

## Inventory of scorpion fauna (Arachnida Scorpiones) in Tiaret region (Algeria)

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### ABSTRACT

The present work was carried out in the region of Tiaret to study the diversity of scorpions in western Algeria. In this locality, three stations were chosen: the first one is a rocky area, the second one is represented by a scrub and the third is an anthropized zone. The scorpions sampling was done, during the year 2017, randomly and it was carried out by searching the scorpions in their hiding places, where a total of 200 individuals were sampled. The specimens morphometry, based on the measurement of 8 parameters, made it possible to diagnose two families: Buthidae represented by two species *Buthus occitanus* (Amoreux, 1789) (88.5%) and *Buthacus arenicola* (Simon, 1885) (7%) and Scorpionidae represented by *Scorpio maurus* Linnaeus, 1758 (4.5%). Among the measures that make the difference between these species, we mention the width of the chela, which is of the order of  $3.03 \pm 0.67$  for *Buthus occitanus* and  $2.27 \pm 0.49$  mm for *Buthacus arenicola*, while *Scorpio maurus* has larger chela.

### KEY WORDS

Algeria; Buthidae; Inventory; Scorpionidae; Tiaret.

Received 13.03.2019; accepted 16.05.2019; published online 18.06.2019.

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### INTRODUCTION

Scorpions form an order of about 600 species, all thermophiles, of which none exceeds, so northward as southward 50 degrees of latitude (Boué & Chanton, 1974). Scorpions occur in tropical and subtropical regions and also in more moderated regions of hemispheres like in the North and the South of America. In North America they unfold far in the northern regions and in Canada (approximately 52° N). In South America, scorpions occur in the south of Chile and in Argentina (approximately 50° S).

Scorpions show different models of adaptation to various types of environments, even inhabited

by humans. Several works were made on the scorpions. Simon (1910) made a revision of the scorpions of Egypt that were the object for a works by Vachon (1952; 1974; 1975). El Hennawy (1992) wrote a catalog of the scorpions of Arab countries. Polis (1990) noted that the diversity of the scorpions is relevant in deserts and dry regions and other contributions were made by Lourenço et al. (2002, 2003), Lourenço & Leguin (2011), Touloun (2004), Touloun et al. (2001, 2014), Touloun & Boumezzough (2011), and Badry et al. (2017).

For this reason, our study is an attempt to determine the inventory of the Fauna scorpions in the region of Tiaret, West Algeria. The investigation is

done through the morphometry of these scorpions in three stations of the region of Tiaret.

## MATERIAL AND METHODS

The present study uses a random sampling selection of scorpions. The scorpions collection were carried out in three stations. The first station is Mellakou, represented by a rocky naked ground and situated at a height between 943 and 1114 meters. The second station is Ledjdar, a scrubland situated at a height between 1114 and 1491 meters. The third station is Guertoufa, a mountainous and anthropized zone, situated at a height between 275 and 943 meters. The collection of the scorpions in the various stations was made by looking for the scorpions in their hiding places, under wooden branches, debris or stones.

Each scorpion was kept individually in a glass jar. The date of the collection, the site and number were mentioned on the jar. In the laboratory, several measures of morpho-metric were taken to the collected scorpions, like the total length, the length of the prosoma, mesosoma, metasoma, length of the vesicle with poison, length and width of the femur, the patella, the length of the mobile finger and others.

## RESULTS AND DISCUSSION

A morphological examination of the collected scorpions was made by the keys of identification of Vachon (1952) and other similar works (Lourenço, 2006; Lourenço & Vachon, 2004).

The scorpions found in the three Algerian stations belong to two families and three species. Family of Buthidae C.L. Koch, 1837 is represented by two species, *Buthus occitanus* (Amoreux, 1789) (88.5 %) and *Buthacus arenicola* (Simon, 1885) (7 %). The family of Scorpionidae Latreille, 1802 is represented by *Scorpio maurus* Linnaeus, 1758 (4.5). These results are showed in Table 1.

The results of the figure 2 allowed to draw a factorial analysis of correspondences (AFC) by using the software XLSTAT (2014).

This AFC illustrates the groupings of the scorpion fauna as well as their interactions with the stations in the study area (Fig. 1).

The examination of this graph shows two relatively heterogeneous groups in both factorial axes; the analysis of the Table 2 shows that the rate of the slowness of the axis 1 is higher than the rate of the slowness of the axis 2 which means that the projection is mainly made on the first axis.

