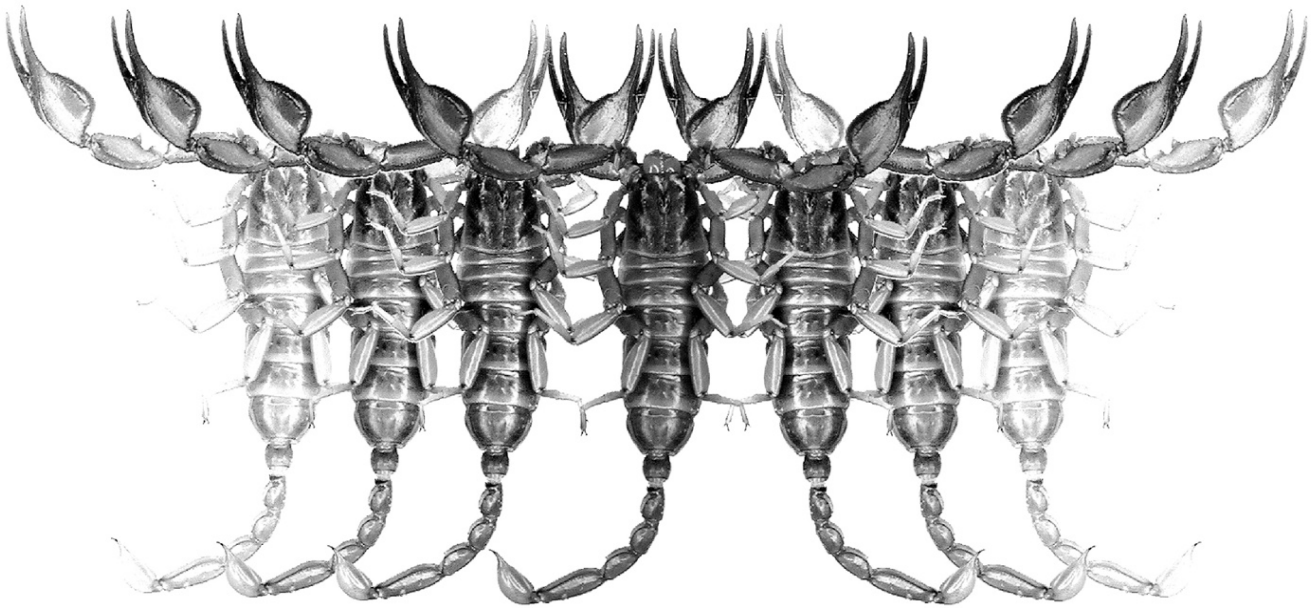


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Mesobuthus zarudnyi sp. n. from Azerbaijan
(Scorpiones: Buthidae)

Nizami E. Novruzov, František Kovařík & Victor Fet

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Mesobuthus zarudnyi sp. n. from Azerbaijan (Scorpiones: Buthidae)

Nizami E. Novruzov ¹, František Kovařík ² & Victor Fet ³

¹Institute of Zoology of National Academy of Sciences of Azerbaijan, Baku AZ1073, Azerbaijan;

email: niznovzoo@mail.ru

²P.O. Box 27, CZ – 145 01 Praha 45, Czech Republic. www.scorpio.cz; email: kovarik.scorpio@gmail.com

³Department of Biological Sciences, Marshall University, Huntington, West Virginia 25755–2510, USA;

email: fet@marshall.edu

<http://zoobank.org/urn:lsid:zoobank.org:pub:F027AB5E-4815-41A0-9D37-48EFA52E3507>

Summary

A new species *Mesobuthus zarudnyi* sp. n. is described from Azerbaijan, fully illustrated with color photos. We compare the new species with two other species, *M. eupeus* (C. L. Koch, 1839) and *M. persicus* (Pocock, 1899), both found also in Azerbaijan.

Introduction

The Asian genus *Mesobuthus* Vachon, 1950, s. str. (Buthidae) (also known as an informal ‘*M. eupeus* complex’) includes the most common scorpion species found from Turkey to China. In Azerbaijan, so far only one species has been recorded, *Mesobuthus eupeus* (C. L. Koch, 1839), s. str. In preparation of a large revision of this genus, we discovered that two more species are found in Azerbaijan: *M. persicus* (Pocock, 1899) and a new species, described here as *M. zarudnyi* sp. n.

Methods, Material & Abbreviations

Nomenclature and measurements generally follow Stahnke (1971), Kovařík (2009), and Kovařík & Ojanguren Affilastro (2013), except for trichobothriotaxy (Vachon, 1974, 1975). All collected material was preserved in 80% ethanol and deposited in NMPC (National Museum of Natural History, Prague, Czech Republic) and AZMM (Alaşehir Specimen Zoological Museum, Manisa Celal Bayar University, Alaşehir, Manisa, Turkey).

Locality coordinates cited without parentheses were provided by collectors (or were cited in the original descriptions), while coordinates in parentheses were estimated or inferred from online resources (e. g. Google Earth™).

COMPARATIVE MATERIAL FROM AZERBAIJAN.

Mesobuthus eupeus (C. L. Koch, 1839)

Azerbaijan, Ağstafa District (41.12°N 45.41°E, Fig. 41), Poylu Village, 8 June 2013, 1♂, leg. D. Kasatkin, AZMM.

Mesobuthus persicus (Pocock, 1899)

Azerbaijan, Talysh, Lerik (38.69°N 48.29°E, Fig. 41), 25 September 2021, 1♀1juv., leg. N. Novruzov, NMPC.

