

# First Two Records of Hemiscorpius species (Scorpiones: Hemiscorpiidae) from Kerman Province, Southeast of Iran

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**ABSTRACT---** Investigations indicated that the scorpions are disturbed on all of Iran. Few researches have been performed to identify and study morphology of the scorpions of Iran. In recent investigations several species of scorpions from Iran have been identified. The scorpions usually live under the stones. To get the scorpions, heavy materials including stones, clod and others, were moved by crow bar and woods. The specimens were captured with a tong. To study the morphological characters and identify the scorpions, Olympus Lica 2000 stereo microscope and key identify to scorpions, were used. In the present research two species of scorpions belonged to genus *Hemiscorpius*, belonged to *Hemiscorpiidae* family, are reported for the first time from Kerman Province (Iran). These two species are called *Hemiscorpius enischnochela* and *H. acanthocerus*. In addition to the two species mentioned above, we obtained another species, called *Hemiscorpius leptorus* from *Hemiscorpiidae* family. This species has been reported from Kerman Province, and other provinces previously. The first two records species and species of *H. leptorus* have been collected from Manoojan area situated in the south west of Kerman province. In taxonomy, the scorpions are order belonged to class arachnida, phylum arthropoda, super phylum invertebrate subkingdom of metazoan and kingdom of animal. Manoojan and the other area which have been studied in the present research, are situated in the southwest of Kerman Province, which positioned in southeast of Iran. The weather south of Kerman Province is warm and relatively humid. Several other species of scorpions found in the south of Kerman Province. Three mentioned species live in mountain area, hill and rocks. *H. enischnochela*, is bigger than two other mentioned species in size and weight. Its pedipalp patella process, possesses recognizable spiny-form granules. In all three species the males are bigger than females.

**Keywords---** scorpions, *Hemiscorpius enischnochela*, *Hemiscorpius acanthocerus*, Manoojan, Kerman

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## 1. INTRODUCTION

Although several researches have been carried out on scorpions of Iran, these researches are not completed yet, because some parts of the country have not been studied so far. Therefore, further investigation is required to determine the scorpions all over Iran and throughout all the Provinces. Manoojan and the area around it were studied. Manoojan, 57° 03' 30"E and 27° 24' 22" N, is located in southwest of Kerman Province, in southeast of Iran. It is a region with about 4437 square kilometers, distance. It is positioned in 125 K.ms east from Bandar Abbas, the capital of Hormozgan Province. The average rainfall in this area is 209 mm annually, while the minimum average temperature throughout the year is 19.2°C, and the maximum average temperature is 33.7°C. The area in South of Kerman Province is warm and relatively humid (Jalalifar, et al., 2013).

According to Fet(2000), during the last 40 years, the scorpions of Iran have been check-listed several times by some workers. The name of the scorpions and the species belong to *Hemiscorpius* genus, which have been published in some papers. These papers have been provided by researchers including, Vachon, 1966; Habibi, 1971; Farzanpay & Pertizen, 1974; Perize & Minosi, 1974; Farzanpay, 1988; Kinzelbech, 1985; and Kovarick, 1977. Sampour et al, 2011, studied on morphological and biometrical characters of two genus of scorpions *Androctonus* and *Odontobuthus* from Markezy Province of Iran. Morphological studies of sensitive seta of scorpions and distribution of scorpions in Luristan have been carried out by Sampour(2012). A check list of scorpions of whole Iran has been reported by Mirshamsi et al (2011b). In most of these, the name of species belonging to *Hemiscorpiidae* family have been reported. Mirshamsi et al (2011a) performed studies on species of *Mesobuthus eupeus*. They reviewed and studied on sub species of the mentioned species. Iran's scorpions are three families, including *Buthidae*(Koch, 1837), *Scorpionidae* (Latreille, 1802), and *Hemiscorpioiidae* (Pocock, 1893; Navidpour, 2013). *Scorpionidae* family was a sub family of *scorpionidae*, called *scorpioninae*, then it proceed to a family, that mentioned above. In recent reviews on scorpions of Iran, nine species from genus of *Hemiscorpius*, have been

