# Morphology and Morphometric studies of Four Scorpions species from Egyptian Deserts

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**Abstract :** The pervious key of scorpions in Egypt was based on the shape of sternum, colour pro-and retro-lateral pedal spurs on legs and presence of spur below sting or not, the new additions in this paper based on shape of pedipalp, pecten and the shape of the fourth, fiveth segment and sting in four species of scorpions in Egypt. Also on Morphometric data of the four species of Egyptian desert were studied. The four investigated scorpions were: *Androctonus australis*, *Androctonus bicolor*, *leiurus quinquestriatus* and *Scorpio maurus*.
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**Keywords:** scorpions, Egypt, *Androctonus* , *leiurus* and *Scorpio*

## 1. Introduction

Scorpions are the most ancient Arachnids on the earth (El-Hennaway, 2001) there are about 26 species of scorpion in Egypt, and about 13 Genus and all loci under a bout 4 families in Egypt, they are Buthidae, Scorpionidae, Diplocentridae and Euscorpiidae (El-Hennaway, 1985).

The last classification of scorpions in Egypt was based on the shape of sternum, colour pro-and retro-lateral pedal spurs on legs and presence of spur below sting or not, the present work bass on shape of pedipalp, pecten and the shape of the fourth and fiveth segments and sting. Scorpions are an ancient and widespread arthropod order well known for their medical importance as venomous arachnids.

(Possani, *et al*., 2000) less known is their importance as model organisms for ecological research comprising key components of desert webs (Polis, 2001). These desert scorpion species have also been shown to exhibit ecomorphological specialization upon specific habitats and possess morphological adaptations to unique edaphic substrates such as sand. (Prendini, 2001). These edaphic specialist species illustratr the role of environmental effects upon scorpion morphological divergence and speciation.

Other recent studies have shown the importance of mountainous terrain and riverine barriers on the diversification of scorpions (Mirshamsi, *et al*. 2010 and Habel, 2012). These recent studies also illustrate the impact of molecular taxonomy in revealing patterns of diversity unrepresented through traditional morphological analyses. Species Delimitahion and Morphological Divergence in the Scorpion *Centruroides vittatus* were studied by Yamashita and Rhoads (2013).

The four examined species are:- Species of *Androctonus australis*, *Androctonus bicolor*, *leiurus quinquestriatus* and *Scorpio maurus.*

## 2. Materials and Methods

Species of *Androctonus australis* were collected from Marsa Matrouh, Saloum & Wadi El- Natroun. Species of *Androctonus bicolor* were collected from Marsa Matrouh, El-hammaum & Alexandria.

Species of *leiurus quinquestriatus* were collected from Suize, Wahat, Aswan and South Saini.

Species of *Scorpio maurus* were collected from Sant Katrin & South Saini.

All Species were put 10% formalin and dessicted to separate padipalp, pecten and fourth, fivth and sting, All morphological parts were drawn by Kamera lucida.

For morphometric studies, the dimensions of all animals (40 specimens for each species) had been measured by standard Verneir Calliper with accuracy of about (± 0.01 mm)

## 3. Results

### A. Morphological studies

***Androctonus australis***

**Pedipalps**

Pedipalp is formed of 4 joints, there are 2 lateral rows of warts along the pedipalp and (13-15) pairs of teeth along the internal surface of chela (Fig. 1 a).

**Pectens**

Each pectin is selender and elongated with about internal 20 spurs and hairs along the external surface (Fig. 1 b).

**4th segment, 5th segment and sting**

The 4th segment of metasoma is rectanglur in shape and overlape with the 5th segment. 5th segment is rectanglur, the 4th and the 5th segments are narrower towards the posterior and have 2 rows of warts in the above surface, between the two rows a groove present along two segments (Fig. 1 c).

***Androctonus bicolor* Pedipalps**

The pedipalps is formed of 4 joints, there are 2 lateral rows of warts along right and left side of Pedipalp but absence of teeth along the chela (Fig. 2 a).

**Pectens**

Pectens are selender and elongated with (20-28) spurs along interal surface of Pectin, absence of hair along external surface (Fig. 2 b).

