INNSPUB

International Journal of Biosciences | IJB |
ISSN: 2220-6655 (Print), 2222-5234 (Online)
http://www.innspub.net
Vol. 16, No. 2, p. 312-322, 2020

RESEARCH PAPER OPEN ACCESS

Some new record of scorpion fauna found in different regions of district Pishin (Balochistan) Pakistan

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Key words: Scorpion fauna, diversity, Buthidae, Pishin, Pakistan.

http://dx.doi.org/10.12692/ijb/16.2.312-322 Article published on February 24, 2020

Abstract

The present study was aimed to ascertain the diversity of scorpion fauna of district Pishin, Balochistan province, Pakistan. Scorpion's species were captured in field at night very carefully by using torch lights from April to October, 2018. A total of 130 specimens including 79 males and 51 females were collected. These were identified based on main diagnostic features. Five species of scorpions from five genera and one family (Buthidae) are recorded for the first from this region of Pakistan. The identified specimens include *Andructonous rubustus, A. austrialis Mesobuthous cypirus, M. eupeus, Hottentotta (Buthotus), Buthacus (Birula),* and *Tityus serrulatus*. The *Androctonus austrialis* showed high ratio of abundance 41(70.73% male, 29.26% female) followed by *Hottentotta (Buthotus)* sp. 31 (61.29% male, 38.71% female) and *Buthacus* (*Birula*) sp. 24 (62.5% male, 37.5% female) respectively. Among six localities, Pishin town showed high number (29) of scorpion species followed by Khanozai (26) and Baostan (25). Based on male specimen's measurements, *Hottentotta* (*Buthotus*) sp. was found to be the larger scorpion with 11.1 cm total body length compared to the male specimens of the remaining four species. Color comparison indicated four species (*A. austrialis, A. rubustus, Buthacus* (*Birula)* sp., *Tityus serrulatus*) with yellow to yellowish body color, whereas *M. cyprius, M. eupeus* and *Hottentotta* (*Buthotus*) sp. showed yellowish brown, gray, and black to yellow body color respectively. Findings concluded that foremost and diverse assortment of scorpions in the study region are existed giving a criterion for further demographic and ecological studies, and stresses the necessity for impact assessment prior to undertaking developmental projects, since arachnids exhibit restricted movements and are vulnerable to habitat modification.

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Introduction

Scorpions (Arthropoda: Chelicerata: Scorpiones) represent a wide range of predatory animals that have been existing nearly 400 million years on planet earth (Polis, 1990).

They are stinging arachnids and inhabit almost every terrestrial habitat, except Antarctica (Weygoldt, 1998). Scorpions are characterized easily by having four pair of legs, two grasping pedipalps, the tapered and segmented tail ends with a noxious stinger (Fet and Soleglad, 2013). Scorpions ranges in size from 3 cm to 11 cm in length (Ebrahimi and Soltani, 2015; Sousa *et al*., 2010), and are commonly found in hot, dry environments, normally nocturnal in habits and appear after sunset. Scorpions live mostly under stones in the daytime to protect themselves from high temperature during hot seasons and also look for their prey (Raz *et al*., 2009; Warburg, 2011).

Scorpions are medically important arachnids in terms of produced potent venom to paralyze and kill their preys (Rafizadeh et al., 2009; Bawaskar *et al*., 2012, Lourenco *et al*., 2018).

To date more than 1700 species of scorpions have been described (Prendini, 2000; Stockmann and Ythier, 2010; Lourenco *et al*., 2018). Although they have a wide range distribution around the globe but the mainstream distributes at altitude ranges from 23° to 38° (Kjellesvige-Waering, 1986; Farzanapay, 1988, Kovarike, 1997; Salama and Sharshar, 2013). The growth of human population and expansion of human civilization have led to enhanced interaction with these arthropods often resulting in accidents when people get stung (Chippaux and Goyffon, 2008).

