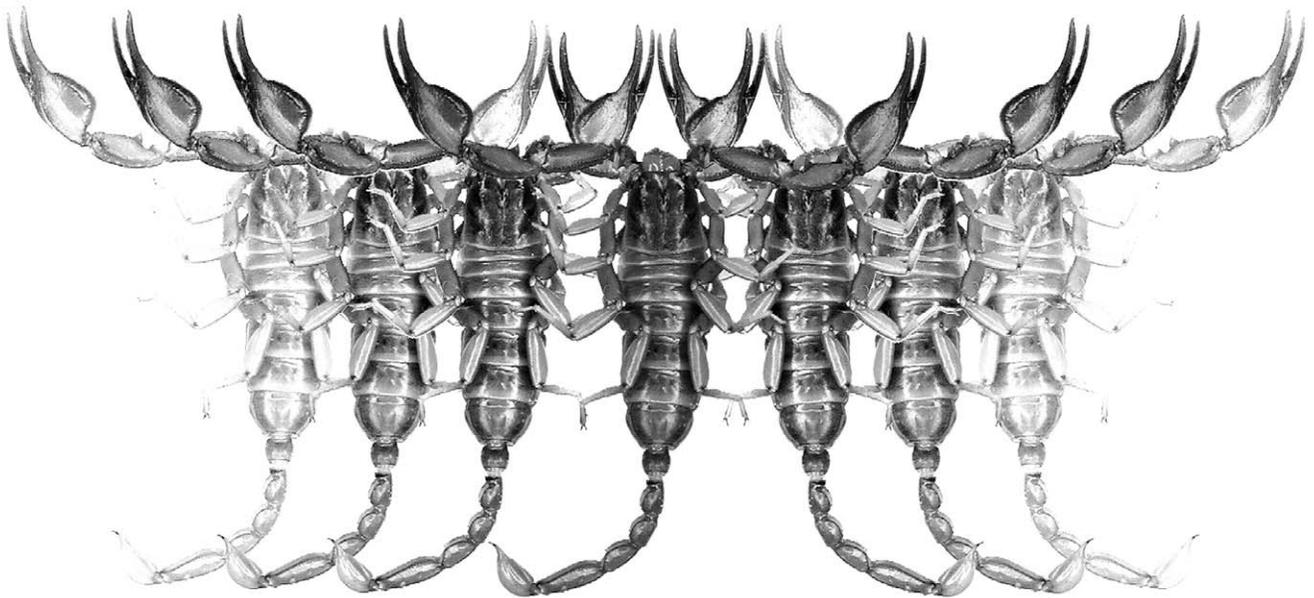


# *Euscorpius*

Occasional Publications in Scorpiology



**Two New *Tityus* C. L. Koch, 1836 (Scorpiones: Buthidae)  
From Hispaniola, Greater Antilles**

**Rolando Teruel & Gabriel de los Santos**

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# *Euscorpius*

## Occasional Publications in Scorpiology

EDITOR: Victor Fet, Marshall University, 'fet@marshall.edu'  
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## Two new *Tityus* C. L. Koch, 1836 (Scorpiones: Buthidae) from Hispaniola, Greater Antilles

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### Summary

Two new species of Buthidae scorpions of the genus *Tityus* C. L. Koch, 1836 are herein described from the Greater Antillean island of Hispaniola. One of them belongs to the "crassimanus" species-group and is known from an adult pair collected at Massif de la Hotte, in southwestern Haiti. The other belongs to the "quisqueyanus" species-group and is known from a single adult female from a high peak in the Central Range (= Cordillera Central), in northwestern Dominican Republic. Moreover, two fossil taxa from this island are retained as junior synonyms of *Tityus geratus* Santiago-Blay, 1988†.

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### Introduction

One of the most diverse scorpion genera in the Greater Antillean island of Hispaniola is *Tityus* C. L. Koch, 1836. Currently it is represented there by 11 Recent and one amber-fossil species, accommodated into two distinct lineages: the "crassimanus" species-group (four species including the fossil) and the "quisqueyanus" species-group (eight species). The most updated catalogues were contributed by Santos et al. (2016) and Teruel (2017b).

In the most recent paper on the Hispaniolan members of this genus, Teruel (2017a) announced the forthcoming description of at least one more species from Haiti. Hence, the aim of the present paper is to describe it, together with an additional one from the Dominican side of the Central Range (= Cordillera Central).

### Methods & Material

Specimens were studied under a Zeiss Stemi 2000-C stereomicroscope, equipped with a line scale and a Canon PowerShot A620 digital camera. A variable series of consecutive-plane shots was taken depending on the field depth (i.e., the bulkiest the structure, the largest number of photographs needed) and afterwards, all images of the same structure were assembled into a single fully-focused image using the free software CombineZP. Habitus photographs were taken with a Nikon

Coolpix S8100 digital camera. All images were processed with Adobe Photoshop CS5 only slightly, i.e., bright/contrast optimization, removal of artifacts and unnecessary details from background and assemblage of plates.

Nomenclature and measurements follow Stahnke (1971), except for trichobothriotaxy (Vachon, 1974), metasomal carinae (Francke, 1977), pedipalp chela carinae (Acosta et al., 2008, as interpreted by Armas et al., 2011), and sternum (Soleglad & Fet, 2003). Unless otherwise noted, all morphologically diagnostic characters mentioned in the diagnoses and comparisons refer to adults of both sexes.

Specimens studied herein are preserved in 80% ethanol and deposited in the following collections: Museo Nacional de Historia Natural "Eugenio de Jesús Marcano", Santo Domingo, Dominican Republic (MNHNSD), first author's personal collection (RTO), and František Kovařík's personal collection (FKCP).

### Systematics

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

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

*Tityus haetianus* Teruel et Santos, **sp. n.**

(Figures 1–6, 10; Table I)

<http://zoobank.org/urn:lsid:zoobank.org:act:2143C001-7308-435A-805B-7824785D14D7>

TYPE DATA. HAITI, Département du Sud, Tiburon Peninsula, Massif de la Hotte, Pic Macaya National Park, Formond, 18°21'00"N - 74°01'00"W, 2,300 m a.s.l., 04–06 February 2006, coll. R. H. Bastardo, 1♀ holotype (MNHNSD 08.436). Same data except 08 February 2006, 1♂ paratype (RTO, *ex* MNHNSD 08.437).

ETYMOLOGY. The selected epithet is the Latinized noun that names the Haitian natives. It alludes the country where this species is known and suspected to be endemic from.

DIAGNOSIS. A member of the "crassimanus" species-group. Adult size moderately large (male 69 mm, female 67 mm) for the group. Coloration basically yellowish brown, densely spotted with medium to dark brown on carapace, legs and metasoma; tergites with three longitudinal dark stripes; pedipalp fingers, metasomal segments IV–V and telson reddish-black. Pedipalp chelae with manus large, oval, much wider than patella (ratio 1.27 in male, 1.18 in female), conspicuously more elongate in male, but more strongly granulose and carinate in female; fixed/movable fingers with 12/13 principal rows of denticles, respectively, basal lobe/notch combination strong. Pectines with 14/14 teeth; basal middle lamella moderately enlarged, angulose-oval (male) to round (female). Sternite V with the smooth patch large, triangular, and wider than long, bulky and translucent; spiracles long, slit-like. Metasoma long, slender and posteriorly wider (much more elongate in male), with 10/8/8/8/5 complete to essentially complete, serrate to crenulate carinae; dorsal lateral carinae on segments II–III with terminal denticle moderately enlarged; intercarinal spaces of segments IV–V densely and coarsely granulose. Telson vesicle oval, densely and coarsely granulose, with subaculear tubercle small, spiniform and with two dorsal granules.

