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A NEW SPECIES OF *TITYUS* FROM PANAMA AND COSTA RICA PREVIOUSLY IDENTIFIED AS *TITYUS PACHYURUS* POCOCK, 1897 (SCORPIONES: BUTHIDAE)

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Abstract: The Central American population of scorpions previously misidentified as *Tityus pachyurus* Pocock, 1897 is described as a new species, which is endemic to most parts of Panama and Limon Province in Costa Rica. As recorded by several authors, those two species are responsible for most of the serious cases of scorpion stinging in Colombia and Panama.
Key words: Scorpiones, Buthidae, *Tityus forcipula* complex, Panama, Costa Rica, Colombia.

Una especie nueva de *Tityus* de Panamá y Costa Rica previamente identificada como *Tityus pachyurus* Pocock, 1897 (Scorpiones: Buthidae)
Resumen: La población de escorpiones centroamericanos que había sido mal identificada como *Tityus pachyurus* Pocock, 1897 se describe como una especie nueva, endémica de gran parte de Panamá y la provincia de Limón, Costa Rica. Ahora, *T. pachyurus* queda limitada a la región centro-oriental andina de Colombia. Como ha sido reportado por diversos autores, estas dos especies son responsables de la mayor parte de los casos graves por picaduras de escorpión en Colombia y Panamá.
Palabras clave: Scorpiones, Buthidae, complejo *Tityus forcipula*, Panamá, Costa Rica, Colombia.

Taxonomy / Taxonomía: *Tityus* (*Atreus*) *jaimei* **sp.n.**

Introduction

The genus *Tityus* C. L. Koch, 1836 comprises more than 220 species of Neotropical scorpions (Rein, 2017), some of which produce stings that can cause the death of people (Ward *et al*., 2018). Of these species, *Tityus pachyurus* Pocock, 1897 was described from one male (holotype) and one female collected in Colombia, without a precise locality (Pocock, 1897). Later, it was recorded from Panama (Lourenço & Méndez, 1984), Costa Rica (Francke & Stockwell, 1987; Víquez, 1999), the Colombian department of Chocó (Lourenço, 1997), but also from some Andean departments of this country, as Antioquia, Boyacá, Caldas, Huila, and Tolima (Flórez, 2001). In Panama, this species has been reported from the eastern Caribbean islands (Montoya & Armas, 2002) and the central provinces (Miranda, 2011), where it is considered the most important scorpion, due its implication in human deaths (Miranda, 2011; Borges *et al*., 2012; Borges, 2015; Salazar *et al*., 2018).

The correct identification of species that induce fatal accidents is a high priority to establishing prevention measures and the epidemiology of stings according to different geographic areas (Quintero & Miranda, 2007; Lourenço, 2016). The aim of this work is to describe as a new species the populations from Panama and Costa Rica previously misidentified as the Colombian taxon. The type-specimen of *T. pachyurus* is lost (Lourenco, 1997; Fet & Lowe, 2000), and its taxonomic identity remains confuse, but at this moment the designation of a neotype seems to be a not prudent procedure because a most exhaustive searching in the British Museum collections is needed for a veritable confirmation.

Material and Methods

Examined specimens are deposited in the following institutions: ICGES: Instituto Conmemorativo Gorgas de Estudios de Salud, City of Panama, Panama Province, Panama, Colección Zoológica "Dr. Eustorgio Méndez" (CoZEM-ICGES). ICN: Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá.

Specimens were examined and measured with a Leica MZ 12.5 stereomicroscope fitted with an ocular micrometer. Photos were obtained with a Canon Powershot SX 60 HS camera; stacked images were taken with Leica MC 170 HD fitted to a Leica M 205 A stereomicroscope and processed with Leica application suite, version 4.12.0. Others digital images obtained were slightly processed with Adobe Photoshop CS8, only for optimizing brightness and contrast for print. The distribution map was elaborated using the cartographic base of the Instituto de Estadísticas y Censos de la Contraloría General de la Nación (INEC) using ArcGIS 10.6.

Measurements and terminology follow Stahnke (1970), except for hand carinae (Acosta *et al*., 2008), metasomal segment carinae (Prendini, 2004), sternum terminology (Soleglad & Fet, 2003), and trichobothrial terminology (Vachon, 1974, 1975).