Systematics

Family Buthidae C. L. Koch, 1837

Genus *Mesobuthus* Vachon, 1950

(Figures 1–41, Table 1)

Mesobuthus Vachon, 1950: 152 (in part).

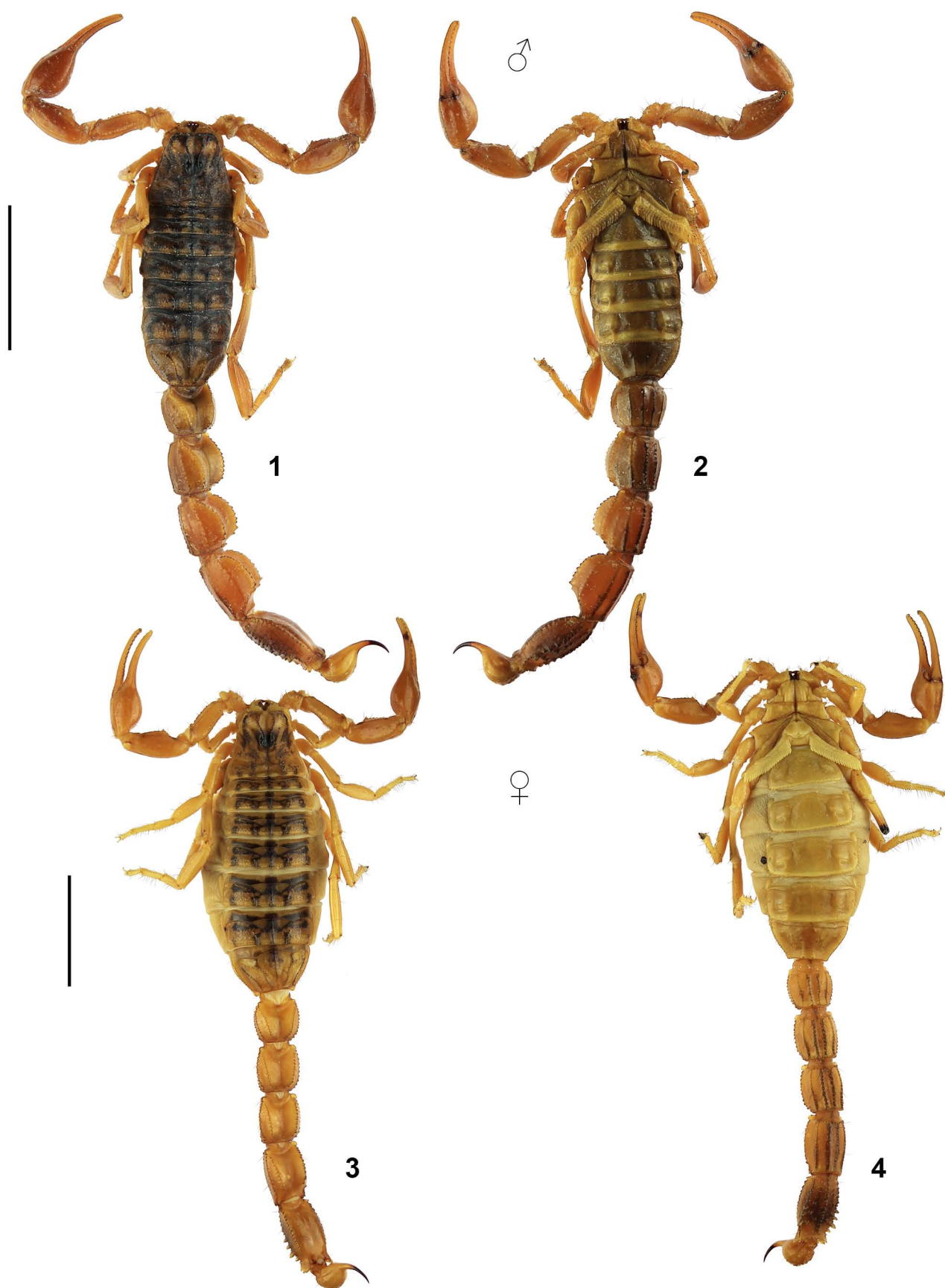
TYPE SPECIES. *Androctonus eupeus* C. L. Koch, 1839.

REFERENCES (selected):

Mesobuthus (in part): Vachon, 1952: 324; Vachon, 1958: 141; Fet & Lowe, 2000: 169–181 (in part; complete references list until 1998).

Mesobuthus: Kovařík, 2019: 17, figs. 134–137, 148, 161–163, 171–172.

DIAGNOSIS. Medium-sized buthids, adults 35–65 mm. Sternum type 1 (Soleglad & Fet, 2003), various degrees of an irregular pentagon in shape. Pedipalps orthobothriotaxic, type Aβ (Vachon, 1974, 1975), femur trichobothrium d_2 dorsal, patella d_3 dorsal of dorsomedian carina. Chelal trichobothrium db usually located between est and esb , or may be on level with trichobothrium est . Trichobothrium eb clearly located on fixed finger of pedipalp. Pectines with fulcra. Dentate margin of pedipalp-chela movable finger with distinct denticles divided into 11–12 linear rows and 5 terminal denticles. Chelicerae with typical buthid dentition (Vachon, 1963, figs. 32–33), fixed finger armed with two denticles on ventral surface. Tergites I–VI granular, with three carinae, tergite VII with 5 carinae. Carapace with distinct carinae, entire dorsal surface nearly flat. First sternite with two granulated lateral stridulatory areas, which, however, may be reduced in some



Figures 1–4: *Mesobuthus zarudnyi* sp. n. **Figures 1–2.** Male holotype, dorsal (1) and ventral (2) views. **Figures 3–4.** Female paratype, dorsal (3) and ventral (4) views. Scale bars: 10 mm (1–2, 3–4).

