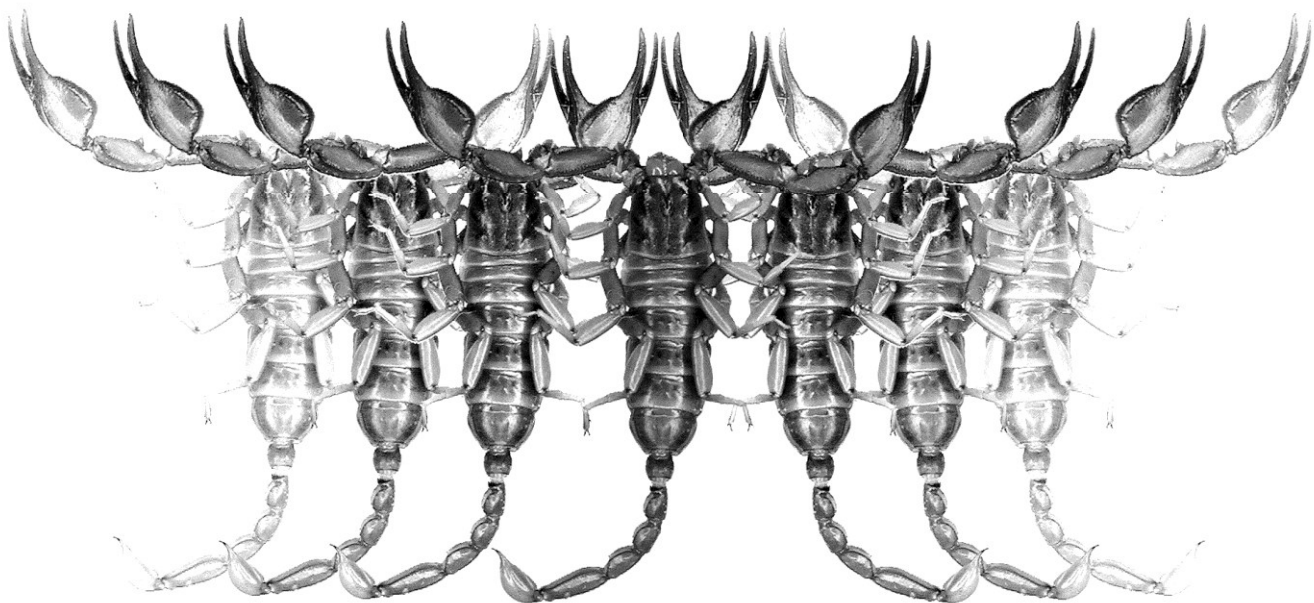


Euscorpius

Occasional Publications in Scorpiology



**The First Record of the Genus *Anomalobuthus*
Kraepelin, 1900 from Iran, with Description of a
New Species (Scorpiones: Buthidae)**

Rolando Teruel, František Kovařík, Shahrokh Navidpour & Victor Fet

October 2014 — No. 192

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Publication date: 23 October 2014

<http://zoobank.org/urn:lsid:zoobank.org:pub:3AC2E3B2-BFC6-4E6D-8476-8674D0A01B33>

The first record of the genus *Anomalobuthus* Kraepelin, 1900 from Iran, with description of a new species (Scorpiones: Buthidae)

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<http://zoobank.org/urn:lsid:zoobank.org:pub:3AC2E3B2-BFC6-4E6D-8476-8674D0A01B33>

Summary

We describe herein a new species of buthid scorpions: *Anomalobuthus talebii* **sp. n.** This is the second species assigned to this genus, endemic from sand deserts of Central Asia, as well as the first record of this genus from Iran. The new species is fully illustrated with color photos of holotype habitus, key morphologically diagnostic characters, and habitat.

Introduction

A rare genus *Anomalobuthus* (Scorpiones: Buthidae) was described by Karl Kraepelin (1900) with its type species *A. rickmersi* Kraepelin, 1900, based on a single type specimen, currently housed at Zoologisches Museum Hamburg. The specimen was captured in Bukhara (modern Uzbekistan) by the famous German explorer Willi Rickmer Rickmers (1873–1965).

Anomalobuthus rickmersi is still rare in collections, but today we know it is a widespread psammophile endemic to Central Asian sand deserts, ranging from the eastern coast of the Caspian Sea to Syr Darya River and Lake Balkhash, spanning Turkmenistan, Uzbekistan, and Kazakhstan (Birula, 1911; Fet, 1989, 1994; Gromov & Kopdykbaev, 1994; Graham et al., 2012; see our Fig. 20).

