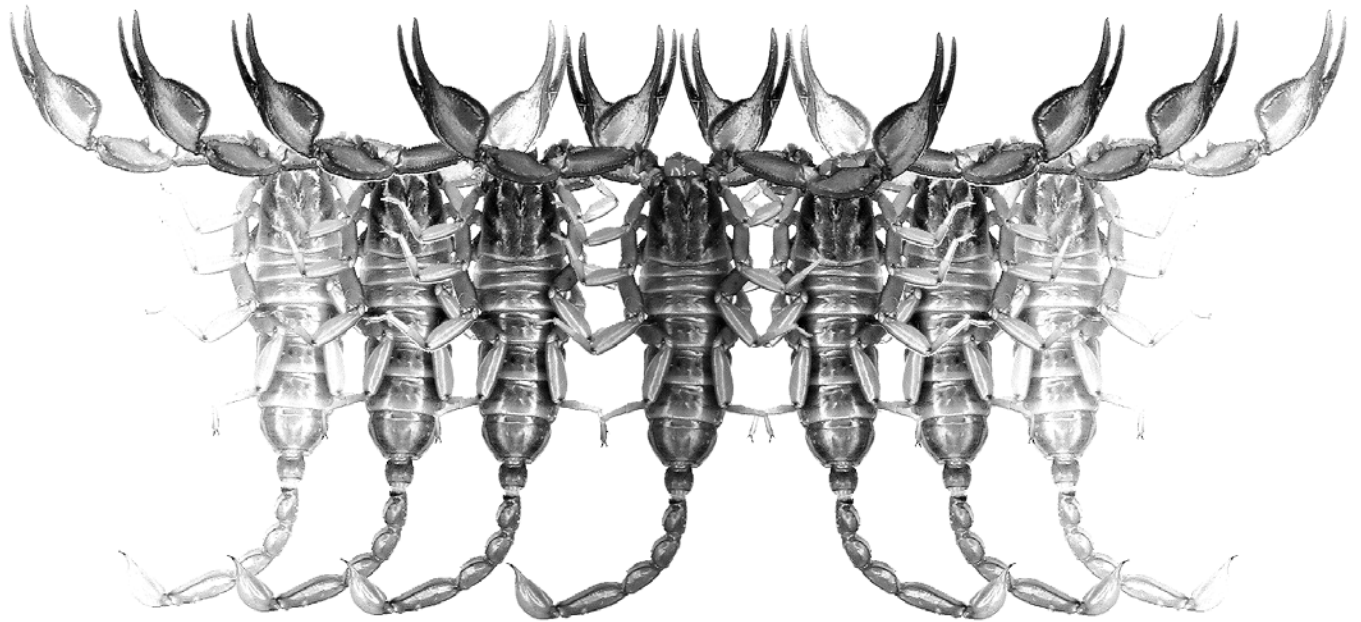


Euscorpilus

Occasional Publications in Scorpiology



**Rare or Poorly Known Scorpions from Colombia. IV.
Additions, Synonymies and New Records
(Scorpiones: Buthidae, Scorpionidae)**

Rolando Teruel & César A. Roncallo

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Euscorpius

Occasional Publications in Scorpiology

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Rare or poorly known scorpions from Colombia. IV. Additions, synonymies and new records (Scorpiones: Buthidae, Scorpionidae)

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Summary

The results of the study of new samples of scorpions from Colombia are presented. *Tityus erikae* Lourenço, 1999 is demonstrated to be a junior synonym of *Tityus tayrona* Lourenço, 1991, and the adult female of *Tarsoporosus macuira* Teruel et Roncallo, 2007 is described for the first time. Also, new locality records and supplementary information on morphological variability (including some diagnosis updates) are given for *Centruroides margaritatus* (Gervais, 1841), *Rhopalurus caribensis* Teruel et Roncallo, 2008, *Tityus tayrona*, and *Tarsoporosus macuira*.

Introduction

The scorpion fauna of Colombia has been one of the best known in South America, as it has been the main subject of several dozens of papers (see thorough compilations in Lourenço, 1997, and Fet et al., 2000). Despite this, an important number of its species still remain poorly known or their precise taxonomic identity has not yet satisfactorily determined, but these taxa have attracted the attention of specialists, and during the last five years some of them have been revisited. As results, new taxa have been discovered, a few others have been synonymized, and others have been redescribed and their diagnosis and geographical distribution have been updated (Botero-Trujillo, 2007, 2008a, 2008b, 2009; Kovařík, 2007; Teruel & García, 2007, 2008a, 2008b; Teruel & Roncallo, 2007, 2008a, 2008b; Lourenço, 2008; Botero-Trujillo & Noriega, 2008; Flórez, Botero-Trujillo & Acosta, 2008; Botero-Trujillo & Francke, 2009; Botero-Trujillo, Erazo-Moreno & Pérez, 2009; Ochoa, Botero-Trujillo & Prendini, 2010).

Recently, we have obtained additional scorpion samples from northern Colombia. Their study yielded very important results, including the confirmation that *Tityus erikae* Lourenço, 1999 is not a valid species, the finding of the adult female of *Tarsoporosus macuira* Teruel et Roncallo, 2007, and new locality records for several taxa. These results are presented and fully discussed in this paper.

Methods

Specimens were studied, measured and photographed under a Zeiss Stemi 2000-C stereomicroscope, equipped with line scale and grid ocular micrometers, and a Canon PowerShot A620 digital camera, all calibrated to 20x. Digital images were slightly processed with Adobe Photoshop[®] 8.0, only to optimize bright and contrast features. Nomenclature and measurements follow Stahnke (1970), except for trichobotriotaxy (Vachon, 1974), metasomal carinae (Francke, 1977) and sternum (Soleglad & Fet, 2003). In the table, all measurements are given in millimeters as length/width/depth except for the carapace, where these correspond to length/posterior width. All specimens mentioned herein are deposited in the first author's personal collection (RTO), with collecting and identification labels originally written in Spanish, but translated to English in the text only for coherence purposes.