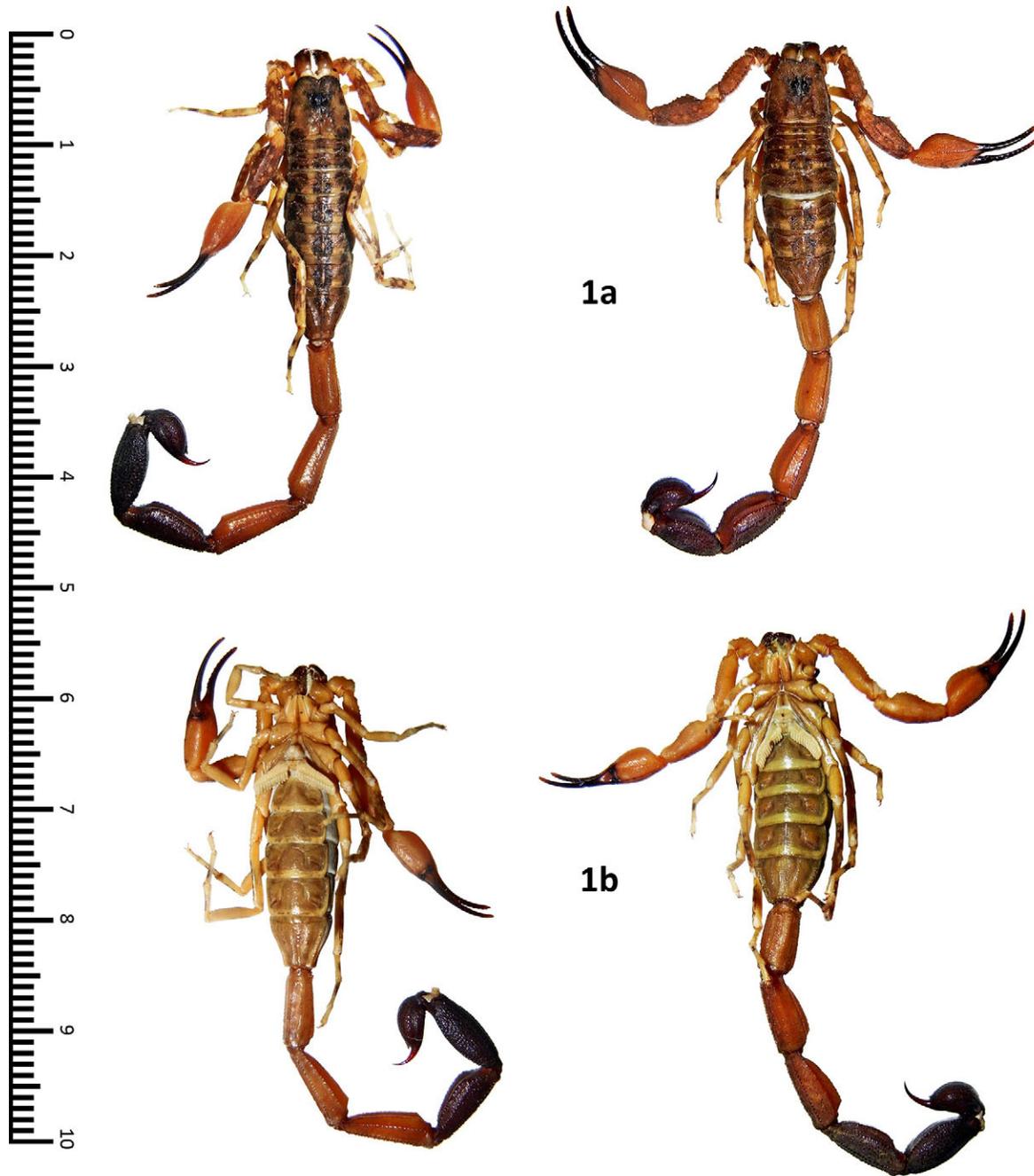
DESCRIPTION (adult female holotype). **Coloration** (Fig. 1) base yellowish brown, with a reddish shade on pedipalp chelae and metasomal segments I–III, pedipalp fingers black, metasomal segments IV–V and telson reddish black. Chelicerae with manus heavily reticulated with blackish brown, except in extreme base, fingers entirely blackish. Pedipalp femur and patella faintly but densely infuscate; chela with manus essentially immaculate, only with irregular infuscation externally, fingers black. Carapace symmetrically spotted with dark to blackish brown, especially around median eyes and on posterolateral areas; eyes and ocular tubercles black. Tergites symmetrically spotted with blackish brown, arranged into three longitudinal stripes. Pectines immaculate whitish to yellowish, with basal portion and basal plate progressively darker due to heavier sclerotization. Sternites essentially immaculate; V with the

smooth patch translucent. Aculeus dark reddish, fading to black distally.

**Chelicerae** (Fig. 2). With dentition standard for the genus, teeth relatively large and sharp. Tegument glossy but with fine granulation scattered, dorsodistal portion of manus with coarse granulation irregularly arranged transversally, defining a depressed area. Setation very dense ventrally, but essentially lacking dorsally, except for six rigid, whitish macrosetae around depressed area of manus.

**Pedipalps** (Fig. 3). Large for the group but noticeably robust, almost glabrous. Orthobothriotaxic A- $\alpha$ , but with chelal trichobothria *est-et-db-et* placed in distal half of finger and essentially with no "petite" trichobothria (basically all trichobothria with noticeably small, subequal areolae). Femur almost straight and essentially bare; all carinae strong and glossy, coarsely dentate to granulose; intercarinal tegument very finely and densely granulose, with abundant medium-sized, glossy granules scattered; space delimited by internal (*i*) trichobothria almost entirely flat, i.e., with only a small conical tubercle between *i*<sub>1</sub> and *i*<sub>2</sub>. Patella straight and essentially bare; all carinae strong and glossy, coarsely granulose to subcostate; intercarinal tegument very finely and densely granulose, with abundant medium-sized, glossy granules scattered, internally with some larger conical tubercles. Chela robust and sparsely setose; manus oval (1.49 times longer than wide), conspicuously wider than patella (ratio 1.18), and with the basal half markedly widest, all carinae strong and glossy, very coarsely granulose to subcostate, intercarinal tegument coriaceous, with abundant medium-sized, glossy granules scattered on all surfaces and many small, sharp, conical granules internally; fingers long (movable finger 1.52 times longer than underhand), evenly curved, sparsely setose, and with tegument smooth and glossy; fixed finger with 12/12 principal rows of denticles, movable finger with 13/13 plus an apical subrow of four denticles and a large internal accessory denticle (large terminal denticle not included), basal lobe/notch combination strong.