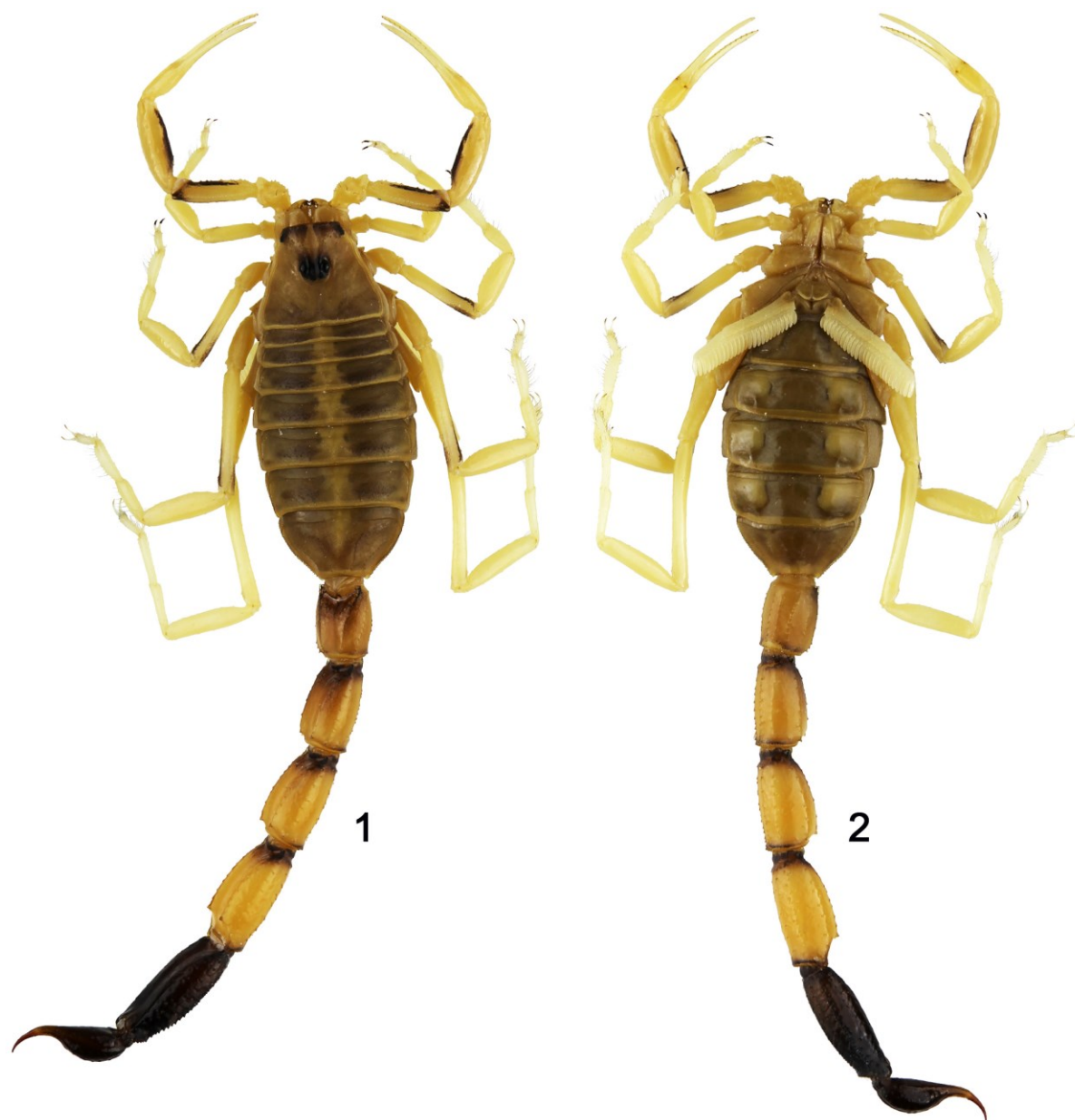
Sand desert scorpions of Central Asia, including *A. rickmersi*, were discussed by Fet et al. (1998) who noted numerous parallelisms in the adaptive features allowing psammophily (life in sand). A phylogeographic model, based on DNA markers, including *A. rickmersi* and a co-distributed convergent psammophile *Liobuthus kessleri* Birula, 1898, was recently offered by Graham et al. (2012).

The genus *Anomalobuthus* was considered monotypic until the recent discovery of a second species in Eastern Iran, which is formally described in this paper. This is also the first record of the genus from Iran, which has a scorpion fauna now known to include 55 species belonging to 18 genera and three families.

Methods & Material

Nomenclature and measurements follow Stahnke (1970), Kovařík (2009), and Kovařík & Ojanguren Affilastro (2013), except for trichobothriotaxy (Vachon, 1974), metasomal carinae (Francke, 1977), pedipalp chela carinae (Acosta et al., 2008, as interpreted by Armas et al., 2011), and sternum (Soleglad & Fet, 2003).

Specimens studied herein are preserved in ethanol 80% and deposited in the personal collections of the authors, to which the following name-based abbreviations have been applied: FKCP, the second author's collection, RTOC, the first author's collection (followed by catalogue number, with collecting and identification labels originally written in Spanish), VFPC, the last author's collection.



Figures 1–2: Holotype female of *Anomalobuthus talebii* sp.n. Dorsal (1) and ventral (2) views.