Dimensions (mm)		<i>Mesobuthus zarudnyi</i> sp. n.	<i>Mesobuthus zarudnyi</i> sp. n.
		♂ holotype	♀ paratype
Carapace	L / W	5.27 / 6.27	6.15 / 7.15
Mesosoma	L	12.98	20.00
Tergite VII	L / W	3.23 / 5.91	4.56 / 7.16
Metasoma + telson	L	28.67	30.65
Segment I	L / W / D	3.61 / 3.96 / 3.71	3.90 / 4.12 / 3.53
Segment II	L / W / D	4.21 / 3.76 / 3.89	4.26 / 3.92 / 3.51
Segment III	L / W / D	4.32 / 3.85 / 3.82	4.42 / 3.88 / 3.60
Segment IV	L / W / D	5.22 / 3.68 / 3.38	5.34 / 3.70 / 3.44
Segment V	L / W / D	6.16 / 3.22 / 2.69	6.72 / 3.27 / 2.85
Telson	L / W / D	5.15 / 2.43 / 2.09	6.01 / 2.57 / 2.34
Pedipalp	L	18.57	21.25
Femur	L / W	4.49 / 1.63	5.03 / 1.63
Patella	L / W	5.33 / 2.28	5.90 / 2.45
Chela	L	8.75	10.32
Manus	W / D	2.70 / 2.93	2.75 / 2.90
Movable finger	L	5.53	6.45
Total	L	46.92	56.80

Table 1. Comparative measurements of *Mesobuthus zarudnyi* sp. n. types. Abbreviations: length (L), width (W, in carapace it corresponds to posterior width), depth (D).

species. Metasoma elongate, segment I with 10 carinae, segments II–III with 8–10 carinae, segment IV with 8 carinae. Ventrolateral carinae of metasomal segment V posteriorly usually with several large lobated denticles. Telson elongated or bulbous, bumpy and granulated, without subaculear tooth. Legs III and IV with well developed tibial spurs. No sexual dimorphism in shape of metasoma.

DISTRIBUTION. Afghanistan, Armenia, Azerbaijan, China, Georgia, Iran, Iraq, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia, Syria, Tajikistan, Turkey, Turkmenistan, Uzbekistan.

***Mesobuthus zarudnyi* sp. n.**

(Figures 1–41, Table 1)

<http://zoobank.org/urn:lsid:zoobank.org:act:BC4425DF-ABAC-4D70-9A22-3F9464FE6774>

TYPE LOCALITY AND TYPE REPOSITORY. **Azerbaijan**, Absheron Peninsula, Shuvalan (40.45°N 49.71°E); NMPC.

REFERENCES (selected):

Mesobuthus eupeus: Birula, 1917: 34 (in part); Yusubov, 1978: 49 (in part); Yusubov, 1985: 43 (in part); Fet, 1989: 88–89 (in part); Fet & Lowe, 2000: 170–171 (in part; complete references list until 1998); Novruzov, 2017: 67; Novruzov, 2019: 28 (in part).

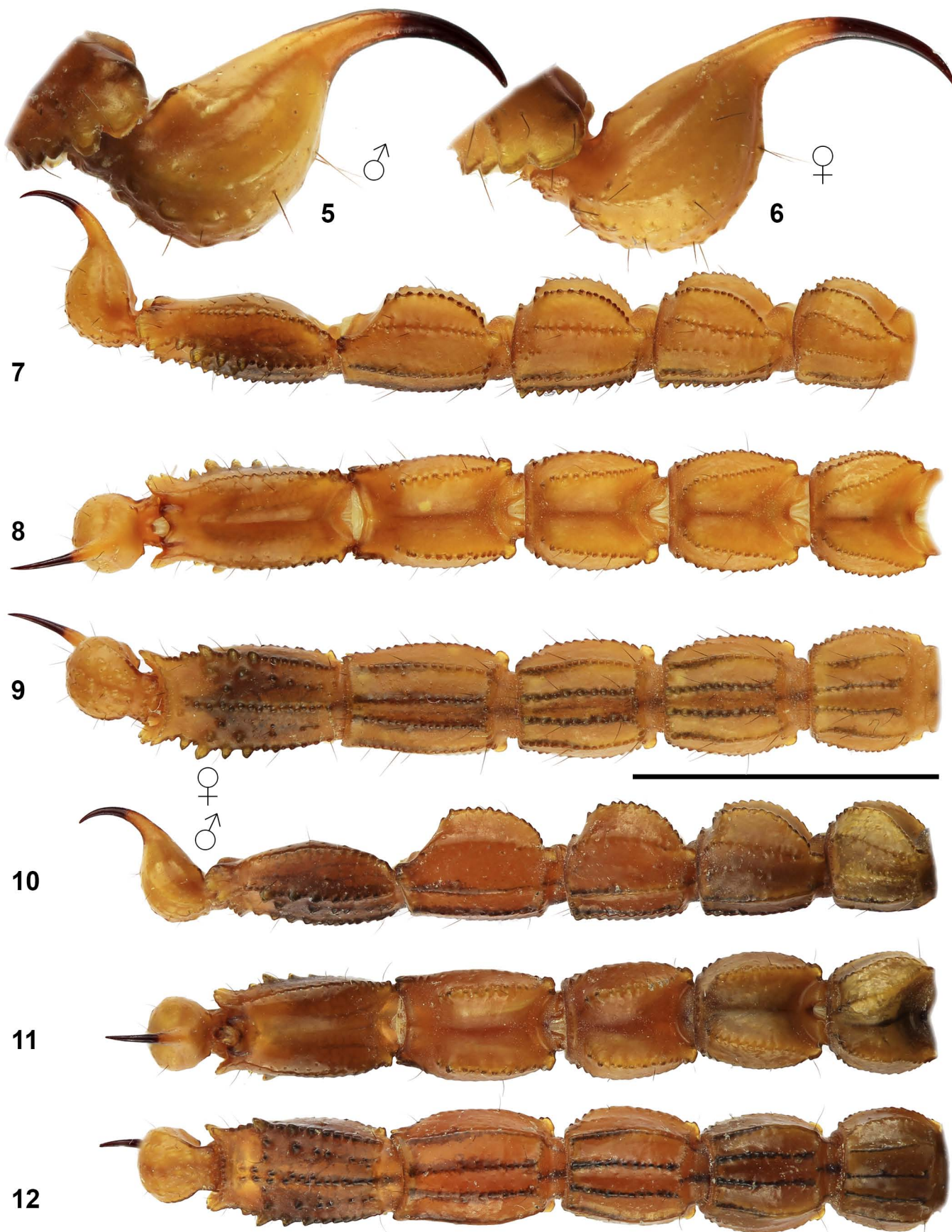
Mesobuthus eupeus eupeus (in part): Fet, 1989: 88–89; Fet & Lowe, 2000: 171–172 (complete references list until 1998).