distinguished by Monod & Lourenco (2005). The systematic studies on scorpion of Iran have been carried out by Predini(2000), who distinguished and identified hemiscorpiidae family from Iran. A new species of genus Hemiscorpius, called *Hemiscorpius kashkayi*, has been reported from Khuzestan Province of Iran by Karatas & MouradiGarkheloo (2013). The species of *H. lepturus*, *H. persicus*, *H. gaillardi* and two new species of *H. acanthocercus* and *H. enischnochela* have been described former from Hormozgan Province. These studies indicated that the *Habibiella* genus is synonym of Hemiscorpius (Monod & Lourenco, 2005).

In some cases scorpions are found in penaeonry ants in few numbers or usually in single. It may happened, because scorpions use the ants and their larva as food. Scorpions are found in warm and moderate climate. The scorpions are active in warm weather. They rest in their housting during day, and active at night, and they gets their prey at this time The scorpions are insectivorous. The scorpions of Iran, are originated from Africa, because most of Iran scorpions genus found in Africa (Farzanpay, 1988). But some of them including genera *Razianus* and *Mesobuthus*, originated from Iran. Three types of sensitive hair (seta) are found on the body of scorpions (Sampour, 2012). Scorpions possess two middle eyes on middle of dorsal surface of carapce and lateral eyes. The numbers of lateral eyes are between 3-5 pairs. They are situated in two side of head in lateral margin in the front of carapace. Some of scorpions like *Scorpio maurus* and *Odontobuthus dorieah* are digger.

## 2. MATERIALS AND METHODS

Field researches on scorpions of Manoojan 57° 03' 30"E and 27° 24' 22" N, in the south of Kerman Province (Kerman city 57° 05' 00"E and 30° 17' 00" N) (Fig. 1), were carried out during years 2013-2014. Scorpions were collected from different locations and varies part from mentioned region, including urban and rural areas. The gathered scorpions were performed at different seasons of year. The specimens were collected under stones, stones cleft, clod and underground holes. To Move the stones and other heavy things, wood and crow-bar were used. The samples were captured with a tong. The specimens were fixed in 70% ethanol, and deposited on the scorpions place in Department of Zoology, in Lorestan University. Identification of scorpions was performed by using a key identify to scorpions. The morphological studies were carried out under an Olympus Lica 2000 stereomicroscope. The photographs were taken by a Nikon camera ; Coolpix p6000 model. Environment temperature was measured with a thermometer. Measurements were taken with an Electronic Digital Caliper. All measurements are given in millimeters.



Fig. 1- Geographical position of Manoojan in the south of Kerman Province.

## 3. RESULTS

In the present investigation, the scorpions of Kerman Province, in southeast of Iran, were collected To obtain the scorpions, different area of this Province were searched. The distribution map of these species showed in Fig.6.

### *Hemiscorpius lepturus*(Peters, 1861)

The species of *H. lepturus*, has been reported by researchers including, Karsch, 1879; Birula, 1905a; Birula, 1917; Birula, 1918; Weidner, 1959; Pringle, 1960; Khalaf, 1962; Khalaf, 1963; Vachon, 1966; Habibi, 1971; Farzanpay&Pretzmann, 1974: 217; Pérez Minocci, 1974; Farzanpay, 1987, 1988; Simard& Watt, 1990; Sissom, 1990; El-Hennawy, 1992; Fet, 2000; Prendini, 2000; Capes &Fet, 2001; Monod &Lourenço, 2005; Akbari, 2007; Pirali-Kheirabadi et al., 2009; Navidpour et al., 2010.

Distribution, this species has been reported in some parts of Iran, such as Manoojan, Qaleh -gange, kahnooje and Jiroft city of Kerman Province.