The following material were examined for comparative purposes:

Tityus pachyurus (figs. 1-4, 16, 18, 20, 22, 24, 26): COLOMBIA, Cundinamarca Departamento: 1 male, Villeta, Finca La Veguita, 9-June-2002, 800 m, coll. O. Castañeda (ICN-AS-492); 1 female, La Mesa vía a Vda. El Palmar, 30-IV-2011, 1200 m, coll. Y. Cifuentes (ICN-AS-865).

Tityus forcipula: COLOMBIA, Quindío Departamento: 4 females, 2 males, 1 juvenile, Armenia, 17-June-2001, coll. H. Suárez (ICN-AS-879).

Taxonomy

Family **BUTHIDAE** C.L Koch, 1837

Genus ***Tityus*** C. L. Koch, 1836

Subgenus ***Atreus*** Gervais, 1843

***Tityus* (*Atreus*) *jaimei* sp. n.**

Figs. 5–15, 17, 19, 21, 23, 25 ; Tables I–III.

Tityus pachyurus: Lourenço & Méndez, 1984: 87-92, fig. 4-13, Tables 1-2. Víquez, 1999: 58-59 (photograph and map, both without numeration). Armas & Maes, 2000: 28 (in part: Panama and Costa Rica records). Fet & Lowe, 2000: 253 (in part: Panama and Costa Rica records). Montoya & Armas, 2002: 158-159. Quintero & Miranda, 2007: 130. Teruel & Cozijn, 2011: 3 (in part: Panama and Costa Rica records). Miranda, 2011: 16, fig. 5. Borges *et al*., 2012: 132, 133, 135, 137, 138, fig. 1, 2 C, table 2 (in part: Panama and Costa Rica records). Lourenço, 2012: 2, 6, 7, table 1 (in part: record from Panama). Borges, 2015: 234, 237, 238, fig. 4 C, table 4. Miranda *et al*., 2015: 116, 117, table I. Miranda *et al*., 2018: 85.

Tityus (Atreus) pachyurus: Salazar *et al*., 2018: 80, 84-86, figs. 1, 4, tables 3, 4.

Type locality and type depository. Panama, Panama Oeste Province, Capira District, Trinidad de las Minas, 8° 46' 57" N 80° 00' 18" W, 200 m a.s.l.; CoZEM-ICGES.

Type material. Holotype: PANAMA: Panamá Oeste Province: Capira, Trinidad de las Minas, 1♂, 3 April 2019, R. Miranda, J. J. Lezcano (CoZEM-ICGES). **Paratypes**: Panamá Oeste Province, Capira: Aguacate, 1♀, 24 August 2018, R. Miranda, J. J. Lezcano, L. Domínguez (CoZEM-ICGES); Trinidad de las Minas, 1♀, 4 April 2019, R. Miranda, J. J. Lezcano; 1♀, 21 March 2018, R. Miranda, I. Murgas, G. García, J. J. Lezcano (ICN-AS-1400). Chame: Altos del María, 1 ♂, 3 May 2017, S. Bermúdez (ICN-AS-1401). Coclé Province: El Valle de Antón: Cerro Sombrero, 1♀, 29 October 2014, R. Miranda, S. Bermúdez; Monumento Natural Cerro Gaital, 1 ♂, 17 December 2009, R. Miranda. La Pintada, 1 ♂, 4 November 2017, dentro de rancho, E. Oliveros.

