

The scorpions of Jordan

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Abstract: 15 species and subspecies representing 10 genera within three families (Buthidae, Diplocentridae and Scorpionidae) have been recorded in Jordan. Distribution and diagnostic features for the scorpions of Jordan are given.

Key words: Scorpions, Scorpionida, Buthidae, Jordan, taxonomy, zoogeography, arid environments.

Introduction

Scorpions are members of the class Arachnida (phylum Arthropoda). They are one of the most ancient animals, and perhaps they appeared about 350 million years ago during the Silurian period, where they invaded terrestrial habitats from an amphibious ancestor (VACHON 1953). Scorpions are characterised by their elongated and segmented body that consists of the cephalothorax or prosoma, abdomen or mesosoma and tail or the metasoma. These animals are adapted to survive under harsh desert conditions.

Due to their medical importance, the scorpions of Jordan received considerable attention of several workers (VACHON 1966; LEVY et al. 1973; WAHBEH 1976; AMR et al. 1988, EL-HENNAWY 1988; AMR et al. 1994, AMR & AL-ORAN 1994). The diversity, distribution and zoogeographic affinities of the scorpions of Jordan are discussed.

Systematics of the scorpions of Jordan

A total of 15 species and subspecies representing 10 genera within three families (Buthidae, Diplocentridae and Scorpionidae) have been recorded in Jordan (AMR et al. 1988, AMR & AL-ORAN 1994; LOURENÇO et al. 2002). Family Buthidae includes eight genera (*Leiurus*, *Buthotus*, *Androctonus*, *Orthochirus*, *Buthacus*, *Compsothotus*, *Birulatus* and *Buthus*) and 12 species and subspecies. Both Diplocentridae

and Scorpionidae are represented by a single genus for each (*Nebo* and *Scorpio*).

Family Buthidae

Triangular sternum is the prominent feature of representatives in this family. Three to five eyes are usually present and the telson is usually equipped with accessory spines. This family includes most of the venomous scorpions.

Leiurus quinquestriatus HEMPRICH & EHRENBURG 1829 (Fig. 1c)

Diagnosis: Yellow in colour. The first two mesosomal tergites have 5 keels. Adult specimens may reach 9 cm in length.

Measurements: Total length 3–7,7 cm (average 5,8 cm), prosoma 3,8–9,6 mm, mesosoma 16,8–19,8 mm, metasoma 19,3–42,4 mm. Pectines 29–41.

Remarks: This is the most common species in Jordan. WAHBEH (1976) reported that *L. quinquestriatus* constituted 85% of the scorpions collected from 13 different localities. WARBURG et al. (1980) noted that *L. quinquestriatus* is quite common in the Northern Jordan Valley. It was collected from Mafraq (LEVY et al. 1970), Wadi Deba (LEVY & AMITAI 1980), Wadi Musa, Wadi Al-Mujib, Aqaba, Wadi Ram, Jabal Nebo (KINZELBACH 1984), Azraq and Wadi Sheib (EL-HENNAWY 1988).

Leiurus quinquestriatus has rather scattered populations. It was collected from Dana area (between Shoubak and Petra),

where it was the only scorpion species with dense populations. Similar observations were seen near El-Hemma in the North, Wadi Al-Walah, Madabah area and Karak. We have few collections from southern Jordan (AMR & AL-ORAN 1994).

It is usually found under stones or rocks with no definite burrows. Stone walls are preferred hiding places for this species. Several specimens were brought from houses in Irbid and surrounding villages. This is the most poisonous species in the area (AMR et al. 1994). WARBURG (1997) stated that this scorpion penetrated deeper into the Mediterranean biotope in Palestine.

Leiurus jordanensis LOURENÇO,
MODRY & AMR 2002 (Fig. 1a)

Diagnosis: Body coloration generally blackish brown with some diffused pale spots on prosoma and mesosoma. Five carines present on tergites I and II. Metasomal carinae are strongly marked and intercarinal spaces are smooth to shagreened. Ventral side of tarsi with numerous setae not arranged in straight rows.

Measurements: Total length 7,4 cm, carapace length 0,85 cm, length of metasomal segment I 0,6 cm, length of metasomal segment V 1,06 cm, vesicle width 0,34 cm, length of movable finger 1,36 cm.

Remarks: The species was recently described from a desert habitat composed of sandstone cliffs surrounded by flat sand dunes from southern Jordan on the basis of a female specimen (LOURENÇO et al. 2002). According to LOURENÇO et al. (2002) the species distribution appear limited to an enclave within the area in which its most related species (*L. quinquestriatus*) is distributed.

Buthotus judaicus SIMON 1872 (Fig. 2a)

Diagnosis: Black in colour, prosoma granulated, pedipalps thin and long, terminating with brown. Sole of tarsi with small spines.

