

AN OVERVIEW OF THE TAXONOMY AND GEOGRAPHIC DISTRIBUTION OF VENEZUELAN *EPICAUTA* (COLEOPTERA: MELOIDAE)

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Abstract.— The incomplete knowledge of the species distribution ranges represents a serious barrier for many areas of study in Biology that goes from Systematics to conservation of Biodiversity. One of the most important available resources to deal with the lack of geographic information are scientific collections. *Epicauta* with more than 366 species described is one of the most speciose lineages within Meloidae. Almost 73% of its diversity occurs in America. In Venezuela, the tenth richest country in biodiversity of the world, only nine species of *Epicauta* have been recorded and most of them are known from one or two localities. The revision of the specimens of *Epicauta* held at the entomological collection of the Museo del Instituto de Zoología Agrícola “Francisco Fernández Yépez” (MIZA) of the Universidad Central de Venezuela at Maracay, with additional data from other American and European collections allowed us to improve significantly the knowledge of the geographic distribution of the Venezuelan taxa. Besides, the morphological study of the specimens resulted in the addition of some species not previously recorded in Venezuela, the description of a new species, and the redescription of the almost unknown and forgotten species *E. subvittata* (Erichson 1848).



Key words.— Wallacean shortfall, scientific collections, new species, redescription, biodiversity

INTRODUCTION

The incomplete knowledge of the species distribution ranges poses a serious constraint for conservation of Biodiversity. This deficit is widely known as the Wallacean shortfall, and it refers to the fact that the geographic distribution of most species is largely unknown, often limited to the data presented in their descriptions (Lomolino *et al.* 2004, Whittaker *et al.* 2005, Bini *et al.* 2006, Lesmes *et al.* 2011). This shortcoming is a problem for poorly known taxa, but also for relatively well-studied species (Kozłowski 2008, Knight 2010). In arthropods, or invertebrates in general, the so-called Wallacean shortfall is remarkably worrying (Cardoso *et al.* 2011).

One of the most important available resources to deal with the lack of geographic information are scientific collections. Scientific collections provide to science and society invaluable current and historical biological information as repositories of the genetic and organismic worldwide biodiversity (Suarez and Tsutsui 2004, Sánchez-Vialas and Calvo-Revuelta 2018).

An insect group, historically studied and well represented in scientific collections, due to their historical pharmacological usage are beetles of the family Meloidae (Dioscorides 1636, Fisher 1827, Beaugregard 1890, Percino *et al.* 2011). Among Meloidae, *Epicauta* Dejean 1834 is the second most speciose genus of the family, with *circa* 366 described species (Pinto 1991, Bologna and Pinto 2002, Batelka and Hájek 2015, Liu *et al.* 2016, Campos-Soldini *et al.* 2018, Pinto 2019, Pan and Ren 2020). *Epicauta* is almost worldwide distributed except in Australia, Madagascar and New Zealand (Bologna and Pinto 2002), with almost 73% of their diversity occurring in the New World (Pinto and Bologna 1999, Bologna and Pinto 2002, Pinto 2019). A recent checklist of American *Epicauta* lists a total of 264 species for the entire continent (Campos-Soldini *et al.* 2018). Currently, the genus *Epicauta* is composed of two subgenera: *Macrobasis* LeConte 1862 and *Epicauta*. The subgenus *Epicauta* covers all the distribution range of the genus across the New and the Old World, while the subgenus *Macrobasis* is restricted to North America, with a few species known in South America (Pinto and Bologna 1999, Bologna and Pinto 2002, Campos-Soldini *et al.* 2018). However, there are no formal phylogenetic studies that support the existence of these subgenera as natural groups (Pinto 1991, Campos-Soldini *et al.* 2018).

In Venezuela, the tenth richest country in biodiversity of the world (Aguilera *et al.* 2003), only nine species of *Epicauta* were recorded to date (2.4% of the species of the genus) and most of them represented only by one or two localities (Blackwelder 1945, Adams and Selander 1979, Campos-Soldini *et al.* 2018). Is it possible that one of the most species-rich genera of

Meloidae is so poorly represented in one of the megadiverse countries? Or are we dealing with a typical case of Wallacean shortfall?

To try to answer these questions, we undertook the revision of the specimens of *Epicauta* held at the entomological collection of the Museo del Instituto de Zoología Agrícola “Francisco Fernández Yépez” (MIZA) of the Universidad Central de Venezuela at Maracay. This revision was supplemented with the study of other American and European collections, and the examination of type specimens of some additional American *Epicauta*. Morphological comparison of specimens of *Epicauta* from the MIZA collection with all the available types, revealed the existence of a morphologically diagnosable new species of *Epicauta* from Venezuela. Here, we provide an account of the new geographic data, that improve significantly the geographic distribution knowledge of the Venezuelan taxa, and discuss the taxonomic implications of the morphological study, including the description of a new species and the redescription of the almost unknown and forgotten species, *E. subvittata* (Erichson 1848).

MATERIAL AND METHODS

We revised a total of 1,895 dried preserved specimens of *Epicauta* from the following institutions and collections:

MIZA – Museo del Instituto de Zoología Agrícola of the Universidad Central de Venezuela, Maracay, Venezuela;

MTM – Hungarian Natural History Museum – Magyar Természettudományi Múzeum, Budapest, Hungary;

NHM – Natural History Museum London, UK;

NHMLA – Natural History Museum of Los Angeles County, California, USA.

Specimens of the type series of *E. subvittata* were received for study from the Museum für Naturkunde, Berlin, Germany (MFN). Digital photographs of the types specimens of *E. apure* and *E. aragua* were kindly facilitated by the American Museum of Natural History (AMNH). Additional comparison materials of several species of *Epicauta* not reported from Venezuela, specially of the *E. vittata* species group, *E. abadona* Skinner 1904, *E. dugesi* Werner 1957, *E. excavata* (Klug 1825), *E. grammica* (Fischer 1827), *E. leopardina* (Haag-Rutenberg 1880), *E. luteolineata* Pic 1933, *E. missionum* (Berg 1881), *E. monachica* (Berg 1883), *E. occidentalis* Werner 1944, *E. semivittata* (Fairmaire 1875), *E. temera* Adams et Selander 1979, *E. unilineata* Champion 1892, *E. vittata* (Fabricius 1775), and *E. vitticollis* (Haag-Rutenberg 1880), were studied from the following institutions: Colección Nacional de Insectos of the Instituto de Biología de la

Universidad Nacional Autónoma de México, Ciudad de México (CNIN-IBUNAM); Estación de Biología de Chamela of the Instituto de Biología, Universidad Nacional Autónoma de México, Jalisco, México (EBCH); El Colegio de la Frontera Sur, San Cristóbal de las Casas, México (ECOSUR) and M. A. Bologna Collection, Università Roma Tre, Roma, Italia (MAB). Specimens studied are listed in the ‘Studied material’ paragraph for each species account. Additional material for comparison was mentioned in García-París *et al.* (2016).

Specimens used for morphological descriptions (new species) and diagnosis were studied using a Leica MZ16A stereomicroscope coupled with a Leica DFC550 camera. Measurements were obtained with the software LAS v4.3. Digital pictures were taken with a Canon 600D camera coupled with a macro-lens and two external flashes. Additional photographs of live and collection specimens were taken with a Nikon Coolpix digital camera. Type species of the new species described here, are provisionally deposited in the Entomological Collection of Museo Nacional de Ciencias Naturales (MNCN), Madrid, Spain. Later they will be deposited in the MIZA collection (Maracay, Venezuela) (holotype and nine paratypes, all dry-preserved).

Geographic data of each specimen were used to construct distribution maps. Geographic coordinates are approximated, as most of the records refer to villages, cities or particular regions; country records lacking accurate localities were not included in the maps. Maps were drawn using the open geographic information system QGIS (QGIS Developmental Team 2020).

RESULTS

Bibliographical sources (Haag-Rutenberg 1880, Rojas 1857, Martorell 1939, Blackwelder 1945, Werner 1949, Adams and Selander 1979, Selander 1981, Pinto 1991, García-París *et al.* 2016, Campos-Soldini *et al.* 2018, Gámez and Acconcia 2020) indicated the presence of nine species of *Epicauta* in Venezuela represented by 53 locality records. Our results reveal the presence of 12 species of *Epicauta* in Venezuela, represented by 1,438 specimens housed at the studied collections (see species accounts). The species present in Venezuela are: *Epicauta anthracina* (Erichson 1848), *E. apure* Adams et Selander 1979, *E. aragua* Adams et Selander 1979, *E. carmelita* (Haag-Rutenberg 1880), *E. caustica* Rojas 1857, *E. chaima* López-Estrada, Sánchez-Vialas, Ruiz et García-París sp. nov., *E. falcolarandina* García-París, Ruiz, Sánchez-Vialas et López-Estrada 2016, *E. flagellaria* (Erichson 1848), *E. major* Pic 1924, *E. melanota* Mäklin 1875, *E. subvittata*, and *E. suturalis* (Haag-Rutenberg 1880). In the Natural History Museum (London), there

is a specimen from Venezuela (without other data) labelled as *E. cimetaria* Borchmann 1940; this specimen is actually misidentified and corresponds to the brown phenotype of *E. suturalis*.

Since there is not a phylogenetic framework upon which to base the classification of *Epicauta*, species assignment to subgenus and species group is discussed within each species account (Pinto 1991, García-París and Ruiz 2013, García-París *et al.* 2016, Campos-Soldini *et al.* 2018), but species are listed alphabetically irrespective to subgenera or species groups.

Species catalogue, diagnosis, distribution, notes on natural history, and taxonomic comments on the Venezuelan *Epicauta*

Epicauta anthracina (Erichson 1848)

Lytta (Epicauta) anthracina Erichson 1848: 566. Type locality: Not stated on the species description, but according to the title of the article it should be ‘Britisch Guiana’. Type specimens probably at the Museum für Naturkunde (Berlin).

Epicauta anthracina (Erichson 1848): Borchmann 1917: 70.

Studied material. BRAZIL – Amazonas: Bendoval: 18-X-1996 (Congo, W.L. Forment): 2 exx. [CNIN-IBUNAM]; Lago Amana: 10-IX-1979, in the lighth (R. Best): 2 exx. [CNIN-IBUNAM]; Amazon (631/48, *Epicauta anthracina* Er. det. Dr. Z. Kaszab): 1 ex. [MTM]; Unt. Amaz. Taperinha b. Santarem: 21/31-VIII-27 (Zerny, *Epicauta anthracina* Er. det. Dr. Z. Kaszab): 5 exx. [MTM]. PERÚ – Pebas upper Amazonas, *anthracina* Er. t. Haag, *anthracina* Er., F. Bates 81-19: 1 ex. [NHM]; Satipo (F. Tippmann, *Epicauta anthracina* Er. det. Dr. Z. Kaszab): 1 ex. [MTM]; Juanjui (*Epicauta anthracina* Er. det. Dr. Z. Kaszab): 1 ex. [MTM]; Jauja: Satipo: 1938-39 (II Meskendahl, *Epicauta anthracina* Er. det. Dr. Z. Kaszab): 1 ex. [MTM]; Pucallpa, Río Ucayalli, 200 m: II-47 (leg. Weyrauch, *Epicauta anthracina* Er. det. Dr. Z. Kaszab): 1 ex. [MTM]. VENEZUELA – Bolívar: Kanarakuni, 450 m: 31-I-1967 (F. Fernández Y., A.D. Ascoli leg.): 1ex. [MIZA]; 1-II-1967: 5 exx. [MIZA]; 6-II-1967: 1 ex. [MIZA]; Kanarakuni, Alto Caura, 450 m: 10/13-IX-1964 (F. F. Yépez, J. Bechyne leg.): 3 exx. [MIZA].

Diagnosis. This species is readily diagnosable by its large size and deep black coloration, usually with an elongated red frontal spot. Body size and sculpture are also characteristic, it is particularly evident the contrast between shiny head and pronotum and matte elytra. Head large, with well-marked temples, covered by dense shallow punctures, and short black setation; eyes also large and evident, elongated, kidney shaped; antennae very long, surpassing the middle of the elytra when extended backward; pronotum relatively small,

broad at the base, dorsally flat, with dense shallow punctures, and black setation, better marked at the sides; elytra long, broadly expanded in the posterior third, covered by dense, grayish, very short, thin vestiture; long and robust legs with elongated tarsomeres, ventrally covered by dense pale setation (Fig. 1).

Taxonomic comments. The species was included in the nominal subgenus by Campos-Soldini *et al.* (2018). Body size, head and pronotum shape, eye size and shape, and antennal length, are relatively similar to *E. suturalis* and related species.

Geographic distribution. Previously known from Guyana, Brazil and Peru (Erichson 1848, Kaszab 1960, Pinto and Bologna 2016, Campos-Soldini *et al.* 2018). In Venezuela is recorded in the South of the country (Fig. 1).

Previously published records. BRAZIL – Brazil (Pinto and Bologna 2016); Amazonas: Tefé (Campos-Soldini *et al.* 2018); Manicoré (Campos-Soldini *et al.* 2018). GUYANA – Guyana (Erichson 1848, Blackwelder 1945). PERÚ – Ucayali (Pinto and Bologna 2016), Coronel Portillo: Pucallpa (Campos-Soldini *et al.* 2018); Río Ucayali (Campos-Soldini *et al.* 2018).

Notes on natural history. Adults are active in February in Venezuela, and in September and October in Brazil. In Brazil, it was captured attracted to artificial light. It seems a low altitude species, ranging from 30 (Amana Lake, Brazil) to 450 m.a.s.l. (Kanarakuni, Venezuela).

Epicauta apure Adams et Selander 1979

Epicauta apure Adams et Selander 1979: 255. Terra typica: “San Fernando, Apure, Venezuela”. Holotype conserved at the American Museum of Natural History (Adams and Selander 1979).

Studied material. VENEZUELA – Type material (holotype): San Fernando, Apure, Venezuela 31-VII-1975, at light R.B. Selander & J.K. Bouseman Notes 2-75 (white label, printed, handwritten erasure marks) // HOLOTYPE *Epicauta apure* Des. A. + S. R.B. Selander (red label, handwritten in part) // AMNH_IZC 00292742 (white label, printed, QR code printed) [AMHN]. Amazonas: San Pedro: 10-VIII-1982 (C.E.U.M. Fac.Agronomía UCV Maracay leg.): 2 exx. [MIZA]; Tamatama: 17-VIII-1982 (C.E.U.M. Fac.Agronomía UCV Maracay): 1 ex. [MIZA]. Anzoátegui: Pariaguán: 8-VIII-1967, 1 ejemplar (J. & B. Bechyne leg.): 1 ex. [MIZA]. Apure: Fundo Ceibote, Hato El Frío, 100 m: 20-V-1975 (C.J. Rosales leg.): 5 exx. [MIZA]; 30-V-1975: 6 exx. [MIZA]; 20-V-1975: 2 exx. [MIZA]; Fundo La Fonda, cerca de Río Quitaparo, 42 m, 7°5'N-68°36'O: 12/13-XI-2001 (E. Osuna leg.): 1 ex. [MIZA]; Río Meta, El Potrero, cerca de Pto. Páez: 25/26-II-1979 (A. Chacón): 1 ex. [MIZA]; carretera San Fernando de Apure, 07°50'44''N-67°29'10'' W: 20-VI-2000 (M. Gaiani;

P. Freytag; Q. Arias leg.): 1 ex. [MIZA]; Fundo La Florida, carretera Río Quitaparo, 7°05'N-68°36'W, 42 m: 12/13-XI-2001 (E. Osuna leg.): 1 ex. [MIZA]; 7-I-1999: 1 ex. [MIZA]; Fundo Morichalote, carretera Río Quitaparo, 7°03'N-68°36'W: 25-IV-1998 (E. Osuna leg.): 4 exx. [MIZA]; Hato El Cedral, 7.43042°N-69.32413°W, 120 m: 28/30-IX-2001 (J. Clavijo, Q. Arias, R. Colmenares, G. Giraldo leg.): 2 exx. [MIZA]; Río Cunaviche, La Soledad, 100 m: 1-III-1979 (A. Chacón leg.): 1 ex. [MIZA]. Aragua: Ocumare de la Costa: 2-X-1964 (C.J. Rosales leg.): 1 ex. [MIZA]; 8-VII-1974 (J. Gélbez, V. Olivo leg.): 1 ex. [MIZA]; Rancho Grande, 1100 m, 16-VI-1949 (F. Fernández Y., P. Fenjres leg.): 1 ex. [MIZA]; 22-VI-1967 (L. Rodríguez leg.): 1 ex. [MIZA]; 26-VIII-1965 (F. Fernández Y., C.J. Rosales leg.) 1 ex. [MIZA]; 27-IV-1971 (J. Salcedo, A. Ramírez leg.): 1 ex. [MIZA]; 8-IX-1966 (J. Salcedo, S. Díaz leg.): 1 ex. [MIZA]. Barinas: Hato los Guasimitos, Dto. Arismendi, 100 m: 6-VI-1980 (E. Osuna leg.): 1 ex. [MIZA]; Reserva Forestal Caparo – Camp. Cachicamos, 100 m: 6/14-VIII-1969 (J. Salcedo, F. Zambrano leg.): 6 exx. [MIZA]. Bolívar: Agua Fría (cerca de Santa Elena), 1000 m: 1/9-XI-1966 (J. & B. Bechyne, E. Osuna leg.): 1 ex.; 800 m: 1/9-XI-1966: 5 exx. [MIZA]; El Callao: 20-VIII-1984 (G. Yépez leg.): 1 ex. [MIZA]; Guasipati: 20-V-1975 (B. Bechyne leg.): 12 exx. [MIZA]; 25-V-1975: 1 ex. [MIZA]; 23-V-1975: 1 ex. [MIZA]; El Pao: 7-VI-1975 (B. Bechyne leg.): 1 ex. [MIZA]; Guri, Río Caroní, 100m: 10-IV-1968 (J. & B. Bechyne, E. Osuna leg.): 1 ex. [MIZA]; 10-VI-1966, en trampa de luz: 1 ex. [MIZA]; 11-IV-1968 (J. Salcedo leg.): 1 ex. [MIZA]; 16-XI-1966: 4 exx. [MIZA]; 17-XI-1966: 3 exx. [MIZA]; Parupa: 15-IX-1977 (B. Bechyne leg.): 2 exx. [MIZA]; Río Caroní, Macagua: 20-XI-1966 (J. & B. Bechyne, E. Osuna leg.): 1 ex. [MIZA]; Río Cuchivero, Mantecal, 150 m: 23/27-III-1970 (F. Fernández Y., C.J. Rosales leg.): 10 exx. [MIZA]; Santa Elena Vairén: 10-XI-1966 (J. & B. Bechyne, E. Osuna leg.): 24 exx. [MIZA]; Yuruaní: 8-XI-1972 (J. & B. Bechyne leg.): 1 ex. [MIZA]; La Gran Sabana: Río Abarcay, 1250 m: 16-VI-1971 (J. Joly): 6 exx. [MIZA]; Campamento Minero Payapal, Río Yuruán, El Dorado, 190 m: 23/30-V-1987 (Expedición del Instituto de Zoología Agrícola leg.): 1 ex. [MIZA]; Guri, 200 m: 27-VI al 6-VII-1998 (L.J. Joly; J.L. García; Y. Zavala leg.): 2 exx. [MIZA]; La Urbana, Río Orinoco, 60 m: 4-VI-1997 (E. Osuna, A. Chacón, F. Rojas leg.): 2 exx. [MIZA]; Reserva Forestal Imataca, Campamento Río Grande, El Palmar, 250 m: 2/5-XII-1985 (L.D. Otero, A. Chacón leg.): 1 ex. [MIZA]; Río Guaniamo, 6°45'N-66°0'O, 160 m: 8/12-V-1979 (E. Osuna, A. Chacón, D. Grance leg.): 1 ex. [MIZA]; San Ignacio de Yuruani: 19-VIII-87 (C.E.U.M., Facultad de Agronomía, U.C.V., Maracay): 1 ex. [MIZA]. Falcón: Sector Campache, Finca Las Vegas, Sanare: 1/2-VI-2001 (R. Montiel; F. Medina leg.): 1 ex. [MIZA]. Guárico: Calabozo: 15-XII-1980 (V. Fung leg.): 2 exx. [MIZA]; Hato El Samán, cerca de El Punzón – Las Mercedes:

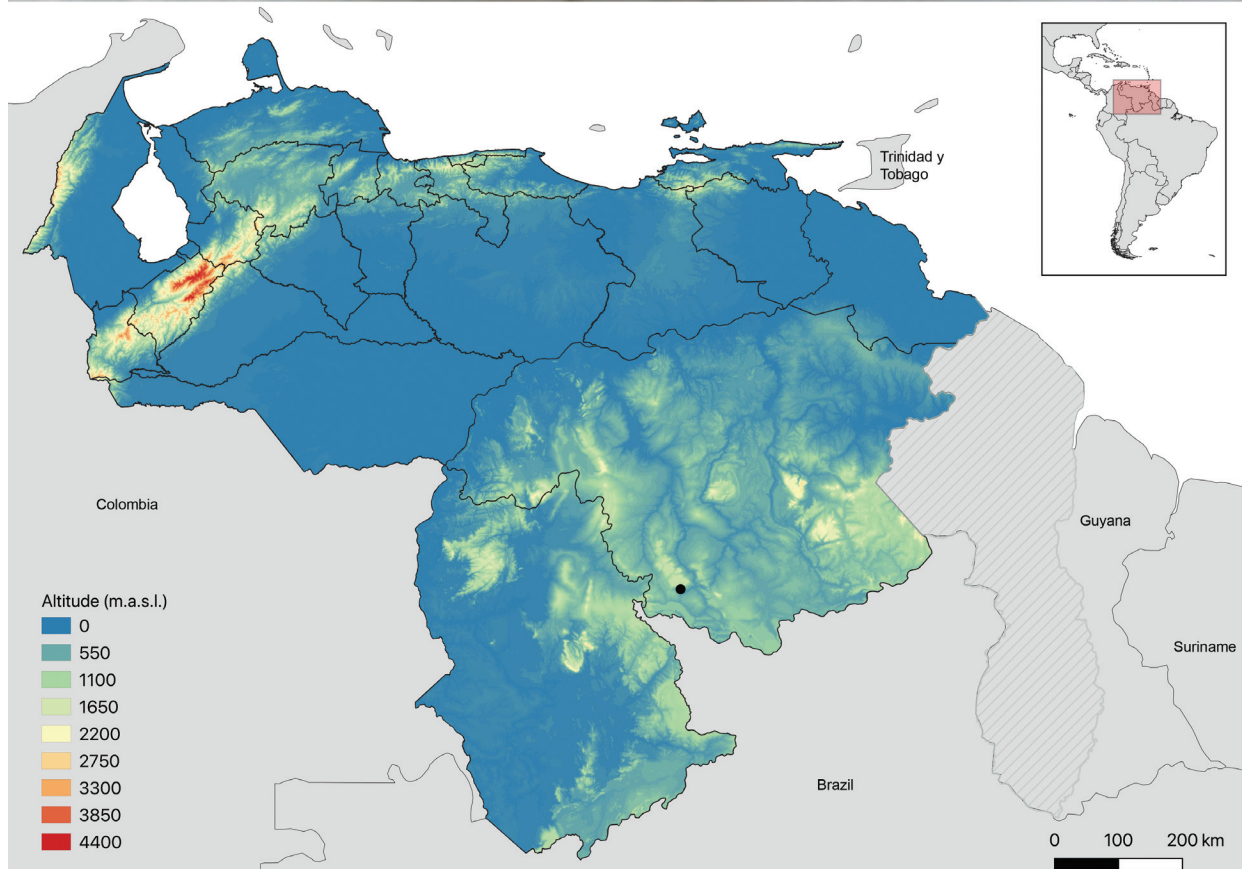


Figure 1. Specimen of *Epicauta anthracina* (Erichson 1848) from Kanarakuni, 450 m (Venezuela, col. MIZA) (top) and distribution map of the species in Venezuela (bottom).

