Euscorpius

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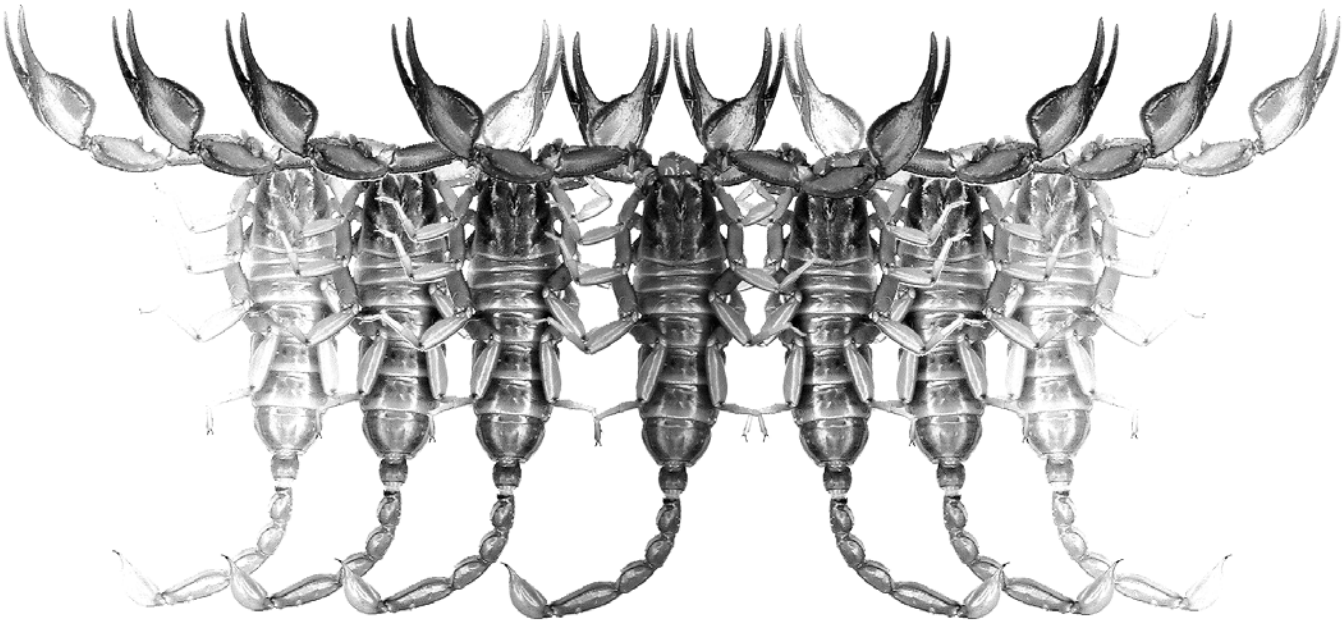

The True Identity of *Rhopalurus pintoi* Mello-Leitão, 1932, with Notes on the Status and Distribution of *Rhopalurus crassicauda* Caporiacco, 1947 (Scorpiones: Buthidae)

Rolando Teruel & Alexander K. Tietz

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The true identity of *Rhopalurus pintoi* Mello-Leitão, 1932, with notes on the status and distribution of *Rhopalurus crassicauda* Caporiacco, 1947 (Scorpiones: Buthidae)

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Summary

The true identity of the enigmatic scorpion *Rhopalurus pintoi* Mello-Leitão, 1932 is herein finally clarified, on the basis of new specimens collected near the type locality: it is demonstrated to be a senior synonym of *Rhopalurus piceus* Lourenço & Pinto-da-Rocha, 1997, as it was already suspected. The species is redescribed, and some topics on taxonomy, geographical distribution and ecology are commented for this species and *Rhopalurus crassicauda* Caporiacco, 1947.

Introduction

More than 75 years ago, on the basis of a single specimen collected at Rio Tacutú in the Brazilian side of the border with Guyana, Mello-Leitão (1932) described *Rhopalurus pintoi*, a very peculiar species because of its entirely blackish coloration. For half a century on, this species was only briefly mentioned or included in keys (i.e., Prado, 1932; Mello-Leitão, 1945), but in the last three decades its taxonomic status became controversial and obscure. It was first downgraded by Lourenço (1982) to a subspecies of *Rhopalurus laticauda* Thorell, 1876, then regarded as a *nomen nudum* by Lourenço (2002) himself, and last recognized as valid by Teruel (2006), who also suggested that *Rhopalurus piceus* Lourenço et Pinto-da-Rocha, 1997, was possibly its junior synonym.

Another species which cannot be left out of these problems is *Rhopalurus crassicauda* Caporiacco, 1947, which was described on the basis of two adult males and one adult female from Rupununi in southwestern Guyana, very near to the type locality of both *R. pintoi* and *R. piceus*. Later Lourenço (1982) studied Caporiacco's types plus some additional material from neighboring Brazil, regarded this species as conspecific with *R. pintoi* in spite of the deep differences between both original descriptions, and treated it as a subspecies of *R. laticauda* (see above). Nevertheless, Lourenço (2002) changed his opinion and restored *R. crassicauda* as a valid species, and it has remained as such since.

Recently, the authors obtained scorpion material collected at Rupununi, which included topotypic specimens of *R. crassicauda* plus a second, very different species of *Rhopalurus* which was clearly referable to *R. pintoi*, but also matched the description of *R. piceus*. The careful study of these specimens demonstrated that both *R. crassicauda* and *R. pintoi* are valid taxa, and that *R. piceus* is a junior synonym of the latter; these conclusions are treated in detail in the present paper. Furthermore, some comments on the taxonomy, distribution and ecology of both species are included.