Measurements: Total length 5–7 cm (average 5,9 cm), prosoma 6,4 mm, mesosoma 16,6–19,9 mm, metasoma 27,5–38 mm. Pectines 22–28.

Remarks: This species was reported from Irbid and Salt (WAHBEH 1976; KINZELBACH 1984) and Amman (EL-HENNAWY 1988). It seems that this species may be confined to mountainous areas of Jordan (AMR & AL-ORAN 1994). It is quite common in the Ajlune Mountains, and associated with the terra rossa soil, where it coexists with *Scorpio maurus palmatus*. It constructs burrows that are usually located under stones and also is found under rocks without burrows.

Androctonus crassicauda
(OLIVIER 1807)

Diagnosis: Black in colour. Tail segments thick and wide. Lateral keels of the second and third segments of the postabdomen are reduced to only a few granules.

Measurements: Total length 4–9 cm (average 8,5 cm), prosoma 10,3–11,5 mm, mesosoma 19,6–23,9 mm, metasoma 42,1–49,9 mm. Pectines 24–33.

Remarks: WAHBEH (1976) showed that only 6% of collected scorpions belong to this species. It has been collected from Amman and Qaser Amra (LEVY & AMITAI 1980) as well as from Aqaba (AMR et al. 1988). This is a desert adapted species as the localities suggest. *Androctonus crassicauda* is one of the venomous species in the Middle East. It lives in horizontal burrows in dry soil in desert regions or in rodent burrows. This species was recovered from pellets of the Eagle Owl in Eastern Desert of Jordan (RIFAI et al. 2000).

Androctonus bicolor HEMPRICH &
EHRENBERG 1829

Diagnosis: The colour of the terminal segments of the legs and pedipalps are light brown. Median lateral keels of the postabdominal segments two and three are developed and possess few granules. Adults may reach 9 cm.

Measurements: Total length 5,5 cm, prosoma 6,9 mm, mesosoma 15,6 mm, metasoma 33,2 mm. Pectines 28–26.

Remarks: EL-HENNAWY (1988) reported this species from Ma'an, Aqaba and Petra. Additional records are from Karak (AMR & AL-ORAN 1994).

Androctonus amoreuxi
(AUDOUIN [1827])

Diagnosis: Yellow to dark brown, prosoma densely granulated, the seventh segment with four crests. Adult specimens may reach 7 cm.

Measurements: Total length 4,5–7 cm (average 5,44 cm), prosoma 5–8 mm, mesosoma 11,7–17,7 mm, metasoma 18,9–34,4 mm. Pectines 23–25 in females and 27–32 in males.

Remarks: This species was collected from Western Jordan. It has a wide distribution along the coastal plains of Palestine and Sinai (LEVY & AMITAI 1980). Its habitat is similar to that of *A. crassicauda*. All the localities for this species are within the Saharo-Sindian region that penetrates Jordan from Wadi Araba to the lower Jordan Valley (AMR & AL-ORAN 1994).

Orthochirus scrobiculosus
(GRUBE 1873) (Fig. 1b)

Diagnosis: Black in colour. Prosoma smooth. Metasoma covered with small depressions. Small in size (about 3 cm).

Measurements: Total length 2,6 cm, prosoma 3 mm, mesosoma 7,6 mm, metasoma 15,2 mm. Pectines 16–20.

Remarks: WAHBEH (1976) reported this species from Madabah area. *Orthochirus scrobiculosus negebensis* (SHULOV & AMITAI 1960) is the known subspecies occurring in Jordan, Palestine and Sinai (LEVY & AMITAI 1980), while other subspecies occur in Iraq, Iran and Turkestan.

This is a desert inhabitant; where it is usually found in small crevices under stones and burrows. High population densities were noticed in Azraq area. We placed alive specimens of this species along with *Leiurus quinquestriatus*, where it was immediately preyed upon. Specimens from Wadi Rum were found in deep sand burrows that extends more than 50 cm deep. Other specimens were observed during the early morning hours basking on small shrubs, perhaps to absorb humidity.

Buthacus leptochelys (HEMPRICH & EHRENBURG 1829) (Fig. 2b)

Diagnosis: Yellow to yellowish brown in colour, first segment with 10 keels, fifth segment lacks dorsal keels. cephalothorax entirely smooth. Total length is about 4 cm.

Measurements: Total length 3,8–4,3 cm (average 4,1 cm), prosoma 4,4–4,6 mm, mesosoma 9–10,3 mm, metasoma 22,7–25 mm. Pectines 20–26.

