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ORIGINAL ARTICLE

HOTTENTOTTA POOYANI SP. NOV. (SCORPIONES, BUTHIDAE) FROM THE KHUZESTAN PROVINCE, IRAN

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ABSTRACT

A new species, *Hottentotta pooyani* sp. nov. is described and illustrated using two female specimens collected from the Khuzestan Province in Iran. This species is compared with the closely species including *H. khozestanus* Navidpour, Kovařík, Soleglad & Fet, 2008; *H. pellucidus* Lowe, 2010 and *H. saxinatans* Lowe, 2010 that were previously described in Iran and Oman.

Keywords: Description, *Hottentotta*, Iran, Khuzestan, New species.

INTRODUCTION

Iran is located between Central Asia, Anatolia and the Middle East. Therefore, many species or genera exist in Iran that originated in those regions. Besides, Iran possesses high levels of endemism. According to Barahoei *et al.* (2020) listed 68 scorpion species for Iran of which 41 are endemic. Ten species belonging to the genus *Hottentotta* have been recorded or described from in Iran: *H. akbarii* Yağmur, Moradi, Tabatabaei & Jafari, 2022; *H. jayakari* (Pocock, 1895); *H. juliae* Kovařík, Yağmur & Fet, 2019; *H. khozestanus* Navidpour, Kovařík, Soleglad & Fet, 2008; *H. lorestanus* Navidpour, Nayebzadeh, Soleglad, Fet, Kovařík & Kayedi, 2010; *H. navidpouri* Kovařík, Yağmur & Moradi, 2018; *H. saulcyi* (Simon, 1880); *H. schach* (Birula, 1905), *H. sistansensis* Kovařík, Yağmur & Moradi, 2018 and *H. zagrosensis* Kovařík, 1997. All species are endemic in Iran except *H. jayakari* and *H. saulcyi* (Birula, 1905; Kovařík, 2007; Mirshamsi *et al.*, 2011; Cokendolpher *et al.*, 2019; Kovařík *et al.*, 2018, 2019; Akbari *et al.*, 2020; Barahoei *et al.*, 2020).

Twenty-one scorpion species have been recorded from Khuzestan Province until now (Navidpour *et al.*, 2008; Karataş and Gharkheloo, 2013; Akbari *et al.*, 2020). Among those, six species belong to the genus *Hottentotta*: *H. juliae* Kovařík, Yağmur & Fet, 2019; *H. khozestanus* Navidpour, Kovařík, Soleglad & Fet, 2008; *H. navidpouri* Kovařík, Yağmur &

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Moradi, 2018; *H. saulcyi* (Simon, 1880), *H. schach* (Birula, 1905) and *H. zagrosensis* Kovařík, 1997 (Navidpour *et al.*, 2008; Akbari *et al.*, 2020). In addition, Lowe (2010) described two new species, *H. pellucidus* and *H. saxinatans* from Oman.

The new species is compared with *H. pellucidus* and *H. saxinatans* due to morphological similarities, as well as with *H. khoozestanus* which is an endemic species in Khuzestan Province. The aim of the study is to introduce a new species of the genus *Hottentotta* from Khuzestan Province of Iran.

MATERIALS AND METHODS

Two female specimens were collected from the Khuzestan Province. The two type specimens were preserved in 96% alcohol. Pictures of the type specimens were taken manually via the Canon EOS 7D. Stacking of pictures was done with the aid of Helicon Focus software, version 5.3.14. Illustrations under UV illumination were performed according to Volschenk (2005). Trichobothrial nomenclature was adopted according to Vachon (1974) and morphological nomenclature follows Stahnke (1971), Francke (1977), and Hjelle (1990). The female holotype and a female Paratype were deposited in the Alaşehir Zoological Museum, Manisa Celal Bayar University, Alaşehir, Manisa, Turkey (AZMM).

RESULTS

Family Buthidae C. L. Koch, 1837

Genus *Hottentotta* Birula, 1908

Hottentotta pooyani sp. nov. (Pls 1-7; Tab. 1)

Type materials: Holotype: 1 ♀, Iran, Khuzestan Province, Bagh-e Malek, Qaleh Tall, 31°37'44"N, 49°53'04"E, 875 m a. s. l., 8 May 2009, A. Akbari leg. (coll. AZMM/Sco-2009:01). Paratype: 1 ♀, same data as holotype (coll. AZMM/Sco-2009:02).

Etymology: The species epithet is a patronym dedicated to Pooyan Moradi, the son of the first author.