Systematics

Family Buthidae

Centruroides margaritatus (Gervais, 1841)

Figs. 1, 10

Centruroides gracilis: Gómez & Otero, 2007: 56; fig. 4a (misidentification).



Figure 1: Adult male and female of *Centruroides margaritatus* from Riohacha, entire dorsal view.

New Records: COLOMBIA, *Magdalena Department*, Santa Marta city, January 2009, leg. J. A. Vargas, 1 juvenile (Sco-0422). *La Guajira Department*, Riohacha, José A. Galán District, 8 November 2006, leg. C. A. Roncallo, 1♀ (Sco-0360); Riohacha, Barrio Arriba District, 25 July 2007, leg. C. A. Roncallo, 1♂ (Sco-0375); Riohacha downtown, 25 June 2008, leg. W. Ramos, 1♂ (Sco-0395), 5 October 2008, leg. C. A. Roncallo, 1 juvenile (Sco-0421); Riohacha graveyard, August 2009, leg. C. A. Roncallo, 1♂ (Sco-0420); Serranía de Macuira, 3 km west of Nazareth, 14 July 2007, leg. J. Echavarría, 1♀ (Sco-0374).

Remarks: all specimens recorded herein were collected under different conditions, but always associated to human environments: inside inhabited houses (two specimens from Riohacha and those from Santa Marta and Nazareth), walking on the streets at night (two specimens from Riohacha), and under rock in a sandy beach (one specimen from Riohacha).

These Colombian specimens of *C. margaritatus* match in all diagnostic features the samples studied from other localities throughout Central America and Greater

Antilles, with the single exception of the base color of the body and appendages, which is light yellowish with a more contrasting dark pattern.

The precise geographical distribution of this species in Colombia is currently unknown. Previously published records must be considered as unreliable, because at least in some cases it has been confused with *C. gracilis*, as is evident from those papers, which have been supplemented with photographs (i.e., Gómez & Otero, 2007: 56; fig. 4a). These misidentifications could explain why some authors have recorded supposed hybridization between these two species (Lourenço, 1991b) or even doubted about their taxonomic validity (Lourenço, 1997); otherwise, both species are not even closely related and belong to different species-groups (R. Teruel, unpublished data).

Rhopalurus caribensis Teruel et Roncallo, 2008
Figs. 2, 11, Tab. 1

Rhopalurus caribensis Teruel & Roncallo, 2008a: 1–11, figs. 1–7, tabs. 1–2; Rojas-Runjaic & Becerra, 2008: 461, 464–466, fig. 1.



Figure 2: Adult male and female of *Rhopalurus caribensis* from Ranchería Irujunai, entire dorsal view.

Sex	N	Pectinal teeth							Media	SD
		19	20	21	22	23	24	25		
♂♂	17	–	–	–	2	4	7	4	23.76	± 0.97
♀♀	19	1	3	9	4	2	–	–	21.16	± 1.01

Table 1: Variation of pectinal tooth count in *Rhopalurus caribensis* sp.n., including data from the types, additional specimens herein recorded and Botero-Trujillo & Fagua (2007). Abbreviations: number of pectines (N), standard deviation (SD).

Diagnosis (emended): species of moderately small size (males 38–40 mm, female 43–55 mm) for the genus. Body pale yellow to light orange brown, with metasomal segment V moderately infuscate and a diffuse pattern of gray spots over carapace and tergites (confluent and darker in earlier juveniles); metasoma ventrally with all carinae infuscate and a thin, dark line between the ventrosubmedian carinae. Pedipalp chelae robust in both sexes, more conspicuously in males; fingers without basal lobe/notch combination, but with subtle scallop in adult males; fingers with eight principal rows of granules, flanked by a few supernumerary granules. Sternite III and pectines with stridulatory apparatus greatly reduced; sternite V without smooth patch. Metasoma distally incrassate on both sexes, much more conspicuously in males; telson vesicle small, subaculear tubercle vestigial, blunt and far removed from the base

of aculeus. Pectinal tooth count 22–25 (mode 24) in males, 19–23 (mode 21) in females.

New Records: COLOMBIA: *La Guajira Department*, Palomino, at Magdalena border, September 2008, leg. C. A. Roncallo, 1♀ (Sco-0419); Ranchería El Pasito, 3 km northeast of Riohacha, 5 December 2008, leg. J. Zubiria, 1♀ (Sco-0415), Riohacha downtown, 27 September 2008, leg. J. Brito; 1 juvenile (Sco-0417), Riohacha, Colegio Sagrado Corazón, km 1 Maicao road, 16 July 2008, leg. C. A. Roncallo, 2 juveniles (Sco-0394); Riohacha, 7 km beyond Colegio Sagrado Corazón, path to Rancherías river, 11 February 2009, leg. C. A. Roncallo, 1 juvenile (Sco-0416); Riohacha, Colegio James Dobson, km 5.4 Maicao road, August 2009, leg. C. A. Roncallo, 1 juvenile (Sco-0418); Ranchería Irujunai, km 12 El Pájaro path, on Maicao road, 2 January 2008, leg. C. A. Roncallo, 1♂, 3♀♀, 1 juv-



Figure 3: Adult male of *Tityus tayrona* from Turbaco: **a)** entire dorsal view; **b)** entire ventral view.

enile (Sco-0393). VENEZUELA: *Zulia State*, Mara Municipality, Cuatro Bocas, La Sierrita, June 1998, 1♂ (Sco-0328).