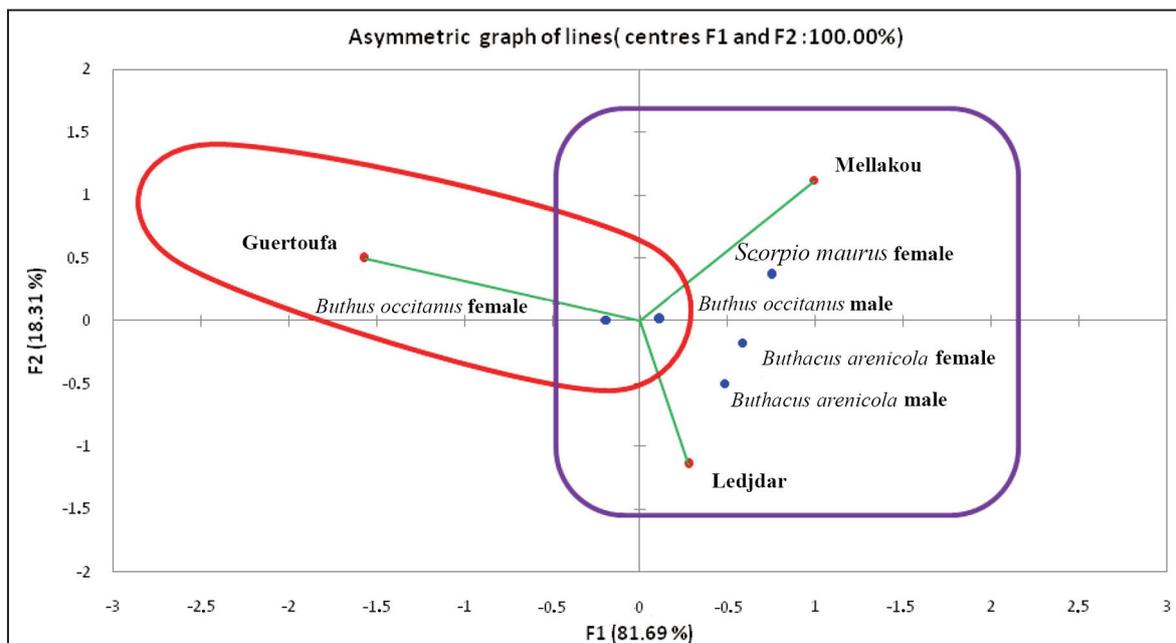


Fig. 2. Factorial Plan of stations according to species.

According to the projection F1-F2, the axis F1 represents 81, 86 of the slowness. In the same vein, we noticed that the positive side towards the extremity of the axis becomes a group in the region that includes Mellakou and Ledjdar stations with *B. occitanus* (males and females), *B. arenicola* (males and females) and *S. maurus* (females). On the negative side, at the end of the axis becomes more groups in the region that constituted the station Guertoufa with *Buthus occitanus*. In the center of the factorial plan, we have the formation of a bubble made up of a species met in all the stations of the study, especially *Buthus occitanus* (males and females).

The factorial analysis of the correspondences applied on the species captured in the region of Tiaret, allowed us to notice that *B. occitanus* is close to the center of the graph and in both sides, being present in the three stations of the study area.

These results are conform to the works of El Hennawy (1992) who reported for this species a large distribution in North Algeria. The two other species, *S. maurus* and *B. arenicola*, are uniquely found in two stations; the station of Mellakou and the station of Ledjdar, but are completely absent in the third station of Guertoufa (anthropized area).

### Morphometry and description of the inventoried species

***Buthus occitanus*.** The morphometry of *B. occitanus* is illustrated in the figure 2. The length of *B. occitanus* is  $64 \pm 8.54$  mm. This measure gets closer to that indicated by Boué & Chanton (1974) of 7.5 cm length. The length and width of femur are, respectively,  $6.39 \pm 0.96$  mm and  $1.94 \pm 0.39$  mm, while of the patella are, respectively,  $5.00 \pm 0.86$  mm and  $1.43 \pm 0.28$  mm. The length and the width of the chela are, respectively, of  $10.64 \pm 1.54$  mm and  $3.03 \pm 0.67$  mm.