11/12-X-1967 (C.J. Rosales, A. Martínez leg.): 13 exx. [MIZA]; Santa María de Ipire, Est. Exp. La Iguaña: 10/12-IX-1980 (J.L. García leg.): 3 exx. [MIZA]; Carretera Chaguaramas - Las Mercedes, 11-VI-1971 (L. Joly T. leg.): 4 exx. [MIZA]; Nicolasito, 08°08'20"N-66°24'32"O, 61 m: 2/8-II-2000 (J. Clavijo; M. Gaiani; R. Briceño; Q. Arias; A. Chacón leg.): 7 exx. [MIZA]; 15/17-VI-2000 (M. Gaiani; P. Freitag; Q. Arias leg.): 1 ex. [MIZA]; Estación Nicolasito: 16-17-X-1993 (L. Rodríguez leg.): 1 ex. [MIZA]. Miranda: Finca Las Delicias, Vía Río Negro, Tacarigua de Mamporal, 27-VIII-1994 (O. Hernández leg.): 1 ex. [MIZA]. Monagas: Hacienda Las Acacias, Caripe, 830 m: 26-VIII-1971, en la luz (R. Casares, J.B. Terán, M. Gélbez leg.): 1 ex. [MIZA]; Jusepín, 50 m: 5-X-1965 (F. Fernández Y., C.J. Rosales leg.): 1 ex. [MIZA]; 13-IX-1965: 1 ex. [MIZA]; 24-IX-1965: 2 exx. [MIZA]; 25-IX-1965: 1 ex. [MIZA]; 28-IX-1965: 1 ex. [MIZA]; Río Morichal Largo (Puente): 2-IX-1975 (R.E. Dietz leg.): 3 exx. [MIZA]; 1-IX-1975: 2 exx. [MIZA]; 3-IX-1975: 7 exx. [MIZA]; Uverito: 28-VI-1979 (C.J. Rosales, J.A. González leg.): 1 ex. [MIZA]; 14-XI-1979: 1 ex. [MIZA]; 17-X-1979 (C.J. Rosales leg.): 1 ex. [MIZA]; La Laguna, huerto semillero, San Antonio de Maturín, 850 m: 28/29-II-1992 (C.J. Rosales leg.): 1 ex. [MIZA]; 6-III-1992: 2 exx. [MIZA]; 28-VI-1992: 1 ex. [MIZA]; 30-IV-1994: 1 ex. [MIZA]. Portuguesa: Las Majaguas: 16-IX-1965 (J.J. Castillo leg.): 1 ex. [MIZA]; Estación Experimental San Nicolás, 56 km de Guanare, 180 m: 3-IV-1975 (L. Joly T. leg.): 1 ex. [MIZA]; Hato Sorugajío, Guanare: 15-X-1975 (C. César leg.): 2 exx. [MIZA]; Hacienda El Pilar, San Nicolás, 180 m: 2/5-XII-1991 (Expedición MIZA, U.C.V. leg.): 1 ex. [MIZA]. Sucre: Cumanacoa: 23-VII-1948 (P. Guagliumi leg.): 1 ex. [MIZA]. Yaracuy: Estación Ecológica Guáquira, 10.30119N-68.65302°O, 18/19-I-2006 (L.J. Joly, L. Mendoza, C.A. Upegui leg.): 1 ex. [MIZA]; La Hoya, 100 m: 28/30-VI-1978 (F. Fernández Y., J. Salcedo, J. Clavijo leg.): 3 exx. [MIZA]; Agua Negra, 80 m: 4-I-1971 (D. Loureiro leg.): 3 exx. [MIZA]; 23-II-1971 (A.J. Pérez leg.): 1 ex. [MIZA]; 4-I-1971 (R. Valera leg.): 1 ex. [MIZA].

Diagnosis. Medium size species (7–11 mm long) (Fig. 2). Head orange with a black mark extending from clypeus along each side of the front, bordering the eyes. Antennae, palpi, labrum and clypeus black. Pronotum entirely black, elongated with parallel margins from the base until the last third where they start to converge. Elytral pattern with alternating wide dark brown-black longitudinal stripes and fine orange stripes, in the apex of the elytra stripes are diffused. Venter and legs black except trochanter and basal third or fourth of femora, which are orange. Tibial spurs slender and spiniform. Tarsal claws dissimilar in shape, dorsal blade curved and wide and ventral blade very narrow and straight. Male antennae not modified.

Taxonomic comments. Included in the *E. vittata* group by Adams and Selander (1979). The identity of

this species is highly questionable; before its formal description, it was included under the designation of *E. grammica* (Fisher 1827). Adams and Selander (1979) mentioned in the description of *E. apure* that this species could be the same as *E. grammica* described from Brazil (a species name that has nomenclatural priority over *E. apure*). Since morphological descriptions of both taxa are not useful for the assessment of their specific identity, a taxonomic study in a molecular framework is necessary.

Geographic distribution. This species is known from Venezuela and Trinidad and Tobago (Adams and Selander 1979). However, it was pointed in the aforementioned study, that the geographic distribution of *E. apure* could reach as south as Bolivia. Geographic distribution of *E. apure* in Venezuela is illustrated in Fig. 2.

Previously published records. TRINIDAD AND TOBAGO – Trinidad: Saint George: Marval (Adams and Selander 1979); Port of Spain (Adams and Selander 1979); Trinidad St. Augustine (García-París *et al.* 2016). VENEZUELA – Apure: San Fernando (Adams and Selander 1979). Guárico: Calabozo (Adams and Selander 1979); Río Guaiquito (Adams and Selander 1979). Monagas: 42 km al SE de Maturia (Adams and Selander 1979); 60 km al SE de Maturia (Adams and Selander 1979). Zulia: El Tucuco (García-París, *et al.* 2016). Localities not found: Coparo (Adams and Selander 1979); Warren (Adams and Selander 1979).

Notes on natural history. Adults have been recorded on *Kallstroemia* Scop. (Zygophyllaceae), although this plant has not been accepted as a food resource under captive conditions (Adams and Selander 1979). *Epicauta apure* has been found in syntopy with *E. aragua*, even over the same plant species (Adams and Selander 1979). Frequently reported at night, on artificial lights (Adams and Selander 1979). In Venezuela, adults are active all throughout the year, with records in every month. According to known precise localities, its altitudinal range in Venezuela varies from 35 (Tacarigua de Mamporal) to 1250 m.a.s.l. (Río Arbacay, La Gran Sabana).

Epicauta aragua Adams et Selander 1979

Epicauta aragua Adams et Selander 1979: 251. Terra typica: 'Maracay, Aragua, Venezuela'. Holotype conserved at the American Museum of Natural History (New York) (Adams and Selander 1979).

Studied material. VENEZUELA – Type material (holotype): Maracay, Aragua, Venezuela 30-VII/1975, Amaranthus, Trianthera, and grass R.B. Selander & J.K. Bouseman Notes 1-75 (white label, printed, handwritten erasure marks) // HOLOTYPE *Epicauta aragua* Des. A. + S. R. B. Selander (red label, handwritten in part) // AMNH_IJC 00292743 (white label,

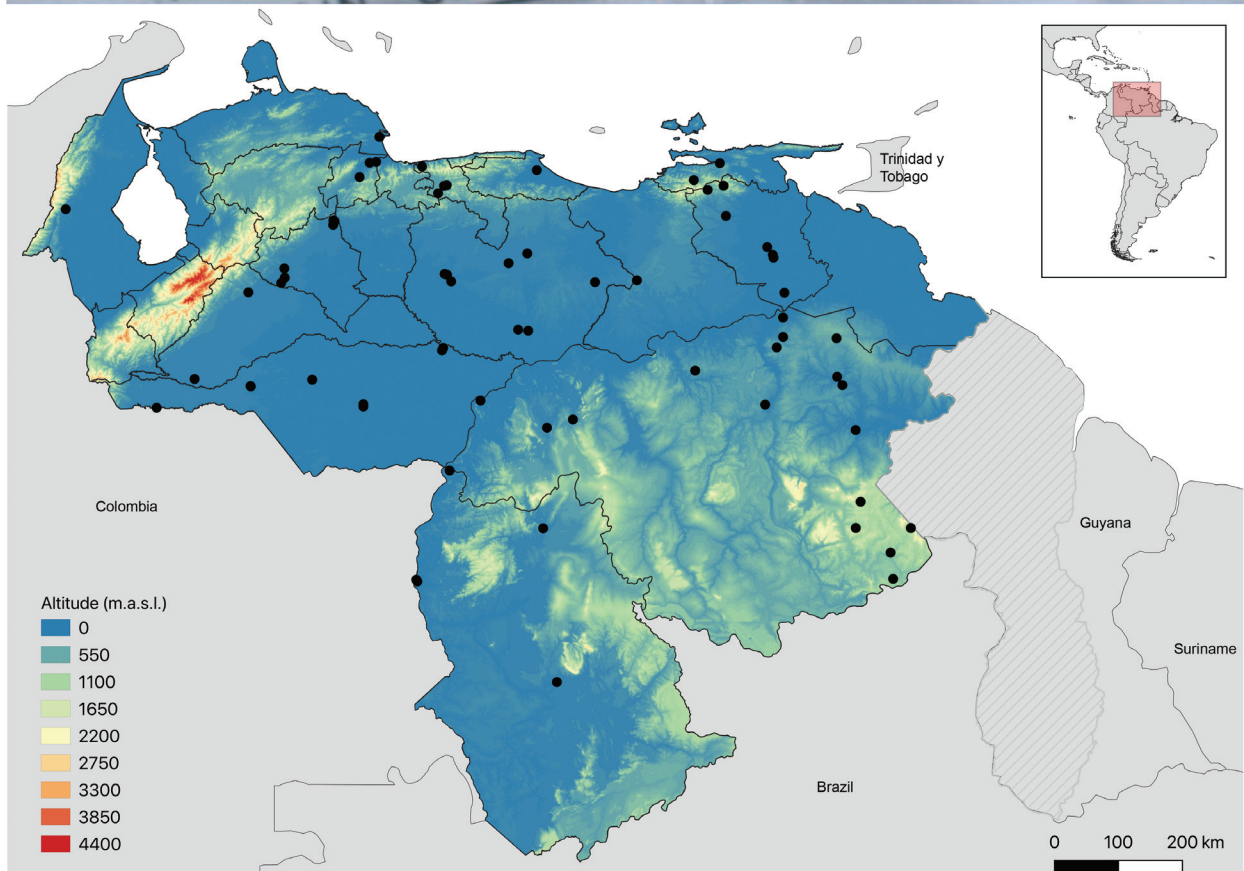


Figure 2. Specimen of *Epicauta apure* Adams et Selander 1979 from Matouray (French Guiana, col. MIZA) (top) and distribution map of the species in Venezuela (bottom).

printed, QR code printed) [AMNH]. Amazonas: San Fernando de Atabapo (H. Espig leg.): 1 ex. [MIZA]; Apure: Hato El Frio, Fundo Ceibote, 100 m: 20-V-1975 (C.J. Rosales leg.): 12 exx. [MIZA]; Hato El Cedral, 7.43042°N-69.32413°W, 120 m: 28/30-IX-2001 (J. Clavijo, Q. Arias, R. Colmenares, G. Giraldo leg.): 4 exx. [MIZA]. Aragua: Cagua: 450 m: 28-V-1958 (A. Fernández leg.): 1 ex. [MIZA]; 28-V-1958: 6 exx. [MIZA]; 2-XII-1957: 2 exx. [MIZA]; 1-XII-1957: 1 ex. [MIZA]; 16-XI-1957 (E. Doreste leg.): 1 ex. [MIZA]; 21-XI-1957: 1 ex. [MIZA]; 12-XI-1957: 1 ex. [MIZA]; 26-XI-1957: 1 ex. [MIZA]; 20-XI-1957: 3 exx. [MIZA]; 10-XI-1957: 3 exx. [MIZA]; 13-XI-1957: 5 exx. [MIZA]; 14-XI-1957: 1 ex. [MIZA]; Villa de Cura: 28-XI-1956, en tomate (R. Labrador leg.): 1 ex. [MIZA]; 18-VIII-1990 (N. Delgado leg.): 1 ex. [MIZA]; 10-X-1960 (Bordón leg.): 1 ex. [MIZA]; Pozo Diablo: cr. Maracay, 500 m: 13-IV-1962, en mango (M. Gélbez leg.): 14 exx. [MIZA]; 2-VII-1961: 1 ex. [MIZA]; 13-IV-1962: 1 ex. [MIZA]; Las Delicias: cr. Maracay: 27-XII-1949, en coliflor (J. Requena leg.): 2 exx. [MIZA]; Maracay: 450 m: 2-IV-1963, en la luz (E. Osuna leg.): 8 exx. [MIZA]; 6-I-1948 (F. Fernández Y. leg.): 1 ex. [MIZA]; 3-V-1948: 1 ex. [MIZA]; 2-VII-1919 (H.E. Box leg.): 1 ex. [MIZA]; 10-XII-1976 (S. Clavijo leg.): 1 ex. [MIZA]; 20-V-1987 (A. Rodríguez leg.): 1 ex. [MIZA]; 21-X-1977 (O. Mattei leg.): 1 ex. [MIZA]; Maracay: 1 ex. [MIZA]; El Limón: 450 m: 29-VI-1964 (J.C. Marín leg.): 6 exx. [MIZA]; 8-VII-1964: 1 ex. [MIZA]; 10-V-1971 (A. Ramírez leg.): 1 ex. [MIZA]; 12-V-1970: 1 ex. [MIZA]; 18-XII-1973: 3 exx. [MIZA]; 19-III-1964 (J. & B. Bechyne leg.): 1 ex. [MIZA]; 29-VI-1964: 9 exx. [MIZA]; 23-IX-1970: 1 ex. [MIZA]; 13-VI-1964: 1 ex. [MIZA]; 30-I-1964: 1 ex. [MIZA]; 23-VI-1952, en patata (J. González leg.): 2 exx. [MIZA]; 17-IV-1951, en patata (F. Fernández Y. leg.): 2 exx. [MIZA]; 18-IV-1952: 3 exx. [MIZA]; 26-III-1951, en patata (L.A. Salas leg.): 7 exx. [MIZA]; 11-XI-1994 (M. Ascari leg.): 1 ex. [MIZA]; 1-XII-1984, campos FONAIAP, en trampa pegajosa (G. Yépez Gil leg.): 1 ex. [MIZA]; 14-X-1984: 1 ex. [MIZA]; 6-II-1982, en patata (J.A. Clavijo leg.): 2 exx. [MIZA]; 19-IV-1977, en la luz: 1 ex. [MIZA]; 8-V-1978, a la luz: 1 ex. [MIZA]; 23-V-1977, en luz de mercurio (F. Fernández Y., F. Fernández H. leg.): 1 ex. [MIZA]; Guayabita Tur.: 440 m: 17-VI-1995 (Colmenares R. leg.): 1 ex. [MIZA]; Quebrada El Piñal: El Limón: 450 m: 13-VIII-1976 (J. Clavijo leg.): 1 ex. [MIZA]; Rancho Grande, 1100 m: 4-IX-1980 (B. Bechyne leg.): 1 ex. [MIZA]; Tiara: 1200 m: 12/14-IV-1995 (G. Ovalles leg.): 1 ex. [MIZA]; 1200 m: 20-V-1998 (A. Chacón leg.): 1 ex. [MIZA]; Villa de Cura: 28-XI-1956, en tomate (R. Labrador leg.): 1 ex. [MIZA]; Pariaguán: 12-VIII-1967 (J. & B. Bechyne leg.): 3 exx. [MIZA]; 11-VIII-1967: 2 exx. [MIZA]; 13-VIII-1967: 1 ex. [MIZA]; 8-VIII-1967: 1 ex. [MIZA]; Clarines: 25-VIII-1975 (A. Dietz leg.): 3 exx. [MIZA]. Barinas: Pueblo Nuevo: 9-VII-1985 (H. Romero leg.): 3 exx. [MIZA]; Reserva Forestal Ticoporo: 230 m:

26/29-II-1968 (F. Fernández Y., C.J. Rosales leg.): 1 ex. [MIZA]; Caparo-Camp. Cachicamos, 100 m: 6-14-VIII-1969 (J. Salcedo, F. Zambrano leg.): 4 exx. [MIZA]. Carabobo: San Diego: 17-V-1971 (N. Ángeles leg.): 9 exx. [MIZA]; Bejuma: 10-IX-1964 (A. Fernández Y, A. Pérez): 2 exx. [MIZA]; 24-IV-1976, en luz de mercurio (C. Michelangelli, J.A. Clavijo leg.): 1 ex. [MIZA]; Canoabo: 300 m: 16-V-1994 (T. Amarilla) (J. L. García leg.): 1 ex. [MIZA]; Miranda: La Pericoca, 800m: 28-X-1991 (C. J. Rosales, M. Borjas leg.): 1 ex. [MIZA]; Montalbán: Hacienda Bucarito, 750 m: 8/9-IV-1982 (L.D. Otero, L.E. Padilla leg.): 1 ex. [MIZA]; San Diego: 17-V-1961 (N. Angeles leg.): 21 exx. [MIZA]; Trincheras, 350 m: 28-III-1949 (F. Fernández Y. leg.): 2 exx. [MIZA]; Valencia, 500 m: 28/30-IV-1981 (L.D. Otero leg.): 1 ex. [MIZA]. Cojedes: El Baúl: 1-VIII-1976 (O. Mattei leg.): 2 exx. [MIZA]; El Pao: 135 m: 9-V-1995, Project M.I.Z.A-D.H.C. (J. Clavijo A., A. Chacón leg.): 2 ex. [MIZA]; El Pao: Galeras, 9°34'24"N-68°09'7"W, 220 m: 1/3-II-1995, Project M.I.Z.A-D.H.C. (A. Alemán leg.): 1 ex. [MIZA]; 16/18-XI-1994: 2 exx. [MIZA]; 16/19-XII-1994: 9 exx. [MIZA]; 18/20-X-1994: 1 ex. [MIZA]; 19/21-XII-1994: 8 exx. [MIZA]; 28/30-XI-1994: 5 exx. [MIZA]; 3/11-I-1995: 1 ex. [MIZA]; 31-2-XI-1994: 9 exx. [MIZA]; 3/5-IV-1995: 3 exx. [MIZA]; 3/6-III-1995: 1 ex. [MIZA]; 4/6-I-1995 4 exx. [MIZA]; 7/10-IV-1995: 1 ex. [MIZA]; 12/13-IX-1994: 1 ex. [MIZA]; 12/14-XII-1994: 1 ex. [MIZA]; 14/18-X-1994: 1 ex. [MIZA]; 14/16-XII-1994: 6 exx. [MIZA]; 21/23-XI-1994: 2 exx. [MIZA]; 21/24-IV-1995: 1 ex. [MIZA]; 21/23-XI-1994.; 3 exx. [MIZA]; 25/28-XI-1994: 3 exx. [MIZA]; 30/2-XII-1994: 1 ex. [MIZA]; 7/9-XI-1994: 3 exx. [MIZA]; 7/9-XII-1994: 5 exx. [MIZA]; 7/9-XII-1994: 3 exx. [MIZA]; 8/9-IX-1994: 1 ex. [MIZA]; 9/11-XI-1994: 3 exx. [MIZA]; 15/17-II-1995: 3 exx. [MIZA]; 1/3-II-1995: 1 ex. [MIZA]; 18/21-XI-1994: 2 exx. [MIZA]; 18/20-X-1994: 1 ex. [MIZA]; 20/22-II-1995: 3 exx. [MIZA]; 21/26-XII-1994: 1 ex. [MIZA]; 2/5-XII-1994: 3 exx. [MIZA]; 2/5-IX-1995: 1 ex. [MIZA]; 25/27-I-1995: 4 exx. [MIZA]; 28-IX-1994: 3 exx. [MIZA]; 5/7-XII-1994: 1 ex. [MIZA]; 8-XII-1994: 3 exx. [MIZA]; 25/30-I-1995: 1 ex. [MIZA]; 188 m: 2-XII-1994: 1 ex. [MIZA]; El Pao: Pilacones, 9°43'54"N-68°8'31"W, 188 m: 23/25-XI-1994, Project M.I.Z.A-D.H.C. (A. Alemán leg.): 2 exx. [MIZA]; 31-I-1995: 1 ex. [MIZA]; 11/15-VII-1995: 1 ex. [MIZA]; 6/7-VIII-1995: 1 ex. [MIZA]; 2-XI-1995.; 2 exx. [MIZA]; 13/15-XI-1995: 1 ex. [MIZA]; 9/12-XII-1994: 11 ex. [MIZA]; 30-XII-1994: 4 exx. [MIZA]; 18/20-I-1995: 4 exx. [MIZA]; 19/21-XII-1994: 6 exx. [MIZA]; 12/14-XII-1994: 7 exx. [MIZA]; 14/16-XI-1994: 10 exx. [MIZA]; 11/14-XI-1994: 4 exx. [MIZA]; 1/2-IX-1994: 3 exx. [MIZA]; 18/22-VIII-1994: 1 ex. [MIZA]; 6/8-III-1995: 1 ex. [MIZA]; 8/9-IX-1994: 1 ex. [MIZA]; 9/12-IX-1994: 1 ex. [MIZA]; 5/7-XII 1994: 4 exx. [MIZA]; 16/18-XI-1994: 5 exx. [MIZA]; 1/2-VI-1995: 1 ex. [MIZA]; 18/20-X-1994: 2 exx. [MIZA]; 21/24-VIII-1994: 1 ex. [MIZA]; 20/24-X-1994: 2 exx. [MIZA]; 6/9-I-1995: 5 exx. [MIZA]; 2/5-XII-1994: 2 exx.

- [MIZA]; 20/22-II-1995: 1 ex. [MIZA]; 25/28-XI-1994: 7 exx. [MIZA]; 26/28-VIII 1994: 1 ex. [MIZA]; 21/22-XI 1994: 3 exx. [MIZA]; 29/4-IX 1994: 3 exx. [MIZA]; 12/13-XI 1994: 1 ex. [MIZA]; 27/30-I-1995: 1 ex. [MIZA]; 31-VIII-1994: 1 ex. [MIZA]; 2/4-I-1995: 1 ex. [MIZA]; 28/30-XI-1994: 2 exx. [MIZA]; 25/27-I-1995: 2 exx. [MIZA]; 1/3-II-1995: 1 ex. [MIZA]; Hato Mata Clara: cerca El Baúl: 1/3-III-1981 (F. Fernández Y.leg.): 9 exx. [MIZA]; 12/16-IV-1981: 5 exx. [MIZA]; San Carlos, DEFORSA: 17-X-1996 (C.J. Rosales leg.): 1 ex. [MIZA]; San Carlos: 2-VII-1988 (G. López leg.): 1 ex. [MIZA]; Hato Piñero, cr. El Baúl: 3/10-IX-1994 (J. Lattke leg.): 1 ex. [MIZA]. Delta Amacuro: Caño Araguae: 0 m: 15-XII-1952: 1 ex. [MIZA]. Distrito Federal: El Valle, en margaritas (C.H. Ballou col.): 1 ex. [MIZA]; 11-XI-1939, pumila (C. Rizo leg.), en *Crotalaria* (C.H. Ballou col.): 1 ex. [MIZA]; 13-IX-1939 (C.H. Ballou leg.): 1 ex. [MIZA]; Todosana: 0-20 m: 10/11- VI-1975 (J. Salcedo, I. Jaspe leg.): 2 exx. [MIZA]. Falcón: Boca de Aroa: 1/3-IX-1976, en luz de mercurio (C. Michelangelli, J.A. Clavijo A. leg.): 2 exx. [MIZA]; Boca de Aroa: 1/3-IX-1976 (C. Michelangelli, J.A. Clavijo A. leg.): 6 exx. [MIZA]; Boca de Aroa: 1-X-1978, arrojados por el mar (S. Clavijo, J. Clavijo leg.): 1 ex. [MIZA]; Curimagua: San Lorenzo, 1040 m: 21/24-V-1993 (F. Cerdá, L. Joly, V. Savini, A. Chacón leg.): 1 ex. [MIZA]; Finca Tillerías: Sanare: 25/28-XI-1978 (Expedición Instituto Zoología Agrícola, Facultad Agronomía, U.C.V. leg.): 15 exx. [MIZA]; Sector Campache, Finca Las Vegas, Sanare: 1/2-VI-2001 (R. Montiel; F. Medina leg.): 4 exx. [MIZA]; Quebrada Carpita: 45 km al ESE de Yaracal, 12°01'38"N-50°44'59"W, 300 m: 24/27-II-2001 (Q. Arias; E. Aparicio leg.): 1 exx. [MIZA]; Represa Isiro, 100 m: 30-VIII-1976 (I. Jaspe leg.): 1 ex. [MIZA]; Santa Cruz de Bucaral: 850 m: 7-III-1995 (C.J. Rosales leg.): 5 exx. [MIZA]; Santa Cruz de Bucaral: 10-XI-1993, 1 ejemplar (C.J. Rosales leg.): 1 ex. [MIZA]; Yaracal: Hato Corralito, río Tocuyo, 60 m: 27/29-I-1984 (Expedición del Instituto de Zoología Agrícola, Facultad de Agronomía, U.C.V. leg.): 1 ex. [MIZA]; Yaracal: 21-III-1987 (L.J. Joly leg.): 1 ex. [MIZA]. Guárico: 6 km al Norte de San Jose de Guaribe: 3/5-III-1978, a la luz (A. Fernández B., C. Andara, J. Clavijo A. leg.): 1 ex. [MIZA]; Calabozo: 15-XII-1980 (V. Fung leg.): 1 ex. [MIZA]; carretera El Sombrero-Calabozo, finca Mi Teruño, 200 m: 20-IX-1996, en trampa amarilla (R. Montilla, R. Colmenares leg.): 3 exx. [MIZA]; Las Mercedes, Hato La MarrereñaLa Marrereña, 250 m: 19-IX-1971, Museo de Historia Natural La Salle, Caracas, Venezuela (W. Martínez, J. Arispe leg.): 1 ex. [MIZA]; San José de Tiznados: 28-IV-1979, in lighth (J. Clavijo, F. Cerdá leg.): 4 exx. [MIZA]. Miranda: Barlovento: 4-I-1967 (F. Yoris leg.): 1 ex. [MIZA]; Estación Experimental Río Negro, cerca de Capaya, 100 m: 10/12-XI-1977 (C. Andara, J. Clavijo leg.): 3 exx. [MIZA]; Ocumare del Tuy: 19-V-1979, a la luz (F. Geraud leg.): 1 ex. [MIZA]; Tacarigua de Manporal: 10°22'32"N-66°12'10"W, 70 m: 23-VIII-1998 (O. Hernández leg.): 2 exx. [MIZA]; Tacarigua de Manporal: 10°22'32"N-66°12'10"W, 70 m: 24-VIII-1998 (O. Hernández leg.): 9 exx. [MIZA]; Tacarigua de Manporal: 10°22'32"N-66°12'10"W, 70 m: 23-V-1998 (O. Hernández S. leg.): 1 ex. [MIZA]. Monagas: Jusepín: 10-IX-1965 (F. Fernández Y., C.J. Rosales leg.): 1 ex. [MIZA]; 14-X-1965: 1 ex. [MIZA]; 24-IX-1965: 3 exx. [MIZA]; 4-X-1965: 1 ex. [MIZA]; Jusepín: 12-IX-1965, Instituto de Zoología Agrícola, Facultad de Agronomía, Universidad Central Venezuela (D. Garcés leg.): 3 exx. [MIZA]. Nueva Esparta: Isla Margarita: Salamanca: 25-VIII-1956: 1 ex. [MIZA]; 8-IX-1956, IV Expedición: 1 ex. [MIZA]; : San Francisco, 40 m: 20-XII-1951 (Museo Historia Natural La Salle Caracas): 1 ex. [MIZA]; Los Cedros: 22-VIII-1956: 1 ex. [MIZA]; Subida al Cerro, 22-VIII-1956: 1 ex. [MIZA]. Portuguesa: Baronero: 5-V-1968 (J. Clavijo, A. Montagne leg.): 1 ex. [MIZA]; Estación Experimental San Nicolás: 56 km de Guanare, 180 m: 8-IX-1971 (A. Notz P. leg.): 2 exx. [MIZA]; 12-V-1975, trampa de luz (H. Gutiérrez leg.): 2 exx. [MIZA]; 29-IV-1971 (A. Notz P., R. Marcano leg.): 4 exx. [MIZA]; 1/2-IV-1968 (C.J. Rosales, R. Casares leg.): 4 exx. [MIZA]; 20-VI-1973 (R. Marcano, F. Ribet leg.): 1 ex. [MIZA]; Guanarito, Km 20: 20-V-1977 (M. Godou leg.): 1 ex. [MIZA]; San Nicolás: Hacienda El Pilar, 180 m: 2/5-XII-1991 (Expedición Miza UC.V. leg.): 2 exx. [MIZA]; San Nicolás: 180 m, 20-IV-1977, trampa de luz: 13 exx. [MIZA]; 25-IV-1977: 22 exx. [MIZA]; 26-III-1976: 2 exx. [MIZA]; 31-III-1976: 3 exx. [MIZA]; 19-IV-1977: 2 exx. [MIZA]; Río Tucupido: carretera Guanare-Barinas Km 15, 125 m: 5-VI-1972 (L.J. Joly T., C. Rubio leg.): 1 ex. [MIZA]; 5-VI-1972: 1 ex. [MIZA]. Sucre: Quebrada de la Niñala Niña: 26-XI-1993 (Rosales, Joly, Scavo, Savini leg.): 1 ex. [MIZA]. Táchira: La Morita: 300 m: 8/14-IV-1972 (A. D'Ascoli, A. Montagne, J. Salcedo leg.): 1 ex. [MIZA]; La Fría: 300 m: 10-VI-1972 (L.J. Joly T. leg.): 2 exx. [MIZA]; Río Frío: 600 m: 11/13-XII-1980 (J.A. Clavijo, A. Chacón H., J. Ayala leg.): 1 ex. [MIZA]; Río Frío: 600 m: 2/10-IX-1981 (F. Fernández Y., J.A. Clavijo, A. Chacón leg.): 1 ex. [MIZA]; Río Negro: 12-XII-1980 (J.M. Ayala leg.): 1 ex. [MIZA]; Finca La Morusca, Vía Guarumito, 130 m: 14/20-VI-1996 (J. DeMarmels, A. Chacón leg.): 2 exx. [MIZA]; La Uracá, 300 m: 12/19-IV-1996 (J. DeMarmels, A. Chacón leg.): 1 ex. [MIZA]. Yaracuy: Agua Negra: 24-II-1971 (G. Piñero leg.): 1 ex. [MIZA]; carretera San Felipe, vía Santa María, 6 km de Posada, Mi Refugio, 10.25375°N-68.66753°W, 650 m: 21-II-2001 (J. Clavijo; R. Briceño; A. Chacón leg.): 1 ex. [MIZA]; La Hoya, 100 m: 28-30-VI-1973, a la luz (F. Fernández Y., J. Salcedo, J. Clavijo leg.): 1 ex. [MIZA]; Taría: VIII-1942: 1 ex. [MIZA]. Zulia: El Tucuco: 420 m: 21/27-V-1971 (C.J. Rosales, J. Salcedo, A. Ramírez leg.): 18 exx. [MIZA]; El Tucuco: 26-XII-76 (O. Mattei leg.): 1 ex. [MIZA]; 27-XII-76 (O. Mattei leg.): 1 ex. [MIZA]; Hacienda San Marino, carretera Machiques - Colón Km 40: 9-X-1966 (C.J.

