



## On the *Tityus stigmurus* complex (Scorpiones, Buthidae)

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## Abstract

The species included in the *Tityus stigmurus* complex as established by Lourenço are revised. The male of *Tityus serrulatus* Lutz & Mello, 1922 is redescribed. New diagnostic characters are given for *T. kuryi* Lourenço 1997, *T. melici* Lourenço 2003, *T. serrulatus* and *T. stigmurus* Thorell, 1876. *Tityus lamottei* Lourenço 1981 and *T. acutidens* Mello-Leitão, 1933 are considered a junior synonyms of *T. serrulatus* (**syn. nov.**). The female of *Tityus kuryi* and the male of *Tityus stigmurus* are also redescribed. New distribution records are presented for species included in the complex.

**Key words:** Systematics, *Tityus stigmurus* complex, redescription, revalidation, distribution, State of Minas Gerais, State of Bahia, Brazil

## Resumo

As espécies do complexo *Tityus stigmurus* Thorell, 1876, estabelecido por Lourenço, são revisadas. O macho de *Tityus serrulatus* Lutz & Mello, 1922 é redescrito. Novos caracteres diagnósticos são dados para *T. kuryi* Lourenço, 1997, *T. melici* Lourenço, 2003, *T. serrulatus* e *T. stigmurus*. *Tityus lamottei* Lourenço, 1981 e *T. acutidens* Mello-Leitão, 1933 são considerados sinônimo de *T. serrulatus* (**syn. nov.**). A fêmea de *T. kuryi* e o macho de *T. stigmurus* também são redescritos. Novos pontos de distribuição são apresentados para todas as espécies do complexo.

**Palavras-chave:** Sistemática, redescrição, revalidação, *Tityus serrulatus*, Minas Gerais, Bahia, Brasil

## Introduction

The genus *Tityus* C.L. Koch, 1836 has a wide geographical distribution in the Neotropical region, being found from the Dominican Republic (Armas & Abud Antun, 2004) to central Argentina (Ojanguren-Affilastro, 2005). With over 175 species and 6 subspecies, it is, at the present, the scorpion genus with the greatest number of described species.

With such a diversity of closely related forms, the classification within the genus is still considered chaotic. Since the very first attempt of subdivision of this genus (Krapelin, 1911), several authors have tried to propose better classifications (Mello-Leitão, 1931, 1939, 1945; Lourenço, 1979, 1980, 1981, 1984, 1992; Lourenço & Maury, 1985; Lourenço & Eickstedt, 1987, 1988; González-Sponga, 1984, 1996; Armas, 1988).

Mello-Leitão (1931) divided all the species into four groups based on color pattern and morphometrics. In 1939, Mello-Leitão raised this number up to eleven using morphological characters as diagnosis, such as the ventral carinae on the metasomal segments, number of pectinal teeth, number of oblique rows of granules on the pedipalp fingers and the presence of secondary sexual characters. The number of groups within *Tityus* was then raised to 15 (Mello-Leitão, 1945) also based on morphological characters and color pattern. Lourenço (1998) in an attempt to simplify this classification, established only three groups for all the *Tityus* species, based on color pattern and morphological characters namely the *T. asthenes* group, the *T. bahiensis* group and the *T. clathratus* group. Subsequently, a fourth group was proposed by Lourenço & Pézier (2002) to include *Tityus adisi* Lourenço & Pézier, 2002. Finally, Lourenço (2006) established a new division of the genus into five subgenera: *Archaeotityus* Lourenço, 2006, *Atreus* Gervais, 1843, *Brazilotityus* Lourenço, 2006, *Caribetityus* Lourenço, 1999 and *Tityus* C. L. Koch, 1836. Informal groups of species inside the subgenus *Tityus* have been referred as complexes (Lourenço, 1981; Lourenço & Silva, 2006). Presently there are two complexes: the *T. stigmurus* complex (*sensu* Lourenço, 1981, 2001) which includes the following nominal species: *Tityus aba* Candido Lucas, Souza, Dias & Lira-da-Silva, 2005, *T. acutidens* Mello-Leitão, 1933, *T. kuryi* Lourenço, 1997, *T. martinpaechi* Lourenço, 2001, *T. melici* Lourenço, 2003, *T. serrulatus* Lutz & Mello, 1922, and *T. stigmurus* Thorell, 1876; and the *T. confluens* complex (*sensu* Lourenço & Silva, 2006) which includes *T. adrianoi* Lourenço, 2003, *T. blaseri* Mello-Leitão, 1931, *T. confluens* Borelli, 1899, *T. marajoensis* Lourenço



& Silva, 2007, *T. paulistorum* Lourenço & Silva, 2006, *T. sylviae* Lourenço, 2005 and *T. uniformis* Mello-Leitão, 1931.

### The *Tityus stigmurus* complex

The *T. stigmurus* complex was first designated as a group of species by Mello-Leitão (1945). This group, according to Mello-Leitão, comprised three species being one of them subdivided into two subspecies: *Tityus acutidens* Mello-Leitão, 1933, *T. stigmurus* Thorell, 1877, *T. serrulatus serrulatus* Lutz & Mello, 1922 and *T. serrulatus vellardi* Mello-Leitão, 1939. Lourenço (1981), after revising this group, synonymised *T. serrulatus vellardi* with *T. serrulatus*, and established the *Tityus stigmurus* complex, including the new species *Tityus lamottei* Lourenço, 1981. Lourenço and Cloudsley-Thompson (1999) informally suggested the synonymy of *T. serrulatus* with *T. stigmurus*, but only synonymised *T. lamottei* with *T. stigmurus* and proposed a new system of classification for the complex, based on the color patterns (referred to here as morphs) inside the *T. stigmurus* complex based on color patterns: morph *confluenciata* (corresponding to *T. serrulatus*), morph *confluenciata/maculata* (corresponding to *T. lamottei*), morph *unifasciata* (corresponding to *T. stigmurus*), and morph *trifasciata* (corresponding to a previously undescribed species, *T. martinpaechi*, latter described by Lourenço (2001). This classification system is not followed here. Two new species were subsequently included in the complex, *T. martinpaechi* Lourenço, 2001 and *T. aba* Candido et al, 2005 increasing the number of species to five (Candido et al, 2005; Souza et al, 2006).

In this paper, the species of the *T. stigmurus* complex are revised. The males of *T. serrulatus* and *T. stigmurus* are redescribed based on specimens from States of Minas Gerais and Bahia, respectively, in Brazil. The redescriptions are necessary, since the male of *T. serrulatus sensu* Lourenço & Cloudsley-Thompson (1999) was discovered to be a misidentification and the sexual dimorphism of *T. stigmurus* is poorly described and illustrated. A redescription of the female of *T. kuryi* is presented, since only the holotype is known. New records, photos and detailed illustrations for *T. kuryi* are given. New records for all species of the complex are presented.

### Materials and methods

Material from the following Museums and Institutions was examined; FUNED (Fundação Ezequiel Dias, Belo Horizonte, G. Agostini Cotta); IBSP (Instituto Butantan, São Paulo, A. D. Brescovit); MHNG (Muséum d'Histoire Naturelle de Genève, Geneva, P. Schwendiger); MNRJ (Museu Nacional do Rio de Janeiro, Rio de Janeiro, A. B. Kury); MZUFBA (Museu de Zoologia da Universidade Federal da Bahia, Salvador, T. K. Brazil.); NRS (Naturhistoriska Riksmuseet Stockholm, Sweden, Anders Warén); ZMB (Zoologisches Museum, Humboldt Universität, Berlin, J. Dunlop).

Measurements were taken using an ocular micrometer. Illustrations were made using a Leica MZ 12.5 stereomicroscope with camera lucida. The photos were taken with a Canon XTi camera, with a Canon 100mm Macro lens. Terminology for general morphology follows Stahnke (1970) except for trichobothrial nomenclature, which follows Vachon (1974; 1975). The subdivision established by Lourenço (2006) is followed here. The following abbreviations are used throughout the redescrptions of the carinae of metasomal segments and pedipalps (Francke, 1977): Vsm = Ventral submedian; Vl = Ventral lateral; Lim = Lateral inframedian; Lsm = Lateral supramedian; Dl = Dorsal lateral; Vm = Ventral median; Vl = Ventral lateral; Vt = Ventral transverse; Lm = Lateral median; Dl = Dorsal lateral; Da = Dorsal anterior; Dp = Dorsal posterior; Va = Ventral anterior; Ma = Median anterior; Mp = Median posterior; Ad = Anterior dorsal; Am = Anterior median; Av = Anterior ventral; Dm = Dorsal median; Pd = Posterior dorsal; Pm = Posterior median; Pv = Posterior ventral.



## Results

### Buthidae C. L. Koch, 1837

*Tityus* C. L. Koch, 1836: 33. Type species by original designation: *Scorpio bahiensis* Perty, 1833 (monotypic).

### Subgenus *Tityus* C. L. Koch, 1836

**Diagnosis:** see Lourenço, 2006

#### *Tityus stigmurus* complex

**Diagnosis:** The species of the *T. stigmurus* complex can be distinguished from those of the *T. confluens* complex by metasomal segments I–IV yellowish with blackish lateral and ventral spots (Fig. 6); metasomal segment V with a blackish ventral stain occupying distal half (Figs. 1; 17C–D); the dorsal lateral carinae of segments II–IV with 1 to 10 posterior spinoid granules of variable size (Figs. 6; 13B; 17C–D); absence of the basal lobe in males (Figs. 2B; 9B; 11A–B).

### *Tityus aba* Candido, Lucas, Souza, Dias & Lira-da-Silva, 2005

*Tityus aba* Candido, Lucas, Souza, Dias & Lira-da-Silva, 2005: 1–8, figs. 1–12, 13, table 1–2. Holotype ♂ and paratype ♀ from Poções, Bahia, Brazil, (deposited in IBSP 3394 and 3395, examined). Souza et al, 2006: 28, 35; Lourenço, 2006: 60.

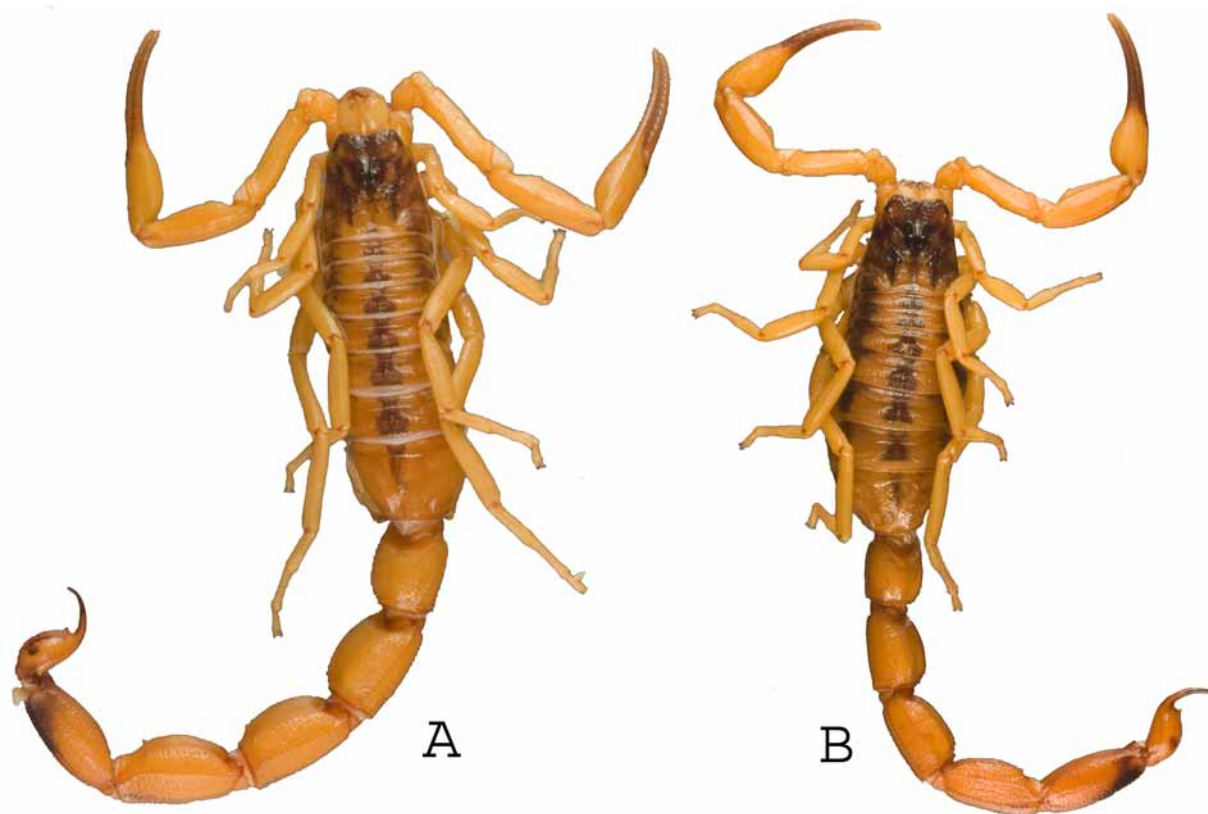
**New record.** Brazil, Bahia: Rio de Contas (Pico das Almas), 871m, 13°35'60''S 41°47'60''W, 11.IX.1991, M. Trefaut U. Rodrigues leg., 1 ♀ (IBSP 2577).

**Diagnosis. Male.** This species differs from the others of complex by the presence of three dark brown longitudinal stripes on tegites, except by *T. martinpaechi* and *T. stigmurus*. *Tityus aba* can be distinguished from *T. stigmurus* by a different pattern of pigmentation, with carapace almost entire dark (Fig. 1A–B), three longitudinal dark brown stripes on tergites which begin at the posterior edge of the carapace, the lateral ones reaching the VI tergite and the central reaching the VII (Fig. 1A–B), a largest number of pectinal teeth (male 25–25, 26–25, 26–27) and greater total length (76,5 mm) (Candido *et al*, 2005), whereas *T. stigmurus* has a single longitudinal dark brown stripe on tergites which reaching the VII tergite, carapace with only one triangular dark brown spot on anterior region (Fig. 16A–B), small number of pectinal teeth (22, 23–24) and smallest total length (60,3–63,8 mm). It also differs from *T. martinpaechi* by a different pattern of pigmentation, without sparse dark brown spots on carapace, palps, legs, morphology of the palps and metasomal segments which are slender (*T. aba*= femur: 8.3; tibia: 8.7; chela: 14.9; fig. 9A–B; *T. martinpaechi*= femur: 7.2; tibia: 7.4; chela: 13.3) and a largest number of pectinal teeth (*T. martinpaechi*: 22–21).

**Female.** Same color pattern as the male (Fig. 1A–B). Morphologically differing from the male, by the shorter chela of the pedipalp (length female: 13.3mm; male: 14.9mm) (Fig. 2.A–B). Metasomal segments IV and V longer and closer (IV: female 9.7mm and 4.5mm; male 9.3mm and 5.6mm—V: female 10.2mm and 4.2mm; male 9.3mm and 5.0mm) and total length (female 66.1mm and male 76.5mm) (Fig. 1A–B) (Candido *et al*. 2005).

**Distribution.** State of Bahia, Brazil (Fig. 8).





**FIGURE 1.** *Tityus aba* (♂ IBSP 3394 e ♀ IBSP 3395; Poções, Bahia, Brazil). Male (A) and female (B) in dorsal view.

### ***Tityus kuryi* Lourenço, 1997**

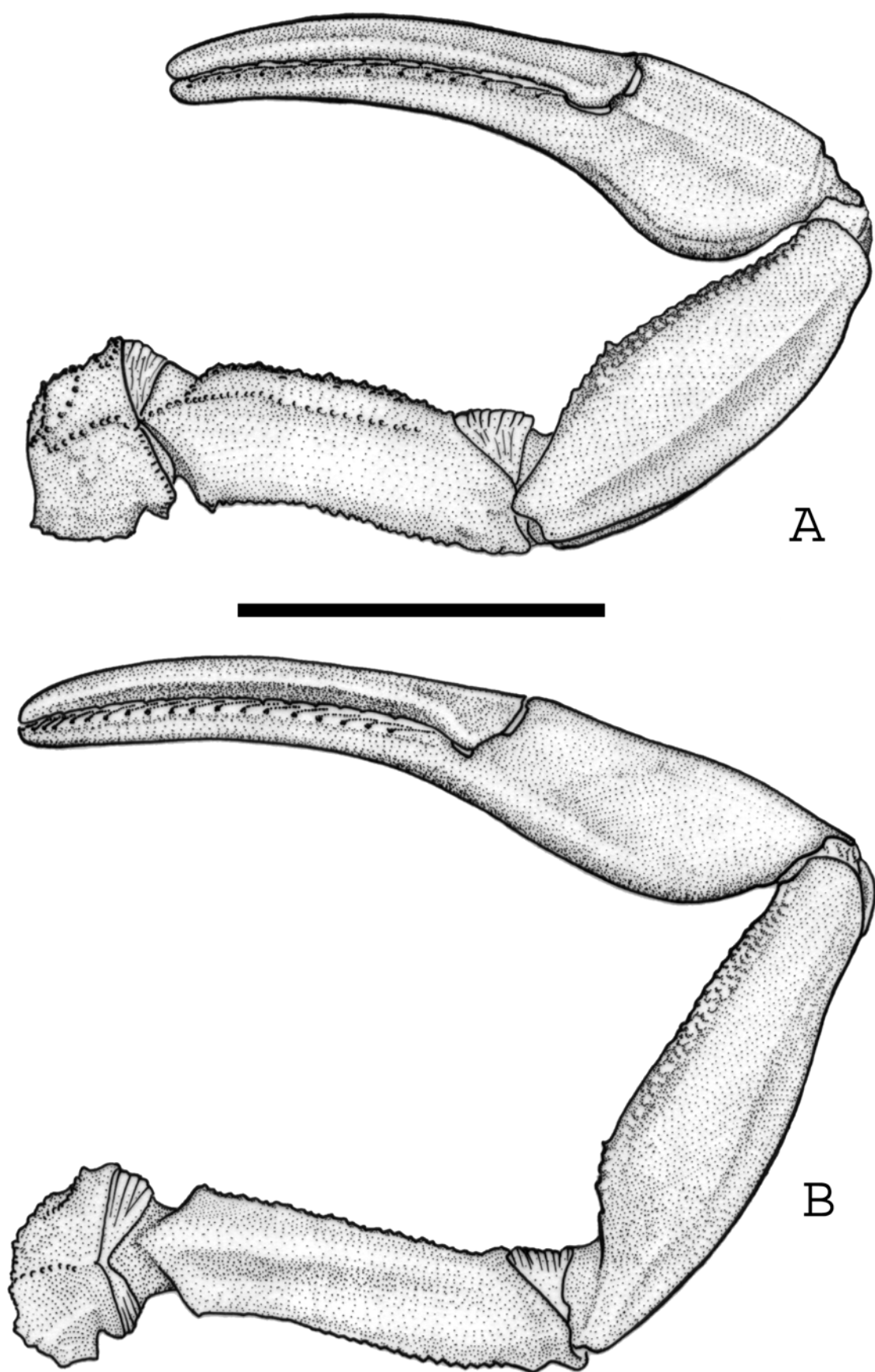
*Tityus kuryi* Lourenço, 1997: 53–59, figs. 1–7, 14, table 1. Holotype ♀ from Parque Nacional da Chapada Diamantina, Caeté-Açu, Palmeiras, Bahia, Brazil, (MNRJ 7035, examined). Fet et al, 2000: 248; Lourenço, 2002: 146, 164; Lourenço, 2003: 109; Lourenço, 2006: 61.

