

Notes on taxonomy and geography of *Bembidion (Neja) leucoscelis* Chaudoir and *Bembidion (Neja) curtulum* Duval (Coleoptera: Carabidae: Bembidiina)

BY PAOLO NERI & LUCA TOLEDANO

PN: Via Alfredo Nobel 11 scala A, 47121 Forlì (FC), Italy; email: nerolit.paolo.neri@gmail.com
LT: Museo Civico di Storia Naturale, Lungadige Porta Vittoria 9, 37129 Verona, Italy;
email: lucatole3@gmail.com

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ABSTRACT

The systematic relationship of *Bembidion (Neja) leucoscelis* Chaudoir, 1850, and *Bembidion (Neja) curtulum* Duval, 1851, is examined. A new subspecies of *B. curtulum* from the Middle East is described and the subspecies *tripolitanum* Schatzmayr, 1937, is assigned to *Bembidion curtulum* (comb. n). The distribution of the species and subspecies is re-examined and the main diagnostic characters emphasized, including the importance of aedeagal structure and elytral microsculpture. The species *Bembidion (Chlorodium) almum almum* Sahlberg, 1900, is reported for Armenia and the Altaj Republic (Russia). A key to the species of *Bembidion* subgenus *Neja* Motschulsky, 1864, with elytra not microsculptured or with microsculpture restricted only at the extreme of elytral apex, is provided.

RIASSUNTO

Note tassonomiche e geografiche su *Bembidion (Neja) leucoscelis* Chaudoir, 1850 e *Bembidion (Neja) curtulum* Duval, 1851. (Insecta: Coleoptera: Carabidae: Bembidiina). Viene esaminata la posizione sistematica di *Bembidion (Neja) leucoscelis* Chaudoir, 1850 e *Bembidion (Neja) curtulum* Duval, 1851. Viene descritta una nuova sottospecie di quest'ultimo abitante l'area mediorientale e la sottospecie *tripolitanum* Schatzmayr, 1937, viene assegnata a *Bembidion curtulum*. Sono riviste le aree di diffusione di specie e sottospecie e messi in evidenza i caratteri differenziali, compresa l'importanza della struttura edeagica e della microscultura elitale. Viene segnalata la specie *Bembidion (Chlorodium) almum almum* Sahlberg, 1900, per l'Armenia e la repubblica dell'Altaj (Russia). Vengono qui fornite delle chiavi di determinazione per le specie di *Bembidion* subg. *Neja* Motschulsky, 1864, ad elitre con microscultura assente o ristretta all'estemo apice.

Keywords: *Bembidion*, *Chlorodium*, *Neja*, elytral microsculpture, aedeagus, species key

INTRODUCTION

While identifying some *Bembidion* Latreille, 1802 (subgenus *Neja* Motschulsky, 1864) specimens in our collections we found it difficult to distinguish between *B. leucoscelis* Chaudoir, 1850, and *B. curtulum* Duval, 1851 from their external morphology. This paper reports the results of our study on the systematic relationship between *B. leucoscelis* and *B. curtulum*, and related taxa, *i.e.*, the species of subgenus *Neja* without elytral microsculpture or with microsculpture restricted only to the extreme elytral apex, and summarises the diagnostic characters we identified as reliable in their determination.

MATERIALS AND METHODS

We follow the *Bembidiina* systematics proposed by Marggi, Toledano & Neri (2017) throughout. Beetle body length (of card-mounted specimens) was measured from the front margin of the labrum to the apex of the elytra. Dissections were made using standard techniques. Genitalia and small parts were preserved in Euparal on acetate mounts fixed on the same pins as the specimens.

The photographs, made by LT, are composite images that used progressive focusing obtained with a Nikon DSFi1 digital camera (controlled with a Nikon DS-L2 stand-alone remote controller) mounted on a Leica Z6 microscope, equipped with a 1.0x Leica lens and a customized motorized stand made by LT. The images were then processed with Helicon Focus® 6.4.3 and optimized with Photoshop® Elements 14. Photographs of aedeagi are made with the same setup and processing method as described above, although in this case using a 5x Infinity Corrected Nikon Fluor lens on the Z6 microscope. The drawings of spermathecae are by Ivo Gudenzi.

Material examined

[N.B. We have re-identified or confirmed the identity of all specimens, except the syntypes from MNHN and the lectotype of *B. leucoscelis* (MCSNG), during the present study.]

- 1 ♂, with four labels: '*Bem. / leucosceis* [sic!] / Chaud. / Caucas. [handwritten by Chaudoir, Fig. 7a] // Caucaso [handwritten label] / Coll. Castelnau [printed label] // *leucoscelis* Chd. [handwritten label] / det. Netolitzky [printed label] // Mus. Civ. / Genova [printed label]' (Fig. 7), Museo Civico di Storia Naturale di Genova, Italy (MCSNG). The specimen (Fig. 1) is in poor condition, it has the elytra spread apart, lacks four left antennomeres and five right antennomeres, the mid and hind right legs; the aedeagus, immature, was dissected and mounted in Euparal on the same pin as the specimen; this syntype is the sole specimen personally labelled as *leucoscelis* by Chaudoir; it was gifted by Chaudoir to Castelnau and arrived at MCSNG via G. Doria about 1873 (Horn *et al.* 1990). We have designated this specimen as the lectotype and add to the specimen the following red, printed, label: '*Bembidion (Neja) leucoscelis* Chaudoir, 1850 – LECTOTYPUS – P. Neri & L. Toledano des. 2023'. A description of the lectotype is given below.
- 13 specimens from the MCSNG Main Collection (from Rhodes, Syria and Iran) and six specimens from the Vigna Taglianti Collection (from Cyprus) (MCSNG), all determined as *B. leucoscelis*.
- Six syntypes, Muséum National d'Histoire Naturelle, Paris, France (MNHN). The specimens, belonging to the Collection Chaudoir, are in a modern box to which they have relatively recently been transferred. Only one of the specimens bears a label, handwritten by Chaudoir, 'Erivan'; the remaining lack any labels. On the bottom of the box, under the six specimens, there is the label '*leucoscelis* / Chaud. / Caucase' (Fig. 6) [handwritten by Chaudoir]. Our request that we might dissect specimens and designate one as lectotype was declined under current MNHN regulations for type material, which are overseen by the French Ministry of Culture. This is one of the problems to taxonomists, together with those described in Löbl *et al.* (2023), that arises from a current trend towards prohibitive legislation concerning scientific collecting and international exchange of taxonomic specimens.
- Seven specimens from Armenia (Yerevan province): Yerevan, Arazdayan [currently Yeraskh], Yerevan, Ranchpar; Russia: Altaj Republic (Chuya river, Kurai; Chuya river, Kosh-Agach; Chuya river, Lake Osmanie); and Kazakhstan. All specimens were determined in the collection as *B. leucoscelis*, but after a careful check we determined these as actually belonging to the species *B. (Chlorodium) alnum alnum* Sahlberg, 1900. Iablokoff-Khnzorian Collection (MKCY).
- The holotype of *B. leucoscelis tripolitanus*, from Garian, and six paratypes of the same species from Garian (Tripoli), Gargaresc (Tripoli) and Tagiura (Tripoli), and 29 specimens from Rhodes, Castelrosso, Palestine, Jerusalem, Jerico, Tel Aviv, Wadi Salt and Beyrut,

determined as *B. leucoscelis*. One specimen from Rhodes determined as *B. curtulum*. Museo Civico di Storia Naturale, Milano, Italy (MSNM).