Methods & Material

All 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 and Photoshop CS3®, 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 Table 1, all measurements are given in millimeters as length/width/depth except for the carapace, where these correspond to length/posterior width. To avoid an unnecessarily extended synonymy, only those papers which include information relevant to the purposes of this article have been included, such as the original description, redescriptions, nomenclatural changes, and records of new localities. Abbreviations of the collections mentioned in the text are as follows:

Dimensions		♂ (RTO)	♂ (AKT)	♀ (RTO)	♀ (AKT)
Carapace	L / Wp	9.0 / 8.7	10.7 / 10.4	9.5 / 9.8	11.2 / 11.2
Mesosoma	L	20.0	22.6	22.5	20.8
Tergite VII	L / W	6.0 / 7.0	8.1 / 10.3	6.5 / 10.0	6.6 / 11.5
Metasoma	L	47.6	54.6	51.5	58.7
Segment I	L / W	6.2 / 5.1	7.7 / 5.7	6.5 / 5.5	7.6 / 5.7
Segment II	L / W	7.2 / 5.4	8.3 / 6.4	7.7 / 5.6	8.9 / 6.4
Segment III	L / W	7.7 / 6.3	8.8 / 7.4	8.0 / 6.0	9.5 / 6.5
Segment IV	L / W	8.2 / 7.4	9.0 / 9.1	9.0 / 6.3	10.2 / 7.7
Segment V	L / W	8.7 / 7.4	10.4 / 9.1	10.0 / 6.3	11.0 / 7.5
Telson	L	9.6	10.4	10.3	11.5
Vesicle	L / W / H	5.0 / 3.2 / 3.0	4.4 / 3.8 / 3.3	5.1 / 3.3 / 3.1	5.1 / 4.0 / 3.3
Aculeus	L	4.6	6.0	5.2	6.4
Pedipalp	L	35.9	34.8	38.9	36.7
Femur	L / W	9.1 / 2.3	7.6 / 2.9	9.6 / 2.5	8.2 / 2.8
Patella	L / W	10.0 / 3.1	7.8 / 3.6	11.0 / 3.2	8.4 / 3.9
Chela	L	16.8	19.4	18.3	20.1
Hand	L / W / H	5.5 / 3.7 / 4.1	7.9 / 4.3 / 5.1	5.8 / 3.5 / 3.6	7.6 / 4.4 / 4.1
Movable finger	L	11.3	11.5	12.5	12.5
Total	**L**	**76.6**	**87.9**	**83.5**	**90.7**

Table 1: Measurements of four adult *Rhopalurus pintoi* from Rupununi. Abbreviations: length (L), width (W), posterior width (Wp), depth (H).

Instituto Oswaldo Cruz, Belo Horizonte, Brazil (IOC), Museu de Zoologia, Universidade de São Paulo, Brazil (MZSP), Museo Zoologico "La Specola" dell'Universitá de Firenze, Florence, Italy (MZUF), Muséum National d'Histoire Naturelle, Paris, France (MNHN), American Museum of Natural History, New York, New York, USA (AMNH), and personal collections of the authors (RTO, AKT).

Systematics

Rhopalurus pintoi Mello-Leitão, 1932
Figures 1–4, 7–9, Tables 1–2

Rhopalurus pintoi Mello-Leitão, 1932: 11–12, 14–15, 31, 38, 46, figs. 2a–c; Prado, 1939: 27, 36; Mello-Leitão, 1945: 266, 284–285, fig. 115 (in part); Lourenço, 1982: 107–108, 115, 117, fig. 78 (in part); Teruel, 2006: 51–52.

Rhopalurus laticauda pintoi: Lourenço, 1982: 107–108, 115, 117–119, 121, 134–138, figs. 39–46, 78; table I (in part, references to the holotype only); Fet & Lowe, 2000: 220–221 (in part, references to the holotype only).

Rhopalurus piceus Lourenço & Pinto-da-Rocha, 1997: 181, 183–185, 187–191, figs. 4, 6, 8, 10, 12–13, 15–21, table I; Fet & Lowe, 2000: 221; Lourenço, 2002: 104–105, 110–111, 304–305, figs. 232–238; Lenarducci et al., 2005: 7, table II; Teruel, 2006: 52. **New synonym**.

Type data: *Rhopalurus pintoi*: ♀ holotype (IOC, lost *sensu* Lourenço, 1982; see Remarks): Brazil, Roraima, Rio Tacutú, Brazilian border with Guyana. *Rhopalurus piceus*: Juvenile ♀ holotype (MZSP-15173, not examined; see Remarks): Brazil, Roraima, Tepequén, 15–22 June 1993, M. Vanzolini.

Diagnosis: species of large size (males 77–88 mm, females 84–91 mm) for the genus. Coloration entirely blackish, except only for white pectines and yellowish tips of legs and pedipalp fingers. Pedipalps densely hirsute and very slender in both sexes, with hands slightly more incrassate in males; fingers without basal lobe/

