



Introducing *Compsobuthus matthiesseni* (Birula, 1905) scorpion as one of the major stinging scorpions in Khuzestan, Iran

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ABSTRACT

Khuzestan province has the highest rate of scorpion sting in Iran. This is a study to identify these scorpions in Khuzestan. In this study 418 scorpions were kept in the ethyl alcohol 70%, each being studied by stereomicroscopy and diagnosis key separately. 120 (28.7%) *Androctonus crassicauda*, 104 (24.9%) *Hemiscorpius lepturus*, 91 (21.7%) *Mesobuthus eupeus*, 86 (20.65%) *Compsobuthus matthiesseni*, 14 (3.35%) *Hottentotta saulcyi*, 2 (0.5%) *Orthochirus scrobiculosus* and 1 (0.25%) *Hottentotta schach* were identified. *H. lepturus* is in the Hemiscorpiidae family and the rest are in Buthidae. *C. matthiesseni* is the most frequent and *O. scrobiculosus* is the least frequent newly identified scorpion. This study adds two new sting scorpions to the previous list of 8 identified scorpions in Iran.

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1. Introduction

Due to its geographical position and climate, scorpions had been a common danger as reflected through scientific, literature and religious texts of ancient Iran (Dehghani, 2006). According to the published reports of the Disease Management Center, scorpion stinging had a frequency of 37,666, 37,259, 38,259, 36,806 and 42,085 from 2001 to 2005 while 14, 29, 23, 14 and 24 cases of death have been attributed to them, respectively (Azhang and Moghisi, 2006). The highest percentages of scorpion stinging were reported in Khuzestan, Kohkiluyeh Boyer-Ahmad and Ilam (Azhang and Moghisi, 2006). According to those reports, the real figure of annual stinging is much more than the reported ones (Dehghani and Valaie 2004).

Khuzestan covers an area of about 64,246 km² encompassing 19 towns. It has been located in the Southwest of Iran and neighbors five other provinces namely: Lorestan in

the North, Ilam in the Northwest, Chahar Mahal and Bakhtiari, and Kohkiluyeh and Boyer-Ahmad in the East, and Bushehr in the Southeast. Persian Gulf limits Khuzestan in the South (Fig. 1). Humidity varies from 10 to 90% and temperature from 60 °C in deserts during summers to 0 °C in eastern mountain areas during winters. The habitats and ecological niches in this part of Iran are diverse. There are 4,187,018 live people with 129,966 (31%) in rural regions (2004 estimates) in this province (Khuzestān Province, 2009). The dry and mid-dry climate provides an appropriate habitat for the Arthropods including venomous animal. The changes ensuing the 8-year-war with Iraq, increasing population, emigration, constructions in rural regions and city neighborhood using old materials such as stone and porous muddy-bricky wall have boost an increase in scorpion sting rates (Dehghani, 2006).

In Iran, highest prevalence of scorpion sting and its resulting death has been reported from Khuzestan province (Azhang and Moghisi, 2006). The highest rates of annual incidence of scorpion sting per hundred thousand populations are 1563 in Khuzestan, 1290 in Kohkiluyeh Boyer-Ahmad and 8260 in Ilam. About 60% of all sting reports

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Fig. 1. Close up map of IRAN provinces, the Khuzestan provinces depicted in black (Withdraw from National Geosciences Database of IRAN).

originate from Khuzestan (Table 1) (Azhang and Moghisi, 2006). No study exists to demonstrate the real spectrum of scorpions in Khuzestan. These data are important for the identification and treatment of stinging by scorpions. This study was conducted to identify the species of scorpion sting agents in Khuzestan, Iran.

2. Materials and methods

In this study 455 scorpions that all had stung patients were collected from medical centers that patient had referred to them. Some of the collected scorpions due to serious damage were non-distinguishable and were excluded from the investigation. Finally 418 scorpions were assessed. The required information about scorpion sting together with scorpion and its sting was collected from rural and urban clinics of Khuzestan.

Table 1
Frequency distribution of scorpion sting in Khuzestan and other provinces from 2001 to 2005 (Azhang and Moghisi, 2006).

Year	Province		
	Only Khuzestan (%)	Other provinces (%)	Total in Iran (%)
2001	23,984 (63.7)	13,682 (36.3)	37,666 (100)
2002	22,847 (60.9)	14,688 (39.1)	37,535 (100)
2003	23,076 (60.3)	15,183 (39.7)	38,259 (100)
2004	20,434 (55.5)	16,372 (44.5)	36,806 (100)
2005	24,876 (59.9)	17,209 (40.1)	42,085 (100)

It was obligatory for medical centers to send the forms along with the scorpion sting. Every sting was put in a container of Ethyl Alcohol 70%, with the information written on them and fixed with a special tape. These containers were put in boxes of 20 and were studied morphologically by Stereomicroscopy and key classification in the Medical Entomology Laboratory of Kashan Medical Sciences University (Farzanpey, 1987; Dehghani and Valaie, 2004). The results were entered on the basis of species and family in a database and descriptive analysis was done.