- Three specimens from Rhodes determined as *B. leucoscelis*. Museo Civico di Storia Naturale, Trieste, Italy (MSNT).
- Three specimens from Armenia, Georgia and Iraq determined as *B. leucoscelis* (Naturhistorisches Museum, Wien, Austria (NHMW)).
- 27 specimens from Turkey, Armenia, Cyprus, Jordan, Israel, Lebanon, Iran and Tunisia determined as *B. leucoscelis*, and two specimens from Crete determined as *B. curtulum*. Luca Toledano coll., Verona, Italy (CTVR).
- 11 specimens from Cyprus, Crete, Turkey, Jordan determined as *B. leucoscelis* and 15 specimens from Crete, Turkey and Iran determined as *B. curtulum*. Paolo Neri coll., Forlì, Italy (PN).
- 54 specimens of subgenus *Neja* from Turkey, Rhodes, Syria, Israel, Jordan, Cyprus, Crete, Tunisia and Iran. David Wrase coll., Gusow-Platkow, Germany (DW; part of Zoologische Staatssammlung München, Germany).
- Six specimens of subgenus *Neja* from Israel. Eylon Orbach coll., Qiryat Tivon, Israel (EO).
- One specimen from Iran. National Museum (Natural History), Prague, Czech Republic (NMPC).
- 14 specimens from Haifa, Jerico, Cyprus, determined as *B. leucoscelis*, and 14 specimens from Palestine, Jerusalem, Haifa, Athens, Attica, Corfu and Asia Minor determined as *B. curtulum*. Hungarian Natural History Museum, Budapest and Hungary (HNHM).
- 29 specimens from Cyprus, Turkey and Iran determined as *B. leucoscelis*. Museum für Naturkunde, Berlin, Germany (MHB).
- Seven specimens from Cyprus. Alexander Dostal coll., Vienna, Austria (AD).

Other collections examined:

MKCY = Mark Kalashian coll., Yerevan, Armenia;

RBINS = Institut Royal des Sciences Naturelles de Belgique, Bruxelles, Belgium;

SMNHATAU = Steinhardt Museum of Natural History, Tel Aviv University, Israel;

WS = Werner Starke coll., Warendorf, Germany;

ZIMG = Zoologische Institut und Museum, Greifswald, Germany.

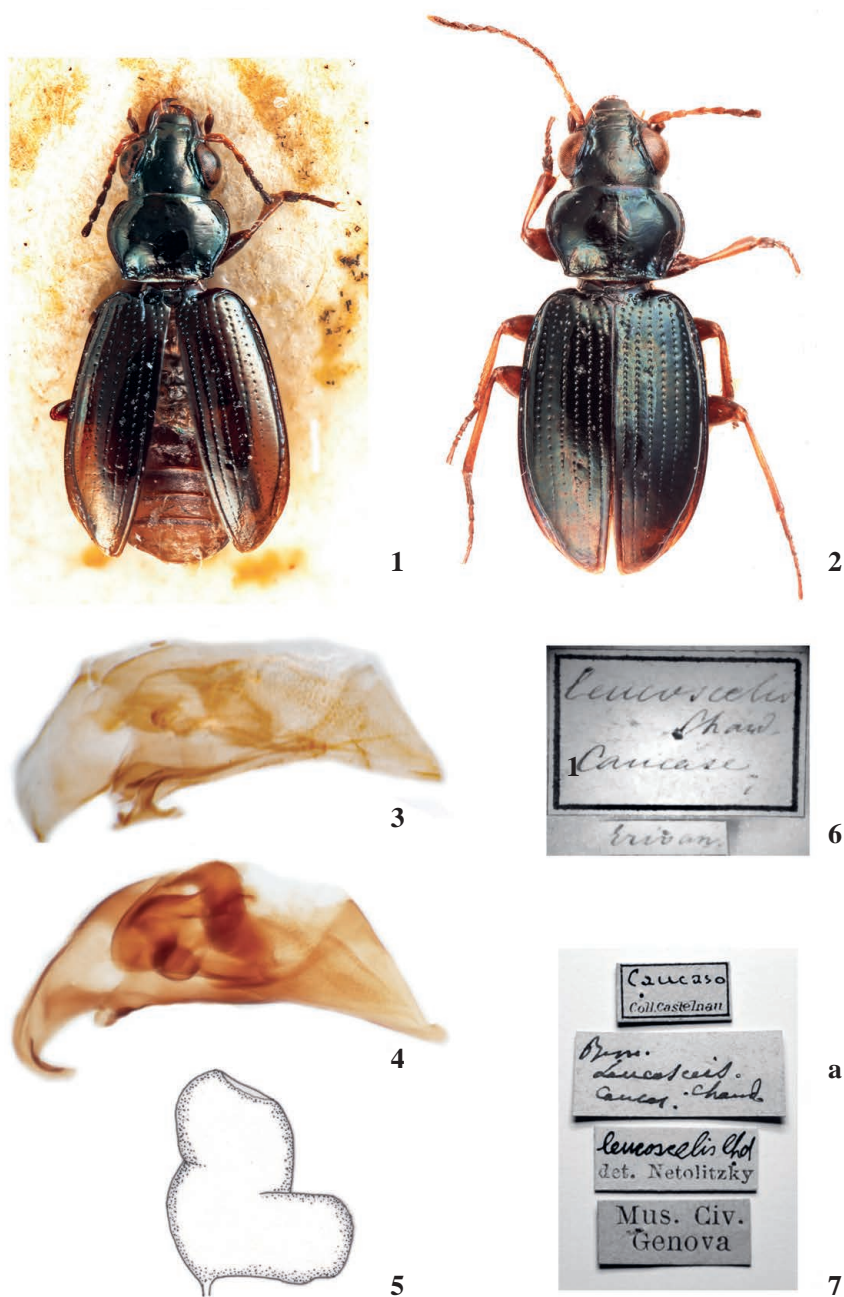
LECTOTYPE DESIGNATION

Bembidion (Neja) leucoscelis Chaudoir, 1850

(Figs 1, 3, 4, 5)

Re-description

Lectotype, ♂, immature specimen (Fig. 1). Brachypterous. Body length: 3.50mm. Coloration: head and pronotum black, smooth and glossy, elytra brownish-black. Femora and tarsi darkened, tibiae yellowish. Antennae blackish with first two antennomeres and the basal half of third, light. Palps darkened, except for last palpomere, yellowish. Head: maximum width, including eyes, 0.81mm; interocular distance 0.38mm; frons smooth and glossy, frontal furrows typical for subgenus *Neja*. Eyes protruding, temples almost absent. Pronotum: length along median line 0.69mm; width of anterior margin 0.71mm; maximum width 0.98mm; width of basal margin 0.72mm; pronotal width/pronotal length ratio 1.42; moderately convex, transverse; sides entirely rebordered, narrowing posteriorly with a sinuate towards base, with which they form an angle very slightly obtuse; lateral gutter narrow, of uniform width; all surface smooth and glossy; laterobasal carina evident; longitudinal median line very faint, anterior transverse semilunar furrow more evident; transverse basal impression punctate and laterobasal foveae subquadrate, almost smooth. Elytra: long 2.05mm, maximum overall width 1.46mm; elytral margin, at shoulder, bent at angle and reaching the beginning of fourth stria; sides ovoid and rounded shoulders; maximum width slightly behind middle, glossy and lacking microsculpture. First six striae punctured, punctation visible up to the apex, where it is very faint, seventh stria barely visible in the basal half. In the intervals is barely visible a very faint, 'pin-pointed' punctation.



