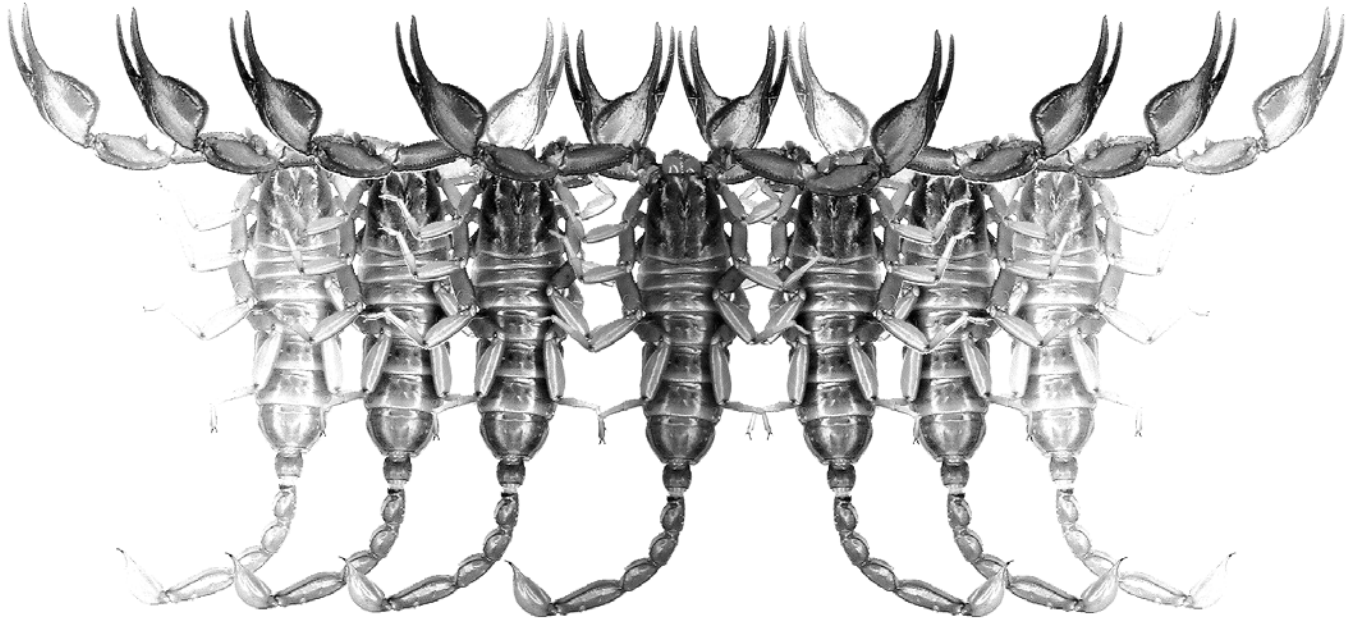


Euscorpius

Occasional Publications in Scorpiology



On the Poorly Known Genus *Mesotityus* González-Sponga, 1981 (Scorpiones: Buthidae)

Luis F. de Armas and Fernando J. M. Rojas-Runjaic

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Euscorpilus

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On the poorly known genus *Mesotityus* González-Sponga, 1981 (Scorpiones: Buthidae)

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Summary

Examination of new available material (18 females and six males) of the rare Venezuelan scorpion *Mesotityus vondangeli* González-Sponga, 1981 (Buthidae) demonstrated that there are consistent taxonomic characters to consider it as a genus different from *Tityus* C. L. Koch, 1836 *sensu stricto*. Nevertheless, it shares important characters with species of the *Tityus clathratus* group (=subgenus *Archaeotityus* Lourenço, 2006). An emended diagnosis of *Mesotityus* is given, as well as data on natural history, meristic and morphometric variation.

Introduction

The Venezuelan scorpion *Mesotityus vondangeli* González-Sponga, 1981, which is the type species of this monotypic genus, remains as one of the most poorly known South American buthids. It was described from two males and one female from Parque Nacional Henri Pittier, Aragua State, Venezuela, and no other specimens have been recorded to date.

According to González-Sponga (1981), *Mesotityus* differs from other buthid genera mainly by having ovoid stigmata, subpentagonal sternum, neobothriotaxic pedipalps (d_2 positioned on internal face of femur, d_2 absent on patella, and Eb_3 absent on chela), and tergites I–VI pentacarinat. Nevertheless, later on he did not mention neobothriotaxy as a diagnostic character (González-Sponga, 1984, 1996). Fet & Lowe (2000: 181) suggested that *Mesotityus* “occupies a plesiomorphic position among the New World Buthidae”, although they pointed out that loss of small trichobothria is frequent in small buthids, and therefore “their systematic significance must be considered with caution.”

