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FURTHER MORPHOLOGICAL CONSIDERATIONS ON THE GENUS *BIRULATUS* VACHON (SCORPIONES, BUTHIDAE), WITH THE DESCRIPTION OF A NEW SPECIES FROM ISRAEL

Wilson R. Lourenço

Abstract

Birulatus Vachon, 1974 remains one of the most enigmatic buthid genera ever described. At the time of its description, Vachon (1974) did not express any precise opinion about the phylogenetic position of the new genus. A more recent analysis (Lourenço, 1999) suggested that *Birulatus* might to some extent be associated with genera such as *Compsobuthus* Vachon, *Cicileus* Vachon and *Buthiscus* Birula, but it undoubtedly represented an older lineage. This would place *Birulatus* in a more isolated phylogenetic position than previously realised. Further morphological considerations, proposed here, are based on morphological characters newly observed by means of scanning electron microscopy. A new species from Israel is also described.

Key words: Scorpiones, Buthidae, *Birulatus*, Israel
Taxonomy:
Birulatus israelensis **sp**. **n.**

Nuevas consideraciones morfológicas sobre el género *Birulatus* Vachon (Scorpiones, Buthidae), con la descripción de una nueva especie de Israel

Resumen

Birulatus Vachon, 1974 sigue siendo uno de los géneros de bútidos más enigmáticos descritos hasta la fecha. En el momento de su descripción, Vachon (1974) no manifestó ninguna opinión concreta sobre la posición filogenética del nuevo género. Un análisis más reciente (Lourenço, 1999) sugería que *Birulatus* podría asociarse de alguna forma con géneros como *Compsobuthus* Vachon, *Cicileus* Vachon y *Buthiscus* Birula pero representaba indudablemente una línea evolutiva más antigua. Esto dejaría a *Birulatus* en una posición filogenética más aislada de lo que se pensaba antes. Las nuevas consideraciones morfológicas aquí propuestas se basan en caracteres morfológicos observados recientemente con ayuda del microscopio electrónico. Se describe también una nueva especie de Israel.

Palabras clave: Scorpiones, Buthidae, *Birulatus*, Israel
Taxonomía:
Birulatus israelensis **sp. n.**

Introduction

In a recent publication (Lourenço, 1999), the circumstances surrounding the description of the enigmatic genus *Birulatus* Vachon, 1974 have been discussed. In fact, Vachon (1974) described several genera and subgenera in a short addendum at the end of his comprehensive monograph on trichobothrial patterns in scorpions. Among these was the new genus *Birulatus*, based on a single female specimen collected in the South of Tafila, near to Schauback (Shauback) in Jordan. Both the diagnosis of the new genus and the description of the type species *Birulatus haasi* were rather limited. Several important characters were neither described nor commented on.

Birulatus remains one of the most enigmatic buthid genera ever described. At the time of its description, Vachon (1974) did not express any precise opinion about the phylogenetic position of the new genus. The recent analysis by Lourenço (1999) suggested that *Birulatus* might to some extent be associated with genera such as *Compsobuthus* Vachon, *Cicileus* Vachon and *Buthiscus* Birula, but it undoubtedly represented an older lineage. This would place *Birulatus* in a more isolated phylogenetic position, than previously realised.

Furthermore the studies by Lourenço (1999) showed not only that the descriptions of certain characters were incorrect, but also that lateral eyes were not present. Investigation of the type collection in Paris shows not only the presence of a single female holotype, as already mentioned (Lourenço, 1999), but in addition a second female specimen was located with the following data "Israel, Massada near

to Dgania (or Deganya), Lake Tiberias, Palmoni coll.; probably an incertain locality according to Levy & Vachon". Despite the poor preservation of the Israeli specimen, more precise analysis of its morphological characters has been carried out using scanning electron microscopy. This study leads at present to a new diagnosis of the genus *Birulatus*, and to the description of a new species from Israel ([1]).