In This research, *H. lepturus*, were obtained from some parts of Kerman Province as follow:

Manoojan city: Chahak Mountain, 27°28'18"N57°28'59"E, ZiaratAbolfazl Mountains27°51'31"N 57°41'15"E, Saras village, 27°29'28"N 57°30'38"E,Bajgan village, 27°38'48"N57°26'29"E, Khosroabad village ,27°20'26"N 57°29'53"E, Bonak (Darhotari) village, 27°16'08"N57°37'18"E,Bonak village (banmola Mountains) ,27°15'59"N 57°37'29"E, Bonak (sarbon) village, 27°15'38"N 57°36'57"E, Kandertolvalley, 27°22'44"N 57°28'39"E, Kalaton village (chahgoarashk), 27°19'56"N57°38'56"E, Keshit village, 27°25'41"N 57°48'12"E.

***Hemiscorpius enischnochela*** (Monod& Lourenco, 2005) (first report)

The species of *H. enischnochela* were collected from Bonak village (daysour) 27°15'40"N 57°36'54"E, Bonak village (Kolohtak), 27°15'39"N 57°37'16"E, Maadan mountains (dastkerdpagodar mountain), 27°23'42"N 57°26'56"E, Maadan mountains (bekhar mountain), 27°24'14"N57°27'25"E, Maadan mountains (ovdelazangi mountain) 27°23'55"N57°27'37"E, around Manoojan city in the south of Kerman Province. The *H. enischnochela* is described as follow :

The color of body is dark yellow and the length of body is 69.5 mm. The length of carapace is more than its width. It is sparsely granular and shagreen, finely granular on the lateral margins, specially below lateral ocular tubercles, superciliary carina weak and finely granular (Fig. 3b). The anterior cleft In carapace, is recognizable. Pedipalp is elongated, and its fingers are long. The pedipalp patellar intro-dorsal carina possesses 3-4 spiny form granules (Fig. 3a). There are 14 sensitive hair "trichobothria " on the external, and 10-12 trichobothria on the ventral side of pedipalp's patella (Fig,3,4,5). Metasoma of male is slender and elongated. Segments I-IV with dorsal carina are composed of spiny form granules and dorsal carina of segment V, with reduced spiny form granules. There is a pair of blunt tubercular form processes at the base of aculeus. Also telson is elongated in males. Metasoma of female is shorter than metasoma of male. It lives in mountainous area, near water places, such as spring and flowing waters. In summer, it found in cold and wet place. This species as two other mentioned species , not find in the plains and clay soil.



Fig. 3-*H. enischnochela*. spiniform granules on patella's process (a), and carapace and Its appendage(b)

Distribution: This species has former been reported from around Bandar Abbas, in Hormozgan Province, and in the present investigation, it has been reported from Kerman Province for the first time.

Distributions in Kerman Province: the mentioned species has been obtained from manoojan city, Maadan mountains and Bonak village. All of mentioned areas, are located in Kerman Province.

