

A new genus and species of psammophilic scorpion from eastern Iran (Scorpiones: Buthidae)

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Summary

Polisius, a new genus of psammophilic scorpion from the Baluchistan Province of Iran, is described, with type species *Polisius persicus* n. sp.

Introduction

The deserts of central and southern Asia are becoming well known for their interesting diversity of psammophilic scorpions (Fet, 1980, 1987; Fet *et al.*, 1998). Although psammophilic genera are also represented in the Nearctic, Neotropical and Afrotropical regions, the psammophiles of the Palaearctic deserts are also quite diverse. In North Africa and the Middle East there are four psammophilic genera: *Apisthobuthus* Finnegan, 1932, *Buthacus* Birula, 1908, *Buthiscus* Birula, 1905 and *Vachoniolus* Levy *et al.*, 1973; and in central and southern Asia (Kazakhstan, Uzbekistan, Turkmenistan, Tajikistan, and Pakistan) there are five: *Anomalobuthus* Kraepelin, 1900, *Liobuthus* Birula, 1898, *Pectinibuthus* Fet, 1984, *Plesiobuthus* Pocock, 1900 and *Psammobuthus* Birula, 1911. All these genera belong to the family Buthidae.

We describe a new genus and species of psammophilic buthid scorpion from the Baluchistan Province of Iran. This interesting species was "discovered" in the collection of the United States National Museum (Washington, DC) by one of the authors (V.F.).

Methods

All measurements are in mm. D = depth, L = length, W = width

Genus *Polisius*, new genus

Etymology: The generic name is a patronym honouring our late friend and colleague, Dr Gary A. Polis, for his many contributions to scorpion biology.

Type species: *Polisius persicus*, new species.

Diagnosis: *Polisius* exhibits the unmistakable characteristics of a psammophile: wide, flattened tarsi armed with setal combs on both the proventral and retroventral margins. There are several psammophilic genera of Buthidae in the deserts of central and southern Asia, including *Anomalobuthus*, *Liobuthus*, *Pectinibuthus*, *Plesiobuthus*, and *Psammobuthus* (Fet, 1987; Fet & Lowe, 2000; Capes & Fet, 2001). Table 1 provides detailed morphological comparisons of these taxa.