The mobile finger has length of  $7.33 \pm 1.21$  mm, and the gland with poison is  $6.15 \pm 0.98$  mm. The body has a yellow color, darker than the appendixes. The tail has the presence of silks. *B. occitanus* is the most plentiful in comparison with the other two species. In the three stations it has the rate of 88.5 %. This is a greater rate than the one studied by Sadine et al. (2011) in the park of Belezma in North Algeria (82.5 %).

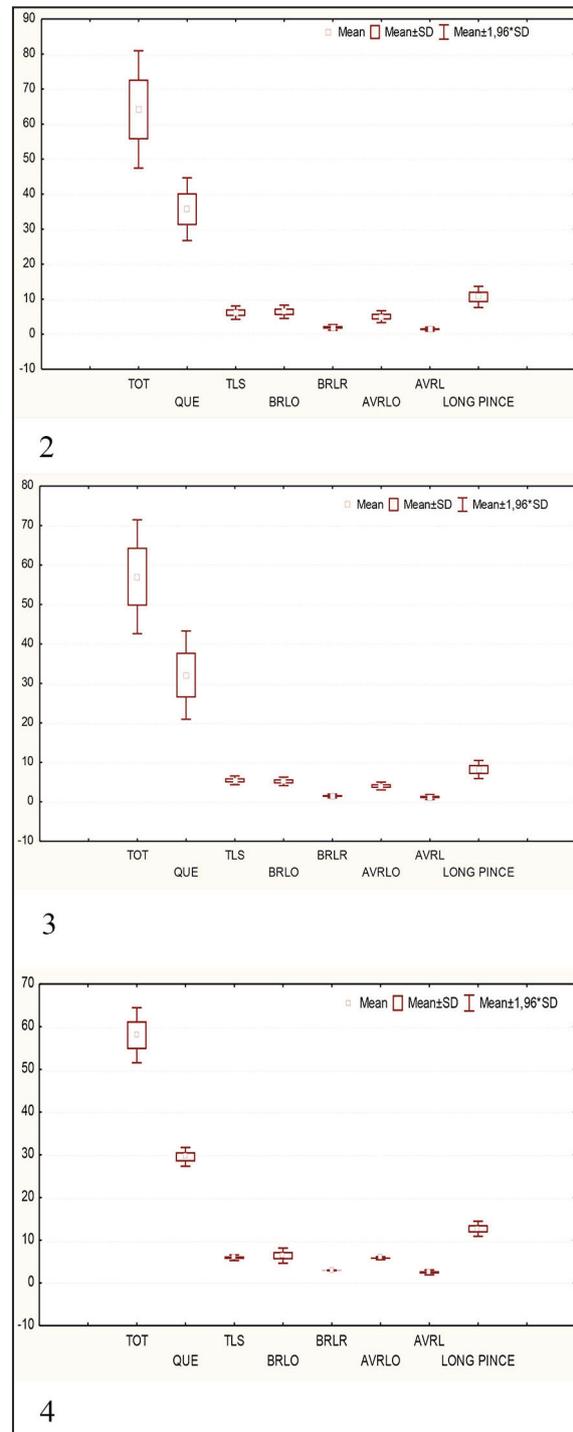


Figure 2. Morphometry of *Buthus occitanus*.

Figure 3. Morphometry of *Buthacus arenicola*.

Figure 4. Morphometry of *Scorpio maurus*.

TOT: total length, TLS: length of the vesicle with poison, QUE : length of the tail, BRLO: length of the femur, BRLR: width of the femur, AVRLO: length of the patella, AVRL: width of the patella, LONG PINCE : length of the chela.

*Buthus occitanus* is widespread in Africa, Asia and Europe (Lourenço & Vachon, 2004). Lourenço (2002) mentioned that the colonization of Europe by this species was made, probably, through the coastal regions of Morocco. Lourenço & Vachon (2004) observed that *B. occitanus* collected in the Sierra Nevada would be originally from the region of North Africa. Gantenbein & Largiadèr (2003) noted that the specimens of Europe are very different from that of those found in North Africa.

*Buthacus arenicola*. The figure 3 shows the morphometry of *B. arenicola*. The length of this species is  $57.04 \pm 7.36$  mm. The femur is long  $5.18 \pm 0.54$  mm and it is wide  $1.48 \pm 0.24$  mm. The patella is long  $4.00 \pm 0.50$  mm and it is wide  $1.21 \pm 0.31$  mm. The length of the finger is  $8.18 \pm 1.17$  mm and it is wide  $2.27 \pm 0.49$  mm. The measures of the chela found in our study are conform with the findings of Lourenço (2006) who has indicated that *B. arenicola* has a thin chela. The length of the mobile finger is  $5.77 \pm 0.64$  mm while the length of the gland with poison is  $5.44 \pm 0.56$  mm. The body of the specimens is brown. The tail is wide and has a dark yellow color, the vesicle with poison is smaller than that of *B. occitanus* and it has very thin yellow pedipalps with several silks.