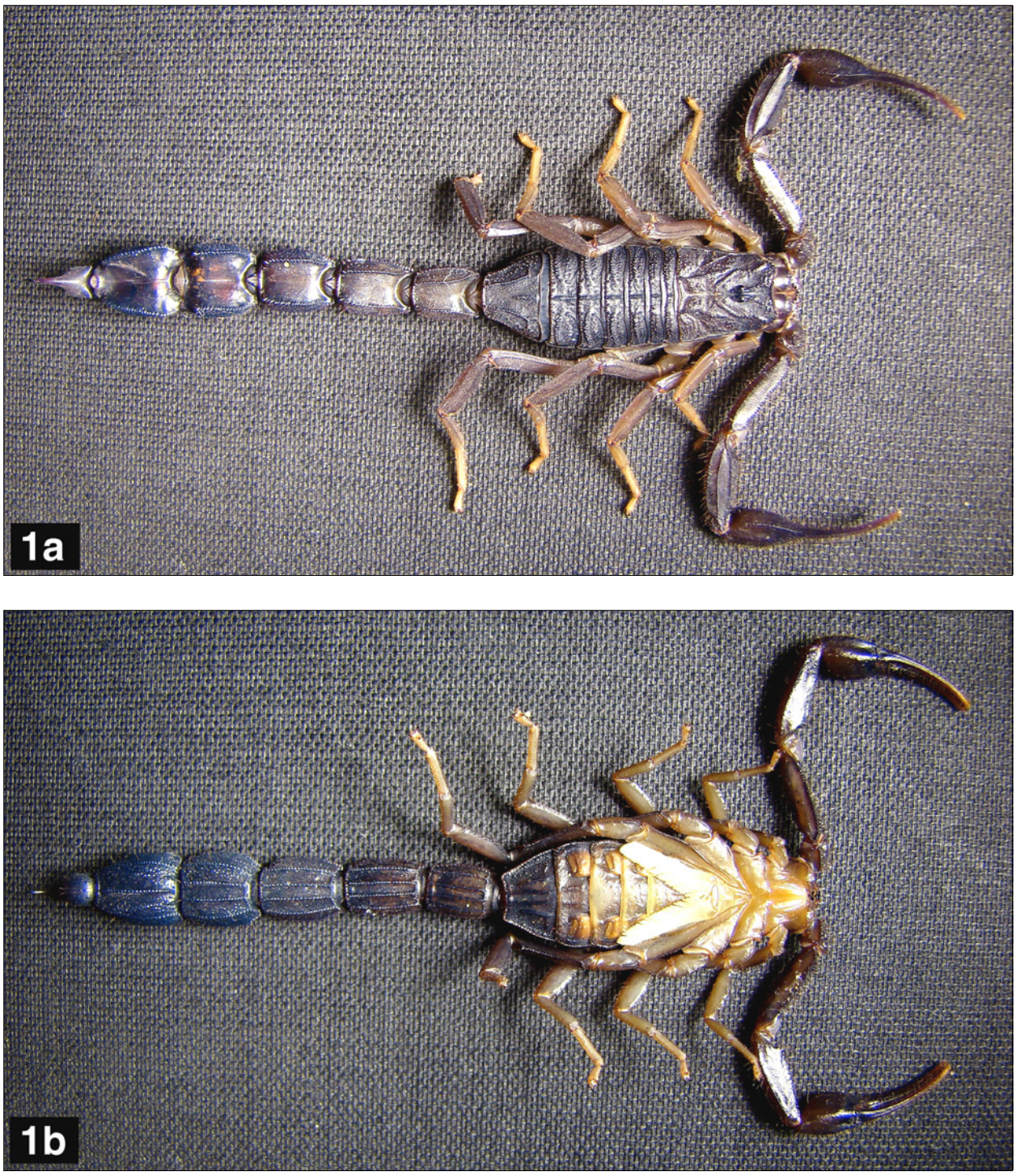

Figure 1: Adult male *Rhopalurus pintoi* from Rupununi: **a)** entire dorsal view; **b)** entire ventral view.

notch combination, but with weak scallop in adult males; fingers with 9–10 principal rows of granules, flanked by a many supernumerary granules. Carapace and tergites very strongly granulose. Sternite III and pectines with stridulatory apparatus well developed; sternite V with a vestigial smooth patch on males. Metasoma distally incrassate on both sexes, much more conspicuously in males; telson vesicle large, subaculear tubercle vestigial and close to the base of aculeus. Pectines with 27–30 (mode 28) teeth in males, and 21–25 (mode 24) in females; basal plate with a very large and deep pit in females.

