vank, 39°04'N, 46°16'E, 2150 m, near stream, litter of *Salix*, roots, and debris sifted, 14.VII.2018, leg. Assing & Schülke (cAss, MNB); 3♂♂, 2 exs., 25 km S Goris, ESE Tatev, 39°20'N, 46°22'E, 1590 m, mixed deciduous forest with small stream, moist litter sifted, 15.VII.2018, leg. Assing & Schülke (cAss, MNB); 5 exs., reservoir 15 km SW Sisian, 39°28'N, 46°08'E, 1340 m, shore of reservoir, *Salix* litter, moss, and roots sifted, 16.VII.2018, leg. Schülke (MNB). Nagorno-Karabakh: 1♀, ca. 40 NW Stepanakert, W Vank, 40°01'N, 46°27'E, 1420 m, S-slope with mixed deciduous forest, moist litter near small stream sifted, 3.VII.2018, leg. Assing (cAss); 5♂♂, 9♀♀, 3 exs., 8 km N Berdzor, 39°42'N 46°32'E, 1220 m, N-slope with mixed deciduous forest and small stream, litter and debris near stream sifted, 7.VII.2018, leg. Assing & Schülke (cAss, MNB). Russia: 1♂, 2♀♀, Krasnodarskiy Kray, Mezmai env., Temnolesskaia, 850 m, 8.VI.1999, leg. Smetana (cAss). Turkey: 2♂♂ [1 teneral], Amasya, Sakarat Dağı, 8.5 km E Amasya, 40°40'N, 35°56'E, 1060 m, stream bank, sifted from moist leaves, 18.VII.2008, leg. Assing (cAss); 1♂, Rize, 20 km S Ikizdere, 22.V.1989, leg. Riedel (cWun); 2♂♂, 1♀, Rize, ca. 30 km SW Hopa, Çağlayan D. river valley, ca. 41°09'N, 41°22'E, 1000 m, forest, 26.VI.1998, leg. Solodovnikov (cAss); 1 ex., same data, but 1800-1900 m, 26.VI.1998, leg. Solodovnikov (cAss); 1 ex., same data, but 1300 m, mushroom, 28.VI.1998 (cAss); 1♂, 1♀, Rize, ca. 30 km SW Hopa, Çağlayan D. river valley, ca. 41°15'N, 41°13'E, 500 m, forest, 26.VI.1998, leg. Solodovnikov (cAss); 6 exs., Erzurum, 40 km NW Tortum, Mescit Dağları, ca. 40°36'N, 41°23'E, 2100 m, pine forest, 20.VI.1998, leg. Solodovnikov (cAss); 1♀, Kahramanmaraş, 35 km SW Kahramanmaraş, SW Doluca, 37°23'N, 36°41'E, 1030 m, 27.III.2005, leg. Wunderle (cWun)

C o m m e n t : *Myllaena caucasica* was originally described based on an unspecified number of syntypes collected "beim Aul Kasbek im Moose einer Quelle" (EPPELSHEIM 1880). Four syntypes were located in the collections of NHMW. A male in good condition is designated as the lectotype. The species was subsequently reported from East Turkey (Bitlis) by SCHEERPELTZ (1958). The primary sexual characters were previously unknown.

D i a g n o s i s : This species is highly similar to *M. intermedia*, as is shown also by the fact that a non-type specimen identified as *M. caucasica* by Eppelsheim himself proved to be *M. intermedia*. Aside from the completely different primary sexual characters, *M. caucasica* is distinguished from *M. intermedia* only by shorter elytra (*M. caucasica*: elytra approximately 0.65 times as long as pronotum; *M. intermedia*: elytra approximately 0.8 times as long as pronotum), hind wings of reduced length (*M. intermedia*: hind wings fully developed), and a relatively larger pronotum. The aedeagus and spermatheca are illustrated in Figs 48-55. Among West Palaearctic *Myllaena* species, *M. caucasica* is most similar to *M. hyperborea* STRAND, 1934, both in external and the male and female primary sexual characters. The aedeagus of *M. caucasica* is readily distinguished from that of *M. hyperborea* by distinctly larger size alone. For an illustration of the median lobe of the aedeagus of *M. hyperborea* see Fig. 56.

D i s t r i b u t i o n : *Myllaena caucasica* is currently known from the Russian part of the Greater Caucasus (first record from Russia), Georgia, Turkey westwards to Amasya in the north and Kahramanmaraş in the south, Armenia (first record), and Nagorno-Karabakh (first record) (Map 2).



Map 2: Distribution of *Myllaena caucasica* in the Caucasus region and Turkey, based on revised records.