ETYMOLOGY. We name this species in honor of a famous Russian zoologist and explorer Nikolay A. Zarudny (1859–1919) who collected numerous important specimens of scorpions for A. A. Birula in Persia (now Iran) between 1896 and 1904.

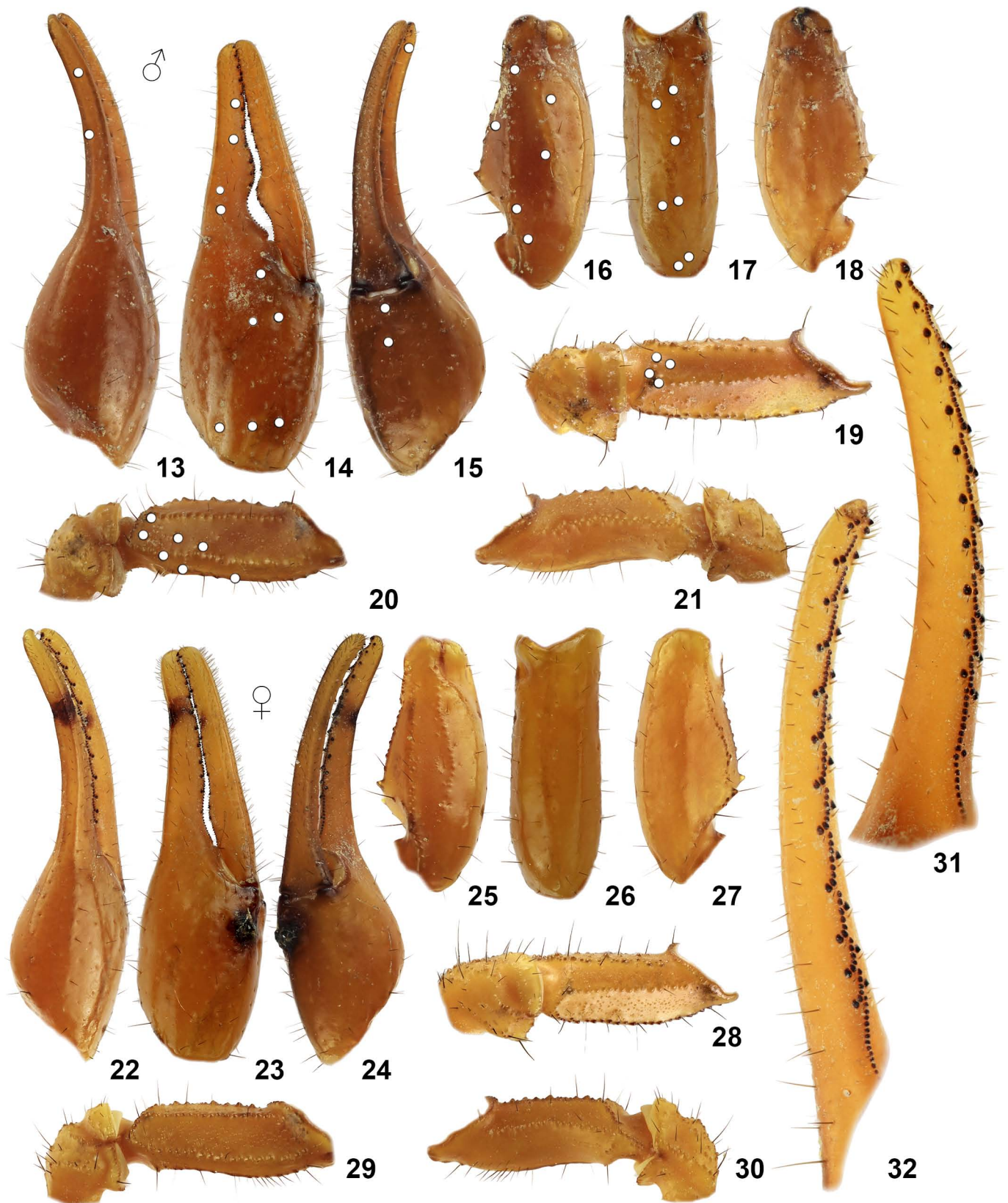
Note: our new species name is *not* a homonym of “*Mesobuthus zarudnyi*”, a combination that exists in literature (Vachon, 1958: 41) for another buthid species described from Iran as *Buthus zarudnyi* Birula, 1900, now *Sassanidotus zarudnyi* (Birula, 1900) (Fet & Lowe, 2000: 222; Kovařík & Fet, 2006: 1).

