



## New species, notes on the biology of *Scaptolenus* LeConte (Coleoptera: Elateridae), and a key to the “*vagans*-group”

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### Abstract

Two new species of the genus *Scaptolenus* LeConte (Coleoptera: Elateridae: Elaterinae: Cebrionini) from Mexico are described and illustrated: *Scaptolenus pacofierroi* sp. nov., found in the municipality of Aldama, in the state of Tamaulipas and *Scaptolenus zuritai* sp. nov., collected from the Chamela-UNAM Biological Station, in the state of Jalisco. Their segregation is based on the morphological configuration of their antennae, aedeagus, protibiae and metacoxal lamina. These new species fit well within the *vagans*-group and a key is presented to distinguish these new species within the *vagans* group. Additionally, distribution data of these new species are provided and biological data of the genus *Scaptolenus* are presented and analyzed.

**Key words:** Cebrionini, *Scaptolenus*, rain click beetles, Mexico, new species

### Introduction

The genus *Scaptolenus* LeConte (Coleoptera: Elateridae: Elaterinae: Cebrionini) is a group of beetles found in North and Central America, and commonly known as “rain click beetles” (Taber & Fleenor, 2003; Johnson, 2013). This genus contains the largest number of described species of the tribe Cebrionini in the American continent. However, it is a little known group and only sporadically collected, with significant lack of biological and taxonomic information. The members of this genus are characterized by being medium-sized insects, approximately 25 mm in length, with a generally uniform brown coloration and a reduced prosternum which is much narrower than that of other members of the Elateridae family (Chevrolat, 1874). In dorsal view, these beetles have a trapezoidal morphological appearance, generally with their elytra narrowed posteriorly. The pronotal apices vary in the degrees of acuity between species. Most of the males of the genus have serrated antennae, with antennomeres 3-10 often apically expanded (Johnson, 2013). Their mandibles are usually sickle-shaped and prognathous. These combined morphological traits make the genus easily recognizable from most other elaterids (Chevrolat, 1874; Martínez-Luque, 2018). The distribution of this group of beetles is from the southern United States of America to Panama with most species recorded from Mexico and Central America. The taxonomic problems of *Scaptolenus* are reflected in the limitations of the descriptions of the 35 species that make it up the genus (Chevrolat, 1874; Champion, 1896; Johnson 2013). For example, twenty-five of the described species (71.4%) are described from a single type locality from Mexico, and eight of which, (22.8%), do not have a specific type locality, as label data is limited only to country level, “Mexico”.

The present article represents the description of two new species that are assigned to the “*vagans*-group”, which previously included five species (Johnson, 2013). This increases to 27 the number of described species of the genus *Scaptolenus* for Mexico.

## Material and methods

The specimens described herein belong to the collections of the Colección Nacional de Insectos, of the Instituto de Biología of the Universidad Autónoma de México, México City, México (CNIN-IBUNAM, Alejandro Zaldívar and Cristina Mayorga) and the private collection of Daniel Curoe in México City, México (DJCC, Daniel Curoe). The studied specimens were dissected and compared with original descriptions of the species that make up the “*vagans*-group” (Johnson, 2013), as well as with the paratypes of the species *Scaptolenus phaltingi* Johnson, 2013, deposited in the CNIN-IBUNAM collection. Also, comparisons were made from type specimen photographs from the National Museum of Natural History, Washington, D. C., and type specimen photographs of the species described by G. C. Champion, deposited in the Natural History Museum, London, provided by Max Barclay (MHN-London), and those of J. L. LeConte, G. H. Horn, and H. C. Fall, available online at the Museum of Comparative Zoology (MCZ 2020).

The criteria used to obtain the measurements of the analyzed organisms focused on the analysis of external morphological characters, such as: the head, pronotum, elytra, maxillary palps, antennomeres, prosternum, protibial spurs, ectal tooth of the protibia, metacoxal lamina and metatarsomeres. Internal characters were also included, such as: the length and width of the lateral parameres, the middle lobe and the base of the penis. The morphological terms and characters measured used in this work are mainly based on the works of Champion (1896), Lawrence *et al.*, (2010), Johnson (2013), López-Colón & Bahillo de la Puebla (2010) and Zapata & Sánchez-Ruiz (2020; 2021).

The photographs of the habitus of specimens that illustrate the new species were obtained with a Canon EOS Rebel T6 Camera with Fotodiox Macro Extension Tube, the photographs of the genitalia were taken with a Velabstereoscopic microscope model Stereo VE-S3 and an external camera Dino-Lite Digital Eye Piece Camera (R4) using the DinoCapture 2.0 program.

## Results

### Systematics

#### Order Coleoptera Linnaeus, 1758

#### Suborder Polyphaga Emery, 1886

#### Superfamily Elateroidea Leach, 1815

#### Family Elateridae Leach, 1815

#### Subfamily Elaterinae Leach, 1815

#### Tribe Cebrionini Latreille, 1802

#### Genus *Scaptolenus* LeConte, 1853

#### *Scaptolenus pacofierroi* Martínez-Luque sp. nov.

(Figs. 1–5, 11, 13, 15, 17, 19)

**LSID.** urn:lsid:zoobank.org:act:48216EFB-6995-4FA4-AC96-89E57C3F541

**Material examined. Holotype (male)** (COL-TIP-03713): MÉXICO, Tamaulipas, Municipio of Aldama, Sabino Gordo, 22-25.08.2009, Cols. Daniel Curoe and Fierro (specimen deposited in CNIN-IBUNAM). **Paratypes.** Seven males, same data. (specimens deposited in CNIN-IBUNAM) (COL-TIP-03714; COL-TIP-03715; COL-TIP-03716; COL-TIP-03717; COL-TIP-03718; COL-TIP-03719; COL-TIP-03720); 1 male, same data (specimen deposited in DJCC) (ELAT-001-DJCC); and 1 male, MÉXICO, Puebla, Chilac, near Tehuacan, 26.05.2009, light trap, Col. Daniel Curoe (specimen deposited in CNIN-IBUNAM) (COL-TIP-03721).

