



DUGESIANA

Revista de Entomología



Volumen 31 número 2

ISSN 2007-9133



Dugesiana, Año 31, No. 2, (julio-diciembre, segundo semestre 2024), es una publicación semestral, editada por la Universidad de Guadalajara, a través del Centro de Estudios en Zoología, por el Centro Universitario de Ciencias Biológicas y Agropecuarias. Camino Ramón Padilla Sánchez # 2100, Nextipac, Zapopan, Jalisco, Tel. 3337771150 ext. 33218, <http://dugesiana.cucba.udg.mx/index.php/DUG>, glenusmx@gmail.com. Editor responsable: José Luis Navarrete-Heredia. Reserva de Derechos al Uso Exclusivo 04-2009-062310115100-203, ISSN: 2007-9133, otorgados por el Instituto Nacional del Derecho de Autor. Responsable de la última actualización de este número: José Luis Navarrete-Heredia, Editor y Ana Laura González-Hernández, Asistente Editorial. Fecha de la última modificación 1 de julio 2024.

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An updated checklist of Endomychidae and Anamorphidae (Coleoptera: Coccinelloidea) from El Salvador, with additional new records from the Neotropical region

Lista actualizada de Endomychidae y Anamorphidae (Coleoptera: Coccinelloidea) from El Salvador, with additional new records from the Neotropical region

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RESUMEN

Se actualiza la lista de especies de escarabajos fungívoros de las familias Endomychidae y Anamorphidae de El Salvador. Sólo seis especies de Endomychidae y una de Anamorphidae habían sido registradas previamente en el país, con localidades específicas sólo para dos de ellas. El estudio de especímenes recolectados en El Salvador hace más de 60 años por Jan y Bohumila Bechyné, y que fueron depositados en el Real Instituto Belga de Ciencias Naturales, Bruselas, permitió tener una mejor idea sobre la diversidad y distribución de estos escarabajos en el país. Se registran aquí ocho especies de Endomychidae y una de Anamorphidae, incluyendo tres primeros registros para El Salvador: *Anidrytus guatemalae* Arrow, *Epipocus bifidus* Gerstaecker y *Stenotarsus ovalis* Arrow. Además, se incluyen los primeros registros de especies de Endomychidae para países de la región Neotropical: *Anidrytus batesi* Strohecker de Perú, *A. ovatulus* Gerstaecker de Guyana, *Ephebus hirtulus* Strohecker de Paraguay, *Epopterus vacuus* Gerstaecker de Costa Rica y *Acinaces unicolor* Tomaszewska de Perú.

Palabras clave: escarabajos micófagos, región Neotropical, América Central, lista, nuevos registros.

ABSTRACT

The checklist of the species of fungus beetle families Endomychidae and Anamorphidae from El Salvador is updated. Only six species of Endomychidae and one Anamorphidae have been previously recorded from the country, with specific localities reported only for two of them. The study of specimens collected in El Salvador over 60 years ago by Jan and Bohumila Bechyné and held in the Royal Belgian Institute of Natural Sciences, Brussels, allowed us to have a better idea on the diversity and distribution of these beetles in the country. Eight species of Endomychidae and one of Anamorphidae are reported here, including three first records for El Salvador: *Anidrytus guatemalae* Arrow, *Epipocus bifidus* Gerstaecker and *Stenotarsus ovalis* Arrow. Additionally, first records for species of Endomychidae from countries of the Neotropical region are provided: *Anidrytus batesi* Strohecker from Peru, *A. ovatulus* Gerstaecker from Guyana, *Ephebus hirtulus* Strohecker from Paraguay, *Epopterus vacuus* Gerstaecker from Costa Rica and *Acinaces unicolor* Tomaszewska from Peru.

Key words: handsome fungus beetles, Neotropical region, Central America, checklist, new records.