Regarding the rows of denticles on pedipalpal fingers, González-Sponga (1981) only mentioned that *M. vondangeli* has 14 rows on the movable finger and 13 on the fixed finger. He neither described their disposition nor illustrated them, but in a later work he (González-Sponga, 1996:130, fig. 299) provided a drawing of the fixed finger with only 11 imbricated rows of denticles. In that drawing the disposition of the rows of denticles appears similar to that observed in species of the genus *Tityus* C. L. Koch, 1836.

Another interesting character described by González-Sponga (1981, 1984, 1996) is the supposed presence of truncate thick macrochaetae (“macroquetas gruesas y truncadas”), although he did not mention in which part of the body they were found.

Recently, the junior author collected several males and females of *M. vondangeli* from the vicinities of type locality. In the present contribution, we examine the taxonomic status of this monotypic genus based on morphological evidence.

Material and Methods

Examined specimens are deposited in the following collections:

IES: Instituto de Ecología y Sistemática, Havana, Cuba.

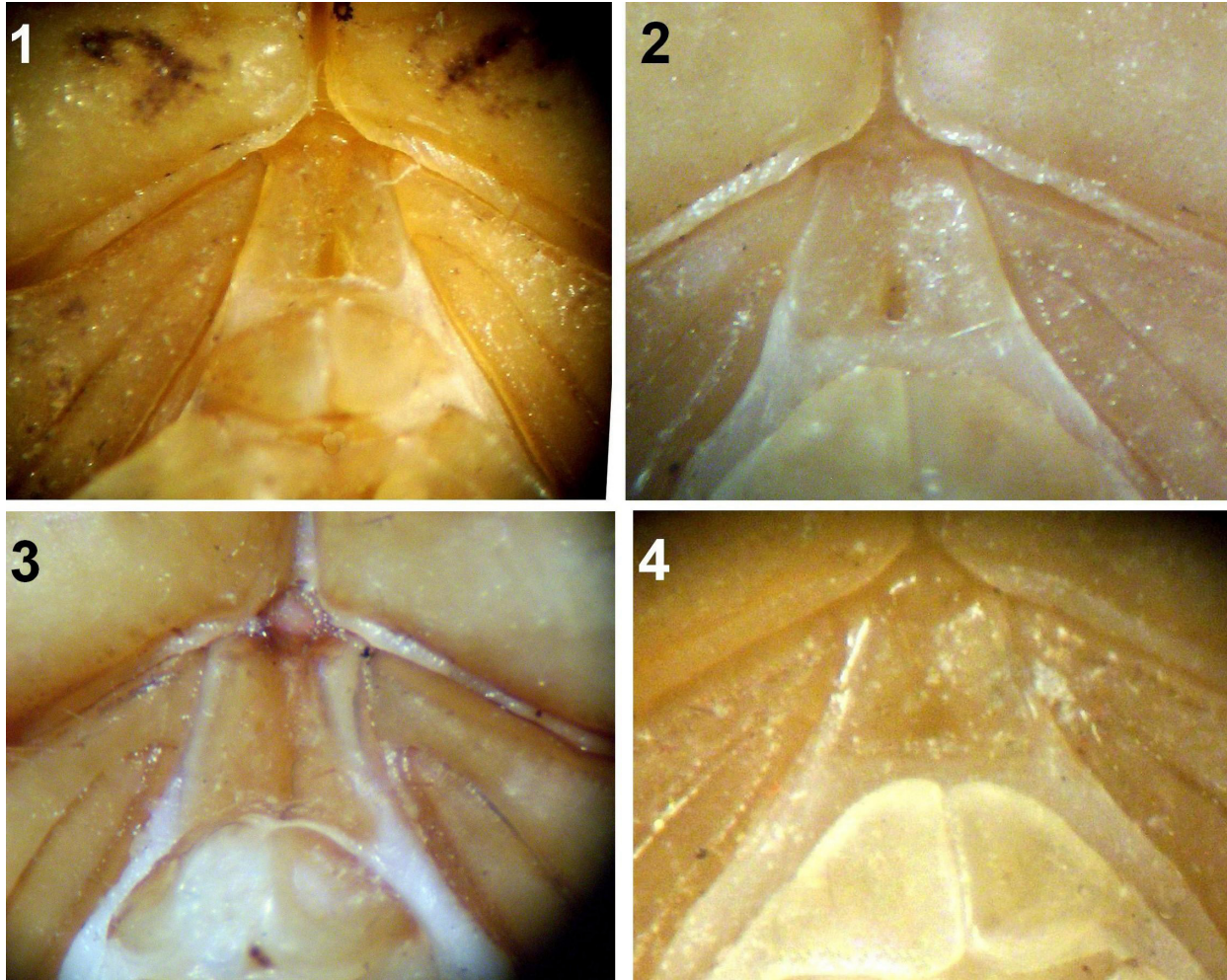
MAGS: M. A. González-Sponga personal collection, Caracas, Venezuela.

