

Venomous Snakes of Jordan

الأفاعي السامة في الأردن

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Abstract: The objective of this paper is to study seven species of *Venomous snakes* belonging to three families, *Atractaspididae*, *Elapidae* and *Viperidae*. They are known to occur in Jordan. Up-to-date data on their distribution are provided. For each species, the study highlights diagnostic features, characteristics, habitat preference and distribution, moreover taxonomy of each family are given. Accordingly, it could be considered as complication of researches on medical awareness of snake bites accidents.

Keywords: Jordan, Venomous snakes, *Atractaspididae*, *Elapidae*, *Viperidae*, distribution, diagnostic features, classification.

المستخلص: يستهدف البحث إلى دراسة ثلاثة عائلات من الأفاعي السامة في الأردن هي، *أتراكتاسبيديدا* *Atractaspididae*، *إلابيدا* *Elapidae*، و *فيبريда* *Viperidae* والتي تندرج فيها سبعة أنواع مختلفة، تهتم الدراسة بإبراز بيانات حديثة عن كل منها، وذلك بتوضيح صفات تشخيصها، وتصنيف مميزات وبيئة تواجد كل منها وذلك في إطار رفع الوعي الطبي ووقاية صحة المجتمع من خطورة وبائيات لزعانها. وتعتبر الدراسة بما تحتويه من وصف دقيق لكل نوع من الأفاعي السامة، إضافة إلى البحوث في مجال تصنيف الحيوانات Taxonomy على نطاق الحزامين الشبة والصحاري من العالم.

كلمات مدخلية: الأردن، أفاعي سامة، *أتراكتاسبيديدا*، *إلابيدا*، *فيبريда*، تصنيف، توزيع جغرافي.

Introduction

Venomous snakes are considered public health issue in tropical and semi-tropical regions. The epidemiology of snake bites accidents in Jordan was studied, where as (6) fatalities occurred during 1970-1992 (Amr & Amr 1983); (Amr *et al.* 1994b). The distribution and ecology of the snakes of Jordan were fairly studied (Disi, 1983, 1985, 1993); (Disi *et al.*, 1988); (Al-Oran *et al.*, 1994); (Al-Oran and Amr, 1995); (Amr *et al.*, 1994a, 1997). With a total of (37) species. Only (7) species are considered venomous. This paper addresses the current distribution, morphology and habitat description of snakes of medical importance in Jordan.

Venomous Snakes of Jordan

The venomous snakes of Jordan belong to three families (*Atractaspididae*, *Elapidae* and *Viperidae*). These species are distributed all over the country, including deserts, mountain ranges and rocky habitats.

(I) First Family, *Atractaspididae*:

Atractaspididae or the Mole Vipers family is related to elapids. Morphologically, they are similar in appearance to colubrid snakes, however, species of this family are

characterized by possessing powerful erectile hollow front fangs. The fangs are laterally erected. Members of this family are strictly fossorial and known as the burrowing asps or mole vipers.

This family includes one genus, *Atractasous*, known from Southern and tropical Africa, Western Arabia, Sinai, Southern Jordan and Palestine. About (14) species have been described, only one species (*Atractasous Engaddensis*) is known to occur in Jordan.

(1) *Atractasous Engaddensis*



Ref.: (Haas, 1950)

Fig. (1): The burrowing asp. *Atractasous engaddensis*

(1.1) Diagnostic Characters:

Atractaspis has large plates on the head like harmless colubrids, but is distinguished from harmless burrowing snakes by uniform blackish colour. Nasal in *Engaddensis* is divided in its lower half only, higher scale counts than *Atractaspididae Microlepidota andersoni*. (*A.M. andersoni*) Maximum length is about 70 cm.

(1.2) Taxonomy:

According to (Kochva 1998) *A. Microlepidota andersoni* nearly reaches the Jordanian border in North-Western Saudi Arabia. (Arnold 1980) raised the opinion that *A. Engaddensis* possibly intergrades with *A. m. andersoni*. This could mean that both are subspecies of *microlepidota*. (Gasperetti 1988) reports a distributional overlap of both forms in South-Western Saudi Arabia. If this holds true, *A. Engaddensis* could well be a separate species. They also show differences in venom action (Kochva, 1998). Therefore the alternative of synonymizing *Engaddensis* with *andersonii*, preferred by (Leviton *et al.* 1992) and (Schätti and Gasperetti 1994) seems less supported.

