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GEOGRAPHICAL DISTRIBUTION OF *APEPLOPODA MECRIDA* (DRUCE, 1889) (EREBIDAE: ARCTIINAE: ARCTIINI: EUCHROMIINA) WITH NOTES ABOUT ITS NATURAL HISTORY

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ABSTRACT. An analysis of curatorial information of *Apeplopora mecrida* (Druce, 1889) (Erebidae: Arctiinae: Arctiini: Euchromiina) from specimens collected between 1889 and 2010 and deposited at several collections is presented. The species is distributed along the heights of 1100 to 2300 m from Arizona (USA) to Punteras (Costa Rica). This makes the species particularly vulnerable to climatic changes. Even though specimens were not found while collecting during the month of March, the species flies throughout the entire year.

Additional key words: Biogeography, wasp moths, México, Guatemala, USA, Costa Rica, biological conservation

Wasp moths belong to the subtribes Ctenuchina and Euchromiina (Erebidae: Arctiinae: Arctiini) (Lafontaine & Fibiger 2006). They fly mainly at night, although there are some species that might fly during the day (Hernández-Baz & Bailey 2006). They are basically Neotropical, reaching their highest diversity in the Amazon forest and the oriental slopes of the South American Andes. Some taxa, however, are distributed in the Nearctic and the genus *Euchromia* Hübner is distributed in certain regions of Africa and Asia (Hernández-Baz & Grados 2004; Hernández-Baz & Bailey 2006)

The richness of these moths in the Americas is substantial. Out of 2482 described species, 2446 are Neotropical (Heppner 1991), whereas 36 are Nearctic (Lafontaine & Schmidt 2010). The last comprehensive taxonomic revision of the Euchromiina in the Americas was published almost 100 years ago (Draudt 1915). Revisions for the genera *Macrocne* Hübner (Dietz 1994), *Horama* Hübner, *Poliopastea* Hampson (Dietz & Duckworth 1976), *Sphecosoma* Butler (Simmons & Weller 2006), *Mallodeta* Butler and *Erruca* Walker (Pinheiro & Duarte 2010) have been done more recently. Mexico is considered a megadiverse country with several hotspots for biodiversity (Myers et al. 2000). However, little is known about the total richness of Lepidoptera in Mexico to date, with the exception of

the butterflies in the superfamilies Papilionoidea and Hesperioidea, and certain families of larger-bodied moths such as Sphingidae and Saturniidae.

The Mexican wasp moths (Ctenuchina and Euchromiina) contain 240 known species (Hernández-Baz 1992). One hundred and twenty eight of them are in 39 genera of Ctenuchina, whereas the remaining 112 species are within the 31 genera of Euchromiina (Hernández-Baz 2008, 2009, 2010, 2011a, b). Not much has been published about the life cycles, ecology, trophic relations, parasites, and geographic distribution of the Euchromiina. As far as we know, the genus *Apeplopora* (Watson 1980) contains two species found in Mexico: *A. mecrida* (Druce 1889) and *A. ochracea* (Felder 1894) (Hernández-Baz 1992), however nothing has been previously reported about the geographic distribution of the genus. Thus the main aim of this study is to present ecological and geographic information about *Apeplopora mecrida* (Druce, 1889) in the Americas.

MATERIAL AND METHODS

Our data is derived from four primary sources: a) specimens collected by the first author (FHB) and deposited in the code collection SEMARNAT/CITES/CP-0026-VER/05, Xalapa, Veracruz, Mexico; b) information obtained at two institutional collections:



FIG. 1. Male *Apeplopora mecrida* (Druce, 1889) specimen deposited at Semarnat / Cites/CP-0026-Ver/05 Collection, Mexico. Picture: F. Hernández-Baz.

