

A Checklist of Scorpions in Iran (By 2017)

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Abstract

Aim: The present study aimed at compiling an updated checklist of scorpion species in 2017. **Methods:** scorpion, species, classification, Iran, and family were taken as keywords and were searched in the websites related to credible academic journals and scientific databases such as Web of Science, Ovid, PubMed, Systematic Review, SID, Iran Medex, Scirus, Google Scholar, and Medline. The search was more focused on species identification and included all articles published by 2017. A total of 150 articles were examined, of which 75 were selected as they involved the scorpion species found in Iran. **Results and Discussion:** Scorpions have attracted a great degree of attention, owing to possess a painful sting, poisonous venom, and sometimes fatal venom. In the past 50 years, scorpions have been studied from different biological and toxicological aspects in Iran. These efforts have been more focused on identifying different species of this animal. From among the 64 scorpion species reported in Iran, 86% belonged to the Buthidae family, 9.5% to the Hemiscorpiidae family, and 4.5% to the Scorpionidae family. The species were mainly reported to inhabit southern and southwestern Iran. The number of scorpion species reported in Iran has increased in the past 50 years. This trend will continue as more accurate studies are going to be conducted in this field. **Conclusion:** Iran is among the countries which have been reported to have a great number of species especial the dangerous ones.

Key words: Checklist, Iran, scorpion, scorpionida, species

INTRODUCTION

Iranian people have always been prone to the bites and stings of several different animals.^[1,2] These bites and stings are mainly inflicted by venomous animals. Different species of venomous animals live in the vast lands of Iran,^[3-5] ranging from the southernmost to the northernmost regions.^[6-9] Scorpions are nocturnal animals and have venomous stings, which they use for self-defense and to capture insects.^[10,11] Their habitats are mostly in deserts and unpopulated areas. The majority of global human fatalities from venomous arthropods are attributed to scorpions.^[12,13] Putting many lives at risk of death, scorpion stings are one of the most important health issues in tropical and subtropical countries including Iran.^[14-19] Thus, the identification of different scorpion species has always been of interest to researchers. The classification of scorpions has undergone many ups and downs over the past decades.^[20,21] The number of identified scorpion families has changed several times over the course of 25 years (1980–2005).^[22]

Changes in the systematic global classification of scorpions have affected the classification of

these arthropods in Iran.^[23-26] In other words, the changes in the former have brought about changes in the latter. Accordingly, there are several different reports on the classification of scorpions reported in Iran. The lack of a scientific and precise method for identifying, naming, and classifying scorpions in Iran has also contributed to this problem.^[25] Despite the widespread increase in the application of molecular and biochemical techniques, traditional morphological methods are still used to identify and classify scorpions, leading to this continuous confusion becoming a common phenomenon.^[25,27] In this study, an updated checklist of scorpion species reported in Iran was compiled without taking into consideration the methods used to study these arthropods.

Credible medical and health journals and scientific databases such as Ovid, PubMed, Systematic Review, SID, Iran Medex,

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Scirus, Google Scholar, Medline, and Web of Science were searched for scorpion, classification, Iran, identification, studies, family, and species as keywords to find relevant articles published in both English and Farsi (Persian) by 2017. A total of 150 studies were found and examined. Finally, 75 studies were selected by taking into account the research objective and the fact that the present study was focused on the scorpion species reported in Iran. These studies and their application in Iran were further examined and critically analyzed. Finally, the collected data were presented as a checklist.

After reviewing the articles published by different researchers, scorpions reported in Iran were classified into three families. These families included Buthidae, Scorpionidae, and Hemiscorpiidae [Table 1]. The three families contained 64 species and 20 genera [Table 2]. From among these 64 species, 55 belonged to the Buthidae family, 6 to the Hemiscorpiidae, and 3 to the Scorpionidae. Over 86% of scorpion species identified in Iran were members of the Buthidae family, while

9.5% and 4.5% belonged to the Hemiscorpiidae family and the Scorpionidae family, respectively.^[25,28-33] According to the latest studies on the different species of scorpions in Iran, three different scorpion families have been identified in this country. These include the Buthidae family, Scorpionidae family, and Hemiscorpiidae family. These families and their species are introduced below.

