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Redescription of *Tityus (Tityus) gaffini* Lourenço, 2000 (Scorpiones: Buthidae) and new locality records.

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Redescription of *Tityus (Tityus) gaffini* Lourenço, 2000 (Scorpiones: Buthidae) and new locality records

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Abstract:

Tityus (Tityus) gaffini Lourenço, 2000 is one of the most poorly known Colombian scorpion species, since it was described based on a unique female specimen, with the male remaining unknown, and has been only recorded from two localities. Herein the male is described for the first time, a new diagnosis and data on the intraspecific variability are given, new locality records are presented, and its altitudinal range of distribution is extended.

Key Words: Scorpions, Colombia, male's description, new locality records.

Redescripción de *Tityus (Tityus) gaffini* Lourenço, 2000 (Scorpiones: Buthidae) y nuevos registros de localidades.

Resumen:

Tityus (Tityus) gaffini Lourenço, 2000 es una de las especies colombianas de escorpiones menos conocidas. Fue descrita con base en un único ejemplar hembra, permaneciendo el macho desconocido, y solo ha sido registrada en dos localidades. En este trabajo se describe por primera vez al macho, se presentan una nueva diagnosis y datos sobre la variabilidad intraespecífica, se indican nuevos registros de localidades y se extiende su rango de distribución altitudinal.

Palabras clave: Escorpiones, Colombia, descripción del macho, nuevas localidades.

Introduction

Tityus (Tityus) gaffini was recently described based on a single female specimen from the Centro Experimental Las Gaviotas, Vichada department, eastern Colombia (Lourenço, 2000). A year later Flórez (2001a) reported an additional specimen of *T. (T.) gaffini* from San Martín, Meta department, deposited at the Instituto de Ciencias Naturales, Bogotá, but did not mention whether it was a male or a female. A recent examination of this scorpion revealed that it is also a female.

Lourenço (2000) mentioned two characters that make *T. (T.) gaffini* differ from *Tityus (T.) lancinii* González-Sponga, 1972 and *Tityus (T.) rebierei* Lourenço, 1997, but did not provide a diagnosis for this species. I recently found five individuals of *T. (T.) gaffini*, one female and four males, from various Colombian localities in the scorpion collection of the Museo Javeriano de Historia Natural (Pontificia Universidad Javeriana, Bogotá). Herein the male is described, and a diagnosis involving both sexes is presented. Unfortunately, the labels of two (male and female) of the five additional specimens contain doubtful information. According to the original label of the specimens (first stored together in the same vial, now separated)

these were collected in San Luis, Antioquia department, located on the eastern slope of the Central Cordillera of Colombia. However, examination of additional arachnid material with the same field data strongly suggested that all those samples were really collected somewhere in the Orinoquian region, presumably in Guaviare department.

Methods

Measurements (L=length, W=width, D=depth) are presented in millimetres and were obtained following the methodology of Sissom *et al.* (1990), using the program Motic Images 2000 version 1.2 through a PC connected to a Motic Digital Microscope DM-143. Photographs were taken using an Olympus D-590 ZOOM digital camera. Illustrations were prepared with the aid of a *camera lucida* mounted onto a Stemi SV 6 stereomicroscope (Zeiss).

Characters listed in the diagnosis are for both males and females unless indicated otherwise. The description of the male is based on four specimens, one normal adult and three small males. Trichobothrial terminology after Vachon (1973, 1975).

Acronyms of museums: **MPUJ**—Museo Javeriano de Historia Natural "Lorenzo Uribe S. J.", Pontificia Universidad Javeriana, Bogotá. **ICN-MHN**—Instituto de Ciencias Naturales, Museo de Historia Natural, Universidad Nacional de Colombia, Bogotá.

Taxonomy

Tityus (Tityus) gaffini Lourenço, 2000
Figs. 1–11

Tityus gaffini: Lourenço, 2000: 449–452, Figs. 1–4, 13, Table 1; Flórez, 2001a: 52; Flórez, 2001b: 28.

MATERIAL EXAMINED.

