

DNA Barcoding of the parasitoid wasp subfamily Doryctinae (Hymenoptera: Braconidae) from Chamela, Mexico

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Academic editor: Jose Fernandez-Triana

Abstract

Background and aims. The Doryctinae is a considerably diverse, poorly studied group of parasitoid wasps and one of the most diverse subfamilies within Braconidae. Taxonomic knowledge of this group remains highly incomplete, specially in the tropics. In Mexico, it has been reported as the subfamily with the highest number of recorded genera. A preliminary Barcoding study carried out in the Chamela region, located near the Mexican pacific coast in Jalisco, identified 185 barcoding species of Doryctinae assigned to 19 identified doryctine genera. This work updates the later study, representing a three years effort to assess the species richness of this subfamily for the Chamela region.

Materials and methods. Ten collecting field trips of 5 to 10 days each were carried out from June 2009 to May 2011. A 2% divergence criterion using the BIN system implemented in BOLD was followed in order to establish species boundaries among the specimens that were collected.

Results and conclusions. A total of 961 specimens were collected, from which 883 COI sequences were obtained. The sequences generated corresponded to 289 barcoding species and 30 identified genera. The most speciose genera were *Heterospilus* Haliday (170 spp.), *Ecphylus* Förster (19 spp.), *Allorhogas* Gahan (15 spp.) and *Callihormius* Ashmead (14 spp.). Addition of previously collected material increased the diversity of the subfamily in the region to 34 genera and 290 species. Paraphyly of *Heterospilus* with respect to *Neoheterospilus* and *Heterospathius* was again recovered. Twenty new species and two new genera (*Sabinita* Belokobylskij, Zaldívar-Riverón et Martínez, *Ficobolus* Martínez, Belokobylskij et Zaldívar-Riverón) have been described so far from the material collected in this work.

Keywords

Ichneumonoidea, species richness, Neotropics, faunistic study, COI

Introduction

Biodiversity inventories represent an integral component for the adequate management of natural resources of any country. In the case of faunistic studies, however, these rarely include arthropod taxa due to their considerably high diversity and scarce taxonomic knowledge. In this context, DNA Barcoding (Hebert et al. 2003a) represents a fast, valuable approach to built species inventories of highly diverse, poorly known invertebrate groups.

With over 1,300 described and almost 3,000 estimated species, Doryctinae is one the four most diverse subfamilies of braconid parasitoid wasps together with the Braconinae, Microgastrinae and Opiinae (Jones et al. 2009, Yu et al. 2012). Doryctine wasps are mainly known to be idiobiont ectoparasitoids of xylophagous and bark boring coleopteran larvae, though other host groups (e.g. Lepidoptera, Diptera, Hymenoptera) and biologies (e.g. phytophagy, endoparasitoidism) have also been reported (Belokobylskij 1992, Belokobylskij et al. 2004). Several doryctine species are known to be parasitoids of insect pests (LaSalle and Gauld 1993), therefore they play an important role for maintaining the balance of terrestrial ecosystems (Hawkins and Hochberg 1994).

The taxonomic knowledge of the Doryctinae is still far from complete, especially in the tropics and subtropics, where most of its species richness is known to occur (Belokobylskij 1992). In the Mexican territory, this was recently reported as the subfamily with the highest number of recorded genera (63 genera; Coronado-Blanco and Zaldívar-Riverón 2014). However, this number contrasts with its scarce number of described species that have been reported for the country. Recently, Zaldívar-Riverón et al. (2010) showed the preliminary results of a DNA Barcoding survey of the Doryctinae from Chamela Biological Station (CBS) in Mexico, which located near the Pacific coast in the state of Jalisco and is mainly composed of tropical dry forest (Noguera et al. 2002). Zaldívar-Riverón et al. (2010) not only revealed an extraordinary, mostly undescribed species richness for this group (185 Barcoding and 20 recognized genera), but also showed some previously undetected taxonomic problems.

Here we show the final list of the DNA Barcoding species inventory of the Doryctinae from the CBS, which was carried out during three years of collecting effort. We updated the list of genera that occur in the region and show their number of DNA Barcoding species based on the barcoding index criterion (BIN; Ratnasingham and Hebert 2013). This faunistic study highlights the extraordinary, neglected species richness of this parasitoid group in the Mexican territory, and is also serving as a basis for the subsequent description of several new taxa.