MBLUZ: Museo de Biología de la Universidad del Zulia, Maracaibo, Venezuela.

MCNC: Museo de Ciencias Naturales de Caracas, Caracas, Venezuela.

MHNLS: Museo de Historia Natural, Fundación La Salle, Caracas, Venezuela.

Photos were taken with a digital camera coupled to a dissecting microscopy. Map was modified from Microsoft Encarta Reference Library 2005. Nomenclature and measurement follows Stahnke (1970), except for trichobothriotaxy (Vachon 1974) and sternum (Soleglad & Fet, 2003). All measurements are given in millimeters.



Figures 1–4: Coxosternal area. 1. *Mesotityus vondangeli*. 2. *Tityus (Archaeotityus) ocelote* (Costa Rica). 3. *Microtityus lantiguai* Armas. 4. *Tityus (Tityus) anasilviae* Armas et Abud Antun, 2002 (male holotype).

Results

Character analysis

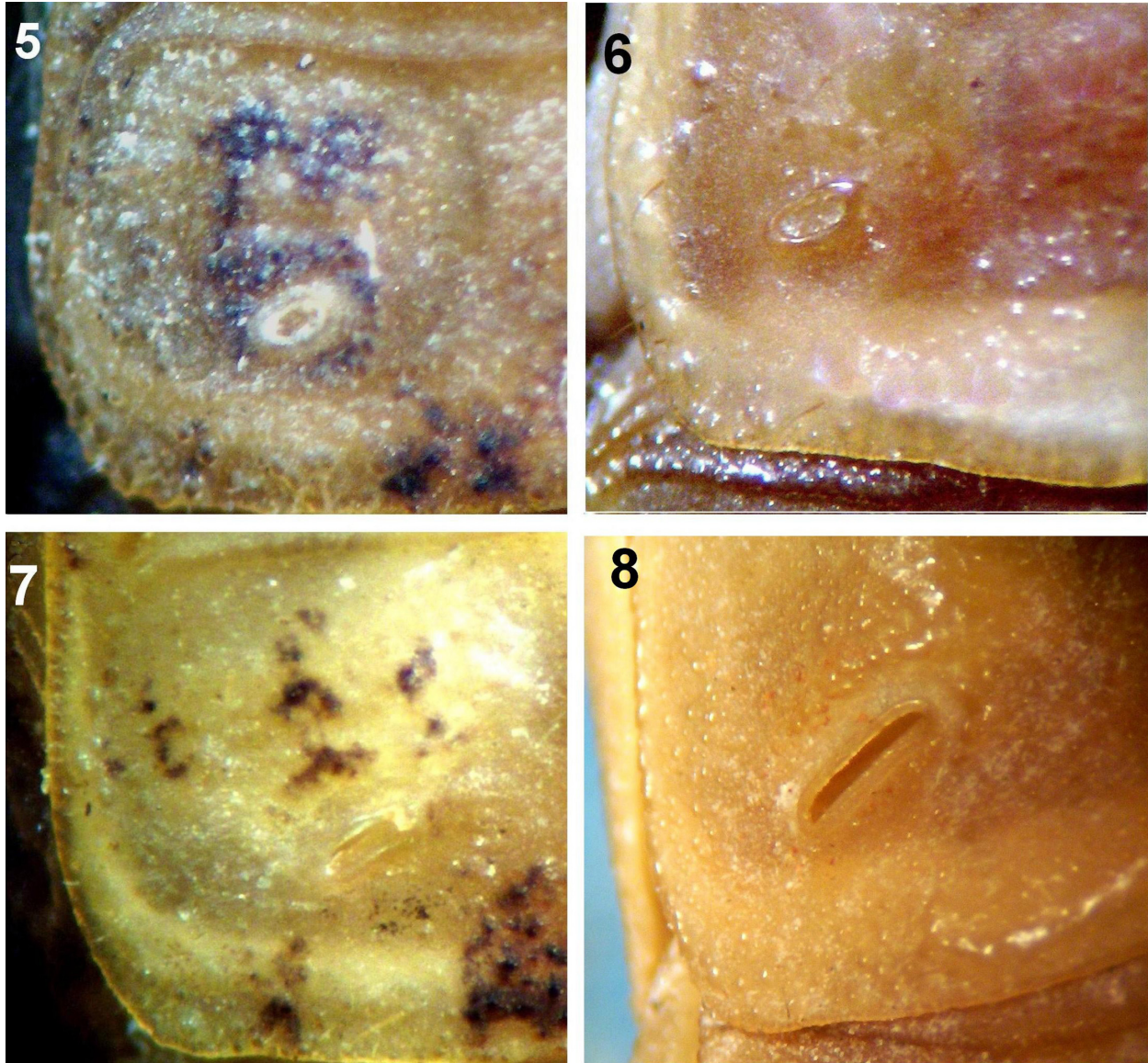
(1) **Sternum.** *Mesotityus vondangeli* has sternum type 1, slightly subpentagonal in external aspect, with a deep posterior depression, characters shared with some species of the *Tityus clathratus* group (= subgenus *Archaeotityus* Lourenço, 2006) (Figs. 1–2). In members of the subgenus *Tityus* (sensu Lourenço, 2006) sternum is subtriangular, it has a median longitudinal furrow and a shallow posterior depression (Fig. 3). In general aspect, sternum in *Mesotityus* resembles that of species of the genera *Microtityus* Kjellesvig-Waering, 1966 (Fig. 4), and *Alayotityus* Armas, 1973.