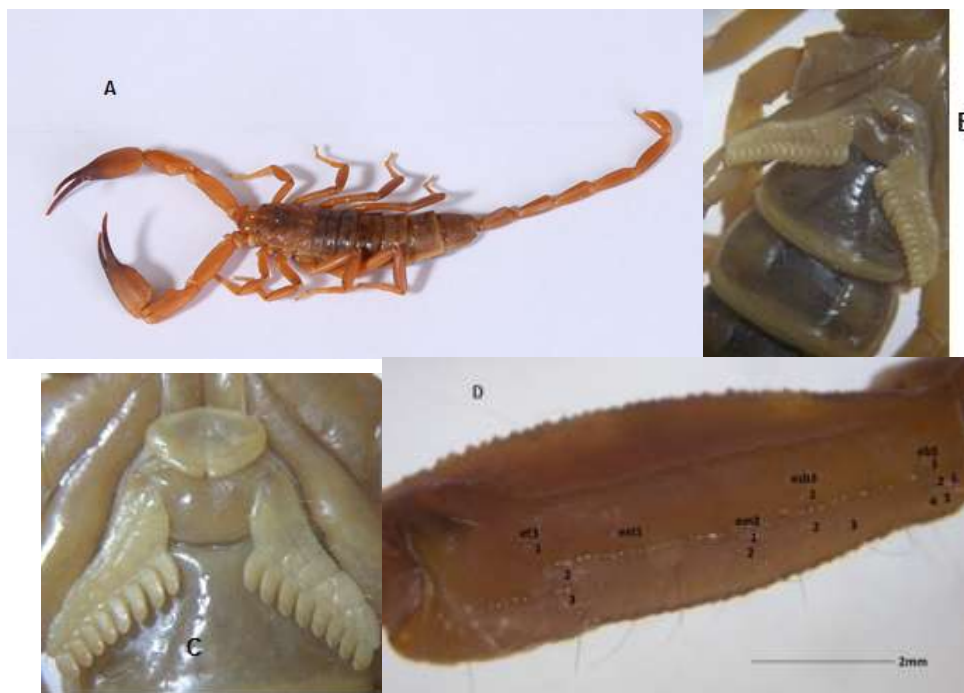


Fig. 4- *H. enschinochela* (A), indicated the pecten in female (C), and in male (B), and trichobothria on external surface of pedipalp patella's(D).

***Hemiscorpius acanthocercus* Monod & Lourenco, 2005 (first report)**

Distribution of this species in Iran, is in Hormozgan (Monod & Lourenco, 2005), Khuzestan (Karatas, et al, 2012), and Kerman Province (first record). Its distribution in Kerman Province is in Manoojan city, Patak village, and Patak mountain 57°30'37" 27°36'12"N.

The body color is from dark orange to brown, and the papillae of middle eyes are black and granular. The length of carapace is longer than its width. Carapace is shagreened with small spiny form granules under lateral eyes papillae. Lateral eyes are three pairs and the last lateral eye is smaller than the other eyes. The anterior middle groove is narrow and superficial. The longitudinal middle groove is superficial. It starts from middle eyes papillae and ends to the depth of triangular region. The lateral posterior groove grows a little. The lateral middle groove is poor and not apparent (Fig. 7c).

Mesosoma possesses dark orange to brown tergites. The tergites in the posterior parts of mesosoma are more light. They are located on the dorsal surface of body. Sternite numbers, 3 to 6 of metasoma are smooth and without granule or carina, while sternite numbers 4-6, possess two superficial middle grooves. Sternite 7 possesses two lateral carina, and it lacks middle carina. The vesicle of telson is yellow color and its sting is brown to black in color. Vesicle is elliptical and long, it possesses papillae which are thick and come out on the base of its sting in male individual.

Metasoma is very narrow and shagreen with scattered granules. Its color is yellow to orange. Middle dorsal longitudinal groove is superficial. Its sting is short, strong, and gets narrowing in the middle region.