New diagnosis for the genus *Birulatus* Vachon

Scorpions of small size, with an average total length of 20 mm. Tergites with three distinct median keels. The entire body is covered with strong pearly granulation. Lateral eyes absent. Moderately elongated stigmata. Telson long and thin without subaculear tooth. Chelicerae with subdistal, medial and basal teeth very reduced. Sternum small but distinctly triangular. Pectines small, with weakly distinct fulcra. Metasomal segments I to IV without keels. Trichobothrial pattern: according to Vachon (1974) and based on the study of *B. haasi*, the genus would be type A, orthobothriotaxic, with 11 trichobothria on the femur with a β configuration for dorsal trichobothria; 13 on the patella and 15 on the tibia; seven on the finger and eight on the chela. Examination of the Israeli specimen described here (with the help of SEM), reveals a minor neobothriotaxy with the absence of several trichobothria. Femur shows two internal, and three dorsal trichobothria and an undefined type α or β, since $\mathbf{d_2}$ and $\mathbf{d_4}$ are absent; the external are also absent. Patella has only four dorsal with $\mathbf{d_1}$ or $\mathbf{d_2}$ absent. Chela shows the absence of **Esb**, and finally, the finger lacks **esb**. Movable fingers of tibia with seven partially oblique rows of granules and without external accessory granules at their bases. Tibial spurs developed in legs IV and moderate in legs III.

Birulatus israelensis sp. n. (Figs. 1-16)

TYPE MATERIAL: Female holotype, Israel, Massada near to Dgania (or Deganya), Lake Tiberias, Palmoni coll. Deposited in the Muséum National d'Histoire Naturelle, Paris.

DERIVATIO NOMINIS: The specific makes reference to the country where the new species was found.

Scorpions of small size, with an average total length of 20 mm. Chelicerae with subdistal, medial and basal teeth very reduced. Pectines small, with weakly distinct fulcra. Trichobothrial pattern: minor neobothriotaxy. Femur with two internal, and three dorsal trichobothria and an undefined type α or β, since $\mathbf{d_2}$ and $\mathbf{d_4}$ are absent; the external are also absent. Patella with four dorsal and the absence of $\mathbf{d_1}$ or $\mathbf{d_2}$. Chela with **Esb** absent and finger without **esb**. Movable fingers of tibia with seven partially oblique rows of granules and without external accessory granules at their bases. Tibial spurs developed in legs IV and moderate in legs III.

Description based on the female holotype (Measurements in Table I).

Table I.
Morphometric values in mm of the female holotypes of *B. haasi* and *B.* israelensis sp. n.

	B. haasi	*B. israelensis*
Total length	18.1	17.2
Carapace		
length	2.8	2.7
anterior width	1.4	1.4
posterior width	2.9	2.8
Metasomal segment I :		
length	1.4	1.3
width	1.4	1.3
Metasomal segment V :		
length	2.3	2.2
width	0.6	0.6
depth	0.5	0.5
Vesicle :		
length	2.0	2.0
width	0.5	0.5
depth	0.5	0.5
Pedipalp :		
Femur length	2.0	2.0
Femur width	0.5	0.4
Patella length	2.5	2.4
Patella width	0.8	0.7
Tibia length	3.9	3.8
Tibia width	0.6	0.5
Tibia depth	0.5	0.4
Movable finger :		
length	2.9	2.8

Coloration. Basically pale yellowish. Prosoma : carapace yellowish with the median eyes surrounded by black pigment. Mesosoma, metasoma, vesicle, chelicerae, pedipalps and legs yellowish.

Morphology. Carapace strongly granular; anterior margin with a feeble to moderate concavity, and several spinoid granules present. Anterior and posterior ocular keels feeble; presence of two strong furrows; one anteriorly and the other posteriorly. Median ocular tubercle slightly anterior to the center; median eyes small separated by two ocular diameters. Absence of lateral eyes. Sternum triangular with a large base. Mesosoma: tergites with moderate to strong granulations. Median keel strong in all tergites. Two latero-longitudinal keels arising behind the posterior ocular keel of carapace, very strong in all tergites. Tergite VII pentacarinate; all keels feeble. Venter: genital operculum large, divided longitudinally. Pectines small, with weakly distinct fulcra; pectinal tooth count 9-10; basal middle lamellae of each pecten not dilated. Sternites