Buthidae family

The Buthidae are the largest family of scorpions. This family is widely distributed in the world, with the exception of New Zealand and polar regions of Earth. Its members are, especially, found in tropical and subtropical regions. Different species of Buthidae family are sized between 20 and 120 mm and have a triangular sternum. Some of these species are considered large scorpions. However, the majority of Buthidae are categorized as medium-sized scorpions. Some Buthidae species are harmless, while the dangerous ones should be completely avoided. In 2001, Lourenco defined 80 genera of the Buthidae family.^[21] Many Buthidae species are venomous, with <20 being fatal to humans.

The Buthidae family is considered as the largest and the most diversified family of scorpions in Iran. From among the 64 scorpion species identified in Iran, 55 belong to the Buthidae family. These 55 species are distributed in 17 genera. The Buthidae have a wide geographical distribution in Iran and are, especially, found in tropical and subtropical areas.^[33-59]

Table 1: The abundance of Iranian scorpions by family, genus, and species^[13,21,22,33-61]

Family	Genus (%)	Species (%)
Buthidae	17 (85)	55 (86)
Hemiscorpiidae	1 (5)	6 (9.5)
Scorpionidae	2 (10)	3 (4.5)
Total	20 (100)	64 (100)

Table 2: List of Iranian Scorpions by family, genus, and species^[13,21,22,33-61]

Family	Genus	Species	Provincial dispersion
Buthidae	<i>Androctonus</i>	<i>Androctonus crassicauda</i> (Olivier, 1807)	Busher, Semnan, Khuzestan, Ilam, Western Azerbaijan, Kurdistan, Razavi Khorasan, Southern Khorasan, Kermanshah, Kerman, Sistan-Baluchestan
		<i>Androctonus baluchicus</i> (Lournco2005)	Sistan-Baluchestan
		<i>Androctonus robustus</i> (Kovařík & Ahmed, 2013)	Sistan-Baluchestan
	<i>Apistobuthus</i>	<i>Apistobuthus pterygocercus</i> (Finnegan, 1932)	Khuzestan
		<i>Apistobuthus susanae</i> (Lourenço, 1998)	Khuzestan, Lorestan
	<i>Buthacus</i>	<i>Buthacus leptochelys</i> (Hemprich and Ehrenberg, 1829)	Khuzestan, Bushehr, Lorestan
		<i>Buthacus macrocentrus</i> (Ehrenberg, 1828)	Khuzestan, Bushehr, Hormozgan, Ilam
		<i>Buthacus tadmoresis</i> (Simon, 1829)	Ilam
	<i>Compsobuthus</i>	<i>Compsobuthus garyi</i> (Lourenço et Vachon, 2001)	Khuzestan
		<i>Compsobuthus jakesi</i> (Kovařík, 2003)	Khuzestan, Bushehr, Ilam
<i>Compsobuthus kafkai</i> (Kovařík, 2003)		Sistan-Baluchestan	

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Table 2: (Continued)