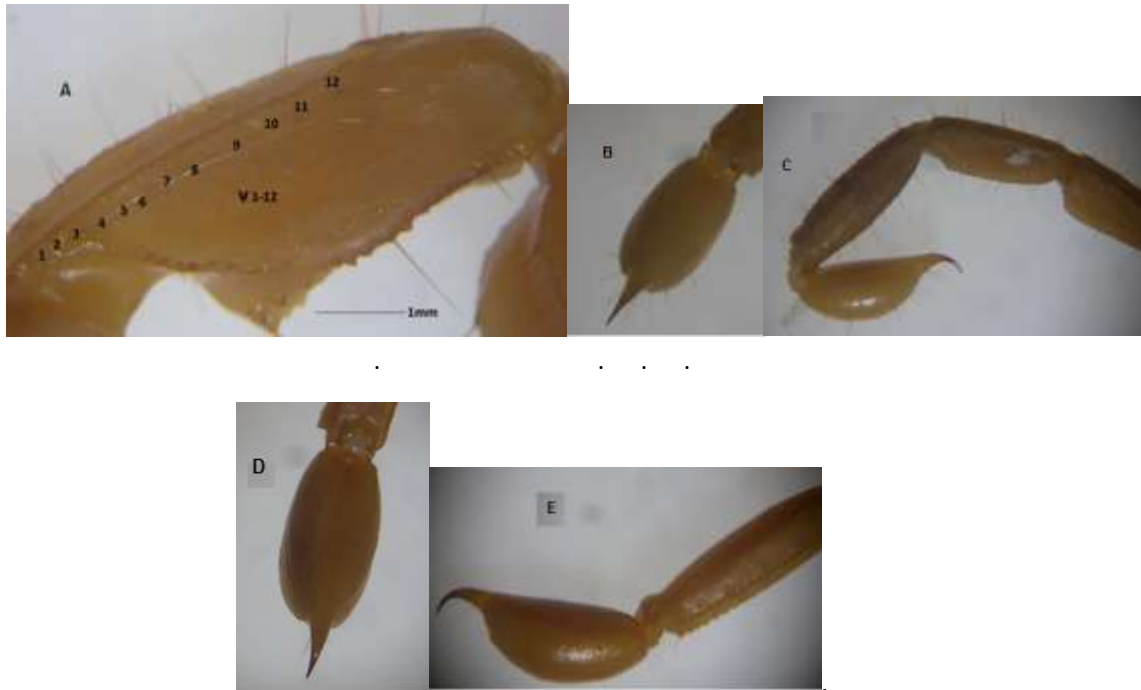


Fig.5-*H. enischnochela* (A),trichobothria of ventral surface of patella (B), telson with the Papilla on the base from dorsal view (c), last segments of metasoma and telson from lateral view in male (D), telson from dorsal view in female (E), last segment and telson.

The patella of pedipalp possesses three trichobothria in the ventral surface and 13 trichobothria in the external surface. The length of manus and fingers are almost equal. The color of manus is orange to red, and the color of fingers is brown to red. Feet are pale yellow. The mentioned species is rare. It usually lives in mountainous area and far from water. Like *H. leptorusthis* species is able to lives in dry place. Biometry of two new records indicated in Table 1.

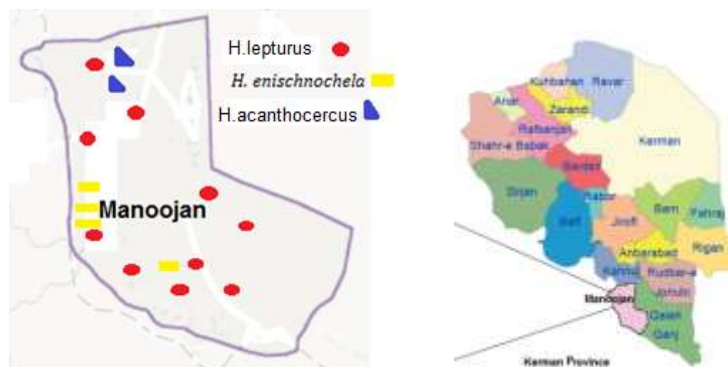


Fig.6, Map of Kerman Province showing distributions of species of Genus Hemiscorpis