**Locality type.** MÉXICO, Tamaulipas, Municipality of Aldama, locality of Sabino Gordo, 22°55'6.15"N-97°56'20.81"W, 100 m.

**Description.** Male. Holotype. Body 14.3–16.6 mm long ( $\bar{x}$  = 15.6, n = 10), 5.9–6.7 mm wide ( $\bar{x}$  = 6.2, n = 10); Color generally brown, with lighter tones on the legs and ventral portions, darker tones on the head and in the apical portions of the elytra (Figs. 1–3). Head with fulvus-aeueous color with fuscus-piceous tones with long, decumbent setae with fulvus coloration. Eyes, prominent and fuscus in color. Antenna brown with thick black setae and smaller, thinner interspersed fulvus setae. Pronotum light brown in color with presence of long, decumbent setae, luteal in color. Coxae and femur of light brown color with short and decumbent, fulvus-aeueous setae. Tibia, tarsi and claws fuscus in color with the presence of fulvus colored setae. Elytra fuscus-rufous at the base, with long and decumbent fulvus-aeueous setae from the base to the initial part of the elytral suture to the humeral region; distal humeral region fuscus until apex with short decumbent fuscus setae, setae on the elytral margins slightly longer, thicker and fulvus. Abdomen, light brown in color, similar in color of the coxa and femur, with moderately long, decumbent, fulvus to fuscus setae.

Head 1.2–1.5 ( $\bar{x}$  = 1.4, n = 10) mm long, 1.1–1.5 ( $\bar{x}$  = 1.3, n = 10) mm wide; with simple and spaced punctation. Maxillary palps with length of the penultimate palp 0.5–0.7 ( $\bar{x}$  = 0.6, n = 10) mm and length of the last maxillary palp 0.5–0.7 ( $\bar{x}$  = 0.6, n = 10) mm with the penultimate segment slightly longer than the last segment (Fig. 17). Antennae long, extend beyond humeral region, from the fourth antennomere to apex more or less acute, dilated at the apex, length of antennomeres 2 to 11 0.2:0.3:0.9:0.9:0.8:0.8:0.8:0.8:1.0. Pronotum 1.7X times wider than long; width of the pronotum 3.8–4.4 ( $\bar{x}$  = 4.0, n = 10); length of the pronotum 2.0–2.4 ( $\bar{x}$  = 2.2, n = 10) mm; anterior margin arched and lobed at midline; lateral margins rounded, without carina, widely arched on the dorsal side. Pronotum with dense and sparsely scattered punctation, less dense and more dispersed on head than on pronotum. Posterior angles divergent, and markedly attenuated towards apex; posterior margin lobed anterad of scutellum. Scutellar shield sub-triangular. Elytra length 10.8–12.8 ( $\bar{x}$  = 11.9, n = 10) mm; width of the elytra (humeral region) 5.9–6.7 ( $\bar{x}$  = 6.2, n = 10) mm; with distinct, circular punctures, with uniform distances between punctation on the disc and apically; presence of deep and well-marked striae, narrowing anteriorly and ending before apex. Abdomen, with five small; ventrites with truncated posterior margins, with shallow punctures, each with a seta. Prosternum, length 0.7–0.9 ( $\bar{x}$  = 0.8, n = 10) mm; width of the prosternum 1.0–1.2 ( $\bar{x}$  = 1.1, n = 10) mm; moderately short (reaches the limit of the coxa), narrowing towards the anterior portion, strongly arched between the coxae, with moderate and slightly marked punctation (Fig. 11). Mesoventrite and metaventrite, with shallow punctures, with a large number of luteal setae obscuring a large part of the segments. Metacoxal lamina moderately wide, tapering laterally, curved at the apex with three rounded projections at the base, connected with a slight curve laterally (Fig. 13). Metanepisternum and Metepimeron, not visible due to the large number of luteal setae in the ventral part. Legs, the prothoracic legs with tibia with a slight emargination medially, the ectal edge with a central tooth of triangular appearance with the apical portion slightly rounded and with a moderate inclination towards the apex, apex with an abruptly acute laterally angular tooth; length of the ectal tooth 0.4–0.6 ( $\bar{x}$  = 0.6, n = 10) mm. Protibial spur, length of left spur 0.6–0.9 ( $\bar{x}$  = 0.8, n = 10) mm; length of right spur 0.5–0.8 ( $\bar{x}$  = 0.7, n = 10) mm; apical margin of spurs acute (Fig. 15). Tarsi, average length of 1 to 5 (2.1:1.1:0.8:0.6:1.0) mm; slender, sub-cylindrical, each ventrally with brush of short and stiff pubescence.