	<i>Compsobuthus kaftani</i> (Kovařík, 2003)	Yazd, Isfahan, Kerman
	<i>Compsobuthus matthiesseni</i> (Birula, 1905)	Bushehr, Charmahal-Bakhtiari, Fars, Hamedan, Kerman, Kohkyloye-Boyer-Ahmad, Kurdistan, Lorestan, Markazi, Qom, Khuzestan, Hormozgan, Khorasan, Kermanshah, Ilam, Kurdistan, Western Azerbaijan, Isfahan
	<i>Compsobuthus persicus</i> sp. n. (Navidpour et al., 2008)	Fars, Bushehr
	<i>Compsobuthus petrioli</i> (Vignoli, 2005)	Fars
	<i>Compsobuthus plutenkoi</i> (Kovařík, 2003)	Hormozgan
	<i>Compsobuthus acute carinatus</i> (Simon, 1882)	Fars, Bushehr
	<i>Compsobuthus rugosulus</i> (Pocock, 1900)	Fars, Bushehr
	<i>Compsobuthus sobotniki</i> (Kovařík, 2003)	Hormozgan
<i>Hottentotta</i>	<i>Hottentotta zagrosensis</i> (Kovařík, 2003)	Charmahal-Bakhtiari, Fars, Kohkyloye-Boyer-Ahmad, Lorestan, Khuzestan, Western Azerbaijan
	<i>Hottentotta schach</i> (Birula, 1905)	Khuzestan, Fars
	<i>Hottentotta saulcyi</i> (Simon, 1880)	Charmahal-Bakhtiari, Fars, Hamedan, Kerman, Kohkyloye-Boyerahmad, Lorestan, Hormozgan, Kermanshah, Ilam, Kurdistan, Western Azerbaijan, Isfahan, Sistan-Baluchestan, Ardebil
	<i>Hottentotta lorestanus</i> sp. n. (Navidpour et al., 2010)	Lorestan
	<i>Hottentotta khozestanus</i> sp. n. (Navidpour et al., 2008)	Khuzestan
	<i>Hottentotta jayakari</i> (Pocock, 1895)	Qom, Hormozgan, Fars
	<i>Hottentotta alticola</i> (Pocock, 1895)	Lorestan, Hormozgan, Kermanshah, Sistan-Baluchestan, Khuzestan
<i>Iranobuthus</i>	<i>Iranobuthus krali</i> (Kovařík, 1997)	Fars, Isfahan
<i>Kraepelinia</i>	<i>Kraepelinia palpator</i> (Birula, 1903)	Kerman, Yazd
<i>Liobuthus</i>	<i>Liobuthus kessleri</i> (Birula, 1898)	Khorasan Razavi
<i>Mesobuthus</i>	<i>Mesobuthus eupeus</i> (C.L. Koch, 1839)	Fars, Kerman, Kohkyloye-Boyer-Ahmad, Hormozgan, Kermanshah, Ilam, Western Azerbaijan, Isfahan, Sistan-Baluchestan, Ardebil, Markazi, Mazandaran, Yazd, Semnan, Khuzestan, Golestan, Tehran, Khorasan Razavi, Southern Khorasan
	<i>Mesobuthus macmahoni</i> (Navidpour et al. 2011)	Sistan-Baluchestan, Kerman
	<i>Mesobuthus phillipsii</i> (Mirhashemi et al. 2011)	Khuzestan, Hormozgan

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Table 2: (Continued)