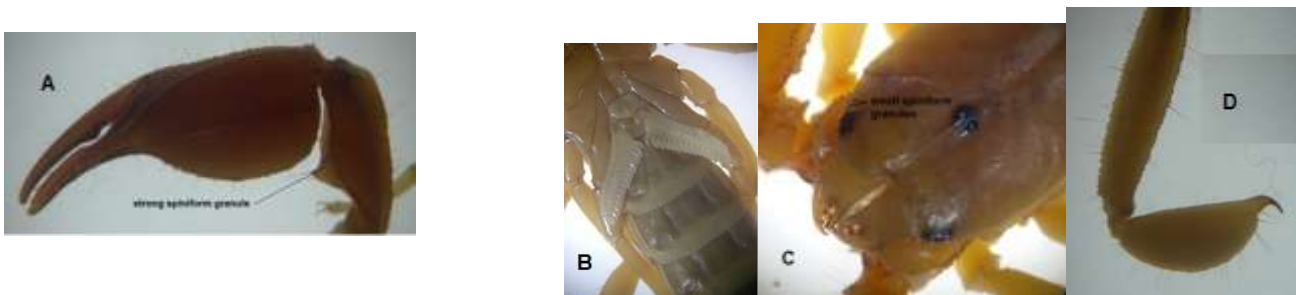


Fig.7-*H. acanthocercus*. chela and pedipalp's patella and spiny form granules of patella

Process (A), ventral surface and pectin(B), carapace and spiny form granules below the lateral eyes(C),telson(D).



Fig.8- Species of *Hemiscorpius acanthocercus*

Table 1

Biometrical characters of *Hemiscorpius enischnochela* and *Hemiscorpius acanthocercus*

(Measurements in mm)

Characters	H. enischnochela(♀)	H. acanthocercus(♂)
Carapace length	9	6.5
Posterior Width	7.5	5
Distance between anterior lateral eyes	4	2.8
Distance between posterior lateral eyes	5	3.9
Distance between median eyes	0.2	0.2
Diameter of median eyes	0.2	0.3
Pedipalp, femur length / width	8.5 / 2.5	5.5/2.5
Pedipalp Patella, length / width	9 / 3.1	5.8/2.45
Chela length	16.2	11
Manus, length / width / depth	8.1 / 4.9 / 2.6	6/4.3/2.5
Movable finger length	8.5	5.8
Fixed finger length	8.1	5
Metasoma segment I, length / width	5.4 / 2.5	5/1.85
Metasoma segment V length / width / depth	8 / 1.6 / 1.8	7.5/1.35/1.85
Vesicle, length / width / depth	5.5 / 2.5 / 2.65	5/1.7/1.8
aculeus length	2	0.6
Total length	69.5	61.01

#### 4. DISCUSSION

Three families of scorpions are found in Iran. They including Buthidae (Koch, 1837), Scorpionidae (Latreille, 1802), and Hemiscorpioiidae (Pocock, 1893; Navidpour, 2013).

In the present investigation, the scorpions of Hemiscorpiidae family in Kerman Province, south-east of Iran, were studied. Kerman Province is a warm area of Iran. Three species of Hemiscorpius genus, from the above mentioned family, including *H. lepturus*, *H. enischnochela*, and *H. acanthocercus*. In mentioned three species, the segment 5<sup>th</sup> of tail is longer than other segments. *H. enischnochela*, and *H. acanthocercus*, were collected from Kerman Province and identified for the first time. Former record of species of Hemiscorpius genus, from the mentioned Province, is *H. lepturus*, which has been reported by Monod & Lourenco (2005). This species and the two other mentioned species, have been obtained from other Provinces of Iran. Scorpions are found in warm and moderate climate. The scorpions are active in warm weather. They rest during day, and active at night. The scorpions are insectivorous.

Performed researches indicated that the species of *Hemiscorpius enischnochela* is active at nights, and captures its prey at this time, it also can be found out of habitat during days. The species is found in spaces under stones, and near the springs waters, at about 40°C in summer, and also it is found in humid places. The color of body is dark yellow, dorsal of mesosoma is darker than other parts of the body. The length of body is about 77 and 52mm in male and female respectively. Carapace's width is less than its length. This species have also been reported from Hormozgan Province, previously. But in the present investigation, is reported from Kerman Province, for the first time. Among the species belonged to Hemiscorpius genus, of Iran, the species of *H. lepturus*, is more distributed than other species. Its distribution has been reported from some other Provinces of Iran, such as Lorestan,

(Sampour, 2012), Fars, Hormozgan, Kohkiluyeh & Boyerahmad, (Kovařík, 1997), Khuzestan, Bushehr, Illam, (Farzanpay, 1987; Monod&Lourenco, 2005; Akbari, 2007; Sampour, 2014), Chaharmahal&Bakhtiari (Pirvali Kheirabadi et al. 2009); Kerman (Navidpour, et al. 2011) and several other Provinces.