**4th segment, 5th segment and sting**

4th and 5th segments are ovoid in shape and overlaping, presence of 2 lateral rows of warts, one right and one left along 4th and 5th segments of metasoma. Stings are small in size (Fig. 2 c).

***leiurus quinquestriatus***

**Pedipalps**

The Pedipalps is formed of 4 joints, 2 lateral rows of warts along right and left side of Pedipalp, absence of teeth along chela (Fig. 3 a).

**Pectens**

It is selender and elongated, (12-15) spurs present at interal surface and no hairs on external surface (Fig. 3 b).

**4th segment, 5th segment and sting**

Presence of rows of warts along right and left side of 4th, 5th and segment, the 5th segment is dark in colour and sting in big (Fig. 3 c).

***Scorpio maurus***

**Pedipalps**

The Pedipalps is formed of 4 joints, left side of chela is big and ovoid with smaller and narrower towards outside, presence of spurs along the pedipalp (Fig. 4a).

**Pectens**

Pectens are small with (8-10) spurs internally and absence of hair externally (Fig. 4b).

**4th segment, 5th segment and sting**

4th, 5th and segments of metasoma are rectangular in shape, elongated. There are 2 rows of warts on right and left side of the segments, sting is relatively big with spurs on it (Fig. 4c).

**B-Morphometric studies**

Table 1: Meristic date for adult ♂ and ♀ species (Measuring by mm)

| Region of Body | *Androctonus bicolor* | | *Scorpio maurus* | | *leiurus quinquestriatus* | | *Androctonus australis* | |
|---|---|---|---|---|---|---|---|---|
| | ♂ | ♀ | ♂ | ♀ | ♂ | ♀ | ♂ | ♀ |
| Total length | 60.22 | 58.50 | 75.34 | 71.56 | 72.28 | 68.74 | 55.33 | 54.50 |
| Carapace length (Anterior width) | 3.50 | 3.40 | 5.20 | 5.11 | 4.62 | 4.40 | 5.23 | 5.08 |
| Carapace length (Posterior width) | 4.22 | 4.02 | 7.50 | 7.10 | 7.22 | 6.80 | 6.32 | 5.90 |
| Metasoma + telson (Total length) | 40.22 | 38.50 | 45.83 | 44.90 | 44.62 | 44.00 | 34.21 | 32.00 |
| Metasoma I | 7.63 | 7.10 | 6.56 | 6.11 | 5.30 | 4.90 | 4.22 | 4.10 |
| Metasoma II | 6.61 | 5.95 | 5.46 | 4.90 | 4.26 | 3.00 | 3.12 | 2.90 |
| Metasoma III | 6.62 | 6.10 | 5.40 | 5.10 | 4.23 | 4.10 | 3.12 | 3.02 |
| Metasoma IV | 6.67 | 6.60 | 5.43 | 5.10 | 4.22 | 4.05 | 3.11 | 3.00 |
| Metasoma V | 6.65 | 6.18 | 5.43 | 5.12 | 4.28 | 4.10 | 2.12 | 2.00 |
| Total length of telson | 8. 53 | 7.90 | 9.22 | 5.90 | 8.30 | 8.20 | 7.40 | 7.10 |
| Total length of pedipalp | 33.20 | 33.10 | 36.20 | 35.90 | 33.40 | 33.45 | 30.24 | 30.25 |
| Femur length | 29.30 | 29.10 | 34.33 | 33.50 | 32.28 | 32.11 | 28.50 | 27.50 |
| Femur width | 2.83 | 2.70 | 3.20 | 2.90 | 2.72 | 2.62 | 2.61 | 2.50 |
| Patella length | 7.52 | 7.33 | 7.94 | 7.80 | 7.63 | 7.50 | 7.51 | 7.10 |
| Patella width | 3.40 | 3.20 | 3.50 | 3.30 | 3.20 | 3.10 | 3.10 | 3.02 |
| Total length of prcten | 4.55 | 4.50 | 4.80 | 4.70 | 4.60 | 4.50 | 4.50 | 4.11 |

From the table: *Scorpio maurus* has the highest measures of total length and Carapace length.
*Androctonus australis* has the smallest measures of Metasoma I,II,III, IV and V., also has the smallest measures of telson, pedipalp, Femur length, Femur width, Patella length, Patella width and prcten.