Systematics

Family **Buthidae** C. L. Koch, 1837

Genus *Anomalobuthus* Kraepelin, 1900

Anomalobuthus talebii Teruel, Kovařík,

Navidpour et Fet, **sp. n.**

(Figures 1–22; Tables 1–2)

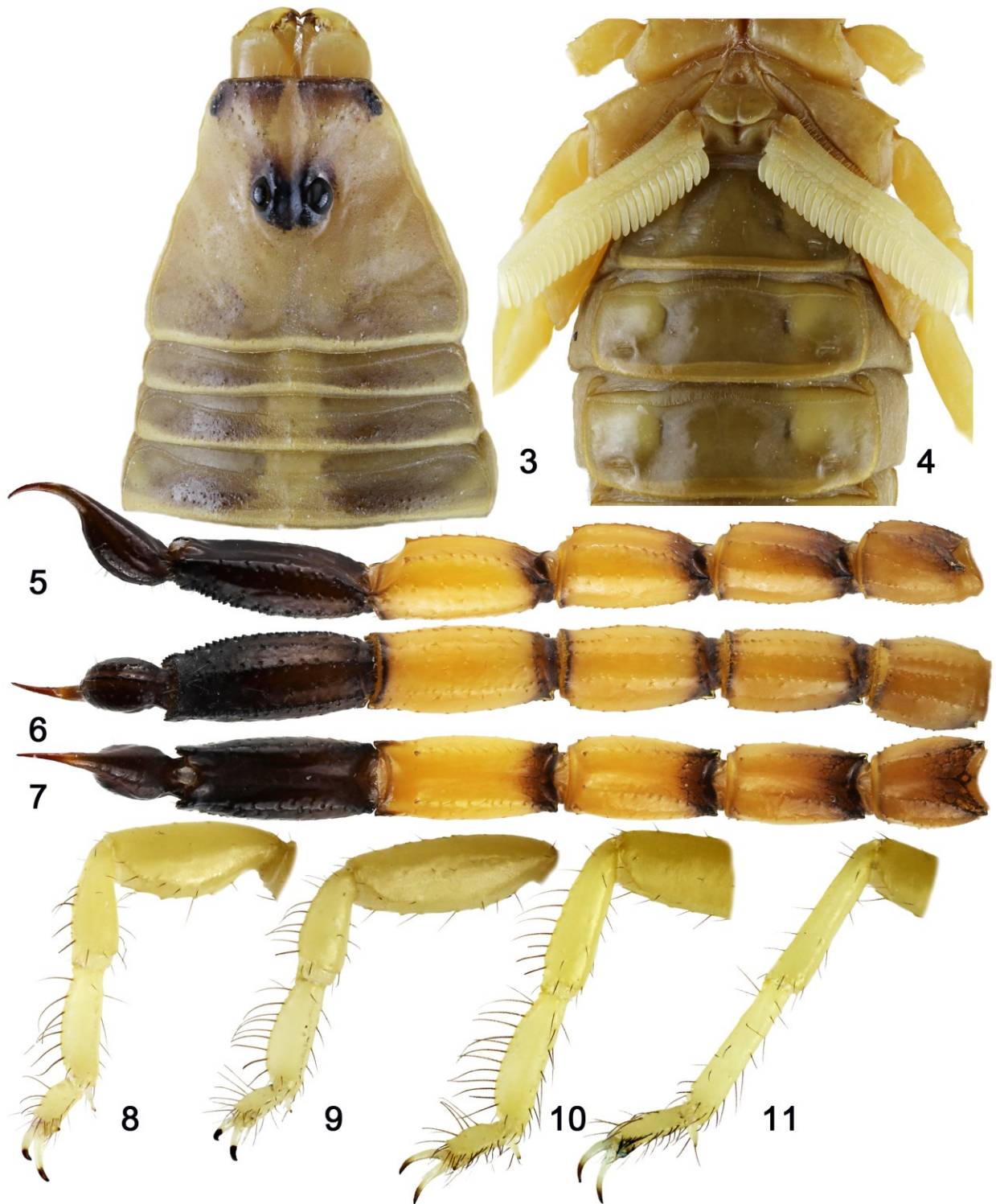
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TYPE LOCALITY AND HOLOTYPE DEPOSITORY. Iran, South Khorasan Province, Hemmatabad (=Hemmatābād) Des-

ert, 33°20'49.45"N, 60°25'56.86"E, close to the Afghanistan border, FKCP.

TYPE MATERIAL. Iran, South Khorasan Province, Hemmatabad (=Hemmatābād) Desert, 33°20'49.45"N, 60°25'56.86"E, close to the Afghanistan border, 17 April 2013, leg. A. Talebi Gol, holotype ♀ (FKCP).

