Zootaxa 4671 (3): 439–445
https://www.mapress.com/j/zt/

Correspondence

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

https://doi.org/10.11646/zootaxa.4671.3.10
http://zoobank.org/urn:lsid:zoobank.org:pub:D1211334-3518-4A34-9143-273214119F08

On the identity of *Cyphonoxia maljuzhenkoi* Zaitzev, 1928 (Coleoptera: Scarabaeidae: Melolonthinae)

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The melolonthine species *Cyphonoxia maljuzhenkoi* Zaitzev, 1928 (Coleoptera: Scarabaeidae: Melolonthinae: Melolonthini) was described from three specimens collected by Dmitriy M. Maljuzhenko, a physician by profession, while he was working in the former Erivan Governorate from 1906 to at least 1914 (Anonymous 1914). Type series was cited by Zaitzev (1928) differently in the Russian and in German versions of the primary description. In the Russian version, Zaitzev stated on p. 393 in Cyrillic script: "Arm. Alishar u Araksa (3 ekz. Maljuzhenko, koll. Muz. Eriv. univ. i Muz. Gruzii)", while in the German version, he mentioned on p. 397: "Nachkraj: Alishar, distr. Sharur (3 ♀♀, dr. Maljuzhenko, Koll. d. Museen Georgien und Armenien)". At the time of collecting the type specimens (no later than 1914 when Maljuzhenko finished his collecting activity in the region (S.M. Iablokoff-Khnzorian, personal communication to M.K. in 1993)), the locality was a part of the Erivan Governorate of the Russian Empire. Currently, it is situated in the Nakhichevan Autonomous Republic of Azerbaijan.

Until now, the taxonomic position of the species has remained unclear. Zaitzev (1928) published this species as a member of *Cyphonoxia* Reitter, 1889 with some doubts, because he was not familiar with the related taxa of *Cyphonoxia* described from surrounding regions. Medvedev (1951) did not know any additional specimens, and merely translated Zaitzev's description into Russian. Based on the antennal club with five antennomeres, Medvedev (1951) transferred the species to the genus *Cryptorogus* Kraatz, 1888, because the pentamerous antennal club in females was one of the important characters of that genus. Subsequently, Iablokoff-Khnzorian (1967) examined two syntypes deposited in IZAY and surprisingly discovered that both were males. Iablokoff-Khnzorian (1967: 173, fig. 13) figured its male genitalia for the first time, but the figure is small and not very illustrative. Nevertheless, as the pentamerous antennal club in males was characteristic for *Cyphonoxia*, Iablokoff-Khnzorian (1967) transferred the species back to *Cyphonoxia*. Iablokoff-Khnzorian's book was partially overlooked by subsequent European authors, including Baraud (1992), so the species was classified as a member of *Cryptotrogus* in the recently published Catalogues of Palaearctic Coleoptera (Bezděk 2006, 2016). Finally, Montreuil & Keith (2017) revised the genus *Cryptotrogus* and synonymized it with *Cyphonoxia*. Because of type material of *C. maljuzhenkoi* was inaccessible to them, they simply listed it within genus *Cryptotrogus* and repeated Zaitzev's mistake concerning the sex of the type specimens.

During a recent expedition of the Scientific Center of Zoology and Hydroecology, National Academy of Sciences of Armenia held in 2017 with the participation of Czech colleagues Jan Šumpich and Alois Pavlíčko, three specimens (one male and two females) of this very rare melolonthine chafer have been collected in the "Vordan Karmir" State Sanctuary (Arazap area).

Based on a study of the type material and recently collected specimens, *C. maljuzhenkoi* is redescribed and transferred to the subgenus *Protanoxia* Medvedev, 1951 of the genus *Anoxia* Laporte, 1832. The lectotype of *C. maljuzhenkoi* is designated and previously unknown female is described. The key of identification of *Anoxia* (*Protanoxia*) species with three external teeth on male protibia is updated.

Altogether, five specimens (see material below) were studied. The type specimens were examined with a Micromed 2-Zoom stereomicroscope, non-type specimens with an Olympus SZX9 stereomicroscope; measurements were taken with an ocular grid. The habitus photographs were taken using a Canon MP-E 65mm/2.8 1–5× Macro

Accepted by A.B.T. Smith: 24 Jul. 2019; published: 18 Sept. 2019

attached to a Canon EOS 550D camera. Partially focused images of all the above mentioned specimens were combined using Helicon Focus 3.20.2 Pro software. Exact label data are cited for the type material examined. Separate labels are indicated by a double vertical bar "||", lines within each label are separated by a single vertical bar "|". Information in quotation marks indicates the original spelling. Our remarks and additional comments are placed in brackets.