**4. Discussion**

In spite of many physiological studies which were applied on scorpions, little work was discussed the morphological aspects of them, so that scorpion systematic and taxonomy have recently shown a need for revision. (Yamashita and Rhoads, 2013).

Due to confusing taxonomic history and the documented morphological diversity within scorpion *Centruroides vittatus*, many datasets must be applied (Brandley, *et al*., 2005). Morphological Identifications of scorpion species from Jazan and Al-Medina regions, Saudi Arabia have been discussed by (Al- Asmari, *et al*., 2007), and deals with Identification of medically important scorpions and the other ones which were collected from JAzan and Al-Mediha. The surveys Confirmed the presence of few species belong to family Buthiidae. Other surveies show that *Scorpio maurus* of family scorpionidae is verified to subspecies *fuscus* (Al-Hajjal, 2005), also *Androctonus* spp. was discussed on basis of classification in family Buthiiae by. Al-Hajjal (2005).

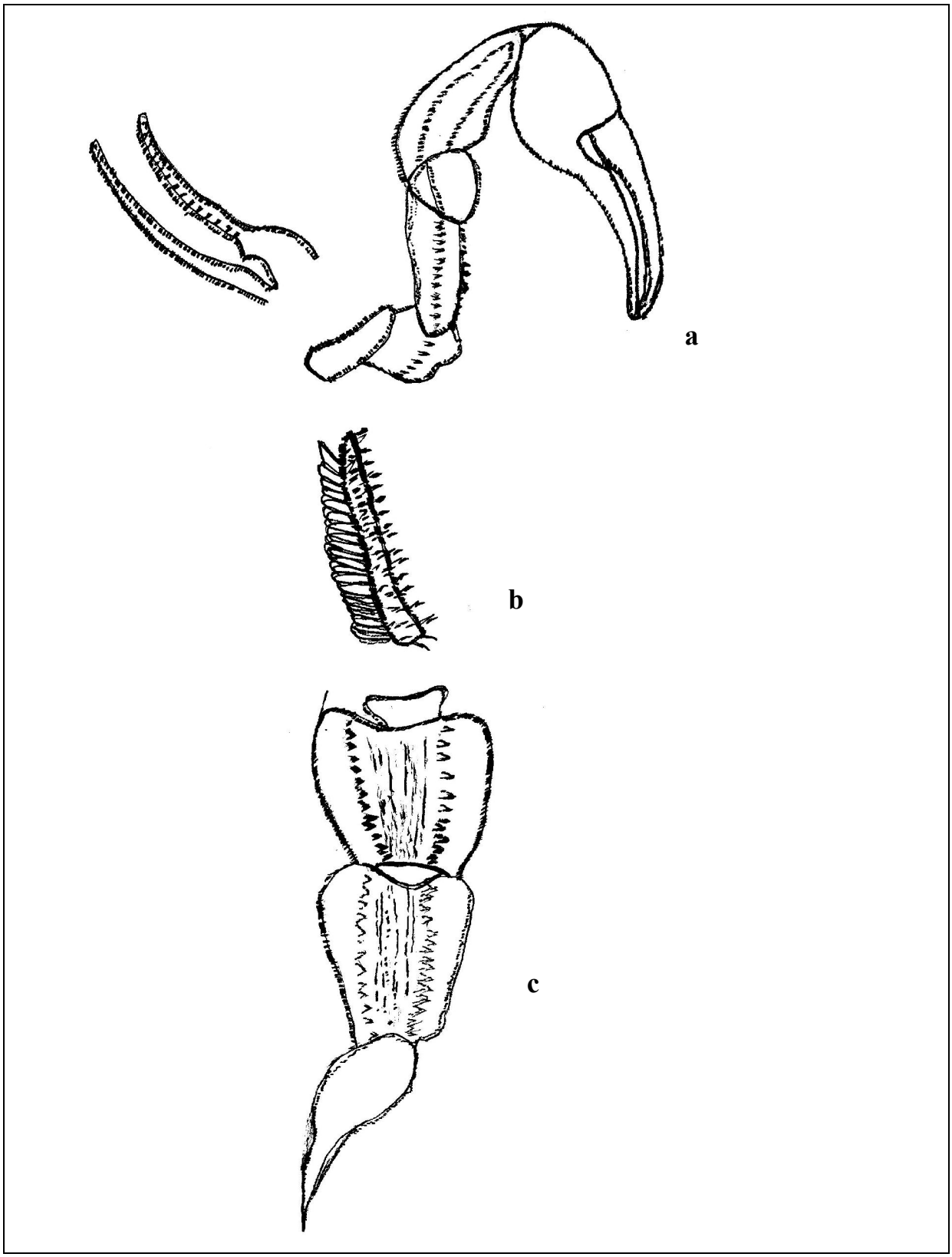


**Fig. 1:** Camera lucida drawing of *Androctonus australis* (10X)
a Pedipalps & chela; b Pectens; c 4th segment, 5th segment and sting