El Salvador is the smallest and most deforested country in Central America. Its land degradation is notorious, dating back millennia to the establishment of the first human settlements (Daugherty 1969, Terborgh 1999, Dull 2008). Only 14% of the territory is covered by some type of vegetation, including abandoned crop areas such as shaded coffee plantations (Crespin and Simonetti 2016). Despite the ecological history of the territory, El Salvador is located entirely within the “Mesoamerican Biodiversity Hotspot”, where almost 7% of the world’s biodiversity resides (Hetch et al. 2006). As a consequence, it is a site of interest from a biological and conservational point of view. The study of the fauna of the territory is uneven; for instance, knowledge about the diversity of vertebrates has been reasonably developed over the years, while for the terrestrial invertebrate fauna, it is very limited (Gallo 2005, Pablo-Cea et al.

2023). However, there have been recent progress and updates with respect to the study of the order Coleoptera in the country. For example, the knowledge about the subfamily Dynastinae has been updated (Ratcliffe and Cave 2006), as well as for families Chrysomelidae (Van Roie et al. 2019), Staphylinidae (Pablo-Cea et al. 2021) and superfamily Scarabaeoidea (Pablo-Cea et al. 2023). In this work we update the knowledge of two families of the superfamily Coccinelloidea in the country, Endomychidae and Anamorphidae, representing another important step forward towards the development of a general knowledge of the diversity and distribution of the order in El Salvador.

Historically, families Endomychidae and Anamorphidae, along with Epsilobiidae and Mycetaeidae were classified together as one family: Endomychidae (Tomaszewska 2000), before the taxonomic rearrangement based on phy-

logenetic study of Robertson *et al.* (2015). These beetles are characterized by their predominantly mycophagous habits (Shockley *et al.* 2009a). Endomychidae is moderately diverse with approximately 1620 described species, while Anamorphidae is less diverse, with approximately 175 species. A large portion of the specific diversity of these beetles is found in the tropics of the globe. For most countries in the Neotropical realm, the most updated list of species for these families can be found in Shockley *et al.* (2009b). However, in the case of El Salvador, some species from the country were first reported in the work of Shockley *et al.* (2009b), without providing any other information or specific data of those records: a common situation for records from El Salvador. An illustrative example of this is the checklist of Staphylinidae for the country (Pablo-Cea *et al.* 2021), where more than half of the recorded species ($n=52$ spp., 54%) do not have specific locality records, evidencing the isolated and unsystematized nature of the entomological collecting and inventory efforts in El Salvador.

The only synthetic treatment including an annotated checklist at the country level for Endomychidae and Anamorphidae in the Neotropical region is available from Mexico (Arriaga-Varela *et al.* 2007, 2021). Six species of Endomychidae had been reported from El Salvador in the literature and only one from Anamorphidae (Arriaga-Varela *et al.* 2021; Shockley *et al.* 2009b). Even as scarce as it seems, the general knowledge of Endomychidae and Anamorphidae from the Neotropical realm suggests that the diversity of these groups in El Salvador is underestimated, as it is the case for many other taxa (e.g. Chrysomelidae, Scarabaeoidea). The examination of specimens held in the Royal Belgian Institute of Natural Sciences, Brussels (IRNSB) allowed us to have a much clearer idea on the diversity and distribution of these families in the Neotropical region. This institution holds the collection of Jan Bechyné and his wife Bohumila Bechyné, who did extensive work on Chrysomelidae from the Neotropics (see Van Roie *et al.* 2019), including treatments on the fauna from El Salvador (e.g. Bechyné and Bechyné 1960, 1963). Given the very limited entomological collecting effort done in El Salvador, the study of the material in IRNSB represents a huge leap forward in the knowledge of handsome fungus beetles.

Additionally, to the records from El Salvador, six neotropical species of Endomychidae are recorded for the first time from different countries in the regions (Costa Rica, Guyana, Honduras, Paraguay and Peru).

