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A New Species of Psammophilic Scorpion From Iran (Scorpions: Buthidae)

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Abstract: In order to study the psammophilic scorpions of sandy habitats of two provinces in western and south western Iran, some samplings were carried out by night catch (UV light) method during October 2007-March 2009. In total, 187 scorpions were collected. *Vachoniolus iranus* is a new species of *Vachoniolus*, that described from Khoozestan and Ilam provinces in South-western and Western of Iran. This is first record of genus *Vachoniolus* from Iran.

Key words: Psammophilic, scorpions, *Vachoniolus iranus*, Khoozestan, Ilam

INTRODUCTION

The psammophilic scorpions are adapted to life on soft sandy substrata (Fet *et al.*, 1998). They display several ecomorphological adaptation to increase locomotor and burrowing efficiency in loose sand (Fet *et al.*, 1998; Prendini, 2001). All psammophilic scorpions are stenotopes, maladapted to life outside their sandy environments and are unable to burrow soil (Polis *et al.*, 1979; Hadley, 1974).

The desert of Central and Southern Asia are becoming well known for their interesting diversity of psammophilic scorpions (Fet *et al.*, 1998). In North Africa and Middle East there are four psammophilic genera: *Apisthobuthus* Finnegan (1932), *Buthacus* Birula (1908), *Buthiscus* Birula (1905) and *Vachoniolus* (Levy *et al.*, 1973).

Recently, Fet *et al.* (2001) reported another one of psammophilic genus, *Polisius persicus*, from Sistan and Bluchestan province (East) of Iran.

Apisthobuthus and *Buthacus* reported in last studies from different parts of Iran specially sandy regions of Khoozestan province (Akbari *et al.*, 1997; Farzanpay, 1988; Habibi, 1971).

In this study, we report *Vachoniolus* (Levy *et al.*, 1973) (a psammophilic buthidae scorpion) and species of this scorpion for first time from Iran.

MATERIALS AND METHODS

Khoozestan province is a one of the large provinces of Iran with 63'236km² land (31°32'37" N, 48°69'40" E). This province located in South-West of Iran. Variability of humidity is from 10-90% and temperature arrived to 60°C in desert regions of Khoozestan (in Summer) and 0°C in mountain area of Eastern Khoozestan (in Winter). Ilam Province located in North of Khoozestan and have same

Table 1: Morphometric measurements of *Vachoniolus iranus* from Iran (mean of male and female specimens)

Parameters	Measurement (mm) [♀]	Measurement (mm) [♂]
Total length	40.29	32.77
Carpace		
Length	4.12	3.74
Width	4.50	4.32
Mesosoma		
Length	9.23	9.99
Width	5.01	5.07
Metasomal segments		
Length I	4.18	2.56
Width I	2.31	1.85
Length II	4.17	2.91
Width II	2.23	1.72
Length III	4.45	3.13
Width III	2.11	1.65
Length IV	4.82	3.33
Width IV	1.94	1.52
Length V	5.42	1.47
Width V	1.73	1.47
Femur		
Length	3.25	2.30
Width	0.95	0.78
Patella		
Length	3.68	2.94
Width	1.56	1.12
Tibia		
Length	5.66	3.71
Width	2.89	1.09
Finger mov. length	3.05	2.31
Telson length	4.31	3.37

climatic and habitat. In order to study the psammophilic scorpions of sandy habitats of two provinces in Western and South Western Iran, some samplings were carried out by night catch (UV light) method during October 2007-March 2009.

Morphometric measurements of the scorpion were carried out as follow: (1) Length and width of carpace, (2) Length and width of mesosoma, (3) Length and width of metasomal segments (I, II, III, IV and V), (4) Telson length, (5) Patella length and width, (6) Tibia length and width, (7) Moveable finger length and (8) Total length of the male and female scorpion (Table 1).