**Carapace** (Fig. 2). Trapezoidal and slightly wider than long; anterior margin rough and widely bilobed, with scattered setation. Carination greatly reduced: the only definable carinae are the irregularly fused anterior medians and superciliaries (coarsely granulose), and the also irregularly fused central medians and posterior medians (moderately granulose). Furrows: anterior median, median ocular, central median, posterior median and posterior marginal fused, wide and moderately deep, posterior laterals and posterior transverse long, wide and shallow, other furrows indistinct. Tegument very finely and densely granulose, with abundant granulation scattered, coarser and denser in ocular triangle. Median eyes large and separated by more than one ocular diameter, lateral eyes much smaller but also relatively large.



**Figure 1:** Male paratype (left) and female holotype of *Tityus haetianus* sp. n., full-body views: **a)** dorsal; **b)** ventral. Scale bar in centimeters, with millimeter subdivisions.

**Sternum** (Fig. 4a). Standard for the genus: type 1, medium-sized, markedly longer than wide and subpentagonal, with two pairs of inconspicuous macrosetae. Tegument coriaceous to very finely granulose.

**Genital operculum** (Fig. 4a). Medium-sized, halves not separated and roundly subtriangular in shape, with a few setae scattered; tegument coriaceous. Genital pa-

pillae absent. Pre-pectinal plate heavily sclerotized and widely crescent-shaped, with a large and oval median depression.

**Pectines** (Fig. 4a). Size and shape standard for the group: not reaching leg IV trochanter, subrectangular and densely setose. Tooth count 14/14, teeth long, essentially straight and only slightly swollen. Basal middle



**Figure 2:** Male paratype (left) and female holotype of *Tityus haetianus* sp. n., close-ups in dorsal view: prosoma and mesosoma.

lamella round, conspicuously enlarged. Basal plate highly sclerotized, wider than long; anterior margin with a narrow and deep V-shaped anteromedian notch, posterior margin shallowly convex; tegument coriaceous.

**Legs.** Relatively long and slender, with all carinae weakly granulose to smooth, intercarinal tegument coriaceous, with abundant vestigial but coarse granules scattered. Prolateral and retrolateral pedal spurs long and thick. Ventral surface of telotarsi round and with many

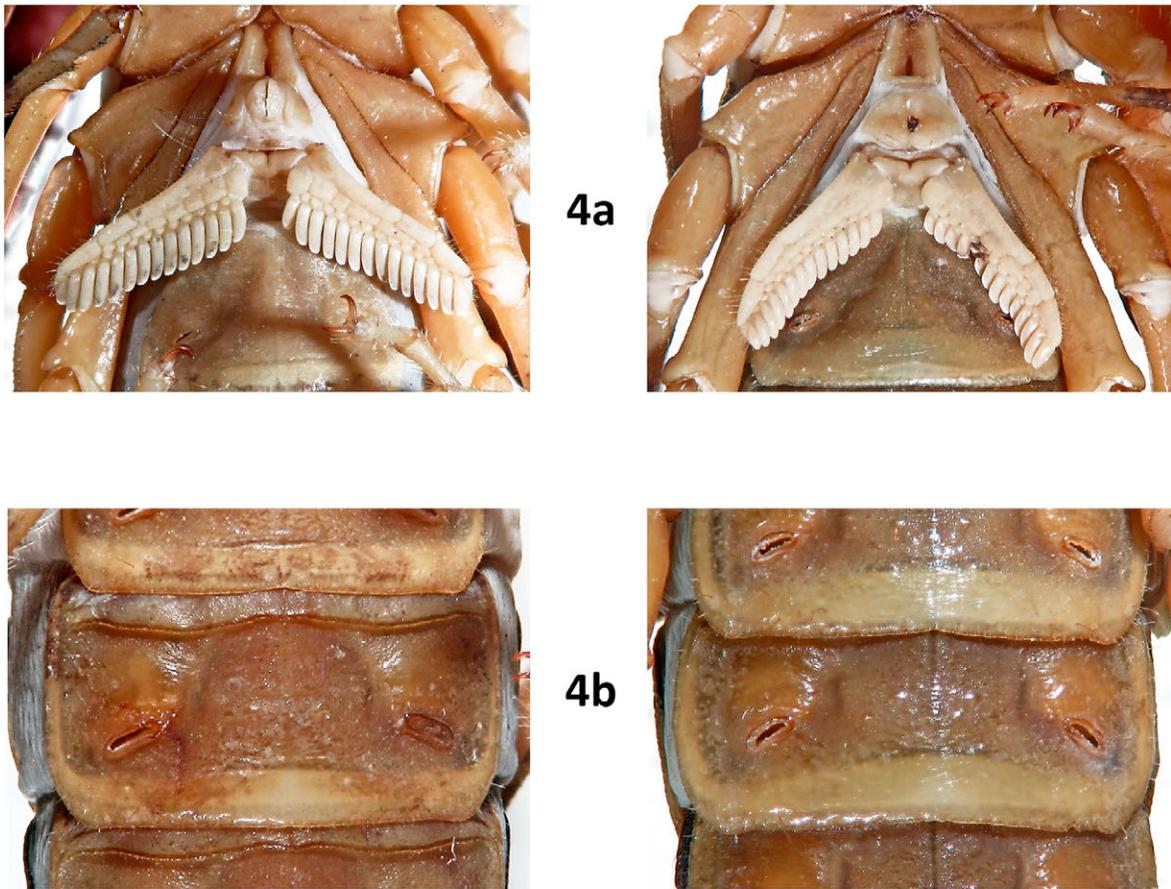


**Figure 3:** Male paratype (left) and female holotype of *Tityus haetianus* sp. n., close-ups: **a)** pedipalp, dorsal; **b)** chela, ventral.

thin, dark setae irregularly arranged into a single longitudinal, broad, dense row. Claws short and strongly curved.

**Mesosoma** (Figs. 2, 4). Tergites very densely granulate, with coarser and glossy granulation scattered; I–

VI with only one well-defined median longitudinal carina which is long, strong, granulate to crenulate, formed by partially anastomosed, very coarse, glossy granules that do not project beyond posterior margin; VII with the standard five carinae which are long,



**Figure 4:** Male paratype (left) and female holotype of *Tityus haetianus* sp. n., close-ups in ventral view: **a)** sternopectinal region; **b)** sternite V.

strong, granulose to crenulate, formed by partially anastomosed, very coarse, glossy granules. Sternites coriaceous to finely and densely granulose, with abundant medium-sized granules scattered; spiracles oblique, long and slit-like; posterior margin of III shallowly convex, of IV widely bilobed, of VI–VI shallowly concave, and of VII markedly concave; smooth patch of V poorly defined, triangular, much wider than long, flat, translucent and glossy.