MATERIAL AND METHODS

The present list includes published records mainly based on checklist by Shockley *et al.* (2009b) and additions by Arriaga-Varela *et al.* (2021). Additional new records are taken from the revision of material from the following collections:

CZUG — Colección Entomológica, Centro de Estudios en Zoología, Universidad de Guadalajara, Zapopan, Mexico (José L. Navarrete-Heredia);

IRNSB — Museum of Natural Sciences (Royal Belgian Institute of Natural Sciences) Brussels, Belgium (Wouter Dekoninck).

MNCR — Museo Nacional de Costa Rica, Costa Rica (Ángel Solís);

MIZ — Museum and Institute of Zoology, PAS, Warsaw, Poland (Wioletta Tomaszewska);

MZLU — Biological Museum, Lund University, Lund, Sweden (Christoffer Fägerström);

NMP — National Museum, Prague, Czech Republic (Lukaš Sekerka);

ZMB — Museum für Naturkunde, Berlin, Germany (Bernd Jaeger);

ZMUC — Natural History Museum of Denmark, University of Copenhagen, Denmark (Alexey Solodovnikov).

Maps for the distribution of Endomychidae and Anamorphidae in El Salvador were made using ArcGIS (ESRI 2023) based on the localities registered here.

RESULTS

Family Anamorphidae Strohecker, 1953

Bystus Guérin-Méneville, 1857: 270

Type species: *Bystus coccinelloides* Guérin-Méneville, 1857: 270

Rhymbus Gerstaecker, 1858: 347

Type species: *Rhymbus hemisphaericus* Gerstaecker, 1858: 349

Bystus hemisphaericus (Gerstaecker, 1858)

Rhymbus hemisphaericus Gerstaecker, 1858: 349; Gorham (1890: 143); Blackwelder (1945: 440).

Bystus hemisphaericus: Strohecker, 1953: 21; Arriaga-Varela *et al.* (2007: 7); Shockley *et al.* (2009b: 9).

Distribution: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama.

Examined material: El Salvador, La Palma (Chalatenango), I.G. 22.899, Leg. J. Bechyné (3 IRSNB) (Fig. 1).

Note: This species was recorded from El Salvador by Shockley *et al.* (2009b) but no precise locality or basis for this record was provided.

Family Endomychidae Leach, 1815

Subfamily Lycoperdininae Bromhead, 1838

Corynomalus Chevrolat in Dejean, 1836: 439

Type species: *Corynomalus tarsatus* Erichson, 1847: 181

Corynomalus perforatus Gerstaecker, 1857

Corynomalus perforatus Gerstaecker, 1857: 238; Arriaga-Varela *et al.* (2007: 13); Shockley *et al.* (2009b: 40).

Corynomalus dentatus Gorham, 1889: 117 (nec Gerstaecker, 1858).

Amphix perforatus: Blackwelder, 1945: 437; Strohecker (1953: 88); Strohecker (1980: 25).

Amphix dentatus: Blackwelder, 1945: 437 (in part)

Distribution: Belize, Brazil, Colombia, Costa Rica, El Salvador, French Guiana, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, Venezuela.

Examined material: El Salvador, Volcán San Vicente, Finca La Paz, I-VII-1959, J. Bechyné (6 IRSNB); El Salvador, Jucuarán (Usulután) I.G.22.899, 10/11-XI-1959 Leg J. Bechyné (2 IRSNB) (Fig. 2).

Note: This species was recorded from El Salvador by Shockley *et al.* (2009b) but no precise locality or basis for this record was provided.

Corynomalus dentatus (Fabricius), 1801

Erotylus dentatus Fabricius, 1801: 7

Amphix dentatus var. *multimaculatus* Pic, 1931: 7

Distribution: Belize, Bolivia, Brazil, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras,

Mexico, Nicaragua, Panama.

Note: This species was recorded from El Salvador by Shockley et al. (2009b) but no precise locality or basis for this record was provided. This species and *C. perforatus* are very similar and the reported distribution in the literature must be carefully assessed by the study of material from all along their distribution range.

