



RESEARCH PAPER

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First record of the spider *Artema atlanta* Walckenaer, 1837 (Araneae: Pholcidae) from Iraq, with references to some its biological aspects

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Abstract

The Present study included the first record of the species *Artema atlanta* in addition to laboratory study for some biological aspects for this species, especially related with the life history, The specimens were collected for the period from Jun, 2017 until May 2018 from the old houses and buildings and a feed cattle stores located in Basrah governorate southern of Iraq. Some specimens were killed with 70% ethyl alcohol, while others were cultured in class equipments in the laboratory and feed by different insects. Morphological characteristics were studied, the most important are globose shape abdomen with dark lines extend from up to down, in the males there are conical enlarged with process pedipalps, chelicerae with hairs arranged as S shape, the epigynal plate with dark and other transparent spots and indented posterior margin. In the laboratory the females laid spherical sacs of eggs of 8mm diameter and composed of 66 of eggs. The eggs took 25-30 days before hatching, the hatching rate ranged between 80-100%. The temperature was correlated positively with the hatching rate and negatively with the period of embryonic development. The newly hatching individuals were 1.2mm in length, the growth was at a weekly rate of 0.1mm, and reached 2mm as a total length in the 10th week.

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Introduction

The family pholcidae Koch, 1850 including 1666 species distributing around the world (World Spider Catalog, 2018). Their individuals live in a wide range of ecological environments (Torres *et al.*, 2015), and increasing its numbers in tropical and subtropical areas, especially those that are in contact with human life (Hubar, 2005). Its prefer to live in closed, protected and dark places (Hawkeswood, 1995). Their nets are wide, irregular and threaded (Saaristo, 2001). The species are characterized by abdomen with variable shapes, colors, spots and dark lines (Jocque and Dippenaar-schoeman, 2006). The males have large and strong pedipalps (Huber, 1999), there are sexual modifications included all segments of pedipalp (Huber, 2000), these modifications used to distinguish between species of the family (Huber, 2011). The females have thin, small and undentate pedipalps (Jocque and Schoeman, 2006). In general the walking legs are long and thin without setae (Filmer, 1999).

The genus *Artema* Walckenaer, 1873 including large and evolutionary important species (Huber, 2016). This genus include eight species distribute around the world (World Spider Catalog, 2018), and most of them are distribute in north Africa and middle East, and live in dark places such as caves, holes and cracks, also it can live in unnatural habitats which made by human (Aharon *et al.*, 2017). The species *Artema atlanta* Walckenaer, 1837 is possibly the biggest of all Pholcid species, with a pantropical distribution (Gao and Li, 2010). This species characters with circular shape carapace, rounded abdomen and long legs with black color rings (Huber and Warui, 2012).

In Iraq, There is no previous registration for the family Pholcidae. Therefore, the present paper aimed at throwing light on the family pholcidae through describe the species *A. atlanta* for the first time from Iraq, and study some of its biological aspects.

Materials and methods

The specimens of the species *A. atlanta* were collected during the period from Jun 2017 to May 2018 from different areas of Basrah province southern of Iraq (29°-31°N, 46°-48°E) (Fig. 1), especially from the old

houses, buildings and feed cattle stores, the collection was directly by plastic tubes. Then transferred to the laboratory. Basrah climate is often wet (35-85% R.H.) and hot during summer (30-50°C) and usually not very cold in winter (10-18°C).



Fig. 1. Map of sampling areas in Basrah governorate.

Ethyl alcohol 70% was used for killing the specimens. More than ten specimens for male and female was used for morphological study. The taxonomic identification of *A. atlanta* was made according to Huber (2000) and Aharon *et al.* (2017).

On the other hand many spiders for biological studies were culturing in the laboratory by using class equipments (20 x 20 x 30cm) and feed by insects such as flies and mosquitoes. After laying the eggs by females, the period of the embryonic development, measurements and other aspects were studied. While after hatching, the morphological development and measurements for newly hatching spiders for ten weeks were investigated.

Results

The species *Artema atlanta* and the family pholcidae are not previously registered in Iraq. Eight male specimens of *A. atlanta* and other 45 females were collected during the study prod.

Artema atlanta Walckenaer, 1837

1- Male (Fig. 2)

Diagnosis

The carapace is characterized by circular shape and bright brawn color with dark areas, there are deep pit

in center of carapace in addition to prominent area which represent the eyes base, there are eight eyes arranged in two rows, for eyes in each row. The sternum is characterized by heart shape with bright brown color and contain the bases of coxa of the legs. The chelicerae with dark brown color, the fangs are supported with small teeth, the pedipalps are modified as conical reproductive organs with prominences. The color of all legs is bright brown with dark rings. The abdomen is globose shape with tapered part extending down and has bright brown color with dark lines extending from up to down.