(1.3) Habitat:

Subterranean at vegetated places in hot and humid areas. Sometimes found in gardens while digging or under stones (Disi, 1983).

(1.4) Distribution:

Shores of the Dead Sea, Negev desert, Sinai (Schmidt and Marx, 1956), Wadi al-Araba, Jordan valley. The record "Lebanon" by (Welch 1983) is probably miss identification, as the mole vipers are tropical snakes, whereas the Lebanon is entirely Palaearctic. In Saudi Arabia, the species has been found near Hail and Riyadh and in a strip parallel to the Red Sea coast, from Jabal as Sinf to Mahda (Gasperetti, 1988). First records from Jordan were published by (Al-Oran & Amr 1995).

(II) Second Family, *Elapidae*:

This family consists of about (100) venomous species, including the cobras.

Members of this family are equipped with anterior pair of grooved fangs located on a fixed maxillary bone. In Jordan, this family is represented by one genus (*Walterinnesia*) and one species (*Walterinnesia aegyptia*).

(2) *Walterinnesia aegyptia*

Ref.: (Lataste, 1887)

Fig. (2): The Black Desert Cobra *Walterinnesia aegyptia*

(2.1) Diagnostic Characters:

All *Elapids* are characterized by the absence of a loreal scale. *Walterinnesia*, like other *Elapids*, has large plates on the head like harmless colubrids, but is distinguished from most of them by uniform dark brownish or blackish colour, without any pattern. First subcaudal scales are unique in being single in the first part of the tail, but divided (paired) in its hind part. It differs from true cobras (*Naja*) in the following characters:

- (2.1.1) Strongly keeled scales on the posterior half of the body (*Naja* smooth all over),
- (2.1.2) Some subcaudals undivided (all divided in *Naja*),
- (2.1.3) Anal plate divided (entire in *Naja*),
- (2.1.4) Maxilla with only two small teeth behind the fangs (*Naja* with a greater number of teeth behind the fangs).
- (2.1.5) Maximum length (128 cm).

(2.2) Taxonomy:

(Boulenger 1920) synonymized *Atractaspis wilsoni* with *Naja morgani*. (Marx 1953), in his revision of the genus, found that the two

are clear synonyms. The population east of Mesopotamia, however, seems to differ from the Western one in the presence of a special juvenile pattern, so that a subspecific differentiation (as *W. a. morgani*) may be justified.

(2.3) Habitat:

Stony desert, steppe (lowland). (*Gasperetti* 1988) assumes that their main prey is the Dabb lizard *Uromastix aegyptius*, with which it shares both distribution range and habitat. However, (*Disi et al.* 1988) state that its main prey in Jordan is the toad *Bufo viridis*, and speculate about an increase of *Walterinnesia* with increasing irrigation.

(2.4) Distribution:

Due to the species' shy habits, records are relatively scarce. It occurs in Northern Egypt East of the Nile (Southern extension not known). It is common in the Negev desert; in Jordan known from several places all over the country (*Disi et al.*, 1988); (*Disi*, 1990), except from the mountain chains between Tafilah and Irbid; recorded from Syria by (*Leviton et al.* 1992), but no localities given; according to (*Martens* 1998) there is no positive record from Syria. In Saudi Arabia East of the hills and mountain chains which block up the Red Sea coast and North of Ar-Rub Al-Hali desert (absent also from other sandy deserts like ad-Dahna and an-Nafud), reaching the Gulf coast opposite of Bahrain; Kuwait, Iraq except Mesopotamia; in Iran Khuzestan and the foothills of the Zagros mountains, the vertical distribution not exceeding (1000 m).

(III) Third Family, *Viperidae*:

The maxilla has two sockets, where hollow and replacement fangs are fitted. The head is obviously distinct from the neck, and covered by small head scales. Eyes are moderate in size with vertical eye pupils, except in the genus *Causus* (*Gasperetti*, 1988). Tail is very short with either paired or entire subcaudal scales. Dorsal scales are keeled at various levels, and the ventral scales are wide and broad.

In the Middle East, this family is represented by the subfamily *Viperinae*,

including five genera (*Cerastes*, *Echis*, *Macrovipera*, *Pseudocerastes* and *Vipera*).