Diagnosis: Scorpions of medium size, total length of 61.43 and 64.71 mm in the two female specimens. All body glabrous, sternites and pecten sparsely setose. Color uniformly pale dark yellow. Carinae of carapace and tergites moderately granular. Carapace with coarse granules laterally but anteriorly with a few coarse granules, between posteriomedian, centromedian and anteriomedian carinae without granules, the intercarinal area of the carapace smooth. Anterior margin of carapace with intermittent coarse granules and a few setae. Tergites that have three carinae and posterior margins that protrude in short spiniform processes. Tergites I-VI have moderate granules laterally, but no granules between the lateral carinae, and the intercarinal area is smooth. Sternites III-VI smooth and carinae, with sternites VII having four granular carinae. Pedipalps with slender shape, femur of a pedipalp has 5 carinae, the patella bears 7 carinae. Pedipalp chela without carinae, elongated, with short manus and long fingers. Pedipalps movable fingers have 16 rows of denticles and 5 terminal denticles with no basal scalloping.

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Trichobothrium db exists on a fixed finger between *est* and *et*. Metasomal segments I-II have 10 carinae, III-IV have 8 carinae, and V bears 5 carinae. Lateral inframedian carinae incomplete at segment II and present on the posterior half. All metasomal segments have very sparsely small granules and setae, surface of intercarinal area smooth. All carinae have medium and intermittent equal-sized granules. All metasomal segments are longer than wide. Vesicle bulbous, with three rows of coarse granules on the ventral surfaces; aculeus robust, curved, shorter than the vesicle. Pectines teeth in two females 27–27 and 31–32.

Relationships: All *Hottentotta* species in Iran are large sized species whereas *Hottentotta pooyani* sp. nov. is medium sized. In addition, *H. akbarii*, *H. juliae*, *H. lorestanus*, *H. navidpourii*, *H. saulcyi*, *H. schach*, *H. sistanensis* and *H. zagrosensis* are hirsute whereas *H. pooyani* sp. nov. glabrous. *H. jayakari* with black coloration on chela, patella, last three segment of metasoma and telson whereas the current species with yellow coloration. *H. khoozestanus* has relatively short fingers and a movable finger/manus ratio of 2.25 (according to Navidpour *et al.*, 2008) whereas the new species has long fingers and movable finger/manus ratios of 2.61 and 2.72 respectively. In addition, *trichobothrium db* positioned on a fixed finger between *et* and *dt* in *H. khoozestanus* whereas between *est* and *et* in *H. pooyani* sp. nov. and *H. khoozestanus* with smooth ventrolateral and ventral submedian carinae on metasomal segments I-IV, whereas in *H. pooyani* with moderately granular carinae. *H. pellucidus* and *H. saxinatans* have 10 carinae with segments on III, whereas the current species has 8 carinae (Lateral inframedian carinae absent). *H. pellucidus* with hirsute pedipalp and metasoma whereas *H. pooyani* with glabrous. *H. saxinatans* has 13-14 rows of denticles on the movable fingers of pedipalps whereas *H. pooyani* has 16 rows of denticles on the movable fingers of pedipalps. In additions the anterior of carapaces of *H. saxinatans* have dense medium to coarse granules whereas *H. pooyani* has a few coarse granules.

Description (holotype): Total length is 61.43 mm. Measurements are in Table (1).

Coloration: Color uniformly, pale yellow; with darker coloration only between the median eyes, the surround of the lateral eyes, and the anterior margin of the carapace; chelicerae and vesicles are lustrous.

Carapace: Subquadrate, slightly wider than long, with a concave anterior margin.. Carapace with coarse granules laterally but anteriorly with a few coarse granules, between posteriomedian, centromedian and anteriomedian carinae without granules, the intercarinal surface of the carapace smooth. Anterior margin with intermittent coarse granules and a few setae. Posterior margin with moderately pointed granules. Lateral margins with microgranules. Carapace carinae that are moderately granular. 12 short and one long macrosetae on the anterior margin of the carapace. Median eyes are more anterior than the center of the carapace. There are five pairs of lateral eyes; the two eyes are only half the size of the three others. But the holotype with six lateral eyes on the left is an exception.

Chelicerae: This species' dentition is typical of the genus; the surface is smooth, lustrous, and glabrous, with large granules arranged in longitudinal rows without reticulations.