In species of *H. acantocercus*, body color is brown to dark orange. The carapace possesses spiny form granules inferior to lateral eyes papillae. The length of carapace is longer than its width. It possesses three pairs lateral eyes. Tergits in mesosoma are orange to brown in color. There is no carina on tergites number 1-6, but tergite 7 possesses lateral and sub lateral carina with spiny form granule. The width of sternit and tergite number 7 is more than its length. Metasoma is narrow and elongated, it is granular. Its color is yellow to orange. Segments 1-4 possesses dorsal-longitudinal grooves, and dorsal carina possesses spiny form granules segment 4 possesses ventral granules. Segment 5 possesses dorsal carina with spiny form granules, its ventral surface possesses non distinguishable carina. It is distributed in Hormozgan (Monod & Lourenco, 2005), and Khuzestan Province (Karatas et al. 2012) and Kerman Province (in region Manoojan, patak village and patak mountain on the Southwest of Kerman Province).

*H. enischnochela* with 14 trichobothria on the external surface of pedipalp's patella and 10-12 trichobothria on the its ventral surface, is recognized from other Hemiscorpius species. This species is very similar to *H. gaillardii* because both species possess elongated pedipalp and 10-12 trichobothria on ventral surface of pedipalp. The fingers of pedipalp are longer than those of manus. In species of *H. gaillardii* pedipalp's patella, possesses 15 trichobothria on its external surface. Other Iran's species of Hemiscorpion genus are more different from *H. enischnochela*. The species of *H. lepturus*, *H. acanthocercus*, *H. persicus* ( Monod& Lourenco, 2005), and *H. kashkayi* (Karatas&Mouradi, 2013), possesses 3 trichobothria on the ventral surface of pedipalp's patella, and 13 trichobothria on the its external surface. In *H. kashkayi*, chela fingers are longer than manus (Karatas&et al. 2012). In all species belonged to Hemiscorpius genus, sexual dimorphism, between male and female, is observed because in male individual, the length of metasoma and telson is more elongated than that of female. In species of Hemiscorpius genus the sexual dimorphism does not appear before sexual maturity. In *H. enischnochela*, *H. acanthocercus*, *H. lepturus* and probably in *H. gaillardii*, sexual dimorphism reaches to its maximum level. In *H. persicus*, metasoma is narrow and elongated in male ones. In this species, there is no sting basement papillae in male. There are some differences in aggregation of sensitive hairs in both metasoma and telson species. Even the length of telson species between mature and immature ones, particularly in males, is different. A species of *H. enischnochela*, which we found, possesses 9 trichobothria on the ventral surface of patellae and 14 trichobothria on the external surface of patellae. Arrangement of spiny form granules patellae process was different in this specimen. It seems this is a specimen of Iran, that indicates this difference. Therefore in *H. enischnochela*, the number of trichobothria on the ventral surface of patella is variable from 9-12 trichobothria. No sexual dimorphism is seen between male and female in *H. persicus* and *H. kashkayi* (Karatas&Mouradi Garkheloo, 2013).

*H. acanthocercus*, is different from *H. lepturus*, as follow :

In *H. lepturus*, the carapace have smooth lateral margin, while in *H. acanthocercus*, the carapace is shagreened and there are some spiny form granules below the lateral eyes papillae. In *H. lepturus*, dorsal internal carina patella process, possesses several poor granules, while in *H. acanthocercus*, telson is longer, and its sting is less bent than that of *H. lepturus*. More investigations must be carried out on scorpions of Kerman region, because Kerman Province is a wide Province and it seems that there are some far away places which have not been searched so far. *H. enischnochela*, is bigger than two other mentioned species in size and weight. Its pedipalp patella process, possesses recognizable spiny-form granules.

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