Rosales, A. D'Ascoli leg.): 2 exx. [MIZA]; Kasmara: Perijá: 11-IV-1963 (P. J. Salinas leg.) (Col: M. Gelbez): 1 ex. [MIZA]; Kasmara: río Yasa, Sierra de Perijá, 250 m: 19-IX-1961 (C. J. Rosales, F. Fernández Y. leg.): 3 exx. [MIZA]; Kasmara: río Yasa, Sierra de Perijá, 250 m: 19-IX-1961 (F. Fernández Y., C.J. Rosales leg.): 1 ex. [MIZA]; 22-IX-1961: 3 exx. [MIZA]; Misión El Rosario: 50 m: 12/13-I-1977 (L.J. Joly T., J. Salcedo, J. Clavijo leg.): 1 ex. [MIZA]; 12-13-I-1977: 9 exx. [MIZA]; Santa Bárbara: 7-VIII-1976 (J.M. González leg.): 1 ex. [MIZA]; 9-VIII-1976: 1 ex. [MIZA]; Tres Bocas, 100 m: 11-I-1977 (L.J. Joly T., J. Salcedo, J. Clavijo leg.): 3 exx. [MIZA].

Diagnosis. Small-medium size (total length of 7–13 mm), with whitish short sparse vestiture covering the body. Head capsule orange, with a pair of black elongated interorbital marks. Antennae, palpi, labrum and clypeus black. Pronotum entirely black with a thin midline white, relatively elongated, with parallel with parallel margins in the posterior two thirds. Elytra mostly black, bordered by a thin orange margin, and with alternating wide black longitudinal stripes and fine orange stripes; orange stripes extend from the humeral area to the elytral posterior third (Fig. 3). Venter and legs mostly black, except trochanter and basal area of femora, which are orange. Tibial spurs slender and spiniform. Claws highly characteristic, presenting the dorsal blade normally curved with the inner blade straight and very narrow and divergent respect to the dorsal blade (Fig. 4B). Sexually dimorphic: males present a ventral smooth and shiny ridge on antennomeres III–VI (Fig. 4C) and with the first tarsomere straight and densely setated fore and middle tarsal pads. For a detailed description of the species see Pinto (1991).

It differs from the rest of the *Epicauta vittata* species group by the claw morphology, in which the inner blade is straight and narrow, by the ventral side of the male antennomeres III–VI, which are ridged, denuded and shiny, and by the presence of a pair of dark interorbital spots. The most similar species to *E. aragua* is *E. apure*, which present the same claw morphology and it is only distinguishable by the lack of the ventral ridges of the male antennomeres.

Taxonomic comments. Allocated within the *Epicauta vittata* species group by Adams and Selander (1979). Previously recorded as *E. grammica* (Champion 1892, Denier 1933, 1935, Martorell 1939, Virkki 1962, Pinto 1991).

Geographic distribution. *Epicauta aragua* ranges from Venezuela and Colombia in northern South America to Guatemala in Central America (Pinto 1991). In Venezuela it can be found in most of its territory (Fig. 3).

Previously published records. COLOMBIA – Without precise locality (Champion 1892 sub *E. grammica*); Bolívar: Los Colorados (García-París *et al.* 2016). Magdalena: Tamalameque (Adams and Selander 1979);

Aracataca (García-París *et al.* 2016). Meta: Villavicencio (Adams and Selander 1979). Santander: La Cimitarra, 80 km al NO de Vélez (Adams and Selander 1979). Valle del Cauca: Río Frío (Adams and Selander 1979); Amero, Santuario & Cauca Valley (Adams and Selander 1979). COSTA RICA – Alajuela: Coyolar (Adams and Selander 1979). Guanacaste: Bagaces (Adams and Selander 1979); Finca Jiménez, near Taboga (Adams and Selander 1979); Santa Elena (Adams and Selander 1979). Puntarenas: Coronado (Adams and Selander 1979). San José: Higuito (Adams and Selander 1979); San José (Adams and Selander 1979). COSTA RICA – Guanacaste (García-París *et al.* 2016). EL SALVADOR – La Libertad: Quezaltepeque (Adams and Selander 1979). San Salvador: San Salvador (Adams and Selander 1979); Ciudad Univesitaria (Virkki 1962 sub *E. grammica*). GUATEMALA – Región III Nororiental: Chiquimula: Izabal, Ruinas de Quirigua (Pinto 1991). Región VI Suroccidental: Suchi-tepéquez: Cuyotenango, Such. (Pinto 1991). HONDURAS – Copán: Copán (Adams and Selander 1979). Francisco Morazán: Zamorano (Adams and Selander 1979). NICARAGUA – Rivas: 5 mi. NW Peñas Blancas (Pinto 1991); Chontales (Champion 1892). PANAMA – Canal Zone: Alhajulla (Adams and Selander 1979); Aneón (Adams and Selander 1979); Balboa (Adams and Selander 1979); Barro Colorado Island (Adams and Selander 1979); Cabima (Adams and Selander 1979); Ciricito (Adams and Selander 1979); Coco Solo (Adams and Selander 1979); Corozal (Adams and Selander 1979); Fort Kobbe (Adams and Selander 1979); Gatún (Adams and Selander 1979); Juan Minas (Adams and Selander 1979); Las Cascadas (Adams and Selander 1979); Madden Dam (Adams and Selander 1979); Margarita (Adams and Selander 1979); Paraíso (Adams and Selander 1979); Tabernilla (Adams and Selander 1979); Canal Zone (García-París *et al.* 2016). Chiriquí: Bugaba (Champion 1892; Adams and Selander 1979); Volcán de Chiriquí (Champion 1892); San Feliz [=San Felix] (Champion 1892); Tolé (Champion 1892); David (Adams and Selander 1979); Rovira (Adams and Selander 1979). Coclé: Río Hato (Adams and Selander 1979). Panama: La Chorrera (Adams and Selander 1979); Río Trinidad (Adams and Selander 1979). TRINIDAD AND TOBAGO – Trinidad (Pinto 1991). VENEZUELA – Without precise locality (Champion 1892 sub *E. grammica*; Denier 1933; 1935 sub *E. grammica*); Anzoátegui: Barcelona (García-París *et al.* 2016). Apure: San Fernando (Adams and Selander 1979). Aragua: Cagua (Adams and Selander 1979); Cagua (García-París *et al.* 2016); El Limón (García-París *et al.* 2016); Maracay (García-París *et al.* 2016); Rancho Grande, Maracay (García-París *et al.* 2016). El Castaño (Adams and Selander 1979); El Limón (Adams and Selander 1979); Las Delicias (Adams and Selander 1979); La Providencia (Martorell 1939 sub

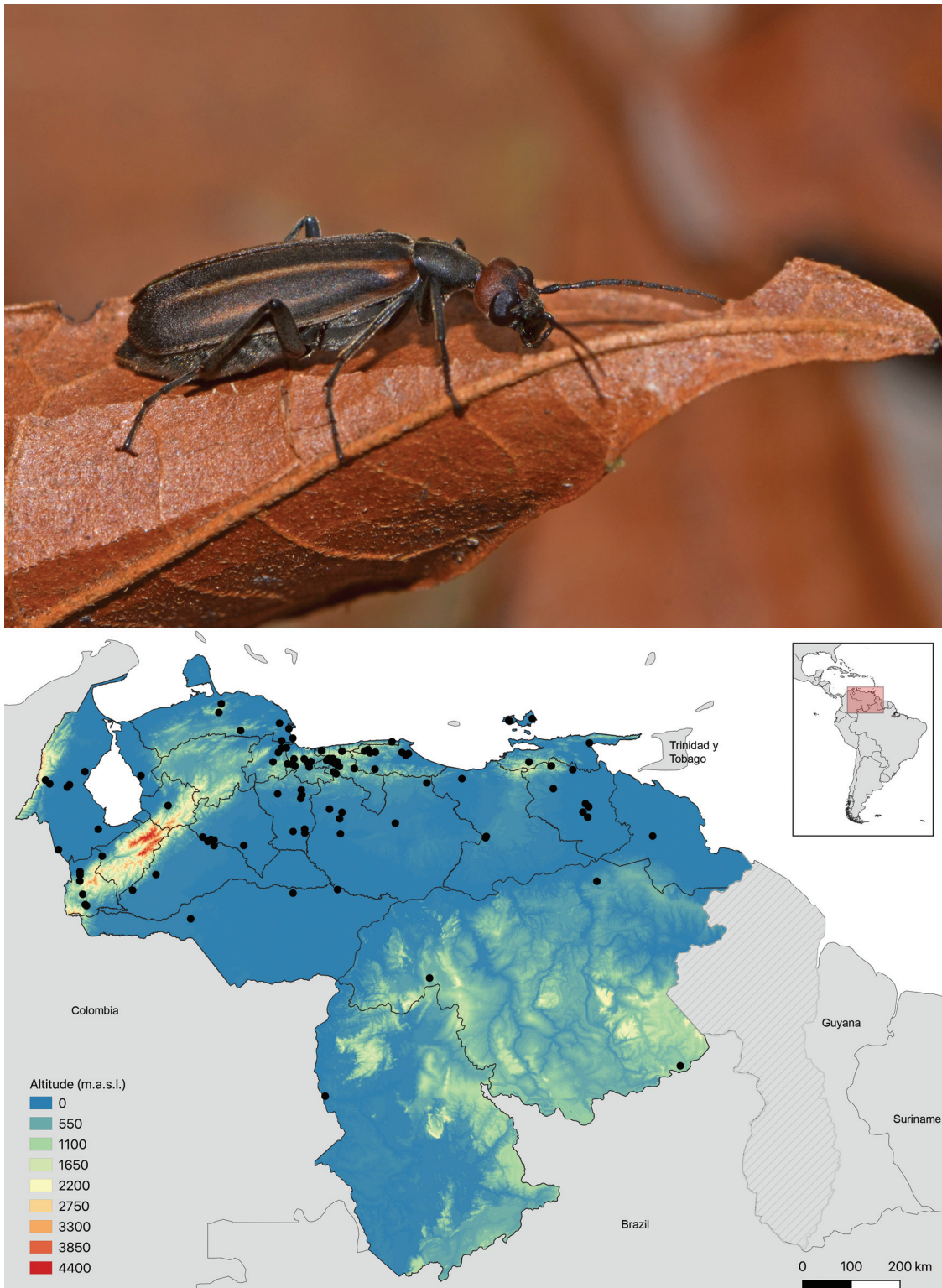


Figure 3. Live specimen of *Epicauta aragua* Adams et Selander 1979 from Pacuare Reserve (Limón, Costa Rica) (top) and distribution map of the species in Venezuela (bottom).

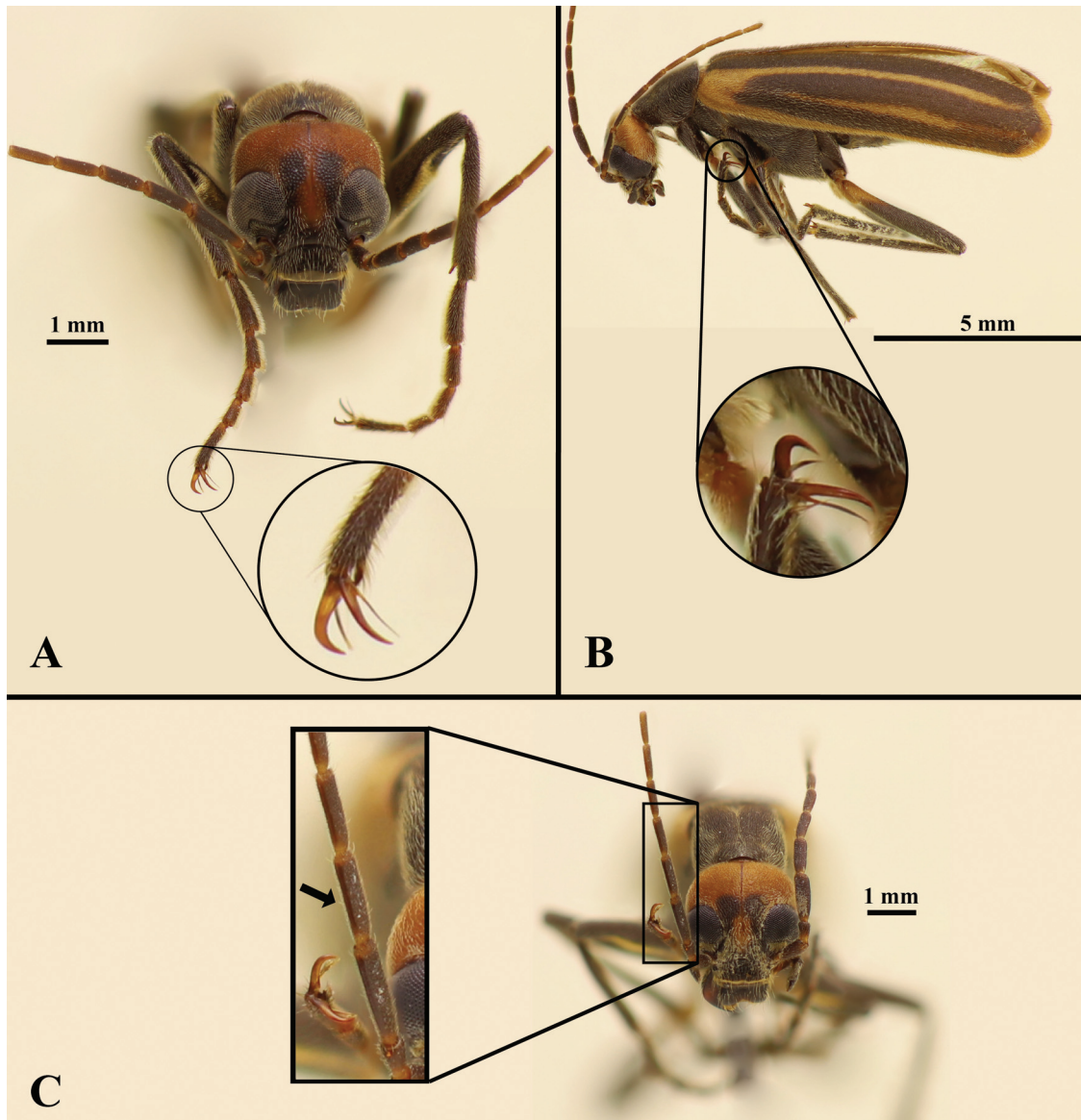


Figure 4. Key morphological characters of *E. apure* and *E. aragua*. (A) Head of *E. apure* (frontal view); inset: detail of the tarsal claws of the species. (B) *Epicauta aragua* habitus (lateral view); inset: detail of the tarsal claws of the species. (C) Head of *E. aragua* (frontal view); inset: details of the ventral smooth ridge exhibited by the males of *E. aragua* on antennomeres III–VI.

E. grammica; Adams and Selander 1979); Maracay (Adams and Selander 1979); Ocumare de la Costa (Adams and Selander 1979); Rancho Grande (Adams and Selander 1979); Samán de Guere (Martorell 1939 sub *E. grammica*; Adams and Selander 1979); Villa de Cura (Adams and Selander 1979). Bolívar: El Pao (Adams and Selander 1979); Guaniamito (Adams and Selander 1979); Santa Elena (Adams and Selander 1979). Carabobo: Guáparo (Adams and Selander 1979); Las Trincheras (Adams and Selander 1979); Las Vueltas (Adams and Selander 1979). Distrito Federal: Caracas (Adams and Selander 1979); El Valle (Adams

and Selander 1979). Guárico: Hato Las Lajas (Adams and Selander 1979); San Diego (García-París *et al.* 2016). Miranda: Baruta (Adams and Selander 1979); Tacarigua (Adams and Selander 1979). Monagas: Caripito (Adams and Selander 1979); Hacienda Las Acacias (Adams and Selander 1979); Caripe (Adams and Selander 1979) 42 km SE Maturin (García-París *et al.* 2016); 60 km SE Maturin (García-París *et al.* 2016). Portuguesa: Baronero (Adams and Selander 1979); San Nicolás (Adams and Selander 1979). Sucre: Cumanocoa (Adams and Selander 1979). Trujillo: Km. 80 carretera Valera-Maracaibo (Adams and Selander

1979); Valera (Adams and Selander 1979). Zulia: San Juan de Colón (Adams and Selander 1979); Kasmaera, Sierra de Perijá (Adams and Selander 1979); Tucuco (Adams and Selander 1979).

Notes on natural history. Adult activity has been registered all throughout the year, with two peaks of activity from April to August and from November to January (Adams and Selander 1979; Pinto 1991). In Maracay, Venezuela, it has been recorded in May (Martorell 1939 sub *E. grammica*). Mostly diurnal, although some collections labels point some nocturnal activity (Adams and Selander 1979).

Epicauta aragua is usually found on weeds and grasees in the surroundings of La Providencia and Samán de Guere, where it seems to be abundant (Martorell 1939 sub *E. grammica*). They feed on *Solanum tuberosum* L. (Solanaceae), *Trianthema portulacastrum* L. (Aizoaceae), *Amaranthus* L. (Amaranthaceae), *Portulaca* L. (Portulacaceae) and *Kallstroemia* Scopoli (Zygophyllaceae), although this last taxon was not accepted under captive conditions (Adams and Selander 1979). Altitudinal ranges from sea level up to 1500 m.a.s.l in Puntarenas (Costa Rica) (Adams and Selander 1979). It has been found in sympatry with *E. apure* in Venezuela at San Fernando (Apure), feeding on *Kallstroemia* (Adams and Selander 1979). Virkki (1962 sub *E. grammica*) studied their chromosomes.

Epicauta carmelita (Haag-Rutenberg 1880)

Lytta carmelita Haag-Rutenberg 1880: 46. Terra typica: "Amer. centr., Neu-Granada, Mexico?" as originally stated by Haag-Rutenberg (1880); "N. Grenada..." after the designation of a lectotype at the British Museum of Natural History (London) (Pinto 1982) (examined). One paralectotype male conserved at the Magyar Természettudományi Múzeum (Budapest) (examined), three paralectotypes female conserved at Zoologische Staatssammlung München and one paralectotype female conserved at the Universitets Zoologiska Museum, Helsinki.

Epicauta carmelita (Haag-Rutenberg 1880): Dugès 1886: 582.

Cantharis carmelita (Haag-Rutenberg 1880): Champion 1899: 174.

Studied material. Type material: Lectotype (circle with dark blue border; printed) // Syntype (circle with light blue border; printed) // N. Granada // *carmelita* m // F. Bates 81-19 // *carmelita* typ Haag // Lectotype male *Lytta carmelita* Haag-Rutenberg, desig. J.D. Pinto, 1981: 1 ex. [BMNH]; Mexio [sic] Baden // Paratypus 1880 *Lytta carmelita* Haag-Rutenberg (white label with red margins; handwritten in part) // KAZ (green label; printed) // Paralectotype *Lytta carmelita* Haag-Rutenberg desig. J. D. Pinto 1981: 1 ex. [MTM].

COLOMBIA – Sierra Madre de Santa Marta: Atánquez: III-VI-1952 (G. Reichel-Dolmatoff) / *Epicauta carmelita* (Haag-Rutenberg), J. D. Pinto det., 1987/8: 2 exx. [NHMLA]. MÉXICO – Chiapas: 26 km al SO de

Ocozocuahtla: 29-VI-1981 (J. Pinto & J. Mathieu leg.), J.D. Pinto det.: 1 ex. [MAB]; San Jerónimo, Tacaná: 2-VIII-1970 (T. W. Taylor): 1 ex. [NHMLA]; 24-VIII-1970 (T. W. Taylor), *Epicauta carmelita* (Haag-Rutenberg), J. D. Pinto det., 1987/8: 1 ex. [NHMLA]. COSTA RICA – Guanacaste: Finca Jiménez, nr. Taboga: 6-VII-1967 (R. W. MacDiarmid), *Epicauta carmelita* (Haag-Rutenberg), J. D. Pinto det., 1987: 3 exx. [NHMLA]. NICARAGUA – León: Izapa: 27-VI-1984 (*carmelita* Haag det. Kaszab): 1 ex. [MTM]. VENEZUELA – Falcón: Cerca de Gaibacoa, 400 m: 13-VII-1957 (C.J. Rosales leg.): 3 exx. [MIZA]; El Mene: 9-XI-1986 (C.J. Rosales, L.J. Joly leg.): 4 exx. [MIZA]; San Luis, 900 m: 16-XI-1978 (D. López leg.): 5 exx. [MIZA]. Mérida: Mérida: 4-IV-1982 (Rodríguez leg.): 1 ex [MIZA]. Trujillo: Valera: 29-X-1953 (N. Angeles leg.): 1 ex [MIZA]; La Ceiba, 50 m: 28-X-2003 (R. Montilla leg.): 2 exx. [MIZA]; Trujillo, 800 m: 30-IV-1948 (P. Guagliumi leg.): 1 ex [MIZA]; El Cenizo: 10-VI-1954: 1 ex. [MIZA]. Zulia: La Kasmaera, Sierra Perija, 200 m: 25-IX-1961 (C.J. Rosales leg.): 4 exx. [MIZA]; Kasmaera, Perija: 12-IV-1963 (R.J. Salinas, M. Gelbez leg.): 4 exx. [MIZA].