Myllaena infuscata KRAATZ, 1853

M a t e r i a l e x a m i n e d : Armenia: 2♀♀, 1 ex., ENE Dilijan, Hovk, 1290 m, 40°48'N, 45°01'E, stream valley, moist litter near stream sifted, 3.VII.2017, leg. Assing & Schülke (cAss, MNB); 1♂, ca. 30 km W Kapan, 39°15'N, 46°08'E, 1680 m, river bank, litter and debris sifted, 11.VII.2018, leg. Assing (cAss); 1♀, N Vanadzor, S Pushkin pass, 40°54'N, 44°26'E, 1780 m, forest margin with *Quercus*, *Fagus*, *Sorbus*, etc., litter and roots near small stream sifted, 1.VII.2017, leg. Assing (MNB). Nagorno-Karabakh: 4♀♀, 1 ex., ca. 40 NW Stepanakert, W Vank, 40°01'N, 46°27'E, 1420 m, S-slope with mixed deciduous forest, moist litter near small stream sifted, 3.VII.2018, leg. Assing & Schülke (cAss, MNB); 1♀, 8 km N Berdzor, 39°42'N 46°32'E, 1220 m, N-slope with mixed deciduous forest and small stream, litter and debris near stream sifted, 7.VII.2018, leg. Assing (cAss).

C o m m e n t : According to SCHÜLKE & SMETANA (2015), this species is widespread in Europe, North Africa, and the Middle East, and has even been reported from Kashmir and North Africa. Many of these records, however, require confirmation.

The above specimens represent the first records from Armenia and Nagorno-Karabakh.

***Myllaena ambulans* nov.sp.** (Figs 33-43, Map 3)

T y p e m a t e r i a l : Holotype ♂: "ARMENIA [19] - 35 km NW Sisian, 39°40'59"N, 45°46'50"E, 2070 m, stream valley, sifted, 3.VII.2016, V. Assing / Holotypus ♂ *Myllaena ambulans* sp. n. det. V. Assing 2018" (cAss). Paratypes: 2♂♂, 3♀♀: same data as holotype (cAss); 1♀: same data, but leg. Schülke (MNB); 3♂♂, 7♀♀: "ARMENIA [20]- 35 km NW Sisian, 39°41'01"N, 45°46'46"E, 2080 m, swampy meadow, 3.VII.2016, V. Assing" (cAss); 7 exs., same data, but leg. Schülke (MNB); 1♂: "ARMENIA [33] – S Spitak, 2000 m, 40°45'45"N, 44°16'23"E, bank of small stream, 7.VII.2017, V. Assing" (cAss); 1♀: same data, but leg. Schülke (MNB); 1♂: "ARMENIA [36] – S Martuni, Sulema Pass, 39°57'58"N, 45°14'13"E, 2340 m, near stream, 8.VII.2017, V. Assing" (cAss).

E t y m o l o g y : The specific epithet is the present participle of the Latin verb ambulare (to walk) and alludes to the reduced hind wings.

D e s c r i p t i o n : Body length 1.8-2.2 mm; length of forebody 0.95-1.05 mm. Coloration: body blackish-brown to black; legs dark-brown to blackish-brown with paler tarsi; antennae blackish-brown.

Head (Fig. 33) wedge-shaped. Eyes relatively small, not protruding from lateral contours of head, shorter than the distance from posterior margin of eye to posterior constriction of head in lateral view. Antenna approximately 0.6 mm long; antennomeres IV-VIII approximately as long as broad (sometimes weakly oblong), IX-X transverse.

Pronotum (Fig. 33) 1.3-1.4 times as broad as long and 1.3-1.4 times as broad as head; posterior margin not sinuate near posterior angles.