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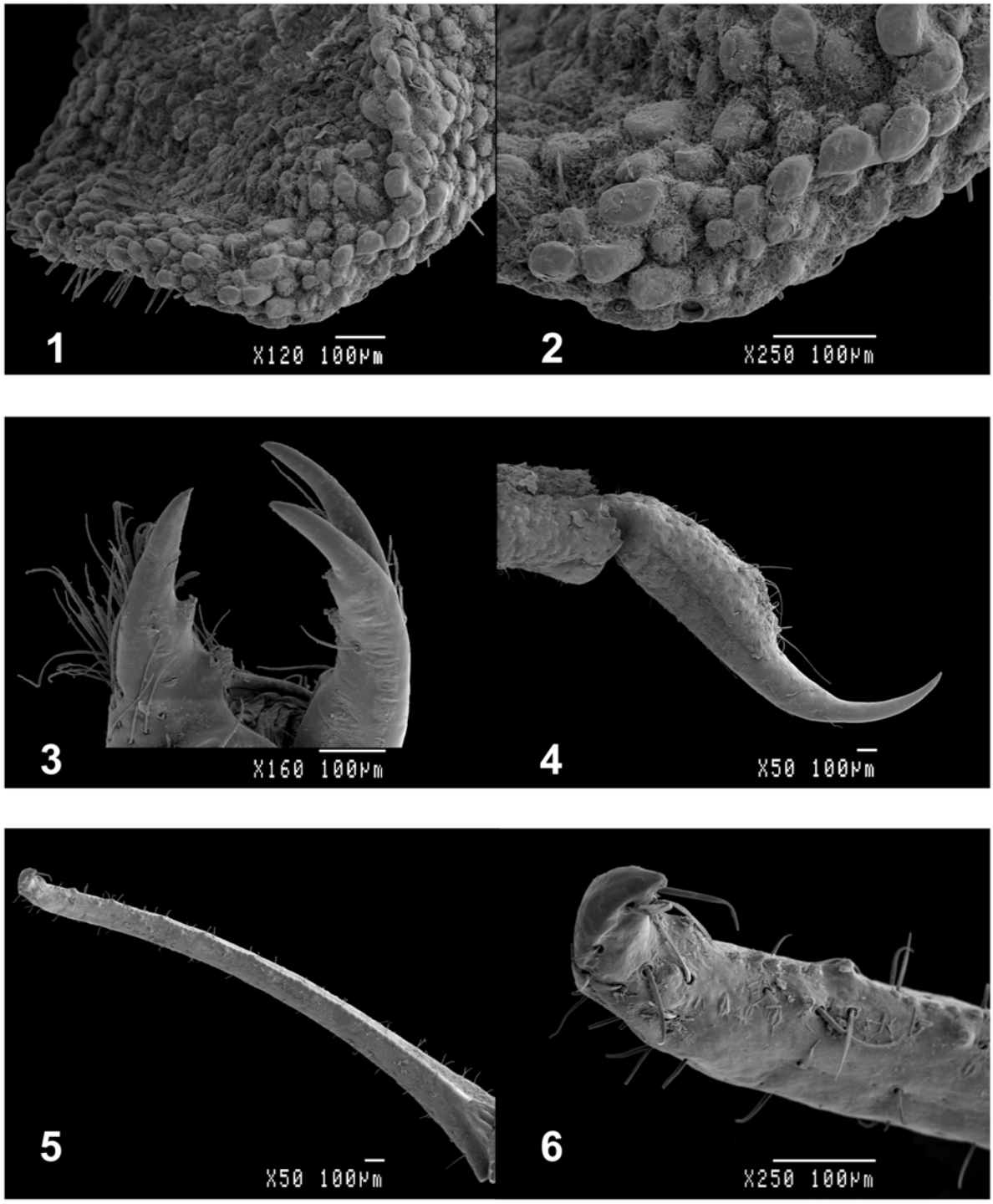
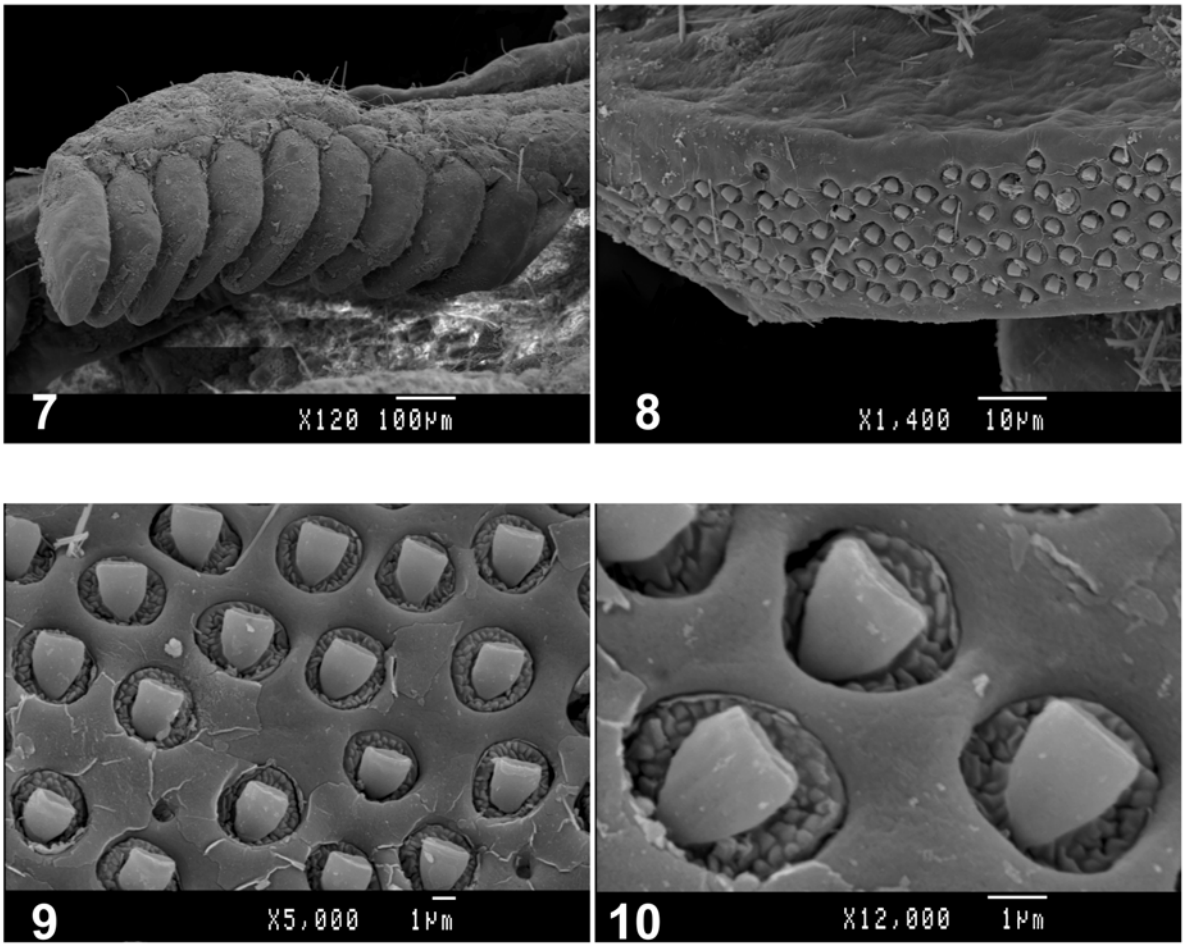
Note ([1])
Another *Birulatus* specimen is cited by Stathi & Mylonas (2001) for Syria. This material is presently in study by Lourenço & Stathi (in prep.).