Diagnosis. Medium-large sized species (10–22 mm long). Easily recognizable by its general coloration: body tegument black (except elytra) with dense short gray pubescence; elytra pale brown with fine dense brown-yellowish pubescence, apical pubescence of elytra color grayish (Fig. 5). Antennae filiform, black. Head wider than long. Male pygidium thickly sclerotized, narrow and elongated, tapering slightly and gradually from the base, apex slightly but distinctly flared, apical margin sinuate. According to Pinto (1991), the modified pygidium of males separates *E. carmelita* from all other species of *Epicauta* from America.

Taxonomic comments. The unavailable name *E. carmelita* Chevrolat in Dejean 1837: 247, was associated to *E. carmelita* by Beaugregard (1890) and Champion (1892). Included in the species group of *E. carmelita* by Pinto (1991).

Geographic distribution. This species presents a wide geographic range, covering from Southern Mexico to Venezuela. It has been recorded in Colombia, Costa Rica, Guatemala, Honduras, México, Nicaragua, Panama and Venezuela (Champion 1892, Pittier and Biolley 1895, Pinto 1991, Nielsen *et al.* 2004, Maes and Huether 2007, Campos-Solidini *et al.* 2018, Gámez and Acconcia 2020). In Venezuela it can be found in the West of the country (Fig. 5).

Previously published records. COLOMBIA – Without precise locality (Blackwelder 1945). COSTA RICA – Bebedero (Pinto 1991); Canas (Pinto 1991); La Pacifica (Pinto 1991); Santa Elena (Pinto 1991); Taboga (Pinto 1991). COSTA RICA. Guanacaste (Nielsen *et al.* 2004); Turubares (Pittier and Biolley 1895); San José (Pittier and Biolley 1895). GUATEMALA – Sololá: Finca Santa María, Santa Barbara, SE Lago Atitlán (Maes and

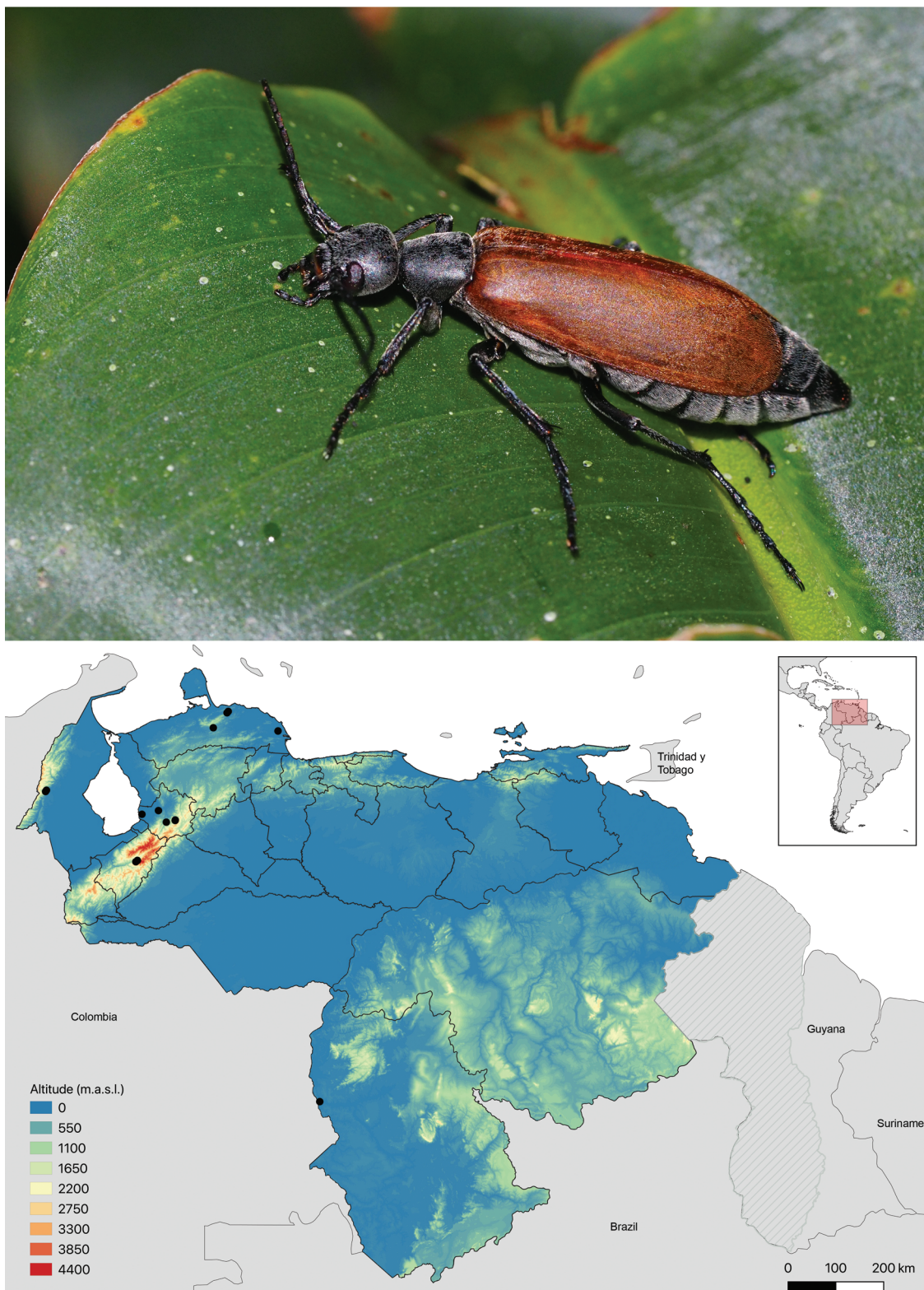


Figure 5. Specimen of *Epicauta carmelita* (Haag-Rutenberg 1880) from Guaría (Puntarenas, Costa Rica) (top) and distribution map of the species in Venezuela (bottom).

Huether 2007); Coatepeque (Pinto 1991); Jalpatagua (Pinto 1991); San Sebastian (Pinto 1991). HONDURAS – Guaimaca (Pinto 1991); La Paz (Pinto 1991); Siquatepeque (Pinto 1991); Zamorano (Pinto 1991). MÉXICO – Chiapas: Arriaga (Pinto 1991); 13 km al NE de Chiapa de Corzo (Pinto 1991); 10-12 mi. N of Cintalapa (Pinto 1991); Ocozucuautila (Pinto 1991); 16 km W of Ocozucuautila (Pinto 1991); 20 km W of Ocozucuautila (Pinto 1991); 18 mi. W of Ocozucuautila (Pinto 1991); 26 km SW of Ocozucuautila (Pinto 1991); San Jerónimo, Volcán Tacana (Pinto 1991); 16 km S of Tonalá (Pinto 1991). *Oaxaca*: Matías Romero (Pinto 1991); Tehuantepec (Champion 1892; Pinto 1991); Ventosa (Pinto 1991). *Veracruz*: Cotaxtla (Pinto 1991); Lago Catemaco area (Pinto 1991); Los Tuxtlas range (Pinto 1991); Paso del Macho (Dugès 1889; Champion 1892; Pinto 1991); Playa Vicente (Champion 1892; Pinto 1991). NICARAGUA – Nicaragua (Blackwelder 1945); Chontales: Rivas (Pinto 1991). Nueva Segovia: Ocotal, San Fernando (Maes and Huether 2007). Boaco (Maes and Chandler 1994; Maes and Huether 2007); Boaco: San Lorenzo (Champion 1892; Maes and Huether 2007). León: San Jacinto; Izapa (Maes and Huether 2007). Managua: Ticuantepe, Reserva Silvestre Privada Montibelli (Maes and Huether 2007). Masaya: Las Flores (Maes and Huether 2007). Granada: Santa Ana, Volcán Mombacho (Maes and Huether 2007); Volcán Mombacho (Maes and Huether 2007); Nandaime, Reserva Silvestre Privada Domitila (Maes and Huether 2007). Chontales (Champion 1892; Maes and Huether 2007). Río San Juan: Solentiname (Maes and Huether 2007). PANAMA – Panama (Blackwelder 1945); near Panama city (Champion 1892); Canal Zone (Pinto 1991); El Coronero (Pinto 1991); Taboga Island (Pinto 1991). VENEZUELA – Venezuela (Blackwelder 1945). Mérida: (Mérida) (Campos-Soldini *et al.* 2018); Chamicerito Alto, Ejido, Municipio Campo Eliás (Gámez and Acconcia 2020); Sector Los Arboles, parte alta de Pozo Hondo, Municipio Campo Eliás (Gámez and Acconcia 2020).

Notes on natural history. It has been recorded feeding on *Acnistus arborescens* (L.) Schltld. and *Solanum hazenii* Britton (Solanaceae) along roadsides and barren fields in Venezuela (Gámez and Acconcia 2020). It appears to show daytime activity. Altitudinal range in Venezuela from 15 (El Mene) to around 1400 m.a.s.l. (Ejido).

Epicauta caustica Rojas 1857

Epicauta caustica Rojas 1857: 441. Terra typica: “San Fernando de Apure” originally, “San Juan de los Morros, Guarico, Venezuela” after neotype designation by Selander (1981) at the MIZA collection. The neotype was not found during our study of the MIZA collection.

Lytta caustica (Rojas 1857): Haag-Rutenberg 1880: 53.

Studied material. VENEZUELA – Amazonas: Puerto Ayacucho: 7-VIII-1982 (C.E.U.M. Fac.Agronomía UCV Maracay): 1 ex. [MIZA]; 2/5-XI-1982 (A. Chacón, G. Yépez G. leg.): 1 ex. [MIZA]. Aragua: San Sebastián de los Reyes, macho, bajo la luz en una pared blanca, junto a bosque claro y zonas abiertas: 1 ex. [MIZA]; Maracay, 450 m: 12-VII-1965 (S. Rivas leg.): 1 ex. [MIZA]. Bolívar: Río Guaniamo, 160 m, 6°45'N-66°1'O: 25/28-V-1979 (J. Clavijo, A. Chacón, G. Yépez leg.): 4 exx. [MIZA]. Carabobo: Naguanagua: 30-V-1966 (S. Díaz Sierra leg.): 1 ex. [MIZA]; Valencia: 900 m: 25/27-V-1981, a la luz (L.D. Otero leg.): 1 ex. [MIZA]; Valencia: Urbanización Guaparo, 500 m: 12/13-VII-1980 (L. D. Otero leg.): 1 ex. [MIZA]. Cojedes: El Pao: Galeras, 220 m, 9°34'24"N-68°9'7"O: 19/22-XI-1995 (A. Alemán leg.): 2 exx. [MIZA]. Guárico: San Juan de los Morros: 420 m: 8-VIII-1964 (J. & B. Bechyne leg.): 3 exx. [MIZA]. Portuguesa: Río Tucupido: Km. 15 carret. Guanare - Barinas, 125 m: 5-VI-1972 (L.J. Joly T., C. Rubio leg.): 1 ex. [MIZA]. Táchira: La Fría, 300 m: 10-VI-1972 (L.J. Joly T. leg.): 1 ex. [MIZA]; San Félix, Río Uracá, 350 m: 12/19-IV-1990 (J. De Marmels, A. Chacón leg.): 2 exx. [MIZA]. Zulia: Río Arigüisa: 20-VIII-1974 (E. Osuna): 5 exx. [MIZA]; Río Arigüisa: Km. 20 vía Carrasquero: 2-V-1960 (C.J. Rosales leg.): 2 exx. [MIZA]; Río Arigüisa: 20-VIII-1974: 1 ex. [MIZA]; El Tucuco, 420 m: 21/27-V-1971 (C.J. Rosales, J. Salcedo, A. Ramírez leg.): 4 exx. [MIZA]; Bahía El Tucuco (primary forest): 5-I-1983 (T. Racheli leg.), *Epicauta caustica* Rojas, M.A. Bologna det.: 2 exx. [MAB].

Taxonomic comments. Included in the *E. caustica* species group by Selander (1981). According to Selander (1981) the synonymies of *E. caustica* with *Lytta capitata* Laporte de Castelnau 1840 proposed by Wellman (1910: 23) and with *Lytta philaemata* Klug 1825 proposed by Borchmann (1917), both retained by Blackwelder (1945), are incorrect.

Diagnosis. Medium sized species (11–19 mm, according to Selander 1981; Pinto 1991). Well characterized by the shape of the head, specifically in the male, with the vertex depressed and the first five antennomeres very different from each other in shape, length and width; antennomeres very shiny (Fig. 6). Both sexes with fore tibial spurs spiform; hind tibial spurs wider. Cuticle dark brown, head red-orange with two small black dots on the frons and two spots above the eyes. Pronotum with a yellowish-brown median line. Elytra with a discal clear line and fadind dark orange lateral margins.

Geographic distribution. Recorded from Panama and Venezuela (Selander 1981). Geographic distribution of *E. caustica* in Venezuela is illustrated in Fig. 6.

Previously published records. PANAMA – Canal Zone: Barro Colorado Island (Selander 1981b). VENEZUELA – Apure: San Fernando de Apure (Rojas 1857, Selander 1981). Aragua: Maracay (Selander

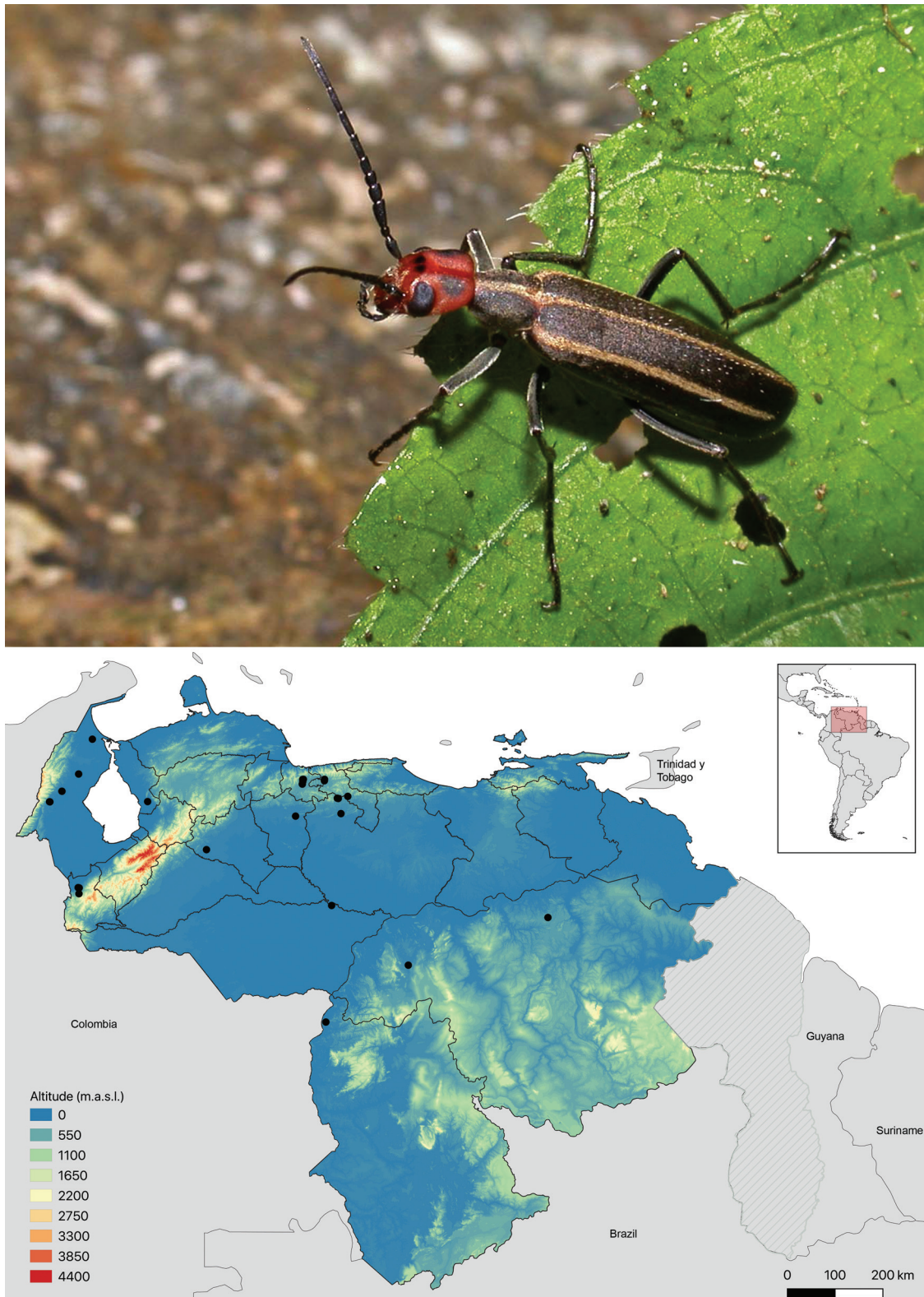


Figure 6. Specimen of *Epicauta caustica* Rojas 1857 from San Sebastián (Aragua, Venezuela) (top) and distribution map of the species in Venezuela (bottom).

1981). Bolívar: La Vergarena (Selander 1981). Carabobo: Naguanagua (Selander 1981). Guárico: Ortiz (Selander 1981); San Juan de los Morros (Selander 1981). Táchira: La Fría (Selander 1981). Zulia: Carrasquero, Km. 20 (Selander 1981); El Tucuco (Selander 1981); Km. 80 de la carretera entre Valera (Trujillo) y Maracaibo (Selander 1981).

Notes on natural history. Elevation records place this species from sea level to 230 m.a.s.l. in Apure, 450 m.a.s.l. in Aragua, 300 m.a.s.l. in Táchira, and 420 m.a.s.l. in Zulia (Selander 1981). Selander (1981) indicated that adult activity extends from April 30th to August 8th, a period that includes the one mentioned by Rojas (1857) at the description of the species. In Apure it was considered a pest of tomato plants by 1850 (Rojas 1857) and later a pest of potatoes (Selander 1981). Adults are mainly nocturnal and are attracted to artificial lights (Rojas 1857, Selander 1981). Rojas (1857) demonstrated that hemolymph from adult specimens, alive or preserved in ethanol, was capable of producing blisters in human skin.

Epicauta chaima López-Estrada, Sánchez-Vialas, Ruiz et García-París sp. nov.

Holotype. (Fig. 7) Male: “Venezuela-Mo/nagas. Jusepín/ 10-IX-1965” (white, rectangular, handwritten and printed) “F. Fernandez Y./ C. J. Rosales” (white, rectangular, handwritten and printed; “Holotypus, *Epicauta chaima* López-Estrada, Sánchez-Vialas, Ruiz & García-París, des. 2021” (red label, printed) [MIZA].

Paratypes. “Urúyen BO/ VENE UELA/ 500m 11-IV-56” (white, rectangular, handwritten and printed), “F. Fernandez Y./ C. J. Rosales/ Cols.” (white, rectangular, printed): 1 ex. [MIZA]. “Venezuela/ Bolívar” (white, rectangular, printed), San Ignacio/ de Yuruani/ 860 m./ 18-VIII-87 (white, rectangular, handwritten), “C.E.U.M./ Fac. Agronomía/ U.C.V. Maracay” (white, rectangular, printed): 1 ex [MIZA]. “Venezuela-MO/ Jusepín/ 19-X-1965” (white, rectangular, handwritten and printed), “F. Fernandez Y./ C. J. Rosales” (white, rectangular, printed), “*Epicauta* sp. *vittata* group det. Selander” (white, rectangular, handwritten): 1 ex [MIZA]. “Venezuela-Mo/ nagas. Jusepín/ 10-IX-1965” (white, rectangular, handwritten and printed), “F. Fernandez. Y/ C. J. Rosales” (white, rectangular, printed): 1 ex. [MIZA]. “Venezuela-MO/ Jusepín/ 25-IX-1965” (white, rectangular, partially printed), “F. Fernandez Y./ C. J. Rosales” (white, rectangular, printed): 1 ex. [MIZA]. “Venezuela-Mona-/ gas. Jusepín/ 50m. 6-VI-67” (white, rectangular, handwritten and printed), “J. Salcedo/ L. Rodríguez” (white, rectangular, handwritten and printed): 1 ex. [MIZA]. “Las Lajas/ Venezuela-Gua-/ rico 13-V-1967” (white, rectangular, handwritten and printed) “A.D´Ascoli./ col.” (white, rectangular,

printed): 1 ex. [MIZA]. “Venezuela Guárico/ Nicolasito 61m/ 8°08’20” N – 66°24’32” O” (white, rectangular, printed), “2-8-ii-2000 J. Clavijo; M./ Gainai; R. Briceño;/ Q. Arias; A. Chacón” (white, rectangular, printed): 1 ex: [MIZA]. “Venezuela Guárico/ Nicolasito 61m/ 8°08’20”N–66°24’32”O” (white, rectangular, printed), “2-8-ii-2000 J. Clavijo; M./ Gainai; R. Briceño;/ Q. Arias; A. Chacón” (white, rectangular, printed): 1 ex. [MIZA]. All paratypes labelled: “Paratypus, *Epicauta chaima* López-Estrada, Sánchez-Vialas, Ruiz & García-París, des. 2020” (red labels, printed).

Description of the holotype (male). Length (frons to posterior margin of elytra): 12.3 mm. Maximum width: 2.2 mm. Body slender and elongated. General body coloration dark brown to blackish with four whitish longitudinal stripes on elytra. Head with a single irregular reddish blotch from the fronto-clypeal suture to the upper interorbital area. Legs light brown at its proximal side, darker in the distal area of femora and tibia. Tibial spines and tarsal claws brownish. Dark brown short vestiture over the dorsal surface of the body, except along the longitudinal stripes of elytra and pronotum midline, which are whitish; ventral body regions with dense and longer whitish setae.

Head suborbicular, wider than pronotum (head maximum width: 1.4 mm); with a longitudinal subtle median groove from the vertex to the upper area of fronto-clypeal suture. Temples subparallel. Head surface covered by numerous punctures uniformly distributed, except in the median groove, which is smooth and glabrous. Punctures very small, rounded, shallow and dense, but isolated from each other. Frons and temples with a short seta on each puncture, separate but close between each other. The area above the antennal insertions slightly elevated, no pilose. Neck (sclerotized region between the posterior edge of the head and pronotum) light brown. Eyes large, kidney-shaped, swollen, with the interior margin emarginated, dividing the eye into upper and lower lobe, the latter of larger size; minimum interorbital distance: 0.68 mm. Fronto-clypeal suture deeply marked, arcuate. Clypeus flat, sub-rectangular, transverse (0.87 mm wide by 0.5 mm long); punctures similar to those on the head, almost absent in its distal third, which is membranous and denuded; setae inside punctures directed forward, longer than those of the frons, specially at the distal area, directed forward. Labrum-clypeus suture almost straight. Labrum transverse (0.65 mm wide by 0.36 mm long), emarginated in the middle; punctures and pilosity similar to those of the clypeus; setae longer in the lobes. Mandibles robust, glabrous in the apex, and basally pilose, asymmetrically notched in their distal region, with the upper lobe smaller. Maxillary palpomere I wide, subtrapezoidal, II similar to I, III subtrapezoidal and flattened; distal segment widest with a narrow excavation along the distal margin; pilosity

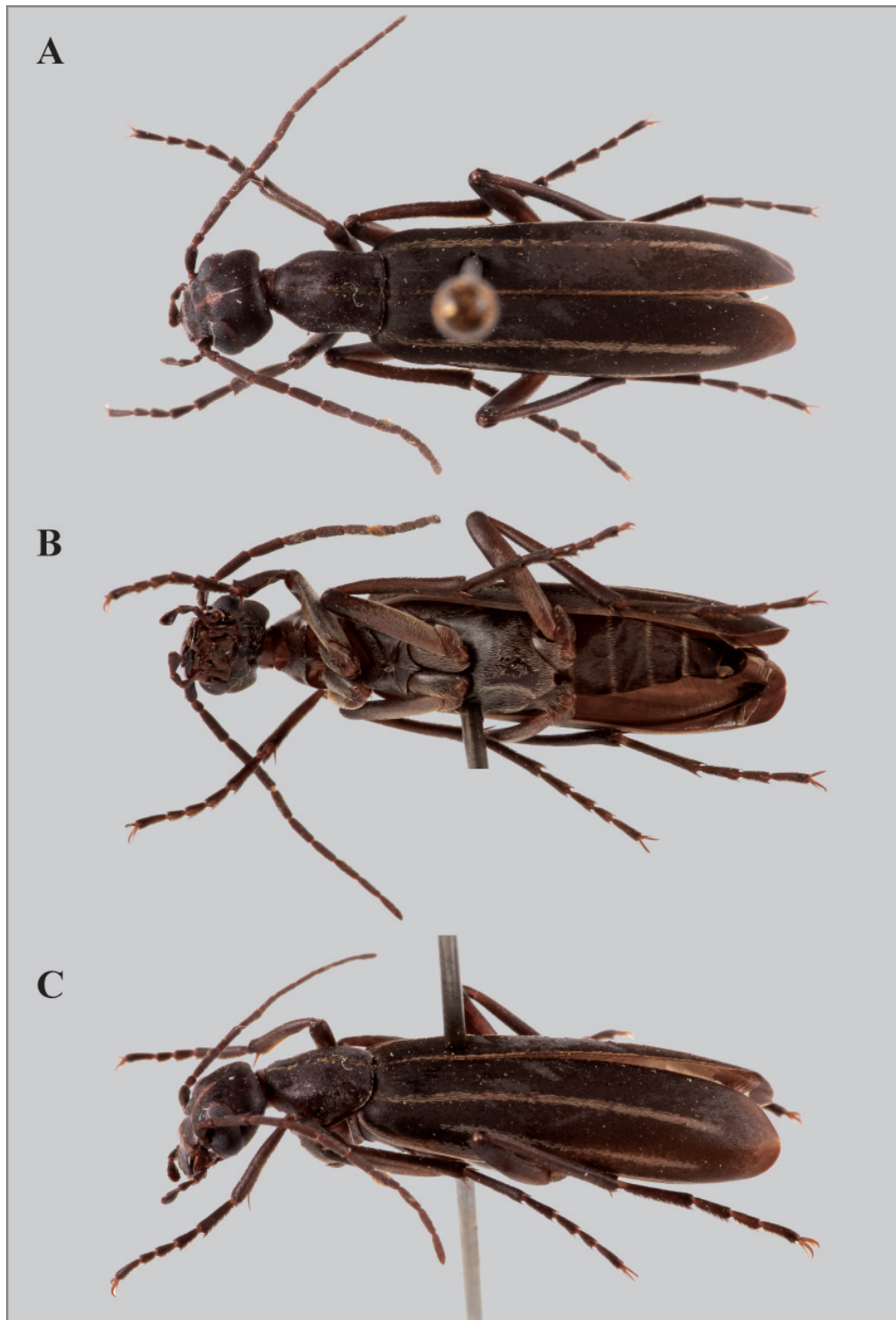


Figure 7. Paratype of *Epicauta chaima* López-Estrada, Sánchez-Vialas, Ruiz et García-París sp. nov. (A) dorsal view. (B) ventral view. (C) lateral view.

moderately long. Labial palpomere I sub-cylindrical, II troncoconical, and III subellipsoidal, with pilosity as on maxillary palpi. Posterior region of the head with relatively short setae.