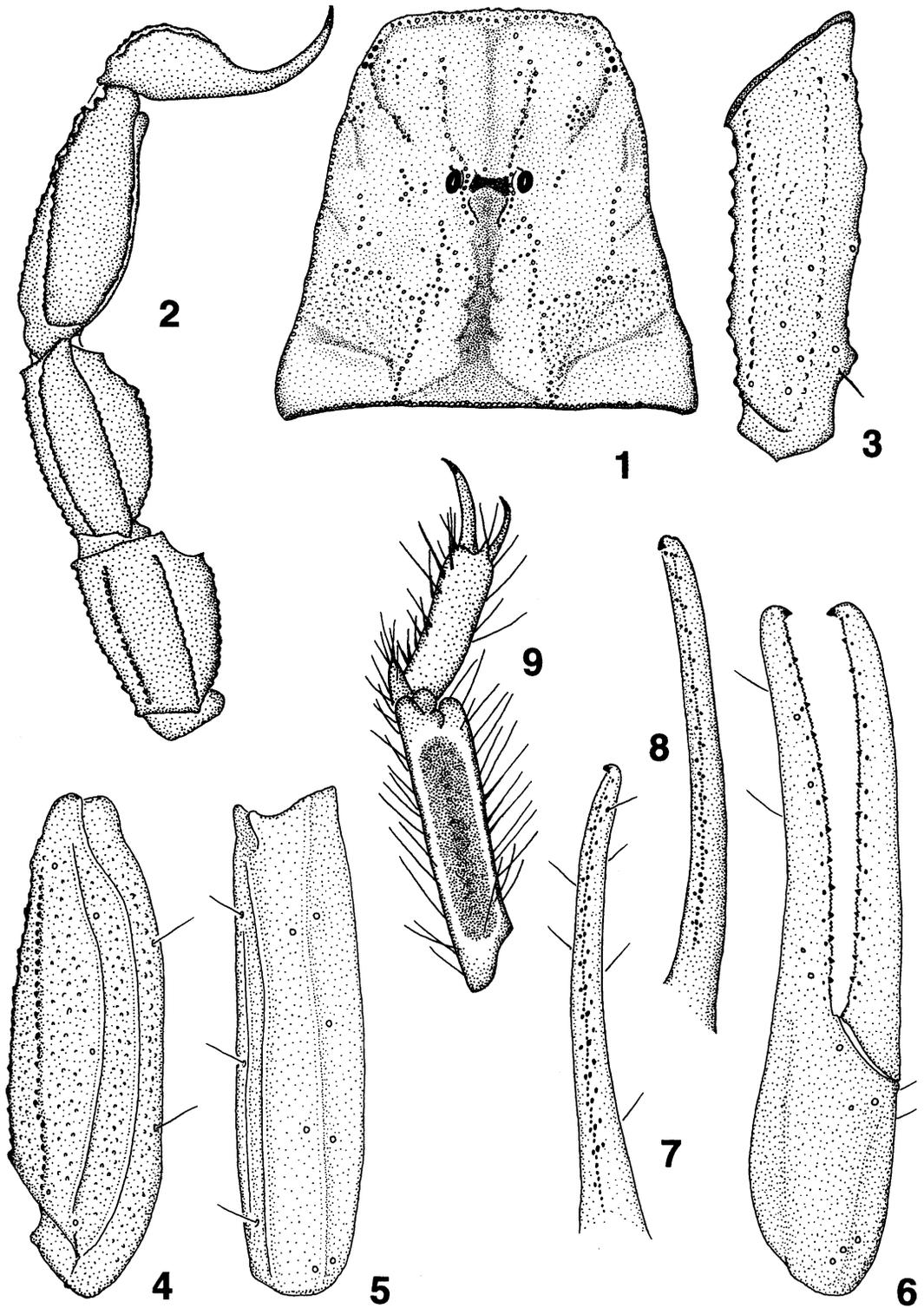
The development of the carapacial carinae suggests potential relationship with genera such as *Hottentotta* Birula, 1908, *Mesobuthus* Vachon, 1950 and *Vachonus* Tikader & Bastawade, 1983. Members of these genera never exhibit psammophilic facies, although some live in sand habitats. Furthermore, in *Hottentotta* and *Mesobuthus* the tarsi bear paired ventral submedian spine rows; the carapace and tergal carinae are stronger. In *Hottentotta*, the denticles of the ventrolateral carinae of metasoma V are subequal in size; the distalmost denticles not distinctly enlarged.

| | <i>Polisius</i> (E. Iran) | <i>Anomalobuthus</i> (Kazakhstan, Uzbekistan, Tajikistan) |
|---|---|--|
| Carapace carinae | anterior medians, superciliaries, central medians, posterior medians well developed, granular | anterior medians weak, granular; superciliaries moderate, smooth; others obsolete |
| Tergal carination | vestigially tricarinate | vestigially tricarinate (lateral carinae with 1–2 posterior granules) |
| Pectinal tooth counts | 24–25 in female | 24–26 in male |
| Metasomal carinae | well developed, crenulated; intermediary carinae vestigial on II, absent from III–IV | greatly reduced to obsolete on I–III; ventrolaterals and ventro-median crenulate on V |
| Dorsal furrow of metasoma | moderately deep | absent |
| Metasomal morphometrics | carapace length < metasoma IV length | carapace length \leq metasoma length |
| No. ventral denticles on cheliceral fixed finger | two | one |
| Trichobothrial pattern | orthobothriotaxy | orthobothriotaxy |
| Pedipalp chela morphometrics | chela slender with long, slender fingers (movable finger > 2 \times length of underhand) | chela very slender, with long, slender fingers (movable finger > 2 \times length of underhand) |
| Pedipalp chela carination | acarinate | acarinate |
| No. denticle rows on pedipalp chela fingers | 15 slightly oblique rows | 10 rows, distal rows slightly oblique, basal rows essentially aligned |
| Inner and outer accessory denticles | both types present | inner accessories present; outer accessories absent |
| No. accessory granules proximal to terminal denticle on movable finger | three | one or two |
| Pedal spurs | prolateral spur enlarged, weakly bifurcate | prolateral spur enlarged, single |
| Tibial spurs | present, but small, on III–IV | absent from female; occasionally present but small on IV in male |