Additional material revised in CoZEM-ICGES (not paratypes). BOCAS DEL TORO Province: 1♂, 1♀ 8 July 2011, R. Miranda, J. Cleghorn. Almirante a 2 Millas, 1♂, 8 April 1962, G. Barrat Jr. Río Changuinola, 1♂, 2007, Dr. M. Paz Atencio. COCLÉ Province: El Valle de Antón, 1♂, 12 June 1986, G. De La Guardia. El Valle de Antón, Monumento Natural Cerro Gaital, 1♀, 10 May 2009, R. Fuentes. Olá, El Copé, 1♀, 18 October 2010, R. Miranda. COLÓN Province: Buena Vista, 1♀, 24 June 2012, Adriel. Nueva Providencia, Río Rita, 1♀, 2 July 2015, V. Herrera; 1♂, 6 October 2015, V. Herrera. Achiote, Sendero Café, 1♀, 23 May 2017, R. Miranda, I. Murgas, J. J. Lezcano; Sendero Higuerón, 1♂, 22 October 2019, I. Murgas, J. J. Lezcano, L.Y. Castillo; Sendero Trogón, 1♂, 22 May 2017, R. Miranda, I. Murgas, J. J. Lezcano. El Plátano, 1♀, 23 October 2019, I. Murgas, J. J. Lezcano, L.Y. Castillo. Coclé del Norte, Costa Abajo, 1♂, October 2012, L. Castillo. Punta Galeta, 1♂, 24 November 2011, M. Berenna. HERRERA Province: Reserva Forestal El Montuoso, 1♀, 1 September 2017, R. Miranda, S. Bermúdez, G. García, J. J. Lezcano; 1♂, same collecting data. 1♂, 30 August 2017, R. Miranda, S. Bermúdez, G. García, J. J. Lezcano. PANAMÁ Province: Chilibre, 1♀, 14 May 1965, R. Rojas. Altos de Cerro Azul, 1♂, 13 June 2014, R. Miranda, I. Murgas, S. Arizala. Parque Nacional Soberanía, Camino Plantación, 1♂, 11 February 2011, R. Miranda, S. Bermúdez. PANAMÁ OESTE Province: Capira: Aguacate, 2♀, 24 August 2018, R. Miranda, J. J. Lezcano, L. Domínguez. Trinidad de las Minas, 1♀, 16 March 2018, R. Miranda, I. Murgas, G. García, J. J. Lezcano. VERAGUAS Province: Parque Nacional Cerro Hoya, 1♂, 12 November 2009, R. Miranda; 1♂, 13 May 2009, R. Miranda, R. Fuentes. Santa Fe, cerca del Mirador, 1♂, 22 June 2017, R. Miranda, S. Bermúdez; Estación de Mi Ambiente, 1♀, 21 June 2017, R. Miranda, S. Bermúdez, J. J. Lezcano. Las Filipinas, 1♀, 23 June 2017, R. Miranda, S. Bermúdez, J. J. Lezcano. Las Filipinas, sendero hacia el río, 1♂, 23 June 2017, R. Miranda, S. Bermúdez, J. J. Lezcano.

Etimology. Patronymic in memory of Jaime González Medina (1966-2020) for his support to the studies of the scorpions and scorpionism in Panama.

Distribution. Panama (provinces of Bocas del Toro, Coclé, Colón, Herrera, Veraguas, Panamá, Panamá Oeste) and Costa Rica (Limón Province).

Diagnosis. Medium size scorpions: 65.37-85.78 mm in males and 58.22-69.36 mm in females. Coloration reddish-brown to dark brown, black in metasomal segments IV, V and telson. Pectines with the basal middle lamella rounded and dilated in females, sub-oval and not dilated in males. Pectinal tooth count 18-21 in males (mode, 20) and 16-22 in females (mode, 20), lower than in *T. pachyurus* that has 20-25 in males and 20-24 in females (mode, 22 in both sexes) (table III). Male chela with hand thickened; movable finger with basal lobe strongly developed; fixed finger slightly curved in external view (sinuous in *T. pachyurus*). Dentate margin of fixed and movable fingers of the pedipalps with 15-15 oblique rows of denticles in both sexes. Metasomal carinae formula 10-10-8-8-5, segment II with median lateral carina visible only in the distal third. Metasomal segment V of male, 1.8 times longer than wide, while in *T. pachyurus* is 1.4 times. Trichobothriotaxy A-α orthobothritaxic.

Description male holotype (measurements in Table I). General colors: dark brown.

Coloration reddish-brown to dark brown, black in metasomal segments IV, V and telson. Prosoma, carapace dark brown. Mesosomal tergites dark brown with median carina slightly darker. Metasoma: segments I to III reddish brown, with black carinae; segments IV-V and vesicle black, aculeus reddish becoming darker towards tip. Coxae dark brown variegates, pectines whitish; sternites III-VII dark brown; antero-medial sternites III-VI with a horseshoe shaped mark (Fig. 14); sternite V with triangular whitish area (Fig. 14). Pedipalp reddish with fingers yellows becoming lighter in the tips. Chelicera ochre with dark reticulations; fingers dark brown. Legs dark brown, tarsi yellow.