ETYMOLOGY. We dedicate this species to the memory of its collector, Mr. Amir Talebi Gol (1980–2014), who was a very active Iranian zoologist that specialized in the country's sand deserts, and a head of an environmental NGO working on Iranian desert wildlife. He died tragically on January 1st, 2014 during one of his frequent



Figures 3–11: Holotype female of *Anomalobuthus talebii* sp.n. Chelicerae, carapace and tergites I–III (3). Sternopectinal region and sternites III–V (4). Metasoma and telson, lateral (5), ventral (6), and dorsal views (7). Distal segments of legs I–IV, retrolateral view (8–11).

field trips to the Lut Desert (Desht-e-Lut), when the car he was driving hit a landmine.

DIAGNOSIS (based on a single adult female). Adult size standard for the genus (34.6 mm). Coloration yellow,

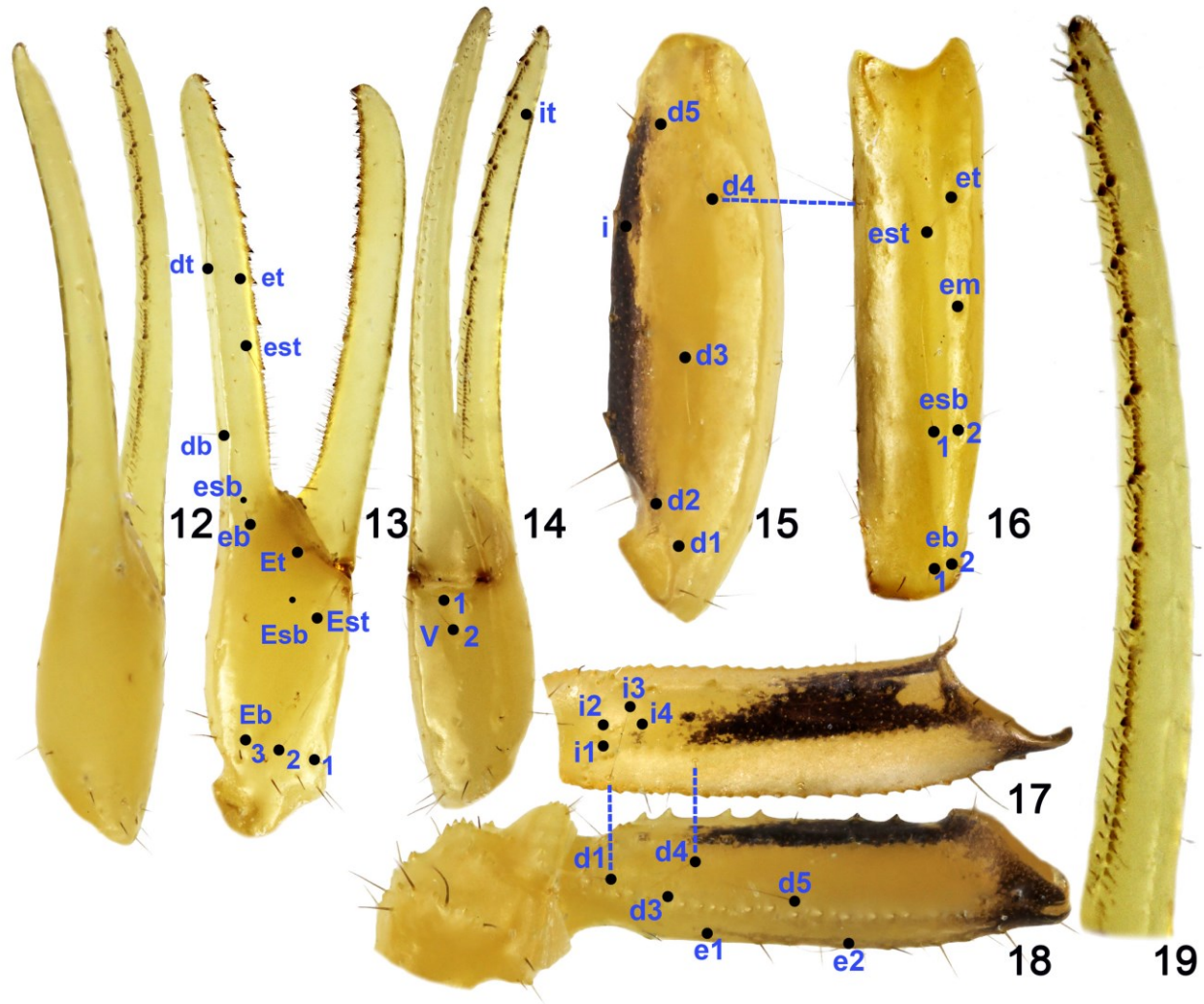
Dimensions (mm)		<i>A. talebii</i> sp.n.	<i>A. rickmersi</i>	
		(holotype)	(RTO: Sco-0208)	(RTO: Sco-0233)
Carapace	L / Wp	3.20 / 3.75	3.00 / 3.40	3.80 / 4.60
Mesosoma	L	11.10	7.00	9.50
Tergite VII	L / W	2.20 / 3.87	1.80 / 3.70	2.20 / 4.60
Metasoma + Telson	L	20.30	18.40	23.30
Segment I	L / W / H	2.40 / 1.85 / 1.60	2.10 / 1.70 / 1.47	2.50 / 2.30 / 1.96
Segment II	L / W / H	3.00 / 1.65 / 1.55	2.60 / 1.60 / 1.48	3.30 / 2.20 / 2.00
Segment III	L / W / H	3.20 / 1.70 / 1.65	2.90 / 1.70 / 1.50	3.60 / 2.20 / 2.07
Segment IV	L / W / H	3.80 / 1.70 / 1.60	3.40 / 1.80 / 1.51	4.40 / 2.40 / 2.11
Segment V	L / W / H	4.10 / 1.75 / 1.42	3.80 / 1.80 / 1.41	4.80 / 2.40 / 1.80
Telson	L	3.80	3.60	4.70
Vesicle	L / W / H	2.40 / 1.10 / 1.12	2.10 / 1.20 / 1.10	2.70 / 1.50 / 1.40
Aculeus	L	1.40	1.50	2.00
Pedipalp	L	10.10	9.50	11.40
Femur	L / W	2.60 / 0.70	2.50 / 0.70	3.10 / 0.90
Patella	L / W	3.10 / 0.95	2.90 / 0.90	3.60 / 1.10
Chela	L	4.40	4.10	4.70
Manus	L / W / H	1.35 / 0.70 / 0.75	1.20 / 0.70 / 0.70	1.40 / 0.80 / 0.90
Movable finger	L	3.05	2.90	3.30
Total	L	34.60	28.40	36.60