**Metasoma** (Fig. 5a). Moderately long, slender and progressively wider distally. Segment I with ten complete carinae, II–IV with eight, V with five: dorsal laterals moderately serratocrenulate to serrate on I–III, with terminal denticle moderately enlarged on II–III, moderately granulose to subserrate on IV, absent on V; lateral supramedians moderately serrate to subserrate on I–III, coarsely granulose on IV–V; lateral inframedians moderately serrate on I, absent on III–V (but indicated by isolate, irregularly aligned granules on II); ventral laterals coarsely serrate on I–IV, coarsely granulose on

V; ventral submedians coarsely serrate on I–IV, absent on V; ventral median absent on I–IV, coarsely granulose on V (regular but poorly defined). Intercarinal tegument coriaceous, with abundant coarse but glossy granules scattered on all surfaces, much coarser and denser laterally and ventrally on IV–V; dorsal furrow complete, moderately narrow and shallow on all segments; setation sparse, with inconspicuous ventrolateral macrosetae on I–V.

**Telson** (Fig. 5). Vesicle globose (1.36 times longer than wide, 1.19 times wider than deep) and with some setae of different sizes scattered; tegument coriaceous, with abundant coarse but glossy granules scattered on all surfaces except dorsally; ventral median carina vestigially granulose, raised abruptly into the subaculear tubercle which is small, sharp, spiniform and ornate with some small granules, two of them in dorsal location. Aculeus short (shorter than vesicle length and width), thick but sharp, and shallowly curved.



**Figure 5:** Male paratype (left) and female holotype of *Tityus haetianus* sp. n., close-ups in lateral view: **a)** metasoma; **b)** telson.

**MALE** (paratype: Figs. 1–6; Table I). Similar to female in coloration, but with well-marked sexual dimorphism: **1)** size slightly larger; **2)** overall coloration paler and more sharply contrasting, especially much darker tergite stripes and distal portion of metasoma and telson; **3)** pedipalps comparatively longer, more slender, and less strongly carinate, with manus elongate and fingers with tegument coriaceous; **4)** mesosoma narrower and parallel-sided; **5)** genital operculum with valves widely separated, with papillae present and conspicuously protruding; **6)** pectines with teeth longer and stouter, and with basal middle lamella angulose-oval and less enlarged; **7)** smooth patch of sternite V better defined and slightly bulky; **9)** metasomal segments much longer and narrower.

**COMPARISONS.** Across the whole "crassimanus" species-group, the combination of large size and slender habitus of this species is matched only by *Tityus ottenwalderi* Armas, 1999, an endemism from the Central Range (= Cordillera Central) of Hispaniola; in fact, both type-specimens were previously misidentified as such (see below in Remarks section). But it can be reliably distinguished from *T. haetianus* sp. n. as follows: **1)** coloration generally paler and with the dark pattern much sparser and paler, especially in carapace and tergites; **2)** pedipalps and metasoma comparatively shorter and more robust in same size-class specimens, especially females; **3)** metasoma and telson with carinae stronger and intercarinal granulation much stronger and denser; **4)** telson with subaculear tubercle vestigial to

absent; 5) pectinal tooth count apparently higher, up to 18.

DISTRIBUTION. Known only from the type locality.

REMARKS. Each type-specimen bears two additional white-paper labels: **1)** museum codes 08.95-07 (holotype) and 08.96-07 (paratype), which correspond to the taxonomical catalogue and are for intra-institutional use only; **2)** former identification as *Tityus ottenwalderi* by K. Polanco, dated 2007 (both specimens).

It is very interesting to note here that the morphologically closest-relative of *T. haetianus* sp. n. is not, as expected, its nearest endemic neighbor *Tityus crassimanus* (Thorell, 1876) from Bahoruco Range (the eastern counterpart of the Massif de la Hotte), but the Central Range endemic *T. ottenwalderi*. At least among non-spider arachnids, such biogeographic relationship is unprecedented.

The comparative material examined of the most closely related species is listed as follows:

- ***Tityus ottenwalderi* (14 specimens: 5♂♂, 5♀♀, 4 juveniles).** DOMINICAN REPUBLIC, Central Range, Elías Piña Province, Río Limpio, 720 m a.s.l., 5 February 2002, D. Pérez, R. Bastardo, B. Hierro, 1 juvenile ♂ (MNHNSD 08.453). Santiago Province, Jánico, Loma Alto de la Bandera, 1,478–1,597 m a.s.l., 11–12 March 1999, L. F. de Armas, R. Ramírez, 1♂ holotype, 1♂ paratype, 2♀♀ paratypes (IES). La Vega Province, Manabao, La Ciénaga, 1,140 m a.s.l., 29 July 1999, M. A. Ivie, K. A. Guerrero, 1♂ (MSU). Same locality, 22 February 2008, P. Muñoz, 1♂ (RTO: Sco.0380). Jarabacoa, Pinar Quemado, 1,200 m a.s.l., 10 March 2002, A. Abud, 1♀ (RTO). Jarabacoa, Loma La Sal, 1,480 m a.s.l., 5 August 1988, E. R. Martínez, 2 juvenile ♀♀ paratypes (IES). Constanza, El Río, 1,000 m a.s.l., 20 August 1975, J. A. Ottenwalder, 1♀ paratype (RTO: Sco.0313). Monseñor Nouel Province, Bonao, densely forested creek midway road Bonao to Casabito, 795 m a.s.l., 12 September 2017, R. Teruel, F. Schramm, J. Nigl, M. Seiter, 1 juvenile ♂ (RTO). Bonao, Blanco, Arroyón [= Los Guázaros], 700 m a.s.l., 8 September 2002, A. Abud, A. S. Reinoso, 1♂ (holotype of *Tityus anasilviae*, IES). San Cristóbal Province, El Majagual, 585 m a.s.l., 3 September 2017, R. Teruel, F. Schramm, J. Nigl, M. Seiter, 1♀ (RTO).
- ***Tityus crassimanus* (79 specimens: 17♂♂, 10♀♀, 52 juveniles).** DOMINICAN REPUBLIC, Pedernales Province, Bahoruco Range, Las Abejas, 1,290 m a.s.l., 19 May 1992, 1 juvenile ♀

(IES). Same locality, 22 July 1999, M. A. Ivie, 1 juvenile ♀ (paratype of *Tityus bahoruco*, MSU). Same locality, October 2011, N. Navarro, S. Incháustegui, 2♂♂, 1♀ (MNHNSD). Bahoruco Range, Mencía, [= Banano], Río Mulito [= El Mulito or Las Agüitas], 409 m a.s.l., 22 August 1987, L. F. de Armas, A. Abud, 1♂ (holotype of *Tityus bahoruco*, IES). Same locality, 12 March 2014, R. Teruel, F. Kovařík, P. Kindl, 3♂♂, 1♀, 2 juvenile ♀♀ (RTO). Bahoruco Range, densely forested creek midway road Mencía to Aguas Negras, 564 m a.s.l., 12 March 2014, R. Teruel, F. Kovařík, P. Kindl, 1♂, 1♀, 1 juvenile ♂ (RTO). Bahoruco Range, km 24 of road Cabo Rojo to El Aceitillar, 782 m a.s.l., 11–12 March 2014, R. Teruel, F. Kovařík, P. Kindl, 4♂♂, 1♀, 30 juveniles (RTO), 4♂♂, 2♀, 13 juveniles (FKCP). Bahoruco Range, km 17 of road Cabo Rojo to El Aceitillar, 324 m a.s.l., 11–13 March 2014, R. Teruel, F. Kovařík, P. Kindl, 2 juveniles (FKCP). Los Tres Charcos, Fondo Paradí, 50 m a.s.l., 20 March 1999, L. F. de Armas, B. Hierro, K. Polanco, 1♀ (IES). Same locality, 1 February 2005, R. Teruel, A. Fong, D. Maceira, A. Sánchez, 1♀ (RTO, Sco.0274). Barahona Province, Bahoruco Range, km 7 of road Cabral to Polo, 221 m a.s.l., 7–8 March 2014, R. Teruel, F. Kovařík, P. Kindl, 1♀ (RTO). Bahoruco Range, km 18 of road from Cabral to Polo, 1.5 km southeast of Monteada Nueva, 26 July 1999, M. A. Ivie, 1 juvenile ♂, 1 juvenile ♀ (MSU). Bahoruco Range, margin of Nizaíto River, near La Lanza Arriba, 800 m a.s.l., 5 November 2005, E. Gutiérrez, 1♂ (IES). Bahoruco Range, dirt road Cabral to Enriquillo, 5–6 km north of Maniel Viejo, 633 m a.s.l., 8 March 2014, R. Teruel, F. Kovařík, P. Kindl, 1♂ (RTO), 1♀ (FKCP).