**Material examined.** Brazil, Bahia: Palmeiras (Campos e Vale do Capão), 12°31'44" S, 41°33'32"W, C. M. Pinto-Leite leg. 1♀ (MZUFBA 1602); Palmeiras (Cachoeira da Fumaça, Capão), 12°31'44"S, 41°33'32"W, 23.II.2007, G. Carvalho leg, 1♀ (MZUFBA 2166); (Cachoeira da Fumaça, Capão), 12°31'44"S, 41°33'32"W, 30.VIII.2001, T. B. Brazil leg, 3♀ (MZUFBA 1603–1605); Mucugê, 882m, 13°0'S 41°22'60"W (Fazenda Mucugê), V.2005, M. Perez leg, 1♀ (IBSP 4724)

**Comments.** This species was not associated with the *T. stigmurus* complex in the original description (Lourenço, 1997), but shows characteristics which correspond to the diagnosis of the complex (see below). Therefore *T. kuryi* is also included in the complex.

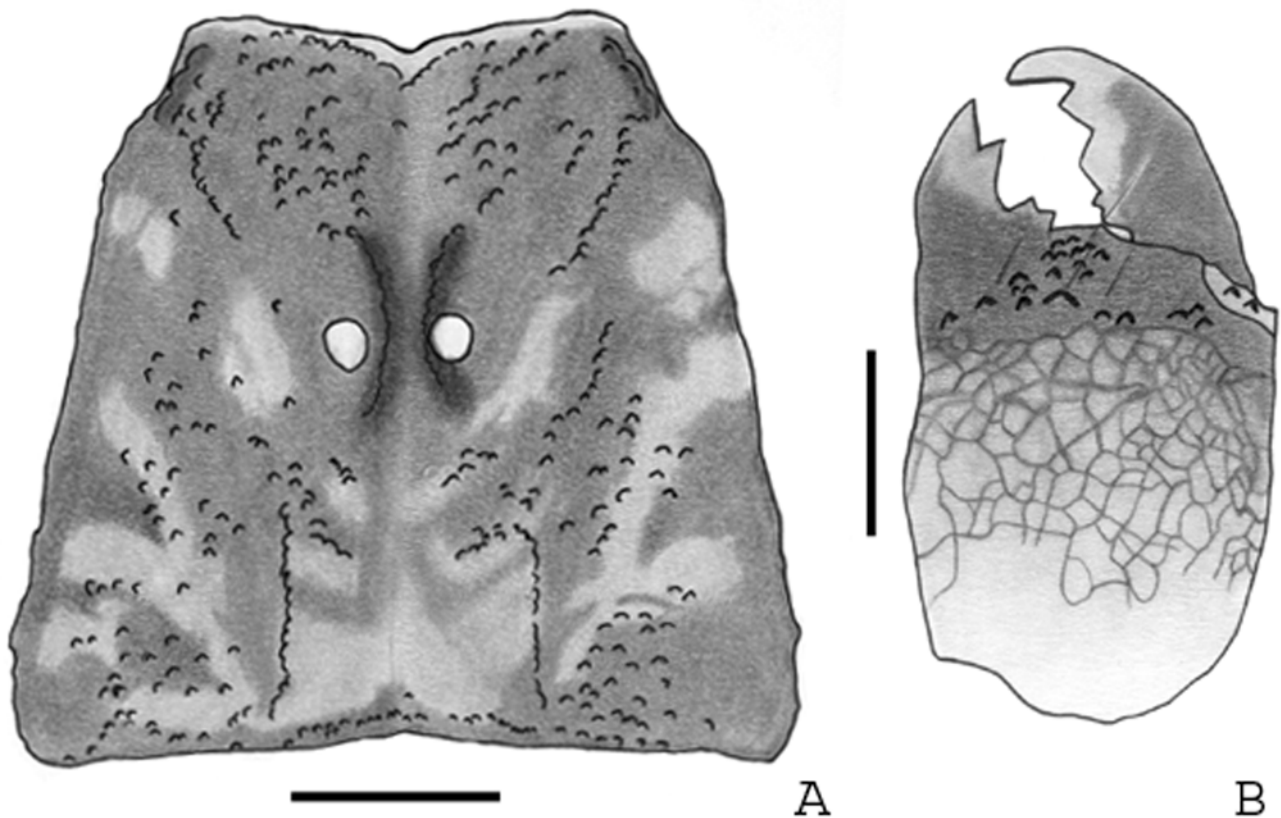
**Diagnosis. Female.** This species differs from the others of the complex by presence of confluent blackish spots on tegites, lateral faces and Vsm carinae of metasomal segments I–IV, except by *T. serrulatus* and *T. melici*. *Tityus kuryi* can be distinguished from *Tityus melici* and *Tityus serrulatus* by a different pattern of pigmentation, with blackish spots on palps, legs, lateral faces and Vsm carinae of all metasomal segments and transversal blackish spots on posterior margin of sternites (Figs. 4D–E; 7B) and a general coloration brownish (Fig. 7A). It also differ from *T. melici* by presence of two pairs of strong posterior spinoid granules on the dorsal lateral carinae of metasomal segments III and three pairs on IV (Fig. 6), whereas *Tityus melici* and *Tityus serrulatus* has not blackish spots on palps, legs, ventral and lateral faces of all metasomal segments and posterior margin of sternites (Fig. 19A–D) and the spinoid granules are absent or reduced on the dorsal lateral carinae of metasomal segments III and IV in *T. melici*.





**FIGURE 2.** *Tityus aba* (♂ IBSP 3394 e ♀ IBSP 3395; Poçoões, Bahia, Brazil). Right palp in dorsal view. Female (A) and male (B). Scale bars=5mm



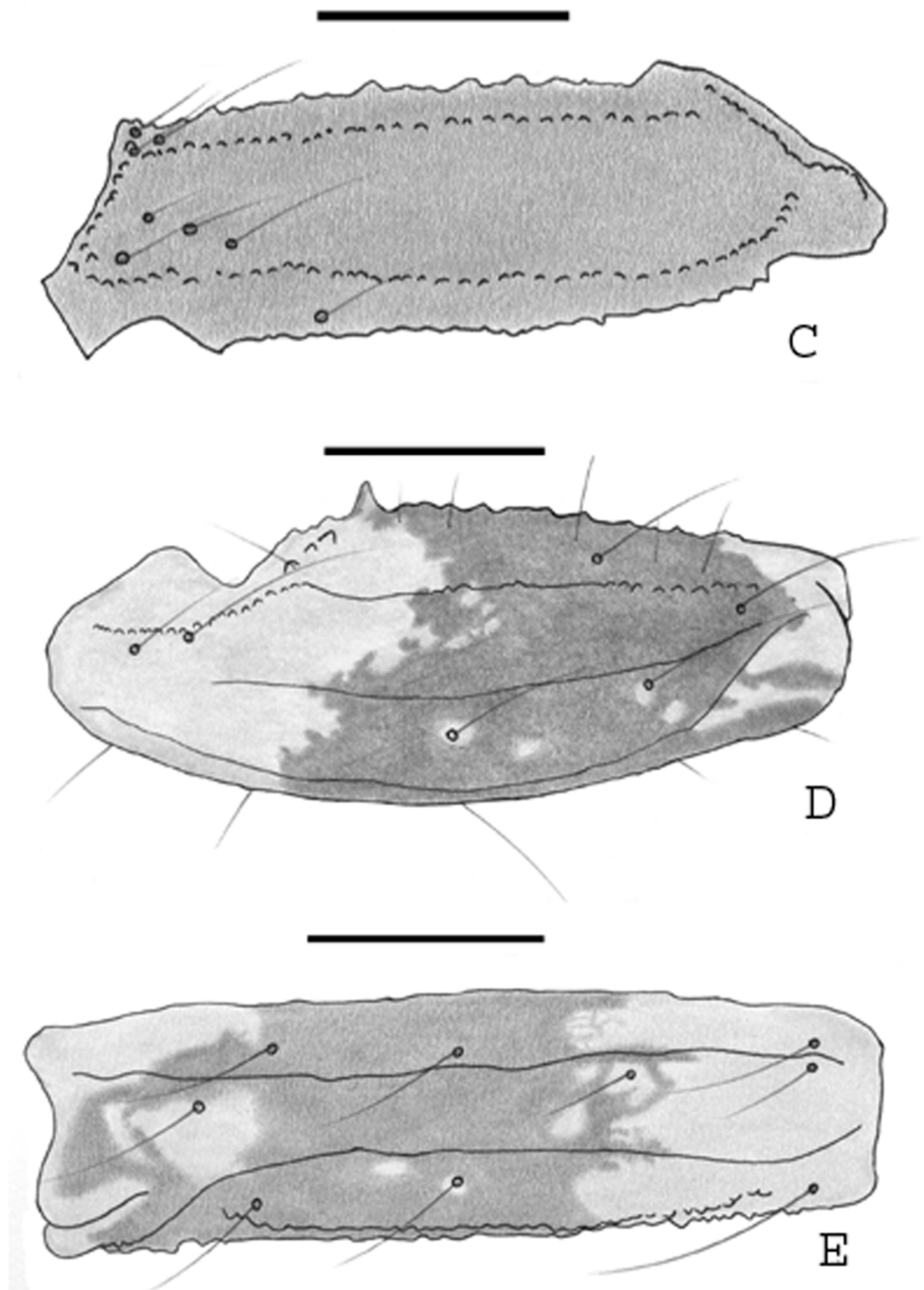


**FIGURE 3.** *T. kuryi* (♀ IBSP 4724; Mucugê, Bahia, Brazil). Carapace in dorsal view (A); Chelicera in dorsal view (B). Scale bars=5mm

**Male.** Unknown.

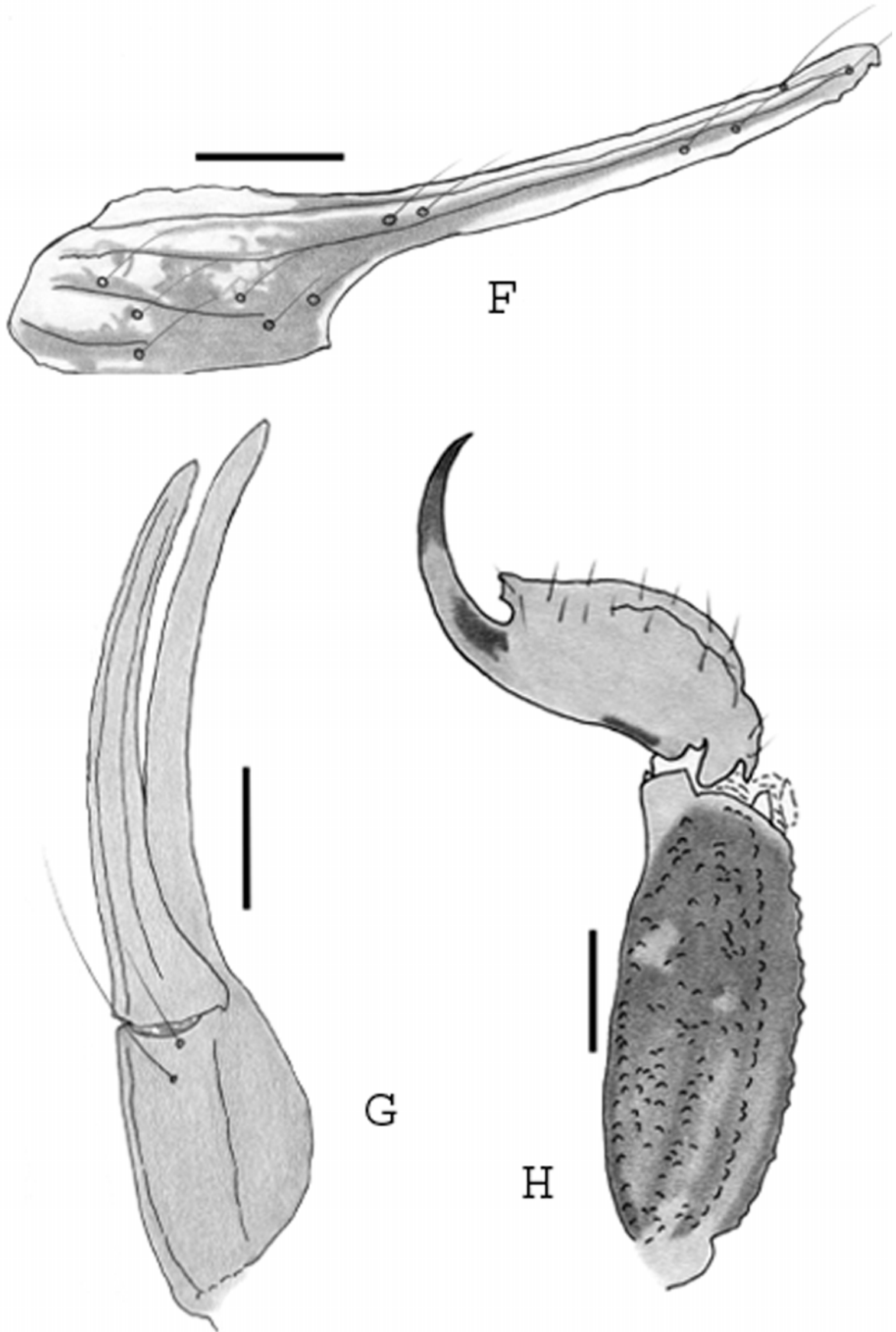
**Redescription. Female (IBSP 4724).** Coloration: brownish red with numerous dark spots. Carapace dark with some light brown spots (Fig. 3A). Ocular tubercle dark. Mesosoma dark to tergite VI, tergite VII with central region darker, lateral region lighter red brownish (Fig. 7A); metasomal segments I–IV red brownish with dark spots on the lateral region and Vsm carinae (Fig. 6; 7A–B); a dark stain occupying almost all of segment V (Fig. 5H). Vesicle red brownish with two small spots on the base. Aculeus with dark spots on the base, medially light brown and distally reddish (Fig. 5H). Ventrally yellow with black spots on maxillary lobes I and II (Fig. 7B); sternites III light brown; the sternites IV–VI darker with medial region light brown; VII darker with medially light brown T-shape. Chelicerae dark with a light brown base. (Fig. 3B); apex of the fingers brown. Pedipalps red brownish with dark spots on patella and chela (Fig. 4D–E and 5F–G); fingers dark distally light brown. Legs light brown with dark spots on tibia and tarsi. Morphology: Carapace: anterior margin with a weak median concavity (Fig. 3A); median ocular tubercle anterior to the centre of the carapace; median eyes separated by more than one ocular diameter. Three pairs of lateral eyes; median ocular carina moderate with medium granules (Fig. 3A); anterior median furrow moderately deep; posterior furrow narrow, shallow anteriorly deep posteriorly. Prosoma moderately granular; tergites moderately granular with larger granules on the posterior region; median carinae present on all tergites. On tergites I and II carinae reduced, on III–VII carinae occupy the distal half and begin bifurcated and finish merged; tergite VII pentacarinata; transversal carina present on all tergites. Pectines: pectinal teeth 24–24; basal middle lamellae of pectines not dilated. Sternites weakly granular; a clear triangular zone on the posterior region of sternite III and a reduced smooth and shiny slightly expanded triangular zone of the posterior region of sternite V (Fig. 7B). Sternite VI with two small median carinae occupying the distal half. Sternite VII with five carinae, two parallel median