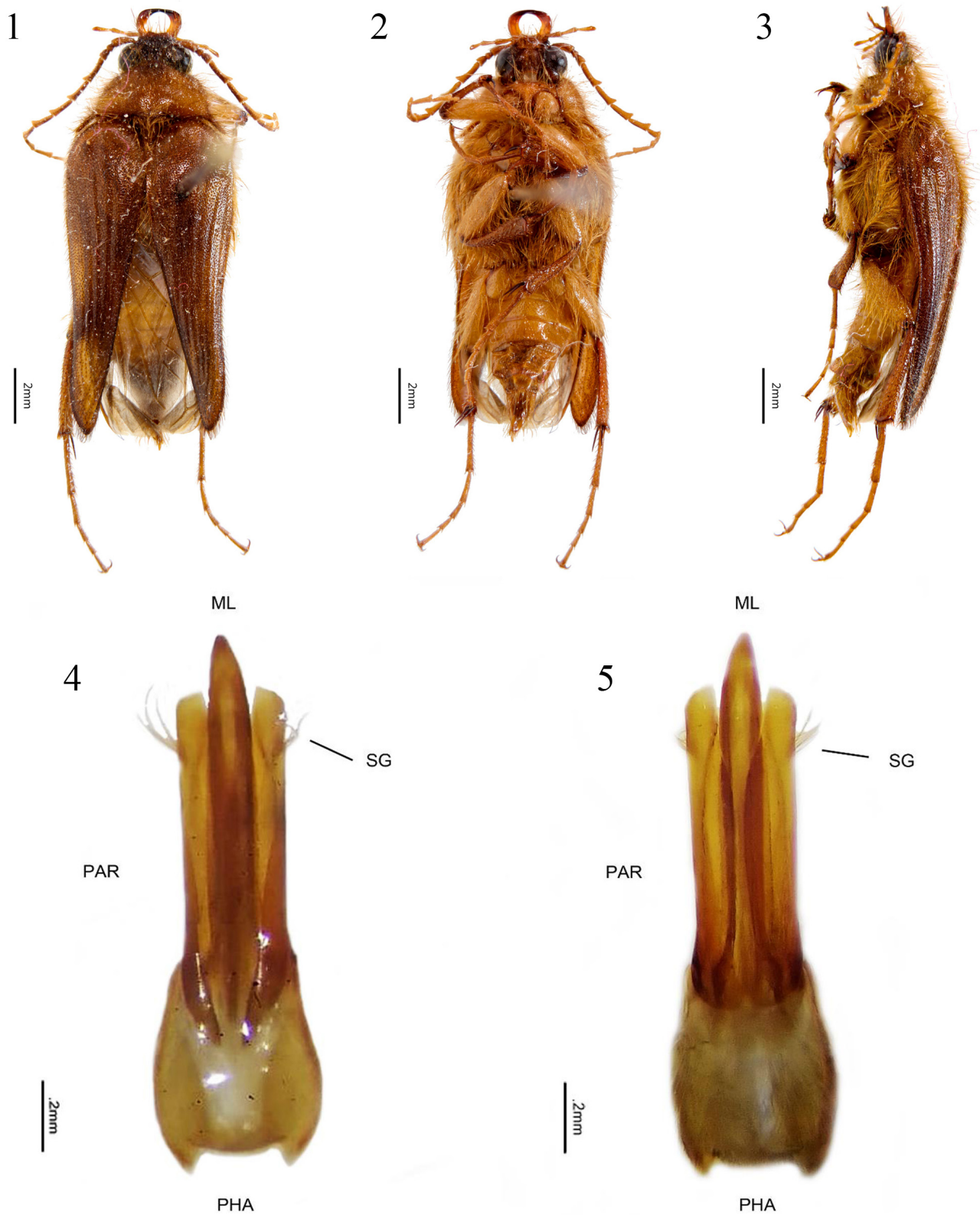
**Male Genitalia,** trilobed aedeagus: phallobase almost twice as long as it is wide, slightly curved, widening in basal third with a semi-rectangular basal notch and a rectangular posterior internal notch, subequal to basal notch, membranous dorsally. Median lobe parallel-sided throughout its length, 1.2X times longer than the parameres, length 1.2–1.5 ( $\bar{x}$  = 1.4, n = 10) mm, apex three-quarters of the total length, tapering to the anterior portion and ending in a curved point. Parameres, length 1.0–1.3 ( $\bar{x}$  = 1.1, n = 10) mm, parallel-sided throughout length, obtusely angulated and fusiform; subtruncated at the apex, with a ventral preapical group of setae.

**Immatures and females.** Unknown.

**Biological Data.** Nine specimens were collected in the town of Sabino Gordo, located 13.5 kilometers east of the town of Aldama, in the municipality of the same name, in the state of Tamaulipas, México. These specimens were collected between August 22 and 25, 2009. An additional specimen was collected in the town of San Gabriel Chilac, near the city of Tehuacán, in the state of Puebla, México. This specimen was collected between May 25 and 26, 2009.

The Sabino Gordo town is located in the Gulf Coastal Plain, which rises from 50 to 250 meters above sea level. Although this region is generally flat, there are some slight elevations and low hills (Cervantes-Zamora *et al.*, 1990;

Ruíz-Cancino & Coronado-Blanco, 2002). The town of Sabino Gordo is reported to have a warm subhumid climate, with a ratio of annual precipitation-average annual temperature of 32 (P/T), with rain in summer with only 5.6% of the rain during winter months (García, 1988). This pattern can be modified by the arrival of cold fronts in winter and sometimes by cyclones (Ruíz-Cancino & Coronado-Blanco, 2002).



**FIGURE 1–5.** *Scaptolenus pacoferroi* sp. nov.; Figs. 1, 2, 3 dorsal, ventral and lateral view; Figs. 4, 5 ventral and dorsal view of the aedeagus. PHA: phallobase; PAR: paramere; ML: median lobe; SG: setation group.

The dominant vegetation is mesquite, tamaulipan thorn scrub and secondary vegetation. Much of the natural vegetation has been disturbed by livestock activities (INEGI, 1982) which have modified the plant composition, due to the expansion of cultivated pastures used as forage. In the central and southern region of the plains and lomerio subprovince, the vegetation is varied with submontane scrub, low deciduous thorn forest, and secondary vegetation (INEGI, 1982).