The following codes identify the collections housing the material examined:

IECA – Biology Centre, Czech Academy of Sciences, Institute of Entomology, České Budějovice, Czech Republic (Aleš Bezděk);
IZAY – Scientific Center of Zoology and Hydroecology, National Academy of Sciences of the Republic of Armenia, Institute of Zoology, Yerevan, Armenia (Margarit A. Mardjanian);
MUCV – Marco Uliana personal collection, Venezia, Italy;
NMPC – National Museum, Prague, Czech Republic (Jiří Hájek).

Anoxia (*Protanoxia*) *maljuzhenkoi* (Zaitzev, 1928) new combination

(Figs. 1–10, 12, 15)

Cyphonoxia maljuzhenkoi Zaitzev, 1928: 397 (original description); Iablokoff-Khnzorian 1967: 176.
Cryptotrogus maljuzhenkoi: Medvedev 1951: 174; Baraud 1992: 441; Bezděk 2006: 193; Shokhin 2007: 154; Bezděk 2016: 229; Montreuil & Keith 2017: 408.

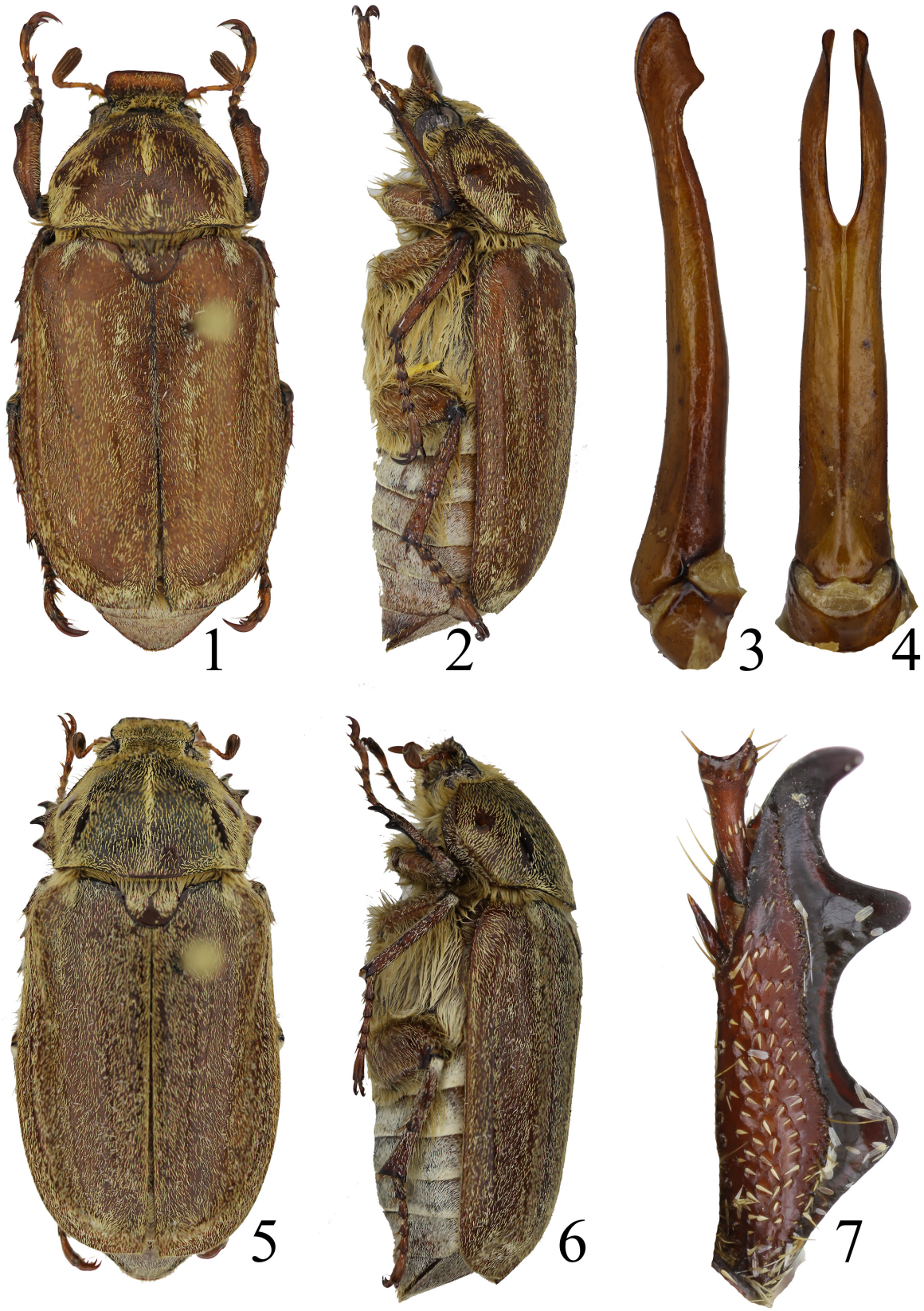
Type locality. "Nachkraj: Alishar, distr. Sharur" [= Nakhichevan Autonomous Republic, Sharur district, Alishar, 39°32'N 44°55'E].