COLOMBIA: *Tityus (T.) gaffini.* ANTIOQUIA DEPARTMENT (doubtful collection data): 1♂, 1♀ from San Luis, Rio Claro, 440m, February 28/1994, A. C. C. (MPUJ-SCO-189, 182). META DEPARTMENT: 1♀ from San Martín, 400m, October 31/1998 (ICN-MHN-As-331); 1♂ from Villavicencio, Vereda El Carmen, Finca La Loma, 800m, in daylight, *ad hoc*, August 5/2006, G. Martínez (MPUJ-SCO-362); 1♂ from Villavicencio, Vereda El Carmen, Finca La Loma, 800–1000m, *ad hoc*, April/2007, M. Viola (MPUJ-SCO-375); 1♂ from Acacías, Vereda La Loma, Finca La Perla, 378m, October 12/2006, L. A. Cendales (MPUJ-SCO-361). VICHADA DEPARTMENT: holotype ♀ from Cumaribo, Centro Experimental Gaviotas, 180m, June/1995, F. Cortez (ICN-MHN-As-196). *Tityus (T.) engelkei.* MAGDALENA DEPARTMENT: 1♂ from Santa Marta, Sierra Nevada de Santa Marta, Ciudad Perdida, near to Caserio Altamira, 780m, June 5/1989, M. C. Ardila (ICN-MHN-As-026). *Tityus (T.) sastrei.* VALLE DEL CAUCA DEPARTMENT: 1♂ from Bahía de Malaga, Base Naval, 5m, April/1989, L. A. Millan (ICN-MHN-As-381). *Tityus (T.) ecuadorensis.* PUTUMAYO DEPARTMENT: 1♂ from Territorio Cofán, 780m, September 29/1998, V. Rodriguez (ICN-MHN-As-281). 1♂ from Territorio Cofán, 1430m, September 20/1998, P. Diaz (ICN-MHN-As-282). 1♂, 1♀ from Orito, Vereda Líbano. 00°40'53.8'' N, 77°02'7.2'' W, 850m, March/2003, F. Quevedo (ICN-MHN-As-527). *Tityus (T.) sabinae.* CUNDINAMARCA DEPARTMENT: Holotype ♂ from Fusagasuga, Vereda El Placer, Finca Aimarure, 1470m, July 10/1983, A. Cadena (ICN-MHN-As-001). BOYACA DEPARTMENT: 1♂ from El Cocuy, 2700m, January 14/2001, G. A. Mora (ICN-MHN-As-511). 1♀ from Boavita-San Bernardo, 2820m, September 25/1991, L. G. Baptiste (ICN-MHN-As-037). 2♀ from PNN El Cocuy, 2850m, November 15/1984, D. Noreña (ICN-MHN-As-224). 1♀ from Tipacoque, El Mella, 1850m, May 15/1991 (ICN-MHN-As-221).