3. Results

A total of 418 scorpions were collected and fully studied. Among 418 collected scorpions, 120 *Androctonus crassicauda* (28.7%), 104 *Hemiscorpius lepturus* (24.9%), 91 *Mesobuthus eupeus* (21.7%), 86 *Compsobuthus matthiesseni* (20.6%), 14 *Hottentotta saulcyi* (3.35%), 2 *Orthochirus scrobiculosus* (0.5%) and 1 *Hottentotta schach* (0.25%) were identified. *H. lepturus* belongs to Hemiscorpiidae or Liochelidae with cytotoxic and hematotoxic venom and the others belong to Buthidae with a neurotoxic venom. In this study *C. matthiesseni* was identified for the first time as a major agent and *O. scrobiculosus* as a minor agent for scorpion sting in Khuzestan and consequently Iran (Table 2). *C. matthiesseni* (Fig. 2) were collected by the authors under fence of stones around plantations made for

Table 2

Total number and percentage of scorpion sting agents based on species and family in Khuzestan province.

Row	Family	Species	Number (%)
1	Buthidae	<i>Androctonus crassicauda</i>	120 (28.7)
2	Hemiscorpiidae	<i>Hemiscorpius lepturus</i>	104 (24.9)
3	Buthidae	<i>Mesobuthus eupeus</i>	91 (21.7)
4	Buthidae	<i>Compsobuthus matthiesseni</i>	86 (20.6)
5	Buthidae	<i>Hottentotta saulcyi</i>	14 (3.35)
6	Buthidae	<i>Orthochirus scrobiculosus</i>	2 (0.5)
7	Buthidae	<i>Hottentotta schach</i>	1 (0.25)
Total	2	7	418 (100)

fencing the farm in the Kaldozakh village of Izeh, Cholcholak village of Baghmalek and Ramhormoz city in Khuzestan.

4. Discussion

Our findings show that at least 7 important scorpion species are found in Khuzestan with varied prevalence. Radmanesh (1990) reported the following sting prevalences in 1990: *A. crassicauda*, 41%, *M. eupeus*, 45%, *H. lepturus*, 13% and *H. saulcyi* sporadic. An anecdotal case of *Apistobuthus pterygocercus* is reported in Khuzestan (Radmanesh and Shaffie, 1989). In a separate study on 199 victims frequencies of *M. eupeus*; 50% in the spring and

25–30% in the summer and *A. crassicauda* and *H. lepturus* were reported 35–40% and 10–15%, respectively (Ali-Chitnis et al., 1993). In a large study on 7930 victims during 1999–2000 in Ahvaz Abuzar Hospital these three scorpions *M. eupeus*, *A. crassicauda*, *H. lepturus* had the highest frequency (Mashak, 2000). On the other hand, Dehghani et al. in Kashan found that 30% of their 200 victims had been attacked by *A. crassicauda* while 62% were suffered from either *M. eupeus* or *Olivierius caucasicus*. They only suggested a case of *Odontobuthus doriae* in their 8% undetermined population (Dehghani et al., 1998). In North-western Iran mostly *A. crassicauda* is reported to possess the highest rate (Ghaderi et al., 2006). As it is evident, all the above reported scorpions were also found in our study.

While *Odontobuthus odonturus* is among the scorpions mostly found in Southern Iran, the detail data about this scorpion is lacking in the literature (Pipelzadeh et al., 2007). Pipelzadeh et al. found also that 10–15% of all of scorpion stinging result from *H. lepturus* and reported that the prevalence of sting in villages was higher than cities in the time course of 1998–2003 (Table 3). In addition we did not identify *A. pterygocercus* in our study. The important part of our study was identification of *C. matthiesseni* with the prevalence of 20.6% as one of the major species responsible for scorpion sting in Iran.

The scorpion *Hottentotta acutecarinatus matthiesseni* was described by Birula in 1905 from several areas in Iran. This taxon received further attention in the literature in the succeeding years. Levy et al. (1973) expressed doubts about the generic affiliation of this species. Kovarik (1996) once again brought attention to classifying *matthiesseni* in species-level (Sissom and Fet 1998).