ECOSUR's Entomological Collection, San Cristobal de las Casas' Unit (ECO-SC-E); Natural History Museum of Mexico City (MHNCM) and the private collection Lepidoptera Collection (SEMARNAT / CITES/CP-0026-VER/05) in Xalapa, Veracruz. (CPFHB), all from Mexico; c) information published in: Druce (1889), Hampson (1898), Dyar, (1907), Draudt (1915), Hernández-Baz (1992, 2009, 2011a,b) and CONABIO's research projects P-080 (Maza 1998); and d) the database "polilla" with information on *Euchromiina* collected and reported for the period of time covering the years 1854–2010. This database contains the most complete information on wasp moths from Mexico.

All records (data from bibliography and collections) were georeferenced using the Mexican National Institute of Statistics, Geography and Computer science catalogue of names and the 1:250000 topographic map of Mexico 1:250 (INEGI 2012). For USA and Guatemala data, we used information obtained in <http://www.googleearth.com>. The information taken from the "Polilla" database was converted into sexagesimal data for inclusion in a geographical information system for the Arc view 2.0 program (Esri, 1998).

RESULTS AND DISCUSSION

Localities of examined material. MEXICO: Chiapas: Ángel Albino Corzo, Reserva "El Triunfo", road to Mapastepec, 2180m, 19-xi-2001, A. Molina & Lind (ECO-SC-E); Ángel Albino Corzo, Reserva "El Triunfo", cerro "El Triunfo", 2050m, 18-xi-2001, A. Molina & Lind (ECO-SC-E); Ángel Albino Corzo, Reserva "El Triunfo", cerro "El Triunfo", 2050m, 18-xi-2001, J. León-C, A. Molina (ECO-SC-E). Distrito Federal: Mexico City, Chapultepec, 2302m (Hampson, 1898); Mexico City, Chapultepec, 2302m (Draudt, 1915); Coyoacán City, Ajusco, 2276m (Hernández-Baz 1992); Mexico City, 2302m, 9-x-1929; R. Mueller

(MHNCM); Mexico City; Ciudad Universitaria, 2299m, 23-i-1979, R. Turrent (Maza 1998); Mexico City, Pedregal, 2307M, 6-x-1939, R. Turrent (Maza 1998); Mexico City, Pedregal, 2307m, 18-iv-1980, R. Turrent (Maza 1998); Mexico City, Pedregal, 2307M, 2-viii-1979, R. Turrent (Maza 1998); Mexico City, San Ángel, 2300m, 9-vi-1929, R. Mueller (MHNCM); Mexico City, Chapultepec, 2302m (Druce 1889). Durango state: Victoria de Durango, 1891m (Druce 1889); Durango City, 1891m (Hampson 1898); Durango City, 1891m, (Draudt 1915); Durango City, 1891m (Hernández-Baz 1992). Mexico state: Valle de Bravo, 1820m, 25-vii-1992, R. Turrent (Maza, 1998); Valle de Bravo, 1820m 9-xii-1988, R. Turrent (Maza 1998); Valle de Bravo, 1853m, 24-vii-1985, R. Turrent (Donahue 1993); Valle de Bravo, 1820m, 21-8-1982, R. Turrent (Maza 1998). Hidalgo state: Tepeji del Río de Ocampo, 2150m, 1-ix-1981, R. Turrent (Maza 1998); Jacala de Ledezma, 1900m, 10-i-1966, L. D. Miller (Maza 1998); Zimapán, 5 miles N, 1780m, 12-i-1966, L.D. Miller (Maza 1998). Michoacán state: Contepec, Contepec, 2936m, 9-ix-1939, R. Mueller (MHNCM); Contepec, 2480m, 9-ix-1929, R. Mueller (MHNCM). Puebla state: Puebla City, 2 km de Cañada Morelos, 2271m, 20-vii-1976, E. Giesbert (Donahue 1993). Veracruz state: Orizaba (Dyar 1907). GUATEMALA: Quezaltenango, Cantel, 2200m, 23-vi-1987, E.C. Welling M. (LACM), Sacatepequez, Antigua Guatemala, Finca el Pilar, 1900m, 20.-ii-2005, ♀, 21-ii-2005, 1 ♀, F. Hernández-Baz, UV light, Light Trap (CPFHB). COSTA RICA: Punteras, Monteverde, 1400m, 22-23-v-1974, E. Giesbert (LACM). USA: Arizona: Cochise County, Douglas, 1220m, 7-x-1945, W.W. Jones, 1♀, (LACM); Cochise County, Douglas, 1220m, 4-v-1986, 1 ♂ UV, Light (LACM).