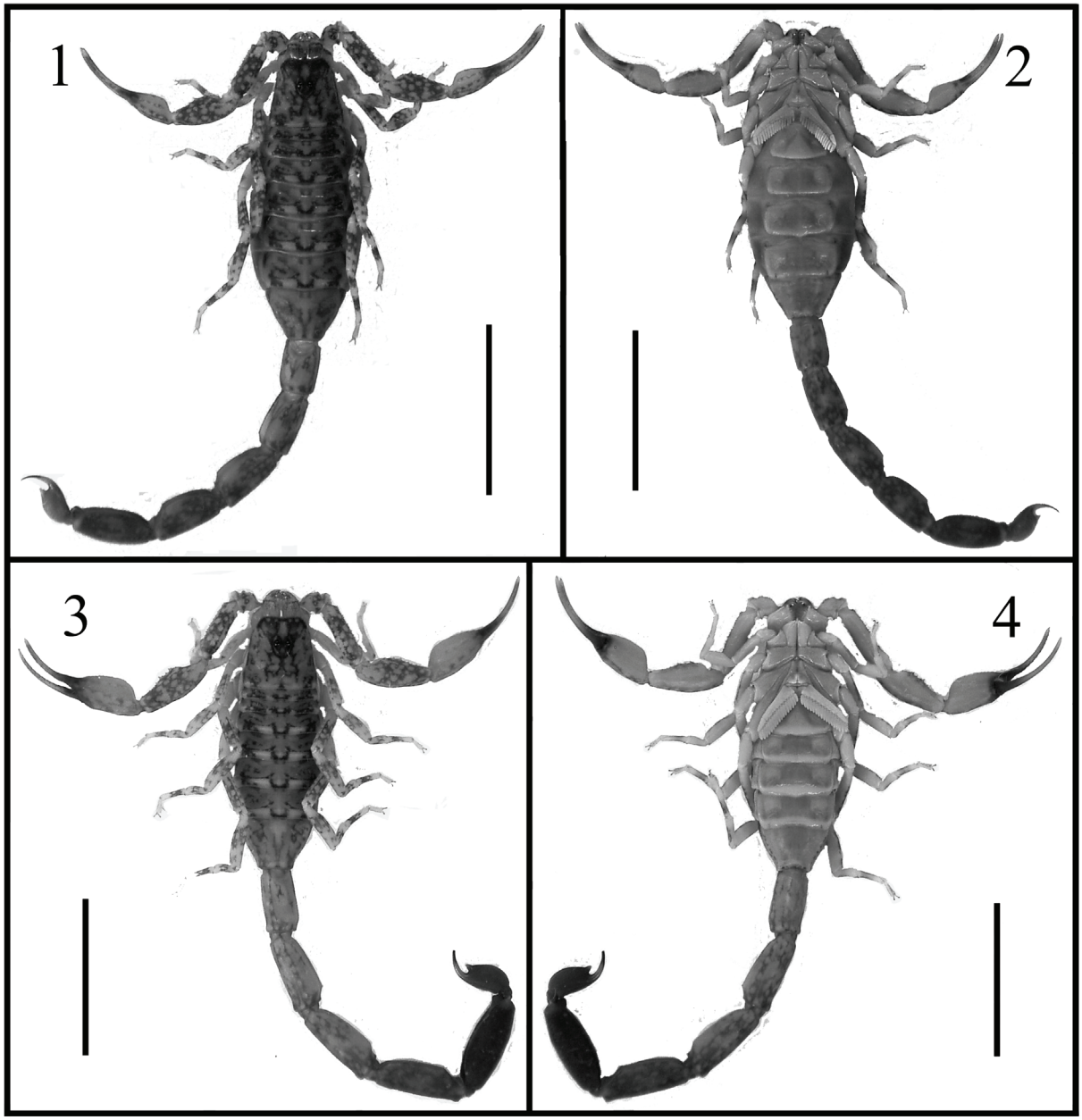
DIAGNOSIS. Scorpions of medium size; general coloration yellowish with a very reticulated pattern over almost the entire body (except for the coxosternal region, venter and ventral surface of pedipalp femur and patella that are light-yellow, and metasomal segment V and telson that are dark-red) (Figs. 1–4); prosoma, mesosoma and metasoma with all carinae very feeble; ventral submedian keels of metasomal segments parallel; basal piece of the middle lamellae of the pectines not dilated; 15–17 pectinal teeth; sternite III with an expanded posterior median region; pedipalps longer and bulkier in males than in females (Figs. 1–4); basilar lobe present on movable finger; movable finger of pedipalps with 14–15 oblique rows of granules (including the short apical row); all metasomal segments longer than wide, longer in males (Figs. 1–4).

DESCRIPTION. - FEMALE - Described by Lourenço (2000).

VARIABILITY: *rows of granules in pedipalp fingers (including the short apical row):* two females present 14–14 rows in movable fingers, and the other 15–15. One female has 12–13 rows in the fixed fingers, one 13–13 and the other 14–14. *Pectinal teeth number:* one female bears 15–16 teeth, one 16–16, and the other 16–17.

MEASUREMENTS OF AN ADULT FEMALE (MPUJ-SCO-182): Total L (excluding telson) 32.63; carapace L 3.63; carapace anterior W 2.60; carapace posterior W 3.98; interocular distance 0.40. Mesosoma L 10.88. Metasoma L (including telson) 21.42: segments: I L/W/D 2.67/2.08/1.95; II L/W/D 3.39/1.88/1.87; III L/W/D 3.67/1.89/1.84; IV L/W/D 4.11/1.93/1.76; V L/W/D 4.28/1.87/1.83. Telson L 3.30; vesicle W/D 1.28/1.25. Pedipalps: total L 12.96; femur L/W 3.47/1.08; patella L/W 3.99/1.65; chela L/W/D 5.50/1.42/1.46; movable finger L 3.68.