Anidrytus Gerstaecker, 1858: 256

Type species: *Anidrytus bipunctatus* Gerstaecker, 1858: 257

Anidrytus guatemalae Arrow, 1920

Anidrytus guatemalae Arrow, 1920: 46; Gorham (1889: 126) (as *Anidrytus liquefactus* Gorham, 1873); Strohecker (1953: 66); Strohecker (1997: 177); Shockley et al. (2009b: 22); Arriaga-Varela (2013: 47); Arriaga-Varela et al. (2021: 296)

Distribution: Mexico, Guatemala, Honduras, El Salvador*
* NEW COUNTRY RECORD FOR EL SALVADOR.

Examined material: “El Salvador, Perquin Morajan [Perquin, Morazán], 22-VI-1959, Leg. J. Bechyné” (1: IRSNB) (Fig. 3).

Epipocus Germar, 1843: 86

Type species: *Endomychus tibialis* Chevrolat, 1834: 94

Epipocus alvaradi Strohecker, 1977

Epipocus alvaradi Strohecker, 1977: 311; Shockley et al. 2009: 25; Arriaga-Varela et al. 2021: 299

Distribution: Guatemala, El Salvador. Records from El Salvador in the literature: San Salvador, 19-VI-1959, Leg. J. Bechyné (Arriaga-Varela et al. 2021) (Fig. 4).

Epipocus bifidus Gerstaecker, 1858

Epipocus bifidus Gerstaecker, 1858: 248; Strohecker (1953: 67); Strohecker (1977: 311); Shockley et al. (2009b: 24)

Distribution: Guatemala, Honduras, El Salvador*, Nicaragua, Costa Rica. * NEW COUNTRY RECORD FOR EL SALVADOR.

Examined material: El Salvador, Volcán San Vicente, Finca La Paz, I-VII-1959, J. Bechyné (2 IRSNB); El Salvador: Santa Tecla (La Libertad), 28-IX-1959 J. Bechyné (4: IRSNB); El Salvador, San Salvador. 15.V.1950. Rec: J. Bechyné (1 IRSNB); El Salvador, Zaragoza. Ex Coll. A. Muysshondt (1 IRSNB) (Fig. 5).

Epipocus punctatus LeConte, 1853

Epipocus punctatus LeConte, 1853: 358; Guérin-Méneville (1857: 265); Gerstaecker (1858: 252); Strohecker (1953: 67); Strohecker (1977: 311); Arriaga-Varela et al. (2007: 21); Shockley et al. (2009b: 24); Arriaga-Varela et al. (2021: 298)

Epipocus bivittatus Gerstaecker, 1858: 253; Gorham (1889: 122); Blackwelder (1945: 438); Strohecker (1953: 67)

Distribution: United States of America, Mexico, Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama. Records from El Salvador in the literature: Quetzaltepeque (Strohecker 1977).

Examined material: El Salvador, Perquin Morajan [Perquin, Morazán], 22-VI-1959, Leg. J. Bechyné (2 IRSNB), S. Salvador, 19-23.v.1960, I.G. 22.899/Leg J. Bechyné (1: IRSNB), El Salvador, 12.vii.1959. I.G. 22899, Leg. J. Bechyné (1: IRSNB), El Salvador, San Salvador, 03-V-1960, I.G. 22899 Leg Bechyné (3: IRSNB), El Salvador, San Salvador, 25-28.IV.1960,

leg. J. Bechyné, I.G. 22.899 (1: IRSNB) (Fig. 6).

Ephebus Chevrolat in Dejean, 1836: 439

Type species: *Ephebus cardinalis* Gerstaecker, 1858: 294

Ephebus piceus Gorham, 1889

Ephebus piceus Gorham, 1889: 131; Strohecker (1975: 336); Shockley et al. (2009b: 23); Arriaga-Varela and Shockley (2010: 209); Arriaga-Varela et al. (2021: 297)

Distribution: Mexico, El Salvador, Colombia, Costa Rica.
Examined material: El Salvador, Jucuarán (Usulután) I.G.22.899, 10/11-XI-1959 Leg J. Bechyné (1: IRSNB) (Fig. 7).