Distribution. *Apeplopora mecrida* (*Euchromiina*) (Figure 1) is a species barely mentioned in the specialized literature. It was described by Druce (1889) based on specimens collected in Mexico City, its type locality. Hampson (1898) also mentions it from Durango State. Dyar (1907) extended its distribution to the Orizaba region, in Veracruz State of Veracruz. Draudt (1915) and Hernández-Baz (1992) corroborate Hampson's localities (1898), but included detailed information about the flying season. Hernández-Baz (2009, 2011b) also increases information on its distribution by including the mountainous regions of the State of México, and other locations in Chiapas State. Hernández-Baz & Bailey (2008) collected specimens in the highest regions of Sacatepequez Department, Guatemala. Donahue (1993) reports it from Cochise, Arizona, USA, but also from Quezaltenango, Guatemala, and Punteras Province, Costa Rica (Figure 2).

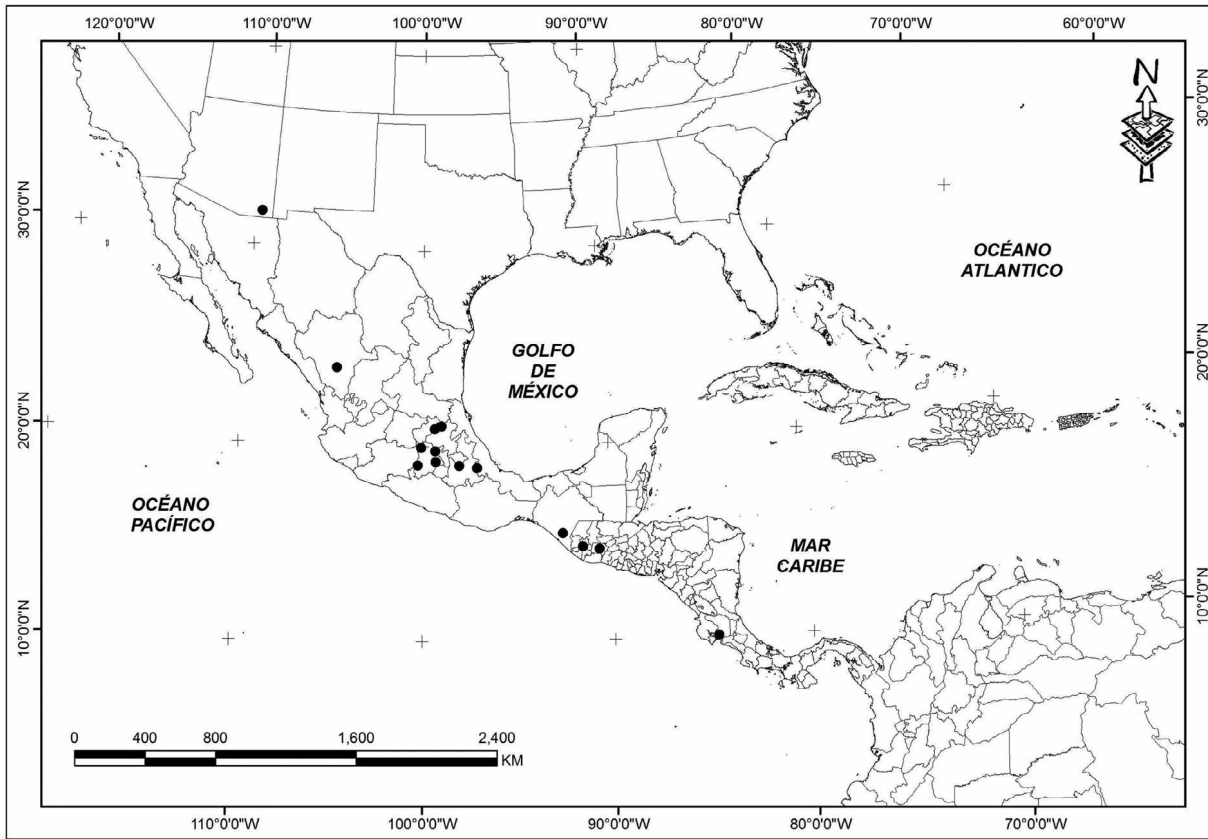


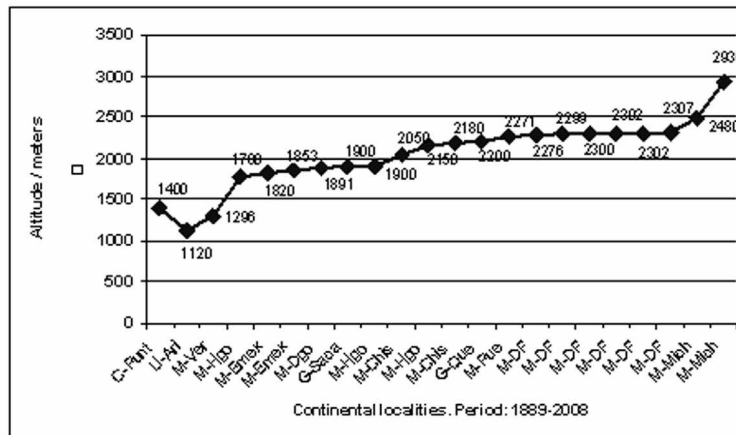
FIG. 2. Distribution of *Apeplopoda mecirida*, in the Americas, from data base “Polilla”, of the Lepidoptera Collection: Semarnat / Cites/CP-0026-Ver/05, Mexico.