Remarks: all specimens recorded herein were obtained under different conditions, but always in arid to desert areas, just as for the types (Teruel & Roncallo, 2008a). The individuals from Irujunai were all found packed together inside a tree hole, and the one from Rancherías river was found under a rock in a secondary dry forest, syntopically with *Tarsoporosus macuira* Teruel et Roncallo 2007. The remaining specimens were all captured in places associated with human environments: inside crevices of benches and walls in schoolyards (three specimens from Riohacha), and inside inhabited houses (one each from El Pasito and Riohacha), syntopically with *Centruroides margaritatus* and *T. macuira*.

The additional specimens now available allow to assess intraspecific variability in *R. caribensis*, and to update its diagnosis. For example, the specimens from Irujunai are basically light orange-brown with the dark pattern less marked, and thus, the scorpions look essentially ferrugineous to unaided eye. Also, one female from Irujunai is smaller (43 mm), and the ones from Palomino and El Pasito are larger (52 and 55 mm, respectively) than those of the type series (48–50 mm).

On the other hand, the undetermined male from Zulia associated by Teruel & Roncallo (2008a: 8) to *R. caribensis* was re-examined and compared to the

additional samples, and it was confirmed to belong to this species (see above, in New Records).

***Tityus tayrona* Lourenço, 1991**

Figs. 3–7, 12

Tityus tayrona Lourenço, 1991a: 275, 279–281, figs. 3–4, tabs. 1–2; Rojas-Runjaic & Armas, 2002: 63; Botero-Trujillo & Fagua, 2007: 129–130, 132–133, figs. 11–15.

Tityus erikae Lourenço, 1999: 1–6, figs. 1–7, tab. I. **New synonym.**

Diagnosis (emended): species of small size (males 33–41 mm, females 35–38 mm) for the genus. Body light yellowish brown, very densely spotted with light to medium brown, tergites with three very irregular dark stripes (better defined in females and juveniles); metasomal segments I–V similarly colored (i.e., V not conspicuously darkened), telson dark reddish brown; pedipalp fingers densely spotted, in adult males with basal portion subtly infuscate. Pedipalp chela and metasomal segment V inflate and moderately globular in larger males. Sternite V with a smooth whitish patch in both sexes: always small and flat in the adults (smaller in females), but expanded and bulky in juvenile males. Dorsolateral carinae of metasomal segments II–IV with distal tooth not conspicuously enlarged. Telson vesicle feebly granulose; subaculear tubercle large and rhomboidal, with two large dorsal granules. Pedipalp fixed

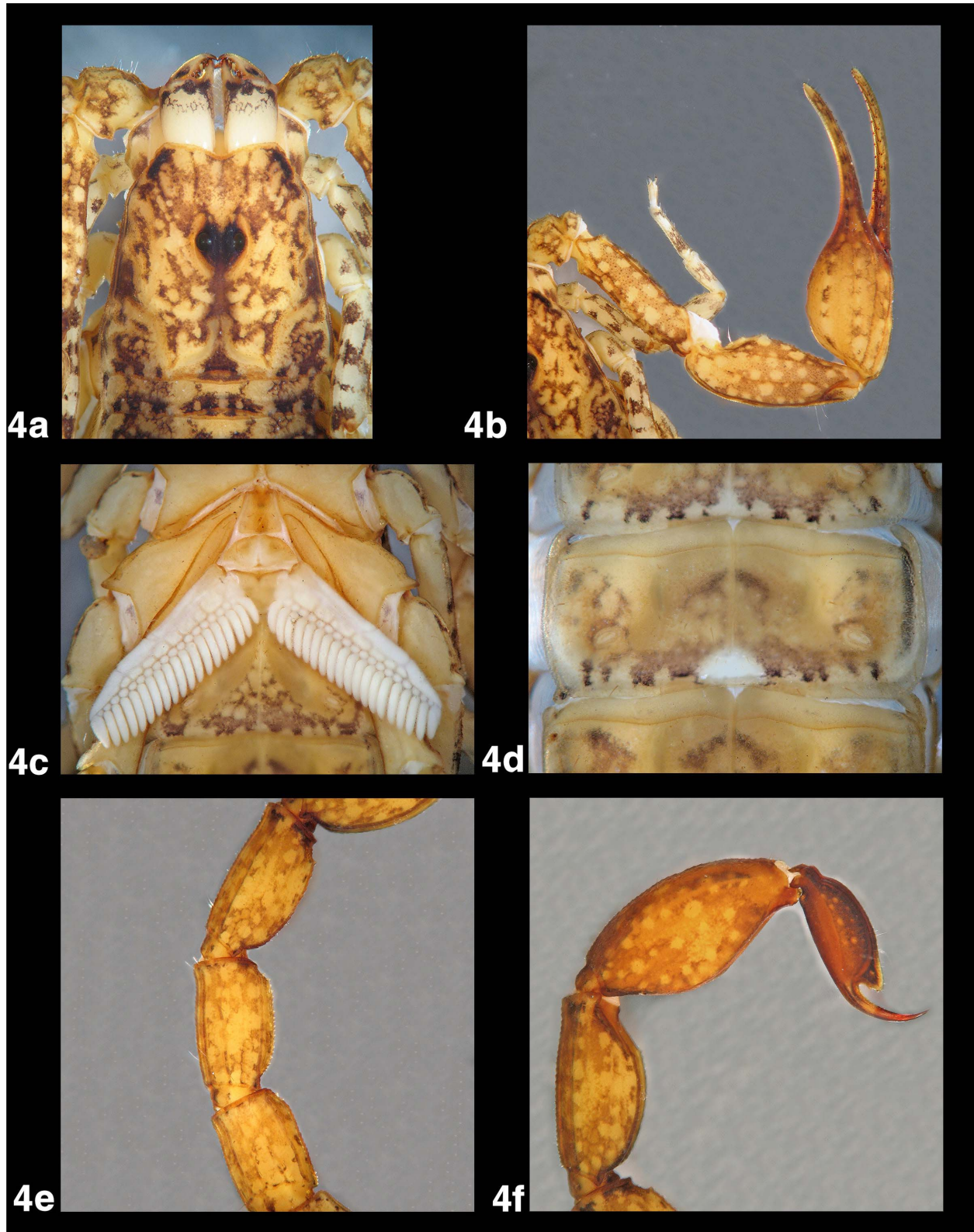


Figure 4: Adult male of *Tityus tayrona* from Turbaco: **a)** carapace; **b)** pedipalp, dorsal view; **c)** sternopectinal region; **d)** sternite V; **e)** metasomal segments I-III, lateral view; **f)** metasomal segments IV-V and telson, lateral view.