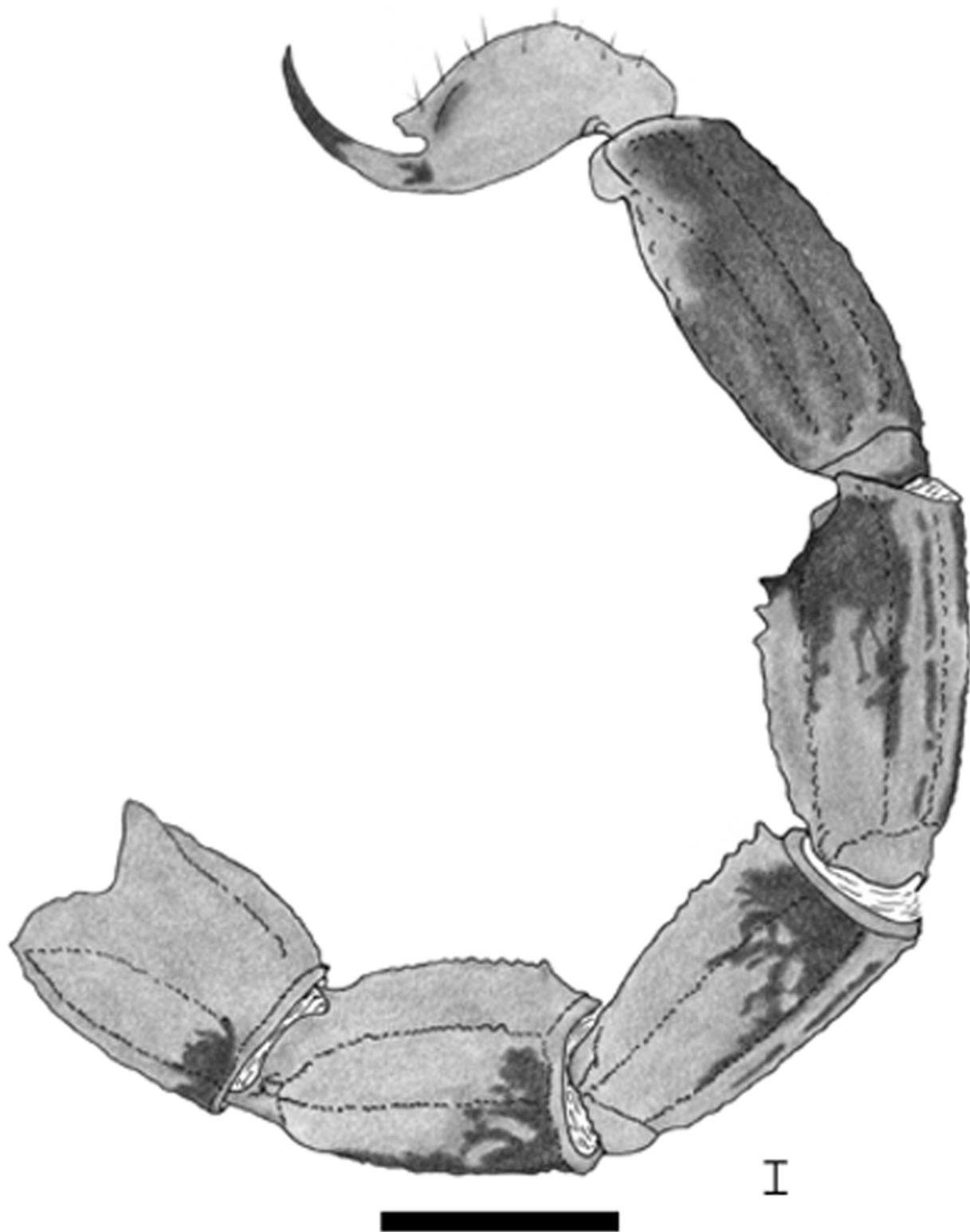
**FIGURE 4.** *T. kuryi* (♀ IBSP 4724). Right pedipalp femur in dorsal view (C); Right pedipalp patella in dorsal view (D) and external view (E); Scale bars=5mm





**FIGURE 5.** *T. kuryi* (♀ IBSP 4724). Fixed finger of the right pedipalp chela in dorsal-external view (F); Right pedipalp chela in ventral view (G); Segment metasomal V and telson in lateral view (H). Scale bars=5mm





**FIGURE 6.** *T. kuryi* (♀ IBSP 4724). Metasomal segments in lateral view. Scale bars=5mm

occupying almost all the sternite with a small carina between them, and two lateral carinae restricted to the central region. Metasomal segments: I with 10 complete carinae of which Vsm, VI, Lim, Lsm and DI have adjacent granules, DI with one posterior spinoid granule; II with 8 complete carinae of which Vsm, VI, Lsm and DI have adjacent granules, Lim is incomplete on anterior third and present sparse granules, DI with one posterior spinoid granule; III with 8 complete carinae of which Vsm, VI, Lsm and DI have adjacent granules,



Dl with three posterior spinoid granules (Fig. 6); IV with 8 complete carinae of which Vsm, VI, Lsm and Dl have adjacent granules, Dl with three posterior spinoid granules (Fig. 6); V with 5 complete carinae with uniform and adjacent granules; intercarinal surface moderately granular. Telson: vesicle with five vestigial carinae of which the ventral is well marked; aculeus long and strongly curved (Fig. 5H); subaculear tooth strong and rhomboid with two small dorsal teeth. Pedipalp: femur with 5 carinae of which Da, Dp and Mp presents median granules; Va with smaller granules and Ma with bigger granules; patella with 7 carinae of which Ad, Am, Av and Dm have median and adjacent granules; Am with a proximal spinoid granule (Fig. 4D); Pd, Pm and Pv with small and continuous granules; chela with 9 carinae, with small and continuous granules; all surfaces moderately to weakly granular. Movable fingers with 17–17 oblique rows of granules. Trichobothriotaxy: ortobothriotaxy A— $\alpha$  (Vachon, 1974 and 1975).

**Variations.** The specimen from the southern region of Parque da Chapada Diamantina is pale light brown in color (Fig. 7A–B).

**Distribution.** State of Bahia, Brazil (Fig. 8).



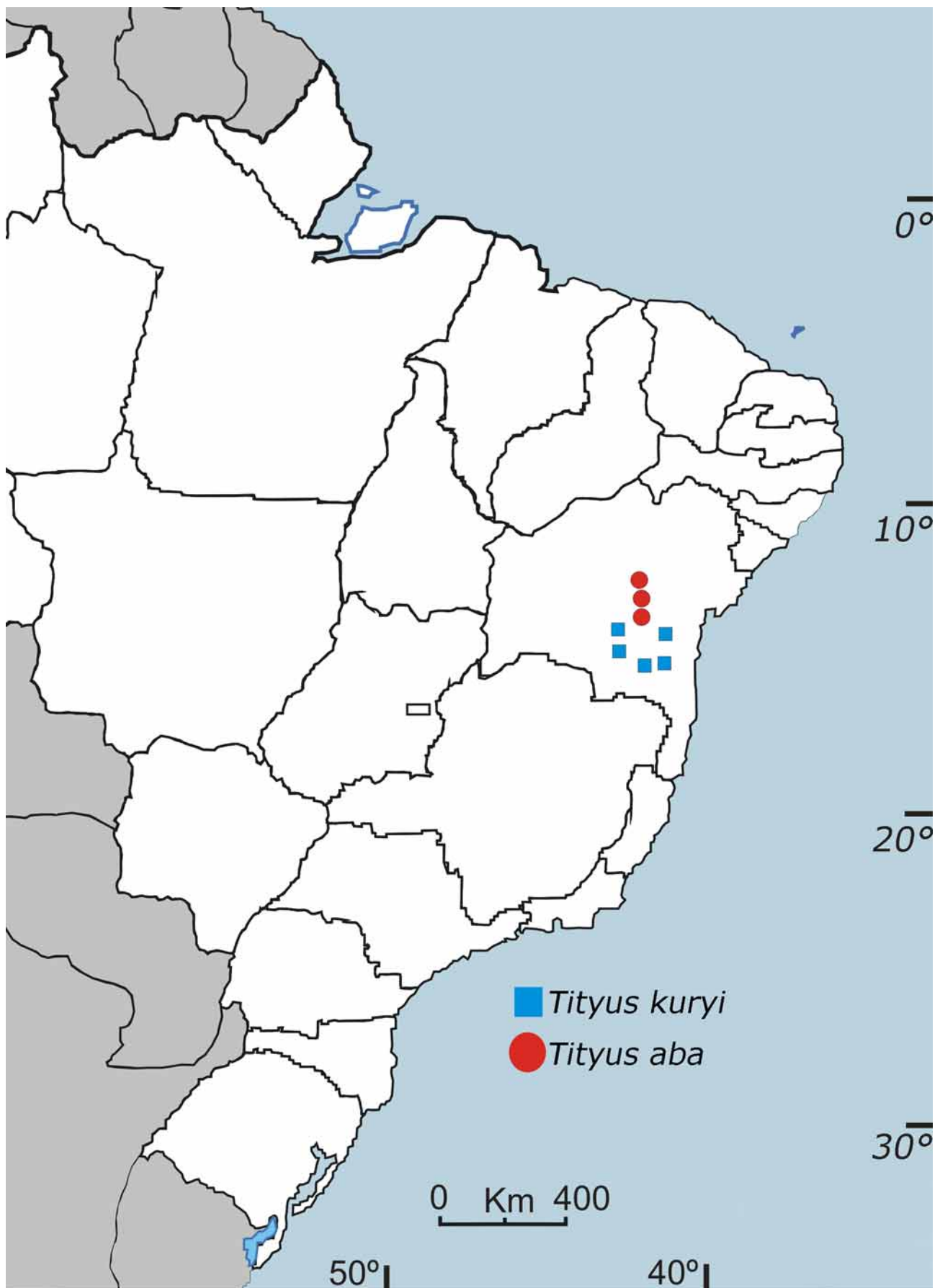
**FIGURE 7.** *T. kuryi* (♀ IBSP 4724). Dorsal (I) and ventral (J) view.

### *Tityus martinpaechi* Lourenço, 2001

*Tityus martinpaechi* Lourenço, 2001: 21–34, figs. 3–12, 14. Holotype ♀ from Francisco Sabóia, Ceará, Brazil (deposited in MNRJ, examined). Souza et al, 2006: 27–35; Lourenço, 2002: 147, 164; Lourenço, 2003: 109; Lourenço, 2006: 61.

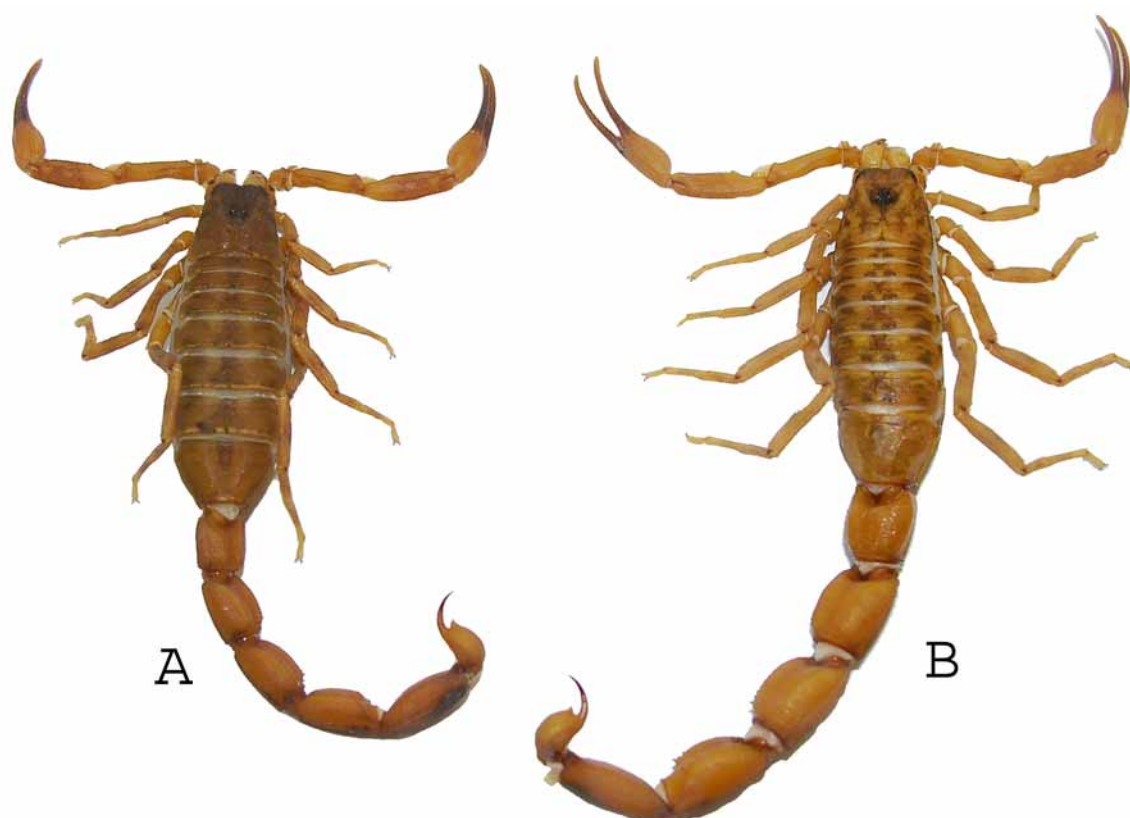
**New records.** Brazil, Paraíba: São João do Cariri, 464m, 7°22'60''S 36°31'W, VII.2004, S. C. Dias leg., 1 ♀ (IBSP 3649); Bahia: Central, 631m, 11°01'–11°19'S 41°47'–42°10'W, 12–21.VII.2000, E. F. Ramos and A. D. Brescovit leg., 1 ♀ (IBSP 3688); Iraquara, 732m, 12°15'S 41°36'W, 31.V.2002, A. Macucci leg., 1 ♀ (IBSP 3240).





**FIGURE 8.** Distribution of *T. aba* and *T. kuryi*.





**FIGURE 9.** *T. martinpaechi* (♂ and ♀ IBSP 4502; Chapada de Ibiapaba, Ceará, Brazil). Female (A) and male (B) in dorsal view.

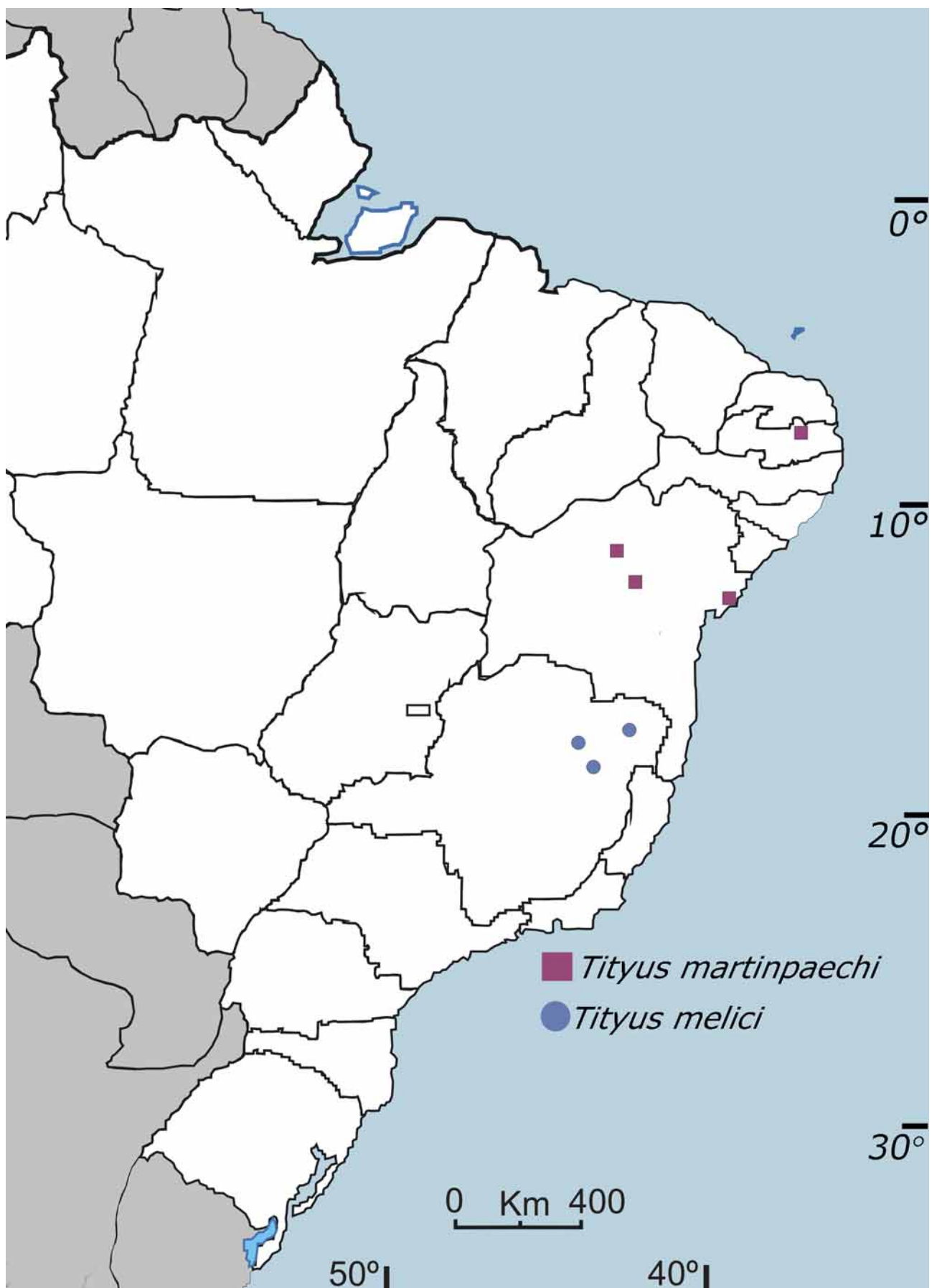
**Comments.** The male was recently described by Souza et al (2006, fig. 9A–B), and some details on female variability were given. Here the distribution range of the species is extended to the States of Bahia and Paraíba, previously only known from Ceará.