- ***Tityus* sp. [aff. *ottenwalderi*].** DOMINICAN REPUBLIC, Hato Mayor Province, Los Haitises, El Naranjo, 80 m a.s.l., 19 January 1980, E. J. Marcano, 1 juvenile ♀ (MNHNSD).

***Tityus schrammi* Teruel et Santos, sp. n.**

(Figures 7–9, 11; Table I)

<http://zoobank.org/urn:lsid:zoobank.org:act:FA95D897-EE94-44E5-8E2D-4A5D993B34B1>

TYPE DATA. DOMINICAN REPUBLIC, Elías Piña Province, Cordillera Central [= Central Range], Nalga de Maco National Park, Río Limpio, 19°12'13.8"N - 71°28'59.6"W, 1,643 m a. s. l., 06 April 2012, coll. C. Marte, A. Sánchez, C. Pérez, 1♀ holotype (MNHNSD 08.448).



**Figure 6:** Type-specimens of *Tityus haetianus* sp. n., photographed alive at natural habitat: a) male paratype; b) female holotype. Photos courtesy Ruth H. Bastardo.

ETYMOLOGY. The selected epithet is a patronym honoring Frederic Schramm (Magdeburg, Germany), a scorpion enthusiast and good friend, who was very helpful and kind during a trip to Dominican Republic by one of us (RT), in September 2016.

DIAGNOSIS (based on a single adult female). A member of the "quisqueyanus" species-group. Adult size moderately large (45 mm) for the group. Coloration basically orange brown, very densely reticulated and spotted with blackish brown all over the body and appendages; tergites with three irregular longitudinal dark stripes; pedipalp fingers black, metasomal segments IV–V and telson reddish black. Pedipalp chelae with manus robust and moderately carinate, wider than patella (ratio 1.17); fixed/movable fingers with 11/12 principal rows of denticles, respectively, basal lobe/notch combination moderate. Pectines with 12/12 teeth; basal middle lamella greatly enlarged and oval to round. Sternite V with the smooth patch large, triangular and bulky; spiracles short slit-like. Metasoma short, robust and conspicuously swollen distally, with 10/8/8/5 complete to essentially complete, strongly serrate to serratocrenulate carinae; dorsal lateral carinae on segments II–IV with terminal denticle vestigially enlarged; all intercarinal spaces very coarsely and densely granulate. Telson short oval, vesicle coarsely granulate, with subaculear tubercle small, conical and without granules.

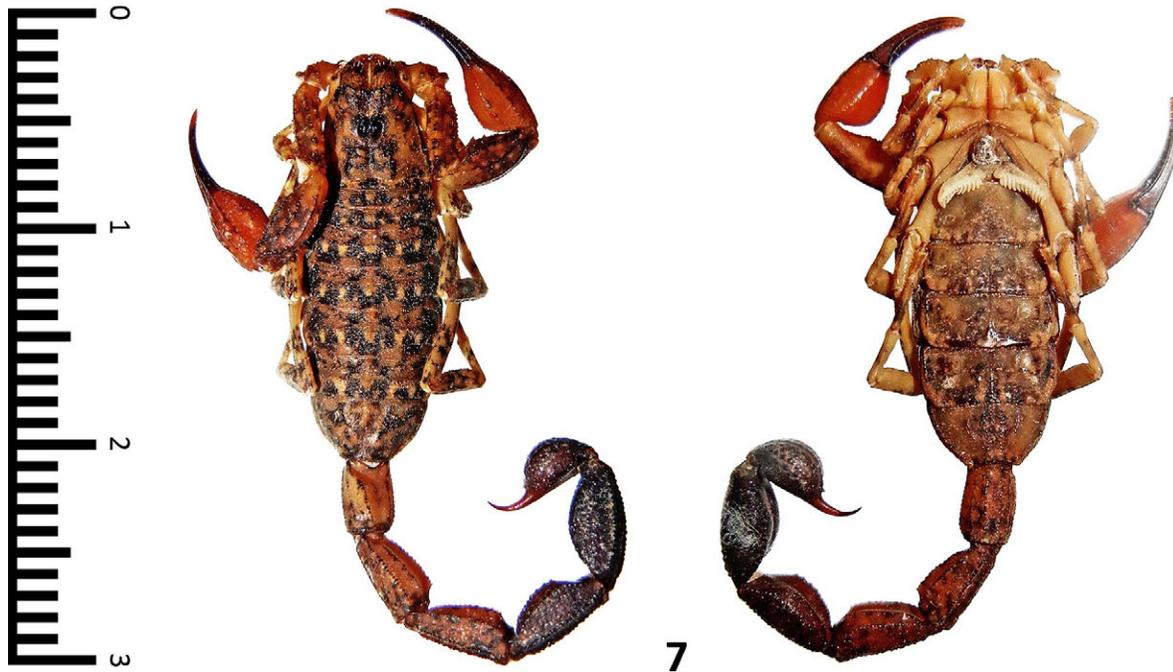
DESCRIPTION (adult female holotype). **Coloration** (Fig. 7) base orange brown, very densely reticulated and spotted with blackish brown all over the body and appendages except on the ventral surface of prosoma. Chelicerae yellowish; manus densely reticulated with blackish brown; fingers only with subbasal part deeply infuscate. Pedipalp femur and patella very densely reticulated with blackish brown on all surfaces except ventral, which is sparsely reticulated; chela with manus densely but irregularly spotted with blackish brown along carinae, mostly on external and ventral surfaces, fingers blackish with yellowish tips. Carapace symmetrically and densely reticulated and spotted with blackish brown, interocular triangle deeply infuscate but with large pale dots; eyes and ocular tubercles black. Tergites symmetrically and densely reticulated and spotted with blackish brown, irregularly arranged into three longitudinal stripes. Pectines immaculate yellowish to pale brownish, with basal portion and basal plate progressively darker due to heavier sclerotization. Sternites symmetrically and densely reticulated and spotted with blackish brown, not arranged into stripes; V with the smooth patch translucent but spotted with blackish brown. Legs densely spotted with blackish brown on all surfaces except internal, which it is essentially immaculate; basitarsi conspicuously annulated, with basal half blackish and distal half pale;

telotarsi similarly patterned, but much fainter. Metasoma with base color progressively darker and redder distally, with segments IV–V reddish black; all surfaces reticulated with blackish brown on I–IV, with pattern becoming denser distally and ventrally in every segment, especially on IV which looks essentially blackish to unaided eye. Telson vesicle reddish black, subaculear tubercle reddish; aculeus reddish, fading to blackish distally.