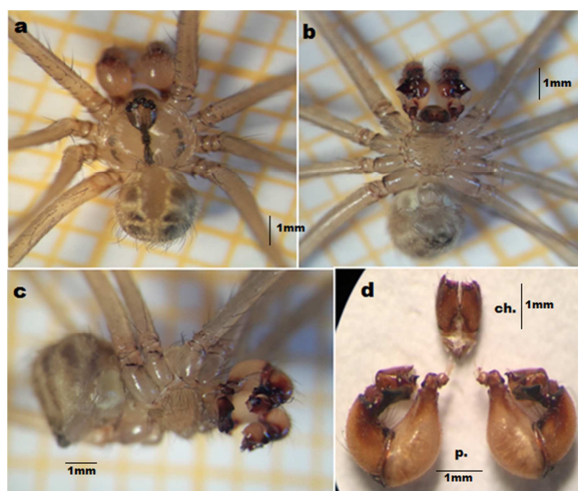


Fig. 2. *Artema atlanta* (male) a-dorsal view b-ventral view c-lateral view d-chelicera and pedipalps.

Measurements

The total length of the mature males which collected was ranged between 5-5.5mm. The length ranges of parts were as following: cephalothorax were between 2.5-2.75mm, chelicerae were between 0.75-1mm, fangs were 0.1-0.2mm, and pedipalps were 2.5 to 3mm. The four walking legs are different in length, the first is the largest one and ranging between 30-35mm in length, followed by the fourth pair with length 25-30mm, then the second pair (20-25mm length) and the third pair (17-22mm length). The abdomen was 2.50-2.75mm length.

2- Female (Fig. 3)

Diagnosis

In general similar to male. The down ward of the abdomen contain the six pairs of spinnerets and dark red and half circle epigynum.

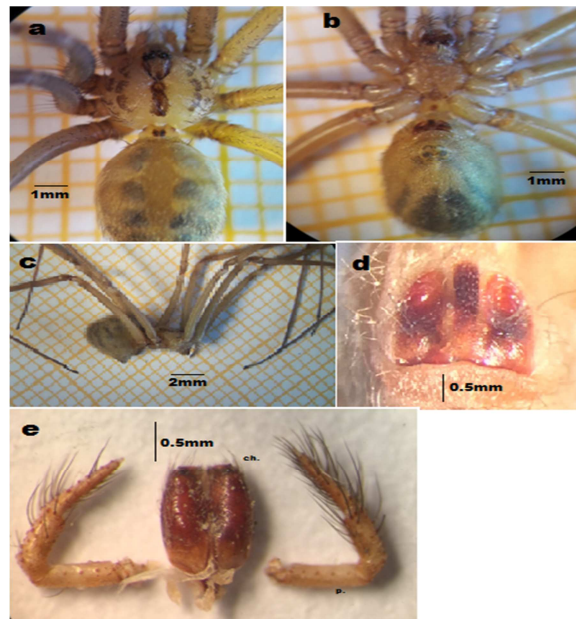


Fig. 3. *Artema atlanta* (female) a-dorsal view b-ventral view c-lateral view d-chelicera and pedipalps.

Measurements

The total length of the mature females which collected are ranged between 9-9.5mm. The length ranges of parts were as following: cephalothorax were between 4.3-4.6mm, chelicerae were between 1-1.3mm, fangs were between 0.3-0.4mm pedipalps were from 2.5 to 3mm in length. The four walking legs are different in length, the first is the largest one and ranging between 3.5-4mm in length, followed by the fourth pair with length 3-3.5mm, then the second pair (2.5-3mm length) and the third pair (2-2.5mm length). The abdomen was 4.7-4.9mm in length.

Laying and hatching eggs

The females laying one spherical shape egg sac reached to 8mm in diameter, contain average of 60 of small spherical eggs, the diameter of eggs is about 1mm. the female wrap the eggs with thread silk. The females carry the egg sac by chelicerae (Fig. 4a) and leave it on the net only during the feeding period, the embryonic development period ranged between 25-30 days according to temperature. The first molting occur in the egg sac, the hatching occurs after silting which occurs in the egg shells by the pressure which made by the hatching spiders, the silts started from the side which opposite to abdomen of the hatching spiders.