Note: Shockley et al. (2009b) recorded this species from El Salvador but no precise locality is provided.

Ephebus sulcatus Strohecker, 1975: 336

Ephebus sulcatus Strohecker, 1975: 336; Arriaga-Varela et al. (2007: 18); Shockley et al. (2009b: 24); Arriaga-Varela and Shockley (2010: 209); Arriaga-Varela et al. (2021: 297)

Distribution: Mexico, Guatemala, El Salvador, Nicaragua, Costa Rica, Panama, Colombia. Records from El Salvador in the literature: El Salvador: Quetzaltepeque, 500m, July (Strohecker 1975) (Fig. 8).

Subfamily Endomychinae Leach, 1815

Stenotarsus Perty, 1832: 112

Type species: *Stenotarsus brevicollis* Perty, 1876: 112

Stenotarsus ovalis Arrow, 1920

Stenotarsus ovalis Arrow, 1920: 50; Blackwelder (1945: 440); Strohecker (1953: 55); Roubik and Skelley (2001: 256); Shockley et al. (2009b: 84); Arriaga-Varela et al. (2013: 35); Arriaga-Varela et al. (2021: 296)

Stenotarsus rotundus Arrow, 1920: 52; Blackwelder (1945: 440); Strohecker (1953: 56)

Stenotarsus orbicularis Gorham, 1890: 134 (in part).

Stenotarsus pilatei Gorham, 1890: 135 (in part).

Distribution: Mexico, Guatemala, El Salvador*, Honduras**, Costa Rica, Panama. * NEW COUNTRY RECORD FOR EL SALVADOR. ** NEW COUNTRY RECORD FOR HONDURAS. Examined material: S. Salvador, 19-23.v.1960, I.G. 22.899/Leg J. Bechyné (1 IRSNB); “Honduras: Olancho, Catacamas, 15°50'N, 85°51'W, 10.VII.1995, leg. R. Cave / malaise trap lowland gallery forest” (1: MZLU) (Fig. 9).

New country records for the Neotropical region Subfamily Epipocinae Gorham, 1873

Anidrytus batesi Strohecker, 1997

Anidrytus batesi Strohecker 1997: 175; 337; Shockley et al. (2009b: 22)

Distribution: Brazil, Peru*. * NEW COUNTRY RECORD FOR PERU.

Examined material: Peru, Huanuco prov., Tingo María, 13-23.ii.2013, V. Hula & J. Niebodová leg. (1: NMPC).

Anidrytus ovatulus Gerstaecker, 1858

Anidrytus ovatulus Gerstaecker, 1858: 262; Strohecker (1997: 171); Shockley et al. (2009b: 23)

Distribution: Colombia, Venezuela, Guyana*. * NEW COUNTRY RECORD FOR GUYANA.

Examined material: Guyana, Landub (1: ZMUC).

Ephebus hirtulus Strohecker, 1975

Ephebus hirtulus Strohecker, 1975: 337; Shockley *et al.* (2009b: 24)

Distribution: Bolivia, Brazil, Paraguay*. * NEW COUNTRY RECORD FOR PARAGUAY.

Examined material: Paraguay, 1905, San Bernardino, leg. K. Fiebrig (3: ZMB).

Epopterus vacuus Gerstaecker, 1857

Epopterus vacuus Gerstaecker, 1857: 283; Strohecker (1997: 171); Shockley *et al.* (2009b: 27)

Distribution: Costa Rica*, Panama, French Guiana. * NEW COUNTRY RECORD FOR COSTA RICA.

Examined material: Est. Pitilla, 700m, 9km S Sta. Cecilia, P.N. Guanacaste, Prov. Guan., COSTA RICA, 19 May – 3 Jun 1993, C. Moraga. L-N-330200, 380200 / COSTA RICA INBIO CRI001 315379 (1: MNCR).