(2) **Stigmata.** As described by González-Sponga (1981), stigmata of *M. vondangeli* are ovoid (Fig. 5), similar to those found in some species of the subgenus *Caribetityus* Lourenço, 1999 (*sensu* Lourenço, 2006)

(Fig. 6). The Central American *Tityus ocelote* Francke & Stockwell, 1987 has stigmata suboval in shape, but slightly most linear than in *Mesotityus* (Fig. 7). In contrast, *Tityus bahiensis* (Perty, 1834) (subgenus *Tityus*) has visibly linear stigmata (Fig. 8).

(3) **Neobotriotaxy.** As stated by Fet & Lowe (2000:181) those trichobothria called “petite” by Vachon (1974) (d_2 on femur and patella, and Eb_3 on chela) are small and tend to be lost in Buthidae. It is a very common phenomenon among *Microtityus* species (González-Sponga, 1970, 1981, 2001b), and some species of *Alayotityus* (Armas, 1973; Teruel, 2004). Therefore, we conclude that it is not a sufficient character for generic identification.

(4) **Truncate thick macrochaetae.** We did not observe this type of setation in the examined specimens (including one paratype), but scarce short acuminate setae (0.065–0.078 mm length) were present, mainly on pedipalps. So therefore, we consider it as an observation error of González-Sponga. Truncate thick macrochaetae



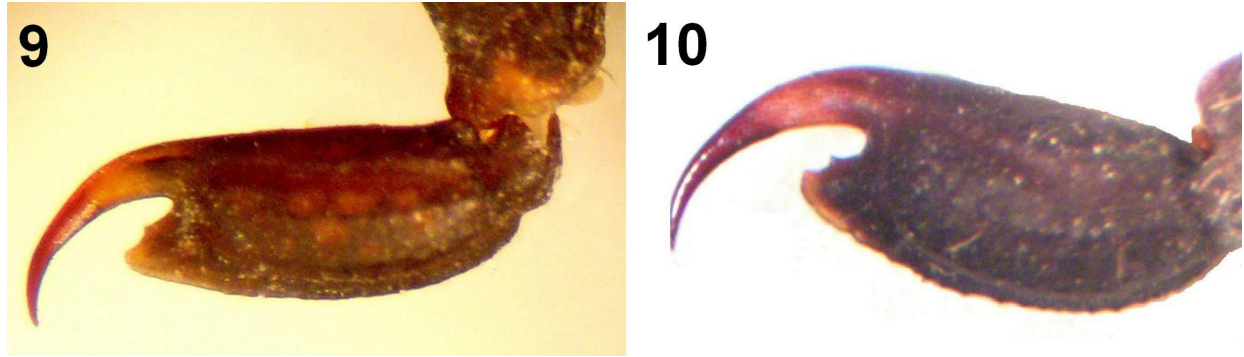
Figures 5–8: Sternite V stigmata. **5.** *Mesotityus vondangeli*. **6.** *Tityus (Caribetityus) quisqueyanus* Armas, 1981 (Dominican Republic). **7.** *Tityus (Archaeotityus) ocelote* (Costa Rica). **8.** *Tityus (Tityus) bahiensis* (Brazil).

have been recorded from some species of the genera *Microtityus*, *Rhopalurus* Thorell, 1876, *Alayotityus*, and *Tityopsis* Armas, 1974 (San Martín, 1968; Armas, 1973, 1974; Cruz & Armas, 1980).