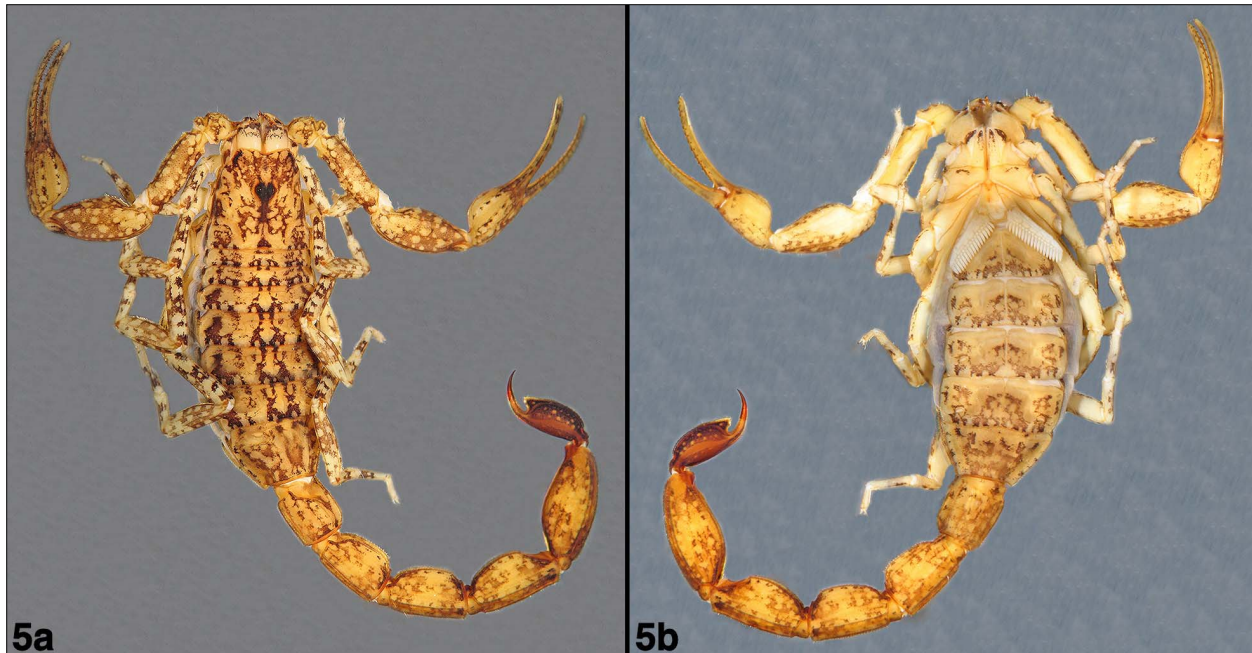


Figure 5: Adult female of *Tityus tayrona* from Turbaco: **a)** entire dorsal view; **b)** entire ventral view.

finger with 13–14 principal rows of granules, movable finger with 14–15; basal lobe/notch combination vestigial in males, absent in females. Pectinal tooth count 16–19 in males, 14–18 in females; basal middle lamella not dilated.

New Records: COLOMBIA: *Bolívar Department*, Turbaco, Urbanización La Granja, 31 December 2008, leg. C. A. Roncallo, R. Roncallo & J. A. Vargas, 1♂, 1♀ (Sco-0413); Turbaco Botanical Garden, 7 October 2008, leg. C. A. Roncallo & R. Roncallo, 1 juvenile (Sco-0414).

Remarks: the adult specimens were collected among rocks and rotten logs during a night search with UV light (02:30 hrs), in an area which had been cleared for building purposes at an altitude of 100 m a.s.l. The juvenile was found among bracts of *Heliconia* flowers.

In a previous paper, Teruel & García (2008b: 10–12) commented on the deep taxonomic problems of the Colombian members of the “*Tityus clathratus*” species-group, and made a special reference to inadequate or unreliable diagnoses of most species, including *T. tayrona* and *T. erikae*. Additional specimens studied herein allow updating and correcting the diagnosis of the former according to the current taxonomy of this group. It is worth to note here that the presence of a smooth patch in sternite V is now confirmed for both sexes of *T. tayrona*, as previously suggested by Teruel & García (2008: 12). This patch is small and flat in the adult male (Fig. 4d), and even less conspicuous in adult female (Fig. 6d); thus, it is obvious that it was simply overlooked by these authors in their specimens; this is even

demonstrated in the paper by Botero-Trujillo & Fagua (2007), where this patch is explicitly stated to be absent in text page 133, but is in turn clearly shown in the figures 13 and 15 of the same paper.