TYPE MATERIAL. **Azerbaijan**, Absheron Peninsula, Shuvalan (40.45°N 49.71°E), 18 June 2021, 1♂ (DNA No. 2060, holotype), 1♀, leg. N. Novruzov, NMPC; Qobustan Village (40.49°N 49.48°E), 23 August 2021, 2♀ (paratypes), leg. N. Novruzov, NMPC; Absheron Peninsula, Umbali Mts., 19 April 2001, 1♀2juvs. (paratypes), leg. Yu. M. Marusik, NMPC; near Baku (40.39°N 49.71°E), 27 April 2013, 3♀ (paratypes), leg. D. Kasatkin, AZMM; Baku, near Qobustan Village (40.08°N 49.34°E), 3 May 2013, 1♀1♂juv. (paratypes), leg. D. Kasatkin, AZMM; near Khyzy, 40°55'05"N 49°03'54"E (40.92°N 49.05°E), 614 m a. s. l., 14 June 2013, 1juv. (paratype), leg. D. Kasatkin & I. Shokhin, AZMM.

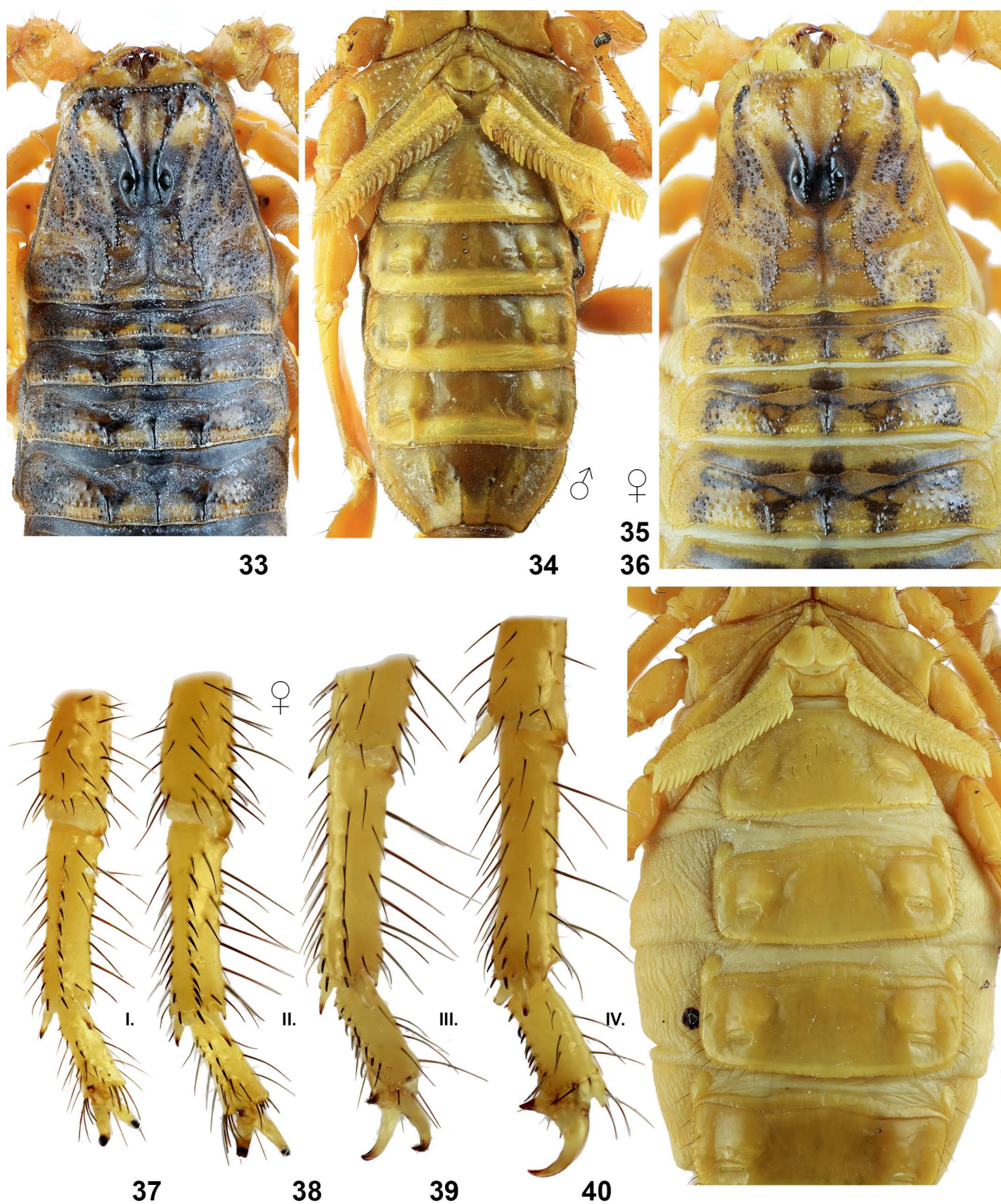
DIAGNOSIS. Total length of adults 40 mm (male) to 58 mm (female). Trichobothrium *db* on fixed finger of pedipalp situated between trichobothria *est* and *esb*, near to *est*. Male with fingers proximally more twisted than female. Pedipalp chela length/width ratio 3.2–3.4 in male and 3.7–3.8 in female. Pectinal teeth number 25 in male, 17–22 in female. Chelicerae yellow, without or with poor reticulation. Pedipalps and metasoma sparsely



Figures 5–12: *Mesobuthus zarudnyi* sp. n. **Figures 5, 7–9.** Male holotype, telson lateral (5), metasoma and telson, lateral (7), dorsal (8), and ventral (9) views. **Figures 6, 10–12.** Female paratype, telson lateral (6), metasoma and telson, lateral (10), dorsal (11), and ventral (12) views. Scale bar: 10 mm (7–12).