* neobothriotaxy reported by Fet (1987) was erroneously based on undercounted petite trichobothria

Table 1: Comparative morphology of six buthid psammophilic genera from central and southern Asia.

| <i>Liobuthus</i> (Kazakhstan, Uzbekistan, Turkmenistan, NE Iran) | <i>Plesiobuthus</i> (NW Pakistan) | <i>Psammobuthus</i> (Uzbekistan, Turkmenistan) | <i>Pectinibuthus</i> (Turkmenistan) |
|--|---|--|--|
| obsolete | obsolete | superciliaries granular; granular; others obsolete | superciliaries granular; others obsolete or indistinct |
| vestigially tricarinate (lateral carinae feeble) | vestigially tricarinate | vestigially tricarinate (lateral carinae with 2–3 posterior granules) | vestigially monocarinate |
| 12–14 in female | 37 in male | 20 in female; 24–26 in male | 39–46 |
| greatly reduced | well developed, crenulated; intermediary carinae on I–III vestigial, absent from IV | I–III with well developed serrated carinae; dorsal carinae reduced on IV–V | dorsolateral (on I–III), ventrolateral, and ventral submedian carinae distinct, finely crenulate |
| moderately deep on I–III, shallow on IV–V | shallow | moderately deep | weak, complete on I–II limited to extreme base on III–V |
| carapace length > metasoma V length one | carapace length > metasoma V length two | carapace length slightly < metasoma V length one | carapace length < metasoma II length one |
| additive neobothriotaxy: 6d & 4e on femur; 11e on patella | orthobothriotaxy | unknown | orthobothriotaxy* |
| chela of average proportions, with fingers shorter (movable finger < 2× underhand) | chela of average proportions, with fingers shorter (movable finger < 2× underhand) | chela of average proportions, with fingers shorter (movable finger < 2× underhand) | chela very slender, with long fingers (movable finger > 2× length of underhand) |
| dorsal marginal, ventro-external, dorsointernals weak, granular | dorsal marginal, dorso-internal, and ventro-externals crenulate | acarinate | acarinate |
| 7 oblique rows | 12 slightly oblique rows | 11 rows, essentially straight | 10 rows (fixed finger), slightly oblique distally, but more or less straight basally |
| both types present | both types present | inner accessories present; outer accessories absent | inner accessories present; outer accessories absent |
| three | unknown | three | three |
| prolateral spur enlarged, feebly bifurcate | prolateral spur enlarged, single | prolateral spur enlarged, weakly bifurcate | prolateral spur enlarged, weakly bifurcate |
| absent | absent | present, but tibial spurs on III reduced in female | absent |



Description: Carapace (Fig. 1) carinate, with anterior median and superciliary carinae moderate, granular; central median and posterior median carinae well developed, more or less aligned, but not joined. Tergites feebly tricarinate, with carinae developed only on posterior portions of segments. Pectines with fulcra; pectinal tooth count of the only known specimen (female) 24–25. Metasoma (Fig. 2) carinate, with 10 carinae on segment I, 8 carinae on segments II–IV, and five carinae on segment V. Telson (Fig. 2) with underside of vesicle tuberculate; aculeus as long as vesicle. Cheliceral dentition typical of family; movable finger of chelicera with two ventral denticles. Trichobothrial pattern of pedipalps (Figs. 3–6) orthobothriotaxic, Type A; femur with beta configuration (Vachon, 1974, 1975). Pedipalp chela (Fig. 6) slender with elongate fingers (both fixed and movable fingers longer than carapace). Chela acarinate. Fixed and movable chela fingers with 15 slightly oblique rows of denticles (Figs. 7–8), these flanked by both inner and outer accessory denticles; movable finger (Fig. 8) with three accessory denticles just proximal to terminal claw. Chela fingers without scalloping (i.e. dentate margins of both fingers straight when viewed in profile; Fig. 6)). Tibiae, basitarsi, and telotarsi of legs I–III (Fig. 9) with setal combs (singular rows of long, curved setae); setal combs present only on retroventral margin of tibia, and on both proventral and retroventral margins of basitarsi and telotarsi. Small tibial spurs present on legs III and IV. Pedal spurs well developed, with pro-lateral pedal spur distinctly enlarged, weakly bifurcate, and bearing setae (4–5 setae on the spurs of legs III and IV).