Thirty-two records from 17 locations were found for the Americas. From Mexico, we found information for eight states: Chiapas, with three records and one location; Distrito Federal: 10 records, four locations; Durango: four records, one location; Mexico State: four records, one location; Hidalgo: three records, three locations; Michoacán: two records, one location; Puebla: one record, one location; Veracruz: one record, one location; Guatemala: two records, two locations. From Costa Rica and the US we found one record and one location in each country.

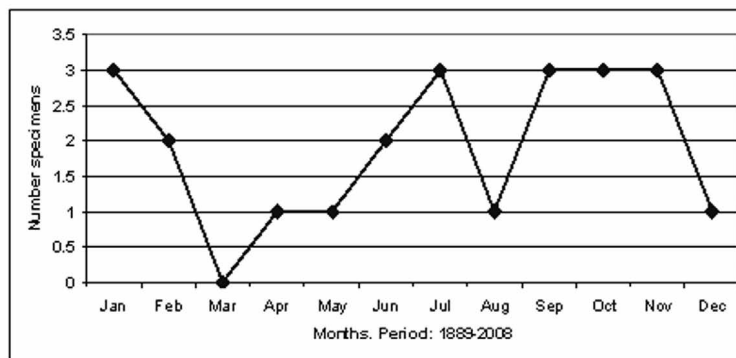
It appears that the ecological niche of *A. mecirida* resides within the mountainous range of the central region of Mexico. This large expanse generated a total of 27 specimens (or 84.4% of total number of specimens) from 12 locations (70.6%). Some records extend the distribution from Mexico up to Arizona, in the Cochise County area at 1120 m (Donahue 1993). We can also appreciate the presence of the species on the corridor that is occupied by the highlands above 1100m of the western Sierra Madre going south down to Guatemala. Hernández-Baz & Bailey (2006) reported that this species flies along the Sierra Madre through Chiapas,