**Diagnosis. Male.** This species differs from the others of the complex by presence of three dark brown longitudinal stripes on tegites, except by *T. aba* and *T. stigmurus*. *Tityus martinpaechi* can be distinguished from *T. stigmurus* by a different pattern of pigmentation with 3 longitudinal dark brown stripes on tergites which begin at the posterior edge of the carapace, the lateral ones reaching the VI tergite and the central reaching the VII, carapace with some dark brown spots (Fig. 9A–B), only one pair of posterior spinoid granule on dorsal carinae of metasomal segment IV, whereas *T. stigmurus* has a single longitudinal dark brown stripe on tergites which reaching the VII tergite and carapace with only one triangular dark brown spot on anterior region (Fig. 16A–B), two pairs of posterior spinoid granule on the dorsal lateral carinae of segment IV that are more conspicuous (Fig. 17C–D); the total length are greatest for *T. martinpaechi* (male 73,6; female 64,7 mm) when compared with *T. stigmurus* (male 60,3–63,8; female 55,6–57,1 mm). *Tityus martinpaechi* can be distinguished from *T. aba* by a smallest number of pectinal teeth (male 22–21), different pattern of pigmentation with sparse dark brown spots on carapace, palps, legs and morphology of the palps (length *T. martinpaechi* femur: 7.2; tibia: 7.4; chela: 13.3) and metasomal segments (length *T. martinpaechi*: I=6.3; II=7.7; III=7.8; IV=8.8; V=8.6) which are stouter (Fig. 9A–B), whereas *T. aba* has carapace almost all blackish, absence of sparse dark brown spots on palps and legs (Fig. 1A–B), largest number of pectinal teeth (23–26, 26–25 e 26–27) and palps (length *T. aba* femur: 8.3; tibia: 8.7; chela: 14.9; fig. 9A–B) and metasomal segments (length *T. aba*: I=6.3; II=7.7; III=8.3; IV=9.3; V=9.3) which are slender (Fig. 2B).

**Female.** See Souza et al (2006).

**Distribution.** States of Ceará, Paraíba, and Bahia, Brazil (Fig. 10).





**FIGURE 10.** Distribution of *T. martinpaechi* and *T. melici*



## *Tityus serrulatus* Lutz & Mello, 1922

*Tityus serrulatus serrulatus* Lutz & Mello, 1922: 25. Holotype ♀ from Belo Horizonte, Minas Gerais, Brazil (lost). Neotype ♀ from Belo Horizonte, Minas Gerais, Brazil (IBSP-1165) (designated by Lourenço & Eickstedt, 1981); Lourenço & Cloudsley-Thompson, 1999: 154–158; Fet et al, 2000: 260–261; Lourenço, 2001: 21–25, 33; Lourenço, 2002: 37, 153–154, 156, 164; Lourenço, 2003a: 112–113; Lourenço, 2003b: 427, 431–432; Lourenço, 2006a: 61. Lourenço & Silva, 2006: 308, 315, 318.

*Tityus serrulatus vellardi* Mello-Leitão, 1939: 60, 65, 69. Holotype ♀ from Catalão, Goiás, Brazil (MNRJ-11279) (synonymised by Lourenço, 1981);

*Tityus lamottei* Lourenço, 1981: 358–361, figs. 1, 13–21, table 1. Holotype ♀ from São Desidério, Bahia, Brazil (IBSP 1442). **New synonym**

*Tityus acutidens* Mello-Leitão, 1933: 201–203, figs. 2 and 2A. Holotype ♀ from Ilha do Bananal, Tocantins, Brazil (MNRJ 27781, examined). **New synonym.**

**Material examined.** Brazil, Pernambuco: Carpina, 151m, 7°50'60"S 35°15'W, 13.I.1993, C. Santos leg., 2♀ (IBSP 1892); Mato Grosso, 20.I.2005, R. Carvalho leg., 6J (IBSP 3778); Bahia: Irecê, 728m, 11°18'S 41°52'W, 27.VII.2000, B. R. dos Santos leg., 1♀ (IBSP 2571); Barreiras, 449m, 12°7'60"S 45°0'W (Serra do Mimo), 08.VIII.2000, E. F. Ramos leg., 1♀ (IBSP 3039); Cocos, 706m, 12°43'S 44°34'W (Fazenda Trijunção), X.2002, R.A. Brandão leg., 1♀ (IBSP 3898); Aracatú, 636m, 14°25'S 41°27'W, 13.V–04.VII.2002, D. Dias leg., 1♀ (IBSP 3360); Itaeté, 277m, 12°58'60"S 40°58'W, 15.I.2002, R.A K. Ribeiro, C. A. Falcetti leg., 2♀ (IBSP 2952); Cruz das Almas, 302m, 9°5'60"S 40°10'60"W, 24.VIII.1989, T. Brazil Nunes leg., 1♀ (IBSP 1514); Mucugê, 882m, 13°0'S 41°22'60"W (Reserva Particular do Patrimônio Natural Odília Paraguassú), XII.2006, J. P. de S. Alves leg., 1♀ (IBSP 4688); Nova Redenção, 03.I.1999, Ricardo leg., 3♀ (IBSP 2616); Jaguaquara, 772m, 13°31'60"S 39°58'W, 24.I.2000, A. T. da Silva leg., 1♀ (IBSP 2590); Jiquiriça, 286m, 13°13'60"S 39°36'W, 19.X.1982, T. Brazil Nunes leg., 1♀ (IBSP 1456); Maracás, 1004m, 13°25'60"S 40°27'W, 27.I.2005, J. R. R. Colta leg., 4 ♀, 1juvenile (IBSP 3769); Jequié, 209m, 13°50'60"S 40°4'60"W (Mandacarú), 24.I.2002, L. Boccardo leg., 1♀ (IBSP 3849); Ipiaú, 110m, 14°7'60"S 39°43'60"W, 24.VIII.1989, T. Brazil Nunes leg., 1♀ (IBSP 1516); Anagé, 530m, 14°35'60"S 41°7'60"W, 07.V–07.VIII.2002, D. Dias leg., 2♀ (IBSP 3359); Poções, 422m, 10°22'S 41°55'W, 14.V–15.VIII.2002, D. Dias leg., 22♀ (IBSP 3363); Ilhéus, 566m, 13°1'S 40°1'W, VIII.1999, 1 juvenile (IBSP 3350); Itabuna, 45m, 14°48'S 39°16'W, 02.VII.2001, S. Trevisan leg., 1♀ (IBSP 4334); Goiás: Corumbá de Goiás, 962m, 15°55'26"S 48°48'32"W, IX.1976, R. Iwamura leg., 1♀ (IBSP 1042); Cristalina, 1250m, 16°46'08"S 47°36'50"W, F. H. Kwasniewski leg., 5♀ (IBSP 3289); Mutunópolis, 13°43'58"S 49°16'30"W, 1979, W. R. Lourenço leg., 1♀ (MHNG); Rio Verde, 748m, 17°47'52"S 50°55'40"W, 21.II.1985, M. G. Baumgart leg., 1♀ (IBSP 1864); Distrito Federal: Brasília (Bairro Ceilândia), 1193m, 15°49'S 48°7'W, 2006, 1♀ (IBSP 4658); Minas Gerais: Porteirinha, 622m, 15°43'60"S 43°1'60"W, 10.V.1998, P. Lubiak leg., 1J (IBSP 3956); Januária, 463m, 15°28'60"S 44°22'W, VII.2005, Secretaria de Saúde leg., 2 ♂ and 4 ♀ (MNRJ 07366); Espinosa, 578m, 14°55'60"S 42°49'60"W, 08.IV.1986, Banco do Brasil leg., 1♀ (IBSP 1867); Taiobeiras, 820m, 15°49'S 42°13'60"W, 14.IV.2002, A. D. Brescovit leg., 1♀ (IBSP 3438); Salinas, 534m, 15°24'S 43°10'W, A. P. Silva leg., 2♀ (IBSP 4913); Unai, 614m, 16°22'60"S 46°52'60"W (UHE Queimada), 08/11.VII.2003, E. O. Machado leg., 4♀ (IBSP 4508); Berizal, 15°36'46"S 41°44'42"W (Fazenda São Jorge and Serra do Anastácio), 15.IV.2002, A. J. Santos et al. leg., 1♀ and 1♀ (IBSP 3439; 3940); Araçuaí, 304m, 16°52'S 42°4'W, 08.VIII.1988, J. M. Padilha leg., 1♀ (IBSP 1874); Campo Florido, 608m, 19°46' 60"S 48°34'60"W, 05.XI.1990, M. C. Pascoal leg., 2♀ (IBSP 1878); Araguari, 913m, 18°37'60"S 48°10'60"W, 20.IX.2000, C. M. B. Junior leg., 4♀ (IBSP 2574); Alfenas, 854m, 21°25'60"S 45°57'W, 28.VII.2003, A. B. Corrêa leg., 2♀ (IBSP 3366); Francisco Badaró, 535m, 17°3'S 42°19'W, D. M. Candido leg., 3♀ (IBSP 3310); Ituiutaba, 593m, 18°58'S 49°23'W, 01.IV.2004, M. I. A. Plazzi leg., 4♀ (IBSP 3605); Itapagipe, 465m, 19°53'60"S 49°23'W, 30.XI.2001, A. D. F. Freitas leg., 2♀ (IBSP 2877); Cascalho Rico, 670m, 18°34'S 47°52'W, 1986, Serraria Guarani leg., 1♀ (IBSP 1722); Carangola, 599m, 20°43'60"S 42°1'60"W,



24.IV.1995, F. Palinger leg., 1♀ (IBSP 1657); Berilo, 460m, 16° 56'60"S 42° 28'60"W (Lelliveldia), 04.V.2003, I. Knysak leg., 3♀ (IBSP 3613); Cataguases 304m, 21° 23'60"S 42° 40'60"W (Vila Fernando Peixoto), J. C. Oliveira leg., 2♀ (IBSP 3213); Córrego Novo, 630m, 19°49'60"S 42°22'60"W, 30.V.1985, J. L. Martins leg., 1♀ (IBSP 2928); Itanhomi 304m, 19° 10'S 41° 52'W (Distrito Edgar de Mello), 29.VII.198, S. A. Silva leg., 1♀ (IBSP 1873); Inhapim, 580m, 19°33'S 42°7'W, 05.II.2001, V. Felizato leg., 5♀ (IBSP 2604); Ipanema, 882m, 19°23'60"S 42°40'60"W, 05.XI.1990, Prefeitura Municipal de Ipanema leg., 6♀ (IBSP 1879); Heliadora, 926m, 22°4'S 45°31'60"W, 07.X.1985, A. Piat leg., 1♀ (IBSP 2021); Miradouro, 585m, 20°52'60"S 42°21'W, 09.X.1985, N. A. Silva leg., 1♀ (IBSP 1866); Piumhi, 857m, 20°28'S 45°58'W, 16.XI.1988, Nestlé Industrial e Comércio Ltda. leg., 2♀ (IBSP 1875); Piraúba, 411m, 21°16'60"S 43°1'60"W, 29.VII.1982, Hospital São Vicente de Paulo leg., 3♀ (IBSP 1287); Paraguaçu, 866m, 21°33'S 45°43'60"W, III.1982, G. J. Isidro leg., 1♀ (IBSP 1278); São Sebastião do Paraíso, 936m, 20°55'S 47°0'W, 07.I.1957, J. B. Pádua leg., 1♀ (IBSP 757); Três Pontas, 912m, 21°22'S 45°31'W, VI.1983, M. B. Dias leg., 11♀ + juveniles (IBSP 1457); Lambari, 891m, 21°58'S 45°21'W, X.1982, Dr. A. R. Hoge leg., 1♀ (IBSP 1413); Rio Pomba, 515m, 21°16'60"S 43°10'60"W, 12.II.1985, F. C. C. Gomes leg., 1♀ (IBSP 1863); Jacutinga, 784m, 22°16'60"S 46°37'W, 16.XI.1992, W. S. Junior leg., 1♀ (IBSP 1891); Mato Grosso do Sul: Campo Grande 585m, 20° 26'60"S 54°37'W (Bairro Indaiá), 17.II.2004, Centro de Controle de Zoonoses leg., 2♀ (IBSP 3615); Espírito Santo: Colatina, 156m, 19°31'60"S 40°37'W, 16.X.1992, S. F. Itho leg., (IBSP 1889); Afonso Claudio, 522m, 20°4'60"S 41°7'60"W, 24.VI.1987, Transportadora Colatinense leg., 1♀ (IBSP 1871); Rio de Janeiro: Itatiaia 386m, 22° 30'S 44° 34'W (Pico de Itatiaia) 02.VII.1979, J. Navas leg., 1♀ (IBSP 1147); Valença, 609m, 22°14'31"S 43°42'5"W (Santa Isabel), 01.XII.2007, R. Feital, leg., 1♀ (IBSP 5073); Barra Mansa, 288m, 22°31'60"S 44°10'60"W, 04.IX.1978, A. R. Silva leg., 1♀ (IBSP 1110); Volta Redonda, 297m, 22°31'60"S 44°7'W, 30.X.2000, P. M. O. Rio leg., 3♀ (IBSP 2576); Petrópolis, 857m, 22°30'39"S 43°11'4"W, 27.XII.1977, I. B. Antartica leg., 1♀ (IBSP 1093); Angra dos Reis, 141m, 23°0'S 44°17'60"W, 16.V.1995, I. I. Lewin leg., 1♀ (IBSP 2457); São Paulo: Rifaina, 607m, 20°4'60"S 47°25'60"W, 10.X.2003, M. A. B. Gomes leg., 2♀ (IBSP 3451); Olímpia, 522m, 20°43'60"S 48°53'60"W, 29.VI.2006, Equipe IBSP leg., 2♀ (IBSP 4833); Panorama, 279m, 21°21'S 51°51'W, 09.XII.2004, Vigilância Epidemiológica leg., 2♀ (IBSP 3762); Dracena, 304m, 21°31'60"S 51°28'60"W, 15.I.2001, M. Bedin leg., 1♀ (IBSP 2602); Junqueirópolis, 309m, 21°31'60"S 51°25'60"W, 01.VII.1992, Granol Indústria leg., 1♀ (IBSP 1887); Presidente Prudente, 495m, 22°7'S 51°22'W, 14.I.2003, SUCEN leg., 1♀ (IBSP 3266); Araçatuba, 409m, 21°11'60"S 50°25'W, 07.VIII.1984, M. A. Ribeiro leg., 1♀ (IBSP 1861); Avanhandava, 438m, 21°28'S 49°57'W, 18.II.1983, U.H.E. Avanhandava CESP leg., 3♀ (IBSP 2276); Itápolis, 488m, 21°34'60"S 48°46'W, 18.VII.2006, M. Gianfioni leg., 1♀ (IBSP 4614); Araraquara, 666m, 21°46'60"S 48°10'W, 18.XI.2004, Prefeitura de Araraquara leg., 1♀ (IBSP 3812); Marília, 609m, 22°113'S 49°55'60"W, 29.I.1991, SUCEN leg., 2♀ (IBSP 2036); Jaú, 573m, 22°18'S 48°32'60"W, 04.XI.1991, SUCEN leg., 9♀ (IBSP 1882); Pompéia, 592m, 22°7'60"S 50°10'W, 24.VII.1998, Derpatamento de Higiene e Saúde leg., 2♀ (IBSP 1899); Lins, 459m, 21°40'S 49°45'W, 04.X.1982, L. G. Alcantara leg., 1♀ (IBSP 1337); Taiúva, 610m, 21°7'60"S 48°27'W, 08.VI.1982, C. C. Sarti leg., 2♀ (IBSP 1332); Santa Rosa do Viterbo, 609m, 21°28'S 47°21'W, 13.II.1989, J. C. R. leg., 1♀ (IBSP 1877); São José do Rio Pardo, 701m, 21°36'S 46°53'60"W, 2005, R. Bertani leg., 6 juveniles (IBSP 5128); Casa Branca, 616m, 21°46'S 47°4'60"W, 26.XI.1990, 1♀ (IBSP 1880); Vargem Grande do Sul, 823m, 21°49'60"S 46°52'60"W, 13.II.2005, G.P. Perroni leg., 1♀ (IBSP 4622); Candido Mota, 547m, 22°43'S 50°22'60"W, 04.IV.2001, H. M. Bastos leg., 2♀ (IBSP 2681); Águas de Lindóia, 877m, 22°28'60"S 46°38'60"W, IX.1967, J. J. Carvalho leg., 10♀ (IBSP 965); Charqueada, 608m, 22°30'S 47°46'W, 08.XII.2003, Centro de Saúde III leg., 1♀ (IBSP 3454); Piraju, 558m, 23°11'60"S 49°22'60"W, 13.III.2006, D. P. Silva leg., 3♀ (IBSP 4588); Lindóia, 788m, 22°31'S 46°38'60"W, XII.1969, Granja Marapuhy leg., 12♀ (IBSP 992); Piracicaba, 541m, 22°43'S 47°37'60"W, 16.X.2002, Prefeitura Municipal leg., 1♀ (IBSP 3216); Limeira, 583m, 20°56'60"S 47°55'W, 31.I.1984, P. E. Baraldi leg., 4♀ (IBSP 1857); Sumaré, 609m, 22°48'S 47°16'60"W, 19.I.2005, Prefeitura de Sumaré leg., 1♀ (IBSP 3782); Indaiatuba, 609m,