Table 1: Comparative measurements of adult females of both species of *Anomalobuthus*. Abbreviations: length (L), width (W), posterior width (Wp), depth (H).

essentially immaculate, only with metasomal segment V and telson blackish and some regular blackish spots on carapace, pedipalps, legs and metasoma. Pedipalp fingers with 10–11 principal rows of denticles and 6–7 internal accessory denticles. Pectines with 26/26 teeth. Metasoma with most carinae moderately developed; ventrolateral carinae of segment V composed of sharply conical denticles, dorsolateral and lateral supramedian carinae of segments I–IV with terminal denticle greatly enlarged. Telson vesicle long oval and sparsely setose.

DESCRIPTION (adult female holotype). Coloration (Figs. 1–19) base light yellowish, very vivid on metasoma, but with an olivaceous shade on prosoma and mesosoma; in general, the base color is paler on pedipalp chelae, legs, and pectines. Chelicerae immaculate, except for blackish finger teeth. Pedipalp femur with a very conspicuous blackish annular ring on distal apex, which continues as

a broad blackish stripe over almost all internal surface; patella with internal surface blackish; chela immaculate, only with finger denticles blackish. Carapace with an anterior V-shaped, broad blackish spot from median ocular tubercle through frontal margin, plus two large but irregular grayish spots on posterior area. Tergites with two very large but poorly defined grayish spots that form a pair of broad, dark lateral bands. Coxosternal region and genital operculum immaculate. Pectines pale yellowish, immaculate. Sternites immaculate. Legs immaculate, except for two irregular blackish stripes (one internal, one external) on distal part of femora II–III; claws with distal half dark brown to blackish. Metasoma bicolor, segment V entirely blackish, I–IV yellow with a conspicuous annulated appearance: basal and distal parts of each segment deeply infuscate in the shape of broad blackish rings, which become somewhat larger and more diffuse dorsally and basally; carinae not infuscate nor



Figures 12–19: Holotype female of *Anomalobuthus talebii* sp. n. Pedipalp chela, dorsal view (12), external view (13), ventral view (14). Pedipalp patella, dorsal view (15), external view (16). Pedipalp femur, internal view (17). Pedipalp trochanter and femur, dorsal view (18). Pedipalp movable finger, dorsal view (19). Black dots depict trichobothrial pattern in Figures 13–18. Trichobothrium *esb* on chela is present as petite on both chelae of the holotype; trichobothrium *Esb* is absent on left chela and present as a petite trichobothrium on right chela.

underlined with dark pigment, except for darkened terminal denticles on dorsolaterals and lateral supra-medians. Telson entirely blackish.

CHELICERAE (Fig. 3). With dentition typical for the genus, teeth sharp. Tegument smooth and shiny, dorso-distal portion of manus with some weak granules arranged transversally, defining a slightly depressed area. Setation very dense ventrally, but essentially lacking dorsally, except many rigid macrosetae on fixed finger and a few around depressed area of manus.

PEDIPALPS (Figs. 12–19). Relatively short but very slender, essentially bare. Femur very subtly curved inwards, with carinae weak, granule to subdenticulate; intercarinal tegument smooth and glossy. Patella straight, with carinae vestigial to very weak, subcostate to smooth; intercarinal tegument smooth and glossy.