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Mesosoma: Sternum Type 1, triangular in shape, somewhat elongated (Soleglad and Fet, 2003). Tergites I-VI glabrous with three granular, moderately carinated tergites. Pretergites and between lateral carinae without granules, out of the lateral carinae with rounded coarse granules laterally. Intercarinal surfaces are smooth; posterior margin of tergites with a single row of pointed granules. Tergites III-V with transversal anterolateral series of granules joined to lateral carinae; tergite VII pentacarinata; lateral pairs are fused, carinae strong with intermittently located coarse and rounded granules, the median carina has only 4-5 big granules. Intercarinal surfaces smooth and bear a few coarse pointed granules. Sternites III-VI smooth, lustrous, and glabrous but with lateral margins of microgranules and a row of macrosetae. Sternite VII smooth and bears four granulated carinae, but the granules rounded. Sternites III without bear carinae and sternites IV-VI bear weak and smooth lateral carinae. Sternite VII smooth, lustrous with four weak finely granular carinae, and lateral margins with crenulate microgranules without setae. Pectinal tooth count 27-27; pectinal marginal tips extend slightly to sternite IV; pectines with three marginal and nine middle lamellae and dense long setae.

Pedipalps: Trichobothrial pattern Type A, orthobothriotaxic. Dorsal trichobothria arranged in β configuration on the femur. Trichobothrium d_2 of the femur located on the dorsal surface; patella trichobothrium d_3 located internal to the dorsomedian carina. Pedipalps glabrous and intercarinal surface smooth.

Femur with five carinae; ventrointernal, dorsointernal and dorsoexternal carinae strong, granular; ventroexternal carina moderate and bears irregular spaced granules; internal median carina moderate with unsteady pointed coarse granules.

Patella has seven moderate carinae; dorsointernal and dorsoexternal carinae have irregular pointed coarse granules and one spinoid granule distally; other carinae with finely and intermittently granular granules.

Chela slender with short manus, long and thin fingers; chela long/width ratios 6.09 and 6.27 and movable finger/manus ratios 2.61 and 2.72 respectively; without carinae; surface smooth with scattered short setae. Fixed and movable fingers of the pedipalps bear 16 rows of denticles and 5 terminal denticles, without basal scalloping. Trichobothrium db located on a fixed finger between *est* and *et*.

Metasoma and telson: All metasomal segments longer than wide; metasomal segments I-II bear ten carinae, III-IV bear eight carinae, V bears five carinae. Lateral inframedian carinae incomplete at segment II and present on posterior half; all metasomal segments with very sparsely small granules and setae, and intercarinal surface smooth. All carinae have medium and intermittent equal-sized granules. Dorsolateral carinae I-IV have larger and more pointed granules, while V has swollen granules anteriorly and obsolete granules posteriorly. Dorsolateral carinae on I-IV bear bigger and more pointed granules, on V with swollen granules anteriorly and obsolete posteriorly. Ventromedian carina on V with coarsely

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irregular granules and bifurcate posteriorly. Segment V has two rows of unsteady granules between the ventromedian and ventrolateral carinae.

Vesicle bulbous, steeply inclined posteriorly; surface smooth and without setae, ventral surfaces bear three rows of big granules. Subaculear tubercle indicated by a big, rounded granule. Aculeus robust, not abruptly curved, shorter than vesicle.

Legs: Tarsomeres and basitarsus with two rows of strong and short spiniform setae on the ventral surface and without setae on the other surfaces. Pedal spur of legs does not bear setae. Tibia and femur with distinct carinae, tibial spurs exist and long on III and VI legs.

Variation: Female holotype has 27-27 pectinal teeth and female paratype has 31-32 pectinal teeth.

DISCUSSION

In this paper, a new species of the genus *Hottentotta* from Khuzestan Province is described, which is similar to *H. pellucidus* and *H. saxinatans*. These are medium sized species and have uniform pale-yellow coloration and a slender chela. These are species similar in terms of these characters to *Hottentotta pooyani*.

Up to know, there are six species belong to *Hottentotta* are known from the Khuzestan Province (Kovařík *et al.*, 2019; Akbari *et al.*, 2020). *Hottentotta pooyani* is the seventh species from the Khuzestan Province, belonging to the genus. Among these records, *H. khoozestanus* is known so far only from this province and *H. pooyani* is the second endemic species there and the ninth endemic species of the genus in Iran.