Morphology: Carapace moderately granular; anterior margin moderately emarginate. Anterior media, superciliar and posterior media carinae well defined, with granules moderate to strong; all furrows defined (Fig. 9). Median ocular tubercle elevated, located in the anterior half of the carapace; distance between eyes slightly larger than the diameter of one eye. Three pairs of lateral eyes. Sternum subtriangular. Mesosoma, median carina defined in all tergites. Tergite VII pentacarinate. Venter, genital operculum longitudinally divided (Fig. 11). Pectines with tooth count 20-20 and basal middle lamella oval, not dilated. Sternites with faint and disperse granules; V with a lustrous triangular whitish area in the posterior margin

Table I. Measurements (mm) of the male holotype and female paratype (from Aguacate) of *Tityus jaimei* **sp. n.**, compared with those of *T. pachyurus* from Cundinamarca Department, Colombia: ♂ neotype (ICN-AS-492); ♀ (ICN-AS-865) .

Characters	*Tityus jamei* sp. n.		*Tityus pachyurus*	
	male	female	male	female
Total length	74.95	69.36	66.58	67.45
Carapace length	8.16	7.89	7.14	7.28
Carapace anterior width	4.65	4.7	4.48	4.2
carapace posterior width	8.4	7.49	7.56	8.26
Pectines	20-20	20-20	23-24	22-21
Mesosoma length	18.07	22.27	17.3	19.29
Metasoma				
segment I length/width	6.02/4.9	4.9/4.48	5.32/4.34	5.18/4.34
segment II length/ width	7.42/5.18	5.74/4.34	6.58/4.48	6.16/4.48
segment III length/width	8.2/5.32	6.44/4.34	7.14/4.9	6.58/4.62
segment IV length/width	9.38/5.6	7.28/4.34	8.12/5.6	7.7/4.62
segment V length/width/ depth	9.8/5.74/4.62	7.7/4.06/3.78	7.98/5.88/4.2	7.98/4.48/3.92
Telson length	7.9	7.14	7	7.28
Vesicle width/depth	3.5/3.5	3.08/2.94	2.94/2.94	2.8/2.8
Pedipalp				
Femur length/width	8.54/2.52	7.7/2.24	7.7/2.1	7/2.1
Patella length/width	8.82/3.64	7.84/3.36	7.98/2.94	7.7/3.08
Hand length/width/depth	7.8/4.9/4.5	4.88/3.5/2.8	6.3/4.06/3.92	5.18/3.22/2.8
fixed finger length	9.2	8.3	8.54	8.41
movable finger length	10.8	9.84	9.88	9.19

Table II. Variation of measurements (mm) in *Tityus jaimei* **sp. n.** and *Tityus pachyurus*. Symbols: * Data from Bohórquez-Gómez (2016); ** error (p. 34).