**Chelicerae** (Fig. 8a). With dentition typical for the genus; teeth relatively large but sharp. Tegument glossy but with minute granulation scattered, dorsodistal portion of manus with coarse, glossy granules irregularly arranged transversally, defining a depressed area. Setation very dense ventrally, but essentially lacking dorsally, except for 5–6 rigid, whitish macrosetae around depressed area of manus.

**Pedipalps** (Figs. 8b–c). Moderately short and robust for the group, with whitish, rigid setae scattered. Orthobothriotaxic A- $\alpha$ , but with chelal trichobothria *est-et-db-et* displaced towards apical third of finger and essentially with no "petite" trichobothria (basically all trichobothria with noticeably small, subequal areolae). Femur slightly sinuose; all carinae strongly denticulate to subserrate; intercarinal tegument coriaceous, with abundant small granules scattered; space delimited by internal (*i*) trichobothria with a large conical tubercle between  $i_1$  and  $i_2$ . Patella straight and essentially bare; all carinae moderately granulate to subcostate; intercarinal tegument coriaceous, with abundant small granules scattered, internally with two conical tubercles and 5–6 small denticles scattered. Chela robust; manus relatively large, oval (1.46 times longer than wide), wider than patella (ratio 1.17), and with the basal half widest, all carinae moderately granulate to subcostate, intercarinal tegument coriaceous, with few small granules scattered and some small conical granules internally; fingers moderately long and slender (movable finger 1.43 times longer than underhand), evenly curved, sparsely setose, fixed finger with 11/11 principal rows of denticles (basalmost row twice longer than usual, revealing two fused rows), movable finger with 12/12 plus an apical subrow of four denticles and a large internal accessory denticle (large terminal denticle not included), basal lobe/notch combination moderate.

**Carapace** (Fig. 8a). Trapezoidal and wider than long; anterior margin very widely V-shaped, with inconspicuous setation. Carination poorly developed: superciliaries strong and composed of partially fused granules, central medians and posterior medians irregularly fused and coarsely granulate, other carinae indistinct. Furrows: anterior median, median ocular, central median, posterior median and posterior marginal fused, wide and shallow to moderately deep, posterior laterals long, wide and moderately deep, other furrows indistinct. Tegument very densely and irregularly gran-



**Figure 7:** Female holotype of *Tityus schrammi* sp. n., full-body views: a) dorsal; b) ventral. Scale bar in centimeters, with millimeter subdivisions.

ulose. Median eyes large and separated by more than one ocular diameter, lateral eyes much smaller.

**Sternum** (Fig. 9a). Standard for the genus: type 1, medium-sized, wider than long, and strongly pentagonal in shape, with two pairs of long macrosetae. Tegument coriaceous.

**Genital operculum** (Fig. 9a). Medium-sized, halves cordiform in shape, with single pair of long macrosetae and widely separated by a very large, shapeless, dark and heavily sclerotized mass (possibly a desiccated aborted embryo). Genital papillae absent.

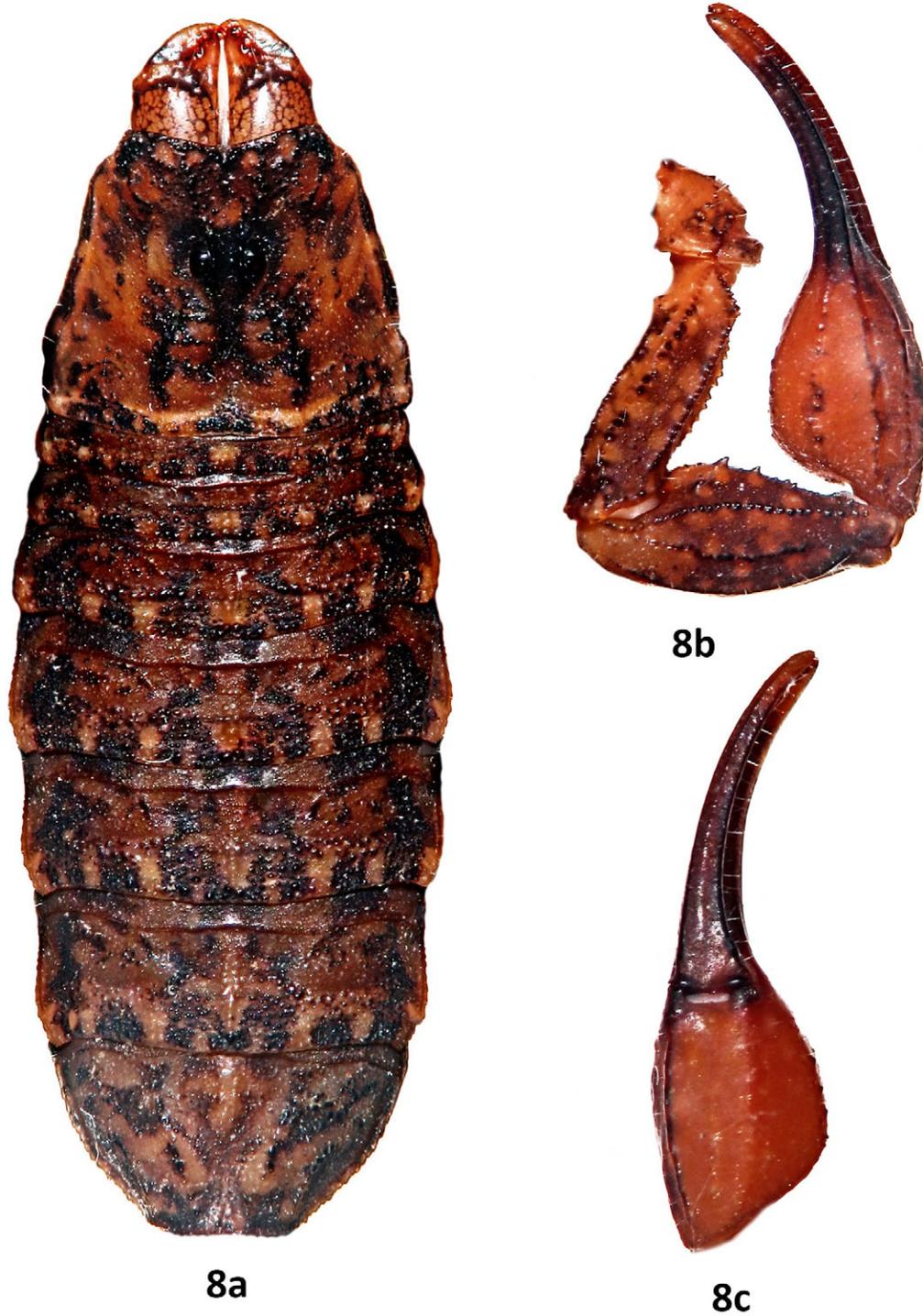
**Pectines** (Fig. 9a). Size and shape standard for the group: small (far from reaching leg IV trochanter), subtriangular and moderately setose. Tooth count 12/12, teeth relatively short, straight and swollen. Basal middle lamella roundly oval and greatly enlarged. Basal plate poorly sclerotized, wider than long; anterior margin with a moderate V-shaped anteromedian notch, posterior margin shallowly convex; tegument coriaceous.