Subfamily Lycoperdininae Bromhead, 1838*Acinaces unicolor* Tomaszewska, 2003

Acinaces unicolor Tomaszewska, 2003: 527; Shockley *et al.* (2009b: 31)

Distribution: Brazil, Suriname, Peru*. * NEW COUNTRY RECORD FOR PERU.

Examined material: (Huanuco), Distrito de Yuyapichis, ACP Panguana, 230m, 9° 37' S / 74° 56' W, 24.ix – 13.x.2016, leg. Gottwald (1: MIZ, 1: CZUG).

CONCLUDING REMARKS

The material collected by the Bechyné over sixty years ago is an invaluable resource for understanding the fauna of handsome fungus beetles in El Salvador. There is now a first glimpse on the geographical distribution of eight species in the country. The species of Endomychidae and Anamorphidae have been collected primarily in areas near or in the central zone of the inner volcanic chain (San Salvador, Santa Tecla, Quezaltepeque), where most of Bechyné collections were biased (Fig. 10) (Van Roie *et al.* 2019). This has been the case for other specialists who sporadically visited the country (e.g. Howden and Peck 1972) and in general in El Salvador (e.g. Pablo-Cea *et al.* 2023). This circumstance is very likely due to their closeness to San Salvador, the capital of El Salvador (J. Pablo, personal observation). Additionally, some isolated records from the northern mountains (La Palma) and the coastal mountains (Cordillera de Jucuarán) are also registered. Unfortunately, the extension of the natural habitats where these species were collected by the Bechyné has suffered a very extreme reduction in the last century, an aspect that is particularly relevant in a country with high ecological disturbance, such as El Salvador. Previously to this list, most of the records of Endomychidae and Anamorphidae from El Salvador were at a country level. A common situation for records from the territory.

As it is evident from the expansion in the knowledge of the distribution of handsome fungus beetles from El Salvador and the Neotropical region reported in this work, there is a need of extensive field work and additional study of entomological specimens, as it is the case for almost all groups of Coleoptera in the Neotropics. There is a high probability of yet undescribed species of handsome fungus

beetles in El Salvador as the diversity of these families in whole Central America is poorly known for most genera. In the same manner, the family Eupsilobiidae Casey, not yet recorded from El Salvador, could be distributed there since an eupsilobiid species, *Evolocera championi* Sharp, has been reported from Honduras and Guatemala (Arriaga-Varela *et al.* 2021).

ACKNOWLEDGEMENTS

We are greatly indebted to the curators of the entomological collections holding the studied material. This contribution is part of the postdoctoral stay by EAV in Universidad de Guadalajara, supported by the program: Estancias Posdoctorales por México, CONAHCYT, México, 2023. Resources for the development of this work partly came from the grant No. 2020/36/C/NZ8/00584 to EAV by the National Science Centre of Poland (Narodowe Centrum Nauki). We are honoured to dedicate this work to Gabriela Castaño Meneses (UNAM) in appreciation for her dedication to the study of Mexican entomofauna and its ecology.