	<i>Mesobuthus zarudnyi</i> (Birula, 1900)	Khuzestan, Hormozgan
	<i>Mesobuthus vesiculatus</i> (Pocock, 1899)	Tehran, Isfahan, Yazd
	<i>Mesobuthus</i> or <i>Olivierus caucasicus</i> (Nordmann, 1840)	Western Azerbaijan, Isfahan, Sistan-Baluchestan, Markazi, Semnan, Khorasan, Tehran
<i>Odontobuthus</i>	<i>Odontobuthus bidentatus</i> (Lourenço et Pézier, 2002)	Lorestan, Hormozgan, Khuzestan
	<i>Odontobuthus doriae</i> (Thorell, 1876)	Kerman, Hormozgan, Kermanshah, Western Azerbaijan, Isfahan, Markazi, Yazd, Semnan, Tehran, Ghazvin, Alborz, Bushehr, Hamedan
	<i>Odontobuthus odonturus</i> (Pocock, 1897)	Khuzestan, Fars, Bushehr, Kermanshah, Ilam, Yazd
	<i>Odontobuthus tavighiae</i> (Navidpour et al., 2013)	Hormozgan
	<i>Odontobuthus tirgari</i> (Mirhashemi et al. 2012)	Khorasan Razavi, Southern Khorasan
<i>Orthochirus</i>	<i>Orthochirus farzanpayi</i> (Vachon et Farzanpay, 1987)	Bushehr, Kerman, Hormozgan, Khuzestan, Southern Khorasan
	<i>Orthochirus fuscipes</i> (Pocock, 1900)	Sistan-Baluchestan
	<i>Orthochirus gruberi</i> (Kovařík et Fet, 2006)	Kerman
	<i>Orthochirus iranus</i> (Kovařík, 2004)	Lorestan, Khuzestan, Ilam, Hamedan, Bushehr, Kohkyloye-Boyerahmad
	<i>Orthochirus scrobiculosus</i> (Birula, 1900)	Hormozgan, Kermanshah, Ilam, Isfahan, Sistan-Baluchestan, Semnan, Khuzestan, Tehran, Southern Khorasan, Guilan, Qom
	<i>Orthochirus stockwelli</i> (Lourenço et Vachon, 1995)	Khuzestan, Ilam, Hormozgan, Bushehr
	<i>Orthochirus varius</i> (Kovařík, 2004)	Hormozgan
	<i>Orthochirus zagrosensis</i> (Kovařík, 2004)	Khuzestan, Kohkyloye-Boyer-Ahmad, Isfahan, Yazd, Kerman
<i>Anomalobuthus</i>	<i>Anomalobuthus talebii</i> (Teruel et al. 2014)	Southern Khorasan
<i>Polisius</i>	<i>Polisius persicus</i> (Fet, Capes et Sissom, 2001)	Ilam, Sistan-Baluchestan, Isfahan, Kerman
<i>Razianus</i>	<i>Razianus zarudnyi</i> (Birula, 1903)	Hormozgan, Ilam, Sistan-Baluchestan, Charmahal-Bakhtyari, Kohkyloye-Boyer-Ahmad, Lorestan, Khuzestan
<i>Sassanidotus</i>	<i>Sassanidotus gracilis</i> (Birula, 1900)	Sistan-Baluchestan, Hormozgan, Tehran
	<i>Sassanidotus zarudnyi</i> (Birula, 1903)	Sistan-Baluchestan, Hormozgan, Tehran
<i>Simonoides</i>	<i>Simonoides farzanpay</i> (Vachon and Farzanpay 1987)	Hormozgan
<i>Vachoniolus</i>	<i>Vachoniolus iranus</i> sp. n. (Navidpour et al., 2008)	Khuzestan

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Table 2: (Continued)

Scorpionidae	<i>Scorpio</i>	<i>Scorpio maurus townsendi</i> (Pocock, 1900)	Fars, Kohkyloye-Boyer-Ahmad, Kermanshah, Ilam, Western Azerbaijan, Isfahan, Semnan, Khuzestan, Khorasan, Charmahal-Bakhtyari, Lorestan, Kurdistan, Guilan, Ghazvin, Alborz, Bushehr
	<i>Nebo</i>	<i>Nebo henjamicus</i> (Franck, 1980) <i>Nebo</i> n. sp. (Dehghani 2008)	Hormozgan Kerman
Hemiscorpiidae	<i>Hemiscorpius</i>	<i>Hemiscorpius acanthocercus</i> (Monod et Lourenço, 2005) <i>Hemiscorpius enischnochela</i> (Monod et Lourenço, 2005) <i>Hemiscorpius gaillardi</i> (Vachon, 1974) <i>Hemiscorpius lepturus</i> (Peters, 1862)	Hormozgan Hormozgan, Khuzestan Sistan-Baluchestan, Kerman Fars, Kohkyloye-Boyer-Ahmad, Kermanshah, Ilam, Isfahan, Semnan, Khuzestan, Lorestan, Kurdistan, Hamedan, Kerman, Bushehr, Hormozgan
		<i>Hemiscorpius persicus</i> (Birula, 1903) <i>Hemiscorpius kashkayi</i> (Karataş and Gharkheloo 2013)	Sistan-Baluchestan Khuzestan
3	20	64	

(Contd...)