***Polisius persicus*, new species** (Figs. 1–9)

Etymology: The specific epithet derives from Persia, the old kingdom that occupied the area now known as Iran.

Holotype: Adult female taken from 85 km N of Zahedan, Baluchistan, Iran, on night of 10–11 February 1963 by L. H. Herman; deposited in the

United States National Museum (USNM), Washington, DC.

Diagnosis: As for the genus.

Description: Coloration uniformly yellow, except as follows: pectines creamy white; ocular areas with black underlying pigment; denticles of cheliceral fingers dark brown; denticles of chela fingers brown; tip of aculeus dark reddish brown.

Carapace (Fig. 1). Posterior width greater than carapace length. Carapacial surface shagreened to finely granular, with sparse coarse granulation. Anterior margin weakly convex with granular marginal carina. Anterior median and superciliary carinae moderate, granular; central lateral and lateral ocular carinae weak, granular. Central median and posterior median carinae well developed, granular; the two carinae aligned, but with central medians continuing posteriorly beyond origin of posterior medians. Carapacial furrows. anterior median furrow wide, shallow; anterior marginal furrow moderately deep; ocular tubercle shagreened, with median ocular furrow shallow; central and posterior median furrows wide, shallow; posterior marginal furrow moderately deep; others feeble. Five lateral eyes on left side, four on right.

Mesosomal tergites finely granular, weakly tricarinate, with carinae weakly developed only on posterior portion of segments I–VI; tergite VII pentacarinat, with median carina developed only in the anterior portion of the segment; lateral carinae moderate, crenulate. Pectinal tooth count 24–25. Sternites shagreened, VII with four moderate, finely serrated carinae.

Metasoma (Fig. 2). All segments distinctly longer than wide; segment V distinctly longer than carapace, its length/width ratio 2.12. Segment I with 10 carinae, segments II–IV with eight carinae (lateral inframedian carinae absent, except on segment II represented by several posterior granules), and segment V with five carinae (lateromedian carina absent); all developed carinae moderate to strong, crenulate; dorsolateral carinae of segments II–IV clearly raised posteriorly. Segments thick, distinctly concave dorsally. Intercarinal spaces shagreened, but with dorsal

Figs. 1–9: Morphology of the holotype of *Polisius persicus* n. sp. 1 dorsal aspect of carapace. 2 right lateral aspect of metasomal segments III–V and telson. 3 dorsal aspect of pedipalp femur. 4 dorsal aspect of pedipalp patella. 5 external aspect of pedipalp patella. 6 external aspect of pedipalp chela. 7 dentate margin of pedipalp chela fixed finger. 8 dentate margin of pedipalp chela movable finger. 9 prodorsal aspect of basitarsus and telotarsus of leg III.

groove smooth and lustrous. Anal lobe of segment V with three teeth.

Telson (Fig. 2). Vesicle narrower than metasomal segment V; subaculear tubercle lacking; ventral aspect of vesicle with five longitudinal carinae, the median and submedian carinae consisting of low tubercles.