Figs. 1-6. *Birulatus israelensis* sp. n. SEM photos.
1-2. Anterior margin of carapace; to notice the absence of lateral eyes. **3**. Right chelicera. **4**. Telson, lateral aspect. **5**. Cutting edge of movable finger with the linear row of granules. **6**. Extremity of movable finger; to notice the strong spinoid tooth.

moderately granular with moderately elongated stigmata; two feeble longitudinal furrows on each sternite; VII without furrows or keels. Metasoma: segments I to IV without keels. Segment V with strong spinoid granules on the ventral face. Tegument feebly granular. Telson very elongated and thin, less granulated than the metasomal segments, almost smooth and with a short and feebly curved aculeus. Subaculear tooth absent. Chelicerал dentition according to the model defined for the family Buthidae (Vachon, 1963), with subdistal, medial



Figs. 7-10. *Birulatus israelensis* sp. n. SEM photos.
7. Right pecten. **8**. Microstructure of peg sensilla on tooth. **9-10**. Peg sensilla in detail.

and basal teeth very reduced; ventral aspect of both finger and manus with long but not very dense setae. Pedipalps: femur pentacarinate feebly crenulate; patella and tibia with only vestigial keels; all faces feebly granular. Movable fingers with seven partially oblique rows of granules and without external accessory granules at their bases. Trichobothrial pattern type A, minor neobothriotaxy (Vachon, 1974). Femur with two internal, and three dorsal trichobothria and an undefined type α or β, since $\mathbf{d_2}$ and $\mathbf{d_4}$ are absent (Vachon, 1975); the external are also absent. Patella with four dorsal and the absence of $\mathbf{d_1}$ or $\mathbf{d_2}$. Chela with **Esb** absent and finger without **esb**. Legs: tarsi with very few fine setae ventrally. Tibial spurs developed in legs IV and moderate in legs III.