The Khuzestan Province has some endemic species that are close to widespread species in the Arabian Peninsula such as *Apistobuthus susanae* and *Vachoniolus iranus*. Similarly, *H. pooyani* sp. nov. is another species in Khuzestan Province which is related to *H. pellucidus* and *H. saxinatans* distributed in Oman. We suggest herein that some species in the Arabian Peninsula are distributed as far as Basra province in Iraq. Because, humidity of this province and Euphrates and Tigris rivers provide barrier and isolation between dry regions located at two sides and xerophilic species cannot penetrate to Khuzestan and Hormozgan Provinces of Iran. As a result previously carried populations from the Arabian Peninsula were evolved into endemic species here.

CONCLUSIONS

The new species *Hottentotta pooyani* sp. nov. is described herein. With the description of this species, the number of species of the genus *Hottentotta* in Iran increased to 11 and the number of endemic species to 9.

Hottentotta pooyani sp. nov.

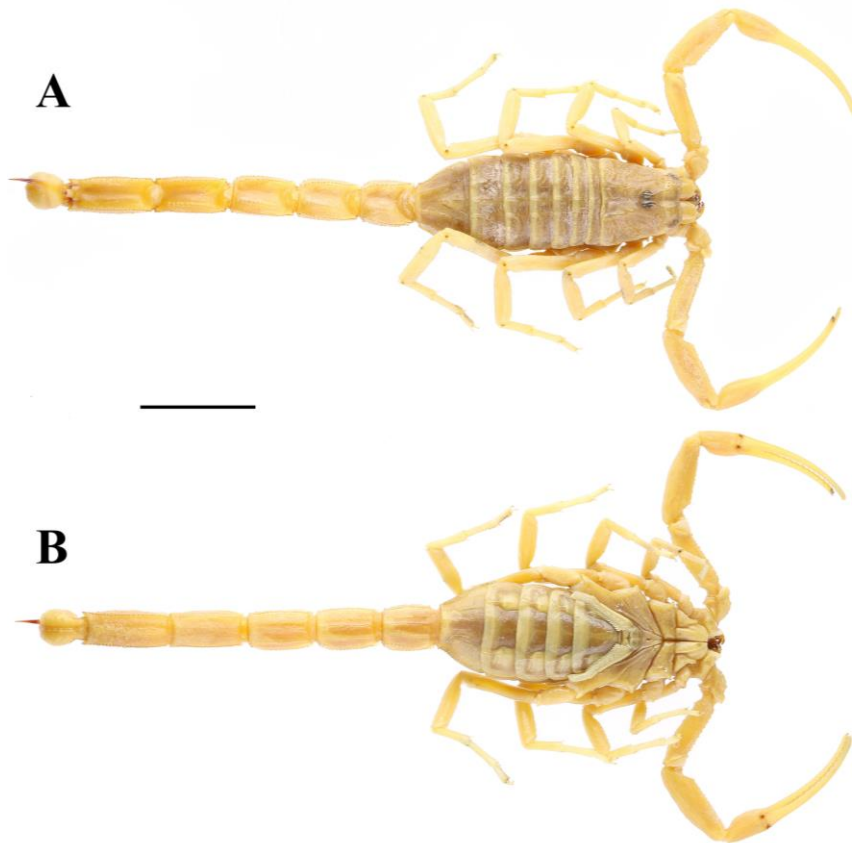


Plate (1): *Hottentotta pooyani* sp. nov., female holotype; (A) Dorsal view, (B) Ventral view (scale: 10 mm)

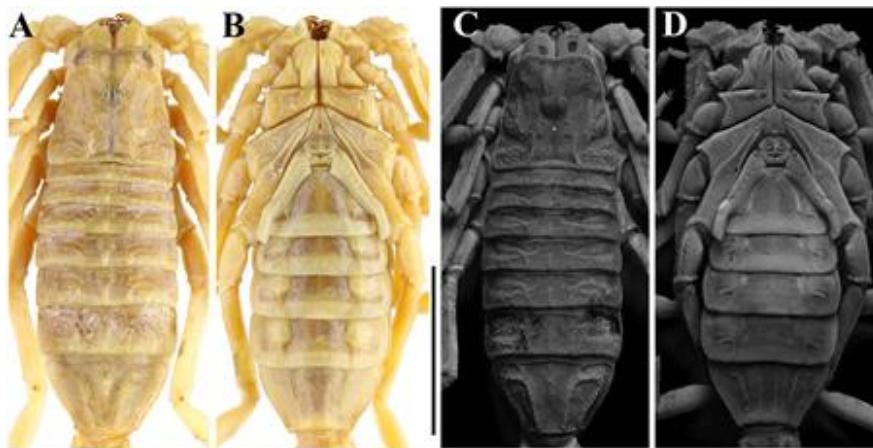


Plate (2): *Hottentotta pooyani* sp. nov., prosoma and mesosoma; (A, C) Dorsal view, (B, D) Ventral view, (A, B) Under white light, (C, D) Under UV light (scale: 10 mm).