Diversity and dispersion of scorpions are not well documented in Pakistan. Fauna of British India monograph comprise limited knowledge about scorpion fauna of the Subcontinent such as Pakistan and India (Pocock, 1900). Since 1900, there are only few reports on scorpions in the country. However, several studies (Tikader and Bastawade, 1983; Lourenco and Vachon, 1997; Lourenco and Monod, 1998; Lourenco, 2005; Kovarik and Fet, 2006; Kovarik, 2000, 2004, 2007) added new species to Pocock scorpion data, around the globe. Kovarik and Ahmed (2013) have reported this species from Sindh province of Pakistan.Ahsan et al., 2016a, 2016b and Ahsan, and Tahir (2016) recorded three species of scorpion namely *Hottentotta tamulus*, *Androctonus finitimus, Odontobuthus odonturus* and *Mesobuthus tumulus* from Punjab province, Pakistan.

According to inauthentic data, Pakistan has approximately 50 species belonging to 17 genera and five families, and most of them are reported by Mirshamsi, (2011). *Androctonus finitimus* (Pocock, 1897) is an important scorpion species in having medical importance of its venom. However, unfortunately it was not previously reported from Punjab, Pakistan. Kovarik and Ahmed (2013) have reported this species from Sindh province of Pakistan.

As for there is lack of a previous research done on diversity and distribution of scorpion's fauna in district Pishin, Balochistan. Hence, to fill this gap, a study was undertaken to recognize the scorpion species and their distribution in the selected localities of the study region.

Material and methods

Study sites

Four field trips to various localities were made situated in rural, urban and mountainous regions of Pishin district (Fig. 1A) during the months April-May, June-July, August-September, and October-November of 2018. Pishin district is located in the northwest of Balochistan province, Pakistan, its geographical coordinates are 30° 35' 28" North, 67° 0' 10" East.

Area-wise it ranks 18 in Balochistan and has an area of 7,819 square kilometers, and distanced about 51 km from the capital city Quetta. Pishin district is bordered with Afghanistan to the west, Killa Saifullah to the east, Killa Abdullah to the north, Quetta and Ziarat districts to the south (Fig. 1B).

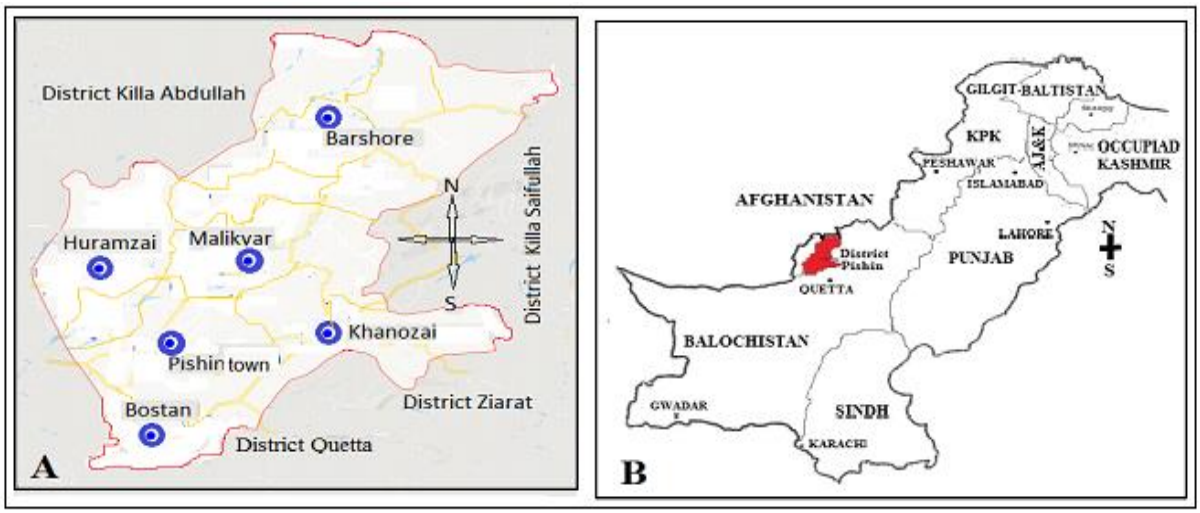

Fig. 1. (A): Map of district Pishin show locations of scorpion species. (B): District Pishin (red) in map of Pakistan.