MALE**:** Coloration: General coloration predominantly light-yellow with variegated pigmentation (Figs. 3–4). *Carapace*: yellow but densely spotted, especially on the region that is anterior to the median eyes; median ocular tubercle blackish, with the interocular furrow and two curved lateral bands yellowish. *Chelicerae*: coxa, tibia and tarsus yellowish; tibia with dense reticulation dorsa-



Figures 1–4. *Tityus (Tityus) gaffini*. **1–2.** Adult female (MPUJ-SCO-182); **1.** Dorsal view; **2.** Ventral view. **3–4.** Adult male (MPUJ-SCO-189); **3.** Dorsal view; **4.** Ventral view. Scale bars equal 10mm.

lly; fixed finger with brownish spots basally; movable finger with a dorsal brown area; teeth reddish on both fingers. *Coxosternal region*: light-yellow, completely devoid of spots. *Tergites*: heavily spotted, especially on lateral regions; tergites I–VI with a brown U-shaped median region located on the posterior margin. *Venter*: light-yellow, devoid of spots except for some inconspicuous ones on sternites IV–V; sternites I and III with an almost white posterior region, that is triangle-like on sternite I. *Metasoma*: segments I–IV yellowish, V dark-red; all segments with abundant brown mottling on lateral and ventral surfaces; dorsal surfaces almost spotless. Telson red, lighter than segment V; tip of subaculeus and base of aculeus yellow. *Pedipalps*: femur and patella heavily spotted on the internal, dorsal and external surfaces; chela and fingers with variegated pigmentation on external surfaces; base of fingers reddish-brown, both internally and externally; other surfaces of all segments completely yellow. *Legs*: with variegated pigmentation on dorsal and external surfaces of all segments, except for the telotarsus that is predominantly yellow.

MORPHOLOGY: *Carapace*: weakly granular; anterior margin with a slight median concavity; median ocular tubercle distinctly anterior to the center of the carapace; three pairs of lateral eyes. *Chelicerae*: with numerous hairs on the internal and ventral surfaces; cheliceral dentition characteristic of Buthidae (Vachon, 1963).

Coxosternal region: sternum subtriangular with a median depression producing two anterolateral furrows; components of this region smooth, except for coxae III–IV that bear some scarce and low tubercles; coxapophyses I–II with dense pilosity anteriorly. *Tergites*: weakly granular; median longitudinal carina very weak on tergites I–VI; tergite VII tetracarinate (paired paramedian and lateral carinae, incomplete and inconspicuous). *Venter*: genital operculum divided longitudinally; pectinal segments: marginal lamellae 3:3, middle lamellae 7–9, teeth 15–17; fulcra present but reduced when compared with other species of the genus; basal piece of the middle lamellae not dilated; sternite I weakly granular in the region covered by the pectines; sternites II–IV smooth; sternite V with two vestigial and incomplete longitudinal carinae and weak granulation; sternite I rounded posteriorly; sternite III with a median posterior expansion covering part of sternite IV; spiracles increasing in length distally, being oval elongate in sternite I and linear in sternite IV. *Metasoma*: weakly and sparsely granular; all carinae very feeble, difficult to identify with certainty; all segments longer than wide. Telson with weak and sparse granulation; vesicle bulbous; subaculeus spinoid; aculeus long and curved. *Pedipalps*: femur pentacarinate; patella heptacarinate; both segments armed with a series of spine-like granules on the internal surface; chela wider and deeper than the preceding segment, with five inconspicuous carinae; fixed finger with 12–13 oblique rows of granules (including the short apical row); movable finger with 14–15 rows and a well developed basal lobe (Fig. 9); trichobothriotaxy type A, femur with α configuration (Figs. 5–10) (Vachon, 1973, 1975). *Legs*: tibia, basitarsus and telotarsus with numerous ventral setae.

VARIABILITY: *rows of granules in pedipalp fingers (including the short apical row):* three males present 15–15 rows in movable fingers and 13–13 rows in fixed fingers. The other male has 14–14 rows in movable fingers and 12–12 rows on fixed fingers. *Pectinal teeth number:* two males have 15–16 teeth, one 17–17, and one 17–16.