The other locality where this species was collected was San Gabriel Chilac, which is located on the south-western side of the Tehuacán valley. This area belongs to Biosphere Reserve Tehuacán-Cuicatlán with the vegetation predominantly consisting of xeric scrublands made up of rosetophilous desert scrub, mezquital, chaparral, and cactus scrub (Carranza, 2000).

It is important to note that the dates on which this species was collected in the town of San Gabriel Chilac, Puebla (May) and Sabino Gordo, Tamaulipas (August) are the months with the highest precipitation in both locations.

**Distribution.** MEXICO, Puebla and Tamaulipas (Fig. 19).

**Etymology.** This species is named in honor of Biol. Francisco Fierro, an enthusiastic and passionate biologist who has dedicated much of his life the management of flora and fauna in southern Tamaulipas, Mexico.

**Taxonomic comments and diagnostic characters.** This species appears closely related to *Scaptolenus acutangulus* Champion, 1896. A diagnostic character separating these species is the difference in length of the third antennomere which is 1.7 times that of the second in *S. pacofierroi* **sp. nov.** and 2 times that of *S. acutangulus*. Another difference is the length of the third antennomere in relation to the fourth, which in *S. pacofierroi* **sp. nov.** is 2.6 times the length of the fourth and in *S. acutangulus*, it is 3 times the length of the fourth. The elytral disc of *S. acutangulus* is notably flattened whereas the disc of *S. pacofierroi* **sp. nov.**, is more rounded (Fig. 3). There is also a notable difference in size of these species, in which *S. acutangulus* is approximately three times as long as *S. pacofierroi* **sp. nov.**

### ***Scaptolenus zuritai* Martínez-Luque sp. nov.**

(Figs. 6–10, 12, 14, 16, 18–20).

**LSID.** urn:lsid:zoobank.org:act:E0A7E85D-D79F-4444-BD65-4B273C778153.

*Scaptolenus* sp.: Martínez-Luque, 2014:78-79,108, male (photographs), Mexico.

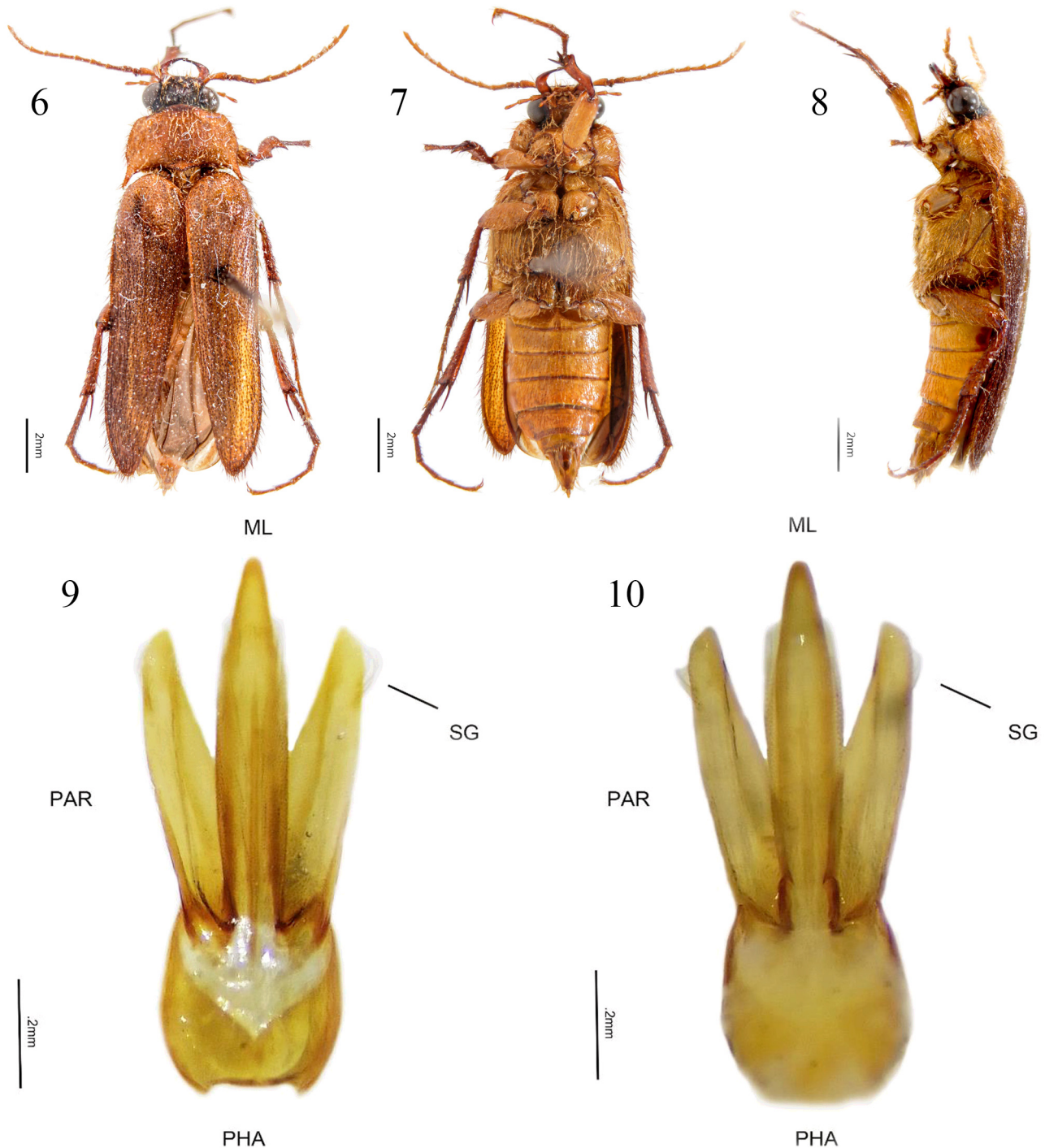
*Scaptolenus* sp.: Martínez-Luque *et al.*, 2016:959-964, male (list), Mexico.