Elevation and climate of Pishin

The district is situated 1370-1680 meter above sea level with 256 mm average annual rainfall. The least amount of rainfall occurs in September. The average in this month is zero (0) mm. But in last decade the water level has fallen down (Climate for Balochistan, Pakistan, 2019), and due to shortage of ground-water, minor variation in climate has been occurred which change the environment little bit dry, hence, as a result, raise scorpion's population to live and offer a sustainable habitat.

Scorpion collection

Scorpions were captured from five localities in Pishin district (Barshore, Huramzai, Malikyar, Pishin town, Baostan and Khanozai) as indicated in a map (Fig. 1A). Total 123 specimens were collected alive at night time by using the UV light and few of them were captured at early morning and day time beneath stones, plant leaves, in caves of rodents and in crevices.

They were transported to porous aerated plastic tanks (16cm x13cm) in size by adding the soil and dust wood for rearing and observing more characteristics.

They were fed with insects such as ants, cockroach, grasshoppers and earthworms for two months, then each scorpion was stored in 70% alcohol in the laboratory for examination.

Identification of specimen

The specimens were identified to genus and species level using keys of Farzanpay (1986), and with the help of forceps, measuring scale, and 3w Cob led magnifier of 3X power. Photographs were taken by Nikon (E8800-Japan) camera.

Results and discussion

Regarding the high prevalence of Scorpions fauna in Pishin district, it was observed that this region of Pakistan offers the best ecological condition for the activity of identified species.

Table 1. Identified scorpion male, female species total and average count.

Scorpion species	Number of specimens				
	Total No.	Male	Average	Female	Average
Androctonus austrialis	41	29	70.73	12	29.26
A. rubustus	12	5	41.66	7	58.33
Mesobuthus cyprius	5	2	40.00	3	60.00
M. eupeus	13	8	61.53	5	38.46
Hottentotta (Buthotus) sp.	31	19	61.29	12	38.71
Buthacus (Birula) sp.	24	15	62.5	9	37.5
Tityus serrulatus	4	1	25.00	3	75.00

The agricultural landscapes of this region, the dominant vegetation associations will generally provide a useful basis for the activity of scorpions. These associations tend to have dominant species and characteristic structural attributes. These associations also tend to correlate with the soil type and the other land features.

Table 2. Locality wise population count of scorpion species.

Scorpion species	Barshore	Huramzai	Malikyar	Pishin town	Baostan	Khanozai	Total	Average
Androctonus austrialis	3	5	7	11	7	8	41	6.83
A. rubustus	_	3	6	3	_	_	12	2
Mesobuthus cyprius	_	5	_	_	_	_	5	0.83
M. eupeus	_	13	_	_	_	_	13	2.16
Hottentotta (Buthotus) sp.	9	16	—	6	—	—	31	5.2
Buthacus (Birula) sp.	—	17	—	7	—	—	24	4
Tityus serrulatus	—	1	—	3	—	—	4	0.66
Total	12	22	16	29	25	26		

In the present study five species belonging to five genera of the scorpion family Buthidae (Koch, 1837) were identified.

In total one hundred and thirty scorpions including 79 males and 51 females were massed. The recorded species encountered with abundance ratio were: *Androctonus austrialis* (70.73% male, 29.26% female), *Androctonus rubustus* (41.66% male, 58.33% femlae), *Mesobuthus cyprius* (40.00% male, 60.00% female), *Mesobuthus eupeus* (61.53% male, 38.46% female), *Hottentotta (Buthotus)* sp. (61.295% male, 38.71% female%), *Buthacus (Birula)* sp. (62.55% male, 37.5% female) and *Tityus serrulatus* (25% male, 75% female).