Figs 1–7. — *Bembidion (Neja) leucoscelis* Chaudoir, 1850: 1, lectotype (MCSNG), habitus (body length: 3.50mm); 2, specimen from Eriwan, 1898 Korb (CTVR), habitus (3.70mm); 3, lectotype median lobe of the aedeagus (0.69mm); 4, specimen from Eriwan, median lobe of the aedeagus (0.71 mm); 5, specimen from Erivan, spermatheca (0.13mm); 6, labels on box base and only labelled syntype in Coll. Chaudoir (MNHN); 7, lectotype labels, including the label handwritten by Chaudoir (a).

♂ genitalia (Fig. 3): aedeagus small (0.69mm), apical third stout, slightly pointed and ventral margin rectilinear, only the apical third slightly bent ventrally.

Spermatheca (for species in general): 0.13mm (Fig. 5).

Intraspecific variability: Length of the six specimens at MNHN from 3.60 to 3.65mm (Thierry Deuve & Dominique Echaroux, pers. comm.). Length of the remaining three ♂♂ seen from 3.40 to 3.80mm (Fig. 2), ♀ 3.80mm long. Aedeagus from 0.69mm to 0.78mm long (Fig. 4). Elytral coloration black or black-bluish in the mature specimens.

Distribution: Armenia and Georgia. Alpine.

Material examined

Lectotype: 1♂, Lectotype of *B. leucoscelis*, 'Bem. / leucoscelis / Chaud. / Caucas. [handwritten label by Chaudoir] // Caucaso [handwritten] / Coll. Castelnau [printed label] // leucoscelis Chd. [handwritten label] / det. Netolitzky [printed label] // Mus. Civ. / Genova [printed label] // *Bembidion leucoscelis* Chaudoir, 1850 Lectotypus, Neri & Toledano des. 2023 [red, printed label]' (MCSNG); the specimen is designed here as the Lectotype according ICZN Code (Article 74.7.3) because it is the only syntype with an original label that we could dissect, in order to fix the species name to internal as well as external morphology.

Other material: 1♂, 'Eriwan / 1898 Korb [printed label] // coll. Paul / Meyer [printed label] // leucoscelis Chd. / det. P. Meyer [handwritten label] // Acqu. -Nr. / 1951-23 // *B. (Neja) / lamprinulum* Rett. / det. Marggi 2009 [printed label]' (CTVR); 1♀, 'Erivan / Korb 1898 [handwritten label] // Punkte / bräftig [handwritten label] // ident. mit Type / *B. palpalis* Mts. / in Mus. Moskau / Netolitzky [handwritten label] // coll. // Netolitzky [printed label] // leucoscelis Chd. [handwritten label] / det. Netolitzky [printed label] // *B. (Neja) / lamprinulum* Rett. / det. Marggi 2009 [printed label]' (NHMW); 1♂, 'Lagodechi, Tifflis / gouv. / Mlovssewitsch [handwritten label] / [in Cyrillic, printed label] // coll. / Netolitzky [printed label] // leucoscelis Chd [handwritten label] / Netolitzky det. [printed] label // *B. (Neja) / lamprinulum* Rett. / det. Marggi 2009 [printed label]' (NHMW).

We added the following label: '*Bembidion (Neja) leucoscelis* Chaudoir, 1850 det. Neri & Toledano 2023' to all the specimens (except for the lectotype).

NEJA MOTSCHULSKY: SYSTEMATICS AND GEOGRAPHY

Bembidion leucoscelis was described by Chaudoir (1850) from the high mountains of Armenia. In its description, the species is compared with *B. velox* Erichson, 1837 (= *B. (Metallina) properans* Stephens, 1828, nec *velox* Linnaeus, 1758). The diagnostic characters mentioned are the shorter pronotum with its less evident posterior sinuosity and impunctate base.

Motschulsky (1850) describes *B. (Metallina) palpalis* from Georgia. *B. palpalis* was synonymised with '*curtulum* Chd [sic!] (*lamprinulum* Rtt.)' (Netolitzky 1935) [the author probably actually means 'synonym of *leucoscelis* Chd.' as suggested by the incorrect authority (i.e., 'Chaudoir' instead of 'Duval') and by further synonymy with *B. lamprinulum* Reitter, 1908].

Duval (1851) described *B. curtulum* from Turkey and Crete. He compared this beetle with *B. ambiguum* Dejean, 1831, and distinguished it from *B. ambiguum* by a few characters, including evident posterior narrowing of its pronotum. Later some authors, including Apfelbeck (1904), mention a wider range for *B. curtulum* that included Syria, Cyprus, Zante, Greece, Palestine, Algeria, Tunisia.

Reitter (1908) had described *B. lamprinulum* from the Caucasus, without more detailed geographic information; it was later synonymized with *B. leucoscelis* by Netolitzky (1914).

Netolitzky (1911) wrote the first indepth study on the subgenus *Neja* Motschulsky, 1864, in which he makes clear that both *B. rugicolle* Reiche & Saulcy, 1855, and *B. sporadicum* Sahlberg, 1903 [according to Netolitzky these are only varieties of *B. ambiguum*] belong to the group of species of *Neja* characterised by fully microsculptured elytra and that *B. curtulum* is a synonym of *B. leucoscelis*.

It is clear from Netolitzky's (1911) synonymy of *B. curtulum* with *B. leucoscelis* that he was not able to check the type series of *B. leucoscelis* preserved at MNHN. He studied three specimens from Caucasus, which we have also examined. These include the specimen herewith designated as lectotype (MCSNG), and two others: 1♂ and 1♀ (Erivan, leg. Korb 1898, NHMW, CTVR). All his other study specimens belong to the Mediterranean region. There is obviously no mention of the genitalia, since the importance of their study was only identified by René Jeannel many years after the description of these taxa (Jeannel 1955).

Müller (1918) includes only *B. leucoscelis* in his key, and mentions *B. curtulum* in a footnote as a coastal race of *B. leucoscelis*, and its synonymisation by Netolitzky (1911, 1914).