This species is less common than the *B. occitanus*, and its presence was indicated only in two stations, Ledjdar and Mellakou (7 %). According to Lourenço & Leguin (2014), the distribution of *B. arenicola* extends from western Libya to Tunisia to northern Algeria. Vachon (1952) discussed the large distribution of the *Buthacus* genus and also expressed his doubts about the real taxonomic status of the various population of *B. arenicola* found in North and Northwest of Africa. Sadine et al. (2011)

observed this scorpion in the region of Ouargla in South Algeria. *Buthacus arenicola* is present in opened spaces such as Ergs, Regs or agricultural fields of sand (Lourenço et al., 2017).

*Scorpio maurus*. The morphometry of the *S. maurus* is illustrated in figure 4. The length of this species is  $57.99 \pm 3.28$  mm. The length and width of the femur are, respectively,  $6.39 \pm 0.90$  mm and  $2.94 \pm 0.03$  mm. Those of the patella are, respectively,  $5.08 \pm 0.17$  mm and  $2.47 \pm 0.29$  mm. The chela is  $12.67 \pm 0.89$  mm long and it is  $5.23 \pm 0.64$  mm wide. Vachon (1952) has reported that, in Algeria and Tunisia, scorpions with wide chela are always *S. maurus*. The length of mobile finger is  $7.56 \pm 1.06$  mm while that of the gland with poison is  $9.90 \pm 0.32$  mm. The body is dark brown with a thin tail and clearer legs. Chelicerae are striking and darkened. Pedipalps are brown, large and strong, and become more darkened in the extremities. This species is known for its capacity to live in high altitude, and it lives, normally, in the hot environments (Mozaffari et al., 2013). Fet (2000) confirmed its presence in Algeria.

*Scorpio maurus* is less plentiful regarding the two other species cited above, its presence rate is 4.5 %, and it was found in only two stations, Ledjdar and Mellakou. This rate is lower than the one registered by Sadine et al. (2011), which was 15.5 % in the park of Belezmain, North Algeria.

## CONCLUSIONS

This study on the scorpions fauna, carried out in the region of Tiaret West Algeria, allowed us to

Stations	Ledjdar		Mellakou		Guertoufa		Total
	Male	Female	Male	Female	Male	Female	
<i>Buthus occitanus</i>	27	45	22	29	14	40	177
<i>Buthacus arenicola</i>	05	04	02	03	/	/	14
<i>Scorpio maurus</i>	/	03	/	06	/	/	09
<b>Total by sex</b>	32	52	24	38	14	40	200
<b>Total</b>	<b>84</b>		<b>62</b>		<b>54</b>		<b>200</b>

Table 1. Enumeration of the species inventoried by stations in Tiaret region (Algeria).

	F1	F2
<b>Appropriate Values</b>	70	0.016
<b>Slowness (%)</b>	81.686	18.314
<b>% accumulated</b>	81.686	100.000

Table 2. Appropriate Values and percentages of slowness of both axes of the AFC.

identify the Buthidae family represented by two species, *B. occitanus* (88.5% presence rate), and *Buthacus arenicola* (7%) and the Scorpionidae family with the *S. maurus* (4.5%).

The Factorial Analysis of the Correspondences (AFC) reveals that the *B. occitanus* is the species more common in the three stations of study area. *Buthacus arenicola* and *S. maurus* are found only in the stations of Ledjdar and Mellakou, but *Scorpio maurus* is less plentiful.

The morphometry of the species shows that *Buthus occitanus* has the chela  $3.03 \pm 0.67$  mm wide, *B. arenicola* is characterized by a thin pedipalps and chela is  $2.27 \pm 0.49$  mm wide. *Scorpio maurus* is characterized by its wide and strong pedipalps and with a large chela ( $5.23 \pm 0.64$  mm wide).

Further studies on these faunas, carried out also in larger territories and with a greater number of stations, will be able to further improve the knowledge on this interesting group of terrestrial invertebrates.

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