**Legs.** Relatively short but slender, with all carinae finely serrate to serratocrenulate, intercarinal tegument finely and densely granulose. Prolateral and retrolateral pedal spurs short and thick. Ventral surface of telotarsi round and with short, thin, dark setae irregularly arranged into two longitudinal, narrow, dense rows converging basally. Claws short and strongly curved.

**Mesosoma** (Figs. 8a, 9a–b). Tergites very densely and coarsely granulose; I–VI with only one well-defined median longitudinal carina which is long, moderately

strong, crenulate to subserrate, formed by partially anastomosed, medium-sized, coarse granules that do not project beyond posterior margin; VII with the standard five carinae which are long and crenulate to serrate. Sternites coriaceous, with abundant whitish macrosetae scattered, spiracles short slit-like; posterior margin of III, IV and VI vestigially bilobed, of V widely convex, of VII concave; smooth patch of V large, much wider than long, very widely subtriangular, bulky and translucent.

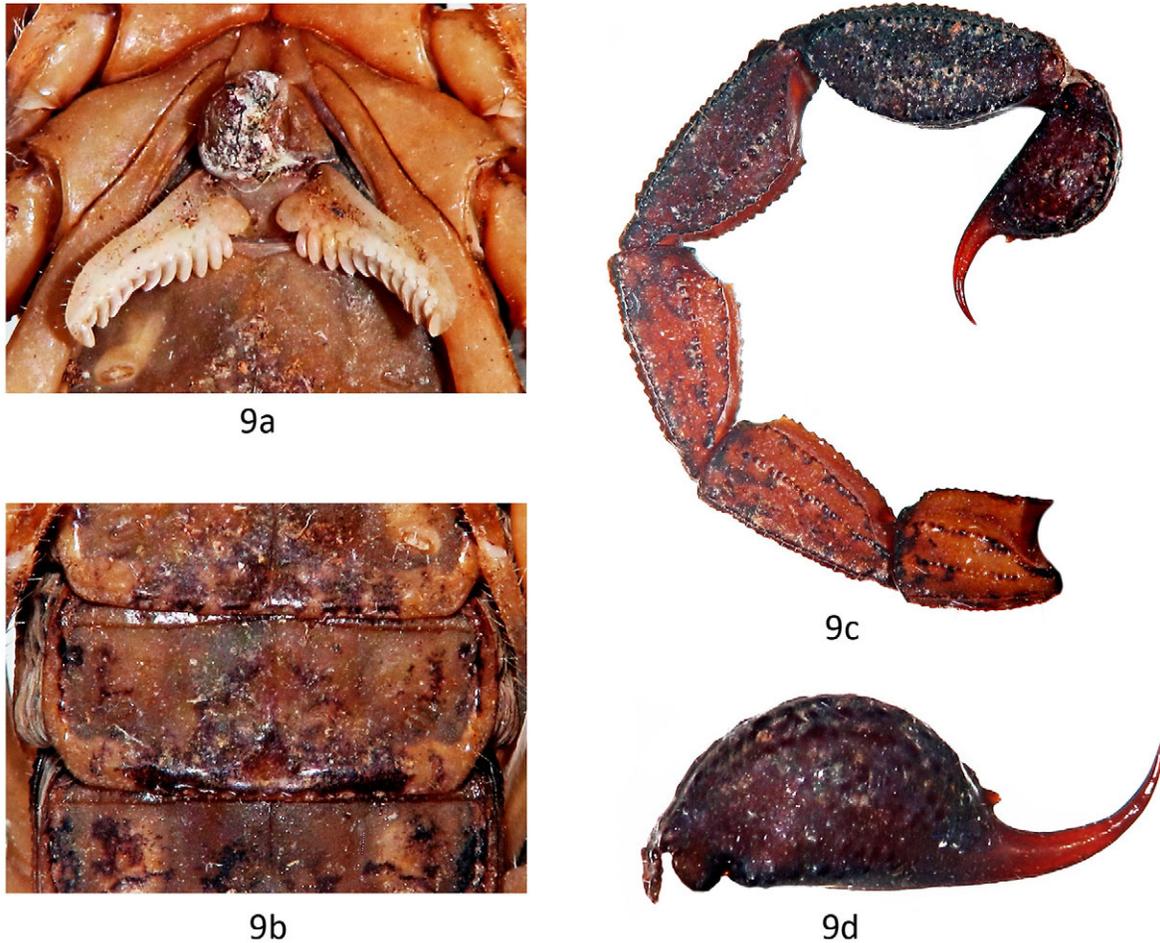
**Metasoma** (Fig. 9c). Short, robust and conspicuously swollen distally. Segment I with ten complete carinae, II–IV with eight, V with five: dorsal laterals strongly serrate to serratocrenulate and with vestigially enlarged terminal denticle on II–IV, absent on V; lateral supramedians strongly serrate to serratocrenulate on I–IV, variably granulose on V; lateral inframedians strongly serratocrenulate on I, absent on II–V; ventral laterals strongly serratocrenulate on I, strongly crenulate on II–IV, strongly granulose on V; ventral submedians strongly serrate to serratocrenulate on I–IV, indicated on basal half of V by rows of coarse granules aligned; ventral median absent on I–IV, strongly granulose on V. Intercarinal tegument coriaceous, with abundant small and medium-sized granule scattered on all segments, coarser and denser towards distal segments; dorsal furrow complete, wide and deep on all segments; setation sparse, with inconspicuous ventrolateral macrosetae on I–V.



**Figure 8:** Female holotype of *Tityus schrammi* sp. n., close-ups: a) prosoma and mesosoma, dorsal; b) pedipalp, dorsal; c) chela, ventral.

**Telson** (Fig. 9d). Vesicle short, inflate oval (1.28 times longer than wide, 1.21 times wider than deep) and almost bare; tegument weakly but coarsely granulose scattered on all surfaces except dorsally; ventral median

carina very weak but coarsely granulose, subaculear tubercle small, blunt conical and lacking any granules. Aculeus standard-sized, sharp, shorter than vesicle and shallowly curved.



**Figure 9:** Female holotype of *Tityus schrammi* sp. n., close-ups: **a)** sternopectinal region, ventral; **b)** sternite V, ventral; **a)** metasoma, lateral; **b)** telson, lateral.

MALE. Unknown.