Remarks: This species is known from Southwest Jordan (KINZELBACH 1984). It was collected from rodent burrows in extreme desert conditions near El Jafr (AMR & AL-ORAN 1994). KINZELBACH (1984) revised the systematic position of *B. leptochelys nitzani* (LEVY et al. 1973) and suggested synonymy with *B. leptochelys* (HEMPRICH & EHRENBURG 1829).

Compsobuthus wernerii wernerii
(BIRULA 1908) (Fig. 1e)

Diagnosis: Light yellow in colour, prosoma smooth except for small granules in front of the ocular crest and lateral eyes. Adults reach about 4 cm in total length.

Measurements: Total length 2,5–3,8 cm (average 3,4 cm), prosoma 3,3–4,2 mm, mesosoma 7,1–8,9 mm, metasoma 14,6–15,5 mm. Pectines 16–20.

Remarks: It was collected from Ptera and Wadi Al-Hasa, Shaumari, Wadi Sheib and Amman (KINZELBACH 1984; EL-HENNAWY 1988). This species was recovered from pellets of the Eagle Owl in the Eastern Desert of Jordan (RIFAI et al. 2000).

Compsobuthus acutecarinatus jordanensis LEVY, AMITAI & SHULOV 1973

Diagnosis: Yellow to light-brown in colour, prosoma densely granulated. Total length of the adult approximately 3 cm.

Remarks: This species was collected from Wadi Deb'em (Southeast of Amman) and Hassa towards Ma'an (LEVY et al. 1973).

Birulatus haasi VACHON 1974

Diagnosis: This is a small-sized scorpion, with an average length of 20 mm. Body heavily granulated. Median eyes small separated by two ocular diameters, lateral; eyes

absent. Body basically pale yellowish, median eyes surrounded by black pigment. Mesosoma, vesicle, chelicera, pedipalps and legs yellowish.

Measurements: Average total length 2 cm, carapace 2,8 mm, metasomal segment I length 1,4 mm, metasomal segment V length 2,3 mm, vesicle width 0,5 mm, length of movable finger 2,9 mm. Measurements based on the female holotype (LOURENÇO 1999).

Remarks: This species was originally described from Tafila area (VACHON 1974). The species was redescribed by LOURENÇO (1999). He suggested that this species is a cave dwelling scorpion. We were unable to collect further specimens of this species. Perhaps the specimen collected from southern Jordan represents a relict population with limited distribution.

Two additional species of the genus were *Birulatus* have been described recently; *B. israelensis* from Palestine (LOURENÇO 2002) and *B. astariae* from Syria (STATHI & LOURENÇO 2003).

Buthus occitanus (AMOREUX 1789) (Fig. 2c)

Diagnosis: Colour yellow to dark brown, eight keels on the second and third segment, lateral ventral keels of the fifth segment equipped with distinct teeth. Adult specimens may reach 7 cm.

Remarks: This species was reported by KINZELBACH (1984) from Wadi Rum and Ma'an. In Wadi Rum, this species was found around intermediate areas between rocky and sand areas. This is the third most dangerous venomous species in Jordan.

Family Diplocentridae

The presence of accessory spine on the telson is the major distinctive character of this family. It is very similar to the family Scorpionidae in possessing a pentagonal sternum. Only one species belonging to this family occurs in Jordan.

Nebo hierichontichus SIMON 1872 (Fig. 2d)

Diagnosis: Dark-brown in colour, prosoma smooth, pedipalps thick and long. Adult may reach 14 cm.

Measurements: Total length 4,5–10,5 cm (average 7,3 cm), prosoma 7,1–12,9 mm, mesosoma 17,4–35,2 mm, metasoma 20,2–47,4 mm. Pectines 13–22.

Remarks: This species is endemic to Syria, Palestine, Lebanon, Jordan and Arabia (VACHON & KINZELBACH 1987). WAHBEH (1976) collected this species from Madabah and Karak. LEVY & AMITAI (1980) reported other localities in Amman and Petra. KINZELBACH (1984) collected specimens from Petra. Other records in our collection are from several localities in Wadi Araba Jordan Valley and near Jarash (AMR & AL-ORAN 1994).

Nebo hierichontichus has a scattered distribution. The localities indicated represent a wide range of biotopes. This is in agreement with WARBURG et al. (1980) and ROSIN & SHULOV (1963). It constructs its own burrows and could be found under rocks and between crevices. This is the largest scorpion species known to occur in Jordan. Its venom has a negligible effect on human (ROSIN 1972).

Family Scorpionidae

The pentagonal sternum is the prominent feature of this family. Species belonging to this family lack the accessory spine on the telson. In the Middle East, members of this family are not considered venomous.

According to VACHON & KINZELBACH (1987), three subspecies occur in Jordan, namely: *Scorpio maurus fuscus* distributed in the North, *S. maurus palmatus* in southwestern Jordan and *S. maurus kruglovi* occurring in the Eastern Desert.