On the other hand, *Tityus erikae* was described by Lourenço (1999) on the basis of a single juvenile male, and it was originally separated from *T. tayrona* on the basis of only three supposedly diagnostic characters: “... a more intense and darker pigmentation generally, a greater distance between median eyes, [...] and the presence of a smooth and shining expanded zone on the posterior region of sternite V...” (Lourenço, 1999: 2; italics herein added). Juvenile *Tityus* have no taxonomic value at all, because they lack secondary sexual dimorphism which is critical to diagnose closely related species, and this fact alone renders both Lourenço’s diagnosis and selection of the holotype of *T. erikae* useless. Apart from this, the first two characters used by Lourenço are largely known to vary from juvenile through adult instars in all species of *Tityus* and thus cannot be used as diagnostic, so we are only left with character 3 to separate *T. erikae* from *T. tayrona*. The examination of the additional specimens of *T. tayrona* herein recorded (which are all clearly conspecific) confirmed that the smooth patch of sternite V is also present in *T. tayrona*, and that it is ontogenetically variable: in males it is expanded and bulky in the juvenile instars (see our Fig. 7c, which shows a patch identical to that depicted in Lourenço [1999: fig. 6] for the holotype of *T. erikae*), and it becomes much smaller and flat in the adult instar (see our Figs. 4d and 6d).

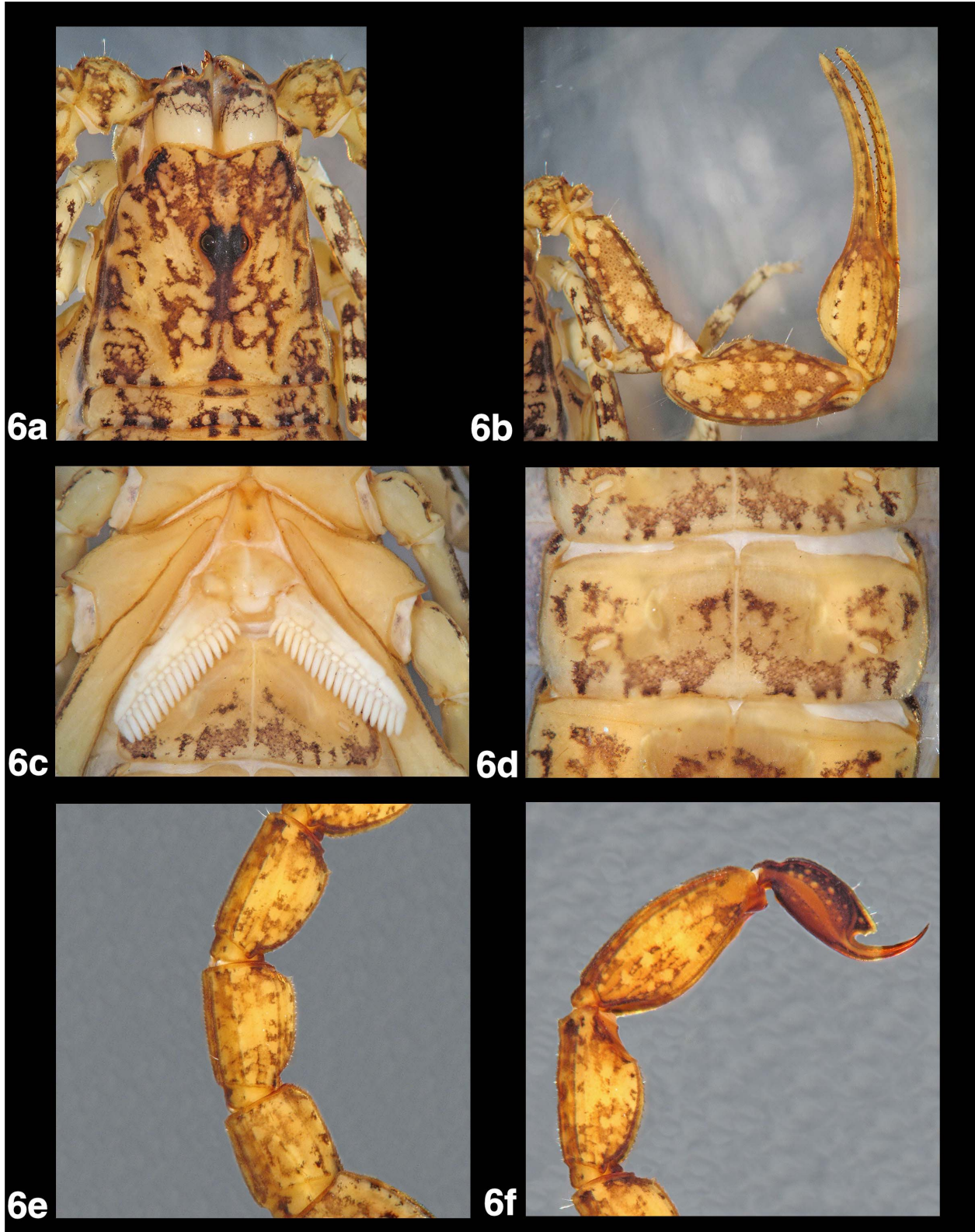


Figure 6: Adult female of *Tityus tayrona* from Turbaco: a) carapace; b) pedipalp, dorsal view; c) sternopectinal region; d) sternite V; e) metasomal segments I–III, lateral view; f) metasomal segments IV–V and telson, lateral view.



Figure 7: Juvenile male of *Tityus tayrona* from Turbaco: **a)** entire dorsal view; **b)** entire ventral view; **c)** sternite V.

Apart from this, the juvenile male *T. tayrona* studied herein matches every point of the original description and figures of *T. erikae* exactly and the distribution of both taxa is also coincident, demonstrating that the holotype of the latter is merely a juvenile *T. tayrona*. Thus, the following synonymy is herein established: *Tityus tayrona* Lourenço, 1991 = *Tityus erikae* Lourenço, 1999, **new synonym**.

On the other hand, some wrong information that has been published on *T. tayrona* needs to be corrected. First, Rojas-Runjaic & Armas (2002: 63) stated that “...

male [...] has metasoma with the fifth segment [...] blackish...” (original text in Spanish, translation and italics added), but this is incorrect according to the original description (Lourenço, 1991a: 280–281, figs. 3–4), additional illustrated papers (Lourenço, 1997: 66, figs. 3–4; Botero-Trujillo & Fagua, 2007: 132–133, figs. 12–15), and our specimens (Figs. 3a–b, 4f).