Schatzmayr (1937) describes *B. leucoscelis tripolitanus* from Garian (Lybia). This subspecies is distinguishable by the presence of more finely and less densely punctured elytral striae. Between 1911 and 1976 many authors retain *B. curtulum* as a subspecies of *B. leucoscelis*, some others as its synonym. Generally authors report *B. leucoscelis* as belonging to the fauna of 'Persia', and *B. curtulum* as belonging to that of Iraq. Examination of the *B. leucoscelis tripolitanum* aedeagus suggested to us that it is more closely related to *B. curtulum*, and subspecies *tripolitanum* Schatzmayr, 1937, is here assigned to *Bembidion curtulum* (comb. n).

Iablokoff-Khnzorian (1976), in his 'Fauna of Armenia', provided a short re-description and careful drawings of aedeagus and pronotum of '*B. leucoscelis*'. Both his drawings and re-description, however, appear not to match with Chaudoir's original description. The specimens identified by Iablokoff-Khnzorian as *B. leucoscelis* actually belong to *B. (Chlorodium) alnum alnum* Sahlberg, 1900 (Figs 12 & 13). This is the first report of *B. alnum* for Armenia (AR) and Altaj republic (Russia) (ES). Furthermore the key mentions *B. palpalis* as not present in Armenia, a species already synonymized with *B. curtulum* Chaudoir. [sic!] by Netolitzky (1935) [see above].

Up until 2011 authors were still finding it difficult to state with certainty the status of *B. leucoscelis* and *B. curtulum*: were they 'good' species, subspecies or synonyms? And the reported distributions of the taxa were confusing. Müller-Motzfeld & Marggi (2011) in 'Carabidae of Greece', retain *B. leucoscelis* and *B. curtulum* as good species, provide a short re-description in the identification key and publish the drawing of the aedeagi, but they do not report the provenance of the figured specimens in any detail: *B. leucoscelis* is reported for the Eastern Mediterranean 'from Cyprus to Middle Asia' and as doubtful for Greece; *B. curtulum* is reported for mainland Greece including the Peloponnese, and for Crete and Aegean Islands.

Marggi, Toledano & Neri (2017) report the following distributions: *B. leucoscelis* from Azerbaijan, Armenia, Georgia, Russia (South European Territory), Tunisia, Cyprus, Iran, Iraq, Israel, Jordan, Syria and Turkey, and *B. curtulum* from Greece (including islands), and Turkey. *B. leucoscelis tripolitanum* Schatzmayr (1937) from Libya.

Müller-Motzfeld & Marggi (2011) ranked *B. curtulum* and *B. leucoscelis* as good species, in their key (which focuses on the distinguishing external characters) and in the drawings emphasizing the aedeagal differences. In the large amount of material at our disposal, we found it difficult to distinguish between these taxa on the basis of the external characters described in Müller-Motzfeld & Marggi (2011). We did notice, however, clear differences in the aedeagal structure between specimens from Caucasus and specimens from other localities. Müller-Motzfeld & Marggi (2011), on the other hand, paid less attention to the differences between aedeagi. While their aedeagal drawing for *B. curtulum* (specimen no. 4179, p. 111 in fig. 4.17-6a) is identical to the aedeagi from our Crete specimens, the drawing for the *B. leucoscelis* aedeagus (specimen no. 4176, p. 111 in fig. 4.17-6b) looks different from the lectotype aedeagus (designated above) and from that of specimens from Armenia and Georgia.

To unravel this discrepancy, we asked Peter Michalik, curator of the Collection Müller-Motzfeld (ZIMG), for the collecting data of the specimen no. 4176 figured at page 111, fig. 4.17-6b) reported as *B. leucoscelis*. Michalik kindly sent us the photo of the following label of the specimen no. 4176: 'Syria: Dier-ez-Zor / Getreidefeld / BF 2: Ser. 1 / Yakti leg.: 13.-21.4.95' (Fig. 18). The specimen is from Syria and not from Armenia, and the drawing of the aedeagus matches exactly the aedeagus of a Syrian specimen available to us (Fig. 16).

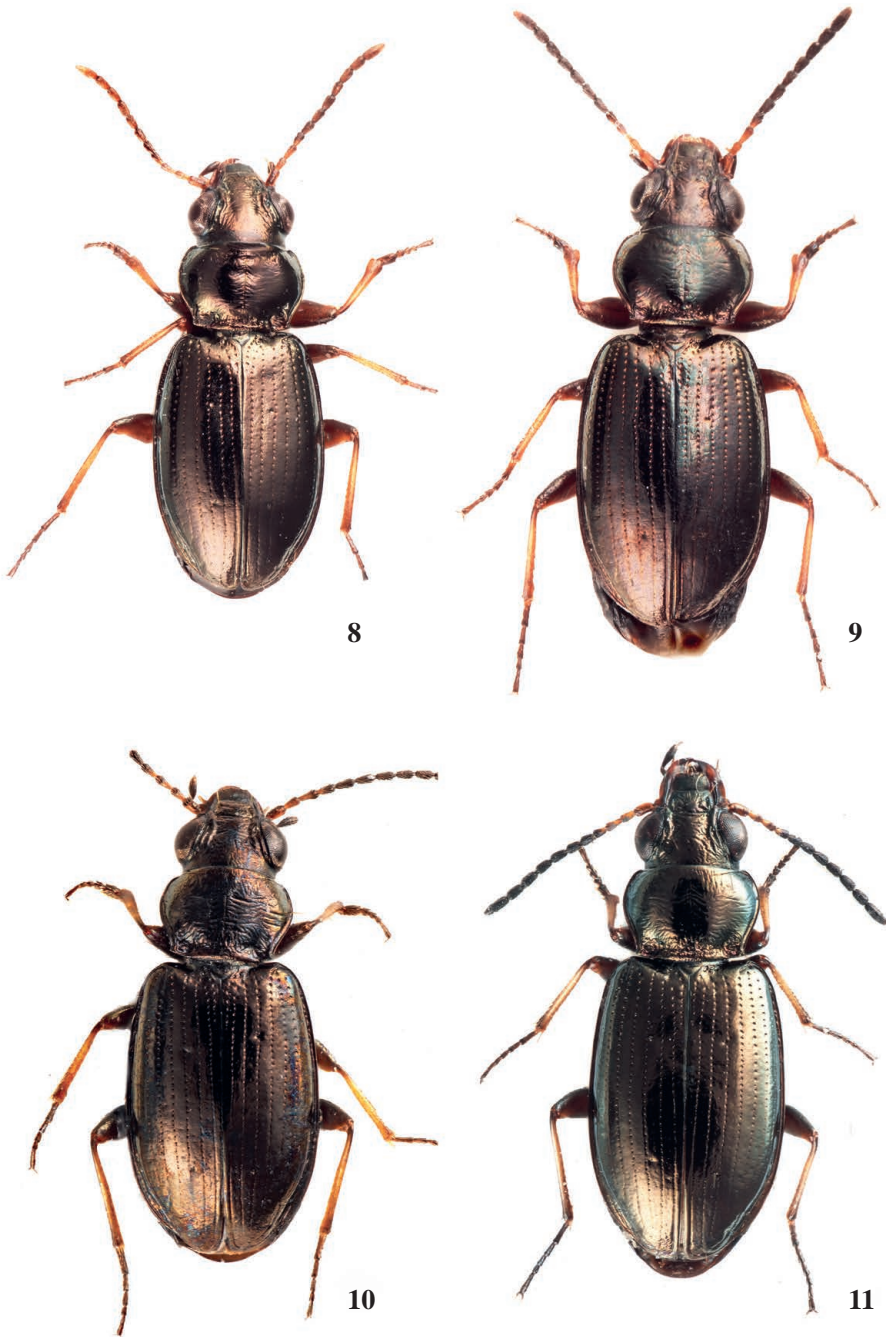
The brief *B. leucoscelis* re-description given by Müller-Motzfeld & Marggi (2011) describes elytra with more or less parallel sides, while the type series (including lectotype) actually shows rounded elytral sides and shoulders. We believe that *B. leucoscelis sensu* Müller-Motzfeld & Marggi (2011) does not match with type specimens of *B. leucoscelis* Chaudoir, but instead to an undescribed taxon from Syria and other neighbouring areas, which we describe below as a new subspecies of *B. curtulum*.