Chela elongate and very slender; manus conspicuously narrower than patella (ratio 0.74), cylindrical (1.93 times longer than wide, 0.93 times wider than deep), with carinae obsolete to vestigial, smooth; intercarinal tegument smooth and glossy; fingers very long (movable finger 2.26 times longer than underhand), only subtly curved and with 10–11 principal rows of denticles (the two basalmost rows are poorly defined), basal lobe/notch combination absent, external accessory denticles absent, internal accessory denticles very large and claw-like (increasing in size distally), numbering seven and six on fixed and movable fingers, respectively, movable finger with two claw-like accessory denticles basal to the very large terminal denticle.

CARAPACE (Fig. 3). Very strongly trapezoidal (much narrower anteriorly) and wider than long; anterior mar-

Ratios	<i>Anomalobuthus talebii</i> sp.n. (holotype)	<i>Anomalobuthus rickmersi</i> (topotypes, n = 2)
Pedipalp chela (L/W)	6.29	5.86–5.87
Pedipalp chela (L) / movable finger (L)	1.44	1.41–1.42
Pedipalp movable finger (L) / manus (L)	2.26	2.42–2.50
Metasoma (L) / Carapace (L)	6.34	6.12–6.13
Metasomal segment I (L/W)	1.30	1.09–1.23
Metasomal segment II (L/W)	1.82	1.50–1.62
Metasomal segment III (L/W)	1.88	1.64–1.71
Metasomal segment IV (L/W)	2.23	1.83–1.89
Metasomal segment V (L/W)	2.34	2.00–2.11
Telson vesicle (L/W)	2.18	1.75–1.80
Telson vesicle (L/H)	2.14	1.91–1.93
Total (L)	34.60	28.40–36.60

Table 2: Comparison between both species of *Anomalobuthus* based upon selected morphometric ratios of adult females. Abbreviations: length (L), width (W), depth (H), number of specimens (n).

gin straight to very shallowly convex, with 4–5 pairs of thin macrosetae and some very short microsetae. Carination essentially absent: the only carinae present are the superciliary, which are moderately granulose to smooth. Furrows: anterior median, median ocular, central median, posterior median and posterior marginal fused, wide and moderately deep; lateral oculars, lateral centrals, central transverse, and posterior laterals long, narrow and shallow. Tegument very finely and densely granulose, with many small to medium-sized granules scattered all over except on the V-shape interocular blackish spot, where the granules are coarser and glossy. Median eyes very large and raised, separated by about one ocular diameter; five pairs of much smaller lateral eyes: three same-sized and aligned along each antero-lateral corner, plus two tiny and offset above the former. STERNUM (Fig. 4). Standard for the genus: type 1, relatively small, and widely triangular in shape, with two pairs of inconspicuous macrosetae. Posterior depression very large, deep, and circular.

GENITAL OPERCULUM (Fig. 4). Relatively small, each half roundly subtriangular in shape, with 2–3 pairs of inconspicuous macrosetae, plus a few short microsetae. Genital papillae absent.

PECTINES (Fig. 4). Standard-sized for the genus: very long, extending beyond leg IV coxa-trochanter joint), subrectangular and densely setose. Tooth count 26/26. Basal plate heavily sclerotized, much wider than long, anterior margin with a very deep, narrow anteromedian furrow, posterior margin very shallowly convex.

LEGS (Figs. 8–11). Very slender, with all carinae moderate to weak and subserrate to granulose; intercarinal tegument coriaceous to smooth. All typical adaptations to psammophilous way of life present: tibia and tarsi of legs I–III short, curved, flat, and paddle-like, with setation heavily modified into bristlecombs, claws very long, asymmetrical, and weakly curved. Tibial spurs entirely absent, prolateral and retrolateral pedal spurs very large in all legs.

MESOSOMA (Figs. 1–4). Tergites with the same sculpture as on carapace; I–VI irregularly tricarinate: the median longitudinal carina is moderately strong, short, and formed by irregular medium-sized granules that do not project beyond posterior margin, but the submedian carinae are undefined on I–IV, very irregular on V, and well defined only on VI; tergite VII with five well-defined carinae (median, submedians and laterals), which are long, strong and finely serrate to crenulate. Sternites essentially bare; III–VI glossy and with subtle vestiges of a pair of smooth submedian carinae, spiracles relatively short and slit-like, transversely arranged (not oblique), V with smooth patch absent; VII with two pairs of carinae (submedians and laterals) which are long and finely crenulate to serrate, intercarinal tegument coriaceous to minutely granulose.

METASOMA (Figs. 5–7). Somewhat elongated and slightly wider both basally and distally; with 10/10/10/8/5 complete to almost complete carinae, almost all formed by conspicuously isolated, sharply serrate to denticulate granulation: dorsolaterals moderate on I–IV