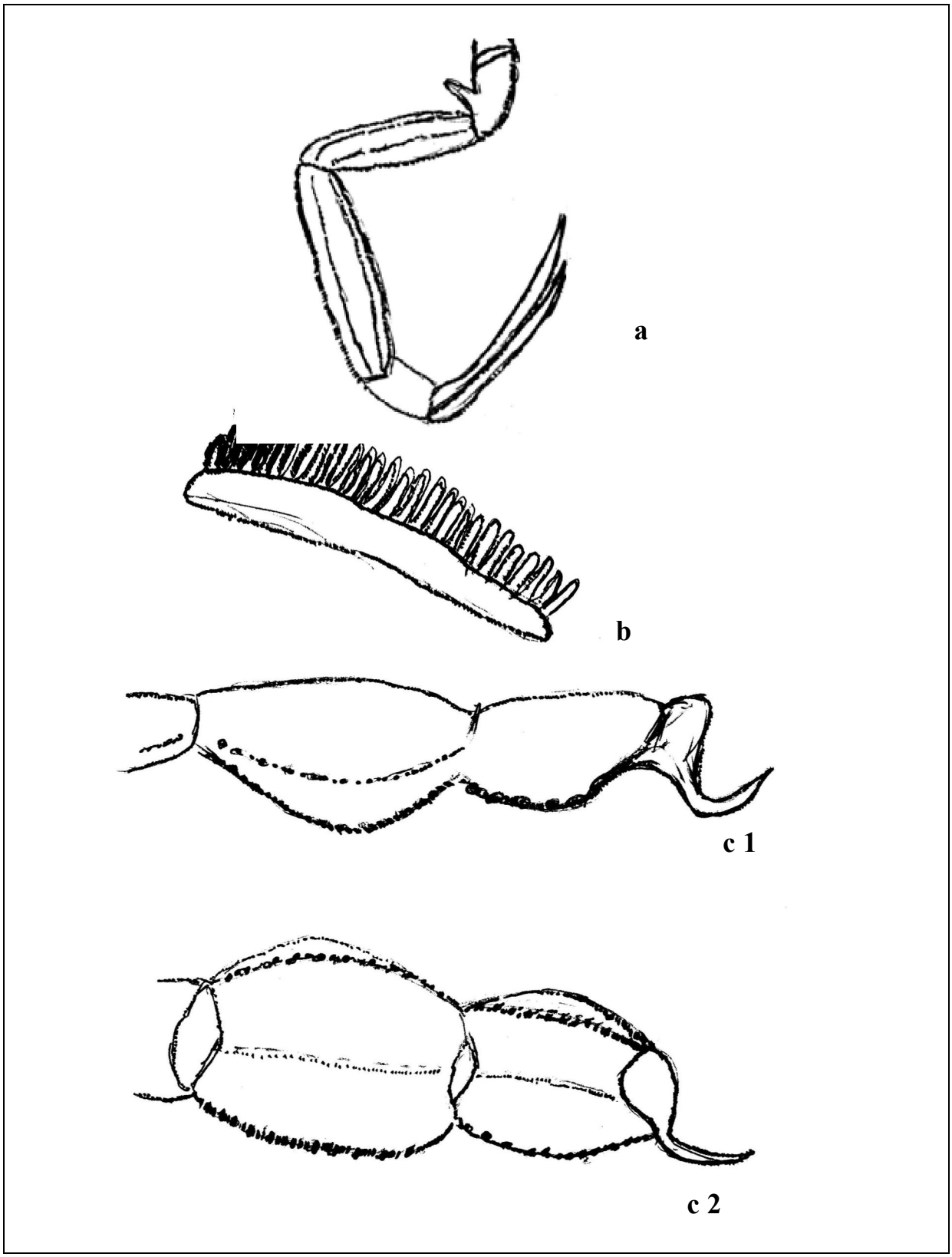


**Fig. (2) Camera lucida drawing of *Androctonus bicolor* (10X)**
a Pedipalps; b Pectens; c1 4th segment, 5th segment and sting (l.v.); c2 4th segment, 5th segment and sting (above. v.)