***Bembidion (Neja) curtulum mediiorientis* subsp. n.**
(Figs 10, 11, 15 & 16)

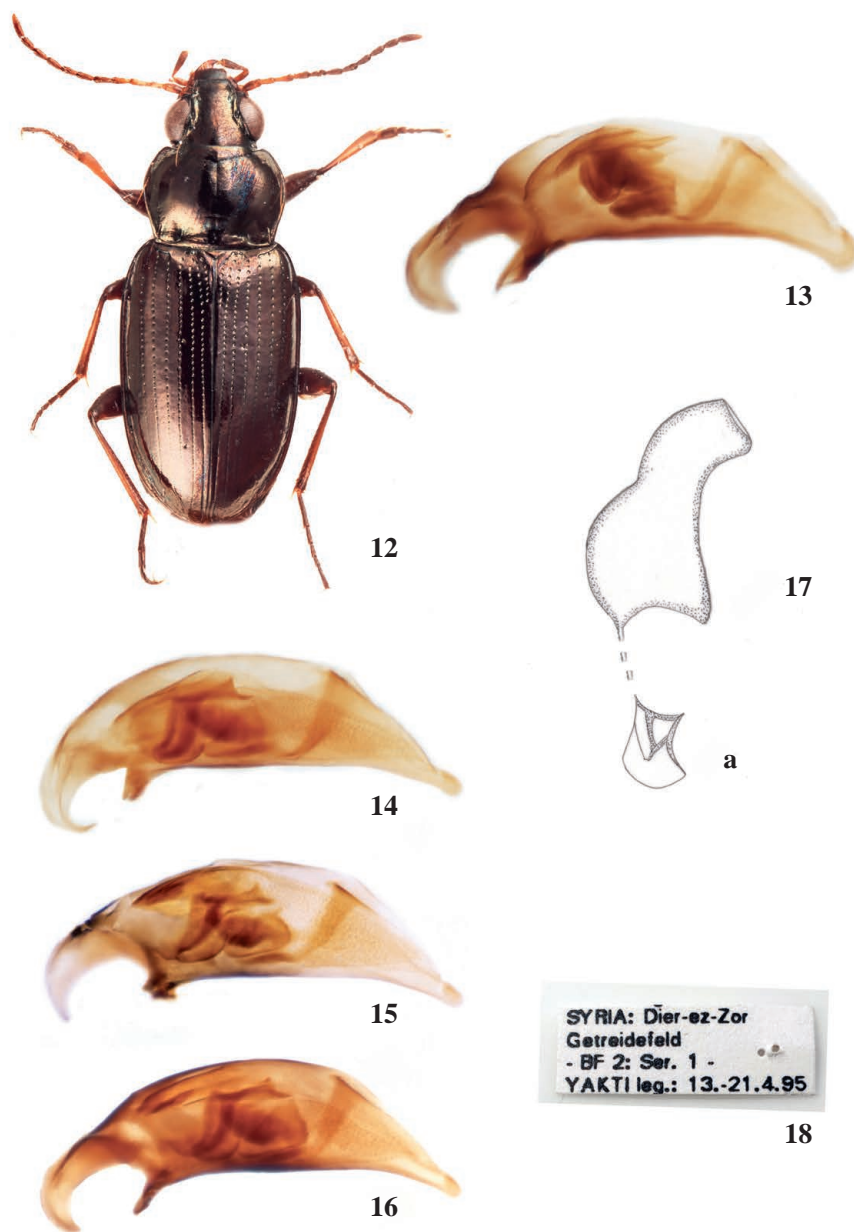
Description

Holotype, ♂, body length 3.60mm (Fig. 10). Coloration: head, pronotum and elytra glossy black. Femora and tarsi darkened, tibiae light yellow. Antennae blackish with first three antennomeres in part darkened. Palps darkened, except for the last palpomere, yellowish. Head: maximum width, including eyes, 0.88mm; interocular distance 0.42mm; frons with evident rugosity, frontal furrows typical for the subgenus *Neja*. Eyes protruding, temples almost absent. Antennae long 1.68mm. Pronotum: length along median line 0.69mm; width of the anterior margin 0.78mm, maximum width 1.02mm, width of the basal margin 0.80mm; pronotal width/pronotal length ratio 1.48; moderately convex, transverse; sides entirely rebordered, narrowing behind with a sinuature towards base, with which they form an obtuse angle; lateral gutter narrow, of uniform width; all surface with faint, undulating folds, glossy; laterobasal carina evident; longitudinal median line very sharp, anterior transverse furrow more evident; basal transverse impression rugose-punctate and laterobasal foveae subquadrate, rugose. Elytra: length 2.13mm, maximum overall width 1.50mm; elytral margin, at shoulders, bent at angle and reaching the beginning of fourth stria; sides barely ovoid, almost parallel and evident shoulders; maximum width slightly behind middle, glossy and without microsculpture. All striae shallowly punctured, punctation visible up to the apex where it is very faint. In the intervals is barely visible and very faint, a 'pin-pointed' punctation. Species macropterous.

♂ genitalia (Fig. 15): aedeagus small (0.74mm), central brush at middle, median third quite wide, apical third long and pointed, rectilinear ventral margin with only the extreme of *apex* slightly bent ventrally. Parameres with four apical setae.



Figs 8–11. — *Bembidion (Neja)* spp: 8, *curtulum* Duval, 1851, Creta, Omalos lake 1200m (PN), habitus (body length: 3.30mm); 9, *curtulum* Duval, 1851, Greece, Creta occ., 1200–1400m, Z. Minarik lgt. (PN), habitus (3.70mm); 10, *curtulum mediiorientis* subsp. n., holotype (CTVR): habitus (3.60mm); 11, *curtulum mediiorientis* subsp. n., paratype (Cyprus (Paphos) Peyia, Pikni Forest 374m, N 34.89535 E 32.37072 (DW)): habitus (4.00mm).