(3) *Cerastes gasperetti*



Ref.: (*Leviton & Anderson* 1967)

Fig. (3): The horned sand viper, *Cerastes gasperetti*

(3.1) Diagnostic Characters

Like all Jordanian vipers, head scales are small and numerous. Eyes are protected by horn-like structure. Outside Wadi Araba, for example in the populations of Wadi Rum (*Disi et al.*, 1988); (*Al-Oran et al.*, 1997) and of (Disah Amr *et al.*, 1994b) there is a single hornlike scale above the eye - not a hornlike protrusion composed of several scales as in *Pseudocerastes*. Yet the horns are lacking in a varying proportion of individuals of some populations. The subspecies of Wadi Araba is completely hornless. It also has a shorter tail (usually less than (33) subcaudals) than typical *gasperettii*. Hornless specimens can be mistaken for *Echis* spp., as both genera use side-winding to move quickly on loose soil, and have serrated lateral "saw-scales", which are orientated in oblique rows, and are used for scale-rubbing as a warning behaviour. However, *Echis* is characterized by its undivided subcaudals, a feature unique among the *Viperidae*. *C. gasperetti* have at least (146) ventrals, whereas (148) is the absolute maximum for *C. cerastes* males. Moreover, *C. gasperettii* lacks enlarged tubercles in the occipital area which *cerastes* has. In the latter, the nasal scale is usually smaller than the first supralabial, whereas the opposite is the case in *gasperetti* (*Werner et al.*, 1991); (*Werner and Sivan*, 1992).

The colour of the horned vipers varies

regionally and can be reddish, yellowish or grey, depending upon the actual colour of the sand where a population lives. The pattern consists of indistinct brown spots in (4) to (6) longitudinal series, a dark streak on the tail and a variable head pattern, which is most accentuated in some populations of *C. cerastes gasperetti*. In the latter, the dark band between the eye and the angle of mouth is accompanied dorsally by a light band. Maximum length (85) cm (most specimens are about half that size). Females grow larger than males.

(3.2) Taxonomy:

(Werner & Sivan 1992) raised *gasperetti* to species status. After this action, *C. cerastes* remains without recognized subspecies. However, (Werner *et al.* 1999) describe a subspecies of *Cerastes cerastes* from southwest Arabia as well as a subspecies of *C. gasperetti* from Wadi Araba, then the southwestern region of Jordan harbors different subspecies than those in the southeastern region.

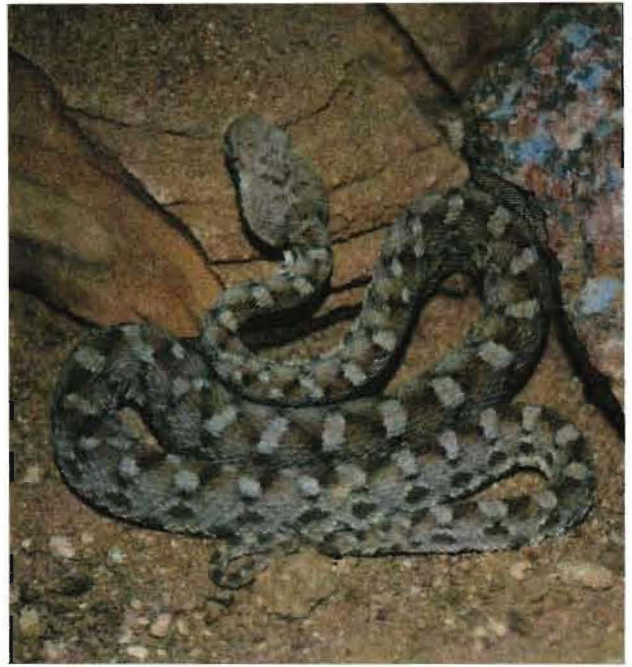
(3.3) Habitat:

Horned Vipers are true desert snakes, preferring sandy soil with some vegetation or rocky outcrops as shelters. They do not go higher than (1500 m). They are the only venomous snakes in the Arabian sand deserts (even ar-Rub al-Khali) (Leviton *et al.*, 1992).

(3.4) Distribution:

The whole Arabian Peninsula except the high mountain areas. A record from northeastern Iraq (Corkill, 1932) may be attributed to a *Vipera raddei kurdistanica*. The only record from Iran is from Albaji near Ahvaz, Khuzestan (Latifi, 1991). As the desert extends into Syria, the Horned Viper is likely to occur there, but has not yet been definitely recorded. In Jordan, it is known from Wadi Araba (distinct subspecies); Wadi Rum, Disah and Al Jafr (Ma'an district).