Vachoniolus iranus

Type locality and type repository: Iran, Khoozestan Prov., near Masdjedsoleyman, 31°38.31'N 48°56.68'E, 53 m; RRLS; Zovyer village, 31°35.33'N, 48°57.02'E Ilam province, Ein khosh, 32°24.76'N, 47°37.48'E. 130 m. Type material Iran, Khoozestan Prov., near Masdjedsoleyman, 31°38.31'N 48°56.68'E, 53 m (Locality. No. A-Ma 806-1), VIII. 2007, 8♂25♀13juvs (holotype and paratypes), leg. Navidpour and Mashipour; Ahvaz- Masjedsoleyman road, Zovyer village, 31°35.33'N 48°57.02'E, 35 m (Locality No. A-Ma-810), IX.2007, 12♂27♀7juvs (paratypes), leg. Navidpour and Mashipour. Ilam province, Ein Khosh. Locality No. IL-806, II. 2007, 2♂, leg. Mashipour, Hayader, Habibzadeh and Bahrani. Holotype and most of paratypes are in RRLS, 4 paratypes are in FKCP(Frantisek Kovarik collection) and one male paratype is in Graeme Lowe collection.

Etymology: Named after the country of occurrence.

Distribution: Khoozestan Province (South-West) and Ilam Province (West) of Iran.

Ecological notes: This scorpion lives in the sandy substratum area of Khoozestan and Ilam provinces. *Apisthobuthus susanae* and *Orthochirus iranus* are two another scorpions that collected with *Vachoniolus iranus* during night catch (by UV light).

Diagnosis: Dorsal trichobothria of femur arranged in beta-configuration with d_2 situated on dorsal surface. External surface of pedipalp patella with 8 or 9 trichobothria, pedipalp femoral trichobothrium d_5 distal to e_2 . Dentate margin of pedipalp-chela movable finger with distinct granules divided into 8 or 9 rows and 4-6 terminal granules.

Cheliceral fixed finger with two ventral accessory denticles. Tergites I-VI of mesosoma each with one carina. Carapace granulated, without distinct carinae. Legs with distinct bristlecombs, 3rd and 4th legs with tibial spurs in all examined specimens. Male pedipalp chela robust and inflated, densely granulated, completely devoid of carinae. Aculeus long. Pectines with fulcra. Stigmata large, slitlike (Fig. 2a-g, 3a-c). Total length 32-42.5 mm.

Description: The total length is 32-42.5 mm. Measurements of the carapace, telson, segments of the metasoma and of the pedipalps and numbers of pectinal teeth in the holotype are given in Table 1. For trichobothrial pattern show in Fig. 3a-c. External surface of pedipalp patella with 8 or 9 (females) trichobothria, pedipalp femoral trichobothrium d_5 distal to e_2 . Pectinal

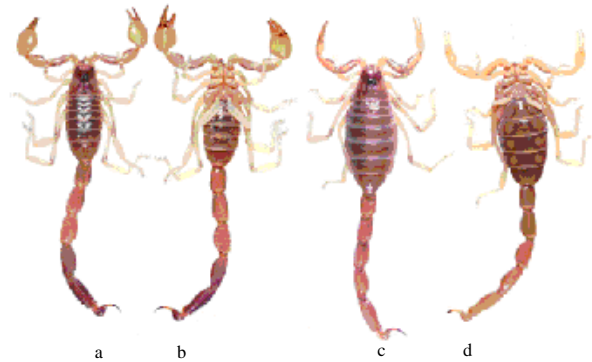


Fig. 1: (a, b) *Vachoniolus iranus*, dorsal and ventral views, ♂(42 mm) holotype, Iran, Khoozestan Province, near Masdjedsoleyman, 31°38.31'N 48°56.68'E, RRLS. (c, d) *Vachoniolus iranus*, dorsal and ventral views, ♀(40 mm) allotype, Iran, Khoozestan Province, Ahvaz-Masjedsoleyman road, 31°35'44"N 48°57'19"E, 35 m a.s.l. (Locality No. A-Ma-810), FKCP

teeth number 20-22 in males and 14-15 in females. The male has pedipalp chela distinctly swollen. Female chela is narrower than in the male (Fig. 1a-d).