Materials and methods

Study area

Specimens belonging to the subfamily Doryctinae were collected in the Chamela biological station (Fig. 1), owned by the Instituto de Biología, Universidad Nacional Autónoma de México (UNAM). This station is located within the Chamela–Cuixmala Biosphere Reserve (CCBR), near the Pacific coast in the state of Jalisco (19°29' N, 105° 02' W). The prevailing climate in the area is tropical sub-humid (mean annual temperature 24.6 °C, annual precipitation 788 mm; García 1988). There is a strong seasonality in the region, with alternating rainy (Jul- Oct) and dry (Nov-Jun) seasons. Altitude ranges from 0 to 500 meters above sea level. The dominant type of vegetation is tropical dry forest, which is characteristic of the Mexican Pacific coast, though patches of tropical evergreen forest, coastal dune, xeric shrubland and mangrove are also present (Rzedowski 1978, Noguera et al. 2002). The relevance of this area lies in the variety of habitats it supports, as well as in its high endemic component of plants, vertebrates and insects (Noguera et al. 2002).

Specimen sampling

A total of 10 collecting trips of 5 to 10 days each were carried out from June 2009 to May 2011. Collects were performed both during the rainy and dry seasons in order to have a complete representation of the examined group through the year. Specimens were collected in 24 sites within the CBS boundaries (Table 1), using for this: 1) malaise traps, 2) light traps, 3) yellow pan traps, as well as 5) sweep nets for at least 4 h per day (Marshall 1994). The collected materials were preserved in 96% ethanol and kept at -20 °C. All specimens were sorted out at subfamily level following the taxonomic key of New World genera of Braconidae (Wharton et al. 1997). Doryctine specimens were then identified to genus level using the relevant literature (Marsh 1997, Marsh 2002) and subsequent descriptions of genera (e.g. Zaldívar-Riverón et al. 2014).

DNA sequencing

DNA samples were obtained from a single hind leg and sent for DNA extraction and amplification to the Canadian Center for DNA Barcoding at University of Guelph, Ontario (see detailed laboratory protocols in Smith et al. 2008). A 615–658 bp fragment corresponding to the standard animal DNA barcoding locus (cytochrome c oxidase subunit I mtDNA gene, COI) was amplified for the collected samples using both LepF1/LepRI (Hebert et al. 2003b) and LCO1490/HCO2198 (Folmer et al. 1994) primers. Sequences were edited with Sequencher 4.0.5 (Gene Codes Corp.) and aligned manually based on their translated amino acids. All of the COI sequences generated are deposited in GenBank (accession numbers GU715182-288, HM420734-5, HM434309-544, HM882254, HQ200960-201008, HQ201239-54). All sequences and

their specimen information are available in the project file “Parasitoid Wasps (Braconidae: Doryctinae) of Chamela–Cuixmala Biosphere Reserve” (ASDORproject) in the projects section of the Barcode of Life Data Systems (www.barcodinglife.com)

Species boundaries

Species boundaries were established following a 2% divergence criterion (Hebert et al. 2003a). This criterion has been shown to represent a fast, generally reliable tool for exploring species richness in different animal taxa (Ratnasingham and Hebert 2013). This established genetic distance is based on the assumption that COI divergences usually do not exceed a 2% divergence within a recognized species, whereas different species generally show a higher divergence (Hebert et al. 2003a). Sequences divergence of the sequenced specimens were obtained using the K2P distance model (Kimura 1980). A neighbourjoining (NJ) tree and an accumulation curve were reconstructed as implemented in the BOLD system (Barcode of Life Data System, www.boldsystems.org). BINs were obtained for each specimen from the BOLD system, and this was employed to establish the number of barcoding species.

Data resources

ASDOR Project link

Search as: ASDOR

http://www.boldsystems.org/index.php/Public_BINSearch?searchtype=records

GeneBank link

Search as: Nucleotide + accession number

<http://www.ncbi.nlm.nih.gov/genbank/>

Checklist of described doryctine species from the Chamela Biological Station

Allorhogas coccolobae Martínez and Zaldivar-Riverón 2013

- http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S1870-34532013000100008

Materials

Paratypes:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Allorhogas*; specificEpithet: *coccolobae*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation;

- decimalLatitude: 19.499; decimalLongitude: -105.042; eventDate: 02-20-10; sex: female; catalogNumber: ASDOR472-10; recordedBy: Zaldívar, Zaragoza, Ibarra; occurrenceID: 08D2529E-FEFE-5E59-AB6E-7DED3B6E1192
- b. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Allorhogas; specificEpithet: coccolobae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.5; decimalLongitude: -105.039; eventDate: 02-21-10; sex: female; catalogNumber: ASDOR517-10; recordedBy: Zaldívar; occurrenceID: C666D658-BF9E-5B5F-9547-BC7552DB3A04
- c. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Allorhogas; specificEpithet: coccolobae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.5; decimalLongitude: -105.039; eventDate: 02-21-10; sex: female; catalogNumber: ASDOR518-10; recordedBy: Zaldívar; occurrenceID: A28F86B2-C4A0-549A-8072-82BCC52614D5
- d. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Allorhogas; specificEpithet: coccolobae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.5; decimalLongitude: -105.039; eventDate: 02-21-10; sex: female; catalogNumber: ASDOR519-10; recordedBy: Zaldívar; occurrenceID: A63D1355-0203-5AE7-AFFD-692B9984FBBD
- e. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Allorhogas; specificEpithet: coccolobae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.504; decimalLongitude: -105.035; eventDate: 03-28-10; sex: male; catalogNumber: ASDOR764-10; recordedBy: Zaldívar, Salinas, Ramos; occurrenceID: B7EE90A6-924E-52D9-9B9A-5ED2C30EF151