(4) *Echis coloratus*



Ref.: (Günther, 1878)

Fig. (4): The saw-scaled viper, *Echis coloratus*.

(4.1) Diagnostic Characters

Echis is different from other vipers by having single (undivided) subcaudal scales. Like *Cerastes*, *Echis* spp. warn enemies by rubbing specialized lateral scales against each other. *Echis coloratus* is distinct from other *Echis* species by (*Echis* "carinatus" / pyramidum characters in parentheses):

- (4.1.1) 3-4 rows of scales between eye and upper labials (1-2),
- (4.1.2) 44-57 subcaudals (23-48),

Ground colour quite variable: yellowish-grey or brownish-grey, but may be reddish-brown or pink in areas of red sandstone or granite (Mendelssohn, 1965). On the back, there is a row of greyish-white, elongate rhomboid blotches or crossbands with dark edges. Head without distinctive marks, except a brownish-grey band from the nostril to the edge of mouth. Males are larger than females and have longer tails. Maximum length 83 cm.

(4.2) Taxonomy:

An unproblematical species, apparently quite distant from the rest of the *Echis* species, but in captivity viable hybrids

between *Echis* "carinatus" (= *pyramidum*) *leakeyi* and *Echis coloratus* could be produced. Its subgenus allocation is not clear.

(4.3) Habitat

Contrary to *Echis carinatus* and *Echis pyramidum*, *Echis coloratus* favours rocky places with hard ground (Mendelssohn, 1965); (Arnold and Gallagher, 1977) vertical distribution in the Southern part of its range up to 2600m (British Museum specimen from Gabal al-Ahdar, Oman). As an adaptation, the eggs are glued to hard surfaces.

(4.4) Distribution:

Mountain areas of Egypt, East of the Nile; Southern Israel East of the watershed which separates Dead and Red Seas from the Mediterranean, North along the Jordan valley to Mt. Gilboa; Western Arabian mountain chains from Jordan along the whole East coast of the Red Sea to Hadramaut. Missing in Southern Oman, according to (Arnold 1980), but abundant in the mountains of Northern Oman and of the United Arab Emirates. In Najd, the species penetrates far into Central Arabia and reaches the surroundings of Ar-Riyadh (Gasperetti, 1988). In Jordan, it seems to be confined to the Western most areas.

(5) *Pseudocerastes fieldi*



Ref.: (Schmidt K.P., 1956)

Fig. (5): The false horned viper, *Pseudocerastes fieldi*

(5.1) Diagnostic Characters

A horn-like structure composed of several scales over the eyes. Side-winding movements like *Echis* and *Cerastes*, but no differentiated noise-making lateral scales. Fewer midbody scale rows (21-23), ventrals (127-144) and subcaudals (34-46) than *P. persicus*.

Colouration; Pale yellowish-grey or brown, with two rows of about thirty darker blotches on the back. In the Eastern lava desert, however, the ground colour is dark grey. Opposite blotches sometimes fuse to form transverse crossbands. An additional row of smaller blotches laterally. Ends of ventrals and subcaudals, as well as many dorsal scales, with little black spots. Sides of head with light brown band from the eye backwards and downwards. Maximum length (79 cm) (females larger than males).

(5.2) Taxonomy:

(Marx & Rabb 1965) considered *fieldi* a subspecies of *Vipera* (*Pseudocerastes*) *persicus*. However, immunological distances of plasma albumins (Hermann *et al.*, 1992) and mitochondrial DNA distances indicate that the genetic differences between the two have already attained species level. Unfortunately, their allopatric distribution does not allow a direct proof.

(5.3) Habitat:

Semi-desert with sandy soil and shrub vegetation, may be interspersed with rocks (neither dune areas nor mountain slopes). In Syria rocky terrain and steppic wadis (Martens, 1998). Shy snake which avoids human habitations.

(5.4) Distribution :

From the Euphrates (Al-Fuaat) River (North-Western Iraq) Westwards, between the true desert in the South and the steppe in the North, to Southern Syria (Moravec and Modry, 1994), Jordan and the extreme North of Saudi Arabia; in Israel Wadi Araba and the Negev Desert South of Baer Seva; Sinai. A record from Lebanon (Harding and Welch, 1980) is not substantiated by collected material, but the Lebanese "*Cerastes cerastes*"

recorded by Hraoui Bloquet (1981) may have been a *Pseudocerastes fieldi*. In Jordan, the species is found in the mountains East of Wadi Araba, in semi-arid steppe areas South of Amman and around Karak, as well as in the stony deserts of Ma'an and Al Mafraq provinces. There is no explanation why it has never been found in the Jordanian part of Wadi Araba (Disi *et al.*, 1988); (Al-Oran *et al.*, 1997) whereas it is known from the Israeli side (Kochva, 1998).