which is an altitudinal corridor connecting the Mexican highlands with Central America (Halffter 1964, 1987). Thus, the species enters Guatemala and moves along the Sierra of the Chucumanes. The Sierra Madre, along the Pacific forms the Meseta Central with two branches: the Sierra Chuacús and the Sierra Merendón, where we can find two collecting localities of the species: Quetzaltenango (2200m) (Donahue 1993) and Sacatepequez (1900m) (Hernández-Baz et al. 2008). On the other side, the Sierra of the Chucumanes becomes the Sierra Chamá, crossing Guatemala through the East and becoming a corridor for wasp moths crossing Central America and entering South America.

We also consulted other important Latin-american insect collections in case there was the possibility of finding specimens collected south of their known distribution. The first of those collections was Museo de Zoología Agrícola, campus Maracay, Universidad Central de Venezuela, in Venezuela; the second were the insect collections of Universidad Nacional de Colombia; one at Instituto de Ciencias Naturales, Facultad de Agronomía, in Bogotá, and the other at Facultad de Agronomía, Medellín. The entomological



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FIGS. 3–4. (3) Altitudinal distribution of *Apeplopora mecrida* in the Americas. C-Punt (Costa Rica, Punteras); U-Ari (USA, Arizona); M-Ver (México, Veracruz); M-Hgo (Mexico, Hidalgo); M-Emex (Mexico, Mexico State); M-Dgo (México, Durango); G-Sac (Guatemala, Sacatepequez); M-Chis (Mexico, Chiapas); G-Que (Guatemala, Quezaltenango); M-Pue (Mexico, Puebla); M-DF (Mexico, Distrito Federal); M-Mich (Mexico, Michoacán). Period of time: 1889–2008. Source: Data Base “Polilla.” (4) Flight period of *Apeplopora mecrida* in the Americas. Period of time: 1889–2008. Source: Data Base “Polilla.”

collection of Instituto de Biología, of Universidad de Antioquia, campus Medellín, was also reviewed. We did not find records of *A. mecrida* in any of them. In this study, the distribution ranges of *A. mecrida* were found to be between 1120 and 2936m (Fig. 3), with the highest range from 2200 to 2936m found only in the Mexican mountains.

Biology and Behavior. Not much is known about the biology of *A. mecrida*. Its flight time seems to be highly variable. It was collected at 07:30 hrs in Arizona (USA), but the information provided for specimens collected in Hidalgo, Mexico was obtained from butterfly collectors. Thus, we assumed the moths fly during the day. However, Hernández et al. (2008) reports two specimens in Sacatepequez, Guatemala that were collected using ultraviolet light from 22:00 to 00:00

hrs. There are reports of several specimens which were seen at 03:00 hrs (CPFHB). Specimens had been collected with ultraviolet light from 20:30 to 23:30 hrs in the Ocote Reserve in Chiapas (ECO-SC-E). The collected information apparently indicates that the species could fly from 22:00 to 07:00 hrs.

As mentioned above *A. mecrida* flies all year round. The population density of the species is very low during the year with the highest records during the months of January, July and from September to November. These findings seem to indicate that the species is multivoltine (Fig. 4). *Apeplopora mecrida* is distributed in USA, Mexico and Guatemala in areas where the type of vegetation includes oaks, pines and other conifers; however, in Costa Rica, the species is found within higher elevational cloud forest.

Final remarks. The mountainous ranges of Mexico play a relevant function as a biological corridor for many North and South American species (Halffter 1964, 1987). This passageway seems to be especially important for *A. mecrida* which flies above 1100 m. This indicates that a higher elevation is one of the main components that will favor or limit the distribution of this wasp moth.

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