Antennae not modified, reaching the first third of elytra when extended backward. Antennomeres relatively long, III to VI with almost the same width, VII to XI slightly narrower; with very short black setae, mostly decumbent or semi-erect, longer on antennomeres I–II; I sub-cylindrical (length: 0.6 mm); II short, sub-cylindrical (length: 0.2 mm); III (length: 0.7 mm) cylindrical; IV (length: 0.6 mm) cylindrical; V (length: 0.6 mm) cylindrical; VI (length: 0.5 mm) cylindrical; VII (length: 0.5 mm) cylindrical; VIII (length: 0.5 mm) cylindrical; IX (length: 0.4 mm) cylindrical; X (length: 0.36 mm) cylindrical; XI (length: 0.4 mm) sub-cylindrical, with apex rounded, blunt.

Pronotum elongated, subcampanulate (2 mm long by 1.2 mm width); lateral sides parallel except in the anterior third where they are convergent towards the head; anterior and posterior margins straight, not flanged. Dorsal surface of the pronotum irregular, with a very fine and subtle impressed longitudinal midline, a marked depression on the anterior half region, and very subtle longitudinal depressed areas along the margins; homogeneously and densely punctured; punctures small, subtle, circular, well separated but close from each other, not confluent. Pronotal setation formed by unobvious dark short semi-erect setae over most of the surface, decumbent longer and whitish, forming a longitudinal stripe along the midline; with sparse whitish setae on the sides of the pronotum. Mesonotum and metanotum not visible. Prosternum wide, extended posteriorly in its middle area, rounded at the tip. Mesosternum with a triangular prolongation, extended posteriorly, ending in a rounded tip. Metasternum large, with a posteriorly extended prolongation that ends in a wide and rounded tip.

Elytra elongate, with subparallel sides (length: 7 mm); tegument with blackish vestiture over most of the surface; four thin and whitish longitudinal stripes are present from inner to external border of elytra: (I) sutural stripe very fine, extending from the base to the posterior third of elytron, not reaching the posterior edge; (II) central vittae wide, extending from the base to the posterior third of elytron along the central area, not reaching its distal edge; (III) sub-central vittae wide, but narrower than the central vitta, ranging from the first 1/5 of the elytron to its posterior third, not reaching the posterior margin of elytron; (IV) marginal vittae wide, bordering the external margin of elytron.

Legs relatively long, covered by decumbent or semi-erect setae, longer in their ventral surface. Metafemur shorter than metatibia (metafemur length: 2.7 mm; metatibia length: 3 mm). Inner side of protibiae with

a depression in their proximal third. Protibiae with two similar spurs, slender and straight; meso- and metatibiae spurs not parallel but divergent, forming an angle of 20 degrees. Tarsi elongate and slender, with tarsomeres subcylindrical, slightly expanded distally; distally emarginated. Protarsus shorter than meso- and metatarsi. First metatarsomere large and wide, followed in size by the second and third (metatarsomeres: from inner to apical: 1.1, 0.4, 0.38, 0.5 mm). Tarsal ventral pads consisting on a dense, short and thick tuft of semi-erect dark setae, except along a median line of each tarsomere where the pilosity is shorter and yellowish. Claws smooth, with the lower lobe narrower, smaller and curved; finer in the fore-tarsi.

Abdomen slender, dark brown; first four ventrites covered by sparse white pilosity, especially conspicuous at the posterior margin; last two covered by black and shorter setae; pilosity decumbent. Last ventrite slightly notched.

Male genitalia poorly sclerotized (Fig. 8). Punctures or setae absent. Gonoforceps brownish; gonostyli long, about 3.8 times longer than wide in lateral view and approximately 2.5 times longer than the gonocoxal plate. Distal portion of the gonostyli separated dorsally by a longitudinal notch that extends to the distal third of the gonostyli (Fig. 8A); apices relatively narrow in lateral view, ending in a rounded tip (Fig. 8C); in dorsal view, the shape of the gonostyli is relatively parallel but gradually becomes narrower towards the apex in its distal third. The gonocoxal plate is wider than the gonostyli; a sclerotized longitudinal midline is present from the base of the gonocoxal plate to the suture between the gonocoxal plate and gonostyli (Fig. 8A). Aedeagus long, flattened, ending at the apex in a single distal hook (Fig. 8D).

Variability. No evident secondary sexual dimorphic traits are present among the examined type specimens. Body size very variable (from vertex to posterior border of elytra): 9.97–18.75 mm (n=10). Width of the central longitudinal stripe of pronotum and elytra are slightly variable. Some specimens have a white short stripe along the vertex to the upper frons (n=5). Width and coloration of the irregular reddish blotch in the fronto-clypeal suture varies including red to red brownish hues.

Diagnosis and comparisons. *Epicauta chaima* can be included in the subgenus *Epicauta*. The placement of this taxon either in the *E. caustica* or in the *E. vittata* species groups is not straight-forward. It differs from members of the *E. vittata* species group as diagnosed by Adams and Selander (1979), and Campos-Soldini and Roig-Juñent (2019), by having the following combinations of characters: body tegument black; head with a single oval red spot in the frons and, usually, with a fine and short longitudinal white line at the apex corresponding to white pilosity; pronotum

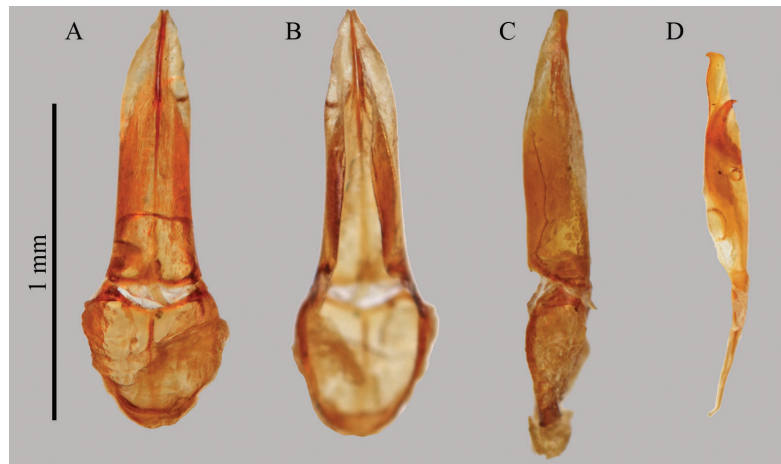


Figure 8. Male genitalia of the holotype of *Epicauta chaima*. (A) Gonoforceps, dorsal view. (B) Gonoforceps, ventral view. (C) Gonoforceps, lateral view. (D) Aedeagus, lateral view.

surface with marked lateral depressions on the anterior third; very thin whitish longitudinal stripes over elytra (in which the main central stripe do not reach the elytra posterior edge); both blades of the tarsal claws smooth and curved (less curved inner blade); and by lacking evident sexual dimorphism. *Epicauta chaima* can be differentiated from its most morphologically similar species of the *E. vittata* species group, *E. temexa*, *E. unilineata*, *E. vittata*, *E. vitticollis* and *E. subvittata*, by (1) their entirely black body coloration, (2) the presence of a thin white line in the pronotum matching with the white pilosity, (3) their distinctive pattern of elytra longitudinal stripes, which are very thin, and the middle (and larger) one does not reach the posterior edge of the elytra. *Epicauta chaima* can be also distinguished from *E. unilineata*, *E. vittata*, *E. vitticollis* and *E. subvittata* by their black femora, since it is bicolored (brown and black) in these last species.

It differs from the species of the *E. caustica* group, as diagnosed by Selander (1981), by having the following combinations of characters: body tegument black; head capsule in males lacking a deeply excavated surface in vertex and frons; antennomeres I–IV in males not enlarged or wide and IV and V longer and not so distinctly shorter and broader than those beyond VII. *Epicauta chaima* can be also distinguished from its most morphologically similar species of the *E. caustica* species group, namely *E. floyd-wernerii* Martínez 1955, by its entirely black body coloration and shiny tegument appearance in head and pronotum.

In conclusion, we consider that *Epicauta chaima* should be included within the *E. vittata* species group because of the antennal morphology of males.

Notes on natural history. This species is currently known from northern central Venezuela in the states

of Amazonas, Apure, Bolívar, Guárico and Monagas (Fig. 9). Adults are active, at least, between February and October (no records in March and July). Altitudinal range from 50 to 860 m.a.s.l.

Etymology. The specific epithet, a noun in apposition, refers to the extinct ethnic group that inhabit the surrounding areas of the new species type locality. Currently, their language, also called Chaima, is almost extinct (Acevedo Torrealba 2017).

Epicauta falcolarandina García-París, Ruiz, Sánchez-Vialas et López-Estrada, 2016

Epicauta falcolarandina García-París, Ruiz, Sánchez-Vialas et López-Estrada 2016: 946. Terra typica: Venezuela, Lara, Parapara. Type material hosted at the Museo del Instituto de Zoología Agrícola of the Universidad Central de Venezuela.

Studied material. We have examined the type material of the species (see published data).

Diagnosis. Medium size species (12.9 mm long, 4.4 mm width). This species is easily recognizable by their characteristic body coloring pattern and by the color mismatch between the tegument and the pilosity (Fig. 10). Tegument of the head, pronotum, elytra and legs matt and ochre-yellowish with brown irregular patches and longitudinal stripes. General body pilosity pale yellow. Antennae and ventral area brown-reddish with dark irregular areas. Pronotum elongated and bell-shaped; lateral sides subparallel in the first two posterior thirds, convergent in the last anterior third. The lower blade of the tarsal claws curved, and it is similar in length and width with respect to the superior blade.

Taxonomic comments. García París *et al.* (2016) included *Epicauta falcolarandina* in the species group of *E. vittata* by its elytral integument coloring pattern, in which pale yellow-orange and dark stripes

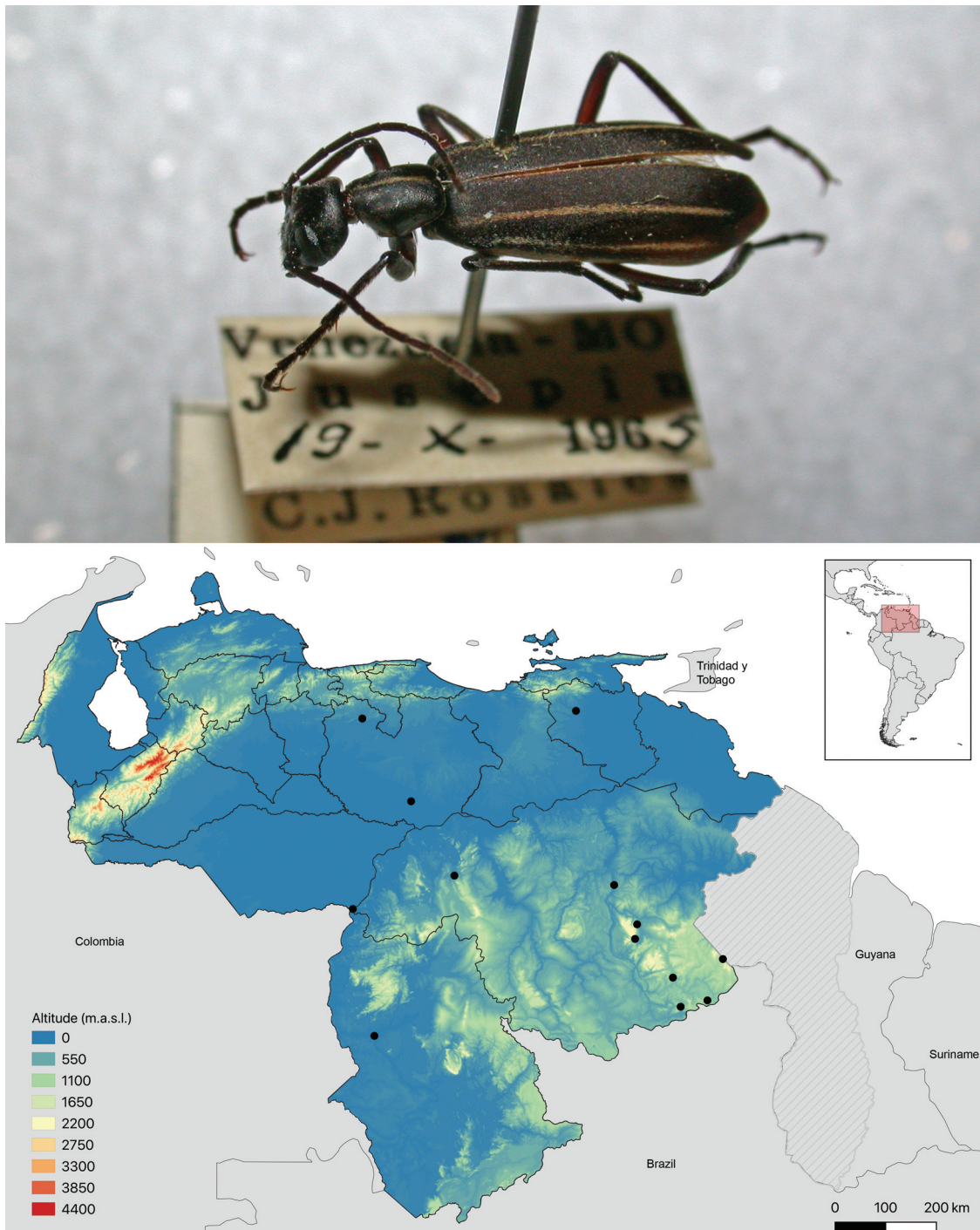


Figure 9. Specimen of *Epicauta chaima* López-Estrada, Sánchez-Vialas, Ruiz et García-París sp. nov. from Jusepin (Monagas, Venezuela, col. MIZA) (top) and distribution map of the species in Venezuela (bottom).

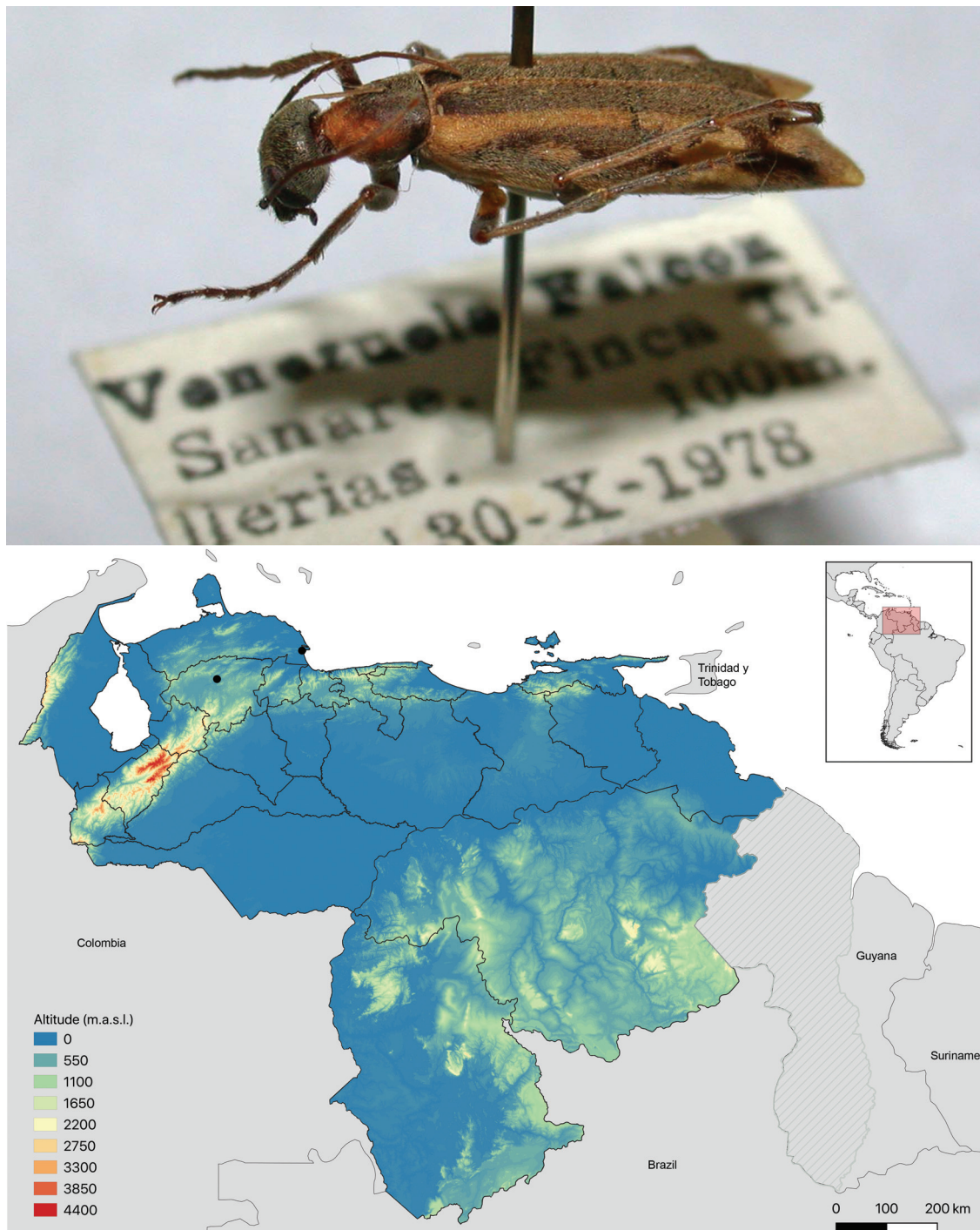


Figure 10. Specimen of *Epicauta falcolarandina* García-París, Ruiz, Sánchez-Vialas et López-Estrada 2016 from Sanare (Falcón, Venezuela, col. MIZA) (top) and distribution map of the species in Venezuela (bottom).

alternate; this pattern is also present in the pilosity, but not necessarily matching. In addition, *E. falcolarandina* present wide eyes, remarkably emarginated and extended towards the medium area of the head. Phylogenetic affinities of this species cannot be established properly since the male is unknown, and most of the traits used for phylogenetic reconstruction in *Epicauta* are male characters. However, the condition of the tarsal claws, draw it far away from *E. grammica*, *E. apure* and *E. aragua*.

Geographic distribution. *Epicauta falcolarandina* is only known from the semiarid regions of Falcón and Lara in Venezuela (Fig. 10). Given the particular geographic isolation and phytoclimatic characteristic, it is highly likely that this species is endemic of these singular semiarid regions (García-París *et al.* 2016).

Previously published records. VENEZUELA – Lara: Parapara (García-París *et al.* 2016). Falcón: Sanare (García-París *et al.* 2016).

Epicauta flagellaria (Erichson 1848)

Lytta flagellaria Erichson 1848: 566. Terra typica: Not specified in the text but likely “Britisch Guiana” as suggested by the title of Erichson’s work. Type specimens likely at the Museum für Naturkunde in Berlin.

Lytta intermedia Haag-Rutenberg 1880: 56. Terra typica: “Columbien”.

Epicauta flagellaria (Erichson 1848): Werner 1949: 76.

Studied material. PANAMA – La Chorrera: (98-146) (*Epicauta flagellaria* (Erichson) male, R.B. Selander det. 1954): 1 ex. [NHM]. VENEZUELA – Aragua: Maracay: 5-V-1981 (H.E. Box leg.) (*E. flagellaria* R.B. Selander det. 1962): 1 ex. [MIZA]; 5-V-1951, Selander det. (H.E. Box leg.): 1 ex. [MIZA]; Campus Universidad Central 18-V-2009, en campos de maíz: 3 exx. [MIZA]; Maracay: 450 m: 2-IV-1963, en la luz (E. Osuna leg.): 4 exx. [MIZA]; San Sebastián de los Reyes, bajo la luz en una pared rojiza, junto a bosque claro y zonas abiertas: 2 exx. [MIZA]; Rancho Grande: 1100 m: 3-V-1954, 1 ejemplar (F. Fernández Y. & C.J. Rosales leg.) (*E. flagellaria* R.B. Selander det. 1962): 1 ex. [MIZA]; 10-V-1979 (G. Yépez G. leg.): 3 exx. [MIZA]; 23-V-1978, a la luz (J. M. González leg.): 1 ex. [MIZA]; El Limón: 450 m: 4-V-1978, luz de mercurio (F. Fernández Y. leg.): 1 ex. [MIZA]; 11-V-1977: 1 ex. [MIZA]; 26-V-1976: 1 ex. [MIZA]; 27-IV-1976: 1 ex. [MIZA]; 4-V-1961: 1 ex. [MIZA]; 6-V-1962: 1 ex. [MIZA]; 4-V-1978: 2 exx. [MIZA]; 7-V-1967: 1 ex. [MIZA]; 2-VI-1975, a la luz (J. Clavijo leg.): 2 exx. [MIZA]; 19-IV-1977: 1 ex. [MIZA]; 21-VI-1973: 2 exx. [MIZA]; 25-VI-1973: 1 ex. [MIZA]; 10-VI-1966, trampa de luz: 6 exx. [MIZA]; 11-V-1971, a la luz (A. Ramírez leg.): 2 exx. [MIZA]; 12-V-1970: 1 ex. [MIZA]; 15-IV-1971 (C.J. Rosales, A. Montagne leg.): 1 ex. [MIZA]; 25-V-1964 (C. J. Rosales leg.): 2 exx. [MIZA]; 2-V-2003, luz de neón: 1 ex. [MIZA]; 26-V-1964:

6 ex. [MIZA]; 8-VI-1964: 1 ex. [MIZA]; 29-IV-1964: 1 ex. [MIZA]; 5-V-1964: 1 ex. [MIZA]; 27-IV-1976, luz de mercurio (S. Clavijo, J. Clavijo leg.): 1 ex. [MIZA]; 27-V-1975, a la luz: 1 ex. [MIZA]; 28-IV-1985 (G. Yépez Gil leg.): 1 ex. [MIZA]; 28-V-1966: 1 ex. [MIZA]; 29-IV-1985: 1 ex. [MIZA]; 3-V-1979: 1 ex. [MIZA]; 5-V-1964, *Macrobasis flagellaria* Er. Z. Kaszab det. 1964 (C. J. Rosales leg.): 1 ex. [MIZA]; El Limón: 450 m: 7-VI-1966 (L. Figueroa leg.): 1 ex. [MIZA]; 7-VI-1966 (Z. Hernández leg.): 1 ex. [MIZA]; Cagua: 450 m: 28-V-1958 (A. Fernández leg.): 1 ex. [MIZA]; Cagua: 21-V-1990 (D. Hernández leg.): 1 ex. [MIZA]; Cata: 19-V-1983 (A. Fernández B., C. Andara leg.): 1 ex. [MIZA]; Chaparral entre San Casimiro y San Sebastian: 17/18-IV-1993 (Z. Narvaez leg.): 1 ex. [MIZA]; Choroni: 15-V-1980 (O. Mattei leg.): 1 ex. [MIZA]; Chuao: 3-V-1993, atraído a la luz (C. Marín leg.): 1 ex. [MIZA]; Encrucijada: 3-V-1951, Museo de Biología, Universidad Central de Venezuela (Roze leg.): 2 exx. [MIZA]; P.N. H. Pittier, Rancho Grande, 1100 m: 24-IV-1993 (C.J. Rosales, V. Savini leg.): 1 ex. [MIZA]; Portachuelo: Rancho Grande, 1100 m: 16-V-1978, volando (J. A. Clavijo leg.): 2 exx. [MIZA]; 10-V-1979, a la luz (J. Clavijo, G. Yépez G. leg.): 4 exx. [MIZA]; 16-8-1989 (A. Adraz leg.): 1 ex. [MIZA]; 19-V-1952 (F. Fernández Yépez leg.): 1 ex. [MIZA]; 21-V-1953 (J. González leg.): 1 ex. [MIZA]; 23-IV-1987: 3 exx. [MIZA]; 21-V-1971 (F. Fernández Y., J.A. Clavijo, F. Fernández H. leg.): 7 exx. [MIZA]; 23-V-1958 (C. J. Rosales leg.): 1 ex. [MIZA]; 3-V-1958: 1 ex. [MIZA]; 24-V-1979 (J. Clavijo, A. Chacón leg.): 1 ex. [MIZA]; 27-IV-1971 (J. Salcedo, A. Ramírez leg.): 1 ex. [MIZA]; 31-V-1980 (J. González, G. Yépez leg.): 5 exx. [MIZA]; 8-V-1985 (F. Cerdá leg.): 1 ex. [MIZA]; 9-V-1977 (L.J. Joly T. leg.): 3 exx. [MIZA]; Portachuelo, Rancho Grande, 1400 m: 23-VI-1990 (R. D. Tovar leg.): 1 ex. [MIZA]; 3-V-1954, Selander det. (F. Fernández Y. & C.J. Rosales leg.): 1 ex. [MIZA]. Barinas: Barrancas: VIII-1973 (F. Díaz leg.): 1 ex. [MIZA]. Bolívar: Río Caroní: Salto Las Babas, 425 m: 8/10-IV-1983 (Expedición Instituto Zoología Agrícola, UCV leg.): 1 ex. [MIZA]; Campamento minero Payapal: río Yuruán, El Dorado, 190 m: 23-30-V-87 (Expedición del Instituto de Zoología Agrícola leg.): 4 exx. [MIZA]; Guri: 200 m: 27-VI al 6-VII-1998, a la luz (L. J. Joly; J. L. García; Y. Zavala leg.): 2 exx. [MIZA]; Hato Muñoz: Guassipati: 28-V-1975 (B. Bechyne leg.): 1 ex. [MIZA]; La Paragua: 19-IV-1969 (J. & B. Bechyne leg.): 1 ex. [MIZA]; 19-IV-1969: 1 ex. [MIZA]; Nuria: Tres Chorros: 26-V-1975 (B. Bechyne leg.): 2 exx. [MIZA]; Pendare: Río Parguaza, 6°6'N-67°5'W, 60 m: 6/7-VI-1997 (E. Osuna, A. Chacón, F. Rojas leg.): 1 ex. [MIZA]; Río Paragua: a E de Río Chiguao, 425 m: 11-IV-1983 (Expedición del Instituto de Zoología Agrícola leg.): 1 ex. [MIZA]; Upata: 3-VI-1973 (J.A. Clavijo leg.): 1 ex. [MIZA]. Carabobo: Valencia: Urbanización Guaparo, 500 m: 6-IV-1981 (L. D. Otero leg.): 1 ex. [MIZA]; Bejuma: 680 m: 17-V-1967