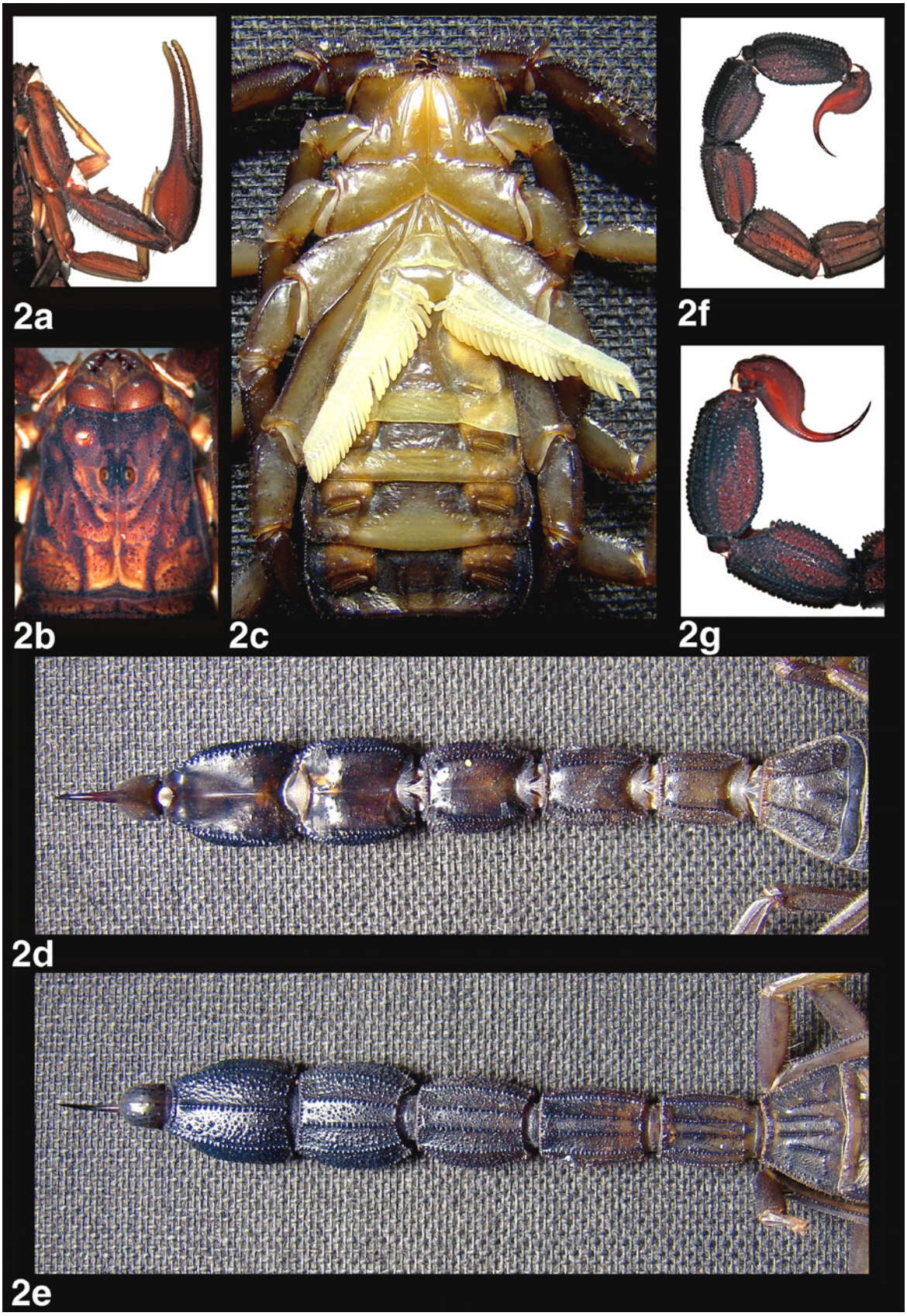

Figure 2: Adult male *Rhopalurus pintoi* from Rupununi: **a)** pedipalp; **b)** chelicerae and carapace; **c)** sternopectinal region; **d)** tergite VII, metasoma and telson, dorsal view; **e)** sternite VII, metasoma and telson, ventral view; **f)** metasoma, lateral view; **g)** metasomal segments IV–V and telson, lateral view.

Sex	N	Pectinal teeth										Mean	SD
		21	22	23	24	25	26	27	28	29	30		
♂♂	12							1	7	3	1	28.33	± 0.78
♀♀	26	2	5	5	10	4						23.35	± 1.20

Table 2: Variation of pectinal tooth count in *Rhopalurus pintoi*, including data from Mello–Leitão (1932, holotype) and Lourenço & Pinto–da–Rocha (1997, as *R. piceus*). Abbreviations: number of pectines (N), standard deviation (SD).

Distribution (Fig. 7): this species appears to be endemic the Rupununi region comprising the border region of Brazil, Guyana and Venezuela. Specimens have been collected only from four localities in Brazil and one in Guyana, but it is probably present also in neighboring Venezuela (southern Bolivar State), where potentially suitable habitat also reaches.

Redescription (adult male from Rupununi)**: coloration** (Fig. 1) basically dark yellowish to reddish brown, very densely spotted with blackish brown all over the boy and appendages so the entire scorpion looks black to unaided eye, except for the bright white pectines and yellowish tip of legs and pedipalp fingers. **Carapace** (Fig. 2b) trapezoidal, slightly longer than wide and with all carinae present and coarsely granulose to denticulate: posterior median carinae almost fused to central lateral carinae (both carinae are aligned in straight row, but separate by a small gap of about one–granule length), central median carinae fused to lateral ocular carinae, superciliary carinae fused to anterior median carinae, posterior lateral carinae long and displaced forward to mid portion of carapace; tegument densely granulose and with many coarse granules scattered, much more densely on interocular triangle; median eyes separate by more than one ocular diameter; three pairs of lateral eyes, all relatively large and about the same size. **Tergites** (Fig. 1a) with the same sculpture as on carapace; median carina very strong and coarsely granulose in all tergites; VII with two pairs of strongly granulose lateral carinae. **Chelicerae** (Fig. 2b) with dentition typical for the genus; tegument smooth, polished. **Pedipalps** (Figs. 1a–b, 2a) orthobothriotaxic A-α, with all segments very slender (femur, patella, and chela each longer than carapace) and densely covered by long, reddish macrosetae. Femur with all carinae crenulate serrate to denticulate, intercarinal tegument densely granulose. Patella with all carinae crenulate to serrate, intercarinal tegument with the same granulation as on femur, internal surface with many large and spiniform granules. Chela oval and slightly incrassate, conspicuously wider than patella; hand with all carinae weakly to moderately granulose, intercarinal tegument coriaceous to finely granulose, with sparse coarser granulation; fingers densely hirsute and without basal lobe/notch combination, but with a weak scallop instead, extending almost the entire length of the fingers when closed. Both fixed and movable fingers with enlarged, clawlike tip and nine principal rows of granules, of which the basalmost is straight and very long (more than twice longer than the remaining), all rows flanked on each side by many supernumerary granules; tip of movable finger with complex dentition, composed of two subrows of four external and two internal granules just basal to distal tooth. **Legs** (Figs. 1a–b) with all carinae granulose, intercarinal tegument coriaceous to finely granulose. **Sternum** (Fig. 2c) type 1 and triangular, typical for the genus. **Pectines** (Fig. 2c) elongate, with basal portion moderately enlarged; pectinal tooth count 28/28; basal plate wider than long, unmodified and with posterior margin slightly convex. **Sternites** (Figs. 1a, 2c) III–VI smooth and shiny, with sparse large punctations, spiracles elongate and slit-like; stridulatory apparatus well developed; posterior margin of sternite V with a moderately large smooth patch, which is much wider than long, light yellow and slightly bulky; sternite VII granulose, with two pairs of very long and strongly granulose lateral carinae. **Metasoma** (Figs. 1a–b, 2d–g) strongly incrassate distally, with each segment noticeably wider than the preceding, especially on IV–V which are inflate; intercarinal tegument coarsely and densely granulose on ventral and lateral surfaces, smooth to sparsely granulose on dorsal surface; segments I–II with ten complete carinae (even though lateral inframedian carinae is poorly defined in the basal portion of the latter), III–I V with eight, V with five (even though the ventrosubmedian carinae are present on proximal third), all strongly developed and coarsely serrate to denticulate; dorsomedian furrow shallow and narrow on segments I–III, progressively much deeper and wider on segments IV–V, specially on the latter where it becomes a deep subtriangular depression; telson with vesicle large, oval and smooth, subaculear tubercle vestigial and very close to the base of the aculeus, which is very long, sharp and shallowly curved.