(5) **Carinae on tergites I–VI.** In his diagnosis of the genus *Mesotityus*, González-Sponga (1981:4) stated that tergites I–VI have a long median carina and two pairs of short carinae. He did not illustrate them, but later in same paper, after describing *Mesotityus vondangeli*, he says that both submedian and lateral carinae on tergites I–VI are only represented by a single large granule projected on posterior margin of each tergite, although granule representing lateral carina is less accentuated. We certainly have observed these

granules, but they do not represent carinae, and they are also present in several species of the genera *Tityus* and *Centruroides*. Thus, we consider tergites I–VI of *M. vondangeli* as having a single longitudinal median carina.

(6) **Spatulate digitoterminal macrochaetae.** This interesting type of pedipalp finger setae, exclusive for the buthid scorpions, has been found in most New World genera, as well as in some Old World taxa (Armas, 1977; Cruz & Armas, 1980). Nevertheless, taxonomists have not yet made use of them as a taxonomic tool. Among New World genera, these macrochaetae are present in *Alayotityus*, *Ananteris* Thorell, 1891, *Centruroides* Marx, 1890, *Isometrus* Ehrenberg, 1828,



Figures 9–10: Male telson, lateral aspect. 9. *Mesotityus vondangeli*. 10. *Tityus (Archaeotityus) clathratus* (Caracas, Venezuela).



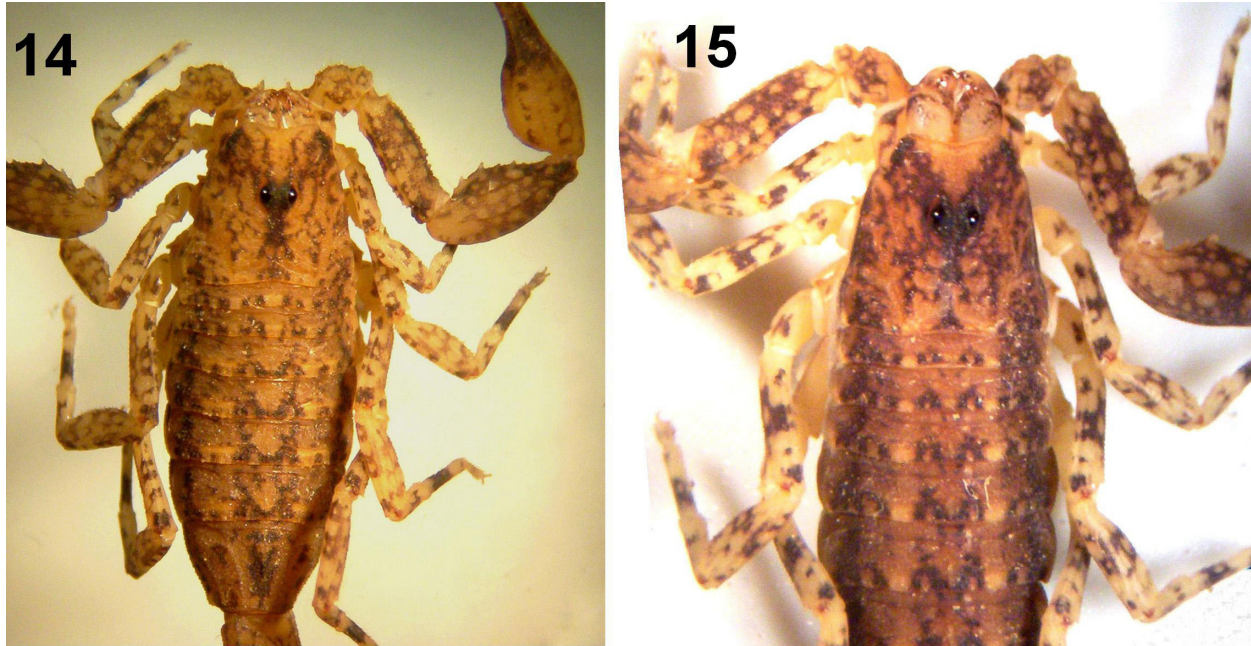
Figures 11–13: Telson, lateral aspect. 11. *Tityus (Tityus) crassimanus* (Thorell, 1876) (male, Dominican Republic). 12. *Tityus (Caribetityus) quisqueyanus* (female, Dominican Republic). 13. *Tityus (Caribetityus) septentrionalis* Armas et Abud Antun, 2004 (female, Dominican Republic).