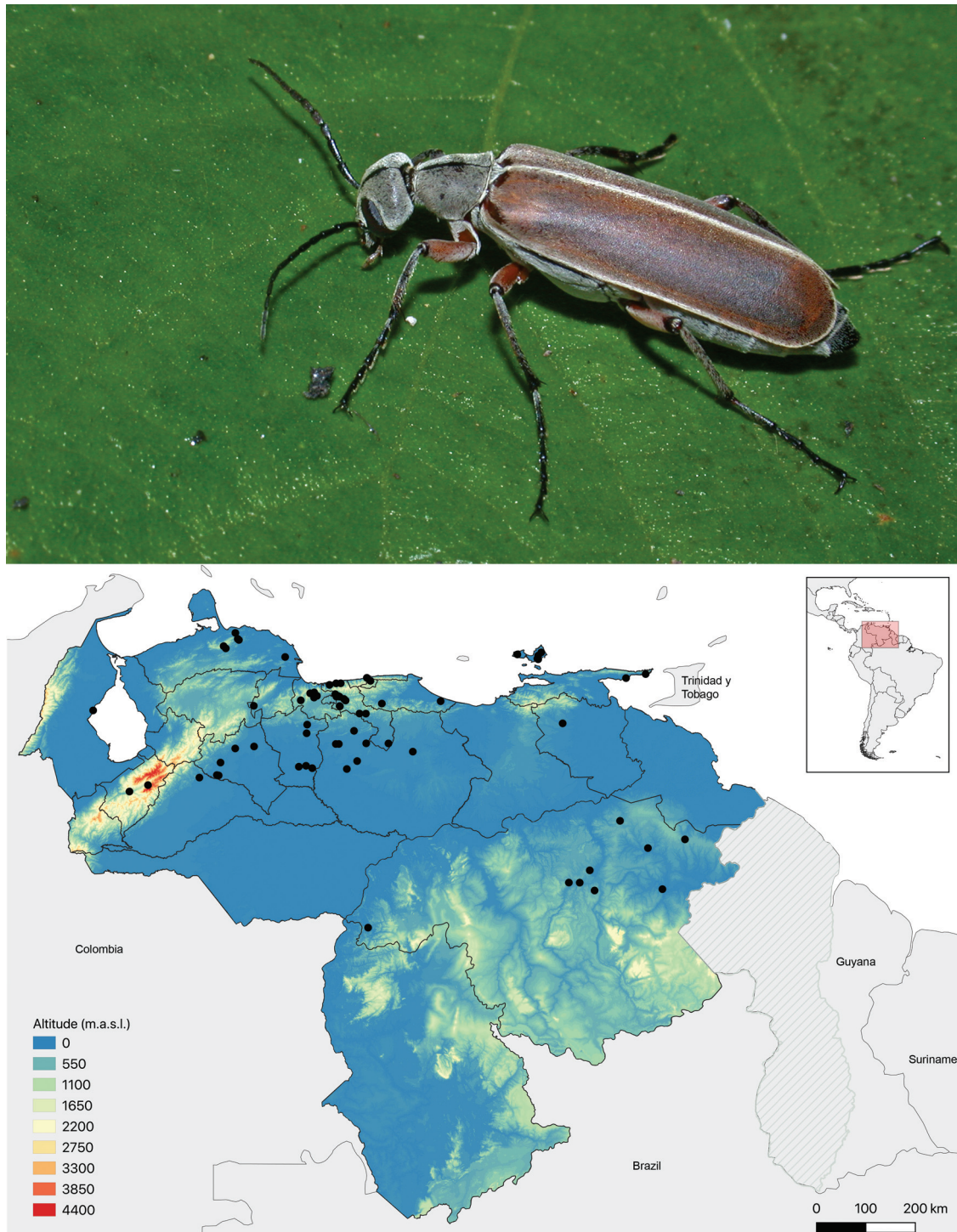


Figure 11. Specimen of *Epicauta flagellaria* (Erichson 1848) from Valle de Pascua (Aragua, Venezuela, col. MIZA) (top) and distribution map of the species in Venezuela (bottom).

(A. Fernández Y., J. Salcedo leg.): 1 ex. [MIZA]; Hacienda El Palmar: Las Trincheras, ±700 m: 6-IV-1981 (J.A. Clavijo, L.D. Otero leg.): 4 exx. [MIZA]; San Diego: 17-V-1961 (N. Angeles leg.): 6 exx. [MIZA]; Tabora: 31-V-1949 (F. Aponte, Araujo leg.): 1 ex. [MIZA]; Urbanización Guaparo: Valencia, 500 m: 6-IV-1981 (L. D. Otero leg.): 1 ex. [MIZA]. Cojedes: El Baúl: 9-V-1967 (J. & B. Bechyne leg.): 2 exx. [MIZA]; El Pao: Galeras, 9°34'24"N-68°09'7"O, 220 m: 7/10-IV-1994, Proyecto M.I.Z.A-D.H.C. (A. Alemán leg.): 1 ex. [MIZA]; El Pao: Pilacones, 9°43'54"N-68°8'31"O, 188 m: 25/26-IV-1995, Proyecto M.I.Z.A-D.H.C. (A. Alemán leg.): 1 ex. [MIZA]; 24/25-IV-1995: 1 ex. [MIZA]; 28/29-III-1995: 1 ex. [MIZA]; El Piñero: 13-V-1967 (J. & B. Bechyne leg.): 1 ex. [MIZA]; Hato Mata Clara: Cerca El Baúl, 12/16-IV-1981 (F. Fernández Y. leg.): 5 exx. [MIZA]. Distrito Federal: Catia la Mar: 24-IV-1960 (C. J. Rosales leg.): 2 exx. [MIZA]; Tacagua: 15-VI-1951, en *Cassia saeri* (M. García leg.): 8 exx. [MIZA]. Falcón: Las Dos Bocas: 200 a 550 m: 7-VI-1969, Kaszab det. (R. Casares, J.B. Terán & M. Gélbez leg.): 1 ex. [MIZA]; Las Dos Bocas: 200 a 550 m: 7-VI-1969 (R. Casares, J. B. Teran, M. Gelbez leg.): 13 exx. [MIZA]; 7-VI-1969, Kaszab det. (R. Casares, J.B. Terán & M. Gálbez leg.): 1 ex. [MIZA]; Cabure: 7-VI-1980, a la luz (R. Casares M., F. Sambraño leg.): 2 exx. [MIZA]; Curimagua: San Lorenzo, 1040 m: 21/24-V-1993 (F. Cerdá, L. Joly, V. Savini, A. Chacón leg.): 1 ex. [MIZA]; Yaracal: 1-III-1989 (C. J. Rosales leg.): 1 ex. [MIZA]; 5-V-1991 (L. J. Joly leg.): 1 ex. [MIZA]; Cerca de Guaibacoa: 400m: 13-VII-55 (C. J. Rosales leg.): 2 exx. [MIZA]. Guárico: Carretera Chaguaramas - Las Mercedes: 11-VI-1971 (L. Joly T. leg.): 2 exx. [MIZA]; San José de Tiznados: 28-IV-1979, a la luz (J. Clavijo, F. Cerda leg.): 16 exx. [MIZA]; Asentamiento Palo Seco, cerca de Calabozo: 4-IV-2000: 9 exx. [MIZA]; Calabozo: 13-IV-84 (A. Escalante leg.): 2 exx. [MIZA]; El Sombrero: 29-IV-1953 (J. Requena leg.): 5 exx. [MIZA]; El Sombrero: 1-IV-1979, Mattei: 1 ex. [MIZA]; San José de Tiznados: 28-IV-1979, a la luz (F. Cerdá, J. Clavijo, G. Yépez G. leg.): 1 ex. [MIZA]; Mesa de Paya: 12-V-1955 (J. Loggiodice leg.): 2 exx. [MIZA]. Mérida: La Mucuy, 2300 m: 5-V-1960 (C. J. Rosales leg.): 1 ex. [MIZA]; Lagunillas: 10-X-1980 (J. Clavijo leg.): 1 ex. [MIZA]. Miranda: Ocumare del Tuy: 11-VI-1961 (A. Musso leg.): 1 ex. [MIZA]; 19-V-1979, a la luz (F. Geruad leg.): 2 exx. [MIZA]; Culpira: 24-IV-1964 (E. Osuna leg.): 1 ex. [MIZA]. Monagas: Jusepín: 50 m: 2-VI-1967 (J. Salcedo, L. Rodríguez V.leg.): 1 ex. [MIZA]; 3-VI-1967: 53 exx. [MIZA]. Nueva Esparta: Salamanca: 60 m: 10-XII-1951: 1 ex. [MIZA]; 3-IX-1953: 4 exx. [MIZA]; 7-XII-1951: 1 ex. [MIZA]; San Francisco: 40 m: 20-XII-1951: 1 ex. [MIZA]; 24-VIII-1956: 1 ex. [MIZA]; La Sierra: 27-VIII 1953: 1 ex. [MIZA]; Las Marites: 3-IX 1953: 1 ex. [MIZA]; Los Añiles: 23-VIII 1956: 1 ex. [MIZA]. Portuguesa: Estación Experimental San Nicolas, 56 km de Guanare, 180 m: 1/2-IV-1968 (C. J.

Rosales, R. Cásares leg.): 3 exx. [MIZA]; Guanare: 19-IV-1948 (W. Whitcomb leg.): 1 ex. [MIZA]; Ospino: 7-V-1953 (F. Kern leg.): 3 exx. [MIZA]; San Nicolás: 180 m: V-1975 (S. Clavijo leg.): 1 ex. [MIZA]; Turén: 4/8-V-1967, a la luz (J. B. Terán leg.): 1 ex. [MIZA]. Sucre: Ensenada Cauranta, Guiria: 4-VI-67 (G. Ulloa leg.): 1 ex. [MIZA]; Macuro: 20-VII-1974 (J. Salcedo, J. A. Clavijo leg.): 1 ex. [MIZA]. Yaracuy: Yaritagua: 7-V-1959 (R. Torres leg.): 2 exx. [MIZA]. Zulia: Caimera, Perijá: 10-IV-1960 (Joly & Lozano leg.): 1 ex. [MIZA].

Taxonomic comments. The species was included in the *E. diversicornis* species group within the subgenus *Macrobasis* (Werner 1949, Pinto 1991).

Diagnosis. It is a relatively large species of *Epicauta*, with a dark-brown almost black cuticle, except mouthparts, most of the femora, and the the elytra, that are dark brown to reddish-orange (Fig. 11). The head and pronotum covered by a dense cinereous decumbent pilosity except along a median shiny denudated broad furrow. Eyes large, kidney shaped. Elytra leather-brown, reddish on the margins, with two large dark spots at at the origin of the suture and at the humeral angle; with short pale pilosity, denser at the margings. Male antennae very characteristic with a disproportionately large, broad, elongated and flattened, antennomeres II and III.

Geographic distribution. Reported from Venezuela, Trinidad and Tobago, Panama, Colombia and Guyana (Erichson 1848, Blackwelder 1945, Pinto 1991). Venezuelan geographic distribution is illustrated in Fig. 11.

Previously published records. COLOMBIA – (Pinto 1991). GUAYANA – (Erichson 1848, Blackwelder 1945). PANAMA – (Pinto 1991). TRINIDAD AND TOBAGO – (Pinto 1991). VENEZUELA – (Pinto 1991).

Notes on natural history. The species is active at night often attracted to artificial light. It presents a wide altitudinal range, from 40 to 2300 m.a.s.l. Adults active between March and December (no records in November).

Epicauta major Pic 1924

Epicauta cincipennis var. *major* Pic 1924: 2. Terra typica: 'Guatemala'. Syntypes at the collection of the Muséum National d'Histoire Naturelle (Paris) one of them examined.

Studied material. COSTA RICA – Reventazon Valley, 2900 ft.: on Solanaceae (1913-315) (Dtd. by GCC) (*Epicauta cinerea* Müll.): 1 ex. [NHM].

GUATEMALA – El Petén: Tikal: 22-VII-1942 (R. B. L.): 1 ex. [NHMLA]. Verapaz: Coban: (Conradt) (Godman - Salvin Coll., Biol. Centr.-Amer.): 1 ex. [NHM]; Jactic: (Conradt) (Godman - Salvin Coll., Biol. Centr.-Amer.) (*Epicauta cinerea* Müll.): 1 ex. [NHM]; Senahu: (Champion) (Godman - Salvin Coll., Biol. Centr.-Amer.): 1 ex. [NHM]. MÉXICO – Campeche: Km. 138 Escárcega -

Chetumal: 23-VI-1989 (A. Cadena, L. Cervantes): 6 exx. [CNIN-IBUNAM]. Chiapas: Finca Prusia, Jaltenango: 10/12-V-1985 (F. Arias, H. Velasco, M. Vertiz): 3 exx. [CNIN-IBUNAM]; La Canja, Chansayas: 19-VII-1977 (P. Reyes) / *Epicauta major* Pic, J. D. Pinto det., 1987/8: 1 ex. [CNIN-IBUNAM]; Mal Paso: La Selva, Km. 39: (C. ARR): 1 ex. [CNIN-IBUNAM]; Municipio Mal Paso: La Ceiva: 2-VI-1974 (Col. A.R.R.) (126. ECOSC-E 13008): 1 ex. [ECOSUR]; Municipio Tuzantán: Finca Irlanda, 1000-1200 msnm: 4-VI-74, cafetal (J. Hendrichs S.): 3 exx. [CNIN-IBUNAM]; Ocosingo: Km. 20 Ocosingo - Altamirano, 1077 msnm, 16°48'45"N-92°02'38"W: 28-VI-2007, bosque de pino-encino (C. Mayorga, G. Ortega, L. Cervantes): 2 exx. [CNIN-IBUNAM]; Pichucalco: Km. 2 a Istapangajoyá, 158 msnm, 17°31'04"N-93°00'07"W: 28-VI-2007, vegetación secundaria (C. Mayorga, G. Ortega, L. Cervantes): 1 ex. [CNIN-IBUNAM]; Tuxtla: (Salle Coll) (Godman - Salvin Coll., Biol. Centr.-Amer.) (*Cantharis marginata* Fab. Nat. 1877 p59 apud Salle): 1 ex. [NHM]. Oaxaca: Juquila Mixes: VII-1970 (W.S. Miller leg.), J.D. Pinto det., 1987: 1 ex. [MAB]; Oajaca [Oaxaca]: (58-135): 1 ex. [NHM]. Quintana Roo: Km. 218 Escárcega - Chetumal: 23-VI-1989 (A. Cadena, L. Cervantes): 1 ex. [CNIN-IBUNAM]; Nuevo X-Can: 8-VI-1963 (T. W. Taylor): 2 ex. [NHMLA]; 18-VII-1963 (T. W. Taylor): 1 ex. [NHMLA]; 28-VI-1964 (T. W. Taylor): 1 ex. [NHMLA]; 18-VII-1964 (E. Welling): 1 ex. [NHMLA]; 18-VII-1964 (T. W. Taylor): 2 exx. [NHMLA]; 1-V-1967: 1 ex. [NHMLA]; 16-VI-1967 (T. W. Taylor): 1 ex. [NHMLA]; 1-VIII-1967: 3 exx. [NHMLA]; 18-VI-1968 (T. W. Taylor): 1 ex. [NHMLA]; 1-VIII-1968: 2 exx. [NHMLA]; 2-VIII-1968 (E. Welling): 1 ex. [NHMLA]. Veracruz: a 6 km de Nanchital: 28-V-1976 (C. Barrera), *Epicauta major* Pic, J. D. Pinto det., 1987/8: 1 ex. [CNIN-IBUNAM]; Atoyac, 550 msnm: 28-VII-2000 (E. Barrera, A. Ibarra): 1 ex. [CNIN-IBUNAM]; Cañón del Río Metlac, 3 km al O de Fortín: 6-VII-1981 (J. Pinto, E. Fisher & J. LaSalle leg.). J.D. Pinto det., 1987: 1 ex. [MAB]; Córdoba: 13-VII-1965 (R. R. Snelling): 2 exx. [NHMLA]; Estación Biológica de Los Tuxtlas, camino a Laguna Escondida: 7-VI-1990 (C. Mayorga, G. Ortega): 17 exx. [CNIN-IBUNAM]; Estación Biológica de Los Tuxtlas: 14-VI-1969 (S. Z. C.): 1 ex. [CNIN-IBUNAM]; 5-VIII-1970: 3 exx. [CNIN-IBUNAM]; 21-V-1971 (S. Z. C.): 8 exx. [CNIN-IBUNAM]; 14-VI-1972: 1 ex. [CNIN-IBUNAM]; 5-V-1973: 1 ex. [CNIN-IBUNAM]; 18/19-V-1974: 1 ex. [CNIN-IBUNAM]; 9-V-1975: 1 ex. [CNIN-IBUNAM]; 7-VI-1975: 1 ex. [CNIN-IBUNAM]; 12/30-V-1979 (F. Soria): 1 ex. [CNIN-IBUNAM]; 6/16-VI-1981 (D. Lorence): 2 exx. [CNIN-IBUNAM]; 2/5-V-1985 (M. F. Y.): 1 ex. [CNIN-IBUNAM]; 13-V-1985 (L. Cervantes): 1 ex. [CNIN-IBUNAM]; 18-VI-1985 (A. Ibarra): 3 exx. [CNIN-IBUNAM]; 18-VI-1985 (P. Sinaca): 1 ex. [CNIN-IBUNAM]; 18-VI-1985 (E. Ramírez): 1 ex. [CNIN-IBUNAM]; 2/10-VII-1985 (C. Mayorga): 1 ex. [CNIN-IBUNAM]; 30-IV-1989 (J. L. Colín, H. Rojas):

1 ex. [CNIN-IBUNAM]; 11-VI-1989 (H. Rojas, J. L. Colín): 1 ex. [CNIN-IBUNAM]; 27-VI-1989, a la luz (E. Mejorada): 1 ex. [CNIN-IBUNAM]; 1/2-VII-1989 (M. A. Pérez): 1 ex. [CNIN-IBUNAM]; Estación Biológica de Los Tuxtlas: 24-V-1972, selva tropical lluviosa (P. Reyes), *Epicauta major* Pic, J. D. Pinto det., 1987/8: 1 ex. [CNIN-IBUNAM]; Estación Biológica Los Tuxtlas, 160 msnm: 30-IV-1985 (E. Ramírez): 1 ex. [TUXTLAS-IBUNAM]; 2-V-1985 (P. Sinaca): 1 ex. [TUXTLAS-IBUNAM]; 5-V-1985 (E. Ramírez): 1 ex. [TUXTLAS-IBUNAM]; 23-V-1985 (A. Ibarra): 1 ex. [TUXTLAS-IBUNAM]; 15-VI-1985 (P. Sinaca): 1 ex. [TUXTLAS-IBUNAM]; 26-VI-1985 (P. Sinaca): 1 ex. [TUXTLAS-IBUNAM]; 28-VI-1985 (E. Ramírez): 1 ex. [TUXTLAS-IBUNAM]; 10-VII-1985 (A. Ibarra): 1 ex. [TUXTLAS-IBUNAM]; 29-V-1986 (G. Ibarra): 2 exx. [TUXTLAS-IBUNAM]; Las Cabañas: 20-VI-1979, col. diurna (E. Mariño): 2 exx. [CNIN-IBUNAM]; Municipio Itzaczoquitlán: Los Sifones, 1000 msnm: 26-VII-2000 (E. Barrera, A. Ibarra): 2 exx. [CNIN-IBUNAM]; Playa Escondida: 26-IV-1976: 1 ex. [CNIN-IBUNAM]; San Rafael Jicaltepec: 17-VI-96 (F. C. Bowditch), *Epicauta major* Pic, J. D. Pinto det., 1987/8: 1 ex. [CNIN-IBUNAM]; Veracruz: (Colección E. Dugès, 763, D-821) / 821: 1 ex. [CNIN-IBUNAM]; Zapuapan de la Cabañala Cabaña: 29-V-53 (31287): 1 ex. [CNIN-IBUNAM]. Without precise locality – México (F. Bates 81-19): 1 ex. [NHM]. NICARAGUA – Chontales: (F. Bates 81-19) (*Epicauta cinerea* Müll.): 1 ex. [NHM]. VENEZUELA – Táchira: Río Frío, 600 m: 20/24-IV-1982: 6 exx. (Expedición del Instituto de Zoología Agrícola leg.) [MIZA]; Vía Chorro del Indio, 1100 m: V-1984: 4 exx. (C.F. Romero leg.) [MIZA].

Taxonomic comments. This species is currently included in the nominate subgenus, within the *E. cinerea* group (Pinto 1991). It is necessary to revise the correct placement of *E. melanota* Mäklin 1875 to determine if it represents the same taxon as *E. major*.

Diagnosis. *Epicauta major* is a large robust species (10–24 mm, according to Pinto 1991), with black cuticle, and highly variable vestiture (Fig. 12). Setation of the Venezuelan species represent one the common color morphs of the species, totally black, with a median pronotum furrow, scutellum, sutural line, elytral margins, pronotal margins, and lateroventral sides of the head, pronotum and abdominal segments covered by dense whitish pilosity, absent in elongated patches in the ventral segments. Male have fore tarsi broadened and covered ventrally by dense pilosity.

Geographic distribution. The species ranges from northwestern Mexico to Panama, with scattered records in Costa Rica, Guatemala, Honduras and Nicaragua (Pinto 1991, Maes and Huether 2007). The specimens studied from Venezuela represent the first record for South America (Fig. 12).