Type material examined. Lectotype, ♂, present designation (IZAY), labelled: "Erivansk. g. [printed] | Alishari [handwritten, in Cyrillic script] | Maljushenco [printed] || Meganoxia ♂ | orita Reitt. !! [handwritten] | Zaitzev det. [printed] || Alishary | Maljuzhenko [Iablokoff-Khnzorian's handwriting, in Cyrillic script] || Cryptotrogus | maluzhenkoi [Iablokoff-Khnzorian's handwriting] || Cyphonoxia | maluzhenkoi Zaitz. [handwritten] Khnzorian det. [printed] || Cyphonoxia maljuzhenkoi | LECTOTYPUS, ♂ | A. Bezděk, M. Kalashian, | T. Ghrejyan des. 2019 [printed, red label]" (Figs. 8, 9); paralectotype, ♂ (IZAY): "Erivansk. g. [printed] | Alishari [handwritten, in Cyrillic script] | Maljushenco [printed] || Cyphonoxia maljuzhenkoi | PARALECTOTYPUS, ♂ | A. Bezděk, M. Kalashian, | T. Ghrejyan des. 2019 [printed, red label]".

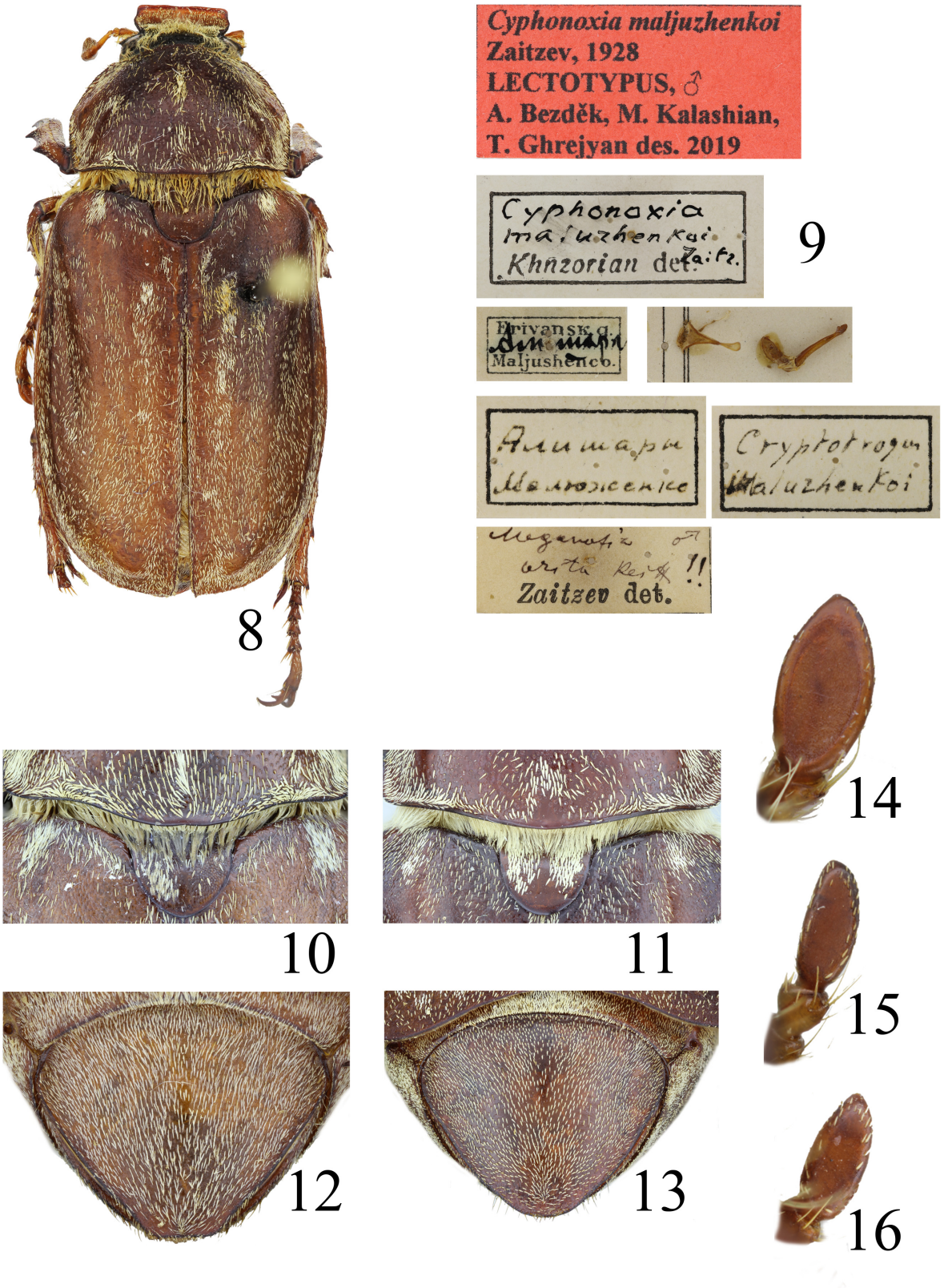
Additional material examined (3 specimens)**. Armenia:** Arazap environs, 12 km SE of Armavir, Araratskaya Koshenil Reserve [= "Vordan Karmir" State Sanctuary], salt marsh, 40°3'48"N 44°7'46"E, 853 m, 13.vi.2017, Jan Šumpich, 1 ♂ 1 ♀ (NMPC); Arazap environs, Armavir, Araratskaya Koshenil Reserve [= "Vordan Karmir" State Sanctuary], salt marsh, 40°3'48"N 44°7'46"E, 853 m, Alois Pavlíčko, 1 ♀ (IECA).