Figures 13–32: *Mesobuthus zarudnyi* sp. n., pedipalp. **Figures 13–21.** Male holotype, chela, dorsal (13), external (14), and ventral (15) views. Patella, dorsal (16), external (17) and ventral (18) views. Femur and trochanter, internal (19), dorsal (20), and ventral (21) views. **Figures 22–32.** Female paratype, chela, dorsal (22), external (23), and ventral (24) views. Patella, dorsal (25), external (26) and ventral (27) views. Femur and trochanter, internal (28), dorsal (29), and ventral (30) views. Movable (32) and fixed (31) fingers. The trichobothrial pattern is indicated in Figures 13–17, 19–20.



Figures 33–40: *Mesobuthus zarudnyi* sp. n. **Figures 33–34.** Male holotype, chelicerae, carapace and tergites I–IV (33), sternoplectinal region and sternites (34). **Figures 35–40.** Female paratype, chelicerae, carapace and tergites I–III (35), sternoplectinal region and sternites III–V (36). Right legs I–IV, retrolateral aspect (37–40).

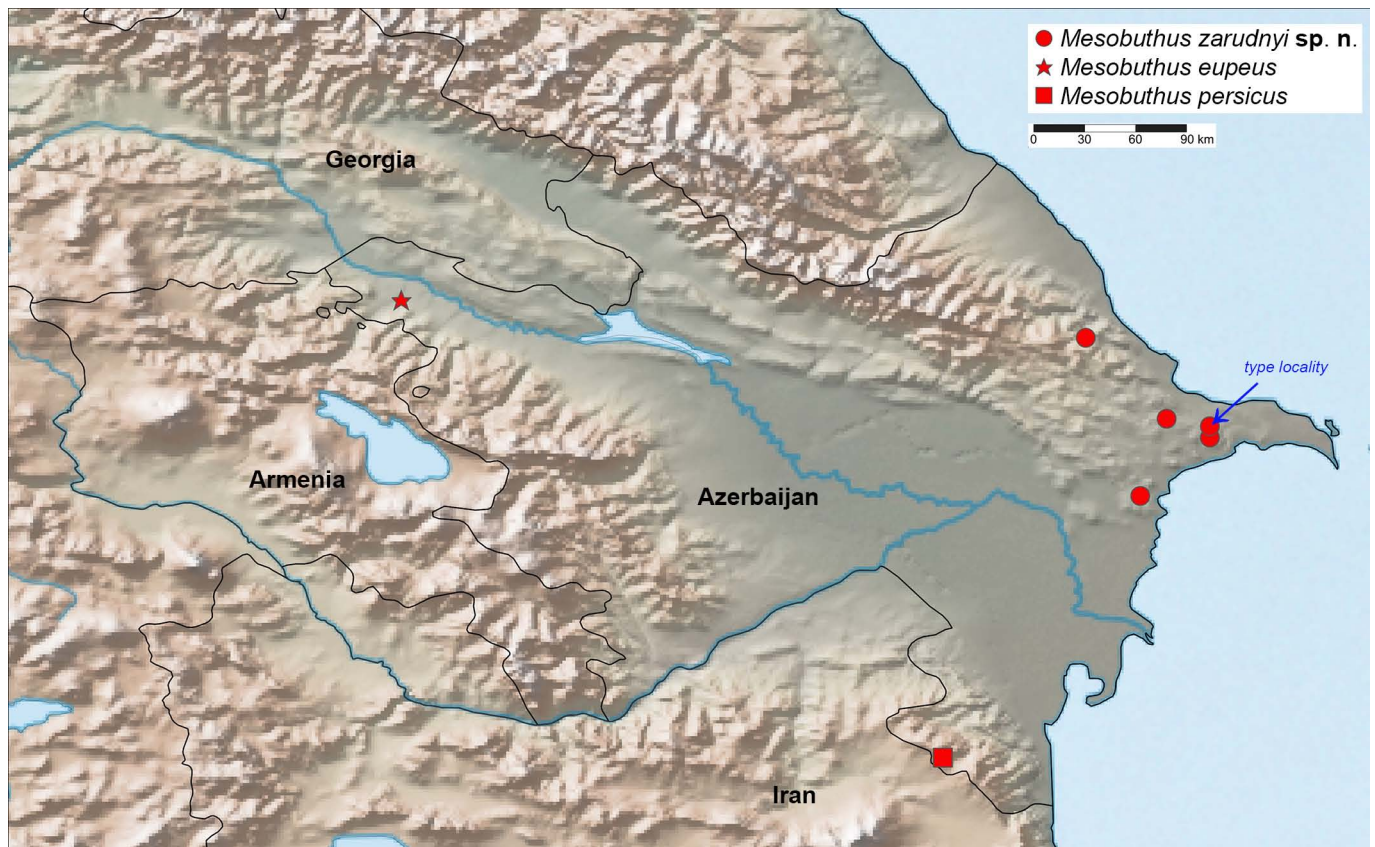


Figure 41. Distribution of *Mesobuthus* spp. in Azerbaijan. Based on studied material only.