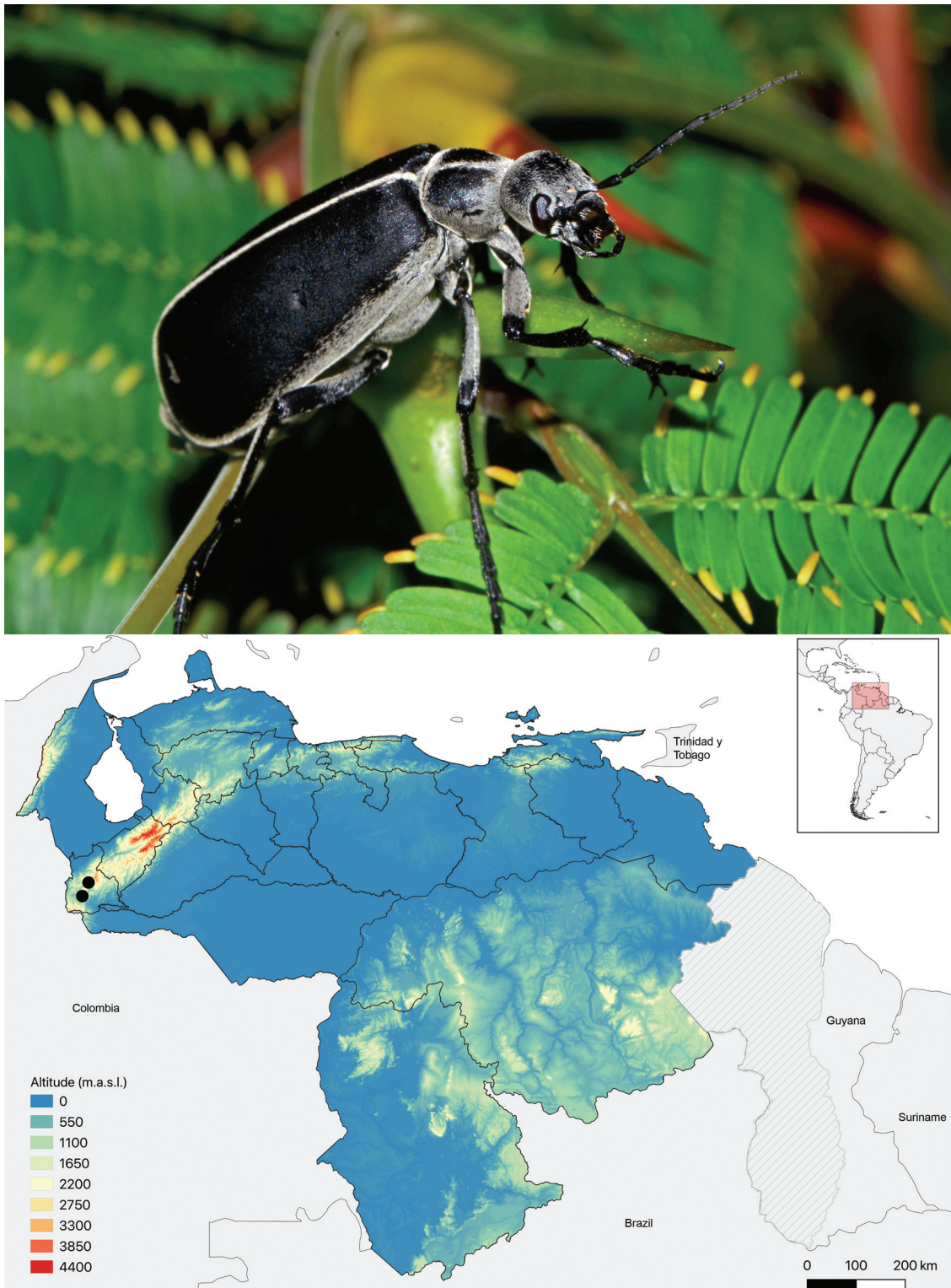


Figure 12. Live specimen of *Epicauta major* Pic 1924 from Los Tuxtlas (Veracruz, México) (top) and distribution map of the species in Venezuela (bottom).

Previously published records. GUATEMALA: (Blackwelder 1945 sub *E. cinerea*); SE of Atitlán lake, Santa Bárbara, Finca Santa María (Maes and Huether 2007). MÉXICO: Campeche: 4 km al E de Xpujil (Pinto 1991). Chiapas: Ladera septentrional Cerro Bola (Pinto 1991); 24 mi. al NO de Huixtla (Pinto 1991); 2 mi. al S de Ixhuatan (Pinto 1991); al N de de Jitotol (Pinto 1991); La Cania Chansayas (Pinto 1991); 18 mi. al O de Ocozocauitla (Pinto 1991); 24 mi. al NO de Ocozocauitla (Pinto 1991); 4 mi. al N de Pablo Nuevo Solistahuacan [sic] (Pinto 1991); Palenque (Pinto 1991); 10 km al S de Palenque (Pinto 1991); cerca de Rincón (Pinto 1991); San Cristóbal de las Casas (Pinto 1991); Simojovel (Pinto 1991); 7 mi. al SE de Simojovel (Pinto 1991); Cañón del Sumidero (Pinto 1991); Tenejapa (Pinto 1991); 14 mi. al N de Tuxtla Gutiérrez (Pinto 1991); Municipio Mal Paso: La Ceiva (García-París *et al.* 2009); Municipio Mal Paso: La Selva, Km. 39 (García-París *et al.* 2009); Finca Prusia, Jaltenango (García-París *et al.* 2009); La Canja, Chansayas (García-París *et al.* 2009); Municipio Tuzantán: Finca Irlanda (García-París *et al.* 2009); Ocosingo: Km. 20 Ocosingo - Altamirano (García-París *et al.* 2009); Pichucalco: Km. 2 a Istapangajoya (García-París *et al.* 2009). Oaxaca: Juquila Mixes (Pinto 1991); 25 mi. al N de Matías Romero (Pinto 1991); Oaxaca (Champion 1892 sub *E. cinerea*); Temescal (Pinto 1991). Puebla: Puebla (Champion 1892 sub *E. cinerea*). Quintana Roo: 2 mi. al S de Felipe Carrillo (Pinto 1991). San Luis Potosí: 52 km al E de Ciudad del Maíz (Pinto 1991); Cascada El Salto (Pinto 1991); 15 mi. al SO de Tamazunchale (Pinto 1991); Tierra Blanca (Pinto 1991). Tabasco: Cárdenas (Pinto 1991); Teapa (Champion 1892 sub *E. cinerea*). Veracruz: Atoyac (Champion 1892 sub *E. cinerea*; Pinto 1991); 15 mi. al S de Catemaco (Pinto 1991); al SE de del Citlaltepétl (Pinto 1991); Córdoba (Champion 1892 sub *E. cinerea*; Pinto 1991); 10.4 mi. al SE de Córdoba (Pinto 1991); 5 mi. al E de Córdoba (Pinto 1991); Fortín de las Flores (Pinto 1991); 1 mi. al O de Fortín de las Flores (Pinto 1991); 2 mi. al N de Fortín de las Flores (Pinto 1991); Xalapa (Champion 1892 sub *E. cinerea*; Pinto 1991); Lago Catemaco (Pinto 1991); Estación Biológica de Los Tuxtlas (Pinto 1991); Mirador [Hacienda El Mirador, Huatusco] (Pinto 1991); Misantla (Champion 1892 sub *E. cinerea*); Nanchital (Pinto 1991); Orizaba (Pinto 1991); 5 mi. al O de Orizaba (Pinto 1991); Playa Vicente (Champion 1892 sub *E. cinerea*); Presidio (Pinto 1991); Río Metlac cerca de Fortín de las Flores (Pinto 1991); San Andrés Tuxtla (Champion 1892 sub *E. cinerea*); 2 mi. al N de Santiago Tuxtla (Pinto 1991); 4 mi. al N de Sontecomapan (Pinto 1991); 7 mi. al N de Sontecomapan (Pinto 1991); Temescal (Pinto 1991); Veracruz (Zaragoza-Caballero 1999 sub *E. marginata*). Yucatán: X-Can (Pinto 1991); Nuevo X-Can (Pinto 1991). Sin localizar: Chinautla (Champion 1892 sub

E. cinerea). NICARAGUA: (Blackwelder 1945 sub *E. cinerea*); Matagalpa: Río Blanco, Cerro Muzún (Maes and Huether 2007). Rivas: Ometepe Island, San Ramón, Biological Station (Maes and Huether 2007). Chontales (Champion 1982).

Notes on natural history. In Venezuela it has been recorded in April and May between 600 and 1100 m.a.s.l. García-París *et al.* (2009) report some data on the habitat of this species in Chiapas (México).

Epicauta melanota Mäklin 1875

Cantharis melanota Mäklin 1875: 624. Terra typica: 'Nova Granada'. Holotype by monotypy, probably held at the Universitets Zoologiska Museum, Helsinki.

Epicauta melanota (Mäklin 1875): Borchmann 1917: 78.

Studied material. VENEZUELA – “*melanota*” Dej. Venezuela //: 1 ex. [NHM]. NO LOCALITY DATA – 209 // Coll. Laf.: / 3839 // *melanota* Mkn. type t. Haag // F. Bates 81-19 (not a type specimen): 1 ex. [NHM].

Diagnosis. *Epicauta melanota* is characterized by its medium size, total length of 16.4 mm (Mäklin 1875), entirely black body coloration with dense whitish – cinereous vestiture mostly concentrated over the external lateral margins of elytra, lateral of pronotum and ventral surfaces of head, pronotum and abdomen. Lateral edge of the base of elytra with a denser area of vestiture. Legs with whitish pilosity mostly centered over the femora. Head with slightly marked temples, finely punctured. Antennomeres elongated. Pronotum of similar length to the head longitude, almost dorsally flat, finely punctured.

Taxonomic comments. *Epicauta melanota* is a poorly known species. The description was based on a single specimen and no additional specimens, besides those reported here, were recorded since their description. This species is not yet assigned to any species group within the nominal subgenus. The study of the type specimens of *E. melanota* is necessary to determine the identity of this species, that could represent a synonym of *E. major*, over which it could have priority.

Geographic distribution. Previously known from the old territorial entity of “Nova Granada” (Mäklin 1875), currently in Central Colombia and reported by Borchman (1917) and Denier (1935) from Colombia (without precise locality). The specimens studied expand the known distribution range into Venezuela.

Previously published records. Only known from ‘Nova Granada’, currently in Colombia, without further geographic details (Mäklin 1875, Borchmann 1917, Denier 1935)

Notes on natural history. All aspects of the natural history of *E. melanota* remain unknown.

Epicauta subvittata (Erichson 1848)

Lytta (Epicauta) subvittata Erichson in Schomburgk 1848: 566.

Type locality: not specified, although it should be 'Britisch-Guiana' according to the title of the book. Three syntypes conserved at the Museum für Naturkunde (Berlin). Haag-Rutenberg (1880: 53) wrote by mistake „*Lytta sublineata*„, referring to this taxon.

Epicauta subvittata (Erichson 1848): Borchmann 1917: 84.

Studied material. GUYANA – Type material (syntypes): Hist.-Coll. (Coleoptera), Nr. 28811, *Lytta subvittata* Er. Guyana, Schomb. Zool. Mus. Berlin (green label, printed) // SYNTYPE, *Lytta (Epicauta) subvittata*, Erichson, 1848, labelled by MFNB 2019 (red label, printed): 1 ex. [MFN]; Hist.-Coll. (Coleoptera), Nr. 28811, *Lytta subvittata* Er. Guyana, Schomb. Zool. Mus. Berlin (green label, printed) // SYNTYPE, *Lytta (Epicauta) subvittata*, Erichson, 1848, labelled by MFNB 2019 (red label, printed): 1 ex. [MFN]; Hist.-Coll. (Coleoptera), Nr. 28811, *Lytta subvittata* Er. Guyana, Schomb. Zool. Mus. Berlin (green label, printed) // SYNTYPE, *Lytta (Epicauta) subvittata*, Erichson, 1848, labelled by MFNB 2019 (red label, printed) // 28811 (hand written) // Guyana, Schomb (hand written) // *subvittata* (hand written): 1 ex. [MFN].

VENEZUELA– Amazonas: Puerto Ayacucho: 2/5-XI-1982 (A. Chacón, G. Yépez G. leg.): 4 exx. [MIZA]; 4/15-XII-1982 (G. Romero leg.): 3 exx. [MIZA]. Apure: Fundo El Ceibote, Hato El Frío: 20-V-1975 (C. J. Rosales leg.): 1 ex. [MIZA]. Bolívar: Río Cuchivero, Mantecal, 150 m: 23/27-III-1970 (F. Fernandez. Y., C. J. Rosales): 1 ex. [MIZA]; Río Cuchivero, Mantecal, 150 m: 23/27-III-1970 (F. Fernandez. Y., C. J. Rosales): 1 ex. [MIZA]; Caicara: 28-XII-1972 (Mattei leg.): 2 exx. [MIZA]; Río Guaniamo, 160 m, 6°45'N-66°61'O: 23/27-III-1970 (F.J. Clavijo, A. Chacón, G. Yépez G. leg.): 2 exx. [MIZA]. Cojedes: El Pao: Galeras, 220 m, 9°34'24"N - 68°09'7"W: 21-23-XI-1994 (A. Alemán); 2/5-XII-1994: 1 ex. [MIZA]; El Pao: Pilancones, 188 m, 9°43'54"N - 68°8'31'O: 25/26-VII-1995, Proyecto M.I.Z.A.-D.H.C. (A. Alemán leg.): 1 ex. [MIZA]. Portuguesa: Hda. El Pilar, San Nicolás, 180 m: 2/5-XII-91, Expedición Miza U.L.V.: 1 ex. [MIZA]; San Nicolás, 180 m: 20-IV-1977, trampa de luz: 2 exx. [MIZA]; San Nicolás, 180 m: 25-IV-1977, trampa de luz: 2 exx. [MIZA].

Reference sample. Type series consisting of 3 syntypes, all labelled: "Hist.-Coll. (Coleoptera), Nr. 28811, *Lytta subvittata* Er. Guayana, Schomb. Zool. Mus. Berlin" [green label, printed]; "SYNTYPE, *Lytta (Epicauta) subvittata*, Erichson, 1848, labelled by MFNB 2019" [red label, printed]; one syntype with 3 additional labels: "28811", "Guayana, Schomb" and "subvittata" [written labels]. 7 specimens from Venezuela.

Redescription. (Fig. 13) Length (frons to posterior margin of elytra) 10-5 mm, with a maximum recorded width of 4.8 mm at the last third of the elytra. Body slender and elongated. General body coloration pale brown-

ish to ochre with four light ochre longitudinal stripes on elytra. Head reddish to brownish, with two symmetrical and isolated black blotches of variable extension over the eyes, extending from the inner-upper eye border to almost the vertex level. Legs brown, similar colored as elytra. Tibial spines and tarsal claws dark brown. Ochre short vestiture over the body and appendages, except along the longitudinal stripes of elytra and pronotum midline, which are light ochre; ventral body regions with dense and longer semierected setae.

Head suborbicular, wider than pronotum (maximum width: 2.8 mm); with a longitudinal subtle median groove from the vertex to the upper area of frontoclypeal suture present. Temples subparallel. Surface covered by numerous punctures uniformly distributed, except in the median groove, which is smooth and glabrous. Punctures very small, rounded, shallow and dense, but isolated from each other. Frons and temples with a relatively long seta on each puncture. The area above the antennal insertions slightly elevated, covered by a long and dense semierected setation. Eyes large, kidney-shaped, swollen, with the interior margin emarginated, dividing the eye into upper and lower lobe, the latter of larger size; minimum interorbital distance of larger studied specimens of 1 mm. Frontoclypeal suture deeply marked, arcuate. Clypeus flat, sub-rectangular, transverse; measurements for the larger studied specimen of 1.7 mm wide by 0.8 mm long; punctures similar to those on the head, almost absent in its distal third, which is membranous and denuded; long setae over each puncture, directed forward. Labrum-clypeus suture almost straight. Labrum transverse; measurements for the larger studied specimen of 1.4 mm wide by 0.6 mm long, emarginated in the middle; punctures and pilosity similar to the clypeus; setae longer in the lobes. Mandibles robust, glabrous in the apex, and basally pilose, notched in its distal region. Maxillary palpomeres I wide, subtrapezoidal, II similar to I, III sub-trapezoidal and flattened; distal palpomeres widest with a narrow excavation along the distal margin; pilosity moderately long. Labial palpomeres I sub-cylindrical, II troncoconical, and III subellipsoidal, with pilosity as on maxillary palpi. Posterior region of the head with relatively long pilosity.

Antennae 11 segmented, not modified, reaching the first third of elytra when extended backward. Antennomeres relatively long, successively narrower from antennomeres III to XI; with very short ochre setae, mostly decumbent or semi-erect, longer on I-II; I sub-cylindrical; II short, sub-cylindrical; III cylindrical; IV cylindrical; V cylindrical; VI cylindrical; VII cylindrical; VIII cylindrical; IX cylindrical; X cylindrical; XI sub-cylindrical, with apex rounded, blunt. Lengths of the larger studied specimen, from I to XI: 1.1 mm, 0.5 mm, 1.3 mm, 0.9 mm, 1.1 mm, 0.6 mm, 0.9 mm, 0.8 mm, 0.8 mm, 0.7 mm, 0.9 mm.

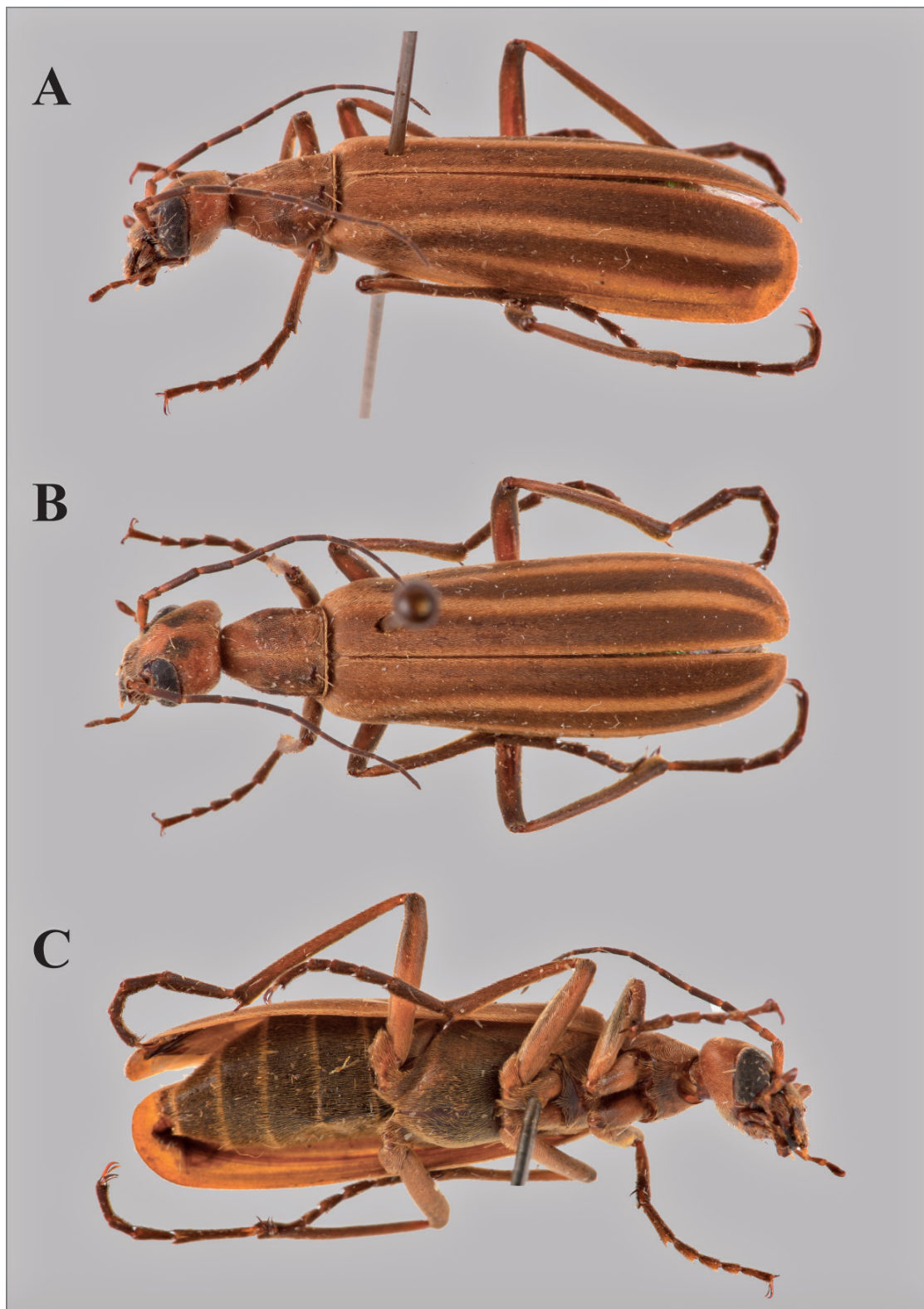


Figure 13. *Epicauta subvittata* (Erichson 1848) Male: (A) lateral view; (B) dorsal view; (C) ventral view.

Pronotum relatively elongated, subcampanulated (measurements of the larger specimen: 2.7 mm long by 2.4 mm maximum width); lateral sides parallel in its 2/3 basal, convergent to the head in its distal portion; anterior and posterior margin straight. Pronotum surface almost flat, with slightly depressed area in their proximal region and a fine and longitudinal white midline; some specimens present a pair of black blotches on the proximal third of pronotum; homogeneously and densely punctyrated; punctures small, subtle, circular, well separated but close from each other, not confluent. Setation formed by ochre decumbent and semierected setae, longer and conspicuous along the midline, and in a lesser extend over the lateral sides. Mesonotum and metanotum not visible. Prosternum wide, extended posteriorly in its middle area, rounded at the tip. Mesosternum with a triangular prolongation, extended posteriorly, ending in a rounded tip. Metasternum large, with a posteriorly extended prolongation that ends in a wide and rounded tip.

Elytra elongate, with subparallel sides (length of larger specimen: 12.3 mm); tegument with ochre vestiture over most of the surface; four light ochre longitudinal stripes are present (from inner to external border of elytra): (I) sutural vittae very fine, extending from base to the posterior border; (II) central vittae very wide, extending along the central area, from base to the distal border of elytra; (III) lateral vittae wide, extending from the base to the posterior border of elytra; (IV) marginal vittae wide, bordering the external margin of the elytra.

Legs relatively long, covered by decumbent or semierected setae, longer in its ventral surface. Metafemur shorter than metatibia (metafemur and metatibia length of the larger specimen: 4.5 and 4.8 mm respectively). Pro- and mesotibiae with two similar spurs, slender and straight. Tarsi long and slender, with tarsomeres subcylindrical, slightly expanded distally; emarginated distally in the ventral surface. Protarsus shorter than meso- and metatarsi. First metatarsomere large, followed in size by the second and the third one (metatarsomeres length of the larger recorded specimen: from inner to apical: 2.1, 0.9, 0.9, 1.2 mm). Tarsal ventral pads consisting on a dense, short and thick tuft of semierected brownish setae, except along a median line of each segment where the pilosity is shorter and yellowish. Claws smooth, curved, the lower lobe smaller and narrower.

Abdomen relatively slender, ventral surface brown; all ventrites covered by ochre decumbent pilosity, especially conspicuous at the distal border of each segment.

No recognizable secondary sexual dimorphic traits were evidenced among type specimens.

Variability. Size variable (from frons to posterior border of elytra) ranging from 14.9 to 16.56 mm (n=7) among the studied specimens (but see Diagnosis). Indi-

vidual color variability has been observed in the extension of the head black blotches (Fig. 14) and also, over the anterior region of pronotum, where sometimes it is present a conspicuous blackish area, which can be formed by symmetrical isolated or contacting blotches.

Diagnosis. Medium-large sized species (10–17 mm). Easily recognizable by the pale brownish general colouration of the body and appendages. Tegument covered by a very short ochre vestiture. Head brownish to reddish, with a pair of black elongated marks between the eyes along each side of the midline of the frons; labrum and clypeus darker; tegument finely puncturated. Pronotum elongated, sub-campanulated, convergent in its fore third; brownish to reddish,

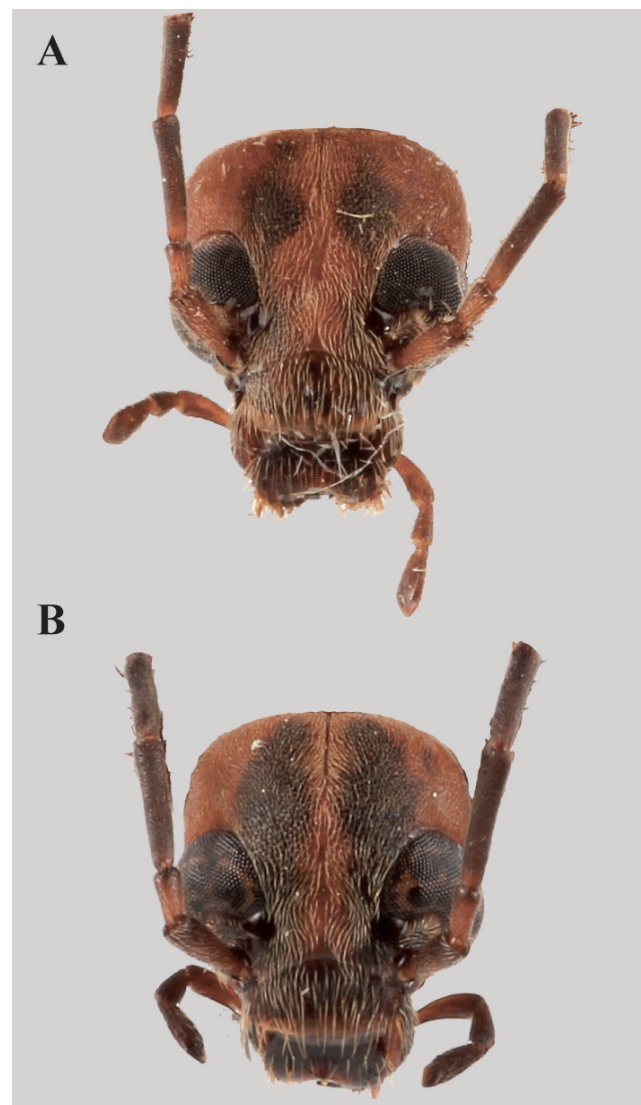


Figure 14. Variability in the head black blotches displayed by *Epicauta subvittata* (Erichson 1848): (A) syntype; (B) specimen from Puerto Ayacucho (Amazonas, Venezuela col. MIZA).

sometimes with dark paired marks in the proximal area. Elytra brown with the suture and the external margin bordered by a thin ochre line, and two wider lines of the same colour in the center of the elytra, arising from the humeral region to the distal margin.

Taxonomic comments. Included in the *E. vittata* species group by Adams and Selander (1979). We share this criteria.