Second, Botero-Trujillo & Fagua (2007: 133) stated that “... this species is characterized by the presence of 14–17 pectinal teeth...”, but this only applies to females as given in the original description by Lourenço (1991a:



Figure 8: Adult female of *Tarsoporosus macuira*: **a)** entire dorsal view; **b)** entire ventral view.

281; tab. 2), which also gives a range of 16–19 for males; our specimens confirm Lourenço's original data, and also allow to know that females may present up to 18 pectinal teeth.

Family Scorpionidae
Subfamily Diplocentrinae

Tarsoporosus macuira Teruel et Roncallo, 2007
Figs. 8–9, 13; Tab. 2

Tarsoporosus macuira Teruel & Roncallo, 2007: 1–8, figs. 1–4, tab. 1; Rojas-Runjaic & Becerra, 2008: 461, 473–474, fig. 4.

Diagnosis (emended): species of medium size (males 40–41 mm, female 39 mm) for the genus. Body yellowish to dark brown, with pedipalps and metasoma distally darker; chelicerae, carapace and tergites densely

but diffusely patterned with dark brown to blackish reticulations; legs immaculate, conspicuously paler than the body; pedipalps and metasoma with carinae and fingers darkened. Carapace and tergites smooth, with coriaceous to finely granulose areas symmetrically scattered. Metasoma with intercarinal tegument smooth and totally devoid of granulation on segments I–IV. Pedipalp chela robust, strongly carinated and covered by granulose reticulations on dorsoexternal surfaces. Pectinal tooth count 12–14 in males, 11–12 in females. Modal tarsal spine formula 4/5 : 5/5 : 6/6 : 6/6.

Adult Female: the specimen examined herein differs from the holotype in the following characters: **(1)** genital operculum completely fused by a membranous connection (Fig. 9e); **(2)** genital papillae absent (Fig. 9e); **(3)** pectines comparatively smaller, with 12/11 teeth (Fig. 9e); **(4)** pedipalp chela less incrassate, with fingers longer and more slender (Figs. 9c–d, Tab. 2); **(5)** metasomal segments shorter but wider (Figs. 8a–b, 9f–g, Tab. 2); **(6)** mesosoma wider and with convex sides