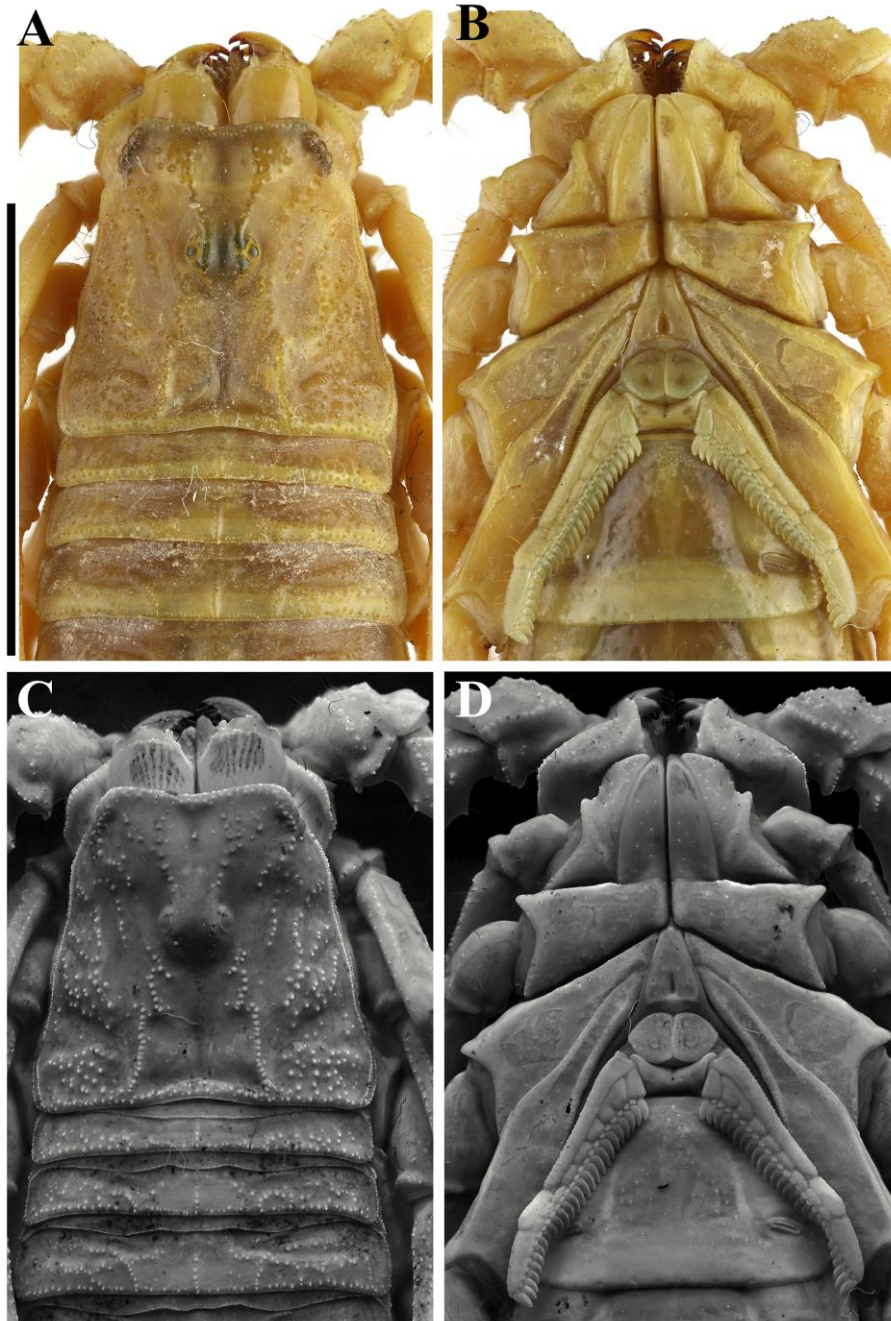


Plate (3): *Hottentotta pooyani* sp. nov., carapace and coxosternal area; (A, C) Dorsal view, (B, D) Ventral view, (A, B) under white light, (C, D) under UV light (scale: 10 mm).

Hottentotta pooyani sp. nov.