Female (Fig. 3, Tabs. 1–2): in general is similar to the male, but there is a marked sexual dimorphism evidenced by: **(1)** mesosoma relatively larger and wider; **(2)** metasoma less robust, only moderately incrassate distally; **(3)** pedipalp chelae noticeably more slender, with carinae stronger; **(4)** pedipalp fingers much longer and straight, without scallop; **(5)** genital papillae absent; **(6)**

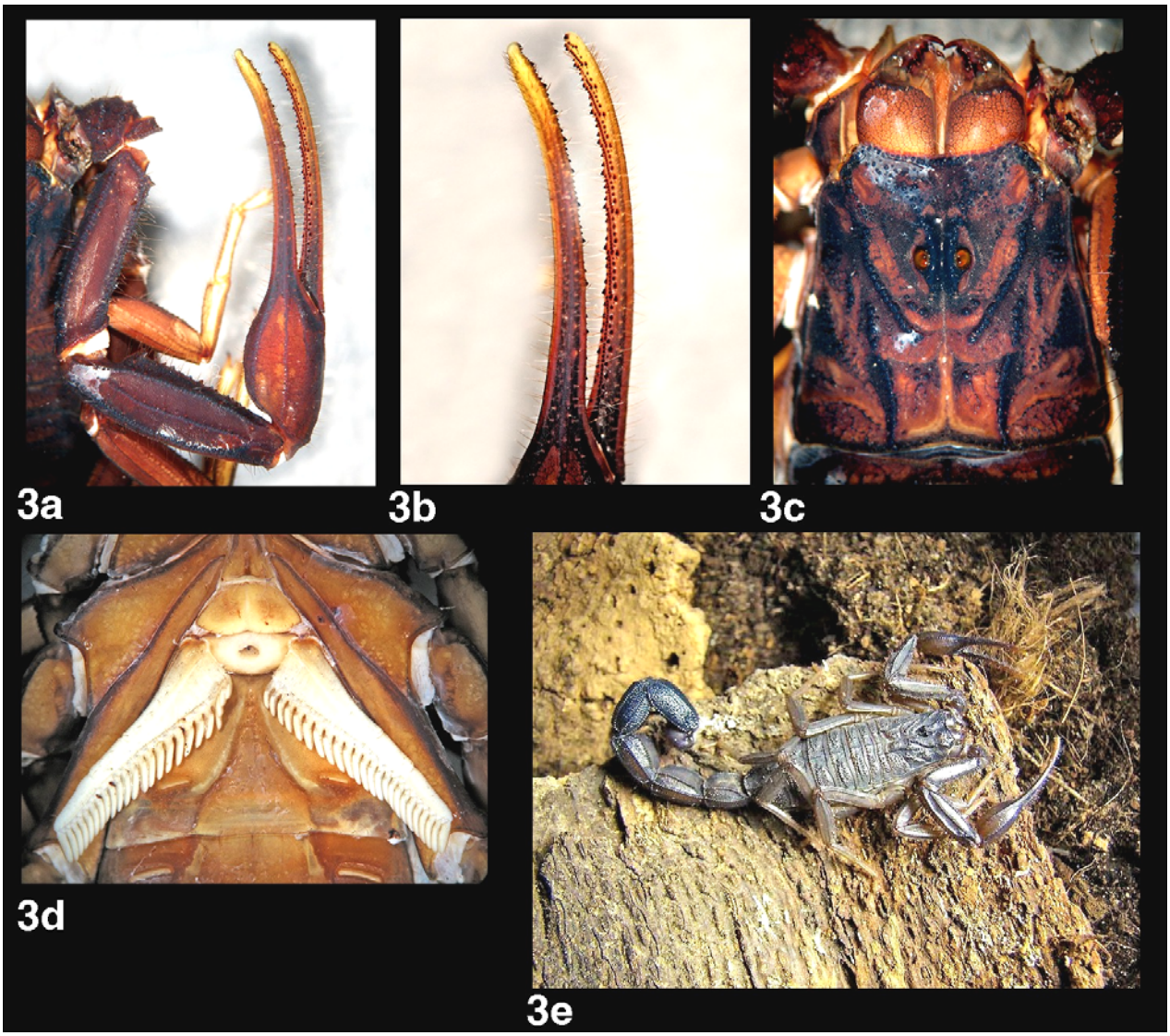

Figure 3: Adult female *Rhopalurus pintoi* from Rupununi: **a)** pedipalp; **b)** close–up of pedipalp movable finger; **c)** chelicerae and carapace; **d)** sternopectinal region; **e)** same specimen, still alive in captivity.

pectines with markedly lower number of teeth, which are also comparative smaller; **(7)** basal pectinal plate with a very large and deep discal pit.