Eight new species of genus *Compsobuthus* were described by Kovarik (2003). *C. matthiesseni* belongs to Buthidae family being bright yellow and 40–50 mm in length. *C. matthiesseni* has robust metasomal segments, pectinal tooth counts (males 27–29 teeth, females 20–23 teeth), a broad telson, and fused central median and posterior median carapacial carinae (Sissom et al., 1998). *C. matthiesseni* has some dark spots, which are considered diagnostic for this taxon (Fig. 2). This scorpion is reported from central Iran (Kashan), southeastern Turkey and eastern Iraq which are all in the Tigris–Euphrates region (Sissom and Fet, 1998; Vignoli et al., 2003). *C. matthiesseni* is common with a very high density in Khuzestan (Navidpour et al., 2008). It is usually found in warm and moist places like stone gaps and tree crusts. Other places in Iran where this scorpion is found are Khorasan, Bandar Abbas,

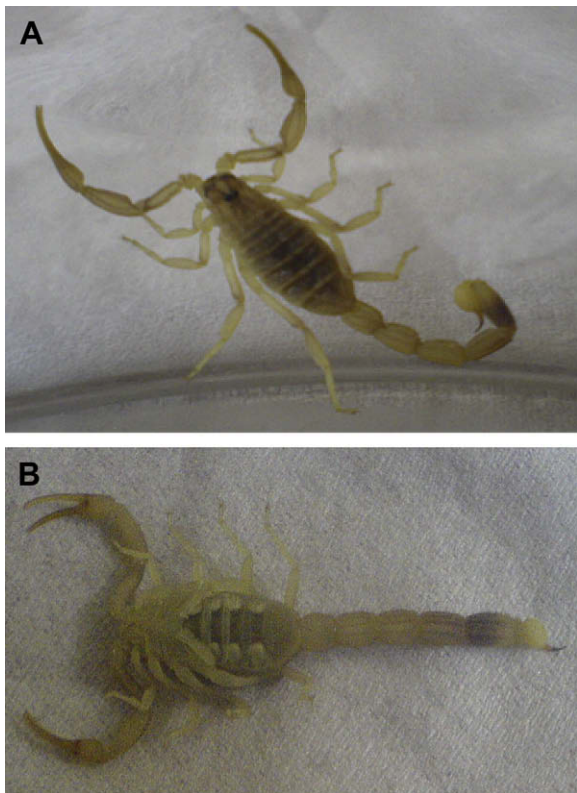


Fig. 2. (A) Dorsal view *Compsobuthus matthiesseni*, (B) Ventral view *Compsobuthus matthiesseni*.

Table 3

Scorpion sting incidence in 100,000 persons in rural and urban areas in Khuzestan province during 1998–2003 (Azhang and Moghisi, 2006).

Year	Incidence	
	Rural N/100,000	Urban N/100,000
1998	922	617
1999	952	625
2000	961	921
2001	865	499
2002	796	464
2003	784	463

Gilangharb and Ghasreshirin. What had been found from rural sayings for the fear of getting close to this scorpion is the ensuing hematuria after the sting (Farzanpey, 1994) however these have no accompanying medical report and proof (Dehghani and Bigdelli, 2007). Because of its yellow color it is probable that it had been thought to be *M. eupeus* or *H. lepturus* which should be avoided because similarity of color is not an accurate clue of identification.

We found two (0.5%) *O. scrobiculosus*, demonstrating to be a minor agent for the first time. It is one of the smallest species in Iran being 3 cm in length with a black color. Its leg and shoulder are light yellow which varies in different regions. Its tail is short and thick with some blister depressions on the 4th and 5th segment. The regions in Iran identified to house this scorpion are Kashan, Aran, Bidgol, Nashalq Mountains and Ahwaz while its sting is largely reported in Khuzestan, Ahwaz (Dehghani, 2006; Dehghani and Bigdelli, 2007).

Existing studies have reported 7 species in Iran 5 of which are identified in Khuzestan. Adding our identified species, we come to at least 8 species in Khuzestan and 10 species in the whole Iran. One can easily predict identification of further species through further research of Iranian centers. Since different scorpions are reported in different places, further research should be focused on venom and venomous mechanisms in areas of human habitant. In addition, behavioral and ecological studies are the other aspects that currently lack. However, further clinical investigations on victims of such scorpions' stings are warranted to evaluate the correlation with scorpion specie. We hope that in near future area-specific studies are conducted because identification of dangerous scorpions in any region is a key for effective treatment of the victims (Dehghani and Valaie, 2004; Dehghani, 2006).

It should be also emphasized once more that only the physicians in the region could help the patients; so they should be aware of the topical and systemic manifestations and should become empowered to identify dangerous species and choose the best treatment protocol in due course.

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Conflict of interest

None of the authors have any conflict of interest.

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