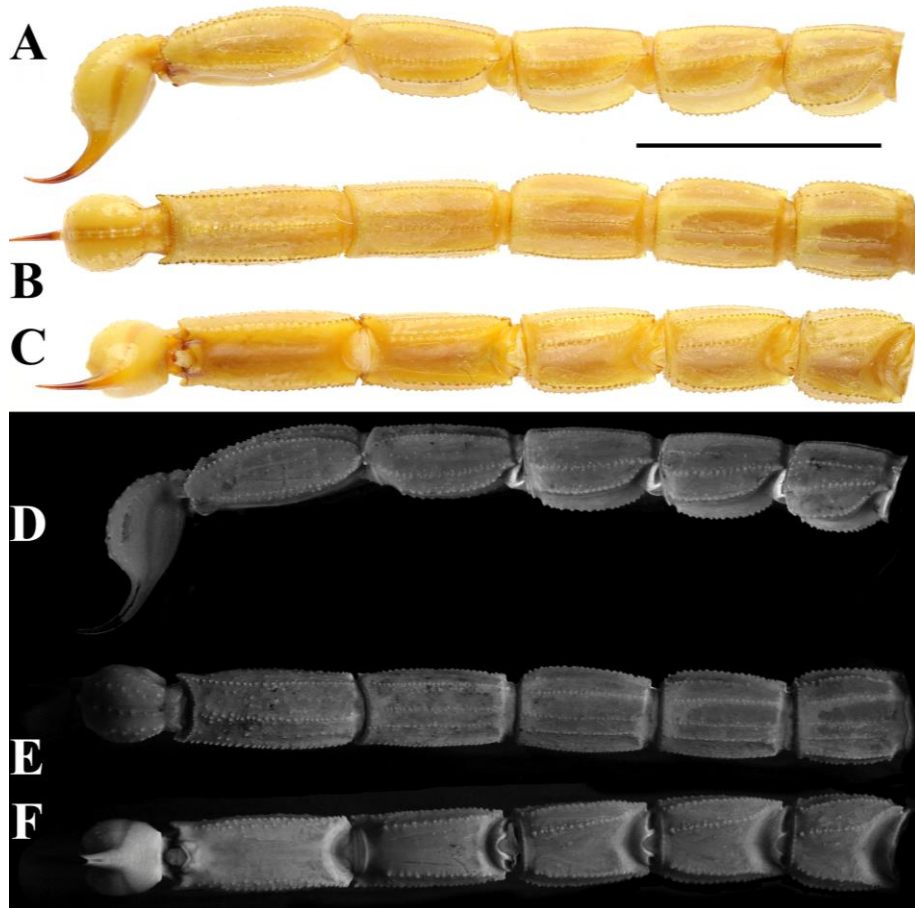


Plate (4): *Hottentotta pooyani* sp. nov., metasoma; (A, D) Lateral view; (B, E) Dorsal view; (C, F) Ventral view; (A, B, C) Under white light; (D, E, F) Under UV light (scale: 10 mm).

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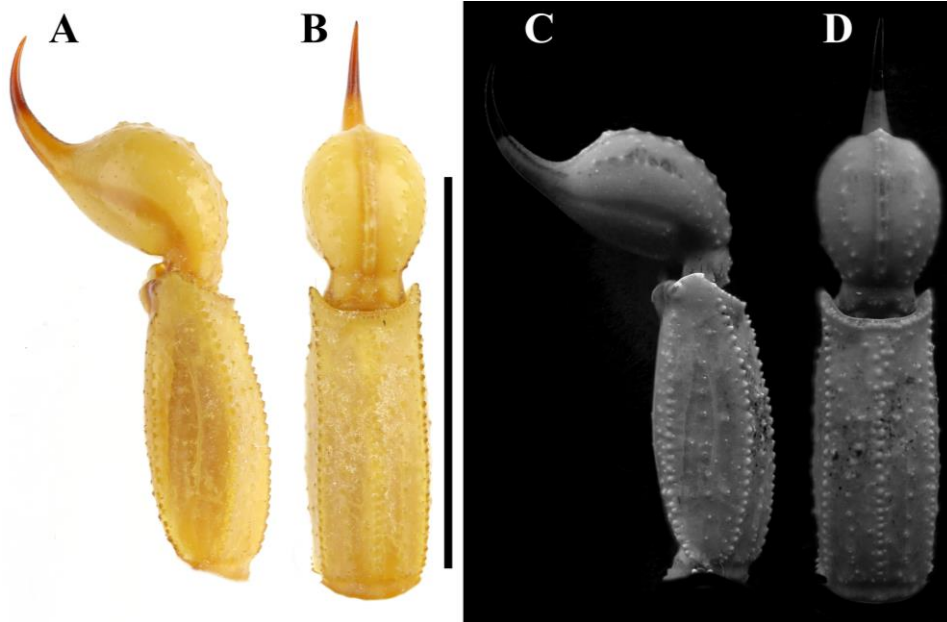


Plate (5): *Hottentotta pooyani* sp. nov., fifth segment and telson; (A, C) Lateral view, (B, D) Dorsal view, (A, B) Under white light, (C, D) Under UV light (scale: 10 mm).