Variation: among the examined adults there are two size classes in each sex but inside the same class, males are slightly smaller than females (Tab. 1). Pedipalp fixed and movable fingers almost always have nine principal rows of granules, but in some specimens (mostly juveniles) the basalmost row is divided, giving a count of ten rows (Fig. 3b). Pectinal toot counts varied from 27–30 (mode 28) in males, and 21–25 (mode 25) in females (Tab. 2); this species is unique in the genus by the strong sexual dimorphism in pectinal tooth counts (male and female ranges entirely separated), and male counts represent the highest values amongst all *Rhopalurus* species. Juveniles are very similar to the adults in coloration and general morphology, but comparatively have much more slender pedipalps and less incrassate metasoma (Fig. 4).

Ecological notes: according to the collector of the samples available to us, about 20 specimens were found, all under stones inside a small relict patch (100 x 100 m) of primary forest enclaved inside surrounding hilly grasslands on volcanic soils (Fig. 8). Only single specimens were found per stone, at an approximate density of four scorpions per 10 m^2, sympatrically with a single specimen of *R. crassicauda*.

Comparisons**:** *R. pintoi* is very unique and easy to recognize on the basis of several important features: **(a)** coloration entirely blackish; **(b)** pedipalp fingers with

Figure 4: Juvenile female *Rhopalurus pintoi* from Rupununi, still alive in captivity.

9–10 principal rows of granules; **(c)** female with a very large and deep discal pit basal on the pectinal plate; **(d)** males and females with pectinal tooth counts not overlapping. All other species of *Rhopalurus* possess fingers with eight rows of granules, basal pectinal plate without a discal pit and pectinal tooth counts which are very similar in both sexes or at least conspicuously overlapping; furthermore, the single species with an entirely blackish morph is the Cuban endemic *Rhopalurus junceus* (Herbst, 1800), but this scorpion has much lower pectinal tooth counts (male 17–22, female 15–21), pedipalps much more robust and with very strong lobe/notch combination, and metasomal segments II–IV with only eight carinae.

MATERIAL EXAMINED: Guyana, Southwestern, Rupununi, March 2008, H.-W. Auer, 2 adult ♂♂, 1 adult ♀, 2 juvenile ♀♀ (RTO: Sco.0383), 1 adult ♀, 3 juvenile ♂♂, 3 juvenile ♀♀ (AKT), 1 adult ♂ (AMNH).

Remarks: there is no doubt that the specimens herein studied belong to *R. pintoi*, as they posses two characters which are absolutely diagnostic for the taxon and were explicitly described by Mello-Leitão (1932) for the holotype: the presence of 9–10 rows of granules on pedipalp fingers and the entirely blackish coloration; all other species in the genus possess eight (exceptionally seven) row of granules, and no other South American taxa exhibit such dark coloration.

On the other hand, the confirmation that *R. piceus* is just a junior synonym of *R. pintoi* is not a surprise, as it had already been suggested by Teruel (2006: 51–52) based on the absolute match of the original descriptions and locality records of both taxa. When Mello-Leitão (1932) described *R. pintoi*, he made special emphasis on its distinctive blackish color because it was unprecedented for the genus. When Lourenço (1982) revised the genus, the holotype of *R. pintoi* was already lost and from the same general area (Roraima) he had available only specimens of *R. crassicauda*, which were correctly associated by him to *R. laticauda* (both species are indeed very close, see below), but as these specimens did not possess the dark color described originally by Mello-Leitão, Lourenço (1982) simply ignored such a conspicuous incongruence and regarded first *R. crassicauda* as a junior synonym of *R. pintoi*, and then the latter as a junior synonym of *R. laticauda* with subspecific rank as *R. laticauda pintoi*. Fifteen years latter, a black *Rhopalurus* was found in Roraima by Lourenço & Pinto-da-Rocha (1997), but strangely these authors not only avoided to make any mention to *R. pintoi*, but described this scorpion as a new species on the basis of the same characters originally used by Mello-Leitão (1932) to diagnose *R. pintoi* (the blackish coloration and the high number of granular rows on pedipalp fingers). Five years later, Lourenço himself appeared to take notice of the conflictive situation created on the identity on both taxa, but his approach to this problem was even more controversial: he regarded *R. pintoi* as a *nomen nudum* and retained *R. piceus* as valid, ambiguously stating that both species "*... may eventually be found to be associated...*" (Lourenço, 2002: 304–305).

Very recently, Teruel (2006) demonstrated that the *nomen nudum* category applied by Lourenço (2002) was clearly erroneous according to the CINZ (2000), restored *R. pintoi* as a valid species, and suggested that *R. piceus* was very probably its junior synonym, but did not establish the formal synonymy due to lack of adequate material. Fortunately, new specimens are now available, and careful study of them confirmed that *R. pintoi* is a fully valid species and *R. piceus* represents its junior synonym, and thus the following synonymy is herein established: *Rhopalurus pintoi* Mello-Leitão, 1932 = *Rhopalurus piceus* Lourenço et Pinto-da-Rocha, 1997, **new synonym**.