Coloration: The color is uniformly pale yellow to yellowish green. The median ocular tubercle black, the anterior part of carapace is gray to black, the distal fourth to fifth of the fourth metasomal segment, the fifth metasomal segment and the telson are yellowish green to black. Carinae on femur and patella of pedipalps are gray. The chelicerae are yellow, without reticulation.

Mesosoma and carapace: The anterior margin of carapace is straight or very slightly convex. The entire carapace is densely granulated but devoid of carinae. Granules in front of the median ocular tubercle are bigger and rounded, elsewhere they are smaller and pointed (Fig. 2a).

The mesosoma is smooth to shagreened and has one carina on the dorsal surface. The sternites are smooth, sternite VII bears four smooth or granulate carinae.

Metasoma and telson: All metasomal segments are longer than wide. The first segment has a total of 10 carinae, the second through fourth segments have eight carinae and the 50 segment has five carinae (Fig. 2d). Intermediate carinae of the second to fourth segments are replaced by less than 10 granules situated mainly in the posterior half. Ventral carinae are moderate to strong, coarsely serrate.

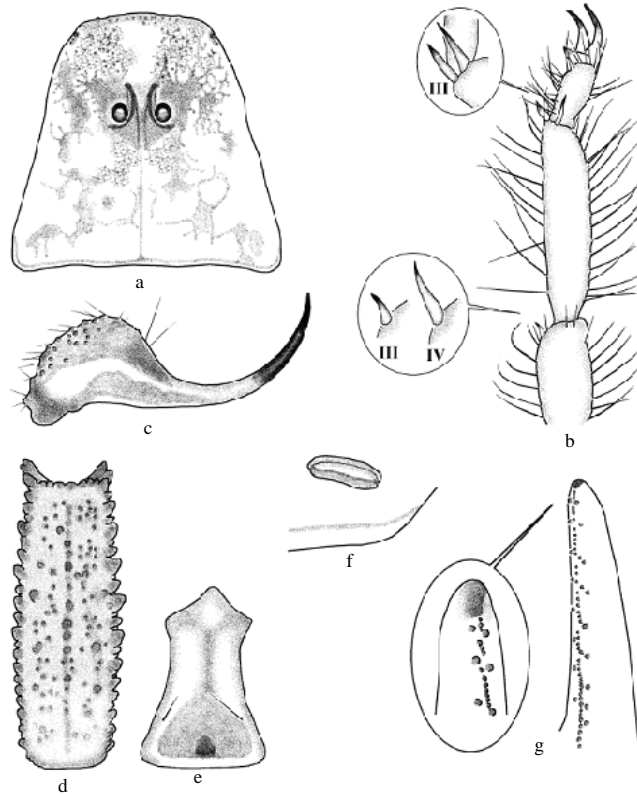


Fig. 2: *Vachoniolus iranus*, male paratype (a) Carapace (b) Left leg III showing setal brush on basitarsus and tibia; enlarged circled areas show uneven lengthed pedal spurs of leg III and tibial spurs of leg III and IV (c) Telson, lateral view (d) Metasomal segment V, ventral view (e) Sternum (f) Fourth right stigma and (g) Chelal movable finger dentition; enlarged circled area shows distal tip