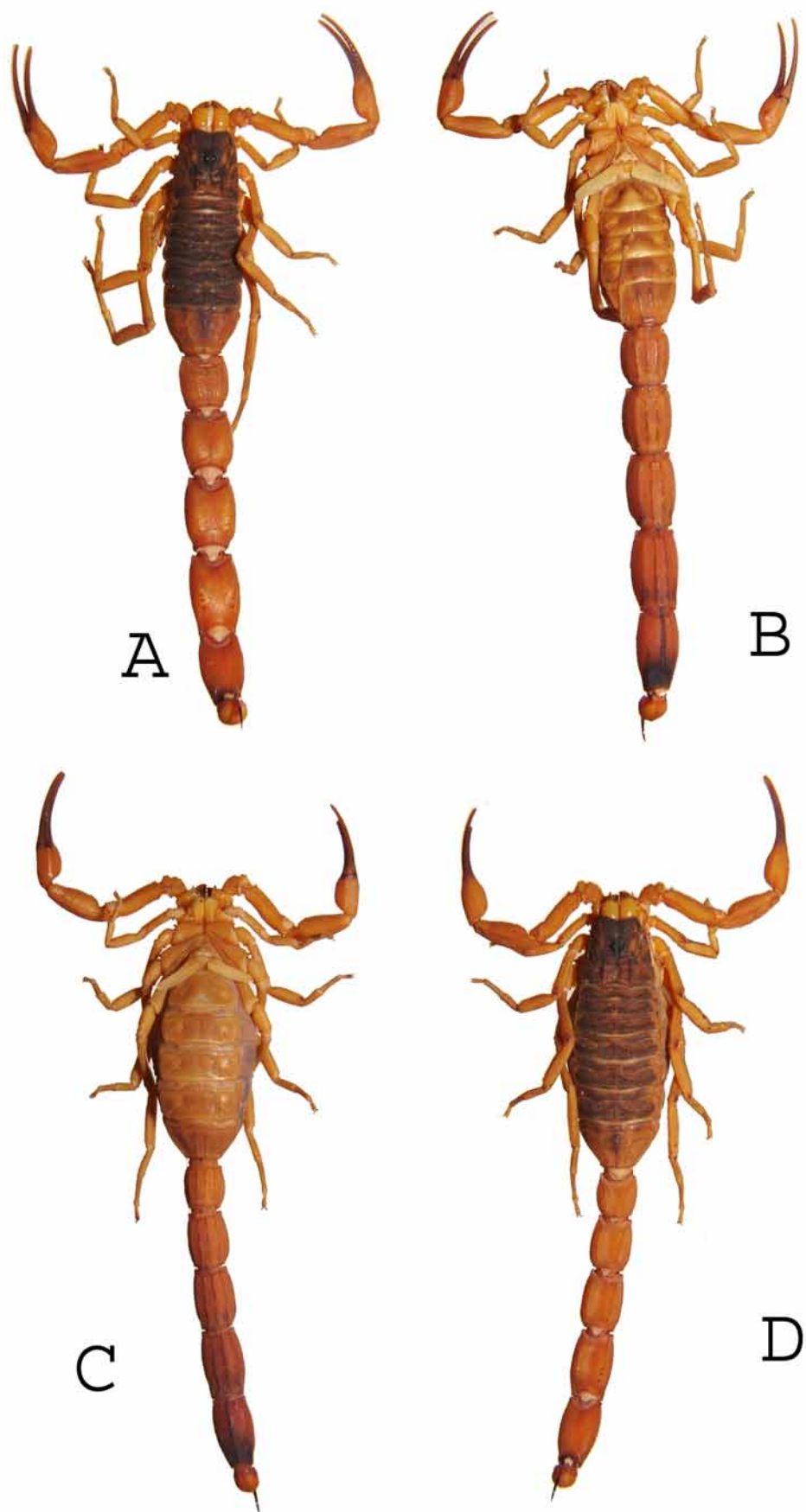
23°4'60''S 47°13'60''W, 07.X.1982, E. S. Kreuke leg., 2♀ (IBSP 1333); Itapetininga, 679m, 23°36'S 48°2'60''W, 16.VIII.1983, FEPASA leg., 1♀ (IBSP1853); Itupeva, 816m, 23°8'60''S 47°4'W, 28.II.1992, J. Sabó leg., 3♀ (IBSP 1884); Porto Feliz, 540m, 23°12'48''S 47°31'23''W, 11.I.2008, S. C. Mattos, 1♀ (IBSP 5068); Itú, 606m, 23°16'S 47°19'W, V.1981, R. D'Avila leg., 4♀ (IBSP 1252); Silveiras, 727m, 22°33'S 46°55'W, 28.II.1984, E. A. O. Guercia leg., 1♀ (IBSP 1859); São José do Barreiro, 523m, 22°37'60''S 44°34'60''W, 07.VII.2004, D. Lobo leg., 1♀ (IBSP 3661); Guararema, 602m, 23°25'S 46°1'60''W, 05.II.2001, SUCEN leg., 4♀ (IBSP 2603); Caçapava, 566m, 23°6'S 45°43'W, 23.VIII.1973, C. A. Sério leg., 1♀ (IBSP 1007); Paraibuna, 680m, 23°22'60''S 45°38'60''W, 11.VI.1991, CESP leg., 1♀ (IBSP 1881); Ubatuba, 0m, 23°25'60''S 45°4'W, 11.VII.1997, Prefeitura de Ubatuba leg., 2♀ (IBSP 1666); São Sebastião, 137m, 23°48'S 45°25'W, 11.VIII.1986, J. P. Matos, leg., 1♀ (IBSP 1868); Americana, 586m, 22°44'25''S 47°20'4''W, 18.X.2006, G.G. Galassi leg., 1♀ (IBSP 4732); Caieiras, 931m, 23°22'S 46°43'60''W, 07.V.2004, Prefeitura de Caieiras leg., 1♀ (IBSP 3628); Atibaia, 796m, 23°7'27''S 46°33'44''W, 29.VII.1983, Prefeitura de Atibaia leg., 1♀ (IBSP 1852); Vargem Grande Paulista, 23°36'10''S 47°1'33''W, 13.VIII.2002, D. M. Candido leg., 1♀ (IBSP 3063); São Roque, 609m, 22°44'14''S 47°21'16''W, 10.XI.2001, Nei leg., 1♀ (IBSP 2887); Santana do Parnaíba, 618m, 23°26'60''S 46°55'W, 18.XII.2007, P. H. S. Gonçalves, 1♀ (IBSP 5031); Jandira, 683m, 23°31'S 46°53'60''W, 37.I.2003, Prefeitura de Jandira leg., 1♀ (IBSP 3271); Barueri, 653m, 23°31'S 46°52'60''W, 08.VIII.2007, R. G. Filho leg., 1♀ (IBSP 4837); Cotia, 827m, 23°37'S 46°55'60''W, 16.IV.2003, Firmenich S/A leg., 1♀ (IBSP 3331); Suzano, 696m, 23°31'60''S 46°19'60''W, 02.II.2005, Prefeitura de Suzano leg., 2♀ (IBSP 3791); Guarujá, 0m, 24°0'S 46°16'W, VII.2004, V. Bicudo leg., 1♀ (IBSP 3641); Juquitiba, 879m, 23°55'38''S 47°4'12''W, 24.XII.1982, H. Cara leg., 1♀ (IBSP 1368); Miracatu, 160m, 24°16'60''S 47°28'W, 17.XI.2004, SUCEN leg., 1♀ and 1J (IBSP 3800); Peruíbe 0m, 24°19'S 47°0'W, (Zona Urbana de Peruíbe), 29.IX.2004, Prefeitura de Peruíbe leg., 2♀ (IBSP 3743); Paraná: 642m, 24°56'60''S 53°28'W, Cascavel, 30.IX.1982, M. E. Maluf leg., 2♀ (IBSP 1291); Curitiba, 913m, 25°25'S 49°15'W, 06.III.1992, Centro de Epidemiologia leg., 1♀ (IBSP 1885).

**Comments.** After the original description, Vellard (1932) was the first to make a contribution to the taxonomy of this species. He stated that *T. stigmurus* was a common species in Minas Gerais and Southern Goiás. Vellard suggested that *T. stigmurus* had a more Northern distribution range while *T. serrulatus* had a Southern range, but considered *T. serrulatus* a synonym of *T. stigmurus*. Mello-Leitão (1939) rejected the synonymy and described a new subspecies *Tityus serrulatus vellardi* Mello-Leitão, 1939 with no apparent reason for his decision (Lourenço, 1981). Lourenço (1981) examined the holotype of *Tityus serrulatus vellardi* and concluded that it is a typical *T. serrulatus* and synonymised the subspecies. Many years later Lourenço & Cloudsley-Thompson (1999) suggested the reestablishment of Vellard's synonym of *T. serrulatus* with *T. stigmurus* and synonymised *T. lamottei* Lourenço, 1981 with *T. stigmurus*. In the same paper they described a male of *T. serrulatus* from Northern Minas Gerais. According to the authors the material was deposited in FUNED and MNHN. During the present revision, though, one of the authors (CARS) visited the repository institution of FUNED looking for the voucher specimen of the male of *T. serrulatus*, which could not be located. In the same article a second repository institution was indicated (MNHN) but this material was never deposited in MNHN (Lourenço pers comm.).

Considering that parthenogenesis has been verified for *T. serrulatus* (Matthiessen, 1962), the existence of the male has been considered doubtful. Mello-Leitão (1945) presented some characters to distinguish male and female but the material used by him to do this could not be located. The exam of the collections of FUNED, IBSP and MNRJ led us to conclude that male and female *T. serrulatus* described by Lourenço & Cloudsley-Thompson belong in fact to a population of *T. melici* Lourenço, 2003 (see under *T. melici*). The male of *T. serrulatus* indeed exists and is redescribed based on two specimens collected in Northern Minas Gerais and deposited in MNRJ and IBSP.

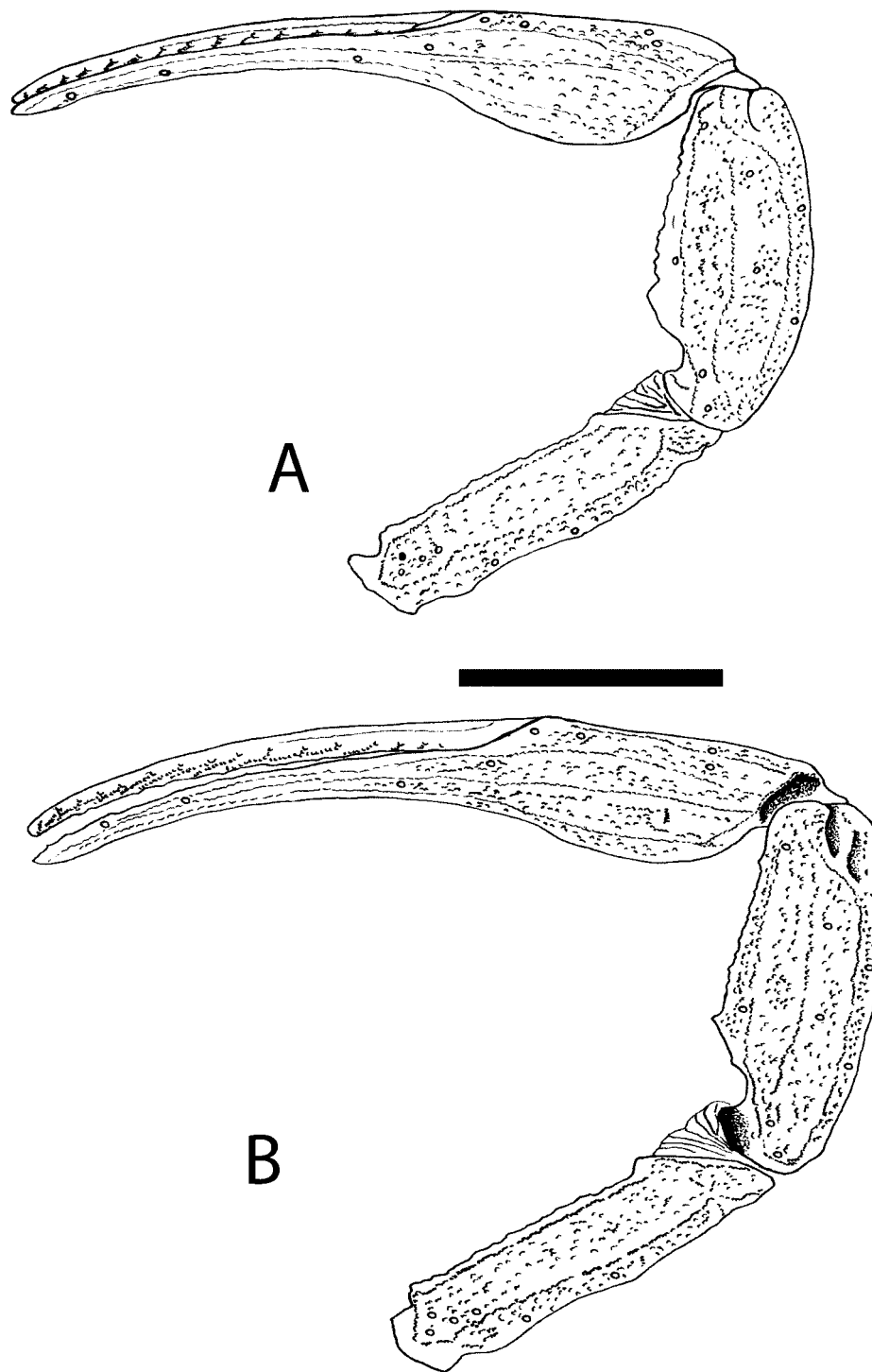
The species *T. lamottei* was described in 1981 when Lourenço established the *T. stigmurus* complex. He considered the presence of spots on the pedipalps and legs as the single feature to distinguish this species from





**FIGURE 11.** *T. serrulatus*. (♂ and ♀ IBSP 5046; Januária, Minas Gerais, Brazil) Male in dorsal (A) and ventral (B) view; Female in ventral (C) and dorsal (D) view.

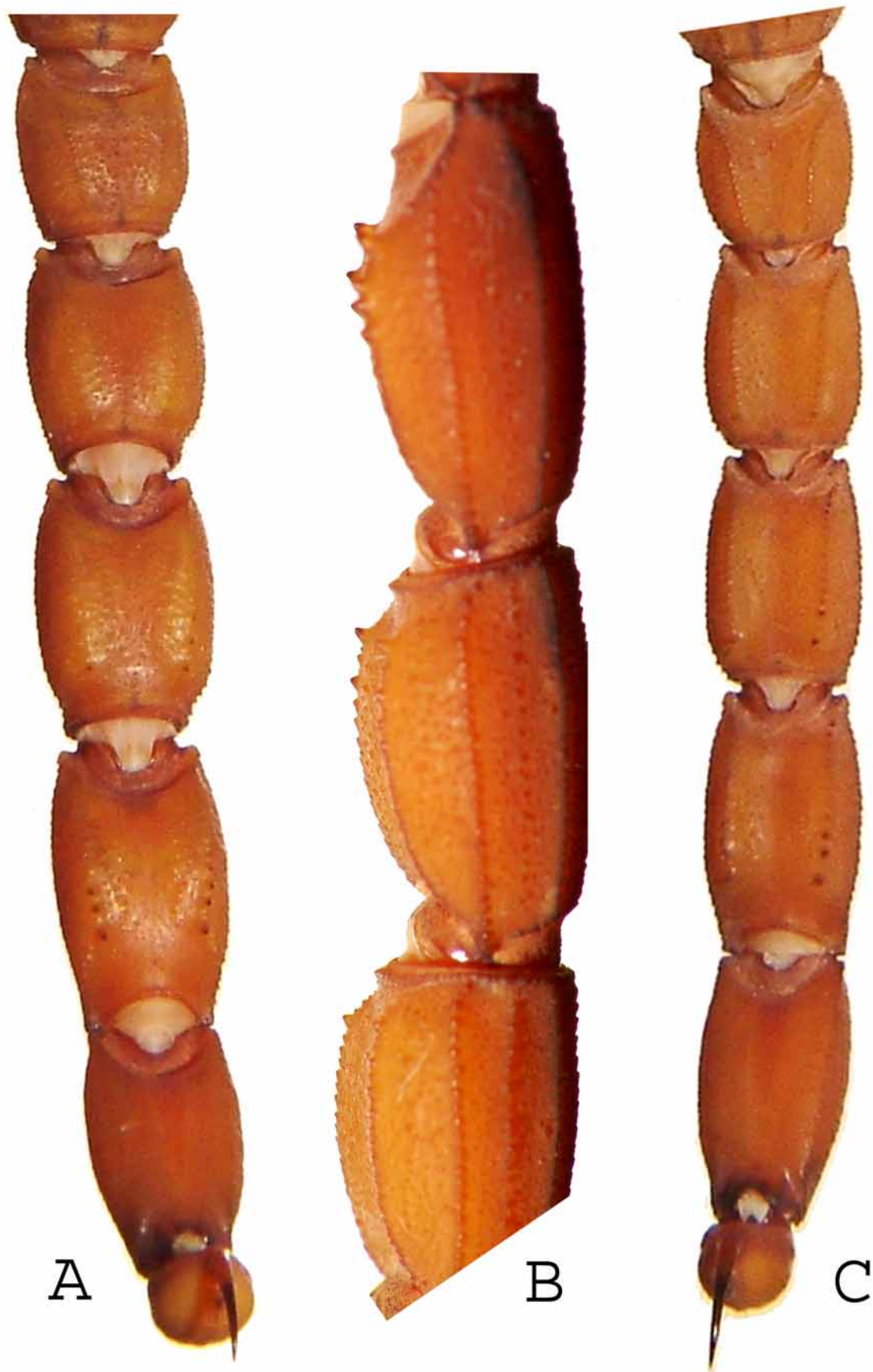




**FIGURE 12.** *T. serrulatus*. (♂ and ♀ IBSP 5046; Januária, Minas Gerais, Brazil). Right palp in dorsal view: female (A) and male (B). Scale bars = 5 mm.

*T. serrulatus*. Later Lourenço & Cloudsley-Thompson (1999) synonymised *T. lamottei* with *T. stigmurus* and suggested the synonymy of *T. serrulatus* with *T. stigmurus*, considering the former two species a polymorphic form of the latter. The holotype of *T. lamottei* was reexamined (Fig. 15A–D) and was found to be a synonym of *T. serrulatus*. *Tityus lamottei* presents the posterior spinoid granules on dorsal lateral carinae of metasomal segments III–IV (Fig. 15D), the pattern of pigmentation of tergites (Fig. 15A) and the ventral surface of the metasomal segments as observed in *T. serrulatus* (Lourenço & Eickstedt, 1981). Thus *T. lamottei* is regarded as a junior synonym of *T. serrulatus*.





**FIGURE 13.** *T. serrulatus*. (♂ and ♀ IBSP 5046; Januária, Minas Gerais, Brazil). Metasomal segments of the male in dorsal view (A); Metasomal segments II and IV in lateral view (B); Metasomal segments of the female in dorsal view (C).