Characters	*Tityus jaimei* sp. n.		*Tityus pachyurus**	
	Males (n=18)	Females (n=21)	Males (n=26)	Females (n=33)
Total length	75.11 (65.37- 85.78)	64.6 (58.22-69.36)	61.40 (49.05-86.97)	70.05 (56.66-82.15)
Carapace length	8.1 (7.24-9.46)	7.5 (6.12-8.3)	6.57 (5.35-9.29)	7.68 (6.36-9.4)
Carapace anterior width	4.65 (4.11-5.75)	4.42 (3.55-4.98)	4.75 (4.04-6.57)	5.46 (4.65-6.67)
carapace posterior width	7.59 (5.75-8.72)	7.23 (5.72-8.32)	6.77 (5.25-9.5)	8.49 (7.17-10)
Mesosoma length	19.68 (15.24-25.03)	19.16 (14.88-22.76)	15.43 (12.88-26.24)	19.34 (14.73-23.45)
Metasoma				
Segment I length	5.75 (4.76-7.28)	4.67 (3.50-5.46)	5.05 (3.84-7.07)	5.25 (4.14-6.26)
Segment I width	4.67 (4.20-5.88)	4.22 (3.36-5.18)	3.84 (3.03-5.86)	4.55 (3.74-5.35)
segment II length	7.15 (6.30-9.10)	5.63 (4.20-6.72)	6.06/ (4.65-8.59/)	6.06 (4.65-8.59)
segment II width	4.83 (4.20-6.16)	4.18 (3.22-5.04)	4.04 (3.13-6.16)	4.04 (3.13-6.16)
segment III length	7.89 (6.86-10)	6.36 (4.9-7.70)	6.67 (5.25-9.40)	7.17 (6.06-8.28)
segment III width	5.01 (4.34-6.44)	4.18 (3.22-5.18)	4.34 (3.13-6.67)	4.65 (3.84-5.86)
segment IV length	8.66 (7.56-11.2)	7.04 (5.60-8.12)	7.58 (5.86-10.69)	8.18/ (6.67-9.09)
segment IV width	5.23 (4.34-7.14)	4.22 (3.20-5.10)	4.85 (3.03-5.46)	4.85 (4.04-5.96)
segment V length	9.46 (8.12-11.3)	7.96 (6.3-9.52)	7.38 (6.06-10.44)	8.59 (7.17-9.60)
segment V width	5.27 (4.34-7.00)	4.13 (3.08-5.18)	5.05 (3.33-7.78)	4.75 (3.94-5.96)
segment V depth	4.35 (3.64-5.32)	3.76 (3.08-4.76)	3.64 (2.83-4.85)	3.84 (3.03-4.65)
Telson length	8.15 (7-9.24)	7.24 (7.00-7.56)	6.67 (5.15-8.39)	7.38 (5.66-8.69)
Vesicle width	3.32 (2.8-4.2)	2.92/ (2.38-3.64)	2.83 (2.12-4.04)	3.03 (2.63-3.54)
Vesicle depth	3.3 (2.66-4.06)	2.92 (2.24-3.64)	2.63 (2.02-3.64)	2.42** (2.42-3.33)
Pedipalp				
Femur length	8.74 (7.42-10.78)	7.27 (6.30-8.68)	7.17 (5.76-9.70)	7.58 (6.47-8.79)
Femur width	2.25 (1.96-2.66)	2.12 (1.68-2.52)	1.92 (1.62-2.73)	2.32 (1.92-2.83)
Patella length	8.99 (7.84-10.5)	7.72/ (6.72-8.96)	7.58/ (5.96-9.80)	8.08/ (6.77-9.60)
Patella width	3.29 (2.94-3.78)	3.03 (2.24-3.78)	2.73 (2.12-3.74)	3.03 (2.53-3.33)
Hand length	7.07 (5.76-8.97)	5.07 (3.93-6.35)	6.87 (4.74-9.16)	6.47 (5.36-7.22)
Hand width	4.48 (3.64-5.74)	3.25 (2.24-3.78)	3.33 (2.22-4.75)	3.03 (2.53-3.54)
Hand depth	4.09 (3.36-5.18)	2.91 (1.96-3.36)	3.44 (2.22-5.25)	3.33 (2.32-3.54)
fixed finger length	8.98 (7.89-10.52)	8.06 (7.23-9.02)	7.38 (6.47-9.93)	8.08 (7.17-9.55)
movable finger length	10.27 (9.17-12.18)	9.3 (8.08-10.19)	9.19 (7.58-12.22)	9.70 (8.28-11.46)

Table III. Variation in the pectineal tooth count in *Tityus pachyurus* and *T. jaimei* **sp. n.** *Abreviations*: n, sample; S. D., standard deviation; *, data modified from Bohórquez-Gómez (2016: table 5).

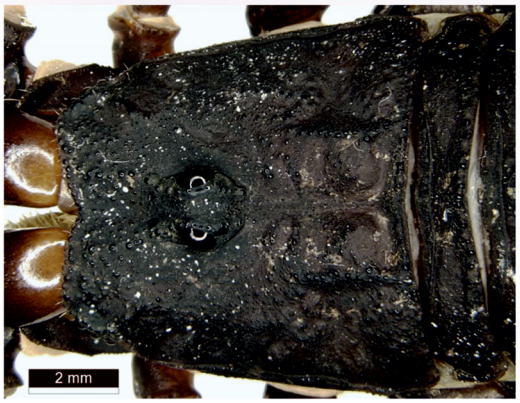
Sex (n)	16	17	18	19	20	21	22	23	24	25	Mode	Range (Mean ± S.D.)
Tityus pachyurus*												
Males (26)	-	-	-	-	4	18	36	6	2	2	22	20-25 (21.8 ± 1.0)
Females (34)	-	-	-	-	2	12	20	12	4		22	20-24 (22.1 ± 1.0)
***Tityus jaimei* sp. n.**												
Males (17)	-	-	3	9	19	3	-	-	-	-	20	18-21 (19.6 ± 0.8)
Females (21)	1	2	3	9	18	8	1	-	-	-	20	16-22 (19.6 ± 1.2)