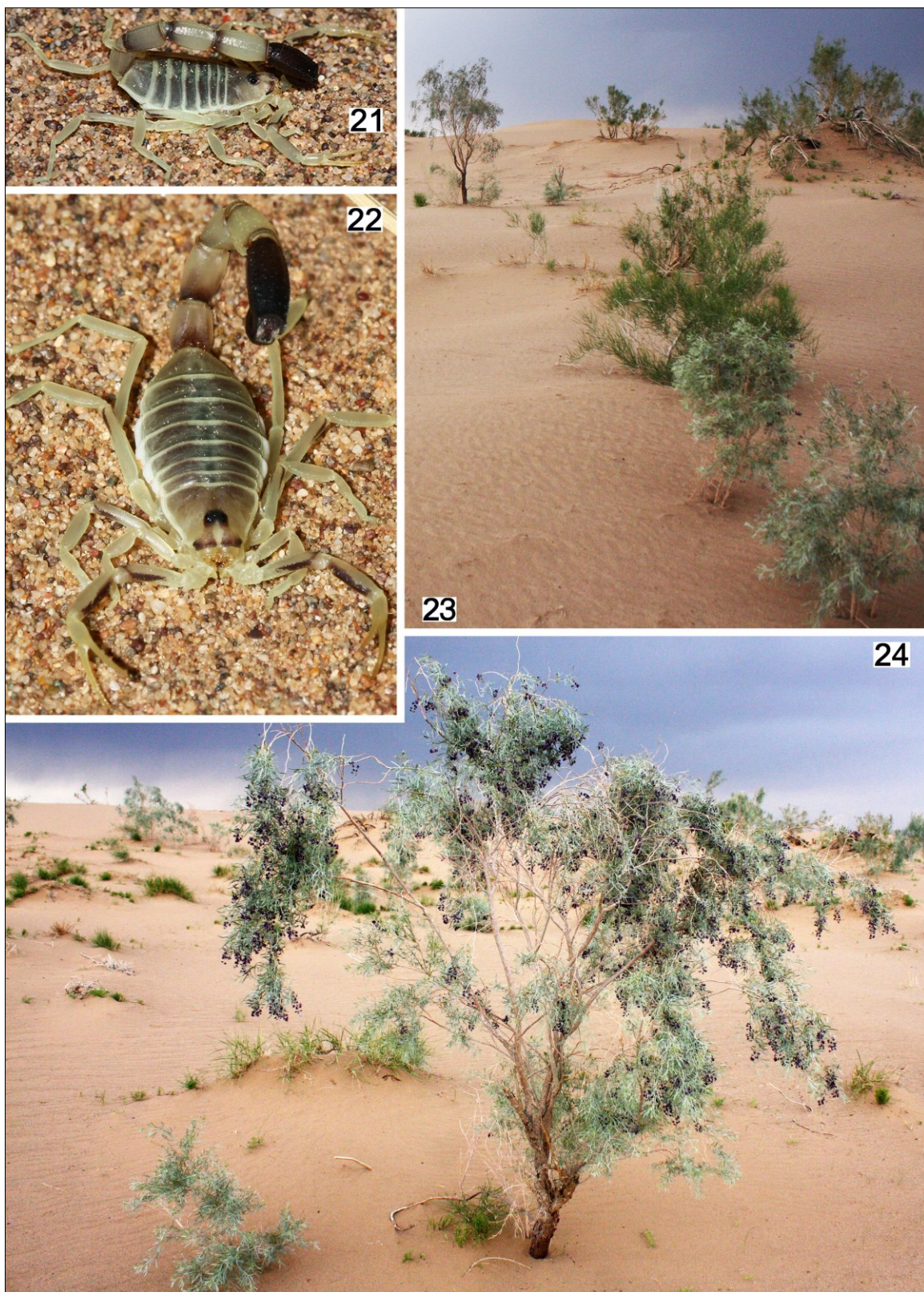
Figure 20: Geographic distribution of *Anomalobuthus talebii* sp.n. (black square) and *A. rickmersi* (white squares). Data on *A. rickmersi* compiled from Fet (1989, 1994), Gromov & Kopdykbaev (1994), Kamenz & Prendini (2008), Mityaev et al. (2005), and Graham et al. (2012).

(with 1–3 terminal denticles conspicuously enlarged), absent on V; lateral supramedians moderate on I, weak on II, very weak to vestigial but complete on III–IV, weak as rounded ridges on V (with 1–3 terminal denticles conspicuously enlarged on I–IV); lateral inframedians moderate on I, weak on II, very weak to vestigial on III, absent on IV–V; ventrolaterals strong on I, moderate on II–III, weak on IV, moderate to strong on V, where become progressively stronger and somewhat flared distally, formed by sharp, subequal denticles; ventrosubmedians strong on I, moderate on II, weak on III, very weak to vestigial on IV, absent on V (indicated by somewhat raised tegument and irregular granulation on basal half); ventromedian absent on I–IV, moderate on V. Intercarinal tegument smooth and glossy, with some coarse punctations laterally on IV–V and sparse granulation of different sizes ventrally. Dorsal furrow wide and somewhat deep on all segments. Setation sparse, mostly represented by 2–5 dark macrosetae over every carina.

TELSON (Figs. 5–7). Sparsely setose, with some setae scattered all over dorsal and lateral surfaces. Vesicle

elongate oval (2.18 times longer than wide, 0.98 times wider than deep), tegument smooth and glossy, with vestiges of coarse granules arranged into three obsolete longitudinal carinae (ventromedian and ventrosubmedians), and some coarse punctations ventrally. Subaculear tubercle absent, but subtly suggested by a vestigial granule. Aculeus conspicuously shorter than vesicle, thick and shallowly curved.