Geographic distribution. It occurs in Guyana (without accurate locality), Brazil (Sao Paulo) (Campos-

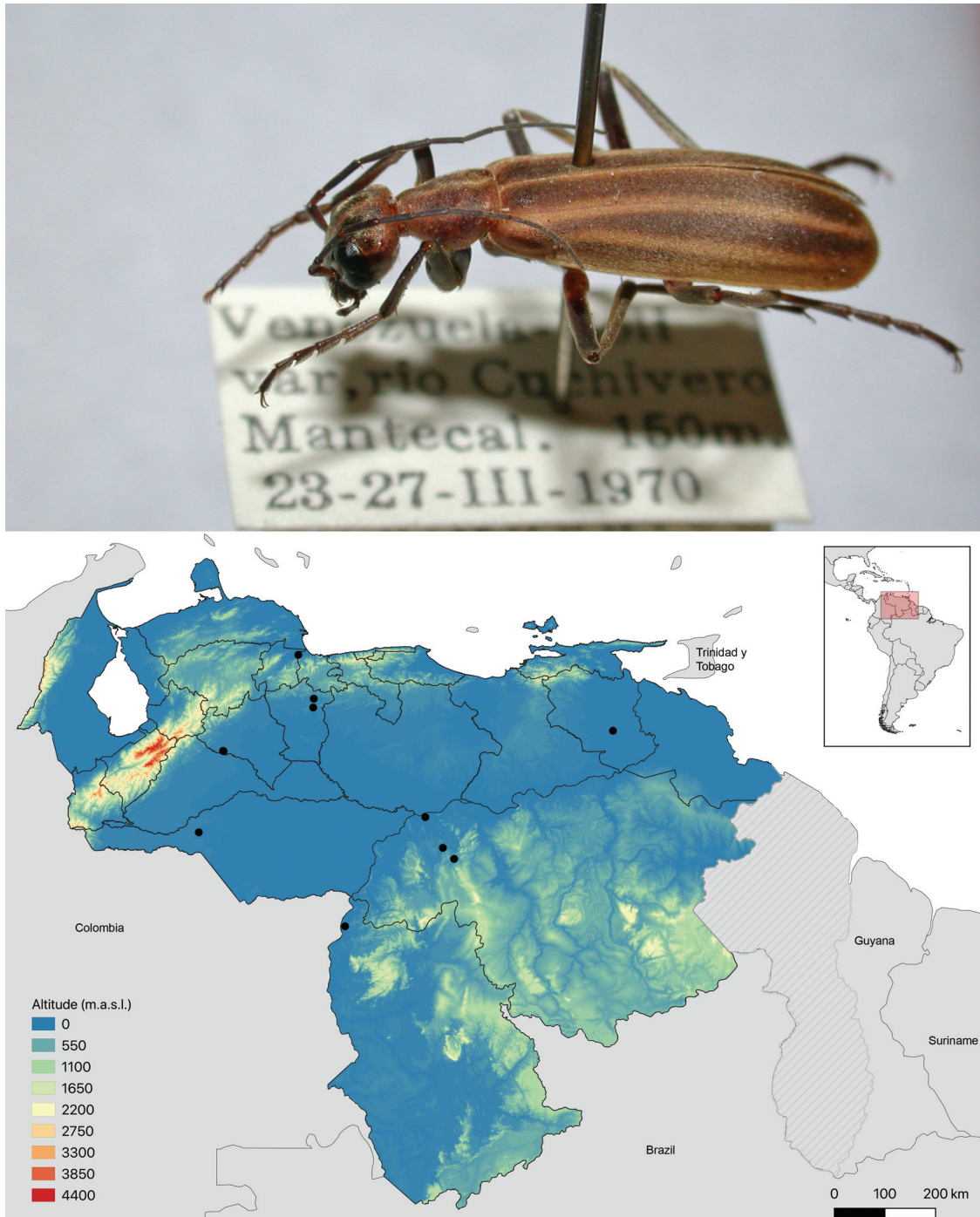


Figure 15. Specimen of *Epicauta subvittata* from Sanare (Falcón, Venezuela, col. MIZA) (top) and distribution map of the species in Venezuela (bottom).

Soldini *et al.* 2018) and Venezuela (see studied material section).

Previously published records. BRAZIL – São Paulo: *São Paulo* (Campos-Soldini *et al.* 2018). GUYANA – Without precise locality (Erichson 1848, Blackwelder 1945, Adams and Selander 1979).

Notes on natural history. According to Erichson (1848), *Epicauta subvittata* was collected in open sunny forests, on bushes, together with *E. anthracina*, *E. flagellaria* and *Spastica glandulosa* (Erichson 1848). Adults are active, at least, from March to July and in November and December; also, they are attracted to artificial light. Narrow altitudinal range, from 150 to 220 m.a.s.l.

Epicauta suturalis (Germar 1821)

Lytta suturalis Germar 1821: 155. Terra typica: "Brasilia".

Cantharis suturalis (Germar 1821): Fischer 1827: 24.

Lytta albicincta Haag-Rutenberg 1880: 23. Terra typica: "Merida".

Type specimen probably at the Zoologische Staatssammlung, Munich (Germany).

Epicauta suturalis (Germar 1821): Bruch 1911: 405.

Epicauta albicincta (Haag-Rutenberg 1880): Borchmann 1917: 70.

Studied material. BRAZIL – Rio de Janeiro: 7-XI-1923 (K.J. Hayward, 1125): 1 ex. [NHM]. VENEZUELA – Apure: Fundo El Ceibote, Hato El Frío: 20-V-1975 (C.J. Rosales leg.): 1 ex. [MIZA]; San Sebastián de los Reyes, bajo la luz, en una pared blanca, cerca de bosque y áreas abiertas: 1 ex. [MIZA]; El Limón, 450 m: 23-VI-1952, en patata (F. Fernández Y. leg.): 24 exx. [MIZA]; 23-VI-1952, en patata (J. González leg.): 2 ex. [MIZA]; 28-V-1954 (C.J. Rosales leg.): 1 ex. [MIZA]; 28-V-1954 (N. Ángeles leg.): 2 ex. [MIZA]; Tasajeras, 450 m: 12-VII-1958 (F. Fernández Y. leg.): 1 ex. [MIZA]; Maracay, 450 m: 20-VIII-1949 (F. Fernández Y. leg.): 1 ex. [MIZA]; 3-V-1948: 1 ex. [MIZA]; 22-VI-1954 (M. Stejskal leg.): 4 exx. [MIZA]; 4-VII-1948 (W. Zsumokowsky leg.): 1 ex. [MIZA]; 2-VII-1935 (D.A. Texera leg.): 1 ex. [MIZA]; Boca de Río, cr. Maracay: 25-VII-1945 (R. Labrador leg.): 1 ex. [MIZA]; La Providencia, cr. Maracay: 27-VI-1951, en cambur (C.J. Rosales leg.): 1 ex. [MIZA]; Turmero, 466 m: 31-V-1949 (F. Fernández Y. leg.): 4 exx. [MIZA]; Cagua, 450 m: 4-VII-1960 (M. Cermeli leg.): 4 exx. [MIZA]; Cagua, 455 m: 21-VI-1969 (R. Marcano leg.): 3 exx. [MIZA]; La Victoria: 17-VII-1941, en *Cap-sicum annuum* (E. Stolle leg.): 1 ex. [MIZA]; Las Tejerías, 500 m: 14-VI-1983 (R. de Uzcategui leg.): 1 ex. [MIZA]; Tejerías, 700 m: 5-VIII-1978, en bosque seco caducifolio, comiendo una planta con muchos alcaloides (J.E. Latkke leg.): 1 ex. [MIZA]. Anzoategui: Clarines: 25-VIII-1975 (R. Dietz leg.): 14 exx. [MIZA]. Barinas: Reserva Forestal Ticoporo, 230 m: 22/28-V-1968 (M. Gelbez; J. Salcedo leg.): 2 exx. [MIZA]; Río Guaniamo, 160 m, 6°45'N-66°1'O: 25/28-V-1979 (J. Clavijo, A. Chacón, G. Yépez leg.): 12 exx. [MIZA]; 8/12-V-1979 (E. Osuna, A.

Chacón, R. Grance leg.): 4 exx. [MIZA]; Km. 210, carretera Caicara – San Juan de Manapiare, 300 m: 23-IV-1976 (J. Salcedo, M. Gálbez leg.): 13 exx. [MIZA]; Km. 168, Río Claro: 10-IV-1976 (O. Mattei leg.): 1 ex. [MIZA]; Río Claro, Guayana: 10-IV-1976 (O. Mattei leg.): 1 ex. [MIZA]. Carabobo: Cachinche: 29/30-VI-1984 (A. Chacón H. leg.): 4 exx. [MIZA]; Naguanagua: 23-VI-1966 (S. Díaz leg.): 1 ex. [MIZA]; Valencia: 27-IV-1955 (J. González leg.): 1 ex. [MIZA]; Miranda, 680 m: 21-VI-1998, captura directa, en tallos de flores (D. López leg.): 1 ex. [MIZA]. Cojedes: El Pao: Galeras, 220 m, 9°34'24"N-68°9'7"O: 19/22-V-1995 (A. Alemán leg.): 3 exx. [MIZA]; 22/24-V-1995: 2 exx. [MIZA]; El Pao: Pilacones, 188 m, 9°43'54"N-68°8'31"O: 1/2-VI-1995 (A. Alemán leg.): 3 exx. [MIZA]; 26/28-IV-1995: 2 exx. [MIZA]; 25/26-IV-1995: 1 ex. [MIZA]; 31/1-VI-1995: 1 ex. [MIZA]; 28/1-V-1995: 1 ex. [MIZA]; 1/2-VI-1995: 3 exx. [MIZA]; 26/28-IV-1995: 2 ex. [MIZA]; 25/26-IV-1995: 1 ex. [MIZA]; 31/1-VI-1995: 1 ex. [MIZA]; 28/1-V-1995: 1 ex. [MIZA]; El Pao: Higuerotol, 376 m, 9°49'27"N-68°2'30"O: 24/31-VI-1995, 1 ejemplar (A. Alemán leg.): 1 ex. [MIZA]. Distrito Federal: Caracas, +920 m: 14-II-1965 (W. Pérez leg.): 1 ex. [MIZA]. Guárico: Chaguaramas: 10-VI-1956 (García E. leg.): 1 ex. [MIZA]; Chaguaramas: 1 ex. [MIZA]; Carretera Chaguaramas - José Nereo, sección Guárico: 11-VI-1971 (L. Joly T. leg.): 1 ex. [MIZA]; Hato Las Lajas: 24/26-VI-1966 (F. Fernández Y.; A.D. Ascoli leg.): 2 exx. [MIZA]; Hato El Saman, Las Mercedes: 16-V-1969 (J. Semidey leg.): 2 exx. [MIZA]; San José de Tiznados: 21-VII-1984 (M. Velásquez leg.): 1 ex. [MIZA]; Valle de Pascua: 12-V-1981 (R. Sánchez leg.): 2 exx. [MIZA]. Miranda: Altigracia de Orituco, Dosríos: 10-VI-1952 (Roze leg.): 1 ex. [MIZA]. Portuguesa: Ospino: 7-V-1953 (Fernández Kern leg.): 1 ex. [MIZA]; San Nicolás, 180 m: V-1975 (S. Clavijo leg.): 1 ex. [MIZA]. Yaracuy: Yaristaseca: (L. Joly T. leg.): 1 ex. [MIZA].

Diagnosis. Medium-large sized species characterized by long antennae, formed by long antennomeres. Cuticle dark brown, blackish, covered by fine brown short decumbent pilosity; margins of the elytra, sutural line and pronotal margins covered by dense, longer yellowish-golden setae (Fig. 15).

Taxonomic comments. Campos-Soldini *et al.* (2018) synonymized *E. albicincta* (Haag-Rutenberg 1880) with *E. suturalis* (Germar 1821). We concur that the coloration pattern of the Venezuelan specimens corresponding to *E. albicincta*, would fall within the great variability of *E. suturalis*; however, we believe that in the future it would be necessary to review with molecular characters the great diversity that currently includes *E. suturalis*. Berg (1881) includes the unavailable name *Epicauta fucata* Dejean 1837: 247, in the synonymy of this species.

Geographic distribution. Argentina, Bolivia, Brazil, Chile, Paraguay, Uruguay (Blackwelder 1945, Campos-Soldini *et al.* 2018) and Venezuela (Haag-

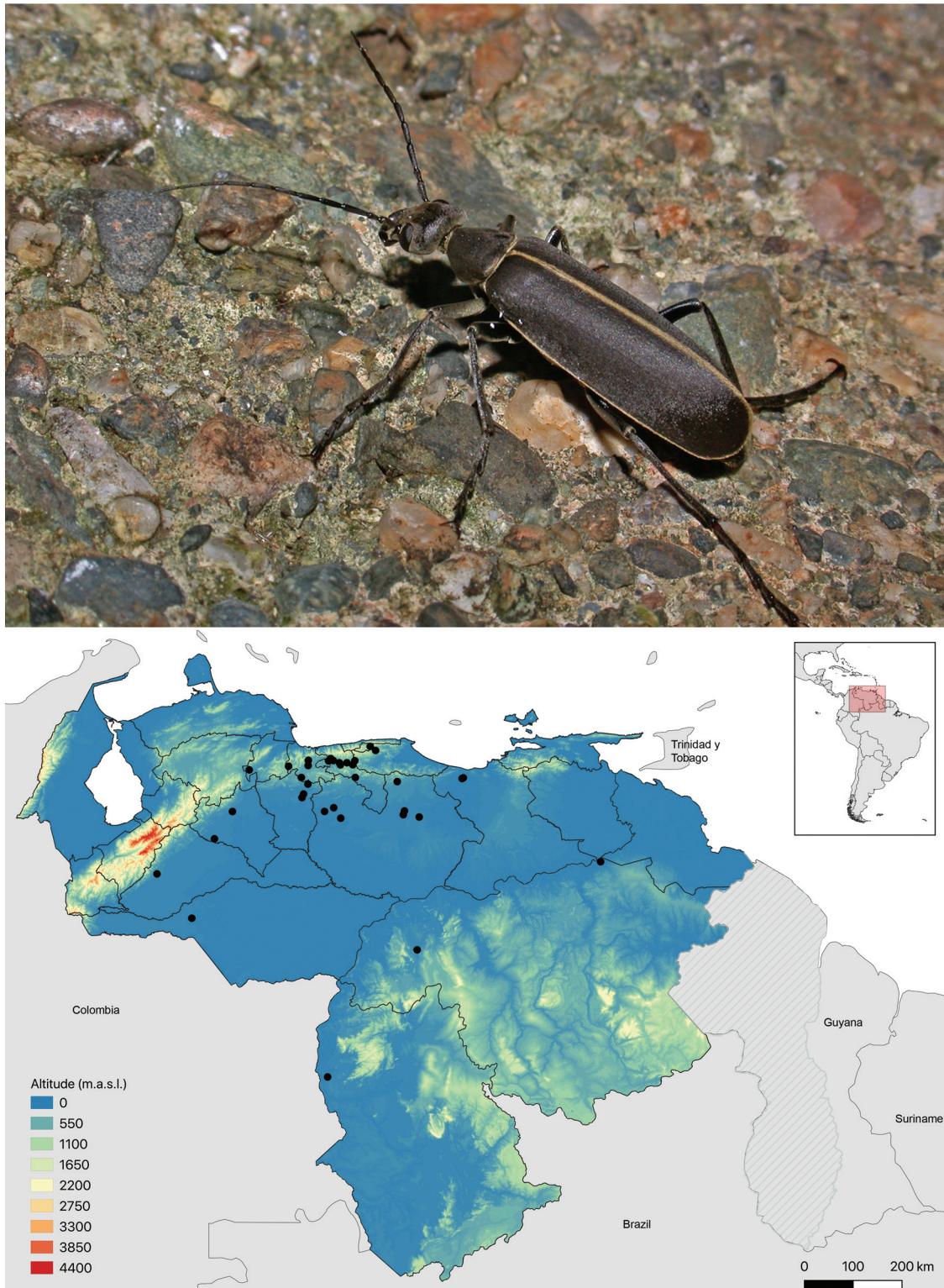


Figure 16. Live specimen of *Epicauta suturalis* from San Sebastián (Aragua, Venezuela) with the typical coloration of Venezuelan specimens (top) and distribution map of the species in Venezuela (bottom).

Rutenberg 1880, Blackwelder 1945 sub *E. albicincta*). In Venezuela it can be found mostly in the part of the country (Fig. 15).

Previously published records. ARGENTINA – Buenos Aires: Cerro Largo (Campos-Soldini *et al.* 2018), Misiones: Alto Paraná, Puerto Victoria (Campos-Soldini *et al.* 2018); Jujuy; Sante Fe: Casilda, Rosario (Campos-Soldini *et al.* 2018); Salta; Tucumán (Campos-Soldini *et al.* 2018). BOLIVIA – Santa Cruz: Chiquitos; Cuatro Ojos (Campos-Soldini *et al.* 2018). BRAZIL – Río de Janeiro: Río de Janeiro (Quintino and Monné, 2009, Campos-Soldini *et al.* 2018); Campo Bello; Goyaz: Río Verde, Yathay; Matto Grosso; São Paulo (Campos-Soldini *et al.* 2018). CHILE – Valparaiso (Campos-Soldini *et al.* 2018). PARAGUAY – Asunción (Campos-Soldini *et al.* 2018); Río Apa (Berg 1881). URUGUAY – Canelones (La Floresta); Cerro Largo: Cuchilla de Melo (Campos-Soldini *et al.* 2018). VENEZUELA – Mérida (Haag-Rutenberg 1880 sub *E. albicincta*).

Notes on natural history. Imaginal phenology between February and August (no records in March); sometimes attracted to artificial light. Altitudinal range from 110 (El Ceibote, Apure) to around 1350 m a.s.l. (Mérida).

Key to the *Epicauta* from Venezuela

An identification key is presented to the recorded species of *Epicauta* in Venezuela; with the exception of *E. melanota* (see Taxonomic comments of the species). The provided key is mainly based on coloration patterns, which are very characteristic among the different Venezuelan species of the *Epicauta*. The key is intuitive, easy to use and complemented with illustrations of habitus of the taxa involved. It is especially focused for identification in the field, faunal inventories, or through photographs, though it is also valid for collection material. Our aim is to facilitate the increase of faunistic and distribution knowledge of the specific representation of the genus in the country by means of a visual, practical and accessible identification tool.

1. Yellowish stripe in the elytral disc absent (Fig. 5) 2
- Yellowish stripe in the elytral disc present (Fig. 6) 6
2. Tegument entirely black, a longitudinal red spot might be present in the frons (Fig. 1) 3
- Tegument of a color other than entirely black ... 4
3. White pubescence absent *E. anthracina*
- White pubescence present in at least legs and ventral surface *E. major* (in part)
4. Pronotum with a marked medium line (Fig. 9) ... 5
- Pronotum without a marked medium line 6
5. Tegument black. Elytra orangey, uniform, without stripes of pubescence light-colored ... *E. carmelita*

- Dark brown elytra, rounded by a stripe of yellowish-golden pubescence *E. suturalis*
- 6. Medium line of the pronotum smooth, shiny and bare. II and III male antennomeres disproportionately large, broad elongated and flattened *E. flagellaria*
- Medium line of the pronotum covered by a dense and light-colored pilosity. The pilosity may or may not be the same color as that of the rest of the body *E. major* (in part)
- 7. Tarsal claws with very different blades from each other (Fig. 4) 8
- Tarsal claws with similar blades 9
- 8. Male antennae without ridge (carena) on the ventral surface *E. aragua*
- Male antennae with ventral smooth and shiny ridges on antennomeres III–VI *E. apure*
- 9. Antennae with sexual dimorphism. Male antennae with the first six antennomeres wide and very dissimilar from each other. Head notoriously cleft ... *E. caustica*
- Antennae without sexual dimorphism; linear ... 10
- 10. Elytral disc stripe close to the lateral margin of the elytra; split into unalignment segments. Tegument and pubescence coloration mismatched *E. falcolarandina*
- Elytral disc stripe close to the lateral margin of the elytra; more or less continuous, not divided (Fig. 13) 11
- 11. Elytral disc stripe almost reaching the end of the elytra, yellowish. General body colouration pale brownish with ochre pubescence ... *E. subvittata*
- Elytral disc stripe short, ends long before the end of the elytra. General body colouration dark brown to blackish, shady, with dorsal dark pubescence *E. chaima*

DISCUSSION

The resulting new species and the numerous new records presented in this work, including new records for four species not previously recorded in Venezuela, yield an overall outlook of the undiscovered diversity of *Epicauta* in this country. The data suggest that some species are more abundant and are more widely distributed across the country than previously thought. However, it also highlights that the species diversity of *Epicauta* in Venezuela is lower than in other countries of America, Mexico (~120 species; García-París *et al.* 2007), for instance. This probably could be related with the fact that *Epicauta* is usually richer in hot dry open areas (Kerr & Packer 1999), suggesting that the widely forested Venezuela (Pacheco *et al.* 2011) is not so suitable to host a high diversity of the species of this genus. Our study also highlights not only the large work that

need to be done in Venezuela to know the real species richness of the genus *Epicauta* and the lack of basic information, as the geographic distribution of their species but the several taxonomic issues that remain unsolved.

The presence of *E. philaemata* in Venezuela is unlikely. *Epicauta philaemata* was recorded from Argentina and Brazil, however, when *Lytta capitata* Castelnau 1840 was synonymized with *E. philaemata* (see Borchman 1917), which at that time included also *E. caustica* in its synonymy, the distribution of *E. philaemata* was expanded to Venezuela since *E. caustica* was described from the state of Guárico. Posteriorly, Adams and Selander (1979) in their revision of the *E. vittata* species group, discarded the presence of *E. philaemata* in Venezuela, but recently Campos-Soldini *et al.* (2018) mentioned the presence of *E. philaemata* in this country again, without locality data and probably dragging the geographic distribution when it was a synonym of *E. caustica*. We did not find any specimen assignable to *E. philaemata* in the revised scientific collections for this study, accordingly, we do not consider that *E. philaemata* is present in Venezuela until more feasible evidence is provided.

Probably one of the urgent concerns, previously mentioned by García-París *et al.* (2016), was the taxonomic uncertainty involving *E. grammica* and *E. apure*. These two species are so similar that even the description of the most recent taxon (*E. apure*) failed to provide solid differences between them (Adams and Selander 1979). The assessment of the specific status of *E. grammica* and *E. apure* remain to be established and both taxa need revision. This is particularly problematic since *E. grammica sensu stricto* is likely not present in Venezuela (it was described from Brazil). Here, we included in *E. apure* all the records of *E. grammica sensu lato* previously reported in Venezuela, since it is noticeable that we are facing two evolutionary units, however, the morphological limits across them, require to be established.

The taxonomy of the subgenus *Epicauta* has been heterogeneously studied in America, but no integrative studies have been undertaken. The North American taxa are well studied (Pinto 1980, 1991, Kerr and Packer 1999) in comparison to the southern American fauna (see Campos-Soldini *et al.* 2018). Particularly, most of the species from the northern region of South America lack proper taxonomic revisions (García-París *et al.* 2016).

Most of the Venezuelan species belong to two relatively well-studied species groups widely distributed from North America to Argentina: the *E. vittata* group (Adams and Selander 1979, Agafitei and Selander 1980, Pinto 1991, Werner 1944, García-París *et al.* 2016, Campos-Soldini *et al.* 2018) and the *E. caustica*

group (Selander 1981). However, these species groups do not exhibit a morphological pattern that allows discriminating between them. Phylogenetic analysis within a molecular framework, are needed to understand how these species groups are related.

Since there is not a consistent morphological distinction between the *Epicauta* species groups *E. vittata* and *E. caustica*, we have tentatively assigned the new species *E. chaima* to the *E. vittata* species group. Following the descriptions, we could assign this species to any of these two groups in question. Species of both groups of *Epicauta*, could be misidentified based on single traits due to the lack of an exclusively combination of characters. Either *E. caustica* or *E. vittata* species groups could present the pronotum, elytral vestiture and cuticle with a longitudinal striped pattern, antennae of male with sexual dimorphism and the fore tibia with two spurs and the first-instar larvae with 2–3 setae on the last segment of labial palp; courtship is also not informative since Pinto (1991) mentioned that the *E. vittata* group displays an extremely variable diversity. The only varying trait noticeable in the descriptions of the two groups is the presence of seven (*E. caustica*) or eight (*E. vittata*) lanceolate setae on the fore femur of the first-instar larvae.

The real problem goes beyond these two groups, and it is more related with the way in which *Epicauta* has been systematized in species groups. Unfortunately, this scheme of classification was built considering that the northern and southern species were not related (see subgenera geographic distribution in Introduction) and was solely based on the North American species without considering that there is likely a shared evolutionary history between all the American species. More detailed data on *Epicauta* are required to understand how its species have evolved and how are they phylogenetically related.

Unfortunately, a phylogeny of *Epicauta* is not the only study necessary to obtain a minimal knowledge for the group. Information on the distribution of the species, as well as a review of the type material that is distributed in different entomological collections around the world, is necessary not only to make taxonomic decisions but also for the conservation management of the group.

The information deficit has a ripple effect on the understanding of the evolution of any organism, this effect starts with the taxonomic shortfall (Linnean shortfall), continue with the absence of natural history and geographic information (Wallacean shortfall), and ends with the scarcity of phylogenetic information (Darwinian shortfall) (Cardoso *et al.* 2011, Diniz-Filho 2013). However, scientific collections play a substantial role to overcome these shortcomings since they hold a rich but underused source of information

for biological studies (Schilthuizen *et al.* 2015, Zardoya 2019, Vieites and Nieto-Román 2019, García-Valdecasas 2019). Scientific collections are useful at these three levels, including the Linnean shortfall, since they can provide materials for genetic studies under high-throughput sequencing technologies, rendering insect collections as the state-of-the-art of the new museomics (Wandeler *et al.* 2007, Guschanski *et al.* 2013, Doadrio 2019).

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