Hottentotta pooyani sp. nov.

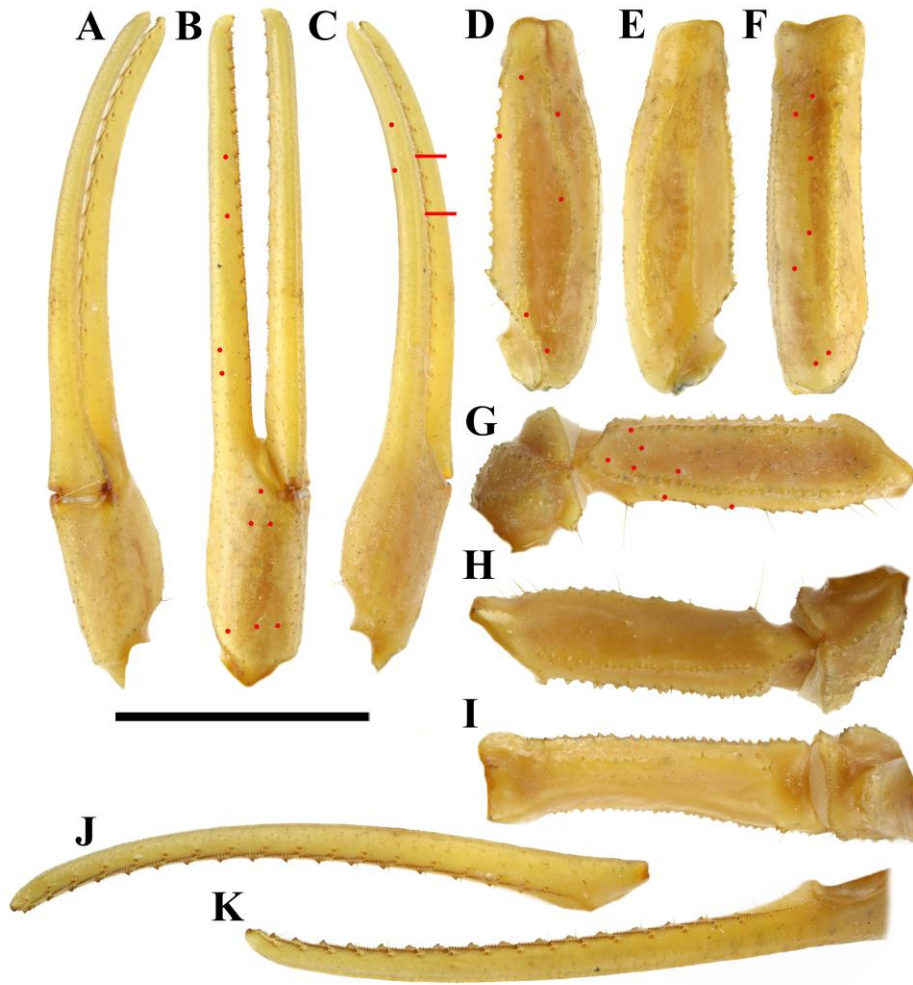


Plate (6): *Hottentotta pooyani* sp. nov.; (A, B, C) Chela, (D, E, F) Patella, (G, H, I) Femur, (J) Movable finger, (K) Fixed finger, (A, E, H) Ventral view, (C, D, G) Dorsal view, (B) Lateral view, (B, I) External (trichobothrial pattern is indicated by red circles) (scale: 10 mm).