hirsute. Carapace and tergites reddish brown, strongly black pigmented; metasoma, telson, pedipalps and legs yellowish to reddish brown, only part of metasomal segment V black. Femur of pedipalp with 4–5 granulated carinae. Patella with 8 usually smooth carinae. Chela lacks carinae. Movable fingers of pedipalps with 11–12 cutting rows of denticles and 5 terminal denticles. Central lateral and posterior lateral carinae of carapace not joined to form a continuous linear series of granules to posterior margin. Seventh sternite bumpy and usually finely granulated with 4 well marked rather smooth carinae. First metasomal segment with 10 carinae; second to fourth with 8 carinae, other two carinae are indicated by incomplete row of granules on metasomal segments II and III; fifth with 5 carinae. Metasoma III–IV with lateromedian carinae smooth in male but granulated in female, all other carinae usually granulated. Intercarinae surface on metasoma I laterally bumpy and smooth. Length to depth ratio of metasoma III 1.1–1.2 in both sexes; metasoma IV 1.4–1.5 in both sexes. Telotarsus III ventral setation represented by short and strong spiniform setae. Tarsi hirsute, adults with 7–9 retroinferior macrosetae on basitarsus III. Telson rather elongated. Anal lobe divided in two parts.

DESCRIPTION. Total length of adult males 40–49 mm, 42–58 females. Trichobothrium *db* on fixed finger of pedipalp situated between trichobothria *est* and *esb*, near to *est*. Male has the fingers proximally more twisted than female. Female has longer and slightly narrower chela of pedipalps. For measurements, see Table 1.

Coloration (Figs. 1–4). Carapace and tergites reddish brown, strongly black pigmented. Chelicerae yellow, without or reticulation, the tips of teeth on cheliceral fingers are black. Metasoma, telson, pedipalps and legs yellowish to reddish brown, faintly black pigmented. Metasoma ventral, mainly segment V black pigmented.

Mesosoma and carapace (Figs. 5–12). Carapace carinate, unevenly covered with granules of varying size; much of the granulation is fine, but some granules are larger and distinctly rounded. Tergites I–VI with three carinae and are granulated, with some intercarinal granules small and others larger and rounded. Tergite VII is pentacarinata. Pectinal tooth count is 25 in male, 17–22 in females. Pectinal marginal tips extend to about end of the fourth sternite in male and about end of the third sternite in females. Pectines have three marginal lamellae and seven to eight middle lamellae. Lamellae with numerous long setae, each fulcrum with three to five dark setae. All sternites are smooth and sparsely hirsute. Sternite VII bumpy and usually finely granulated with four well marked rather smooth carinae. Other sternites have two furrows.

Pedipalps (Figs. 13–32). Pedipalps sparsely hirsute and smooth, only femur is granulated. Femur has four to five granulated carinae, the middle carina on internal surface consist from strong irregular granules. Patella with eight carinae from which internal are always and dorsal are rarely granulated, mainly in female. Chela without carinae. Movable fingers of pedipalps have 11–12 cutting rows of denticles, every row with external and internal denticles present, and five terminal denticles.

Legs (Figs. 37–40). Telotarsus III ventral setation represented by short and strong spiniform setae. Tarsi hirsute, adults with 7–9 retroinferior macrosetae on basitarsus III. Femur with only several macrosetae. Femur and patella with carinae well developed. Tibial spurs present and moderate to strong on third and fourth legs and absent on the other legs.

Metasoma and telson (Figs. 5–12). Metasomal segments are only sparsely hirsute. Metasomal segment I with 10 carinae, II–III with 8 carinae but other two lateromedian carinae are indicated by incomplete row of granules, IV with 8 carinae, and V with 5 carinae. Metasoma III–IV with lateromedian carinae smooth in male, all other carinae usually granulated by consistent granules. Intercarinae surface on metasoma I laterally bumpy and usually smooth. Ventrolateral carinae of metasoma V posteriorly with several large lobated denticles. Telson very sparsely hirsute, elongate, bumpy and smooth. Telson rather elongated. Anal lobe divided in two parts.

AFFINITIES. The new species is differentiated morphologically from both other species known from Azerbaijan by having anal lobe divided into two parts (Figs. 5 and 6). Both *Mesobuthus eupeus* and *M. persicus* have anal lobe divided into three parts. For further distinction from all other *Mesobuthus* species morphologically and through DNA analysis, see Kovařík et al. (in press).

DISTRIBUTION. Azerbaijan (see Fig. 41).

Discussion. Discovery of three distinct *Mesobuthus* species in Azerbaijan is corroborated by our detailed phylogenetic analysis of the genus (Kovařík et al., in press), which indicates that the three are not immediate sister species but parts of the “*eupeus*” complex but originate from different, not closely related lineages found in Turkey and Iran. Both *Mesobuthus persicus* and *M. zarudnyi* sp. n. were earlier identified from Azerbaijan as *M. eupeus* or *M. eupeus eupeus*.

Birula (1917: 34) described two “races” (“natio”) of the subspecies *Buthus eupeus eupeus* from the modern Armenia and Azerbaijan (respectively, *armeniaca* and *talyschensis*). These infrasubspecific names are not available according to the ICZN and do not enter into synonymy. Yusubov (1985) studied distribution of “*Mesobuthus eupeus*” in Azerbaijan and concluded that four allopatric geographic groups of populations existed: Absheron-Shirvan, Talysh, Nakhichevan, and populations from the Caspian Sea islands. It is clear (see our map at Fig. 41) that the Absheron-Shirvan group of populations (Eastern Azerbaijan) belongs to *M. zarudnyi* sp. n. while the Talysh group (Birula’s “natio” *talyschensis*) belongs to *M. persicus*, which is widely found in northern Iran (Kovařík et al., in press). The Nakhichevan group is likely *M. eupeus* s. str. A detailed map of distribution of “*Mesobuthus eupeus*” in Azerbaijan (about 100 localities) was recently published by Novruzov (2019: 29, fig. 1). At this moment, the exact range boundaries of three Azerbaijan species are not clearly defined, and are a subject of our further ongoing study.