**Material examined. Holotype (male)** (COL-TIP-03722): MÉXICO, Jalisco, La Huerta, Estación de Biología Chamela. 6-9.09.2012, Cols. Erick Omar Martínez Luque and Oscar Pérez Flores. (specimen deposited in CNIN-IBUNAM). **Paratypes.** Three males, MÉXICO, Jalisco, La Huerta, Estación de Biología Chamela, 6-9.09.2012, Cols. Erick Omar Martínez Luque and Oscar Pérez Flores (specimens deposited in CNIN-IBUNAM) (COL-TIP-03723; COL-TIP-03724; COL-TIP-03725); one male, MÉXICO, Jalisco, Estación de Biología Chamela, 1.08.1978, Col. Gorrola (specimen deposited in CNIN-IBUNAM) (COL-TIP-03726); one male, MÉXICO, Jalisco, La Huerta, Biology station Chamela, 24.05-23.06.2014, Col. Carlos Balboa Aguilar (specimen deposited in CNIN-IBUNAM) (COL-TIP-03727); one male, MÉXICO, Jalisco, Estación de Biología Chamela 12-19.04.2013, Cols. Oscar Pérez Flores and Gabriela Aguilar (specimen deposited in CNIN-IBUNAM) (COL-TIP-03728).

**Locality type.** MÉXICO, Jalisco, La Huerta, Estación de Biología Chamela 19°29'55.536"N; 105°2'35.4834"W, 116 m.

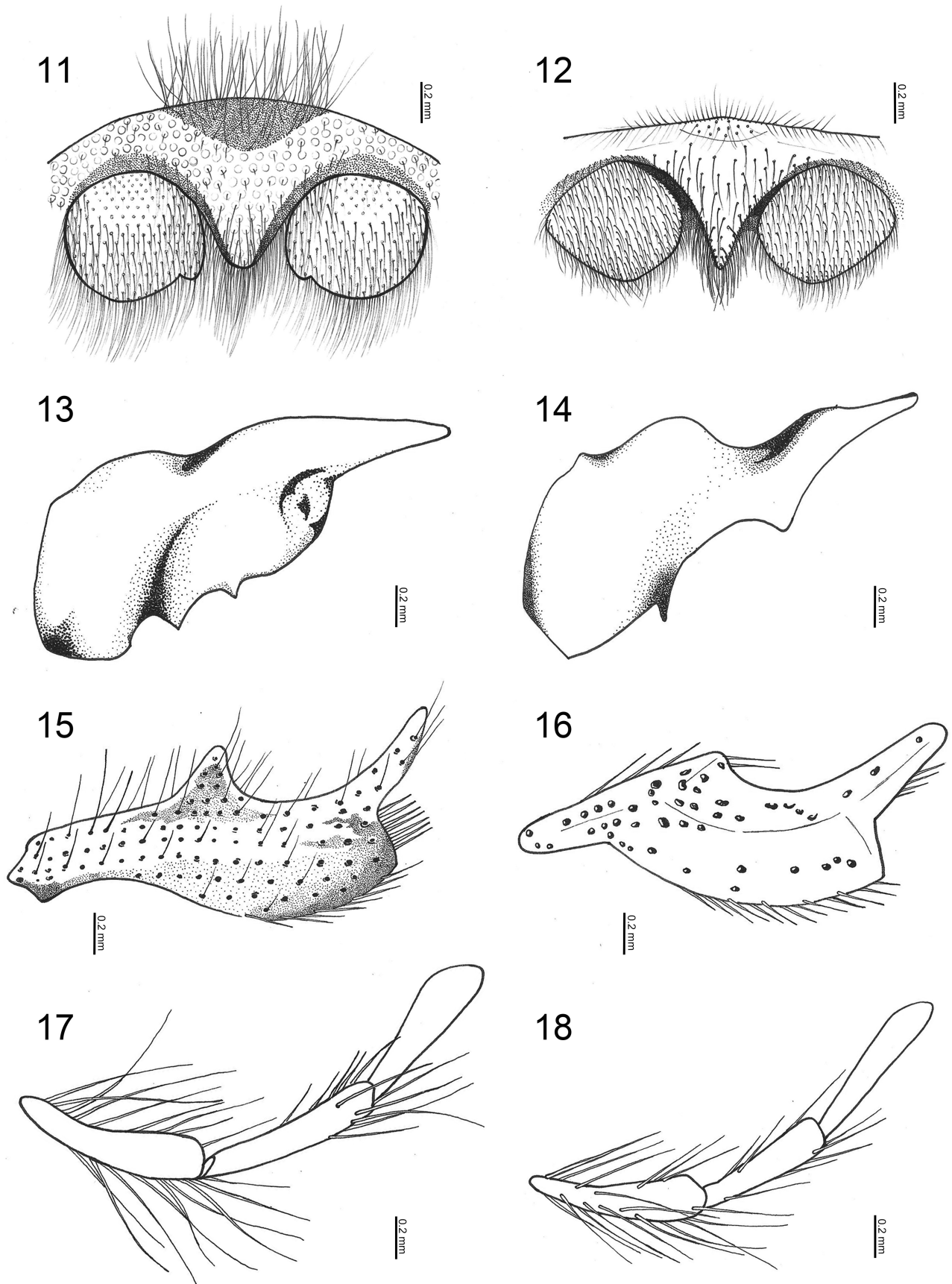
**Description.** Male. Holotype. Body 13.6-15.7 mm long ( $\bar{x}$ = 14.5, n=6), 4.9-6.6 mm wide ( $\bar{x}$ =5.5, n=6); This species has a brown, black and fuscus-ferruginous coloration. Head fuscus-piceus to black, with medium-sized setae, decumbent and with fulvus coloration. Eyes prominent and black. Antennae fuscus in base with the first antennomere with lighter fulvus-aeous tones posteriorly, with small and moderately abundant, fulvus colored setae. Pronotum, fusco-ferruginous to light brown in color, with a dark brown to black outer margin with medium-sized setae and fulvus color, with short decumbent, thin and black setae. Legs, coxa and femur light brown to testaceous, with long setae on coxa and medium-sized, decumbent setae on femur, femur with short fuscus-piceus to black setae. Tibiae fuscus-rufous in color with fuscus to black margins with short, erect, thick marginal setae compared to thinner more decumbent setae of the mid-region, both black; tarsi of fuscus-rufous color with medium-sized, decumbent, fulvus-aeous setae, marginal setae in the lower part of greater thickness than those present in all the tarsi, and with a fuscus-piceous color; claws ranging from fuscus-piceus to black color. Elytra, fuscus in color, with