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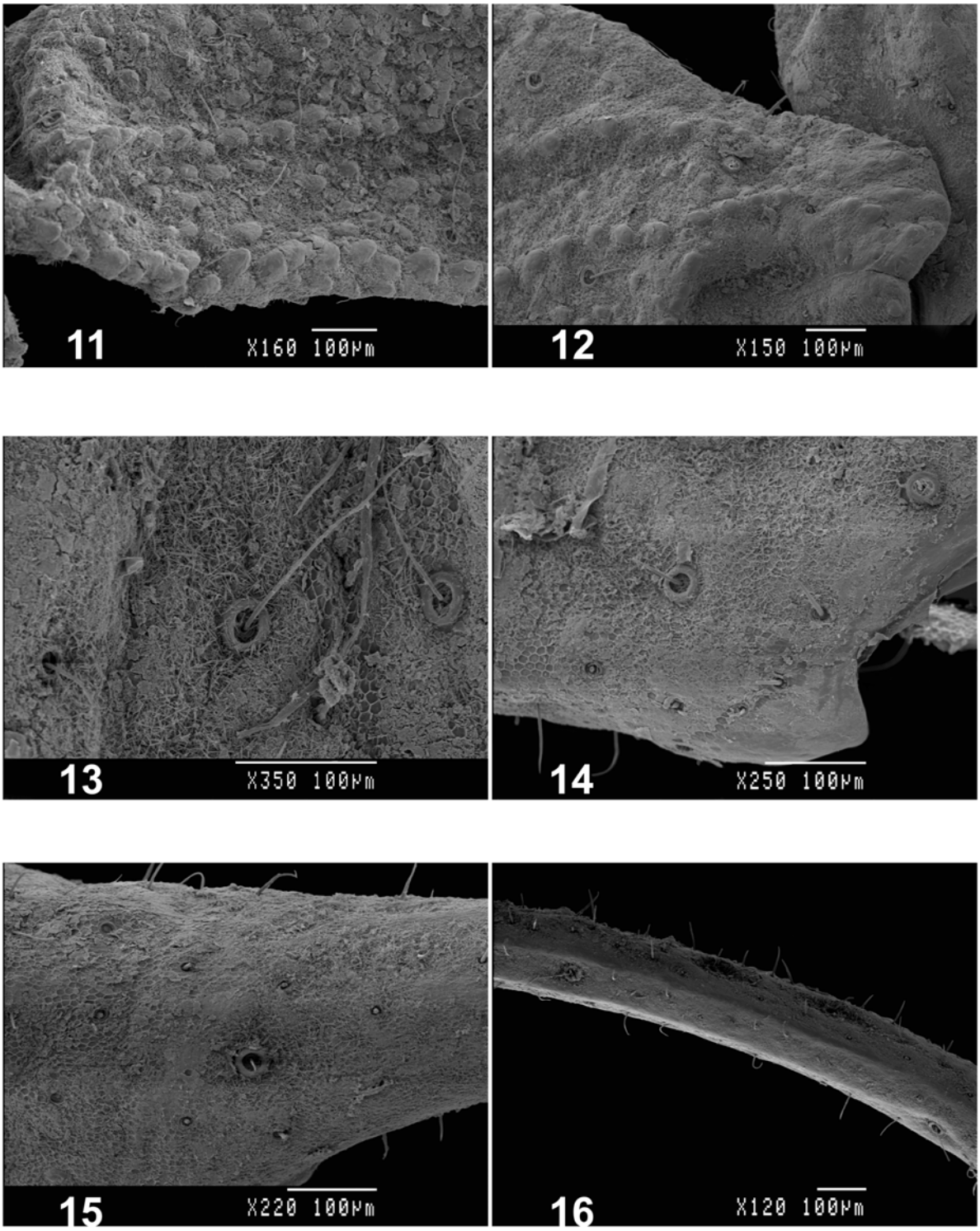

Figs. **11-16.** *Birulatus israelensis* sp. n. SEM photos.
11-16. Trichobothrial pattern. **11.** Femur with internal and dorsal trichobothria; to notice the absence of the external. **12.** Patella, distal extremity, showing $\mathbf{d_4}$, $\mathbf{d_5}$ and the internal trichobothria. **13.** Chela, showing $\mathbf{Eb_1}$, $\mathbf{Eb_2}$ and $\mathbf{Eb_3}$. **14.** Chela, showing **Et** and **Est**. **15.** Base of fixed finger showing **eb**. **16.** Fixed finger, showing **dt**, **et**, **est** and **db**.