Rhopalurus, and *Tityus* [except subgenus *Caribetityus* (L. F. de Armas, pers. obs.)] (Armas, 1977; Cruz & Armas, 1980). They were also observed in a female specimen of *Zabius fuscus* (Thorell, 1876) from Cabalango, Cordoba, Argentina (IES), but seem to be absent in the entire genus *Microtityus* (L. F. de Armas, pers. observ.). Now, we have established that they are lacking in *Mesotityus* as well.

(7) **Rows of denticles on pedipalpal fingers.** *Mesotityus vondangeli* has 12–14 strongly imbricated rows of denticles (Table I), without lateral accessory

denticles, a character shared with members of the *Tityus clathratus* group (subgenus *Archaeotityus*). Species of the entire genus *Tityus*, as it is now accepted, have pedipalpal fingers with strongly imbricated rows of denticles, without lateral accessory denticles, a configuration that, in the New World, is shared only by *Mesotityus*.

(8) **Telson.** *Mesotityus vondangeli* has telson similar to *Tityus clathratus*, with a large rhomboidal subaculear tubercle (Figs. 9-10). It clearly differs from members of the subgenera *Tityus* and *Atreus* Gervais, 1843 (as



Figures 14–15: Prosoma and mesosoma, dorsal aspect, showing general color pattern. **14.** *Mesotityus vondangeli*. **15.** *Tityus (Archaeotityus) clathratus* (Caracas, Venezuela).

defined by Lourenço, 2006), which have a rather sharp subaculear tubercle, sometimes absent (Fig. 11). Species of the subgenus *Caribetityus* have vestigial or small spinoid subaculear tubercle (Figs. 12–13).

Discussion

By its color pattern (Fig. 14), and general morphology, *Mesotityus vondangeli* seems to be a member of the *Tityus clathratus* group (= subgenus *Archaeotityus* Lourenço, 2006) (Fig. 15). However, it differs from *Archaeotityus* species by having ovoid stigmata, and lacking spatulate digitoterminal macrochaetae. Neobothriotaxic pedipalp is not considered as diagnostic at generic level because in this particular case it seems to be uninformative.

Mesotityus differs from subgenus *Tityus* (*sensu* Lourenço, 2006) by having: (a) ovoid stigmata, (b) slightly subpentagonal sternum with deep posterior depression, (c) pedipalpal fingers with 12–14 rows of denticles (15–18 in *Tityus*), (d) telson with subaculear tubercle strongly rhomboidal (mostly spinoid in *Tityus*), and (e) absence of spatulate digitoterminal macrochaetae.

Therefore, we conclude that at the present level of knowledge it is better to maintain *Mesotityus* as a valid genus. Future research (F. Rojas-Runjaic, in progress) perhaps will contribute to clarifying relationships of *Mesotityus* with subgenera *Archaeotityus*, *Tityus* and other related taxa. If it is demonstrated that *Mesotityus* is

a member of the *Tityus clathratus* group, then *Archaeotityus* must be regarded as its junior synonym.

Taxonomy

Genus *Mesotityus* González-Sponga, 1981

Mesotityus González-Sponga, 1981:5; González-Sponga, 1984:67, 100; González-Sponga, 1996:130; Kovařík, 1998:115 (citation only); Fet & Lowe, 2000:181.

Type species. *Mesotityus vondangeli* González-Sponga, 1981, by original designation.

Distribution. Only known from Aragua State, Venezuela.

Diagnosis (emended). Small sized species, rarely reaching 31 mm in total length, base color golden yellowish with dark brown spots on the entire body. Carapace subrectangular in shape. Tergites I–VI with a median longitudinal carina. Sternum type 1, slightly subpentagonal, with deep posterior depression. Pectines short, with 12–15 teeth in both sexes, with basal intermediate plate not enlarged. Sternites III–VI with ovoid stigmata; V with a small posterior median whitish area in both sexes. Metasomal segments I–IV with parallel ventral submedian carinae. Telson with a large rhomboid subaculear tubercle. Pedipalpal fingers with 12–14 rows of strongly imbricate rows of granules, without accessory denticles; spatulate digitoterminal macrochaetae absent. Secondary sexual dimorphism only slightly evident.