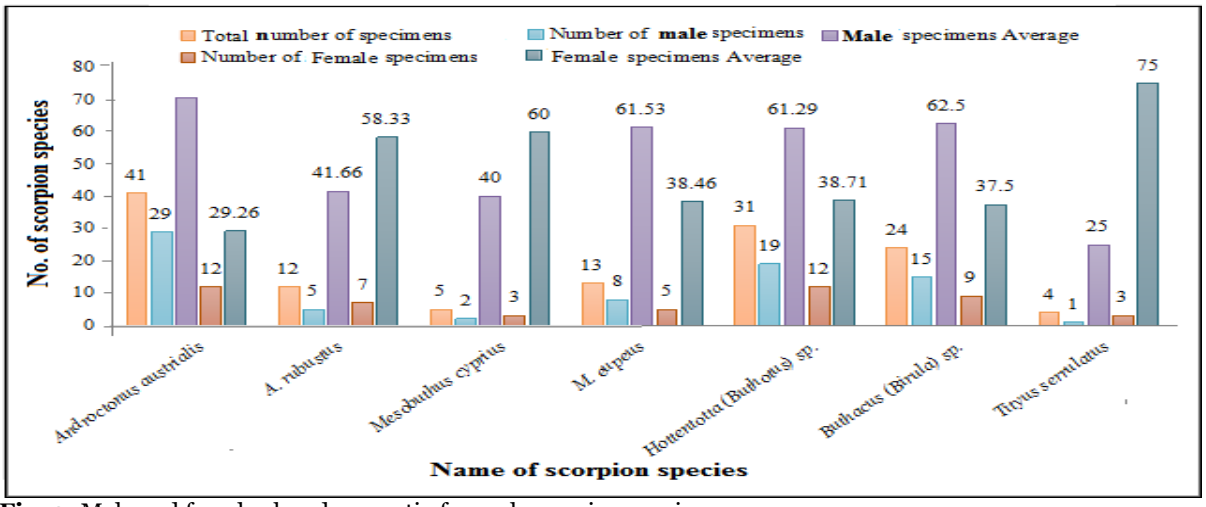

Fig. 2. Male and female abundance ratio for each scorpion species.

The scorpion species identified are listed in Table 1. Result of locality wise count revealed Pishin town with highest number (29) of scorpion species followed by Khanozai (26) and Baostan (25). Among species, *Androctonus austrialis* showed highest number of abundance 40 (6.83) captured from all localities while *Tityus serrulatus* showed lowest number 4 (0.66%) of individuals recorded in the ratio of 1+3 from Pishin town and Huramzai respectively (Table 2 and Fig. 3). *Hottentotta* (*Buthotus*) sp. was observed the largest scorpion has 11.1 cm total body length compared to *A. austrialis* (9.6 cm), *A. rubustus* (9.1 cm), *Buthacus* (*Birula)* sp. (6.3 cm), *M. cyprius* (4.6 cm). The smallest scorpion in body length was *M.*

eupeus reach to 3.6 cm. This species was also differing in having gray body color while above species have yellow body color with exception to *M. cyprius* and *Hottentotta* (*Buthotus*) sp. whose body exhibit yellowish-brown, and black to yellow coloring respectively as indicated in table 3.

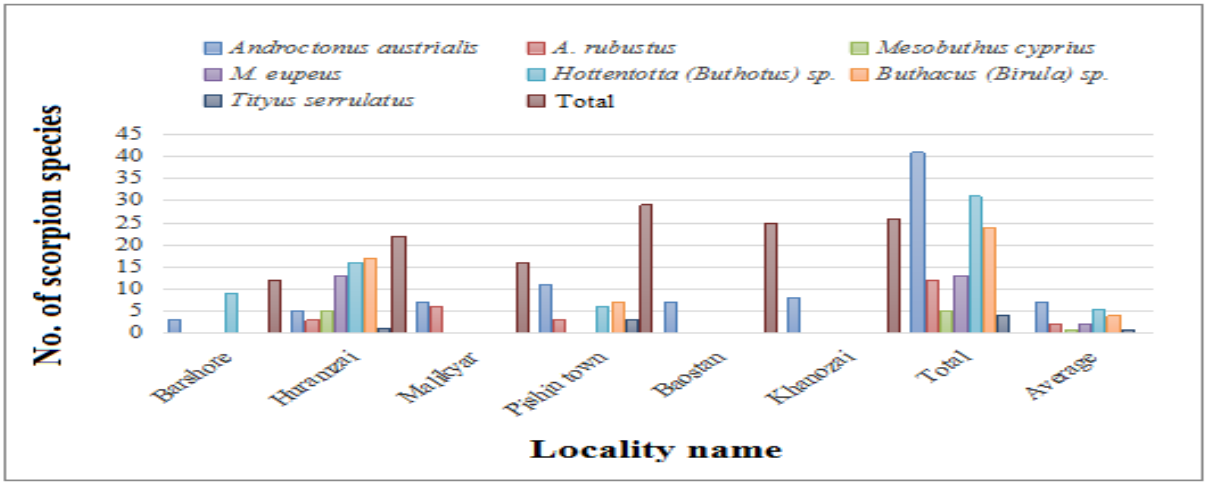

Fig. 3. Locality wise occurrence percentage for each scorpion species.