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References

- (BIRULA, A. A.) BYALYNITSKII-BIRULYA, A. A. 1917. Arachnoidea Arthrogastra Caucasica. Pars I. Scorpiones. *Zapiski Kavkazskago Muzeya (Mémoires du Musée du Caucase)*, Tiflis: Imprimerie de la Chancellerie du Comité pour la Transcaucasie, A(5), 253 pp. (in Russian; published August 1917) (in Russian). English translation: Byalynitskii-Birulya, A. A. 1964. *Arthrogastric Arachnids of Caucasica. 1. Scorpions*. Jerusalem: Israel Program for Scientific Translations, 170 pp.
- FET, V. 1989. A catalogue of scorpions (Chelicerata: Scorpiones) of the USSR. *Rivista del Museo Civico di Scienze Naturali “Enrico Caffi”*, 13(1988): 73–171.
- FET, V. & G. LOWE. 2000. Family Buthidae. Pp. 54–286 in: Fet, V., W. D. Sissom, G. Lowe & M. E. Braunwalder (eds.). *Catalog of the Scorpions of the World (1758–1998)*. New York: New York Entomological Society, 690 pp.
- KOVAŘÍK, F. 2009. *Illustrated catalog of scorpions. Part I. Introductory remarks; keys to families and genera; subfamily Scorpioninae with keys to Heterometrus and Pandinus species*. Prague: Clairon Production, 170 pp.
- KOVAŘÍK, F. 2019. Taxonomic reassessment of the genera *Lychas*, *Mesobuthus*, and *Olivierus*, with descriptions of four new genera (Scorpiones: Buthidae). *Euscorpius*, 288: 1–27.
- KOVAŘÍK, F. & V. FET. 2006. Taxonomic position of the genus *Sassanidotus* Farzanpay, 1987 (Scorpiones: Buthidae). *Euscorpius*, 39: 1–9.
- KOVAŘÍK, F., et al. 2022. A revision of the genus *Mesobuthus* Vachon, 1950, with a description of 14 new species (Scorpiones: Buthidae). *Euscorpius*, 348 (in press).
- KOVAŘÍK, F. & A. A. OJANGUREN AFFILASTRO. 2013. *Illustrated catalog of scorpions. Part II. Bothriuridae; Chaerilidae; Buthidae I. Genera Compsobuthus, Hottentotta, Isometrus, Lychas, and Sassanidotus*. Prague: Clairon Production, 400 pp.
- NOVRUZOV, N. E. 2017. [Notes on night activity and trophic behaviour of *Mesobuthus eupeus* (C.L. Koch, 1839) (Arachnida, Scorpiones, Buthidae) in the Eastern Azerbaijan]. *Eurasian Entomological Journal*, 16(1): 67–72 (in Russian).

- NOVRUZOV, N. E. 2019. [Distribution and morphometric variability of *Mesobuthus eupeus* (C.L. Koch, 1839) (Arachnida, Scorpiones, Buthidae) in Eastern Azerbaijan]. *Eurasian Entomological Journal*, 18(1): 27–38 (in Russian).
- STAHNKE, H. L. 1971. Scorpion nomenclature and mensuration. *Entomological News*, 81: 297–316.
- VACHON, M. 1950. Études sur les Scorpions. III (suite). Description des Scorpions du Nord de l'Afrique. *Archives de l'Institut Pasteur d'Algérie*, 28(2): 152–216.
- VACHON, M. 1952. Études sur les scorpions. *Institut Pasteur d'Algérie, Alger*, 1–482. (published 1948–1951 in *Archives de l'Institut Pasteur d'Algérie*, 1948, 26: 25–90, 162–208, 288–316, 441–481. 1949, 27: 66–100, 134–169, 281–288, 334–396. 1950, 28: 152–216, 383–413. 1951, 29: 46–104).
- VACHON, M. 1958. Scorpionidea (Chelicerata) de l'Afghanistan. (The 3d Danish Expedition to Central Asia. Zoological Results 23). *Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening i København*, 120: 121–187.
- VACHON, M. 1974. Études des caractères utilisés pour classer les familles et les genres de Scorpions (Arachnides). 1. La trichobothriotaxie en arachnologie. Sigles trichobothriaux et types de trichobothriotaxie chez les Scorpions. *Bulletin du Muséum national d'Histoire naturelle, Paris*, 3e sér. n°140, Zool. 140: 857–958.
- VACHON, M. 1975. Sur l'utilisation de la trichobothriotaxie du bras des pédipalpes des scorpions (Arachnides) dans le classement des genres de la famille des Buthidae Simon. *Comptes Rendus de l'Académie des Sciences, Paris, D*, 281: 1597–1599.
- YUSUBOV, E. B. 1978. [Scorpions of the Baku and Absheron archipelagoes]. *Uchenye zapiski AGU. Seriya biologicheskaya*, 3: 49–50 (in Russian).
- YUSUBOV, E. B. 1985. *Skorpiony (Arachnidae, Scorpiones) Azerbaijana [Scorpions of Azerbaijan]*. Avtoreferat [PhD digest]. Leningrad: Leningrad State University, 20 pp. (in Russian).