**FIGURE 14.** Distribution of *T. serrulatus*.



Mello-Leitão (1933) distinguished *T. acutidens* from *T. serrulatus* by the measurements of the movable finger and pigment pattern but did not describe these differences in detail. Lourenço (1979) tried to collect specimens in the type locality with no success. He collected one in Mutunópolis, Goiás which he tentatively identified as *T. acutidens*. The specimen which is labeled as a topotype was reexamined and was found to be an immature of *T. serrulatus*: having three posterior spinoid granules on the dorsal lateral carinae of metasomal segments II and IV, confluent black pigmentation pattern on tergites and stripes on the ventral surface of metasomal segments. The holotype of *T. acutidens* was found in MNRJ, contra to Lourenço (1981) and Fet et al (2000). This specimen is poorly preserved but it is possible to see the posterior spinoid granules on the dorsal lateral carinae of metasomal segments III and IV, which is the main characteristic of *T. serrulatus*. Thus *T. acutidens* is also regarded as a junior synonym of *T. serrulatus*.

**Diagnosis. Male.** This species differs from the others of the complex by presence of confluent blackish spots on tergites and presence of two pairs of posterior spinoid granules on the dorsal carinae of metasomal segment III and three pairs on metasomal segment IV, except from *T. kuryi* and *T. melici*. *Tityus serrulatus* can be distinguished from *T. kuryi* by lack of blackish spots on palps, legs, lateral faces and Vsm carinae of all metasomal segments, lack of transversal blackish spots on posterior margin of sternites and general coloration yellowish (Fig. 11A–B), whereas *T. kuryi* has blackish spots on palps, legs (Fig. 7A), lateral faces and Vsm carinae of all metasomal segments (Fig. 6), transversal blackish spots on posterior margin of sternites and a general coloration brownish (Fig. 7A–B). It also differs from *T. melici* by the presence of two pairs of posterior spinoid granules on the dorsal carinae of metasomal segment III and three pairs on metasomal segment IV, pedipalps (*T. serrulatus*: length femur=8.2; tibia=8.3; chela=14.5; fig. 12B) and metasomal segments (*T. serrulatus* width I=6.3; II=6.3; III=6.3; IV=6.0; V=5.1; fig. 11A) that are stouter and the color pattern of the carapace and tergites, which has dark brown spots, whereas *T. melici* has not posterior spinoid granules on the dorsal carinae of metasomal segment III and IV (if present they are smaller; see variation of *T. melici*), pedipalps (*T. melici*: femur=9.8; tibia=10.1; chela=16.5; fig. 20A–B) and metasomal segments (*T. melici* I=4.6; II=4.7; III=5.1; IV=4.8; V=4.6) slender and color pattern of the carapace and tergites, which are uniformly brownish without spots (Fig. 19A–D).

**Female.** The pattern of coloration is similar to the male (Lourenço & Eickstedt, 1981) (Fig. 11A–D). The main morphological differences of the female are the narrower metasomal segments (Fig. 13A; C) (female: I=4.7; II=4.7; III=4.7; IV=4.7; V=4.5; male: I=6.3; II=6.3; III=6.3; IV=6.0; V=5.1) and shorter pedipalp segments (Fig. 12A–B) (female: femur=7.0; tibia=7.3; chela=13.1; male: femur=8.2; tibia=8.3; chela=14.5)(table 1).

**Redescription. MALE (IBSP 5046).** Basic coloration yellow; carapace yellow with dark brown spots, anterior margin with a dark brown triangular stain on the apex oriented backwards (Fig. 11A); tergites I–VI yellow with dark brown confluent spots that are accentuated on anterior and posterior margin, the central region of tergite VII with a dark brown triangular spot on anterior margin with the apex oriented backwards (Fig. 11A) (see Lourenço and Eickstedt, 1981; Lourenço, 2002). Metasomal segments I–IV yellow with dark brown spots on ventral submedian and ventral lateral carinae; segment V yellow with a ventral stain that occupies almost all the posterior region (Fig. 11B). Telson: vesicle yellow; aculeus reddish-yellow at its base and reddish at its extremity; venter yellow (Fig. 11B); chelicerae yellow, extremity of the fingers and teeth reddish. Morphology: Carapace: anterior margin with a weak median concavity; median ocular tubercle anterior to centre of the carapace; median eyes separated by more than one ocular diameter; shallow space between median ocular carinae; Three pairs of lateral eyes; median ocular carinae moderate with small granules; anterior median furrow moderately deep; posterior furrow narrow, shallow anteriorly deep posteriorly. Prosoma: moderately granular; granulation more intense on anterior region; tergites weak to moderately granular with some large granules on the posterior region; median carinae present on all tergites, on tergites I and II reduced; on II and IV occupying distal third; on V and VI occupying the distal half; on tergites III–VI carinae begin bifurcated and finish merged; tergite VII pentacarinat; transversal carinae present on all tergites. Pectines:



pectinal teeth 24–24; basal middle lamellae not dilated. Sternites weak granular; a smooth and shining slightly expanded triangular zone on the posterior region of sternite III and V (Fig. 11B); sternites VI with two small median carinae occupying the distal half; sternite VII with five carinae, of which two parallel median occupying almost all of the sternite with a small one between them and two lateral carinae restricted to the central region. Metasoma: segment I with 10 complete carinae of which Vsm, VI, Lim, Lsm and DI have adjacent granules; II with 8 complete carinae of which Vsm, VI, Lsm and DI have adjacent granules, Lim is incomplete on anterior third and has sparse granules, DI with one posterior spinoid granule; III with 8 complete carinae of which Vsm, VI, Lsm and DI have adjacent granules, DI with three posterior spinoid granules; IV with 8 complete carinae of which Vsm, VI, Lsm and DI have adjacent granules, DI with three posterior spinoid granules (Fig. 13B); V with 5 complete carinae with uniform and sparse granules; intercarinal surface moderately granular. Vesicle with five vestigial carinae of which the ventral one is well marked; aculeus long and strongly curved; subaculear tooth strong and spinoid with two small dorsal teeth. Pedipalp: femur with 5 carinae of which Da, Dp, Va and Mp have small and adjacent granules; Ma with bigger granules; patella with 7 carinae of which Ad, Am, Av and Dm have median and adjacent granules; Am with a proximal spinoid granule (Fig. 12B); Pd, Pm and Pv with small and continuous granules; chela with 9 carinae, with small and continuous granules; absence of the basal lobe on the movable finger of chela (Fig. 12B); all surfaces moderately to weakly granular. Movable fingers with 17–16 oblique rows of granules. Trichobothriotaxy: ortobothriotaxy A— $\alpha$  (Vachon, 1974 and 1975).

**Variations.** The females collected in the west region of the State of Bahia have sparsely distributed blackish spots on the pedipalps and legs (Fig. 15A; C).

**Distribution.** Brazil, Piauí, Ceará, Rio Grande do Norte, Pernambuco, Sergipe, Bahia, Mato Grosso, Tocantins, Goiás, Distrito Federal, Mato Grosso do Sul, Minas Gerais, Espírito Santo, Rio de Janeiro, São Paulo, Paraná, and Rio Grande do Sul (Bortoluzzi et al, 2007) (Fig. 14).

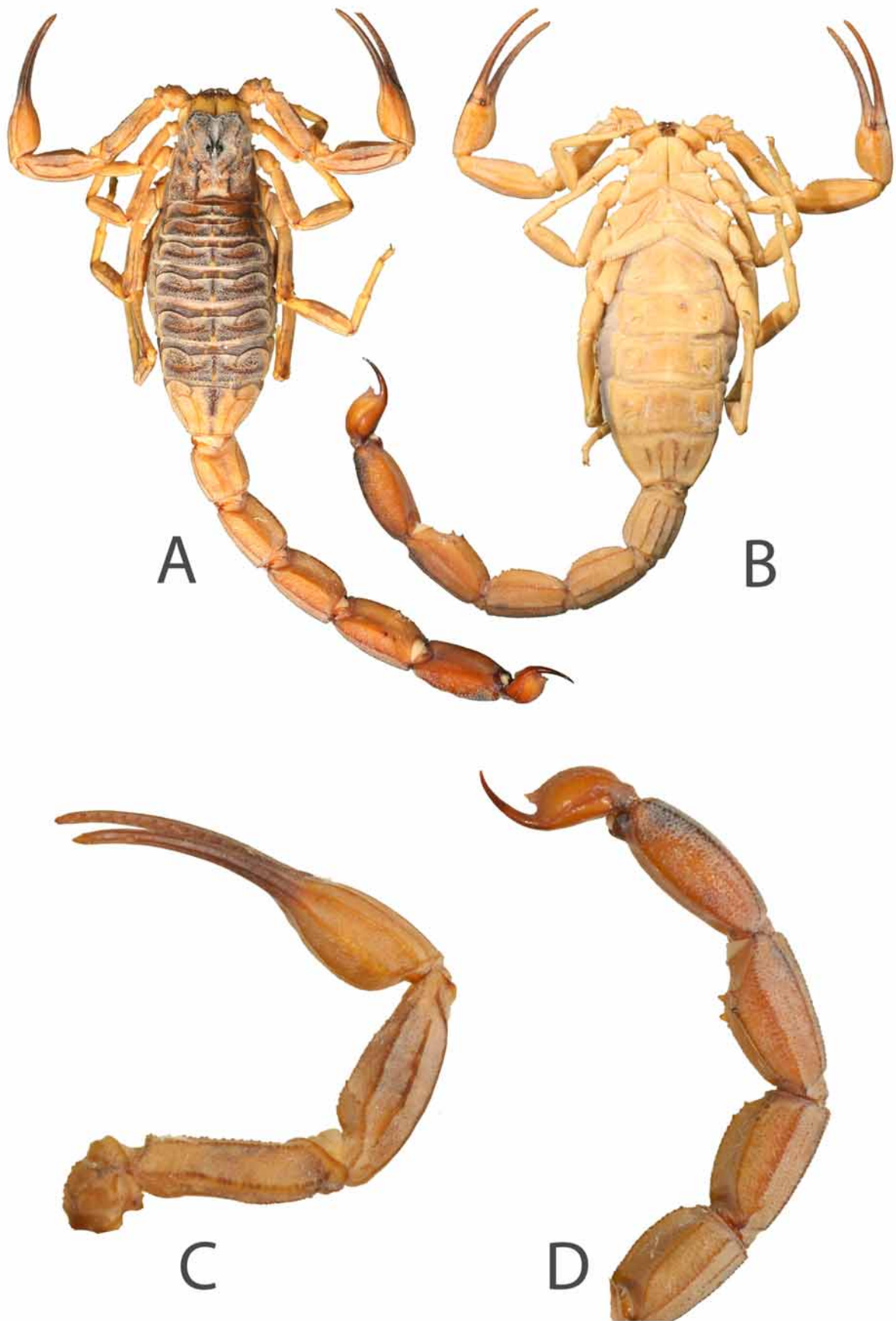
### *Tityus stigmurus* (Thorell, 1876)

*Isometrus stigmurus* (Thorell, 1876): 132–134. Holotype ♀ from Pernambuco, Brazil (deposited in NRS, not examined). *Tityus stigmurus*. Lourenço & Cloudsley-Thompson, 1999: 154–156, 158; Fet et al, 2000: 262; Lourenço, 2001: 21–26, 29, 34; Lourenço, 2002: 37, 153–154, 155, 164; Lourenço, 2003a: 109, 113; Lourenço, 2003b: 427, 432; Lourenço, 2006: 61; Souza et al, 2006: 27–28, 35; Dias et al, 2006: 707–709.

**Material examined.** Brazil, Ceará: Crato, 692m, 7°13'60"S 39°29'60"W, X.2004, A. Vasconcellos leg., 1 ♀ (IBSP 3841); Paraíba: Cabaceiras, 319m, 7°1'S 37°27'W, 2004, M.T.L.Duarte leg., 8 ♀ (IBSP 3644); João Pessoa (Mata do Buraquinho), 7°6'S 34°52'W, 2003, S. C. Dias leg., 1 ♀ (IBSP 3987); Pernambuco: Surubim, 236m, 7°49'60"S 35°45'W, 18.VIII.2003, S. M. T. Macedo, 1 ♀ (IBSP 3369); Carpina, 151m, 7°50'60"S 35°15'W, 19.X.2002, Engenho Petribú leg., 3 ♀ (IBSP 2866); Lagoa do Itaenga, 154m, 7°55'S 35°19'60"W, 25.X.2001, Usina Petribú leg., 1 ♀ (IBSP 2859); Arquipélago de Fernando de Noronha, Ilha de Fernando de Noronha, 3°50'S 32°15'W, 2006, G. Freitas leg., 1 ♀ (IBSP 4683); Bahia: Paulo Afonso, Raso da Catarina, 9°33'–9°54'S 38°29'–38°44'W, VII.1982, T. Brazil Nunes leg., 1 ♂ (IBSP–1330); Camaçari, 413m, 10°5'60"S 42°32'60"W, VII.1983, T. Brazil Nunes leg., 1 ♂ (IBSP 1481); Jequié, 209m, 13°50'60"S 40°4'60"W, 03.II/07.VII.2005, L. Boccardo et al leg., (Pitfall in urban area) 1 ♀ (IBSP 4287); Alagoas: Murici, 145m, 9°19'S 35°55'60"W, 28.I.1989, L. M. Freitas leg., 4 ♀ (IBSP 2025); Rio Largo, 75m, 9°28'60"S 35°51'W, 27.I.1999, R. Omera leg., 1 ♀ (IBSP 2479); Maceió (Ipióca, Serra da Saudinha), 9°22'S 35°43'W, 04.VI.2005, G. Q. Correia leg., 1 ♀ (IBSP 4602).

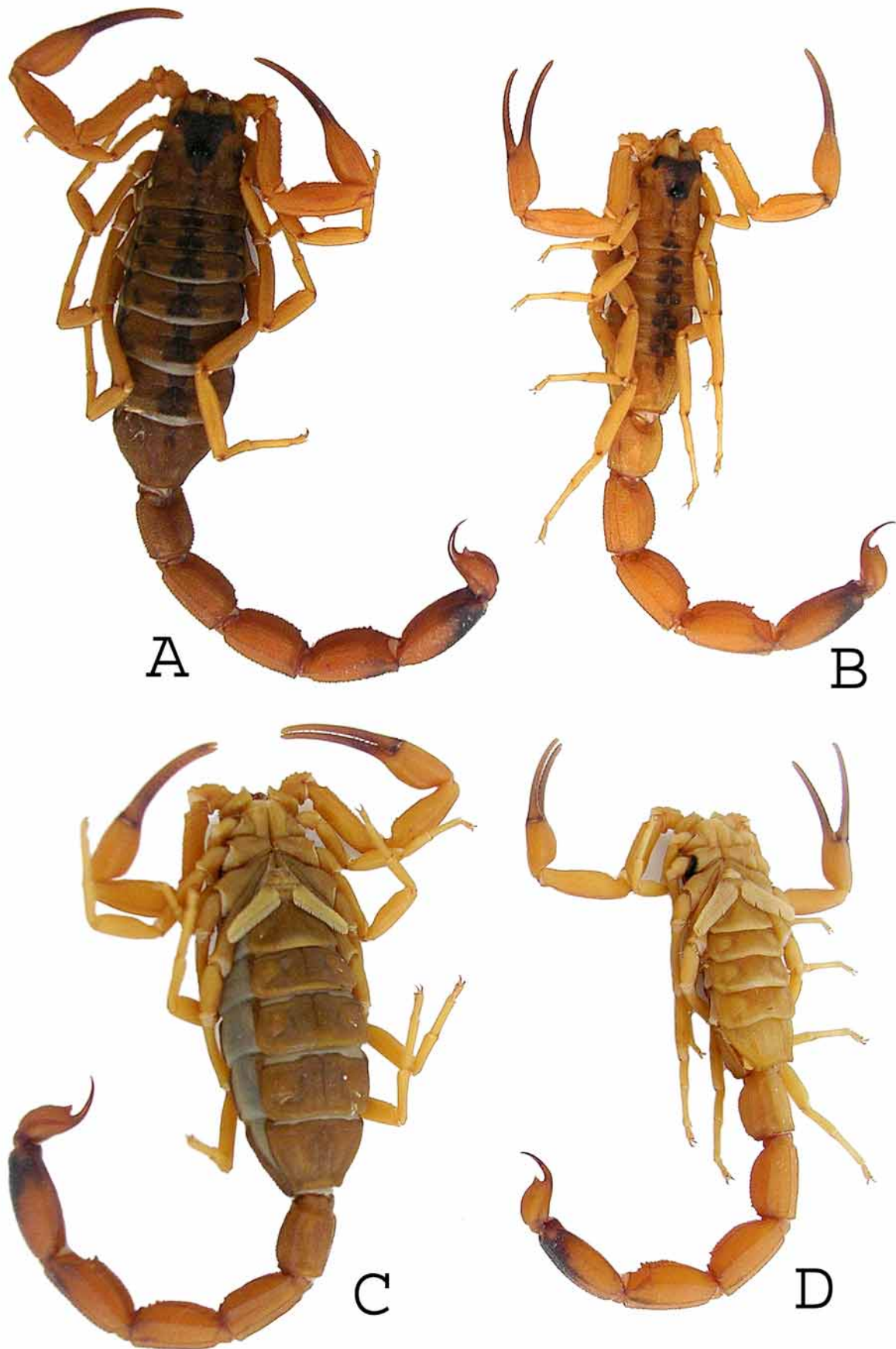
**Comments.** The species *T. stigmurus* Thorell, 1876 was described as *Isometrus stigmurus*, and transferred to *Tityus* by Kraepelin (1899). *T. serrulatus* and *T. stigmurus* are very closely related species and due to this close relationship several taxonomical changes have been proposed between them (see *T. serrulatus*