Pedipalps. Trichobothrial pattern orthobothriotaxic, type A. Femur (Fig. 3). Shorter than carapace, its ratio of length/width 3.21; pentacarinata, with all carinae distinct, serrate; intercarinal spaces shagreened; ventrodiscal aspect with a distinct row of six large setae located apical to trichobothrium e_2 ; trichobothria d_1 , d_3 , and d_4 form beta configuration (Vachon, 1975; Sissom, 1990); trichobothrium d_5 slightly basal to e_2 . Patella (Figs. 4–5). Longer than carapace, octocarinata; carinae of ventral and internal aspect weak, others feeble. Chela (Fig. 6). Slender, with elongate fingers; chela length/width ratio 6.29, movable finger length/palm (underhand) length ratio 2.56, palm narrower than patella; chelal carinae obsolete; trichobothrium db basal to est; trichobothria db and est widely separated from eb and esb. Fixed finger dentate margin with fifteen slightly oblique longitudinal rows of granules (Fig. 7), these flanked by inner and outer accessory granules; two basalmost rows not well defined; outer accessory granules weak. Movable chela finger without basal lobe; dentate margin as on fixed finger, but with three accessory granules just proximal to terminal denticle (Fig. 8).

Legs. Femora with weak dorsal and moderate, serrated ventral carinae; patellae and tibiae weakly carinated. Small tibial spurs present on legs III and IV. Tibiae I–III with short retrolateral row of long setae (bristlecombs). Basitarsi and telotarsi of legs I–III (Fig. 9) with retroventral and proventral rows of long curved setae (bristlecombs); setae of retroventral combs distinctly longer than those of proventral combs. Ventral aspect of basitarsi of II–III distinctly concave, less so on leg I. Leg IV with all segments more or less quadrate in crosssection, lacking bristlecombs. All legs with two prominent pedal spurs between tarsomeres I and II; prolateral pedal spur larger, weakly bifurcate, on III and IV bearing four or five long, dark curved setae.

Measurements. Total L 41.0, carapace L 5.0, mesosoma L 10.3, metasoma L 20.7, telson L 5.0. Metasomal segments: I L/W/D 3.2/2.8/2.5, II L/W/D 3.7/2.7/2.5, III L/W/D 3.9/2.7/2.6, IV

L/W/D 4.6/2.7/2.5, V L/W/D 5.3/2.5/2.1. Telson: vesicle L/W/D 2.4/1.9/1.6, aculeus L 2.6. Pedipalps: femur L/W 4.5/1.4, patella L/W 5.5/1.8, chela L/W/D 8.8/1.4/1.6, fixed finger L 5.4, movable finger L 6.4, palm (underhand) L 2.5.

Comments

The diverse arid-land scorpiofauna of Iran has been the subject of many studies since the early nineteenth century, starting with Olivier (1807) who described *Androctonus crassicauda* from Cashan. Considerable contributions were made in a series of works by A. Birula (1900, 1903, 1905) who analysed and described the collections made by the famous Russian zoologist Nicholas A. Zarudny (these collections still exist in the Zoological Museum, Russian Academy of Sciences, St Petersburg). Among Zarudny's samples were not only large, easily noticeable scorpions such as *Androctonus* or *Mesobuthus* but also a number of less common taxa; some of these specimens have continued to be subjects of taxonomic and biogeographical investigation until our days (Vachon, 1974; Fet, 1984, 1997; Lourenço, 1996). Additional collections and taxonomic publications (e.g. Vachon, 1958; Lourenço & Vachon, 1995; Kovařík, 1997; Sissom & Fet, 1998), as well as checklists (Vachon, 1966; Habibi, 1971; Farzanpay, 1988; Kovařík, 1997), added considerably to the knowledge of the Iranian scorpiofauna. However, UV-light collection has never been applied in Iran; and certain areas in Iran have been devoid of attention by collectors altogether, most notably the eastern part of the country (Iranian Baluchistan). The scorpion fauna of the neighbouring Baluchistan Province of Pakistan has also remained unstudied since the time of Pocock (1900), who described a psammophilic genus *Plesiobuthus* from that area. It is therefore not surprising that these remote parts of Iran could still harbour undiscovered scorpion species and even genera. Speciation in the sand deserts of the Old World is apparently quite extensive in scorpions (Fet *et al.*, 1998; Prendini, 2001).

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