MEASUREMENTS OF AN ADULT MALE (MPUJ-SCO-189): Total L (excluding telson) 39.17; carapace L 4.27; carapace anterior W 2.99; carapace posterior W 4.32; interocular distance 0.49. Mesosoma L 10.40. Metasoma L (including telson) 28.37: segments: I L/W/D 3.66/2.09/1.99; II L/W/D 4.58/2.06/2.07; III L/W/D 5.07/2.08/2.19; IV L/W/D 5.45/2.22/1.93; V L/W/D 5.74/2.33/2.05. Telson L 3.87; vesicle W/D 1.52/1.55. Pedipalps: total L 17.32; femur L/W 4.22/1.14; patella L/W 4.81/1.85; chela L/W/D 8.29/2.09/2.08; movable finger L 5.15.

INTERSPECIFIC COMPARISONS. Below are listed some features that distinguish *T. (T.) gaffini* from all other Colombian species of the subgenus *Tityus*. It differs from *T. rebierei* since the ventral submedian keels of metasomal segments I–IV are parallel in the former species, and converge in segments III–IV forming a "Y" in the second (Lourenço, 1997). From *Tityus (T.) engelkei* Pocock, 1902 since in this species the metasomal carinae are strong and bear well developed granules, and the general coloration is yellow without any reticulations (except for the chelicerae). From *Tityus (T.) sastrei* Lourenço & Flórez, 1990 because its general coloration is yellowish-brown (except for the legs that are yellow) without reticulations, the pectinal teeth number is greater (20–20 in the specimen studied), and metasomal carinae are easily distinguishable (although these bear weak and sparse granules). From *Tityus (T.) ecuadorensis* Kraepelin, 1916 since in this species the metasomal carinae are well developed, dorsolateral carinae bear a posterior enlarged granule and the basal piece of the female's middle lamella is strongly dilated.From *Tityus (T.) sabinae* Lourenço, 1994 because its coloration is predominantly brown without reticulations, the metasomal carinae are well developed with strong granules, and the pectinal teeth number is greater (22–24 in males, 22–25 in females [in the specimens examined]). From *Tityus (T.) blanci* Lourenço, 1994 since in this species the dorsolateral carinae of metasomal segments II–IV bear spine-like granules (Flórez, 2001a). From *Tityus (T.) prancei* Lourenço, 2000 since it has strong metasomal carinae (Flórez, 2001a). Finally, *T. (T.) gaffini* can be distinguished from *Tityus (T.) lourençoi* Flórez, 1996 since in this species the pedipalps of males are slightly longer and less bulky than the female's (Flórez, 2001a).

DISTRIBUTION. This species was known only from two localities, which are the type locality in Vichada department and San Martín in Meta department. The material found in the MPUJ allows adding two localities, both in Meta department, Acacías and Villavicencio (Fig. 11). According to Flórez (2001b) this species is known to occur in the 100–500m range. The new locality records herein presented extend its altitudinal range of distribution to 800m. It is probable that this species is widely distributed in the Orinoquian region of Colombia, but scarce samplings and the use of inappropriate techniques may be responsible for its limited geographical distribution known to date.

FIELD OBSERVATIONS. In Villavicencio this species lives in sympatry with *Ananteris myriamae* Botero-Trujillo, 2007, *Tityus (Atreus) nematochirus* Mello-Leitão, 1940 and *Tityus (Archaeotityus) bastosi* Lourenço, 1984. In five expeditions carried out there, no specimens of this species were collected in diurnal or nocturnal searches, nor were any captured with pitfall traps frequently placed randomly in the forests in sets of 5–10 traps for two/three days. Both specimens were found inside a house, suggesting that this species presents low population densities and tends to inhabit human constructions. The unique specimen from Acacías was captured in daylight from under a pile of stones.