AFFINITIES. The only other member of the genus is *A. rickmersi*, which can be unequivocally separated by (females only): **1)** coloration much more uniform, with carapace and tergites essentially immaculate, not striped; **2)** pedipalp chelae conspicuously less slender (Tab. 2); **3)** carapace with coarse granules much fewer and sparser; **4)** tibial spurs weak to well developed in leg IV, occasionally also in leg III; **5)** pectinal tooth count remarkably lower: 19–22, even males have lower counts of 22–25; **6)** metasoma with all carinae much weaker, especially the dorsolaterals which have only one terminal denticle enlarged on II–IV, which is also weaker; **7)** metasoma and telson conspicuously less slen-



Figures 21–24: 21–22: Holotype female of *Anomalobuthus talebii* sp.n., live specimen. 23–24: Natural habitat of *Anomalobuthus talebii* sp.n.

der (Tab. 2); **8**) ventrolateral carinae of metasomal segment V composed of roundly lobate denticles; **9**) telson vesicle with denser and longer setation.

DISTRIBUTION (Fig. 20). Known only from the type locality, in the sand deserts of extreme eastern Iran.

ECOLOGICAL NOTES. According to the personal data supplied by its collector, the single known specimen of *A. talebii* **sp. n.** was found in sandy desert with sparse vegetation (Figs. 23–24) during a night search with UV light. As it can be seen in Figs. 21–22, the behavior of this species is similar to the members of the genus *Orthochirus* Karsch, 1891; i.e., the scorpion rests flattened against the substratum and walks displaying a defensive posture, with the metasoma stretched forward against the dorsum. This observation of common behavioral traits, first made for Central Asian populations of *Orthochirus* spp. and *A. rickmersi* by A.V. Gromov (Fet et al., 2003: 4; “the resting position of metasoma and its characteristic “jerky” movements”) fits well the recent discovery, based on DNA markers, that these two morphologically dissimilar genera are closely related (Fet et al., 2003).

REMARKS. The yellow base color described above corresponds to the holotype after one year of ethanol preservation. While the same specimen was still alive, it was remarkably paler and had a somewhat translucent, neutral shade (see Figs. 21–22).

Discovery of the second, distinct species in Iran attests to differentiation of this psammophile genus in isolated pockets of Central Asian sand deserts, a biogeographic process well-documented in other animal groups (Kryzhanovskiy, 1965; Graham et al., 2012). The new record extends the range of the genus *Anomalobuthus* considerably southward into Iran, to 33°20' 49.45"N; the southernmost known record of *A. rickmersi* is 35°40'52"N at Chainury, Turkmenistan (Graham et al., 2012). The northernmost locality of *A. rickmersi* is ca. 46°N at Lake Balkhash, Kazakhstan (Gromov, 2003; Mityaev et al., 2005). Thus the genus's range spans over 13 degrees (>1,400 km) from north to south across the great deserts of Central Asia and Iran. From west to east, it spans over 23 degrees (>2,600 km) from Heles (Kheles), Turkmenistan, at 53°24'E, to Kapchagai, Kazakhstan, at 77°05'E (Fet, 1994; Gromov & Kopdykbaev, 1994; see also Fig. 20 herein).

The presence of *Anomalobuthus* in Afghanistan has never been documented, but it can be predicted to occur there in continuous or similar habitats because both species occur very near to the Afghan border: *A. rickmersi* widely along the north and *A. talebii* **sp. n.** in the west. The genus could even be found in the lowland Chinese portion of the Ili basin (Xingjian Province), as *A. rickmersi* has already been collected less than 300 km

westward along this same river (Gromov & Kopdykbaev, 1994; see Fig. 20 herein).

COMPARATIVE MATERIAL EXAMINED (*Anomalobuthus rickmersi*).

Uzbekistan, Kyzyl-Kum Desert, Bukhara Province, between Bukhara and Gazli, 40°05'N, 64°04'E, 206 m a.s.l., 11 May 2002, leg. V. Fet, 5♂, 1♀, 6 juv. (topotypes, VFPC), 1♀ (topotype, RTO: Sco-0208); Bukhara, 30 April 1979, leg. Antuš, 1♀ (topotype, FKCP); Navoyi Province, Tamdy (=Tomdi), 1–2 km south-southeast of Zarafshan, 41°32'N, 64°12'E, 18–28 April 1998, leg. A.V. Gromov, 2♂, 5♀ (FKCP), 1♂, 1♀ (RTO: Sco-0233).

Acknowledgments

We are deeply indebted to the late Amir Talebi Gol, who collected the single specimen known of this Iranian scorpion and kindly made it available to us, as well as the photographs included herein as Figs. 21–24. Further, we thank two anonymous reviewers for their comments to the manuscript.

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