setae of medium size and thickness, generally fuscus-rufous, abundant in the external marginal portion from the base to the apex. Abdomen light brown to testaceous for all segments, and all with a margin of dusky to black, short, thin, moderately abundant setae.



**FIGURE 6–10.** *Scaptolenus zuritai* sp. nov.; Figs. 6, 7, 8 dorsal, ventral and lateral view; Figs. 9, 10 ventral and dorsal view of the aedeagus. PHA: phallobase; PAR: paramerous; ML: median lobe; SG: setation group.

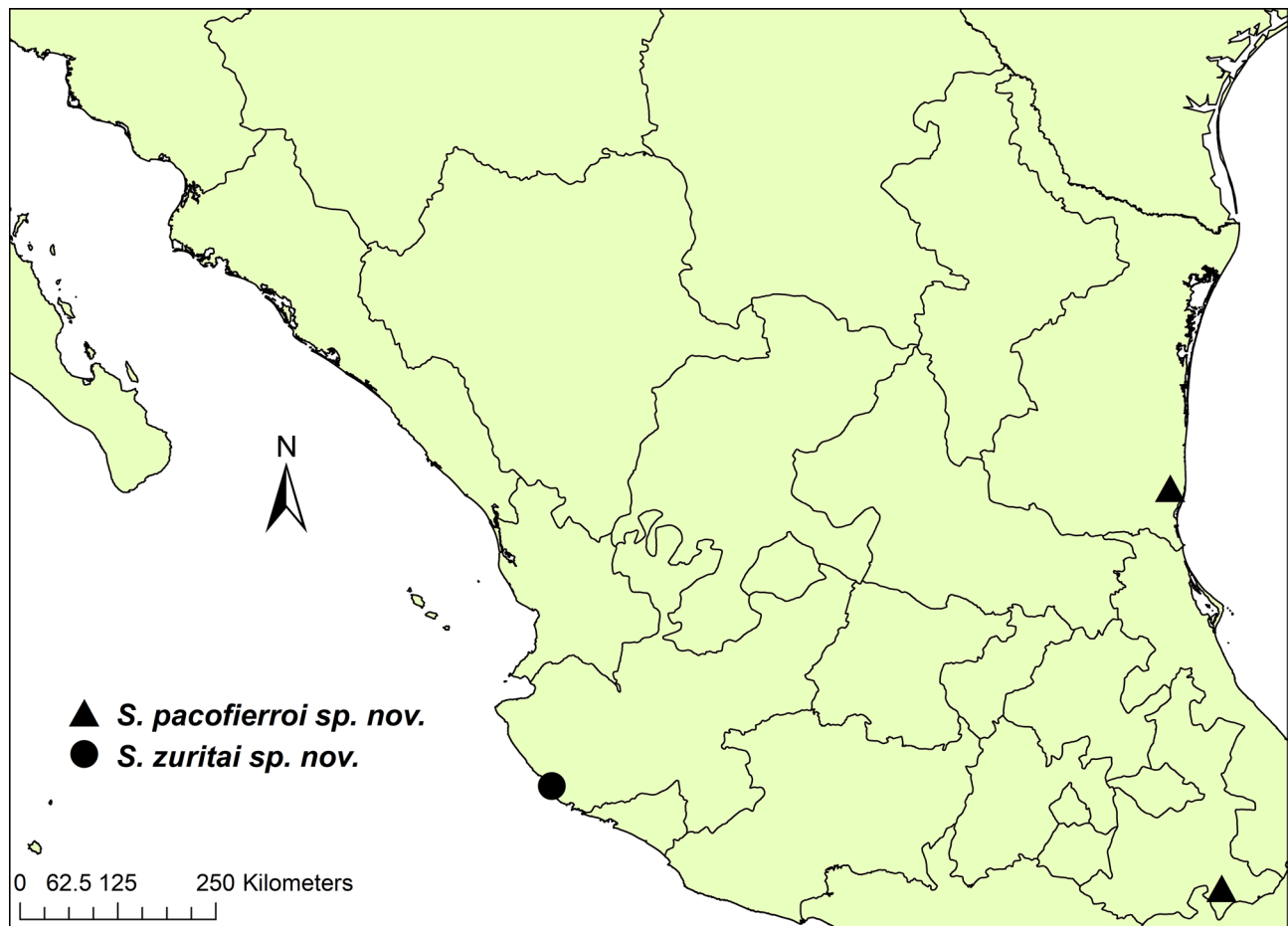
Head 1.0-1.6 ( $\bar{x}$ = 1.3, n=6) mm long, 1.1-1.4 ( $\bar{x}$ =1.3, n=6) mm wide; punctation simple and with setae. Maxillary palps, length of the penultimate maxillary palp 0.4-0.6 ( $\bar{x}$ =0.5, n=6) mm and length of the last maxillary palp 0.5-0.7 ( $\bar{x}$ =0.6, n=6) mm with the last and penultimate segment almost equal in length, last segment is longer (Fig. 18). Antennae closely serrate, antennomeres 4-10 with apices almost angulated ventrally; with moderate length, length of the 2 to 11 antennomeres 0.2:0.3:0.6:0.6:0.6:0.6:0.5:0.5:0.5:0.6. Pronotum 1.6X times wider than long; width of the pronotum 3.4-4.6 ( $\bar{x}$ = 4.11, n=6); length of the pronotum 2.0-3.0 ( $\bar{x}$ = 2.4, n=6) mm; anterior margin