Scorpio maurus fuscus (HEMPRICH & EHRENBURG 1829) (Fig. 1d)

Diagnosis: Dark brown in colour, pedipalpal claw similar to the lobster, prosoma smooth. Total length may reach 8 cm.

Measurements: Total length 4–5,5 cm (average 4,5 cm), prosoma 6,5–9,1 mm, mesosoma 18,6–20,3 mm, metasoma 19,1–25,7 mm. Pectines 9–10.

Remarks: This species construct its burrows either under stones or in the terra rossa soil. It was collected from areas with high

rain fall and cold winters. It is usually found in dense populations within the same area. At Zubya, an oak forested area, over 15 specimens were collected within an area of about 500 m². However, WARBURG (1997) stated that, this oakwood scorpionide, formerly the most abundant scorpion in the Mediterranean region, shows a marked decline in numbers.

***Scorpio maurus palmatus* (HEMPRICH & EHRENBERG 1829) (Fig. 3)**

Diagnosis: Yellow to light olive brown in colour, pedipalpal claw similar to the lobster, prosoma smooth. Total length may reach 7 cm.

Measurements: Total length 5–5,5 cm (average 5,25 cm), prosoma 7,6–8,3 mm, mesosoma 14,9–18,6 mm, metasoma 18,9–22,9 mm. Pectines 11–13.

Remarks: *Scorpio maurus palmatus* is of African origin that penetrated into southern Jordan. It was reported from Wadi Musa, Theban, Amman and Ajlun (WAHBEH 1976; EL-HENNAWY 1988). This species was recovered from pellets of the Eagle Owl in the Eastern Desert of Jordan (RIFAI et al. 2000).

Zoogeography

The scorpions of Jordan are mostly eremic. *Buthacus leptochelys*, *Scorpio maurus palmatus*, *Androctonus bicolor*, *A. crassicauda* and *A. amoreuxi* are considered xerophilic species as suggested by their distribution. They are found in the Saharo-Arabian region. This type of habitat is characterised by low rain fall that does not exceed 10 mm annually. Soil varies from sandy to limestone and sandstone. As indicated by VACHON & KINZELBACH (1987), *Scorpio maurus palmatus* is of African origin that penetrated into southern Jordan. VACHON (1979) reported this species from southern Arabia along the western coasts of the Red Sea. *Buthacus leptochelys* distribution is restricted to the southern deserts of Jordan. It occurs in the extreme deserts of Saudi Arabia (VACHON 1979). Although the majority of *Androctonus crassicauda* specimens were collected from dry regions, it was also collected from the Mediterranean territory (WARBURG et al. 1980).

Both *Buthotus judaicus* and *Scorpio maurus fuscus* are truly Mediterranean species. However, *Buthotus judaicus* penetrated into arid regions as the southern parts of the Jordan Valley. *Orthochirus scrobiculosus* was collected from the three main biogeographical regions as well as *Nebo hiericontichus*, which showed a varied habitat preference.

Birulatus haasi was described from Tafila area. No further specimens were collected from this area. It is suggested here that *B. haasi* is a relict species with restricted distribution. It seems that it is a Mediterranean form whereas two other species were described from Palestine and Syria (LOURENÇO 2002, STATHI & LOURENÇO 2003).

Compsobuthus weneri was collected from the Irano-Turanian ecozone. Most of our collection originated from basalt and granite deserts, however, other few were collected from steppe regions (Karak area). This is a problematic genus that requires further studies.

Leiurus quinquestriatus was the most common species all over Jordan. It prefers steppe regions, although several locations represent the Mediterranean ecozone, few specimens were collected from the eastern desert or from Wadi Araba. We have no records from Zobya or Ajlun, both are typical Mediterranean areas. Previous reports indicated its presence in very dry regions (KINZELBACH 1984; EL-HENAWY 1988). It has rather scattered populations, since it was collected from Dhana area (between Shoubak and Petra) and seems not to coexist with other scorpions. Similar observations were made in other areas. WARBURG et al. (1980) indicated that *L. quinquestriatus* distribution is restricted to areas with low precipitation.

Further studies are required to reveal the taxonomic status of species of the genus *Compsobuthus* as well as *Orthochirus*. Ecological and behavioural studies on various species are highly recommended.

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Fig. 1: **a:** *Leiorus jordanensis*. **b:** *Orthochirus scrobiculosus*. **c:** *Leiorus quinquestriatus*. **d:** *Scorpio maurus fuscus*. **e:** *Compsobuthus werneri*.



Fig. 2: a: *Buthotus judaicus*. b: *Buthus occitanus*. c: *Buthacus leptochelys*. d: *Nebo hierionticus*.



Fig. 3: *Scorpio maurus palmatus*.

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