It is noteworthy to mention that most of the nomenclatural confusion that has surrounded the status of *R. pintoi* and *R. piceus* has originated because in their original descriptions the sex and/or maturity of the types have been erroneously determined. The holotype of *R. pintoi* was declared as male by Mello-Leitão (1932), but its slender habitus and low pectinal tooth count of 20/21 (depicted as 21/21 in his figure 2a) clearly demonstrate that it was a female. Also, the holotype and one paratype of *R. piceus* sexed as males by Lourenço & Pinto-da-Rocha (1997) are in fact females, as reveal their low pectinal tooth counts (23/24 and 22/22, respectively) and the presence of a large discal pit in the basal pectinal plate (visible in their figure 18); furthermore, the four types of *R. piceus* supposed to be adults are undoubtedly juveniles, as evidence its very slender pedipalp chelae and slightly incrassate metasoma (i.e., compare their figures 17–18 to Figure 4 of the present paper).

Even though the holotype of *R. pintoi* is currently thought to be lost and the types of its junior synonym *R. piceus* are all juveniles, it is unnecessary to designate a neotype for *R. pintoi* because its main diagnostic characters (particularly the color pattern, number of rows of granules on pedipalp fingers and presence of a large discal pit on the female basal pectinal plate) are so unique inside the genus *Rhopalurus* that warrant an easy and accurate identification for this taxon.

Rhopalurus crassicauda Caporiacco, 1947
Figures 5–9

Rhopalurus crassicauda Caporiacco, 1947: 20; Caporiacco, 1948: 609–610, figs. 1–3; Lourenço, 2002: 36, 98–100, 110–111, figs. 214–224; Teruel, 2006: 51–52.

Rhopalurus laticauda pintoi: Lourenço, 1982: 107–108, 115, 117–119, 121, 134–138; figs. 39–46, 78, table I

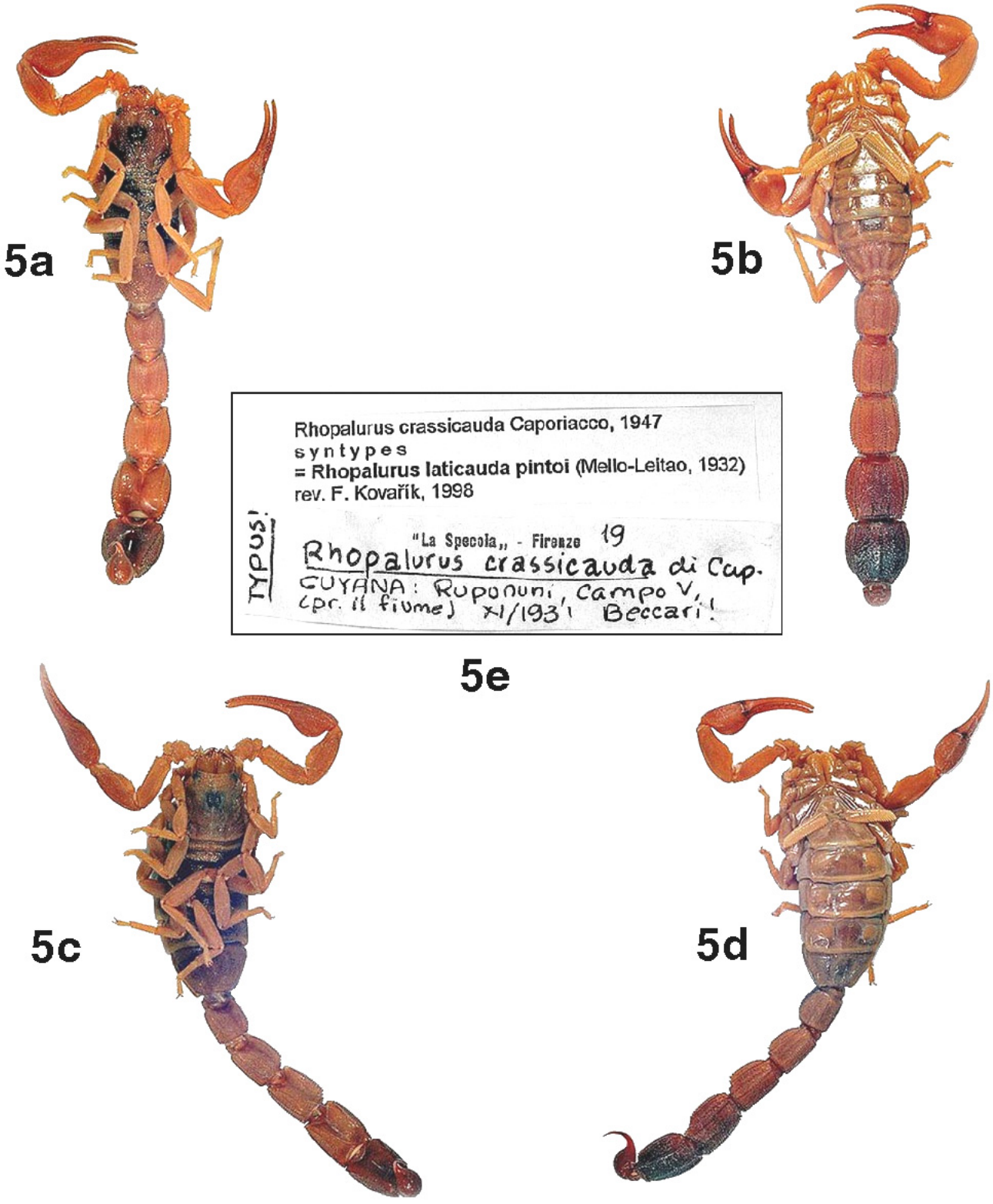

Figure 5: Adult syntypes of *Rhopalurus crassicauda* (copyright by František Kovařík): **a)** male, entire dorsal view; **b)** male, entire ventral view; **c)** female, entire dorsal view; **d)** female, entire ventral view; **e)** original Caporiacco's label, plus additional label by Kovařík.