**FIGURE 11–18.** *Scaptolenus pacofierroi* sp. nov.; Figs. 11 prosternum, 13 metacoxal lamina, 15 prothoracic tibiae, 17 maxillary palp. *Scaptolenus zuritai* sp. nov.; Figs. 12 prosternum, 14 metacoxal lamina, 16 prothoracic tibiae, 18 maxillary palp.

superficially arched, lobed at midline; lateral margins rounded, without carina, widely arched on dorsum. Moderately denser punctation than on head with more widely spaced punctures; posterior angles, moderately divergent and attenuated; posterior margin lobed, anterad of scutellum. Scutellar shield subtriangular with moderately arched anterior margin. Elytra length 10.4-11.6 ( $\bar{x}$ = 10.7, n=6) mm; width (humeral region) 4.9-6.6 ( $\bar{x}$ = 5.5, n=6) mm; moderately punctured, puncture diameters <0.5 mm with uniform distances between the punctation on the discal portion and apically with superficially and slightly marked striae, narrowing anteriorly and ending before apex. Abdomen with five small ventrites with truncated posterior margins, with scant punctation, each puncture with a moderately long and decumbent seta. Prosternum, length 0.7-0.9 ( $\bar{x}$ = 0.8, n=6) mm; width of prosternum 0.8-0.9 ( $\bar{x}$ = 0.8, n=6) mm; very short not reaching coxae, narrowing anteriorly and truncated; strongly arched between the coxae with scattered setae within shallow punctures (Fig. 12). Mesoventrite and metaventrite with shallow punctures, each puncture with a long decumbent seta. Metacoxal lamina, broad medially, narrowed laterally, with the presence of two rounded projections apically and two acute projections basally, connected by an arch laterally (Fig. 14). Metepimeron triangular in shape, narrowing anteriorly, connected to the metacoxa. Tibiae of prothoracic legs without border medially, with flat appearance, ectal border with an apparent carina, with a very short angular tooth at the apical, length of the ectal tooth 0.4 -0.5 ( $\bar{x}$ = 0.4, n=6) mm. Protibial spur, length of left spur 0.7-0.9 ( $\bar{x}$ = 0.7, n=6) mm; length of right spur 0.6-0.8 ( $\bar{x}$ = 0.7, n=6) mm; both arched, the right spur smaller than the left; apical margin of spur slightly blunt (Fig. 16). Tarsi, average length of tarsomeres 1 to 5 (2.2:1.2:0.9:0.7:1.0 mm); slender, sub-cylindrical, each ventrally with brush of short and stiff pubescence.

**Male Genitalia**, trilobed aedeagus; phallobase broad, slightly curved throughout length with a rectangular basal notch and a posterior internal V-shaped membranous notch. Width of median lobe equal along its width, 1.1x times longer than parameres, length of the median lobe 1.4-1.7 ( $\bar{x}$ = 1.5, n=6) mm, apex curved ventrally. Parameres, length 1.2-1.5 ( $\bar{x}$ = 1.3, n=6) mm, obtusely angulated and spindle-shaped; subtruncated at the apex, with a ventral and lateral preapical setal group, with small sclerotized spurs in the first third of the parameres, very close to the genital base, these spurs project towards the base and pass behind the middle lobe.



**FIGURE 19.** Distribution of *Scaptolenus pacofierroi sp. nov.* and *Scaptolenus zuritai sp. nov.*





**FIGURE 20.** Collecting site for the species *S. zuritai* **sp. nov.** at the Chamela Biology Station in municipality of La Huerta, Jalisco, Mexico.

**Immatures and females.** Unknown.

**Biological Data.** The series of specimens collected in 2012 of which the Holotype and three paratypes are designated were collected with a Malaise trap during the months of September in a single location, within the Chamela Biology Station. The dominant vegetation at the collection site was secondary growth of a tropical deciduous forest (Fig. 20). This station is located on the Mexican Pacific coast. Delimited to the south by the Cuixmala River and to the north by the San Mateo ejido, this site has an altitude that ranges from 0 to 500 meters above sea level (Martínez-Luque, 2014). The climate is classified as warm subhumid, with an annual precipitation-mean annual temperature ratio of 32 (P/T), with rains in summer, 5.6% of winter rain and with an isothermal regime (García, 1988). Among the most characteristic species of the station are *Jatropha chamelensis*, *Siadodendron excelsum* and *Celanodendron mexicanum* (Rzedowski, 1978; Ceballos *et al.* 1999).

The collection period coincided with the historical observations on the biology of the genus, where the presence of this group of beetles is associated with the dates of intense monsoon rains.