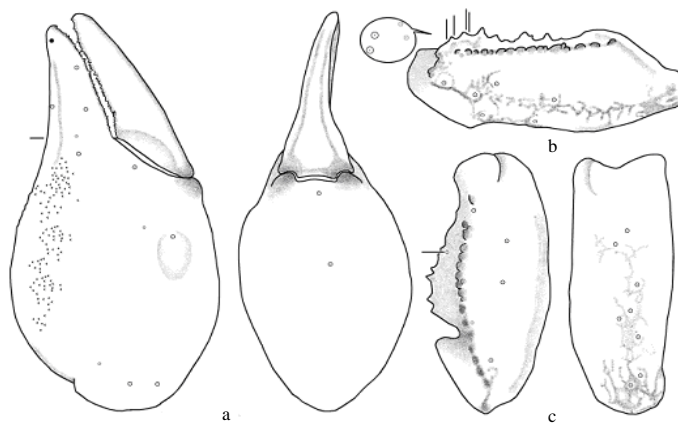


Fig. 3: *Vachoniolus iranus*, male paratype, showing trichobothrial pattern. (a) Chela, external and ventral views. Closed circle on chelal fixed finger external view indicates trichobothrium i (b) Femur, dorsal view. Circled area shows internal trichobothria from an internal perspective and (c) Patella, dorsal and external views. In external view note neobothriotaxy, an accessory trichobothrium present in the esb series. Note, these figures are of the left pedipalp, the images have been reversed for easy comparison to other right pedipalp illustrations

The surface between the carinae is sparsely to densely granulated. The segments bear only a few bristles. The telson is elongate, with the vesicle shorter than the aculeus and the surface nearly smooth, with only a few granules and setae. There is no subaculear tubercle (Fig. 2c).

Pedipalps: The femur has dorsal carinae strong and granulose, no ventroexternal carina and the internal surface bears a few coarse granules, the surfaces are shagreened and sometimes bear a few randomly situated coarse granules. The patella has dorsal carinae moderate, granular and ventrointernal carina strong, granulose. Other carinae are inconspicuous or absent. The male chela is robust, inflated and completely devoid of carinae. The fingers are quite short. The entire surface is finely granulated, especially the dorsum of chela. The female chela is smooth and narrower than in the male (Fig. 1 a-d). The dentate margin of the pedipalp-chela movable finger bears distinct granules divided into 8 or 9 rows and 4-6 terminal granules (Fig. 2g).

Comments: All examined specimens have tibial spurs on the third and fourth legs (Fig. 2b), but presumably this may be as variable as in *Vachoniolus globimanus*, in which some specimens possess the spurs and others lack them.

Affinities: The described features distinguish *Vachoniolus iranus* from all other species known to occur in Khoozestan Province. The genus *Vachoniolus* (Levy *et al.*, 1973) has so far included only one species, *V. globimanus* (Levy *et al.*, 1973), which occurs in the Arab Emirates, Saudi Arabia and Oman. The new species thus represents the first record of this genus in Iran. The two species can be distinguished from one another by the males of *V. globimanus* having the chela of pedipalp smooth and carapace smooth to shagreened, whereas in the males of *V. iranus* these parts are densely granulated. Other differences between *V. iranus* and *V. globimanus* include the following (variation is to be expected in some). *V. iranus* has strong fuscous patterns on carapace, internal and external surfaces of pedipalp femur and internal surface of pedipalp patella, whereas in the *V. globimanus* pigmentation is much weaker on carapace and absent on pedipalps. *V. iranus* is smaller, total length is 34-42.5 mm (adult *V. globimanus* may reach 65 mm). *V. iranus* has metasoma II and III dorsal carinae serrate, with larger denticles arrayed uniformly, closely spaced and mostly separated by one denticle width or less

(in *V. globimanus* these carinae are denticulate, with smaller denticles, most separated by two denticle widths or more). *V. iranus* has fewer denticles on metasomal carinae, e.g., metasoma II and III ventral carinae with 6 denticles on posterior half of segment (*V. globimanus* with 7-13). *V. iranus* has pedipalp patella with dorsointernal carina prominently developed, with robust granules or denticles (weaker with smaller granules or denticles in *V. globimanus*). *V. iranus* has tergites III-VI lateral carina positions marked by paired posterolateral longitudinal rows of 2-3 distinct granules (only one weak granule, if any, in *V. globimanus*) and median carina bearing 1-3 granules (none in *V. globimanus*). *V. iranus* has heavier granulation on anterior interocular area of carapace (*V. globimanus* with finer granulation). *V. iranus* has posterior portions of tergites finely granular (smooth in *V. globimanus*). *V. iranus* has metasoma I and II with dorsolateral surfaces granulated (smooth to finely shagreened in *V. globimanus*).

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