Redescription of the lectotype (male). Body elongate, almost parallel, convex. Dorsal and ventral surface moderately shiny, brown; macrosetation pale (Fig. 8). Dorsal surface of head, pronotum, scutellar shield, and elytra covered with white and pale yellow, short, recumbent scale-like macrosetae; ventral surface of thorax densely covered with pale yellow, long, erect macrosetae; ventral surface of abdomen with densely spaced, white, recumbent, scale-like macrosetae. Head appendages and legs covered with pale yellow, moderately long macrosetae sparsely mixed with white, recumbent, scale-like macrosetae.

Head. Labrum transverse, deeply bilobed, lobes rounded, irregularly and coarsely punctate, covered with long, erect macrosetae and basally with few scale-like macrosetae. Clypeus transverse, rectangular, anterior margin upturned, anterior angles rounded apically. Frontoclypeal suture weakly visible, forming continuous bisinuate flat line. Clypeus and frons densely, irregularly, coarsely punctate; covered with short, erect, scale-like macrosetae; macrosetae mixed on frons with long, erect macrosetae. Eye canthus narrow, with row of short, scale-like macrosetae and few long, erect macrosetae. Eye moderately large, only minutely extending beyond eye canthus. Antenna with 10 antennomeres; antennomere III somewhat longer than antennomeres IV and V combined; club with five antennomeres, shorter than antennal shaft. Antennomere I with long, erect macrosetae apically and laterally; antennomeres II–IV with few isolated, long macrosetae; club with sparse, short macrosetae. Terminal maxillary palpomere elongate, apically rounded, approximately as long as palpomeres II and III combined.



FIGURES 1–7. *Anoxia* (*Protanoxia*) *maljuzhenkoi* (Zaitzev, 1928) from "Vordan Karmir" State Sanctuary, Armenia. **1**, male (length 22.5 mm), dorsal view; **2**, male, lateral view; **3**, male aedeagus, lateral view; **4**, male aedeagus, dorsal view; **5**, female (length 21.4 mm), dorsal view; **6**, female, lateral view; **7**, female protibia, ventral view. Not to scale.