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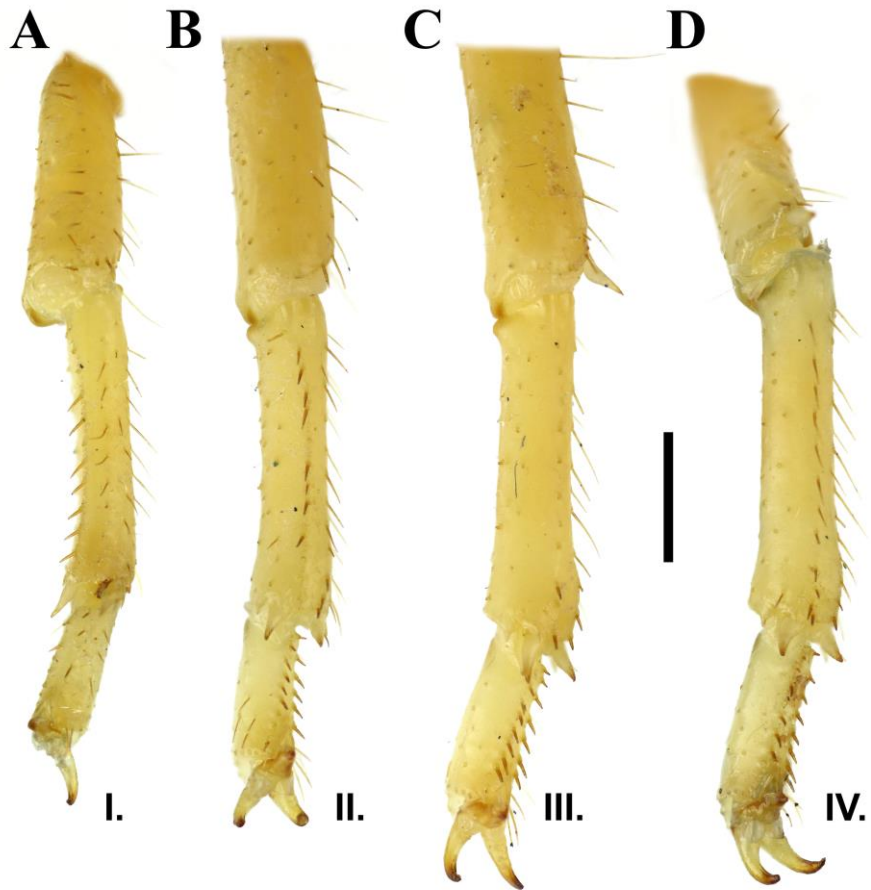


Plate (7): *Hottentotta pooyani* sp. nov., right legs; I–IV, retrolateral view (scale: 1 mm).

Hottentotta pooyani sp. nov.

Table (1): Measurements (in mm) of the female holotype and female paratype of *Hottentotta pooyani* sp. nov.

Body parts	Dimensions	Holotype ♀	Paratype ♀
Carapace	L / W	7.20 / 7.31	6.92 / 7.07
Mesosoma	L	15.92	19.66
Tergite VII	L / W	4.02 / 7.26	5.38 / 8.79
Metasoma + telson	L	38.31	38.15
Segment I	L / W / D	4.84 / 4.25 / 3.91	4.67 / 4.29 / 3.57
Segment II	L / W / D	5.67 / 3.91 / 3.45	5.13 / 3.84 / 3.31
Segment III	L / W / D	5.81 / 3.46 / 3.33	5.68 / 3.62 / 3.25
Segment IV	L / W / D	6.48 / 3.18 / 3.30	6.50 / 3.26 / 3.11
Segment V	L / W / D	7.81 / 3.29 / 3.17	8.63 / 3.46 / 3.00
Telson	L / W / D	7.70 / 3.40 / 3.14	7.54 / 3.39 / 2.81
Pedipalp	L	29.60	28.23
Femur	L / W	7.34 / 1.97	6.98 / 1.76
Patella	L / W	7.93 / 2.49	8.33 / 2.44
Chela	L	14.33	12.92
Manus	L / W / D	3.86 / 2.35 / 3.16	3.68 / 2.06 / 3.16
Movable finger	L	10.09	10.03
Total	L	61.43	64.71

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CONFLICT OF INTEREST STATEMENT

"The authors have no conflicts of interest to declare".

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Hottentotta pooyani نوع جديد للعلم
(Scorpiones, Buthidae)

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الخلاصة

وصفَ و صور العقرب *Hottentotta pooyani* كنوع جديد للعلم، اعتمادا على عينيتين من الإناث التي جمعت من مقاطعة خوزستان الإيرانية.

تمت مقارنة هذا النوع مع الأنواع القريبة منه التي ضمت كل من:
H. pellucidus و *H. khoozestanus* Navidpour, Kovařík, Soleglad & Fet, 2008
و *H. saxinatans* Lowe, 2010 التي سبق و ان تم وصفها في إيران و عُمان.