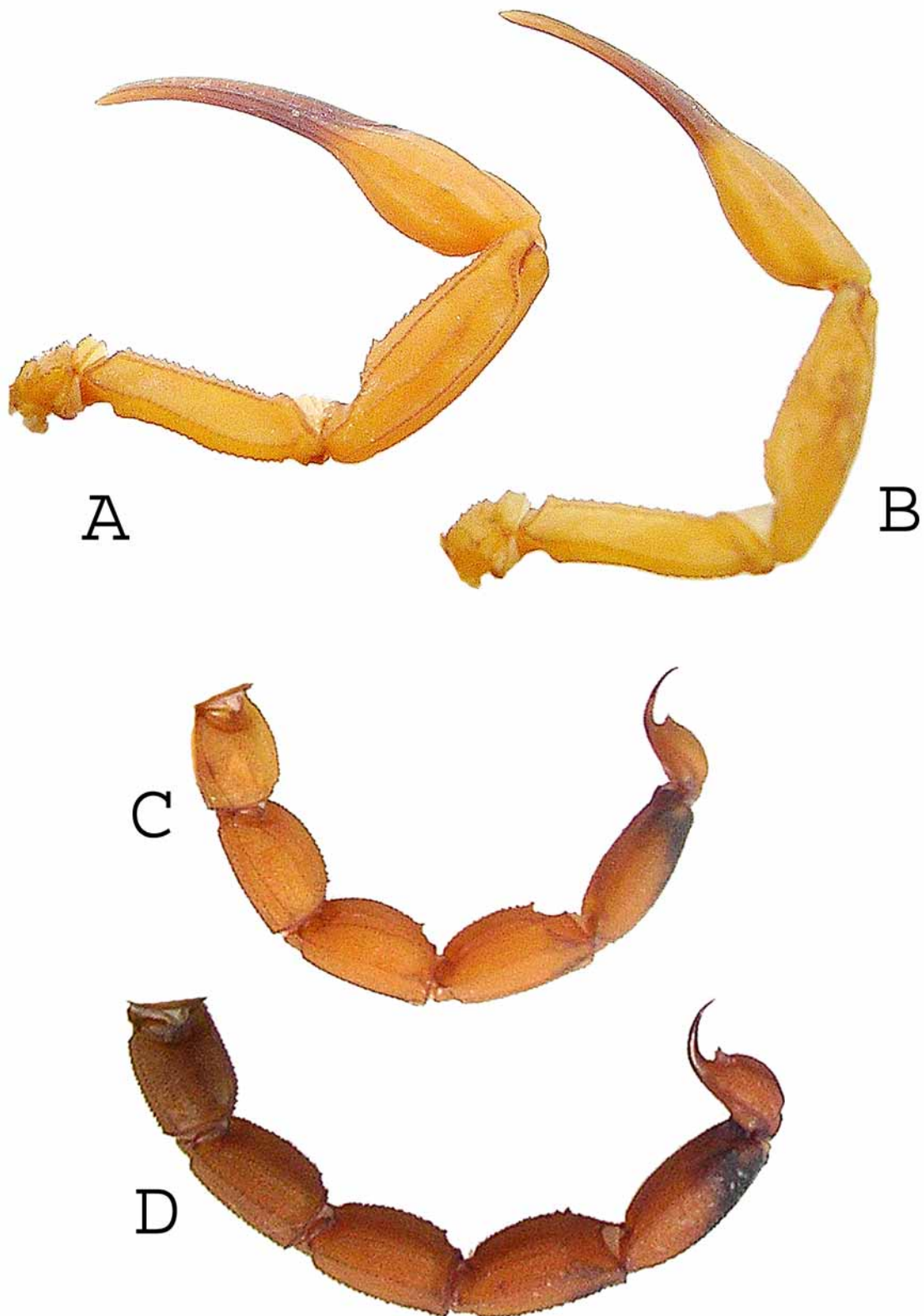
**FIGURE 15.** *T. lamottei* (holotype ♂ IBSP 1442; São Desidério, Bahia, Brazil) new synonym. Dorsal (A) and ventral (B) view; Right palp in dorsal view (C); Metasomal segments in lateral view (D).





**FIGURE 16.** *T. stigmurus*. (♂ IBSP 1330, ♀ IBSP 1449; Raso da Catarina, Bahia, Brazil). Female in dorsal (A) and ventral (C) view; Male in dorsal (B) and ventral (D) view.





**FIGURE 17.** *T. stigmurus*. (♂ IBSP 1330, ♀ IBSP 1449; Raso da Catarina, Bahia, Brazil). Right palp in dorsal view: female (A) and male (B); Metasomal segments and telson in lateral view: male (C) and female (D).

above). The original description was based on two female specimens from Pernambuco, Brazil. Mello-Leitão (1945) first pointed out some differences between the female and male but without precise details and not mentioning which specimens he examined. No further contributions have been proposed to distinguish the



sexes since 1945. The male of *T. stigmurus* is redescribed and the diagnostic differences between the sexes described.

**Diagnosis. Male.** This species differs from the others of the complex by presence of three dark brown longitudinal stripes on tegites, except by *T. aba* and *T. martinpaechi*. *Tityus stigmurus* can be distinguished from *T. aba* by a different pattern of pigmentation, with a single longitudinal dark brown stripe on tergites which reaching the VII tergite, carapace with only one triangular dark brown spot on anterior region (Fig. 16A–B), smallest number of pectinal teeth (22, 23–24), pedipals slender (length femur=6.5; tibia=7.2; chela=12.5) and smallest total length (*T. stigmurus* 60,3–63,8 mm), whereas *T. aba* has carapace almost entire dark (Fig. 1A–B), three longitudinal dark brown stripes on tergites which begin at the posterior edge of the carapace, the lateral ones reaching the VI tergite and the central reaching the VII (Fig. 1A–B), a largest number of pectinal teeth (male 25–25, 26–25, 26–27), pedipals stouter (length femur=8.3; tibia=8.7; chela=14.9) and greatest total length (*T. aba* 76.5 mm)(Candido *et al*, 2005). It also differs from *T. martinpaechi* by a different pattern of pigmentation, with a single longitudinal dark brown stripe on tergites which reaching the VII tergite, carapace with only one triangular dark brown spot on anterior region (Fig. 16A–B) and smallest total length, whereas *T. martinpaechi* has three longitudinal dark brown stripes on tergites which begin at the posterior edge of the carapace, the lateral ones reaching the VI tergite and the central reaching the VII, carapace with some dark brown spots (Fig. 9A–B) and greatest total length (male 73,6 mm).

**Female.** Female pattern of coloration is similar to the male (Fig. 16A–D). The main morphological differences are the narrow metasomal segments (female: I=3.3; II=3.3; III=3.3; IV=3.5; V=3.2; male: I=4.8; II=5.0; III=5.0; IV=4.7; V=4.1) and shorter pedipalp segments (Fig. 17A–B) (female: femur=5.7; tibia=6.3; chela=11.7; male: femur=6.3; tibia=7.1; chela=12.2) (table 1).

**Redescription. Male (IBSP 1330);** Coloration basically yellowish, carapace pale yellow, with a dark triangle whose base faces the anterior region (Fig. 16B); ocular tubercle dark. Mesosoma with three longitudinal dorsal stripes along the tergites. The central stripe extends from the posterior edge of the carapace to tergite VII while the lateral stripes extend from the posterior edge of carapace to tergite IV; on tergite VII there is a dark brown triangular spot on the anterior margin with the apex orientated backwards in the central region (Fig. 16B). Metasomal segments I–IV yellow with dark brown spots on the ventral submedian carinae, segment V yellow with a ventral stain occupying almost all the posterior region (Fig. 17C–D). Vesicle yellow, with aculeus reddish-yellow at its base and reddish at its extremity. Ventral surface yellow, chelicerae yellow, extremity of the fingers and teeth reddish. Pedipalps and chela yellow; fingers reddish though distally paler. Legs yellow. Morphology; Carapace: anterior margin with a weak median concavity; median ocular tubercle anterior to centre of the carapace; median eyes separated by more than one ocular diameter; space between median ocular carinae shallow; three pairs of lateral eyes; median ocular carinae moderate with small granules; anterior median furrow moderately deep; posterior furrow narrow, shallow anteriorly deep posteriorly. Prosoma: moderately granular; granulation more intense on anterior region. Tergites weak to moderately granular with some large granules on the posterior region; median carinae present on all tergites, on tergites I and II reduced; on II and IV occupying the distal third; on V and VI occupying the distal half; on tergites III–VI carinae begin bifurcated and finish merged; tergite VII pentacarinata; transversal carinae present on all tergites. Pectines: pectinal teeth 23–24; basal middle lamellae not dilatated. Sternites weakly granular; a smooth and shining slightly expanded triangular zone on the posterior region of sternites III and V (Fig. 16B); sternite VI with two small median carinae occupying the distal half; sternite VII with five carinae, of which the two parallel median carinae occupy almost all of the sternite with a small carina between them, the two lateral carinae restricted to the central region. Metasoma: segment I with 10 complete carinae of which Vsm, Vl, Lim, Lsm and Dl have adjacent granules; II with 8 complete carinae of which Vsm, Vl, Lsm and Dl have adjacent granules, Lim is incomplete on anterior third and have sparse granules, Dl with one posterior spinoid granule; III with 8 complete carinae of which Vsm, Vl, Lsm and Dl have adjacent granules, Dl with one posterior spinoid granule (Fig. 17C); IV with 8 complete carinae of which Vsm, Vl, Lsm and Dl have adjacent





**FIGURE 18.** Distribution of *T. stigmurus*.



granules, D1 with one posterior spinoid granule (Fig. 17C); V with 5 complete carinae with uniform and sparse granules; intercarinal surface moderately granular. Telson: vesicle with five vestigial carinae of which the ventral is well marked; aculeus long and strongly curved; subaculear tooth strong and spinoid with two small dorsal teeth. Pedipalp: femur with 5 carinae of which Da, Dp, Va and Mp have small and adjacent granules; Ma with bigger granules; patella with 7 carinae of which Ad, Am, Av and Dm present median and adjacent granules; Am with a proximal spinoid granule (Fig. 17B); Pd, Pm and Pv with small and continuous granules; chela with 9 carinae, with small and continuous granules; absence of basal lobe on the movable finger of chela (Fig. 17B); all surfaces moderately to weakly granular. Movable fingers with 17–16 oblique rows of granules. Trichobothriotaxy: ortobothriotaxy A— $\alpha$  (Vachon, 1974 and 1975).

**Variations.** Some specimens of *T. stigmurus* present the lateral longitudinal dark brown stripes, in some cases reaching the III or IV tergite or restricted to a small spots on posterior region of tergites I–VI.

**Distribution.** States of Piauí, Ceará, Rio Grande do Norte, Pernambuco (recently recorded in Fernando Noronha by Freitas & Vasconcelos, 2008), Paraíba (Dias et al, 2006), Alagoas, Sergipe and Bahia, Brazil (Fig. 18).

### *Tityus melici* Lourenço, 2003

*Tityus melici* Lourenço, 2003: 109–115, figs. 1–10, 13, table 1. Holotype ♂ and 7 ♀ and 4 juvenile paratypes from Serra da Jurema region, Bahia, Brazil (MNRJ). Lourenço, 2006: 61.

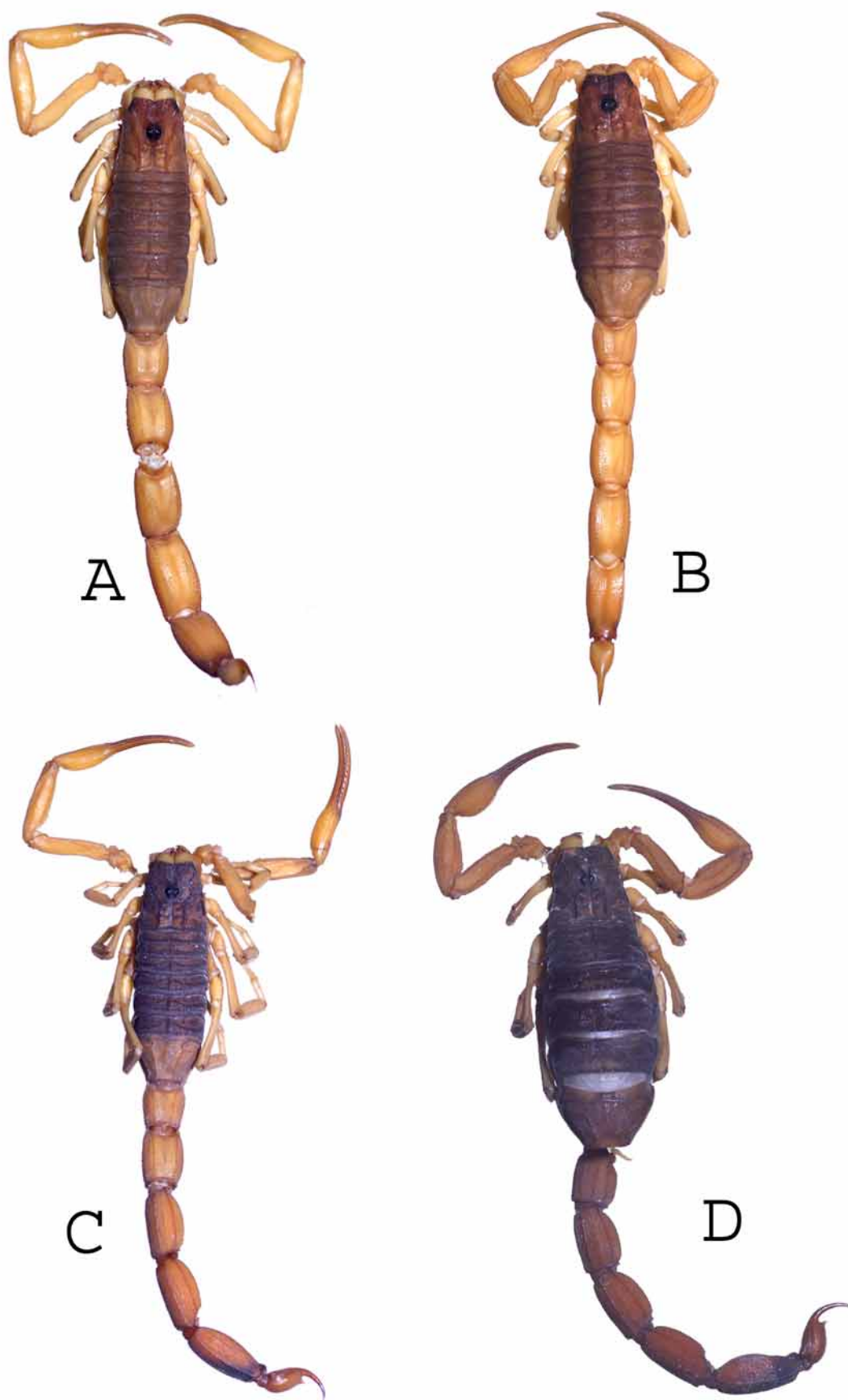
*Tityus serrulatus*: Lourenço & Cloudsley-Thompson, 1999: 154–158, figs. 1–6 (only the males from close to Jequitinhonha river, Irapé, Minas Gerais, Brazil, not examined, should be in FUNED or MNHN, not localized, misidentification).

**Material examined.** Brazil, Minas Gerais: Minas Novas, 613m, 17°15'S 42°36'W, (Usina Hidrelétrica Irapé), III/1989, R. U. Feio leg., 3 ♀ and 8 juveniles, (IBSP 5044); Botumirim, 963m, 16°52'S 43°1'W, (Usina Hidrelétrica Irapé), R. U. Feio leg., 1 ♂, 1 ♀ and 23 juveniles (IBSP 5045).

**Comments.** This species was described from the Southern region of the State of Bahia in the Southern range of the *Caatinga* vegetal formation. *Tityus melici* has almost all the diagnostic characters of the species of the *T. stigmurus* complex except the presence of posterior spinoid granules on the dorsal carinae of metasomal segments II and IV, though without doubt this species is related with this complex. Lourenço & Cloudsley-Thompson (1999) described a sexual population of *T. serrulatus* and pointed out as the main characteristic of the males the absence of modified granules as spines on the posterior region of the dorsal lateral carinae of metasomal segments III and IV, also longer and slender pedipalps (Fig. 20A) and larger pectines. These are the diagnostic characteristics for *T. melici* Lourenço, 2003 (Fig. 19C–D). Other previously unidentified specimens were also located in FUNED (Fig. 19A–B). After examining the material of FUNED, the types of *T. melici* and original description of Lourenço & Cloudsley-Thompson (1999) it was possible to conclude that all the specimens discussed in this paragraph are *T. melici*. This was also corroborated by the rediscovery of the male of *T. serrulatus* by the present authors.