Figs. 1-2. *Tityus pachyurus*, male from Cundinamarca Department, Colombia (ICN-AS-492). Habitus, dorsal (**1**) and ventral (**2**) aspects..
Figs. 3-4. *Tityus pachyurus* female from Cundinamarca Department, Colombia (ICN-AS-865). Habitus, dorsal (**3**) and ventral (**4**) aspects.
Figs. 5-6. *Tityus jaimei* **sp.n.**, male holotype from Panama Oeste, Panama. Habitus, dorsal (**5**) and ventral (**6**) aspects. Scale= 1 cm.

















Figs. 7-8. *Tityus jaimei* **sp.n.**, female paratype from Aguacate, Panama Oeste, Panama. Habitus, dorsal (**7**) and ventral (**8**) aspects. Scale= 1 cm. **Figs. 9-14.** *Tityus jaimei* **sp.n.**, male holotype (**9-11**, **13-14**) and female paratype (**12**). **9**, carapace; **10**, chelicerae, dorsal aspect; **11-12**, pectines; **13-14**, mesosomal segments V-VII in dorsal (**13**) and ventral aspect (**14**).



Figs. 15-20. Male pedipalp of *Tityus jaimei* **sp.n.** holotype (**15**, **17**, **19**) and *Tityus pachyurus* (**16**, **18**, **20**) from Cundinamarca Department, Colombia (ICN-AS-492). **15-16**. Femur. **17-18**. Patella. **19-20**. Chela, external view, detail of fingers. **Figs. 21-26.** Males. *Tityus jaimei* **sp.n.**, holotype (**21**, **23**, **25**) and *Tityus pachyurus* (**22**, **24**, **26**) from Cundinamarca Department, Colombia (ICN-AS-492). **21-22**, pedipalp hand, dorsal aspect. **23-24**, metasomal segment V, dorsal aspect. **25-26**, metasomal segment V and telson, lateral aspect.

(Fig. 14); VII tetracarinate; spiracles elongate (Fig.11). Metasomal carinae formula 10-10-8-8-5; dorsosubmedian carinae composed by weakly developed rounded granules in segments I-IV; segment II with median lateral carina visible only in the distal third; IV-V segments with lateral intercarinal space strongly granulose. Telson, vesicle granulose; aculeus long and strongly curved, with the subaculear tubercle spinoid. Chelicerae dentition similar to other Buthidae; basis of hand with yellow hairs. Pedipalp femur pentacarinate; patella with seven carinae, dorso-interior carina composed by