(6) *Macrovipera lebetina obtusa*



Ref.: (Dwigubsky, 1932)

Fig. (6): The Levantine viper, *Macrovipera lebetina obtusa*

(6.1) Diagnostic Characters:

Macrovipera as a whole is different from *Vipera* by the breaking up of the large supraocular plate into several small scales; this character, however, shows some variation, and is also found in *Echis*, *Cerastes* and *Pseudocerastes*.

In comparison with the other vipers, *lebetina* has a higher ventral scale count (155-181) and grows larger (150 cm; however maximum length recorded from Jordan is 111 cm from only 2 specimens). The colour is khaki or greyish, with many dark brown or grey crossbands which are often interrupted and may be very indistinct. The tail is light brown, the belly whitish, more or less stippled with grey. Sides of the head with or without a broad dark band.

(6.2) Taxonomy:

The value of the different subspecies described of *Macrovipera lebetina* on the Asian mainland is very questionable. *Macrovipera lebetina euphratica* from Iraq has been suspected as being a synonym of *obtusa* by several authors (Joger, 1984).

High immunological distances of serum albumins led (Herrmann *et al.* 1992) to separate *Macrovipera* from *Vipera*. This has meanwhile been reinforced by mitochondrial DNA data.

(6.3) Habitat:

Macrovipera lebetina is a snake of stony, semi-arid areas with some shrub vegetation. It avoids the wet mountainous forests as well as true deserts. Its preferred habitat seem to be foothills and mountain valleys (Corkill, 1932); (Al-Oran *et al.*, 1998).

(6.4) Distribution:

The vast distribution area of *Macrovipera lebetina obtusa*, due to the ecological requirements of the species, has a scattered appearance on the map. There is no real sympatry with desert snakes like *Cerastes* and *Pseudocerastes*. In Jordan and elsewhere in Northern Arabia, the Southern border of the Irano-Turanian steppe marks its distributional limit.

In Palestine the species seems to have occurred South to Akka and to Lake Tiberias (specimens in the British Museum), but has vanished now from that country (Mendelssohn, 1963). In Lebanon, it is known from coastal areas, on the West Bank from Jericho (Haas, 1951). In Iraq it is restricted to the area east of the Tigris; in Syria, it has been found throughout the North and West of the country (Martens 1998). The two Jordanian localities are situated in mountainous areas of the Tafila-Karak region, well South of the nearest records in neighboring countries (Al-Oran *et al.*, 1998).

(7) *Vipera palaestinae*

Ref.: (Werner, 1938)

Fig. (7): The Palestine viper, *Vipera palaestina*

(7.1) Diagnostic Characters:

24 or 25 midbody scale rows, more subcaudals (36-44) than the other species of *Vipera* (but similar to *Macrovipera* in scale counts). In contrast to other Jordanian viperids, there is a single large plate on top of each eye. Ground colour grey to ocre, with a series of light brown, oval spots with lighter centers and pale edges; the spots may be fused to form a zigzag band. Top of the head with two brown occipital bands with dark edges, in shape of a "V"; in front of them one large, round brown patch; side of head with yellow markings in adult (yellow colour may vanish when the snakes are held in captivity (Mendelssohn, 1963). Largest *Vipera* species (both sexes up to 130 cm).

(7.2) Taxonomy:

This species may be closely related to *Daboia russelii* and *Macrovipera* spp. than to *Vipera*.

(7.3) Habitat:

Originally clear oak forests (Mendelssohn, 1963), nowadays rocky hillsides, plantations etc. Abundant near human settlements. Climbs occasionally onto trees.

(7.4) Distribution:

Mediterranean parts of Palestine, including Gaza strip, North-Western corner of Jordan South to Karak region (Al-Oran *et*

al. 1997), and the whole Jordan valley. In Syria, it is known from Jabla (Werner, 1938), from the Golan and Jebel ash Sheikh Heights (Werner and Avital, 1980); (Werner and Sivan, 1992). In Lebanon, it is known from three localities (Hraoui Bloquet, 1981), but probably much more abundant.

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