Figure 6: *Rhopalurus crassicauda* from Rupununi: two adult female topotypes, still alive in captivity.

(misidentification); Fet & Lowe, 2000: 220–221 (misidentification).

Type data: 2 adult ♂♂ and 1 adult ♀ syntypes (MZUF, indirectly examined; see Remarks and Fig. 4): Guyana, Rupununi, Campo V (near the river), November 1931, Beccari.

Diagnosis: species of moderately small size (males 40–45 mm, females 45–50 mm) for the genus. Body light brown, densely infuscate on carapace, tergites I–VI, pedipalp fingers, metasomal segment V and telson; metasoma ventrally with a wide and solid blackish stripe. Pedipalp chelae robust in both sexes, more conspicuously in males; fingers without basal lobe/notch combination, but with moderate scallop in adult males; fingers with eight principal rows of granules, flanked by a few supernumerary granules. Sternite III and pectines with stridulatory apparatus slightly reduced; sternite V with a vestigial smooth patch in males. Metasoma distally incrassate on both sexes, much more conspicuously in males; telson vesicle small, subaculear tubercle moderate, spinoid and far removed from the base of aculeus. Pectines with 24–25 teeth in males, and 20–22 in females.

Distribution (Fig. 7): this species appears to be endemic the Rupununi region comprising the border region of Brazil, Guyana, and Venezuela. Specimens have been collected only from two localities in Brazil and one in Guyana, but it is probably present also in neighboring Venezuela (southern Bolivar State), where there is similar potentially suitable habitat.

Ecological notes: this species lives together with *R. pintoi*, but according to the personal notes of the collector at least at Rupununi both species appear to avoid interspecific competition by habitat segregation: *R. crassicauda* is very common in the open grasslands where it mostly hides inside soil crevices, but only one specimen was found in the relict forested patches to which *R. pintoi* is restricted.

MATERIAL EXAMINED: Guyana, Southwestern, Rupununi, March 2008, H.-W. Auer, 1 adult ♀ topotype (RTO: Sco.0384), 2 adult ♀♀ topotypes (AKT).

Figure 7: Geographical distribution of *Rhopalurus pintoi* (1–5) and *Rhopalurus crassicauda* (5–7): Tepequén [1], Surumu [2], Rio Surumu [3], Rio Tacutú [4], Rupununi [5], 12 km north of Boa Vista [6], Rio Branco [7].

Remarks: The Brazilian female specimen illustrated as an adult twice by Lourenço (1982: figs. 27–28; 2000: fig. 215) is in fact a juvenile, which is evident from its slender pedipalp chelae (i.e., compare these pictures to Figures 5c–d of the present paper). We could not obtain the types of *R. crassicauda* for the present study, but we were fortunate to get three adult topotypes and also to receive a great help from František Kovařík, who personally examined two syntypes in 1998 and kindly provided us with high–resolution color photos of both specimens and its original label.

The identity of *R. crassicauda* cannot be considered as fully clarified yet. It was regarded as a junior synonym of *R. laticauda* by Lourenço (1982), still retaining its validity at subspecific rank under the incorrectly applied name *R. laticauda pintoi* (see above). Here we have demonstrated that Lourenço's previous interpretation of *R. pintoi* was erroneous, and that it is a valid species totally different from *R. crassicauda* (see above), but in turn, *R. crassicauda* is virtually indistinguishable from *R. laticauda* (see its updated diagnosis in Teruel & Roncallo, 2008). This strongly suggests that both taxa may indeed be conspecific, but we refrain from proposing the formal synonymy here because adequate samples of *R. laticauda* are still unavailable to us. In addition, the known distribution of both taxa still appears allopatric, with *R. laticauda* in the Orinoquian Llanos and *R. crassicauda* in the northern reaches of the Amazon basin. Nevertheless, this apparent allopatry requires rigorous confirmation because it may only reflect poor and/or inadequate sampling in the intervening lowland areas, which otherwise seem to lack any real geographic barrier for scorpion dispersal. These areas are covered mainly by seasonally inundated forests, but other species of *Rhopalurus* are known to be well adapted to similar habitats and escape from flooding by readily climbing onto the vegetation, as does the Cuban endemic *R. junceus* in the extensive swamps of Zapata, Cauto and north–central Camagüey (R. Teruel, unpublished data); even this same strategy has also been described for other terrestrial arachnids of the Amazon basin such as schizomids (Cokendolpher & Reddell, 2000). For the moment, we retain *R. crassicauda* as valid but its true identity warrants further studies.

Figure 8: Two views of the habitat where both *Rhopalurus pintoi* and *Rhopalurus crassicauda* occur at Rupununi (copyright by Hans-Werner Auer).

Figure 9: View of the microhabitat where both *Rhopalurus pintoi* and *Rhopalurus crassicauda* occur at Rupununi (copyright by Hans-Werner Auer).

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