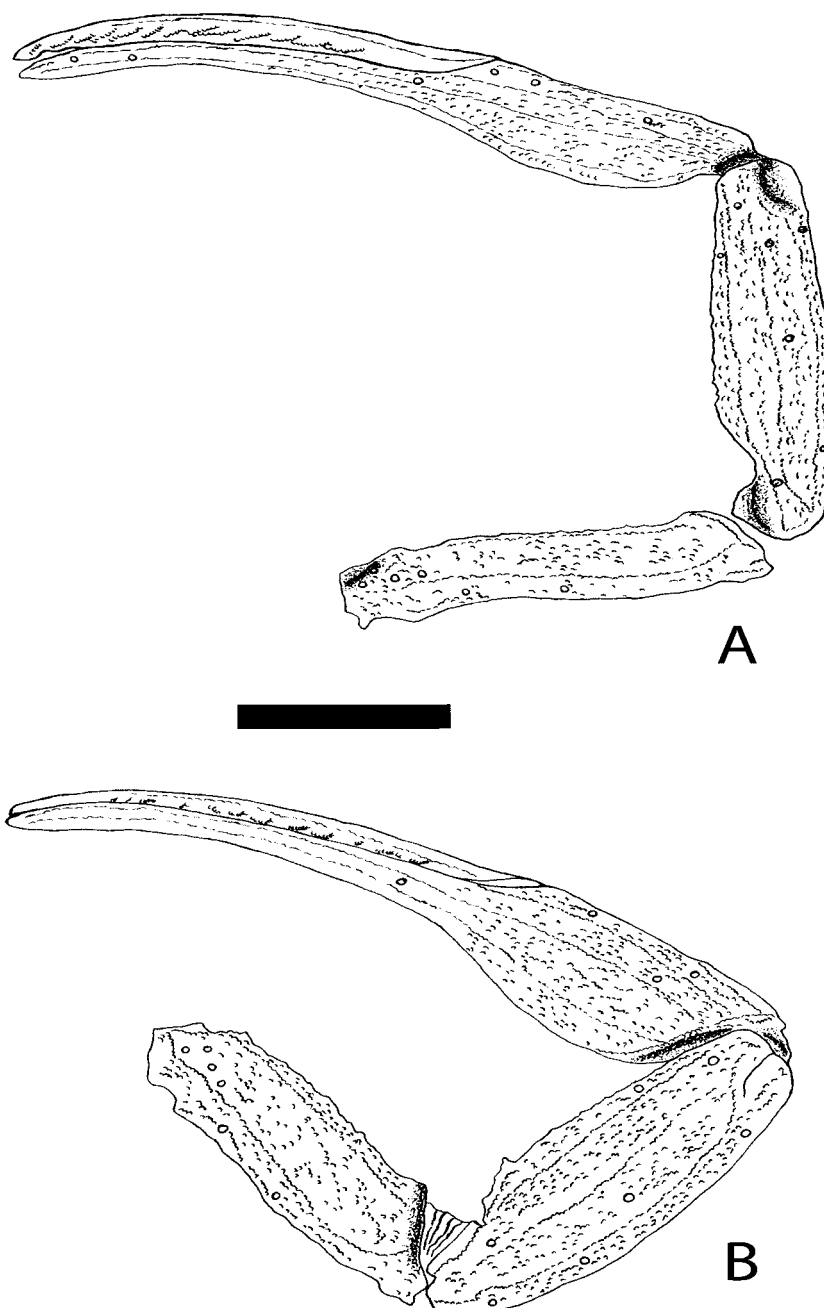
**Diagnosis. Male.** This species differ from the others of the complex by color pattern on tergites and carapace, uniformly brownish without spots, except from *T. kuryi* and *T. serrulatus*. *Tityus melici* can be distinguished from *Tityus kuryi* by absence of blackish spots on palps, legs, lateral faces and Vsm carinae of all metasomal segments (Fig. 19A–D), lack of transversal blackish spots on posterior margin of sternites, the spinoid granules are absent or reduced on the dorsal lateral carinae of metasomal segments III and IV. It also differs from *T. serrulatus* by the lack of posterior spinoid granules on the dorsal carinae of metasomal segments III and IV (if present they are smaller; see variation of *T. melici*), pedipalps (*T. melici*: length femur=9.8; tibia=10.1; chela=16.5; fig. 20A–B) and metasomal segments (*T. melici* width I=4.6; II=4.7; III=5.1; IV=4.8) that are slender and color pattern of the carapace and tergites, which are uniformly brownish





**FIGURE 19.** *T. melici* (♂ and ♀ IBSP 5045; Botumirim, Minas Gerais, Brazil). Male (A) and female (B) in dorsal view; *T. melici* (holotype and paratype). Male (C) and female (D) in dorsal view.





**FIGURE 20.** *T. melici*. (♂ and ♀ IBSP 5045; Botumirim, Minas Gerais, Brazil). Right palp in dorsal view: male (A) and female (B). Scale bars = 5 mm

without spots (Fig. 19A; C), whereas *T. serrulatus* has two pairs of posterior spinoid granules on the dorsal carinae of metasomal segment III and three pairs on metasomal segment IV, pedipalps (*T. serrulatus*: length femur=8.2; tibia=8.3; chela=14.5) and metasomal segments (*T. serrulatus* width I=6.3; II=6.3; III=6.3; IV=6.0; V=5.1) which are stouter and the color pattern of the carapace and tegites, which has dark brown spots (Fig. 11A).

**Female.** See Lourenço (2003).

**Variations.** The specimens of State Minas Gerais have a more yellowish pattern of coloration on the tergites (Fig. 19A–B) when compared with the type specimens described by Lourenço (2003), which are brownish (Fig. 19C–D). Female specimens collected at Minas Novas, State of Minas Gerais presented one/two posterior spinoid granules on metasomal segment III, and two/three on metasomal segment IV. These granules are reduced when compared with other members of the complex.



**TABLE 1 .** Measurements (in mm) of the specimens included in this work.

	<i>T.serrulatus</i> ♂ (IBSP 5046)	<i>T.serrulatus</i> ♀ (IBSP 5046)	<i>T.serrulatus</i> ♂ (MNRJ 7366)	<i>T.serrulatus</i> ♀ (MNRJ 7366)	<i>T.serrulatus</i> ♀ (MNRJ 7366)	<i>T.stigmurus</i> ♂ (IBSP 1481)	<i>T.stigmurus</i> ♀ (IBSP 4602)	<i>T.stigmurus</i> ♀ (IBSP 3987)	<i>T.stigmurus</i> ♂ (IBSP 1330)	<i>T.stigmurus</i> ♀ (IBSP 1449)
<b>Total length</b>	77.0	71.8	73.7	64.5	65.8	60.3	55.6	57.1	63.8	68.1
<b>Carapace</b>										
length	8.1	7.6	8.1	7.2	7.5	6.6	6.3	6.3	6.6	7.1
anterior width	4.5	4.1	4.0	3.6	3.7	3.1	3.1	3.2	3.6	3.7
posterior width	8.5	8.5	7.8	7.6	7.8	7.0	6.8	6.5	7.0	7.3
<b>Metasoma</b>										
<i>segment I</i>										
length	6.1	6.0	6.2	4.7	4.5	5.1	3.7	4.3	6.0	5.6
Width	6.3	4.7	5.8	4.3	4.2	4.8	3.3	3.6	5.0	4.2
<i>segment II</i>										
Length	8.0	6.8	8.1	5.3	5.6	6.0	4.6	5.1	6.6	6.1
width	6.3	4.7	6.0	4.1	4.2	5.0	3.3	3.6	5.0	4.2
<i>segment III</i>										
length	8.7	7.1	8.6	6.0	6.2	6.8	5.2	5.5	7.1	6.5
width	6.3	4.7	6.0	4.1	4.3	5.0	3.3	3.6	4.8	4.1
<i>segment IV</i>										
length	9.8	7.5	9.5	7.0	7.0	7.5	5.8	6.2	7.7	6.8
width	6.0	4.7	5.8	4.1	4.3	4.7	3.5	3.6	4.7	4.3
<i>segment V</i>										
length	9.6	7.8	9.1	7.8	7.7	7.5	6.6	7.1	7.2	7.6
width	5.1	4.5	4.8	3.7	4.0	4.1	3.2	3.5	4.1	4.0
<b>Vesicle</b>										
length	7.0	6.8	7.0	6.7	6.8	6.3	6.2	6.3	6.3	6.3
depth	2.7	2.5	2.6	2.2	2.3	2.2	2.1	2.0	1.6	1.6
<b>Pedipalp</b>										
<i>Femur</i>										
length	8.2	7.0	7.6	6.6	6.6	6.3	5.7	6.2	6.5	7.0
width	2.0	2.1	2.0	2.0	2.0	1.7	1.6	1.7	1.7	2.0
<i>Tibia</i>										
length	8.3	7.3	8.2	7.1	7.3	7.1	6.3	6.6	7.2	7.7
width	2.7	2.8	2.7	2.7	2.7	2.3	2.5	2.5	2.5	2.6

.....to be continued



TABLE 1 (continued)

<i>Chela</i>										
length	14.5	13.1	14.0	12.3	12.6	12.2	11.7	12.0	12.5	13.2
width	2.6	2.7	2.6	2.6	2.6	2.2	2.1	2.2	2.2	2.6
<i>Movable finger</i>										
length	9.6	8.7	9.3	8.2	8.7	7.7	8.0	8.1	8.0	8.7

TABLE 1. (continued)

	<i>T. aba</i> ♂ (IBSP 3394 Holotype)	<i>T. aba</i> ♀ (IBSP 3395 Paratype)	<i>T. martinpaechi</i> ♂ (IBSP 4502)	<i>T. martinpaechi</i> ♀ (IBSP 4502)	<i>T. melici</i> ♂ (IBSP 5045)	<i>T. melici</i> ♀ (IBSP 5044)	<i>T. kuryi</i> ♀ (MZUFBA 1000)	<i>T. kuryi</i> ♀ (MZUFBA 2166)	<i>T. kuryi</i> ♀ (MZUFBA 1602)	<i>T. kuryi</i> ♀ (IBSP 4724)
<b>Total length</b>	76.5	66.1	73.6	64.7	67.5	59.8	67.6	78.1	71.5	55.3
<b>Carapace</b>										
length	6.6	6.6	6.9	6.8	7.6	6.8	8.2	8.3	8.1	6.2
anterior width	4.1	4.4	3.9	4.4	3.4	3.6	4.3	4.6	4.6	3.7
posterior width	8.4	8.0	7.4	7.2	7.5	7.3	9.0	8.8	8.8	6.6
<b>Metasoma</b>										
<i>segment I</i>										
length	6.3	6.2	6.3	4.9	5.1	4.8	5.8	6.0	5.5	4.3
Width	5.8	5.7	5.7	4.0	4.6	4.0	5.0	4.8	5.0	3.7
<i>segment II</i>										
Length	7.7	7.5	7.7	5.4	7.0	5.5	6.8	7.0	7.1	5.5
width	5.8	4.5	5.8	3.9	4.7	4.1	5.0	4.8	5.1	3.7
<i>segment III</i>										
length	8.3	8.0	7.8	5.9	8.6	5.8	7.5	7.6	7.6	5.7
width	5.9	4.6	5.7	3.9	5.1	4.0	5.1	5.0	5.1	3.6
<i>segment IV</i>										
length	9.3	9.7	8.8	7.3	8.5	6.3	8.2	8.1	8.3	6.2
width	5.6	4.5	5.4	3.9	4.8	4.1	5.5	5.0	5.1	3.5
<i>segment V</i>										
length	9.3	10.2	8.6	7.6	9.0	7.6	9.5	9.1	8.8	7.1
width	5.0	4.2	4.6	3.6	4.6	4.0	4.6	4.5	4.1	3.2
<b>Vesicle</b>										
length	3.0	2.6	6.7	6.6	7.1	6.7	6.8	8.3	8.2	4.3

.....to be continued



**TABLE 1** (continued)

depth	2.4	2.3	2.5	2.2	2.5	2.2	2.7	2.7	2.7	2.1
<b>Pedipalp</b>										
<i>Femur</i>										
length	8.3	6.7	7.2	6.2	9.8	6.2	8.2	7.6	7.6	6.0
width	1.7	2.0	1.5	1.9	2.1	1.8	2.2	2.3	2.5	1.7
<i>Tibia</i>										
length	8.7	7.5	7.4	7.2	10.1	6.8	8.2	8.2	8.0	6.5
width	2.5	2.7	2.2	2.5	2.5	2.5	3.2	3.2	3.2	2.5
<i>Chela</i>										
length	14.9	13.3	13.3	12.1	16.5	12.5	14.3	14.6	14.3	11.2
width	2.6	2.7	2.5	2.6	2.3	2.5	3.1	2.6	3.1	2.3
<i>Movable finger</i>										
length	9.8	8.8	8.2	8.3	10.2	8.1	9.7	9.8	9.7	7.1

**Distribution.** Brazil, Bahia (Serra da Jurema region); Minas Gerais (Vale do Jequitinhonha area) (Fig. 10).



**FIGURE 21.** Sites of occurrence of *T. aba*, *T. martinpaechi*, *T. melici* and *T. stigmurus*: Central, Bahia, Brazil (A–C); Estação Ecológica Raso da Catarina, Canudos, Bahia, Brazil (B–D).





**FIGURE 22.** Sites of occurrence of *T. kuryi*: Mucugê, Bahia, Brazil (A), Vale do Capão, Palmeiras, Bahia, Brazil (B); Site of occurrence of *T. serrulatus*: Cerafma, Guanambi, Bahia, Brazil (C–D).

### Species excluded from the *T. stigmurus* complex

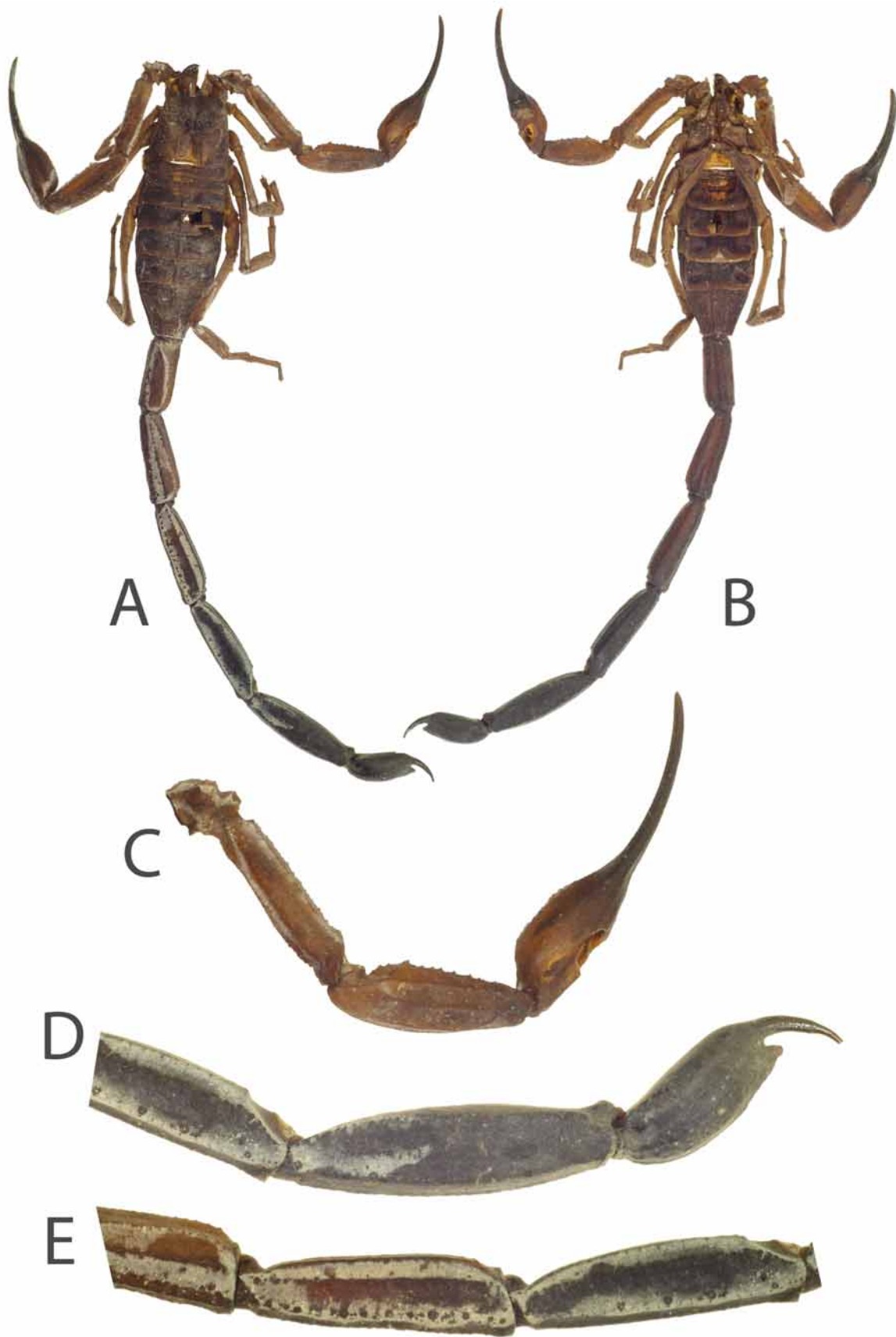
#### *Tityus cylindricus* (Karsch, 1879), species revalidated

*Isometrus cylindricus* Karsch, 1879: 114–115. Holotype ♂ from Bahia, Brazil (ZMB 105, examined).

*Tityus cylindricus*: Kraepelin, 1899; Fet et al, 2000: 262.

**Comments.** According to Fet et al. (2000) “In his original description”, Karsch (1879: 115) indicated that *Isometrus cylindricus* was perhaps the male of *Isometrus stigmurus* Thorell, 1876. Kraepelin, in 1891, listed it as a questionable synonym of *Tityus bahiensis*, but in 1899 reverted to listing it as a questionable synonym of *Tityus stigmurus*” (Fet et al, 2000). The type specimen (Fig. 23A–B) is in poor condition, probably due to the initial preservation in a dry collection. This species is not a synonym of *T. stigmurus* and does not belong to the *T. stigmurus* complex. It has blackish coloration, absence of posterior spinoid granules on the dorsal carinae of metasomal segments II–IV (Fig. 23D–E), metasomal segments and telson very slender and rhomboid shape of subaculear granule (Fig. 23D–E), whereas in species of the *T. stigmurus* complex the metasomal segments are stouter and the subaculear granule is spiniform. The type locality is uncertain, it is stated as “Bahia” in Brazil, without concise location data. *T. cylindricus* it is associated with the subgenus *Atreus* (Loureço, 2006), by having blackish coloration, metasomal segments and telson very slender (Fig. 23D–E) and rhomboid shape of subaculear granule. More details will be given in a future work which will encompass the species of the subgenus *Atreus*.





**FIGURE 23.** *T. cylindricus*. (Holotype ♂ ZMB 105; Bahia, Brazil). Dorsal (A) and ventral (B) view; Right palp in dorsal view (C); Metasomal segments and telson in lateral view (D–E).



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