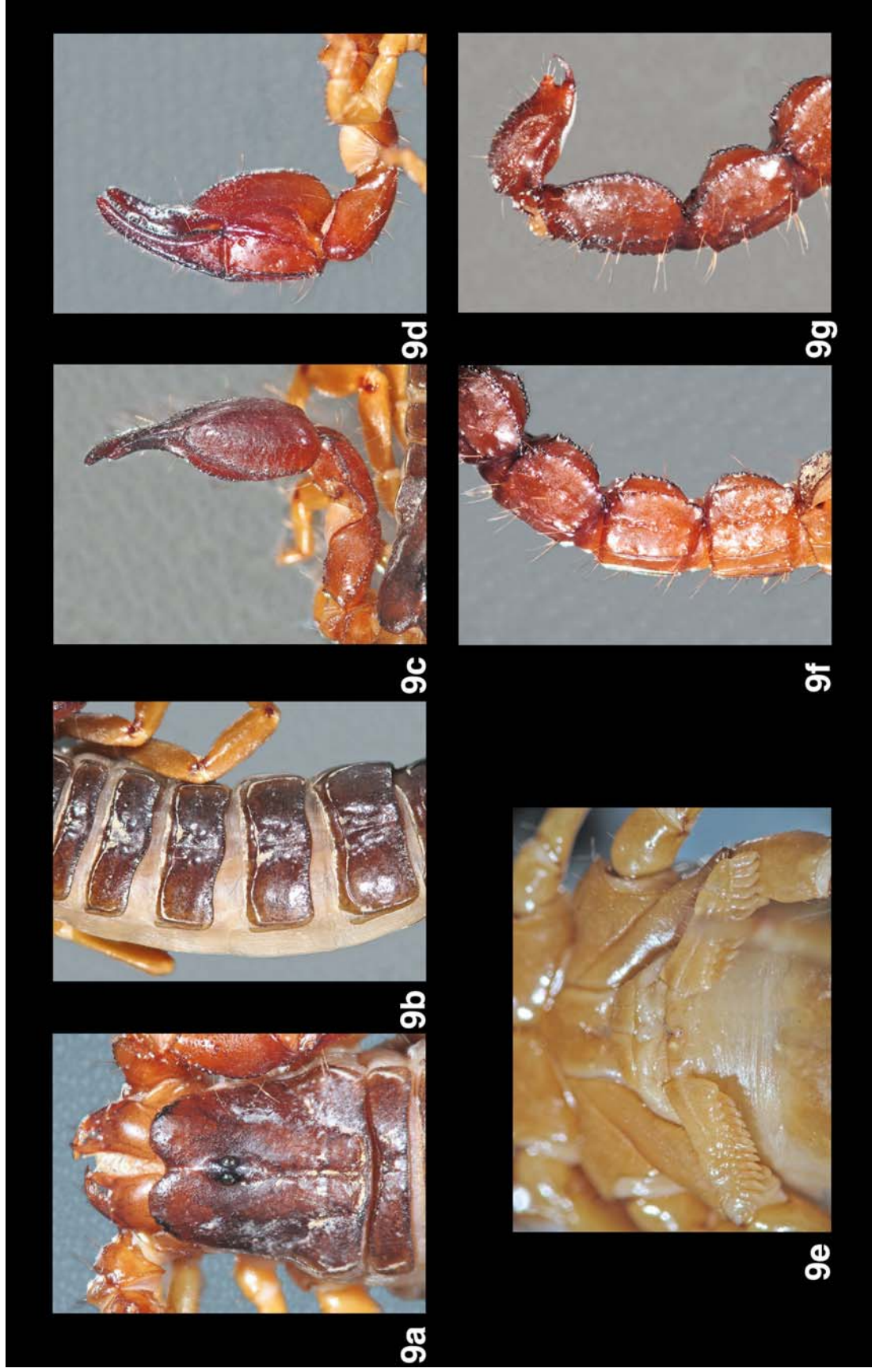
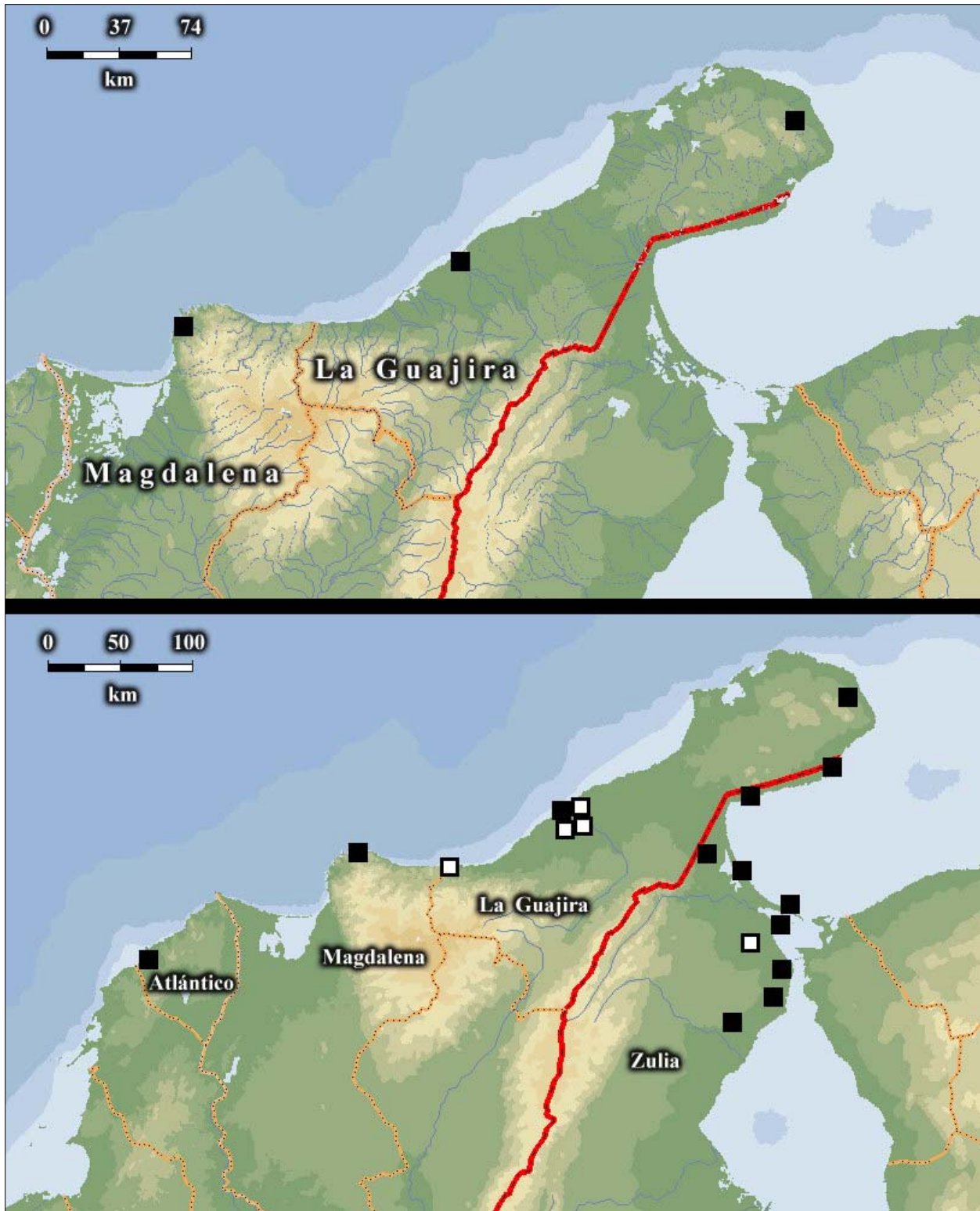
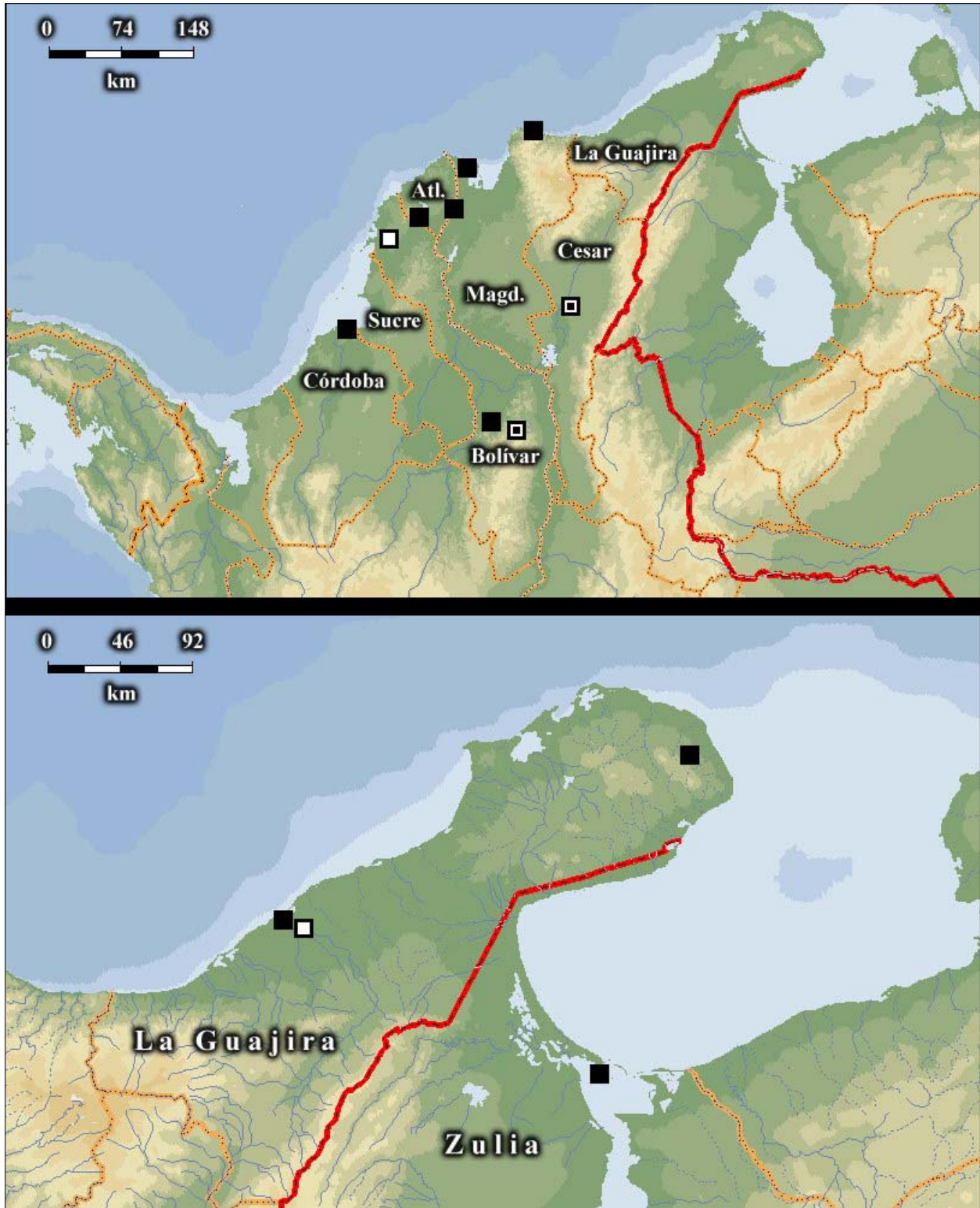