**Distribution.** MEXICO, Jalisco (Fig. 19).

**Etymology.** The specific epithet is a tribute to memory and recognition of the work of Martín Leonel Zurita-García, an enthusiastic Mexican taxonomist, who contributed greatly to the knowledge of the Elateridae family in México.

**Taxonomic comments and diagnostic characters.** This new species is close to *Scaptolenus paltingi* Johnson, 2013, however the shape and size of the pronotum, pro-tibiae, prosternum, metacoxae, meta-tarsomeres, tibial spurs and the length and width of antennomeres 2-11 are distinct. The male genitalia is also distinct and differs in the phallobase, in which *S. zuritai* **sp. nov.** has a V-shaped anteroventral portion (Fig. 9), whereas that of *S. paltingi* has a rectangular notch on this portion. Another difference occurs in the width and length of the lateral lobes, as *S. zuritai* **sp. nov.** (Fig. 9, 10) has the lateral lobes that are smaller in length but wider than the lateral lobes of *S. paltingi*. Finally, another difference is that the middle lobe of the male genitalia is wider in *S. paltingi* compared to that of *S. zuritai* **sp. nov.**

## Biology of the genus *Scaptolenus*

Very little is known about the biology of the Cebrionini. Much of the information is based on casual observations obtained in the field, mostly of the genus *Cebrio* Olivier, 1790 (mainly European), and on some observations generated during the collection of North American species of the genus *Scaptolenus*. However, a large part of the species of the genus is described from localities of México and Central America. One of the first works in which biological data of this group of insects is presented is in Guérin-Méneville (1844) and Werner (1969). The first observations of the behavior of female individuals is with *Scaptolenus fuscipennis* (Fall, 1932). Collected females of this species were found partially buried in the ground, from where they do not fully emerge which is very similar to that observed in Spain, Italy and France with females of the genus *Cebrio*. In this genus, females are exposed on the ground and males emerge and fly in search of the females for copulation during and after rainstorms (Mitré, 1839; Moroder, 1920; Rattu, 2012; 2016; Zapata & Sánchez-Ruiz, 2016). Another genus of Cebrionini that has been reported with very similar activities in females and males, are some species of the genus *Selonodon* (Latreille, 1834), where the females of some species of the genus remain partially exposed in the soil, and the males present a very marked flight activity during the heavy summer rains (Galley, 1999).

We observed this behavior in Querétaro, México, for an undescribed species of *Scaptolenus*, where we collected 45 male individuals on the university campus in Juriquilla after one of the first heavy seasonal monsoon rains. Interestingly, all males died in less than 24 hours, suggesting that mating flights are very short and male mortality is high, resulting in a short opportunity for collection, regardless of population size. Subsequently, a search was started at various points in the soil of the scrub vegetation surrounding the campus and some larvae of the genus were collected. In addition, the probable apterous condition of the females and their behavior of remaining buried limit the chances of detection and collection. This also suggests that the genus *Scaptolenus* may be more common than previously reported, and that collecting larval forms may give a better estimation of population density.

In the case of the new species presented in this work, there are no data associated with their biology. However, the periods in which the specimens of the type series of both species were collected coincide with the rainy seasons in Mexico, which is linked to high levels of environmental humidity and this in turn is related to a flush of vegetative

growth and root growth. These rains also produce water saturation and soften soils, which would presumably favor the movement of the larvae and emergence of adults of these edaphic organisms. This seasonality is probably closely linked to the life history events of *Scaptolenus* in these highly seasonal habitats of tropical deciduous forests.

#### A key to the groups of *Scaptolenus* (males) (based on Champion, 1896; Fall, 1932 and Johnson, 2013)

- 1. Antennomeres with subparallel shape ..... *chevrolati*-group
- Antennomeres without subparallel shape ..... 2
- 2. Antennomeres angularly extended, “L” shaped ..... *vagans*-group
- Antennomeres serrated (in all its variants) ..... *fulvus*-group

#### A Key to the *vagans*-group of *Scaptolenus* (males) (based on Johnson, 2013 and Champion 1896)

- 1. Antennomeres 4-10 slightly apically dilated ..... 2
- Antennomeres 4-10 clearly dilated to subangulated ventrally at the apices ..... *S. amplipennis*
- 2. Elytra with inter-grooves flat or slightly elevated; antennae do not reach the middle length of the elytra ..... 3
- Elytra with clearly raised striae, giving a sulcate appearance of the striae; antennae longer extending to elytral mid-length .. 4
- 3. Pronotum wider than the elytral base; head, thorax and scutellum densely covered with long and decumbent fulvous setae; parameres without small spurs at the genital base ..... *S. vagans*
- Pronotum similar in length to the elytral base; head, thorax and scutellum region, moderately lined with separate setation, setae long, fulvous and decumbent; parameres with small sclerotized spines in the first third very close to the genital base, these spines project towards the base and pass behind the middle lobe (Fig. 10) ..... *S. zuritai* **sp. nov.**
- 4. Head, pronotum and scutellum black, which contrast with the chestnut elytra ..... 6
- Head black, pronotum and scutellum with different coloration from the head ..... 5
- 5. Pronotum and scutellum light brown in color similar to the coloration of the elytra; fulvus colored legs ..... *S. paltingi*
- Pronotum and scutellum of testaceous color (yellow-brownish) and elytra of brown color; fuscous colored legs (Figs. 1-3) . . .  
..... *S. pacofierroi* **sp. nov.**
- 6. Posterolateral angles of pronotum subparallel; fuscous-colored antennae ..... *S. lecontei*
- Posterolateral angles of pronotum divergent; fusco-testaceous colored antennae ..... *S. acutangulus*

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