Pakistan has rich and diverse scorpion fauna. Data on these arthropods (scorpions) are meagre especially in Balochistan province of Pakistan. Moreover, prevalence and habitat makeup of known species is also undetermined in the country. However, according to Farzanpa (1988) previously two sub-species of *Mesobuthus eupeus* had been inhabit Pakistan and are: *M. eupeus macmahoni* (Mirshamsi 2011).

Fig. 4. *Androctonus australis* (male).

This form was captured from Balochistan of Pakistan, and *M. eupeus. atrostriatus* (Pocock, 1897), the range of distribution of this form extends up to Sindh and Punjab. Some known species like *Hottentotta tamulus* (Fabricius, 1798), *Odontobuthus odonturus* (Pocock, 1897) have been recorded by Ahsan and Tahir (2016a) from rural areas of the Sargodha and Shorkot districts of Punjab province, Pakistan.

Fig. 5. A. rubustus (male).

In another study Ahsan *et al.* (2016b) has recorded three scorpion species namely, *Mesobuthus tumulus* (Fabricius, 1798), *Odontobuthus odonturus* (Pocock, 1897) *and Androctonus finitimus* (Pocock, 1897) from of Sargodha, Jhang and Shorkot districts rural areas respectively. While. in the present study, we reported five species of scorpion namely, *Androctonus australis*, *Androctonus rubustus*, *Mesobuthus cyprius*, *Mesobuthus eupeus*, *Hottentotta (Buthotus)* sp., *Buthacus* (*Birula*) sp., and *Tityus serrulatus* from

different areas of Pishin district which is new record to type locality and Balochistan province. *A. australis*, *A. rubustus*, *M. cyprius*, and *T. serrulatus* provides new record for Pakistan as these scorpion species have not previously been reported from other localities of the country.

Fig. 6. Buthacus (Birula) sp.(male).

In the present study four yellow scorpions (including one light yellow), and one yellow brown, gray and black to yellow were recognized (Table 3, Figs. 4-10). The yellow species include: *A. australis* (Linnaeus, 1758), are the most prevailing and stinging species among all other scorpions (El Hidan *et al.*, 2016).

Fig. 7. Tityus serrulatus (male).

In this study *A. austrialis* showed higher occurrence of 41 specimens, the longer specimen measured was 10.01 cm in total body length (Table 1, 3, Fig. 4). It is also known as yellow fat-tail scorpion in possessing very thick and powerful cauda (tail) and with pincers sometimes darker (Williams, 1980). The last segments of the cauda are slightly darker than the rest of the cauda. This specimen is distinguished by its bright yellow colored body and much enlarged chela (Hjelle, 1990). *A. rubustus* was light yellow in color, medium-sized, and noted to be the third least prevailed species with 12 individuals (Table 1, 3, Fig. 5). Among 12 specimens, larger reaches to 9.5 cm in length. It has also fat cauda but narrower than *A. australis,* pincers light brown, terminal segment of tail dark brown, wider than other segments distinctly. This species is distinguished by its very smooth cephalothorax and weak carinae.

The forth most dominant species observed was *Buthacus* (*Birula*) sp. with 24 individuals. General coloration yellowish, mesosomal tergite (back) brown. These scorpion species are small to moderate sized with 6.3 cm body length when measured in the present study (Fig. 6, Table 1 and 3).

Fig. 8. *Hottentota (Buthus)* (male).