FIGURES 8–16. Comparison of *Anoxia* (*Protanoxia*) species. **8**, Lectotype of *Anoxia maljuzhenkoi* (Zaitzev, 1928), male, dorsal view; **9**, *A. maljuzhenkoi* lectotype labels; **10**, *A. maljuzhenkoi* base of pronotum and elytra; **11**, *A. ciliciensis* Baraud, 1989 base of pronotum and elytra; **12**, *A. maljuzhenkoi* pygidium; **13**, *A. ciliciensis* pygidium; **14**, *A. smyrnensis* Petrovitz, 1965 terminal maxillary palpomere; **15**, *A. maljuzhenkoi* terminal maxillary palpomere; **16**, *A. ciliciensis* terminal maxillary palpomere. Not to scale.

FIGURE 17. "Vordan Karmir" State Sanctuary, Armenia – the biotope of *Anoxia* (*Protanoxia*) *maljuzhenkoi* (Zaitzev, 1928). Photograph by Jan Šumpich, June 2017.

Pronotum transverse, moderately convex with distinct longitudinal groove in the middle, widest approximately in the middle. Basal border present, broadly interrupted in the middle, lateral borders complete, anterior border missing. Lateral margins weakly crenate. Anterior margin regularly, broadly sinuate. Anterior angles obtuse-angular; posterior angles broadly rounded. Punctation consisting of coarse, irregularly-spaced punctures becoming denser in the longitudinal groove, each puncture bearing white, scale-like, recumbent macroseta; two rounded, impunctate, bare lateral areas on each side of pronotum present.

Scutellar shield large, transverse, sides and apex broadly rounded; disc punctate

laterally, densely covered with white, scale-like, recumbent macrosetae.

Elytra convex, parallel sided, rounded apically; apical angle obtuse-angular. Striae missing; humeral umbones present, vaguely swollen. Surface moderately shiny; punctation coarse, irregularly spaced. Each puncture bearing short, white, scale-like, almost recumbent macroseta. Epipleura narrow, with several macrosetae in basal third.

Macropterous.

Legs. Femora narrow, shiny, irregularly punctate; densely covered with long, semierect, pale yellow macrosetae mixed with short, white, recumbent, scale-like macrosetae. Protibia narrow, tridentate, terminal calcar missing. Mesotibia and metatibia slightly expanded apicad, with two macrosetiferous longitudinal and two incomplete oblique transversal carinae, sparsely covered with short scale-like macrosetae, inner part densely covered by long erect macrosetae. Upper terminal calcar of metatibia flattened, blunt apically, about 1.5 times as long as lower calcar. Tarsal claws bifid, with well-developed, unequal ventrobasal teeth. Protarsus with distinctly longer ventrobasal tooth of inner claw, whereas mesotarsi and metatarsi with more robust ventrobasal teeth on outer claws.

Ventral surface of thorax densely covered with pale yellow, long, erect macrosetae; ventral surface of abdomen with densely-spaced, white, recumbent, scale-like macrosetae.

Pygidium almost flat, completely bordered; apically broadly rounded; irregularly covered with coarse punctures bearing short, recumbent, scale-like macrosetae.

Male genitalia. Parameres symmetrical, two times as long as phallobasis (Figs. 3–4).

Sexual dimorphism. Female (Figs. 5–6) differs from male in the following characters: pronotum dark brown to black; clypeus broadly rounded; antennal club with four antennomeres, shorter; terminal calcar of protibia present (Fig. 7); tarsal claws of all legs with ventrobasal teeth equal.

Variability. In comparison with lectotype, recently collected male from "Vordan Karmir" State Sanctuary has partially abraded scale-like macrosetae on pronotum and protibia, as well as external teeth on protibia.

Measurements. Total body length of males: 22.1–22.5 mm (lectotype 22.1 mm), females: 21.4–21.8 mm.

Diagnosis. An examination of both sexes helps us to clarify the generic placement of the species. The presence of terminal calcar of protibia in the female, its absence in the male, and the length of antennomere III clearly place this species in the genus *Anoxia*. The rounded apex of the pygidium more precisely place it in the subgenus *Protanoxia*. Therefore, the following combination is proposed: *Anoxia* (*Protanoxia*) *maljuzhenkoi* (Zaitzev, 1928), **new combination**.