Scorpionidae family

The Scorpionidae species inhabit in Africa, Asia, and Australia. In a revision of the higher scorpion systematics, Soleglad *et al.* included all the genera of the family Diplocentridae into Scorpionidae. As a result, the Diplocentridae family became a subfamily of the Scorpionidae. This revision increased the number of Scorpionidae species and genera to 208 and 14, respectively.^[56] In Iran, in addition to the genus *Scorpio*, the genus *Nebo* has also been reported in Hengam Island (in the Persian Gulf) and Kerman Province.^[58,59] From among the genera and species belonging to the Diplocentrinae subfamily, only one species in one genus has been reported in Iran, which, fortunately, is harmless to humans.^[14] The *Scorpionidae* species identified in Iran include *Scorpio maurus* and *Nebo hengamicus*.^[33-59]

Hemiscorpiidae family

The Hemiscorpiidae family was previously known as Ischnuridae. In 2003, in compliance with the International Code of Zoological Nomenclature, the Ischnuridae family was given a new name: The Liochelidae family.^[16,59] However, in 2005, Soleglad *et al.* changed the name to the Hemiscorpiidae family and included the genus *Heteroscorpion* in the family.^[56] Members of this family are quite similar to members of the Scorpionidae family. In fact, they were previously classified

in one single family. The *Hemiscorpius lepturus* species is one of the dangerous members of the Hemiscorpiidae family.^[31] In Iran, one genus and 6 species of the Hemiscorpiidae family have been observed and reported.^[33-59]

DISCUSSION

From among the scorpion species reported in Iran, 86% belong to the Buthidae family, 9.5% to the Hemiscorpiidae family, and 4.5% to the Scorpionidae family. The changes in the structure of the species found in different climatic and geographical regions are one of the main reasons for the instability in the classification of scorpions. Addressing this problem requires adopting some new species identification methods, including molecular and genetic techniques. According to the latest investigations, the checklist of scorpion species reported in Iran consists of three families. These include the Buthidae family, Scorpionidae family, and Hemiscorpiidae family. These families contain 64 species and 20 genera. The latest changes to this checklist include a new unknown species belonging to the genus *Nebo* reported in Jiroft (Kerman Province).^[33,59] Currently, five species belonging to the genus *Odontobuthus* are reported in Iran.^[60,61]

Androctonus crassicauda is the most dangerous and deadliest member of the Buthidae family. From among the members

of the Hemiscorpidae family, *H. lepturus* is of utmost importance. *H. lepturus* is one of the most dangerous and most medically significant scorpions in Iran.^[13,17,19] With only 3 species reported in Iran, members of the Scorpionidae family are not of much medical significance.^[58,59] Southern and southwestern parts of Iran are rich in scorpion species diversity.^[17,22,37,38] Some scorpion species reported in Iran possess venomous and deadly stings, and some have painful stings. Both these groups are considered as medically significant. Some species belonging to the genus *Odontobuthus*, *Hottentata*, *Compsobuthus*, *Apistobuthus*, *Androctonus*, *Mesobuthus*, *Orthochirus*, *Hemiscorpis*, and *Olivirus* their stings have also been reported in Iran. People stung by these scorpions can develop complications, such as hypotension, tachycardia, convulsion, unconsciousness, distraction, restlessness, anxiety, hemolysis, wounds, skin necrosis and kidney failure. In the habitats of the scorpions reported in Iran, especially in the hot parts of Khuzestan and Isfahan Provinces, there are a number of animals that feed on scorpions and are regarded as their predators.^[62-70] Like many other animals and arthropods, scorpions are among the major pests threatening public health in different parts of Iran and causing harm and annoyance to people.^[71,72] One of the methods that should be taken into consideration in the efforts to control these annoying pests is the use of chemical pesticides. However, in addition to the problem of environmental pollution, these pests can increasingly become resistant to chemical pesticides. This applies to all other arthropods too. As a result, the use of chemical pesticides in fighting scorpions should be carefully and accurately planned and implemented.^[73-75]

CONCLUSIONS

Currently, several investigations and studies show that southern and southwestern parts of Iran are the richest in scorpion species diversity and abundance. It can be predicted that changes in the methods used to identify scorpion species in Iran will lead to more accurate estimates about their distribution and population density throughout the country. Thus, a uniform method should be used to conduct a thorough and nationwide study at both the provincial and city levels. As always, southern and southwestern provinces will be the richest in species diversity. However, the species diversity decreases as we move away from the southwest toward the northeast and northwest.

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