Figure 9: Adult female of *Tarsoporus maculira*: **a**) carapace and tergite I; **b**) tergites II–VI; **c**) pedipalp, dorsal view; **d**) pedipalp, ventral view; **e**) sternopectinal region; **f**) metasomal segments I–III, lateral view; **g**) metasomal segments IV–V and telson, lateral view.



Figures 10–11: 10 (top). Geographical distribution of *Centruroides margaritatus* in Caribbean Colombia (only confirmed records included). 11 (bottom). Geographical distribution of *Rhopalurus caribensis*: previous records (black squares), new records (white squares).



Figures 12–13: 12 (top). Geographical distribution of *Tityus tayrona*: previous records (black squares), new record (white square), records previously assigned to *T. erikae* (white squares with black dot). Abbreviations for Departments: Atl. = Atlántico, Magd. = Magdalena. 13 (bottom). Geographical distribution of *Tarsoporosus macuira*: previous records (black squares), new record (white square).

Dimensions		♀ Riohacha	♂ Holotype
Carapace	L / Wp	6.0 / 5.4	5.3 / 5.0
Mesosoma	L	12.1	13.1
Tergite VII	L	3.0 / 5.8	3.3 / 4.9
Metasoma	L	20.5	22.0
Segment I	L / W	2.7 / 3.8	3.0 / 3.7
Segment II	L / W	2.8 / 3.6	3.1 / 3.4
Segment III	L / W	2.9 / 3.6	3.2 / 3.4
Segment IV	L / W	3.4 / 3.5	3.8 / 3.3
Segment V	L / W / H	4.3 / 3.3	4.5 / 3.2
Telson	L	4.4	4.4
Vesicle	L / W / H	3.2 / 2.9 / 1.9	3.2 / 3.0 / 1.9
Aculeus	L	1.2	1.2
Pedipalp	L	16.5	15.1
Femur	L / W	3.5 / 1.9	3.4 / 1.8
Patella	L / W	4.4 / 1.9	3.7 / 1.8
Chela	L	8.5	8.0
Hand	L / W / H	3.3 / 2.9 / 4.0	3.0 / 3.1 / 4.1
Movable finger	L	5.2	5.0
Total	L	38.6	40.4

Table 2: Measurements of the adult female of *Tarsoporosus macuira*; those of the holotype male have been included for comparison. Abbreviations: length (L), width (W), posterior width (Wp), depth (H).

(Figs. 8a–b, Tab. 2); (7) overall size slightly smaller (Tab. 2); (8) color pattern somewhat darker (Figs. 8–9).

New Record: COLOMBIA: *La Guajira Department*, Riohacha, 7 km beyond Colegio Sagrado Corazón, path to Rancherías river, 11 February 2009, leg. C. A. Roncallo, 1♀ (Sco-0412).

Remarks: this species was described only from two adult males captured in the Colombian side of La Guajira Peninsula, but the authors hypothesized that this species was likely present also in neighboring Venezuela (Teruel & Roncallo, 2007). This prediction was soon confirmed by Rojas-Runjaic & Becerra (2008), who recorded this scorpion from a small island in the Maracaibo Gulf (Isla de Toas, Zulia Department).

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Luis F. de Armas (Instituto de Ecología y Sistemática, Havana, Cuba) and Franklyn Cala (BIOECO), kindly hand-carried the new specimens to the first author. Luis F. de Armas and two anonymous reviewers made careful peer-reviews of the manuscript. Fernando M. Rojas-Runjaic (Museo de Historia Natural “La Salle”, Caracas, Venezuela) supplied important geographical data about Venezuelan specimens herein studied. We are very grateful to all of them.

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