COMPARISONS (female only). Across the whole "quisqueyanus" species-group, this unique combination of size, robust habitus, and size and shape of the basal middle lamella of pectines and subaculear tubercle, is matched only by *Tityus neibae* Armas, 1999, an endemism from the Hispaniolan Neiba Range (= Sierra de Neiba). But it can be reliably distinguished from *T. schrammi* sp. n. as follows: **1)** pedipalp femur, patella and manus with intercarinal tegument densely and finely granulose; **2)** pedipalp manus markedly narrower, elongate-oval in shape; **3)** sternites granulose but largely glossy; **4)** metasoma with all carinae weaker, but with intercarinal granulation remarkably denser; **5)** telson vesicle less inflate, but with dorsal surface conspicuously convex; **6)** telson with aculeus shorter and more strongly curved.

DISTRIBUTION. Known only from the type locality.

REMARKS. It is very interesting to note here that the morphologically closest-relative of *T. schrammi* sp. n. is not, as expected, any of its nearest neighbors that live in the Central Range of Hispaniola, but the single representative of this group from the more southern Neiba Range, i. e., *T. neibae*. Nevertheless, this is not an isolate case: very recently Teruel (2017b) described the first example of such biogeographic relationship in the whipscorpion genus *Ravilops* Viquez & Armas, 2005, also endemic from this Greater Antillean island.

The comparative material examined of the most closely related species is listed as follows:

- *Tityus neibae* (24 specimens: 3♂♂, 14♀♀, 7 juveniles). DOMINICAN REPUBLIC, Elías Piña Province, Neiba Range, Hondo Valle, El

Dimensions		<i>Tityus haetianus</i> sp.n.		<i>Tityus schrammi</i> sp.n.
		♂ paratype	♀ holotype	♀ holotype
Carapace	L / Wp	5.80 / 5.90	6.50 / 6.80	4.70 / 5.60
Mesosoma	L	16.80	16.50	13.00
Tergite VII	L / W	4.60 / 5.60	4.10 / 6.30	3.00 / 5.40
Metasoma	L	46.70	43.85	27.40
Segment I	L / W / D	6.60 / 2.65 / 2.70	5.75 / 3.30 / 3.20	3.30 / 2.40 / 2.10
Segment II	L / W / D	8.00 / 2.80 / 2.70	7.10 / 3.40 / 3.15	4.20 / 2.20 / 2.10
Segment III	L / W / D	8.50 / 2.90 / 2.70	7.50 / 3.55 / 3.30	4.60 / 2.40 / 2.10
Segment IV	L / W / D	8.50 / 3.20 / 3.00	7.90 / 3.70 / 3.35	4.80 / 2.63 / 2.10
Segment V	L / W / D	7.90 / 3.30 / 3.20	7.70 / 3.75 / 3.50	5.30 / 2.80 / 2.50
Telson	L	7.20	7.90	5.20
Vesicle	L / W / D	4.60 / 3.05 / 2.55	4.60 / 3.38 / 2.85	3.10 / 2.43 / 2.00
Aculeus	L	2.60	3.30	2.10
Pedipalp	L	25.75	25.30	17.91
Femur	L / W	6.40 / 1.50	6.00 / 1.85	4.40 / 1.50
Patella	L / W	6.65 / 2.20	6.70 / 2.83	5.01 / 2.05
Chela	L	12.70	12.60	8.50
Manus	L / W / D	5.40 / 2.80 / 2.80	5.00 / 3.35 / 3.35	3.50 / 2.40 / 2.30
Movable finger	L	7.30	7.60	5.00
<b>Total</b>	<b>L</b>	<b>69.30</b>	<b>66.85</b>	<b>45.10</b>

**Table 1:** Measurements (mm) of the types of two new species of *Tityus* from Hispaniola. Abbreviations: length (L), width (W), posterior width (Wp), depth (D), left (L), right (R).

- Hoyazo, Sabana del Silencio, 2,007 m a.s.l., 19–22 June 2015, G. de los Santos, C. Marte, A. Sánchez, 4♀♀, 2 juveniles (MNHNSD 08.455), 3♀♀ (RTO). Independencia Province, Neiba Range, Postrer Río, Los Bolos, 1,100 m a.s.l., 10 April 1999, L. F. de Armas, 1♂ holotype, 2♀♀ paratypes (IES), 1♂, 1♀ paratypes (RTO). Bahoruco Province, Neiba Range, Apolinar Perdomo, La Ceiba, 807 m a.s.l., 9 March 2014, R. Teruel, F. Kovařík, P. Kindl, 1♂, 3♀♀, 5 juveniles (RTO), 1♀ (FKCP).

### General remarks

The present contribution adds one more member to each of the two species-groups of *Tityus* recognized to occur in Hispaniola. The "crassimanus" species-group now includes four living and one fossil species, and the "quisqueyanus" species-group now includes nine living

species. In total, 14 species of this genus are confirmed for this island of the Greater Antilles. Of them, *Tityus haetianus* sp. n. is of particular interest by being the third endemic scorpion from Haiti, with a geographical occurrence possibly limited to the Massif de la Hotte Mountains in extreme western Tiburon Peninsula. This seems to be the only scorpion endemism hotspot that still remains in the depleted Haitian geography, because the two other endemic species are also known to occur only there: the buthid *Centruroides tenuis* (Thorell, 1876) and the diplocetrine scorpionid *Heteronebo pumilus* Armas, 1981, see Santos et al. (2016) and Teruel (2016).

### A final comment on the Hispaniolan members of the genus: a necessary reply

Two fossil species from Hispaniola, *Tityus azari* Lourenço, 2013† and *T. hartkorni* Lourenço, 2009†,



**Figure 10:** Map of Hispaniola, showing geographical distribution of all local extant members of the "crassimanus" species-group: *Tityus haetianus* sp. n. (rhombus), *Tityus crassimanus* (circles), *Tityus ottenwalderi* (squares) and *Tityus* sp. (triangles).



**Figure 11:** Map of Hispaniola, showing geographical distribution of two local members of the "quisqueyanus" species-group: *Tityus schrammi* sp. n. (rhombus) and its morphologically closest relative *Tityus neibae* (circles).

were both recently synonymized under *Tityus geratus* Santiago-Blay et Poinar, 1988† (Teruel, 2017a). In a recent paper, Lourenço (2017) severely criticized these synonymies. Alas, over the recent years the taxonomic work of Wilson R. Lourenço has been consistently demonstrated to be unreliable and his decisions should not be accepted without careful scrutiny. The publications of this author have been deeply flawed by factual in-

accuracies and unethical procedures: authoritarian statements instead of scientific arguments, inclusion of falsified images; invention of nonexistent characters to justify descriptions of "new" taxa; and intentional omission from his taxonomic comparisons of the literature and taxa written by the others; see e.g. Kovařík & Ojanguren-Affilastro (2013), Kovařík et al. (2013, 2015, 2016, 2017), Teruel (2017a), Teruel et al. (2017).

Lourenço (2017: 105) complains aggressively about the synonymies and their putative reversal, without presenting either the slightest supporting evidence or a single argument that can be scientifically tested. This is in complete opposition to the original paper of Teruel (2017a), where all conclusions are supported by clear and unambiguous evidence. Thus, the synonymies of the two fossil *Tityus* species as suggested by Lourenço (2017) cannot be considered as reverted and are herein upheld as originally introduced by Teruel (2017a).

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