These are distributed in Israel, Iraq, Syria, Jordan, Turkey, Iran, Pakistan (Vignoll et al., 2003) and India (Zambre and Lourenco, 2010). The last yellow scorpion species described in the present study is *Tityus serrulatus* which is native to Brazil, but now it is found in other South American countries like Columbia, Chile, Argentina, Colombia, Peru, Uruguay and Venezuela. Adult specimens typically measure between 5-7 cm (2-3 in) in length, coloration consists of pale-yellow, pedipalps, with a darker shade of yellowish brown, tail bulbous, often carried in acharacteristic forward curve over the back (da Rosa *et* al., 2015). In contrast our specimen (the longer) was 9.1 cm in length, yellowish in color, pedipalps almost yellow, and presence of dark confluent spots

over the tergites (back) with prominent ridges and serrations. Tail bulbous often carried in a characteristic straight pattern. *T. serrulatus* showed the fewer occurrence with only 4 specimens (Table 1-3, Figs. 2 and 7).

Fig. 9. Mesobuthus eupeus (male).

A sizeable number (31) of *Hotentotta* (*Buthotus*) sp. were encountered. Of them, the larger specimen was 11.1 cm in length, it was also greater in size than other six studied scorpion species. Body color varied almost black to yellow (Table 3).

Mesosomal tergite flattened with black ridgeline and striking serrations. Pedipalps wider and stout, telson segments broad, chela fingers slender, bluntly pointed (Fig. 8). *Hotentotta* sp. are variable in size and polymorphic species in family Buthidae (Bawasker and Bawaskar, 1998). Its distribution is extended from Pakistan, Afghanistan, India, and Nepal and to Cape Verde Islands, Sri Lanka, Middle East and across the Africa (Kovarik *et al*., 2007).

The fifth diverse scorpion species observed was *Mesubuthus eupeus* (Koch, 1839) with 13 specimens. The longest individual measured was 3.6 cm in length compared to other genera (Table 1, 3 and Fig. 8).

The species of this genus are generally smaller in size and shape with gradual variation in colour (Ebrahimi and Soltani, 2015). Our specimen was gray in color, mesosomal tergite almost with 7 serrations divide parallels, gray-brown. Pedipalps much smaller than chela finger in size, tail bulbous, segments of telson showed variable diameter (Fig. 6). *M. eupeus* has a wide geographic distribution in Middle East and Central Asia, Morocco, Zimbabwe, India, China, Armenia, Georgia, Iraq, Turkey, and Afghanistan and Pakistan (Nejati *et al*., 2014). (Karatas and Karatas, 2003; Sadeghian, 2003; Sun and Sun, 2011). Another species of the genus *Mesubuthus* (Vachon, 1950) captured in the present study was *M. cyprius* (Gantenbein & Kropf, 2000). Only five (5) specimens were caught, it was brownish-yellow in color mostly on mesosomal tergite (back) and on tail region.

It is characterized by a slender chela, Pedipalps brownish-yellow, posterior edges of carapace and tergites with blackish-brown to black pigments, legs pale yellow to yellow; tip of femur and base of patella with some dark spots (Fig. 5).

Fig. 10. M. cyprius (male).

This species is endemic to Cyprus and recorded for the first time from the same locality, also known as the Cyprus scorpion (Gantenbein *et al*., 2000). Now it is widely dispersed in Russia, Turkey, Syria, Iran, Iraq, Azerbaijan, china, Afghanistan and India (Mirshamsi *et al*., 2011).

Conclusion

The present research study revealed excellent and diverse verities of scorpions in this region, with five genera and five species reported for the first time from this locality (Pishin district, Balochistan) of Pakistan. This study will help future researchers in identification of scorpions and their Bio-diversify. It will also help in Biomedical Science in association with Scorpion Taxonomy in order to treat number of

incurable diseases with venom in near future.

Acknowledgments

The authors are thanking full to corresponding author (Dr. Asmatullah Kakar) for providing space & facilities to carry out the research work in Laboratory of Entomology & Fish Parasitology, Department of Zoology (Faculty of Life Science), University of Baluchistan, Quetta, Pakistan. We convey our sincere gratitude to research fellows, Zafarullh, Niazullah, Rehmatullah, Syed Burhan Uddin, and students of Government Boys Degree College, Pishin for their help in collecting the specimens.

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