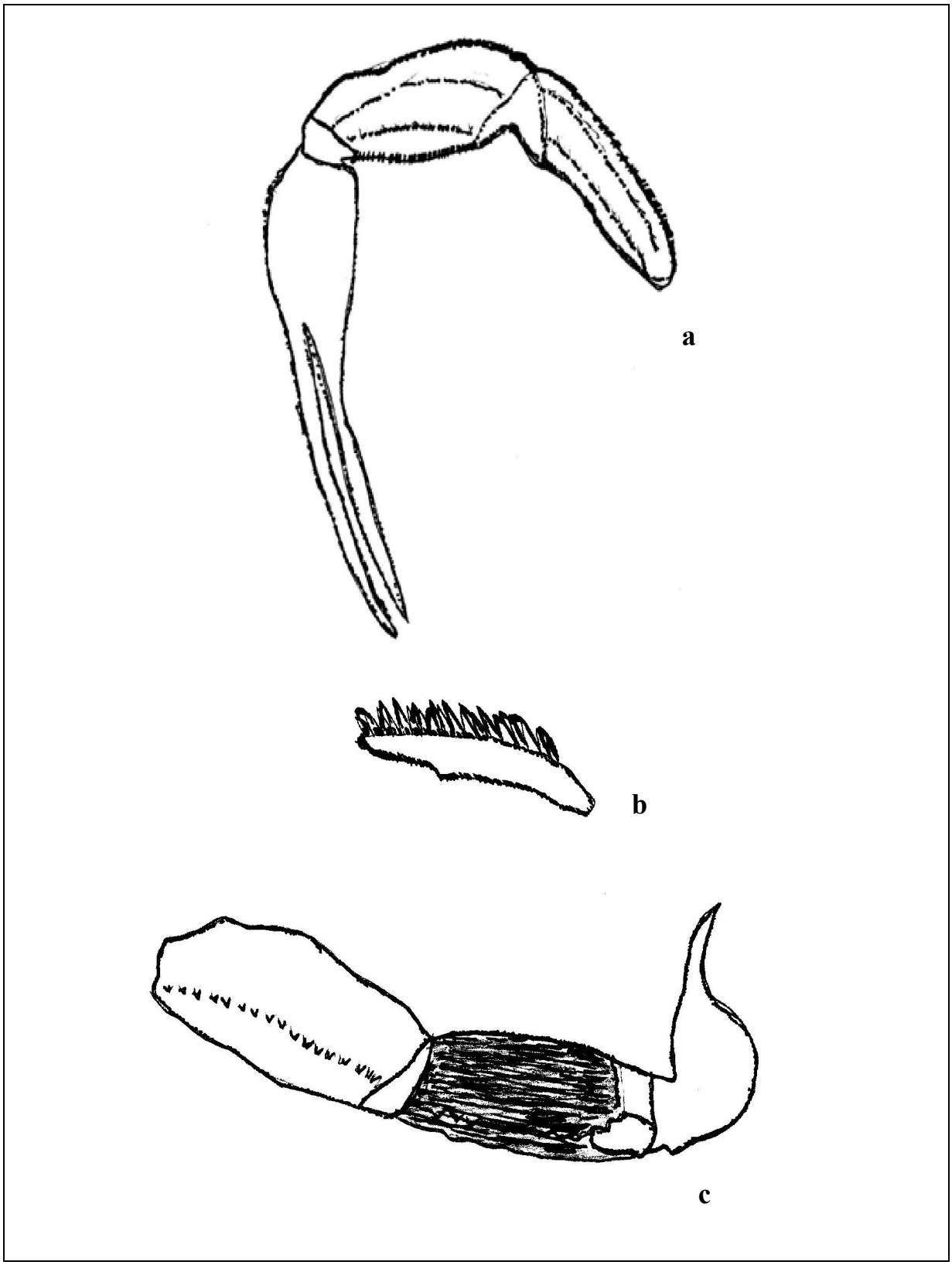


**Fig. (3) Camera lucida drawing of *leiurus quinquestriatus*** (10x)
a Pedipalps; b Pectens; c 4th segment, 5th segment and sting