Figs 12–18. — *Bembidion* spp: 12, *B. (Chlorodium) alnum alnum* Sahlberg, 1900, Yerevan, Arazdayan (MKCY), habitus (body length: 4.50mm); 13, *B. (Chlorodium) alnum alnum* Sahlberg, 1900, Yerevan, Arazdayan (MKCY), median lobe of the aedeagus (0.87mm); 14, *B. (Neja) curtulum* Duval, 1851, Greece, Creta occ., 1200–1400, Z. Minarik lgt. (PN), median lobe of the aedeagus (0.80mm); 15, *B. (Neja) curtulum mediorientis* subsp. n., holotype (CTVR), median lobe of the aedeagus (0.73mm); 16, *B. (Neja) curtulum mediorientis* subsp. n., Syria, Tadmur (Palmyra), Pov. Homs (DW), median lobe of the aedeagus (0.75mm); 17, *B. (Neja) curtulum* Duval, 1851, GR, Creta, Omalos lake 1200m, (PN), spermatheca (0.13mm), and annulus receptaculi (17a) (0.06mm); 18, label of the specimen of '*B. leucoscelis*' from Syria mentioned in the paper.

♀ genitalia (of species in general) (Fig. 17): spermatheca (0.11mm) with annulus receptaculi, similar to the nominotypical form; distal cavity curved with a few longitudinal folds (annulus receptaculi, Fig. 17a)

Intraspecific variation: Body length (♂♂ and ♀♀) from 3.55mm to 4.00mm. Aedeagus from 0.72 to 0.78mm long. Elytra often with subquadrate shoulders and sides more or less rectilinear. Various evident rugosity of head and pronotum (Fig. 11).

Etymology: The name is derived from the geographical area where the subspecies is distributed and it is in the genitive, meaning 'of the Middle East'.

Diagnosis: This macropterous subspecies of *Bembidion* (*Neja*) *curtulum* Duval, 1851, from the Middle East shows head with rugose frons, elytra not micro-sculptured, elytral sides more or less parallel with evident shoulders or humeral base subquadrate, elytral striae evidently punctured, including stria 7 (at least in the anterior half) and antennomeres 1 to 3 at least in part darkened.

Type locality: Cyprus, Kato Paphos.

Material examined

Holotype, ♂, CYPRUS: 'Kato Paphos / Cyprus VD44 / 28/10/2006 / running on patio [printed label]' (CTVR). The aedeagus, in Euparal, is preserved on the same pin as the specimen. We have added to the specimen the following label: '*Bembidion* (*Neja*) *curtulum mediorientis* Neri & Toledano, 2023 – HOLOTYPE' [red, printed label].

Paratypes (topotypes), 1♀, CYPRUS: 'Kato Paphos / Cyprus VD44 / 26/01/2007 / pitfall' (CTVR); 1♂, CYPRUS: 'Zypren, Kato Pafos / 15–27.XI.2011 / leg. W. Schawaller' (PN); 1♀, CYPRUS: 'Cyprus Akamas-Halbinsl / Neochorion 200m / Sprik 24.04.1995' (DW); 1♀, CYPRUS: 'Cyprus-N Limassol / Limnatis-Ufer / b. Alassa 300m / 08.IV.1995 Assing' (DW); 1♂, CYPRUS: 'Zypern / Bezirk Pafos / Umgebung Polis 5m / I. Wolf leg. 9.4.–21.4.2010' (DW); 3♂♂ 1♀, CYPRUS: 'Zypren 1993 / 13km nw.- Limassol / Khalassa / Scherm leg. 20.4' (PN); 1♀, CYPRUS: 'Cyprus occ. 1.1.2011 / Paphos env. / Skoupy leg.' (PN); 2♀♀, CYPRUS: 'Cyprus Nicosia pr. 416m / Lefkara Dam, 28–29.4.2012 / N34°54,423' E33°17,699' / J. Pelikùn lgt.' (PN); 1♂, CYPRUS: 'Cyprus 29.4.2012 / Nicosia Kyprovasa-Lefkara Dam / 34°54,708' N33°16,523E / Jan Pelikùn lgt (382m)' (PN); 1♂, CYPRUS: 'TR Cyprus / SE of Küçükerenköy / 15 IV.1998 / leg. St Vit' (CTVR); 1♀, CYPRUS: 'Cyprus Akamas-Halbinsl / Neochorion 200m / Sprik 24.04.1995' (CTVR); 1 ex., CYPRUS: 'Cyprus Larnaca / 10-XI-1932 / A. Ball 37/14' (CTVR); 4 exx., CYPRUS: 'Zypern Ovon / Kato Dikomo, 230m / 33°20'–35°26' (MHB); 1 ex., CYPRUS: 'Larnaca / Cyprus / Cl. Splichal' (HNHM); 1 ex., CYPRUS: 'Cyprus / Larnaka / Glaszner' (CTVR); 2♂♂, 2♀♀, CYPRUS: 'Cyprus / Mt. Armén.' (HNHM, CTVR); 2♂♂, CYPRUS: 'Cyprus – Lamaka region / Choirokoitia – m100 / 20.IV.1995 / E. Colonnelli' (MCSNG – coll. Vigna Taglianti); 1♀, CYPRUS: 'Cyprus – m1000–1100 / Cedar Valley / 20.IV.2010 – E. Colonnelli' (MCSNG – coll. Vigna Taglianti); 1♂, 2♀♀, CYPRUS: 'Cyprus – Akamas / Pyrgos lis Riganis m300 / 19.IV.2010 – E. Colonnelli' (MCSNG – coll. Vigna Taglianti); 9♂♂, 12♀♀, CYPRUS: 'Cyprus (Paphos) / Peyia, Pikni Forest 374m / N34°89'53" E32°37'07" / (open fallow land) / 14–23.III.2018 / U.& K.-H. Kielhorn [CY7]' (DW, CTVR); 1♂, 1♀, CYPRUS: 'North Cyprus (Famagusta) / Ydotoexameni Kouklion / Mantres tou Prastio, / ca. 16km W Famagusta / 500m, 35°07'N/33°46'E / (loamy field edge) / 20.II.2011 D.W. Wrase [5b]' (DW, PN); 3♂♂, 4♀♀, CYPRUS: '157/Cyprus, SW Larnaka, / Akonia, N34°46'55.2" / E033°27'53.2", 20m, 28.03.2019 / Leg. Dr. A. Dostal' (AD, CTVR, PN); 1♂, CYPRUS: 'Cyprus, Pr. Larnaka / SW Larnaka, Kiti Dam / lg. M. Balkenohl, 03.04.2018' (WS).