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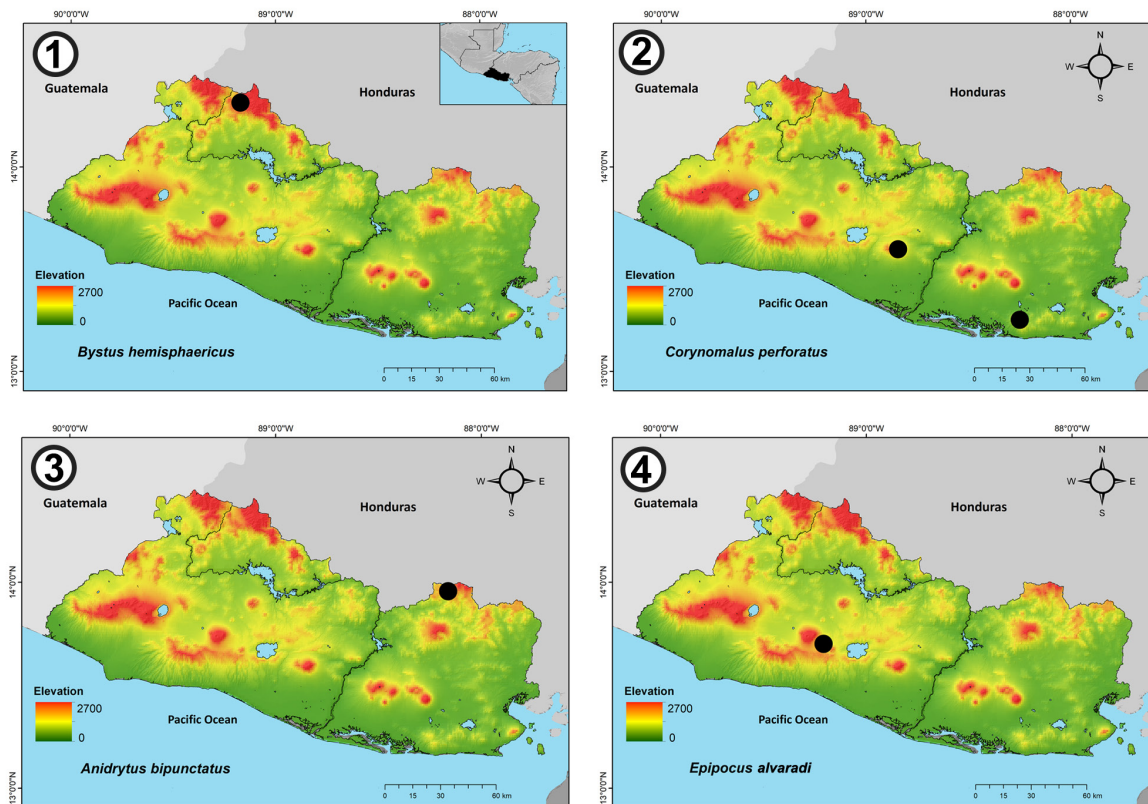
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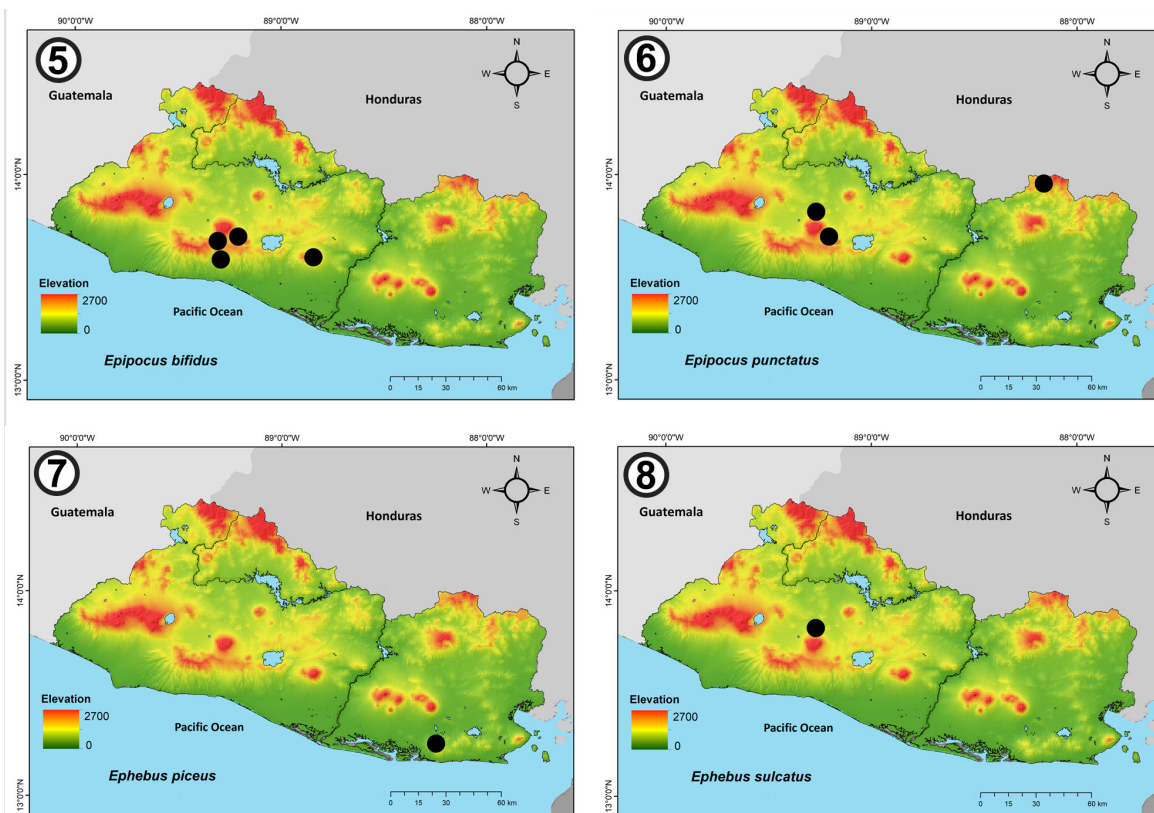
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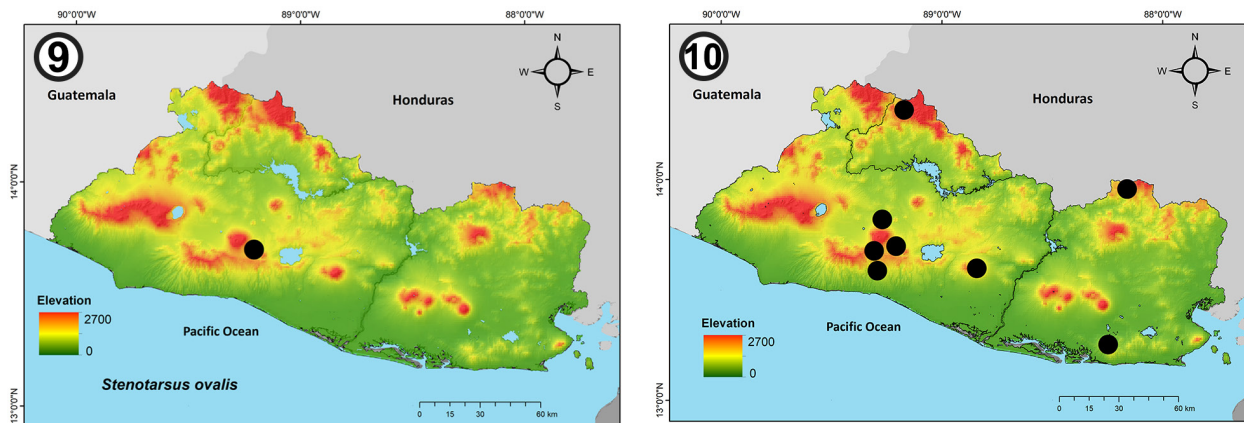
Aceptado: 5 de junio 2024



Figs. 1-4. Maps showing the distribution of species of Anamorphidae and Endomychidae in El Salvador. 1. *Bystus hemisphaericus* (Gerstaecker). 2. *Corynomalus perforatus* Gerstaecker. 3. : *Anidrytus guatemalae* Arrow. 4. *Epipocus alvaradi* Strohecker.



Figs. 5-8. Maps showing the distribution of species of Endomychidae in El Salvador. 5. *Epipocus bifidus* Gerstaecker. 6. *Epipocus punctatus* LeConte. 7. *Ephebus piceus* Gorham. 8. *Ephebus sulcatus* Strohecker.



Figs. 9-10. Maps showing the distribution of species of Anamorphidae and Endomychidae in El Salvador. 9. *Stenotarsus ovalis* Arrow. 10. Map showing known distribution of all Anamorphidae and Endomychidae in El Salvador.