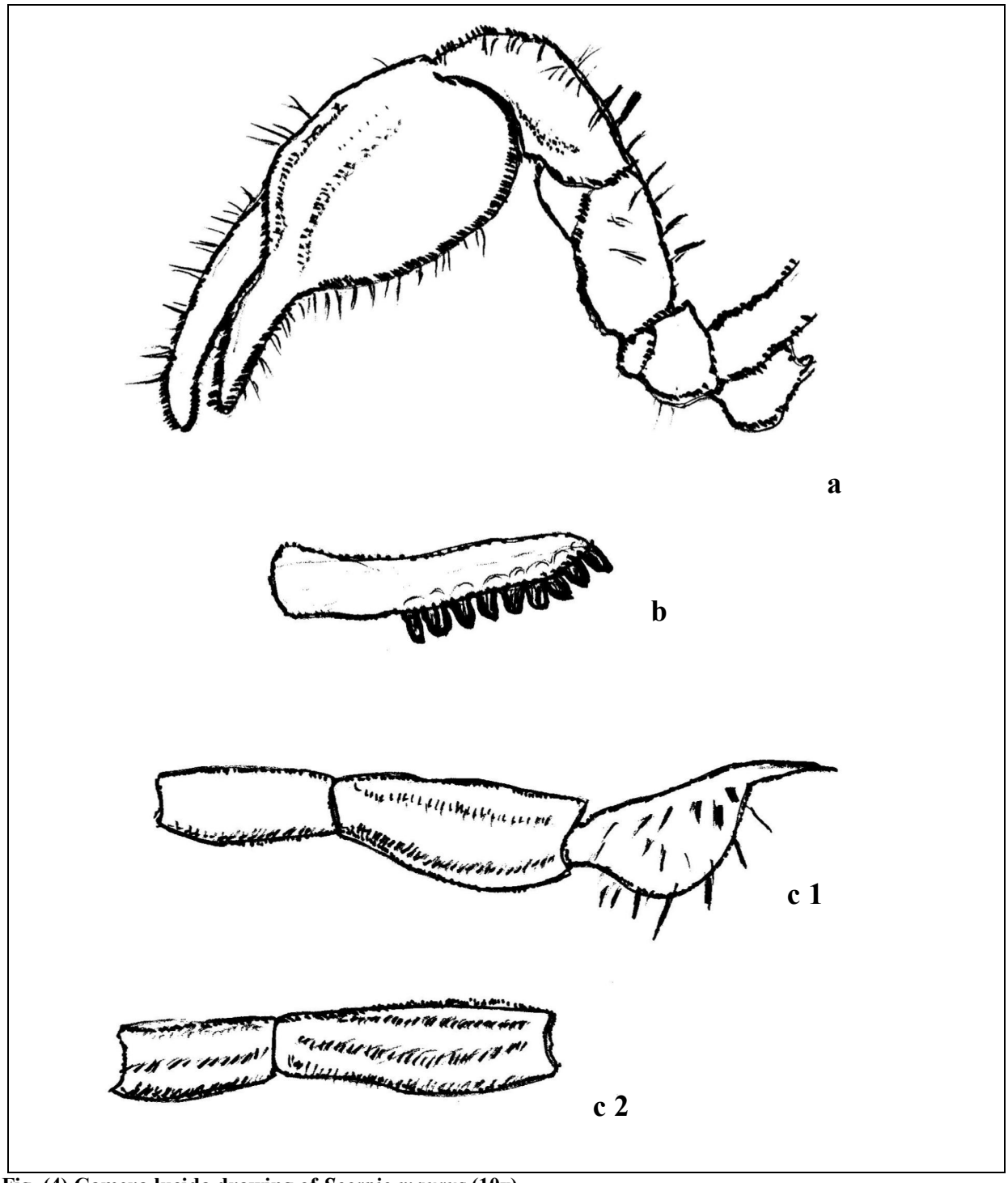


**Fig. (4) Camera lucida drawing of *Scorpio maurus* (10x)**
a Pedipalps
b Pectens
c1 4th segment, 5th segment and sting (l.v.)
c2 4th segment, 5th segment and sting (above. v.)

In the United States of America, not only taxonomic uncertainty existed in some species, but also in western and Eastern parts, morphological investigations are applied to solve these confusings (Stahnke and Carlos, 1977).

Morphology and Morphometric studies, also Furthur Additions to the scorpion Fauna of Trinidad and Tobago in south Africa were studied by Prendini (2001).

Chronic problems of scorpion classification are now of subject DNA-based, modern molecular techniques applied specially in complicated parts of the world Eastern Mediterranean and Middle East (Fet and Braunwalder, 2000)

In the present study, Further additions to our knowledge of Egyptian scorpion Fauna based on morphological aspects of pedipalp, pecten, 4th segment, 5th segment of Metasoma and sting, also Morphometric data of some body regions.

**References**


1. Al- Hajjal, A. (2005). A scorpions in the Arab world and rest of the Globle. Ammam: Daraldia. 120 p.
2. Al-Asmari, A. K.; Al-Saif, A. A. Abdo, N. M. (2007). Morphological identification of scorpion from JAZAN and Al-Medina, Saudi Arabia, J. venom. Anim. Toxins, incl V. 12, n. 4:821-843.
3. Brandley, M C.; Chmitz, A S. and Reeder, T W. (2005). Partitioned Bayesian Analyses, Phylogenetic Relationships of Scinid Lizards. Syst. Biol., 54: 373–390.