Paratypes (not topotypes), 14♂♂, 9♀♀, ISRAEL: 'Israel (South distr.) / Ha Bsor, Nakal Bsor, / ca. 12km SW Ofakim / (banks, leaf litter, / under plants, sifted) / 22.III.2008 D.W. Wrase' (CTVR, PN, DW). 1♀, ISRAEL: 'Israel (North distr.) / Upper Galilee / Ha Khula Valley /

Ma'agar Einan lake 73m / 33°05.137'N 35°34.730'E / (toe of dam, in moist loamy soil) / 1–2.V.2006 D.W. Wrase' (DW); 1♀, ISRAEL: 'Jerico Pal. [currently Israel] / 10.4.35 Jordan / W. Wittmer' (MSNM); 3♀♀, ISRAEL: 'Jerusalem / 9.10.30 / Japukhi / Palestine' [handwritten label] (RBINS, CTVR); 1♂, ISRAEL: 'Israele-Haifa / Palmahim IV/82 / Tedeschi' (CTVR); 1♂, ISRAEL: 'Gerusalemme / 8.3.33 / Schatzmayr' (MSNM); 3♂♂, 2♀♀, ISRAEL: 'Palestina / Jerusalem / 5.III.1948 / Bytinski-Salz' (MSNM, CTVR, PN); 1 ex., ISRAEL: 'Tel Aviv / 14.3.1933 / Schatzmayr' (MSNM); 1♀, ISRAEL: 'Tel Aviv / Palestine / 20.VI.1948 / leg. Bytinski-Salz' (MSNM); 1♂, 4♀♀, ISRAEL: 'Syria / Kaifa / Reitter' (HNHM); 1♂, ISRAEL: 'Jerico' (HNHM); 1♂, 1♀, ISRAEL: 'Palaestina' (HNHM); 1 ex., ISRAEL: 'Jerusalem' [handwritten label] (HNHM); 1♀, ISRAEL: 'Israel, foothills of / Judea, 3km SE Devira / 15.IV.2011, E. Orbach' (EO); 1♀, ISRAEL: 'Israel, N. Negev, / Makhtesh Be'eri nat.res., / 23.I.2015, E. Orbach' (EO); 2♂♂, 1♀, ISRAEL: 'Israel, Northern Negev / Hazerim, 20.IV.1991 / E. Orbach' (CTVR, NP, SMNHTAU); 1♀, ISRAEL: 'Israel, N. Negev / Hazerim, 5–13.V.1992 / E. Orbach' (SMNHTAU); 1♀, ISRAEL: (South distr.) / Dead Sea area / En Gedi / Wadi Arugot / (gravel along small river) / 16.03.2008 D.W.Wrase [14] (DW); 2♀♀, ISRAEL: (South distr.) / Nakhal Beka / S Be'er Sheva / (ruderal river valley, / under stones) / 21.03.2008 D.W.Wrase [25] (DW); 2♀♀, ISRAEL: (Centr. distr.) / Nitsanim / dunes betw. Ashdod / and Ashkelon / 29.03.2008 D.W.Wrase [36] (DW); 4♀♀, LEBANON: 'Beyrouth / 21.4.35 Liban / W. Wittmer' (MSNM); 1♀, LEBANON: 'Liban: Nabeh safe / 1000m, V-1966 / G. Fagel' (RBINS); 3 exx., LEBANON: 'Liban Beyrouth / 26.XI.1932 / S. Ball' (RBINS, CTVR); 1♂, JORDAN: 'Wadi Salt / 11.4.35 Transj. / W. Wittmer' [handwritten label] (MSNM); 1♂, JORDAN: 'N Jordan-Jerash / archeological site / 13.III.2019 G. Platia' (PN); 1♂, JORDAN: 'Jordan oc. 400m / Wadiel Hasa / 30,58N 35,47E / 6.4.1994 / lgt. S. Becvar J.&S.' (CTVR); 1♀, JORDAN: 'Jordan oc. 0–200m / Wadi el Mujib / 31,30N 35,41E / 7–9.4.1994 / lgt. S. Becvar J.&S.' (CTVR); 5♂♂, 5♀♀, JORDAN: 'Jordan (Ma' dabà) / Mts. Above / Hammamat Ma'in (Hot springs) / 7km SSW Ma'in vill., 432m / 31°38'N 35°39'E (dry slope, / field edges, under stones) / 2.IV.2016 Wrase & Laser' (DW, CTVR); 1♂, SYRIA: 'Tadmur (Palmyra), Prov. Homs / (SYR), Ruinenglände u. Umg. / eg. Esser 27.3.99' (DW); 1♂, IRAQ: 'Mossoul / Belon. [handwritten label] // coll. / Netolitzky // *leucoscelis* Chd. [handwritten label] / det. Netolitzky' (NHMW); 1♀, IRAN: 'E. Iran, 1100m / 33km W Sabzvaran / 6–7.5.1973' (NMPC); 2♀♀, IRAN: 'Iran, Ilam Province / 10km S Ilam City / 1300m / N33°34'15" E46°25'04" / 19.10.2011, leg. Frisch' (MHB); 1♂, IRAN: 'Persia septent. / Doria 1862–63' [handwritten label] (MHB); 1♂, IRAN: 'Iran, Fars m1750 / Mian Jangel 40km N Fasa / 13.V.2005 G. Sama leg.' (PN); 1♂, IRAN: 'Iran, Lorestan, 1400 / 5–15km SW Dorud / G. Sama leg. 9–10.V.2002' (PN); 1♂, IRAN: 'S. Iran, Kerman / 30km NNE di Jiruft / 21-4-2007 m1750 / Leg. D. Gianasso' (CTVR); 1♂, IRAN: 'Iran, Kerman province / Baft-Jiroft: 7km NE Hanza / 2950m / N29°20'53" E57°12'29" / 25.05.2010, leg. Frisch' (MHB); 1♂, 3♀♀, IRAN: 'Iran, Kerman Province / Baft-Jiroft 25km W / Darbt Behesht 2360m / N29°17'23" E57°06'43" / 25.05.2010 lg. Frisch & Serri' (MHB, CTVR); 3♂♂, 1♀, IRAN: 'Iran, Kerman Province / 22km E Rabor / 2330m / N29°17'11" E57°06'25" / 05.05.2007 lg. Frisch & Serri' (MHB, PN); 1♀, IRAN: 'Iran, Kerman province / 17km E Rabor / 2180m / N29°16'39" E57°04'34" / 05.05.2007 lg. Frisch&Serri' (MHB); 2♂♂, 3♀♀, IRAN: 'Iran, Fars Province / Sarvestan – Estahban road: / Runiz, 1770m / N29°09'43" E53°45'36" / 25.04.2006 lg. Frisch & Serri' (MHB, PN); 2♂♂, 3♀♀, IRAN: 'Iran, Fars Province / Estahban – Darab road: lj / 1630m / N29°02'50" E54°13'16" / 24.04.2006 lg. Frisch & Serri' (MHB, CTVR); 1♀, IRAN: 'Iran, Fars province / 30km NE MarvDasht: / Seydan, 1770m / N30°06'29" E53°04'03" / 07.04.2006 lg. Frisch & Serri' (MHN); 1♂, IRAN: 'Iran, Fars province / Farrashband – Firuzabad road: / Kherghe, 1620m / N28° 54'39" E52°21'41" / 13.04.2006 lg. Frisch & Serri' (MHN).

[All labels, unless otherwise indicated, are printed. We added the following label: '*Bembidion (Neja) curtulum mediiorientis* Neri & Toledano, 2023 – PARATYPUS' [red, printed] to all the paratypes.]

Distribution: The subspecies is widely distributed in the Middle East and is known from Cyprus, Israel, Lebanon, Jordan, Syria, Iraq, and Iran.