Catalogue N°	Sex	LFF	RFF	LMF	RMF
MHNLS 1162	M	13	13	14	14
MHNLS 1169	M	13	13	13	14
MHNLS 1170	M	12	13	14	14
MHNLS 1161	F	13	13	14	14
MHNLS 1163	F	13	13	14	14
MHNLS 1164	F	12	12	13	14
MHNLS 1165	F	13	12	14	14
MHNLS 1166	F	13	13	14	14
MHNLS 1167	F	13	13	13	14
MHNLS 1168	F	12	13	14	14
MHNLS 1171	F	12	12	14	14
MHNLS 1172	F	12	12	13	13
MHNLS 1773	F	13	13	14	14
MHNLS 1174	F	13	12	14	14
MHNLS 1175	F	12	12	13	13
MHNLS 1176	F	13	12	14	14
MHNLS 1177	F	12	12	14	14

Table 1: *Mesotityus vondangeli*, variation of the number of denticle rows on pedipalpal fingers. Abbreviations: LFF, Left fixed finger; RFF, right fixed finger; LMF, left movable finger; RMF, right movable finger.

Sex	N	Number of Pectinal Teeth				SD	X
		12	13	14	15		
Female	33	4	17	11	1	0.72	13.27
Male	16		3	10	3	0.63	14.00

Table 2: Variation of the pectinal tooth count in *Mesotityus vondangeli*. N, number of pectines examined; SD, standard deviation; X, arithmetic mean. Includes data of type series (two males and one female), as given by González-Sponga (1981).

Mesotityus vondangeli González-Sponga, 1981

(Figs. 1, 5, 9, 14, 16, tables 1–4)

Mesotityus vondangeli González-Sponga, 1981:5–14, 23, figs. 1–9, table; González-Sponga, 1984:67–69, fig; González-Sponga, 1996:130–131, figs. 298–303; Kovařík, 1998:115 (citation only); Fet & Lowe, 2000:181; González-Sponga, 2001a:30, 42, 50.

Type data. Male holotype (MCNC-784), one female paratype (MCNC-785), and one male paratype (MAGS-3629), Hacienda La Trilla (10°27'N, 67°24' W), Parque Nacional Henri Pittier, Distrito Girardot, Estado Aragua, Venezuela. *Note:* Holotype and paratype, supposedly deposited in the MCNC, were not found in that institution. We only examined male paratype MAGS-3629.

Distribution. Only known from type locality and another neighboring one (Fig. 16).

Diagnosis. Total length, 24–31 mm. Pedipalp neobothriotaxitic type A- α (d_2 positioned on internal face of femur, d_2 absent on patella, and Eb_3 absent on chela);

fixed finger with 12 or 13 rows of denticles; movable finger with 13 or 14 (Table 1). Pectines with 12–14 teeth in female, and 13–15 in male (Table 2). Other characters same as in the genus. Measurements, see Tables 3–4.

Natural history. According to González-Sponga (1981, 1996) this species was found under stones, and the litter of humid tropical forest (200 m a.s.l.), sympatrically with species of the genera *Tityus*, *Microtityus*, and *Ananteris*. In “Rio Catá” (6 km E of “Hacienda La Trilla”) it was found in a similar habitat at 100 m a.s.l., sympatrically with *Tityus clathratus*, *Tityus pittieri* González-Sponga, 1981, *Tityus melanostictus* Pocock, 1893, *Tityus* sp., *Microtityus sevciki* González-Sponga 2001, and *Chactas ferruginosus* González-Sponga, 1982. In this last locality specimens were collected at night (22:00 hr) with help of UV light, on shrubs and branches of small trees, at 10–50 cm over the surface. The female:male ratio observed in this locality on April 2006 was 1:0.33.

Specimens examined. Three males and 14 females (MHNLS), two males (IES), two females (MAGS-6413), two females and one male (MBLUZ), Río Catá (\pm

Characters	(1) IES	(2) IES	X (N=5)	SD (N=5)
Carapace, L / posterior W	2.91/3.17	3.48/3.74	3.04/3.47	0.30/0.32
Pedipalp, L	9.99	12.43	11.22	1.15
Femur, L/W	2.50/0.83	3.07/1.04	2.78/0.91	0.27/0.09
Patella, L/W	2.96/1.20	3.48/1.51	3.22/1.36	0.27/0.14
Chela, L	4.73	5.88	5.27	0.56
Manus, L/W/H	1.87/1.25/1.14	2.18/1.58/1.51	2.01/1.46/1.42	0.25/0.22/0.23
Movable finger, L	2.91	3.48	3.32	0.34
Mesosoma, L	6.00	7.70	6.27	0.86
Metasoma, L	15.23	18.05	17.14	1.18
I, L/W/H	1.77/1.46	2.08/1.66	1.99/1.52/1.43	0.13/0.19/0.11
II, L/W	2.13/1.28	2.60/1.51	2.50/1.38	0.21/0.10
III, L/W	2.39/1.25	3.02/1.46	2.78/1.35	0.24/0.11
IV, L/W	2.86/1.25	3.38/1.40	3.15/1.36	0.21/0.12
V, L/W/H	3.48/1.30/1.35	3.95/1.62/1.77	3.79/1.50/1.59	0.20/0.18/0.21
Telson, L	2.60	3.02	2.93	0.23
Vesicle, L/W/H	1.82/0.83/0.88	2.08/0.99/1.04	1.96/0.96/0.98	0.17/0.10/0.09
Total length	24.14	29.23	26.45	1.99