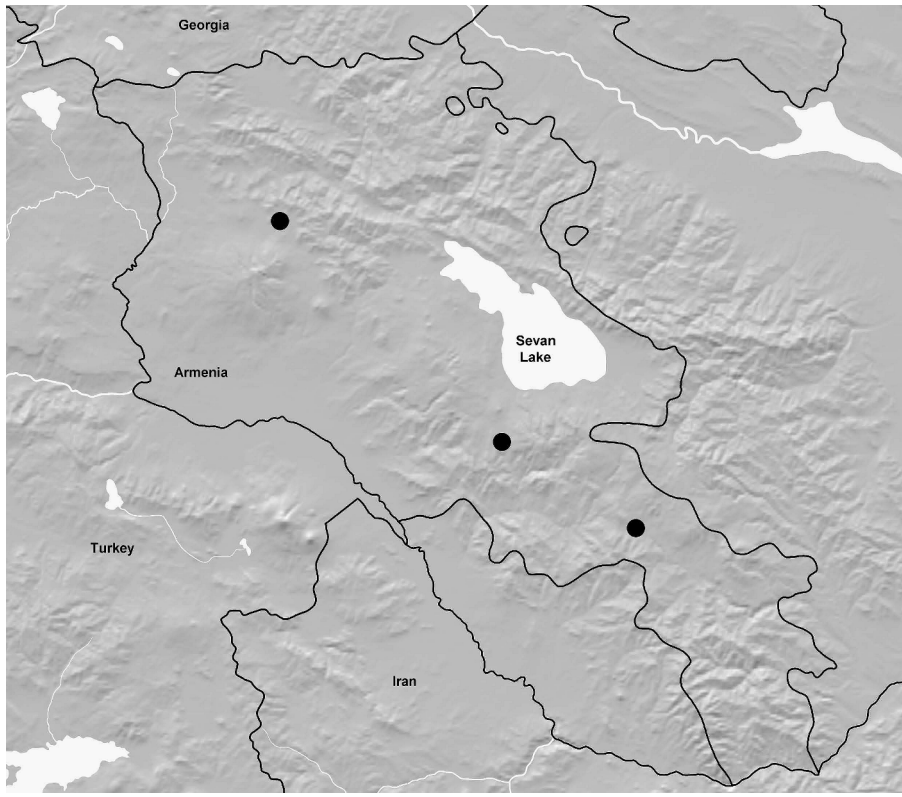
Elytra (Fig. 33) short, approximately 0.65 times as long as pronotum. Hind wings reduced, rudiments only slightly protruding from under the elytra when fully unfolded. Posterior margin of abdominal tergite VIII with palisade fringe.

♂: posterior margin of tergite VIII obtusely pointed in the middle (Fig. 39); sternite VIII (Fig. 40) of similar length as sternite VIII, posterior margin convex and with long thin setae; median lobe of aedeagus 0.32-0.35 mm long and shaped as in Figs 34-37; paramere (Fig. 38) nearly 0.5 mm long, with very long and slender apical lobe.

♀: tergite VIII (Fig. 41) of similar shape as in male; sternite VIII (Fig. 42) approximately as long as tergite VIII, posterior margin very weakly convex, nearly truncate, with long and rather stout marginal setae; spermatheca as in Fig. 43.

C o m p a r a t i v e n o t e s : *Myllaena ambulans* belongs to a group of small-sized species including *M. minuta* (GRAVENHORST, 1806), *M. gracilis* (MATTHEWS, 1838), and *M. infuscata* KRAATZ, 1853. It is distinguished from *M. infuscata*, the only species of this group recorded from Armenia and with elytra of reduced length, by even shorter elytra (*M. infuscata*: elytra usually 0.75-0.80 times as long as pronotum), very short hind wings, darker average coloration (*M. infuscata*: body mostly dark-brown to blackish-brown), the shapes of the apex of the ventral process (lateral view) and internal structures of the aedeagus, a less oblong and posteriorly less acute female tergite VIII, and by a larger distal portion of the spermatheca capsule with a more pronounced cuticular invagination. For illustrations of the primary sexual characters of *M. infuscata* see Figs 44-47.

D i s t r i b u t i o n a n d n a t u r a l h i s t o r y : This species is currently known from three localities in North, Central, and South Armenia (Map 3). The specimens were collected from moist litter near streams, on stream and river banks, and in a swampy meadow at altitudes of 1680-2340 m.



Map 3: Distribution of *Myllaena ambulans* in Armenia.

Acknowledgements

I am indebted to the colleagues indicated in the material section for the loan of material from the collections under their care, as well as to Lutz Behne (SDEI) and Michael Balke (Zoologische Staatssammlung München) for their efforts in trying to locate type material of *Myllaena graeca*.

Zusammenfassung

Zwei zuvor ungeklärte Arten der Gattung *Myllaena* ERICHSON, 1837 werden revidiert und abgebildet: *M. graeca* KRAATZ, 1858 (Griechenland, Nordtürkei) und *M. caucasica* EPPELSHEIM, 1880 (Kaukasusregion). Für *M. graeca* wird ein Neotypus, für *M. caucasica* ein Lektotypus designiert. Drei Arten werden beschrieben und abgebildet: *M. mutabilis* nov.sp. (Griechenland: Korfu), *M. cretica* nov.sp. (Griechenland: Kreta) und *M. ambulans* nov.sp. (Armenien). Acht Erstnachweise werden aus Armenien (3), Bergkarabach (2), Russland (1), Aserbaidschan (1) und Iran (1) gemeldet. Die derzeit bekannten Verbreitungsgebiete von *M. graeca*, *M. caucasica* sowie der drei neu beschriebenen Arten werden anhand von Karten illustriert.

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