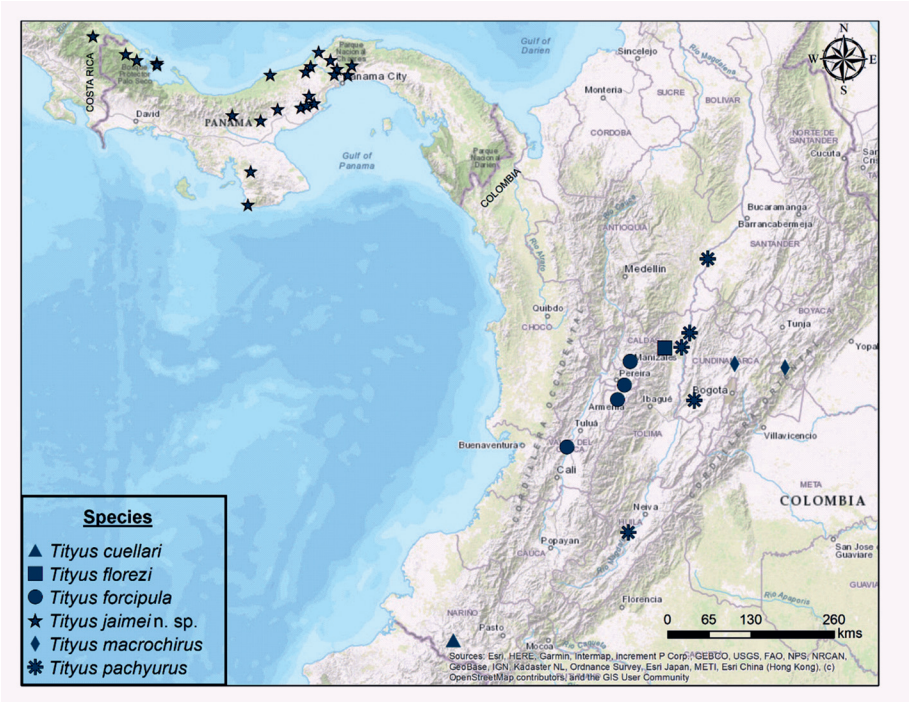


Fig. 27. Distribution of the species belonging to the *Tityus forcipula* group from Colombia, Panama and Costa Rica.

several coarse granules (Fig. 17). Chela with nine carinae, weakly defined, subgranulate, being the dorsal secondary carina the strongest (Fig. 21), intercarinal spaces finely granulate. All carinae of pedipalps with scattered setae associated to granules. Hand thickened (Figs. 19, 21), clearly wider than depth; fixed finger slightly curved in external view (Fig. 19); movable finger with proximal lobe strongly developed. Dentate margin of the fixed and movable fingers with 15 oblique rows of denticles, in addition to apical row with three granules in movable finger. Trichobothriotaxy: orthobothritaxy A-α. Legs with short setae in all segments, tarsi with dense group of ventral hairs in tarsomere II and in apical part of the tarsomere I.

Female paratype (from Capira: Aguacate, 1♀, 24 August 2018, R. Miranda, J. J. Lezcano, L. Domínguez (CoZEM-ICGES), measurements in Table I). Similar to the male, with exception of a reddish-brown color in the metasomal segments IV, V and telson; sternite V with triangular whitish area less conspicuous than the male; basal middle lamella rounded and dilated (Fig. 12); metasomal and pedipalps carinae with granules more developed than the male; IV-V segments with lateral intercarinal spaces less granulose than the male. Chela hand less robust than in the male and movable finger without proximal lobe in dentate margin.

Variation. Total length 75.11 ± 5.74 in males, and 64.6 ± 2.89 in females; for other morphometric characters, see Table II. Coloration reddish-brown to dark brown. Fixed finger oblique rows of denticles vary 14-16 in males, with 16 in larger specimens. Pectinal tooth count: 16 to 22 in females (mode 20) and 18 to 21 in males (mode 20) (Table III). No variation of taxonomic value was observed among the different classes of males respect the form of the pedipalp fixed finger (slightly curved in external aspect).

Montoya & Armas (2002) report a male from Isla Popa, Bocas del Toro, of 54 mm of length, and a pectinal tooth count variation of 18 to 21 in females and 18 to 20 in males, with mode of 19 teeth for both sexes.

Relationships. *Tityus jaimei* **sp. n.** belongs to the subgenus *Atreus* and is closely related to species of the *T. forcipula* complex as defined by Lourenço (1988) based on dark brown color and thick metasomal segments. It included *T. forcipula, T. festae, T. fuhrmanni, T. macrochirus, T. metuendus*, *T. pachyurus*, and *T. pugilator*. Recently other species, as *Tityus cuellari*, and *T. timendus*, have been related to *T. pachyurus* (Lourenço, 2012).

According to Lourenço & Ythier (2013), *T. forcipula* complex radiated in the Andean mountains from Colombia and Ecuador in range of altitudes varying from 100 to 2200 m a.s.l. (Fig. 27). This is incongruent with reports of *T. pachyurus* in Choco department, Panama and Costa Rica, because these localities do not correspond to Andean environment or similar. Unfortunately, the specimens of *T. pachyurus* reported by Lourenço (1997: figs. 32-33) for Chocó were not revised, but they seem to be other species.

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