4. El- Hennaway, H. (1985). Preliminary notes on biology, distribution and predatory behavior of *peudopompilus humbaldti* proc, Egypt's National conf. Ent, Cairo. Vol., 1: 33-48.
5. El- Hennaway, H. (2001). Photography of Arachnids. A simple technique serket 7(2):106-107.
6. Fet, V. and Braunwalder, M. (2000). Scorpions of Aegeen area, current problems in taxonomy & biography. Balgian J. Zool. 130: 7-22.
7. Habel, JC. (2012). Microallopatry caused strong differentiation in *Buthus* scorpions, N.W. Africa. Pols one 7(2): p.29403.
8. Mirshamsi, D.; Sari, A.; Elahi, E. (2010). Phylogenetic relationships of *Mesbuthus eupeus* inferred from COI sequences J. of Nat Hist, 44: 2851–2872.
9. Polis, G. A. (2001). Population and community of desert scorpions. Scorpion Biology and Research, New York: Oxford Univ. Press., 302–316.
10. Possani, L. D.; Merino, E.; Corona, M. and Bolivar, F. (2000). Peptides and genes coding for scorpion toxins that affect ion-channels. Biochimie, 82: 861–868.
11. Prendini, L. (2001). Futher Additions of scorpion fanna of Trinidad and Tobago, J. of Arachinology, 29: 173–188.
12. Stahnke, H L. and Carlos, M. (1977). A key to the species of genus *Centruroides marx* Ent. News, 88: 111–120.
13. Yamashita, T. and Rhoads, D. D. (2013). Species Delimitation and morphological Divergence in the Scorpion *Centruroides vittatus* pols. One 8(7): p. 68282.


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