The hatching rate was ranged between 80-100% depend positively on temperature. The hatching spiders (spiderling) remain close to the mother spider for one week and are able to produce the thread silk but are unable to hunting and killing their prey. During the second week, the spiderling spread but remain on their mother net and depend on it in capture the food until the age of the third week, then they become rely on himself completely (Fig. 4b).

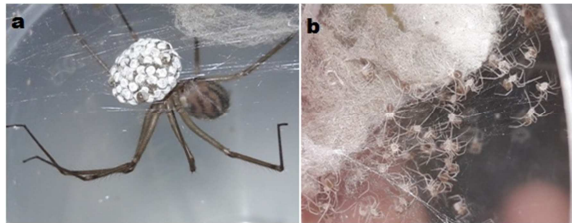


Fig. 4. *Artema atlanta* a-egg sac carried by female b-newly hatching spiders.

Spiderling growing

The median length of the spiderling body when hatching was 1.2mm, and this length increases weekly by a rate up to 0.1mm, unit reach 2.2mm at the 10th week (Table 1). The color when hatching was white transparent without distinct areas except the dark brown eyes, then the body become more dark with the growth progressing (Fig. 5 b). The mouth parts is not well developed when hatching, but the spinnerets are able to produce the threads silk after hatching directly.

Table 1. Rate of body length of Spiderling for 10 weeks measured in millimeter.

	1 th week	2 th week	3 th week	4 th week	5 th week	6 th week	7 th week	8 th week	9 th week	10 th week
Total Length	1.40	1.40	1.50	1.60	1.70	1.80	1.90	2.00	2.10	2.20
Cephalothorax length	0.60	0.60	0.65	0.70	0.75	0.80	0.80	0.85	0.90	0.95
Abdomen length	0.80	0.80	0.85	0.90	0.95	1.00	1.10	1.15	1.20	1.25

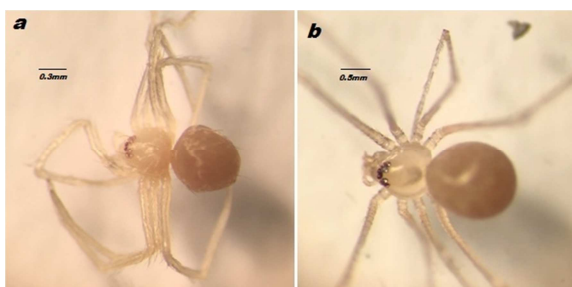


Fig. 5. *Artema atlanta* a-newly hatching spider b-spider with ten week age.

Discussion

The genus *Artema* is easily distinguished by its large body and strong legs. For the purposes of diagnosis of these species (as well as genera), the characters are considered as most important (Aharon *et al.*, 2017). The spider *A. atlanta* has many morphologic characters related with the size of the body and legs, shape of pedipalps and chelicerae of the male, shape of the female epigynum, and mosaic pattern on the abdomen of each of male and female. All these characters also can be used to distinguish the other species such as *A. nephilit*, *A. kochi*, *A. magna*, *A. transcaspca*, *A. doriae*, *A. bunkpurugu*, and even other genus such as *Micropholcus fauroti*, *Physocyclus globosus*, *Madisimus culicinus* (Saeristo, 2001; Aharon *et al.*, 2017). There are many taxonomic studies for the species *A. atlanta* from different areas. It was recorded from many countries such as America (Brignoli, 1981), granitic Seychell (Saaristo, 2001), China (Gao and Li, 2010) and it was described by Aharon *et al.* (2017) From the middle east.

There are fewer biological studies, and one of the most important of these studies is that conducted by Ahmed (2017), he was study the life history of the spider, *A. atlanta* under constant conditions in the laboratory (25±2°C and 60-70% R.H.), the results of this study were different in some aspects from what was reached by the current study, such as the number of eggs in the egg bag and the length of the incubation period, these may be due to the differences in the temperature and other factors during which the two studies were conducted, the first study was under controlled temperature, compared with the current study which was at the laboratory where the temperature varied with the season to simulate the natural habitat.

The spider *A. atlanta* collected from different areas of Basrah governorate. It is as all other species which belong to the family (pholcidae) prefer to live in dark and closed areas (Hawkeswood, 1995). The live of these spiders in places such as buildings, camps, and the downstairs of the houses may give important benefits. Since the species *A. atlanta* is feed on different insects, it can be act as a biological control,

on the other places may use as a natural alternative to control insect pests to produce plants free from pesticide residues (Ahmed, 2017).

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