SUMMARY

Examination of the newly designated lectotype of *Bembidion leucoscelis* and its comparison with material from Crete, the type locality of *B. curtulum*, shows the close external similarity of both species. They are, however, clearly distinguishable by the aedeagus: the apical third is longer and more slender in *B. curtulum* (Figs 14 & 15), shorter and less pointed in *B. leucoscelis* (Figs 3 & 4), and by the head with frons smooth in *B. leucoscelis* (Figs 1 & 2) and rugose in *B. curtulum curtulum* (Fig. 8) and *B. curtulum mediorientis* subsp. n. (Fig. 10).

The current study indicates that only the Armenian and Georgian specimens show an aedeagus attributable to *B. leucoscelis*, while the Mediterranean and Middle Eastern specimens show an aedeagus attributable to *B. curtulum* and related subspecies: *tripolitanum* and *mediorientis*. It seems that specimens of *B. curtulum mediorientis* subsp. n. have probably often (always?) been confused with *B. leucoscelis* (at least those captured in the Caucasian Region).

This study confirms the specific differentiation of *B. leucoscelis* and *B. curtulum* already stated by Müller-Motzfeld & Marggi (2011). In addition, we have established a new taxonomic combination: *Bembidion (Neja) curtulum tripolitanum* Schatzmayr, 1937, for the subspecies reported from Libya and Tunisia. *B. curtulum curtulum* Duval, 1851, is known from Greece (including Crete and Rhodes) and Turkey. *Bembidion curtulum mediorientis* subsp. n. is known from Cyprus, Iran, Iraq, Israel, Jordan, Lebanon and Syria; *B. leucoscelis* Chaudoir, 1850, is known from Armenia and Georgia. These four taxa have the following diagnostic characteristics:

Bembidion leucoscelis Chaudoir, 1850: head with frons smooth; pronotum smooth or showing very few traces of transverse, undulate folds; elytra with rounded shoulders and sides, punctured striae normally impressed, except for seventh stria, which is barely visible in the anterior half; first two antennomeres and basal half of third light, the remaining darkened; habitus (Figs 1 & 2); aedeagus (Figs 3 & 4); spermatheca (Fig. 5). Brachypterous species.

Bembidion curtulum curtulum Duval, 1851: head with rugose frons; pronotum with faint transverse, undulate folds; elytra with rounded shoulders and sides with striae evidently punctured, including seventh stria (at least in the anterior half); first two antennomeres light, or a part of first antennomere and the whole second antennomere light; habitus (Figs 8 & 9); aedeagus (Fig. 14); spermatheca (Fig. 17). Macropterous subspecies.

Bembidion curtulum tripolitanum Schatzmayr, 1937: head with smooth frons; pronotum showing only a few traces of transverse, undulate folds and less evident sinuature before hind angles; rounded elytral shoulders and sides, with striae more sharply and less densely punctured; first two antennomeres in general light colour, or a part of first antennomere and the whole second antennomere light. Brachypterous subspecies.

Bembidion curtulum mediorientis subsp. n.: head with rugose frons; pronotum with slight transverse, undulate folds; elytra at sides more or less parallel, with evident shoulders or humeral base subquadrate, elytral striae evidently punctured, including seventh stria (at least in the anterior half); first three antennomeres at least in part darkened; habitus (Figs 10 & 11); aedeagus (Figs 15 & 16); spermatheca similar to the nominotypical form. Macropterous subspecies.

**Key to the identification of the species of *Bembidion* subgenus *Neja*
Motschulsky, 1864, with elytra not microsculptured or with microsculpture
only at the extreme of elytral apex**

This key includes the following species: *B. nigricorne* Gyllenhal, 1827, *B. leucoscelis* Chaudoir, 1850, *B. curtulum curtulum* Duval, 1851, *B. curtulum tripolitanum* Schatzmayr, 1937, *B. curtulum mediiorientis* subsp. n., *B. striaticeps* Andrewes, 1935, and *B. gansuense* Jedlička, 1965. These taxa have European or Mediterranean / Middle Eastern distributions, except for the last two that have an Indo-Chinese distribution.

- 1 Antennae and legs entirely dark; bronze species, rarely blue, very convex and shiny, pronotum strongly rounded at sides and base evidently narrowed; elytral intervals lacking secondary punctures; Belgium, Czech Republic, Germany, Estonia, Finland, France, Great Britain, Germany, Latvia, Netherlands, Norway, Russia (North European Territory), Sweden (Marggi, Toledano & Neri 2017) *nigricorne* Gyllenhal, 1827
- Antennae and legs at least in part lightly coloured 2
- 2 Pronotum not heart-shaped, uniformly rounded at sides and only slightly sinuate towards base; head and pronotum smooth and glossy; pronotum with sides of base evidently oblique towards the obtuse hind angles; elytra with striae faintly punctured, vanishing before the apex; isolated apical puncture; seventh stria made by a few punctures; first two antennomeres and base of third and fourth reddish, rest of antennae darkened; femora and palpi darkened; body length: 2.50–4.00mm; China, Gansu, (Marggi, Toledano & Neri 2017) *gansuense* Jedlička, 1965
- Pronotum heart-shaped, evidently sinuate before hind angles, with base rectilinear or almost so near the hind angles; apical stria and apical puncture present 3
- 3 Elytra faintly and finely punctate-striate, striae complete, but superficial towards apex ... 4
- Elytra with striae normally or evidently punctured, striae generally complete, but more superficial towards apex 5
- 4 Head with frons finely punctate, rugose; pronotum with basal transverse impression coarsely rugose, punctate; elytra with evident shoulders (from the original description); body length: 3.50mm; 'Punjab' [currently Himachal Pradesh] (Marggi, Toledano & Neri 2017) *striaticeps* Andrewes, 1935 (species described upon a single ♀)
- Head with frons smooth; pronotum with basal transverse impression finely punctured; elytra with more rounded shoulders; body length: 3.20–4.00mm; Libya, Tunisia *curtulum tripolitanum* Schatzmayr, 1937 (comb. n.)
- 5 Head with frons smooth, pronotum smooth or only with traces of waved lines; elytral striae normally punctured, except for seventh stria barely visible in the basal half; habitus (Figs 1 & 2); aedeagus (Figs 3 & 4); spermatheca (Fig. 5); body length: 3.40–3.80mm; Armenia, Georgia *leucoscelis* Chaudoir, 1850
- Head with frons rugose; pronotum with faint transverse waved lines; elytral striae evidently punctured, including seventh stria (at least in the anterior half) 6
- 6 Elytra with rounded shoulders and sides; second antennomere light, first antennomere light, sometimes only in part; habitus (Figs 8 & 9); aedeagus (Fig. 14); spermatheca (Fig. 17); body length: 3.50–4.00mm; Greece (including Crete and Rhodes); Turkey *curtulum curtulum* Duval, 1851
- Elytra more or less parallel at sides and with evident shoulders, sometimes subquadrate; first three antennomeres in part darkened; habitus (Figs 10 & 11); aedeagus (Figs 15 & 16); spermatheca similar to the nominotypical form; body length: 3.55–4.00mm; Cyprus, Iran, Iraq, Israel, Jordan, Lebanon, Syria *curtulum mediiorientis* subsp. n.

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