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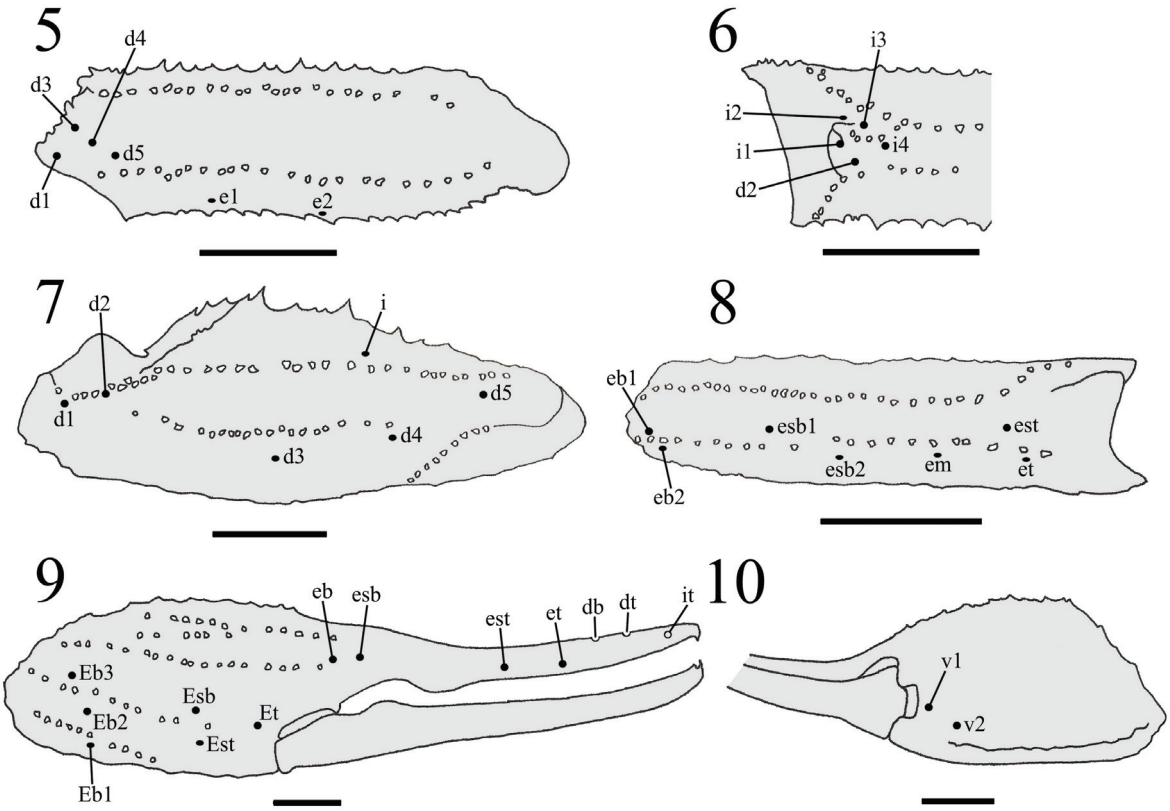

Figures 5–10. Distribution of the trichobothria (right pedipalp) in an adult male *Tityus (Tityus) gaffini* (MPUJ-SCO-189). **5.** Femur, dorsal and external views; **6.** Femur, internal view; **7.** Patella, dorsal view; **8.** Patella, external view; **9.** Chela, external view; **10.** Chela, ventral view. Scale bars equal 1 mm.

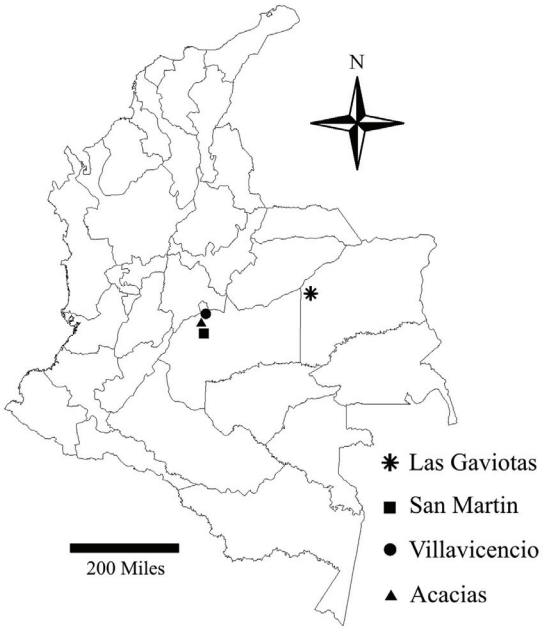

Figure 11. Known distribution of *Tityus (Tityus) gaffini*.

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