Table 3: Measurements (mm) of five male specimens of *Mesotityus vondangeli* from IES. Abbreviations: H, height; L, length; SD, standard deviation; W, width; X, arithmetic mean; (1) and (2) represent the smallest and the largest specimens, respectively.

Characters	(1) MHNLS-1164	(2) MHNLS-1172	X (N=5)	SD (N=5)
Carapace, L / posterior W	3.16/3.79	3.42/4.07	3.34/3.92	0.13/0.14
Pedipalp, L	11.78	13.28	12.29	0.59
Femur, L/W	2.91/1.00	3.21/1.12	3.01/1.04	0.13/0.06
Patella, L/W	3.40/1.44	4.14/1.58	3.64/1.51	0.29/0.07
Chela, L	5.47	5.93	5.64	0.18
Manus, L/W/H	1.86/1.12/1.14	2.14/1.30/1.19	2.00/1.20/1.18	0.11/0.07/0.02
Movable finger, L	3.77	3.95	3.87	0.08
Mesosoma, L	7.84	8.88	8.15	0.92
Metasoma, L	17.62	18.43	18.20	0.52
I, L/W/H	2.09/1.65/1.40	2.09/1.79/1.40	2.04/1.72/1.46	0.07/0.06/0.08
II, L/W	2.6/1.37	2.67/1.53	2.62/1.45	0.05/0.06
III, L/W	2.84/1.30	3.02/1.42	2.92/1.36	0.10/0.06
IV, L/W	3.21/1.26	3.37/1.42	3.26/1.33	0.13/0.06
V, L/W/H	3.93/1.28/1.35	4.14/1.44/1.51	4.16/1.35/1.43	0.15/0.07/0.07
Telson, L	2.95	3.14	3.20	0.17
Vesicle, L/W/H	1.95/0.98/1.02	2.09/1.05/1.12	2.02/1.02/1.04	0.08/0.03/0.05
Total length	28.62	30.73	29.70	1.00

Table 4: Measurements (mm) of five female specimens of *Mesotityus vondangeli*. Abbreviations: H, height; L, length; SD, standard deviation; W, width; X, arithmetic mean; (1) and (2) represent the smallest and the largest specimens, respectively.

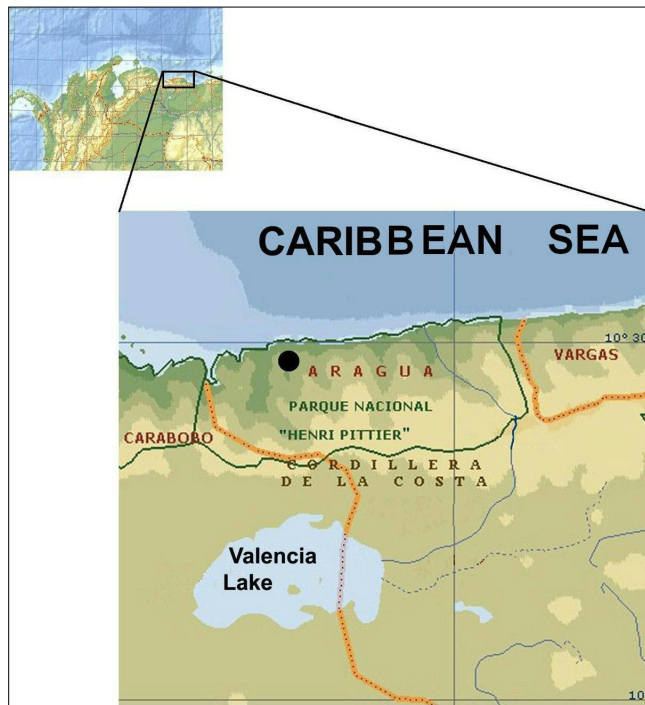


Figure 16: Geographical distribution of the genus *Mesotityus*.

100 m a.s.l.), upstream from the dam, Parque Nacional "Henri Pittier", Estado Aragua, Venezuela, 6 April 2006, F. J. M. Rojas-Runjaic.

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