Previously, eight members of *Protanoxia* were known (Baraud 1980, 1992, Bezděk 2016). Two of them, *A*. (*P*.) *kocheri* Dewailly, 1957 and *A*. (*P*.) *rotroui* Dewailly, 1957 are endemitic to Morocco. The remaining species are distributed in southeastern Europe and the Near East. *Anoxia* (*P*.) *maljuzhenkoi*, *A*. (*P*.) *ciliciensis* Baraud, 1989, and *A*. (*P*.) *smyrnensis* Petrovitz, 1965 form a trio of habitually similar and rarely collected species, the males of which are characterized by an antennal club as long as the antennal shaft and by the presence of three external teeth on the protibia. Males of other *Protanoxia* species differ from this trio in displaying an antennal club that is distinctly longer than the antennal shaft (*A*. (*P*.) *laevimacula* Petrovitz, 1973) or by the presence of only an apical external tooth on the protibia (*A*. (*P*.) *orentalis* (Krynicki, 1832), *A*. (*P*.) *cingulata* Marseul, 1868, *A*. (*P*.) *baraudi* Keith, 2003, and *A*. (*P*.) *rotroui*), see also Baraud (1989) and Rittner (2016). Males of the Moroccan species *A*. (*P*.) *kocheri* also bear a barely visible basal external tooth on the protibia (Baraud 1980). For discrimination of *A*. (*P*.) *maljuzhenkoi*, *A*. (*P*.) *ciliciensis*, and *A*. (*P*.) *smyrnensis*, see identification key below.

Collecting events. All recently recorded specimens from Arazap were collected by light trap (J. Šumpich and A. Pavlíčko, personal communication). The biotope, where the specimens were collected, is very specific (Fig. 17). According to the European Nature Information System habitat classification (Davies *et al.* 2004), it belongs to the category E6.2. (continental inland salt steppes), habitats completely included in Resolution 4 of the Bern Convention as specifically protected. The particular biotope belongs to the subcategories E6.25-AM (salt steppes and solonchaks grasslands) and E6.251-AM (*Aleuropus* (Poaceae) dominated habitats) (Fayvush & Aleksanyan 2016). The latter being one of the few remained spots of this type of habitat and it is protected as a biotope of the critically endangered Araratian cochineal or Vordan karmir – *Porphyrophora hamelii* (Brandt, 1833) (Hemiptera: Margarodidae).

Distribution. Azerbaijan (Nakhichevan Autonomous Republic), first record for Armenia.

Key for identification of *Anoxia* (*Protanoxia*) males from Europe and Asia (modified from Baraud 1989):

1. Antennomere III at least three times as long as antennomere II; antennal club straight, short, as long as (or shorter than) antennal shaft 2
- Antennomere III approximately two times as long as antennomere II; antennal club arcuate, distinctly longer than antennal shaft . . . . . ***A*. (*P*.) *laevimacula* Petrovitz, 1973**
2. Protibia with three external teeth 3
- Protibia only with the apical external tooth. . . . . ***A*. (*P*.) *baraudi* Keith, 2003, *A*. (*P*.) *cingulata* Marseul, 1868, and *A*. (*P*.) *orientalis* (Krynicki, 1832)**
3. Apical maxillary palp enlarged and broad (Fig. 14). . . . . ***A*. (*P*.) *smyrnensis* Petrovitz, 1965**
- Apical maxillary palp normally developed, narrow (Figs. 15–16) 4
4. Basal margin of pronotum broad (Fig. 11); scale-like macrosetae on pygidium short and sparse (Fig. 13) . . . . . ***A*. (*P*.) *ciliciensis* Baraud, 1989**
- Basal margin of pronotum narrow (Fig. 10); scale-like macrosetae on pygidium longer and dense (Fig. 12 . . . . . ***A*. (*P*.) *maljuzhenkoi* (Zaitzev, 1928)**

The following additional specimens were used for comparison.

***Anoxia* (*P*.) *ciliciensis* Baraud, 1989. Turkey:** 1 male (MUCV), Adana, VI.1936; 1 male (NMPC), Adana Province, Misis, 8–11.V.1969, C. Holzschuh.

***Anoxia* (*P*.) *laevimacula* Petrovitz, 1973. Israel:** 2 males (IECA), Nitsanim Reserve, 31°44'N, 34°36'E, dunes, 11 m, 20.VI.2008, G. Sabatinelli.

***Anoxia* (*P*.) *smyrnensis* Petrovitz, 1965. Turkey:** 1 male (NMPC), Aydın–Çine, 11.VI.1979, Yeofistigi [partially illegible].

Acknowledgements

We extend our sincere appreciation to all the curators and private collectors who loaned or supplied material for this study. Richard Sehnal (Czech University of Life Sciences, Prague, Czech Republic) and Jan Šumpich (National Museum, Prague, Czech Republic) provided us with habitus and biotop photographs, respectively. Christopher Steer (University of South Bohemia, České Budějovice, Czech Republic) kindly improved the English of our manuscript.

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