Holotype:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Allorhogas; specificEpithet: coccolobae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.044; eventDate: 05-05-11; sex: female; catalogNumber: CNIN777; recordedBy: Zaldívar, Zaragoza, Ibarra; occurrenceID: 25B70860-98EA-5B98-9B99-C263CAE72B8E

Distribution: Chamela, Jalisco, Mexico

Notes: n.sp. described from specimens collected in this study (Martínez and Zaldívar-Riverón 2013)

***Allorhogas crassifemur* Martínez and Zaldívar-Riverón 2014**

- http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S1870-34532013000100008

Materials

Paratype:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Allorhogas; specificEpithet: crassifemur; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation;

decimalLatitude: 19.498; decimalLongitude: -105.044; eventDate: 06-24-09; sex: male; catalogNumber: ASDOR042-09; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: ACED7767-6A60-5DFE-8C59-51318193A787

Holotype:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Allorhogas; specificEpithet: crassifemur; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.498; decimalLongitude: -105.044; eventDate: 06-23-09; sex: female; catalogNumber: ASDOR043-09; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: 5E413F08-EF52-5323-BE35-C1816E6A6635

Distribution: Chamela, Jalisco, Mexico

Notes: n.sp. described from specimens collected in this study (Martínez and Zaldívar-Riverón 2013)

***Allorhogas jaliscoensis* Martínez and Zaldívar-Riverón 2013**

- http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S1870-34532013000100008

Materials

Paratypes:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Allorhogas; specificEpithet: jaliscoensis; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.498; decimalLongitude: -105.044; eventDate: 09-24-09; sex: female; catalogNumber: ASDOR081-09; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: 45723D5C-5313-584B-A186-D8141314EE9B
- b. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Allorhogas; specificEpithet: jaliscoensis; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.505; decimalLongitude: -105.038; eventDate: 09-03-09; sex: female; catalogNumber: ASDOR350-10; recordedBy: Zaldívar; occurrenceID: 38F6396C-8C56-5541-A449-3507D5AFDA12
- c. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Allorhogas; specificEpithet: jaliscoensis; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.504; decimalLongitude: -105.038; eventDate: 11-20-09; sex: female; catalogNumber: ASDOR456-10; recordedBy: Zaldívar; occurrenceID: 7F037AF6-049F-5052-AF05-97BB914482DF

Holotype:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Allorhogas; specificEpithet: jaliscoensis; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.504; decimalLongitude: -105.038; eventDate: 11-20-09; sex: female; catalogNumber: ASDOR457-10; recordedBy: Zaldívar; occurrenceID: 7A6B39CB-D60B-57AF-966A-E7838C1E4855

Distribution: Chamela, Jalisco, Mexico

Notes: n.sp. described from specimens collected in this study (Martínez and Zaldívar-Riverón 2013)

***Allorhogas marshi* Martínez and Zaldívar-Riverón 2013**

- http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S1870-34532013000100008

Materials

Paratypes:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Allorhogas*; specificEpithet: *marshi*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.042; eventDate: 02-25-10; sex: female; catalogNumber: ASDOR758-10; recordedBy: Zaldívar; occurrenceID: 0C33FC64-E74B-500A-8E03-C81AAC8994A2
- b. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Allorhogas*; specificEpithet: *marshi*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.042; eventDate: 02-25-10; sex: female; catalogNumber: ASDOR759-10; recordedBy: Zaldívar; occurrenceID: DD082630-178E-52B2-917D-63F2572C2709
- c. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Allorhogas*; specificEpithet: *marshi*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.042; eventDate: 02-25-10; sex: female; catalogNumber: ASDOR760-10; recordedBy: Zaldívar; occurrenceID: C13D619B-2079-5D39-A659-1B8A1D349B60
- d. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Allorhogas*; specificEpithet: *marshi*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.496; decimalLongitude: -105.039; eventDate: 03-28-10; sex: female; catalogNumber: ASDOR762-10; recordedBy: Zaldívar, Salinas, Ramos; occurrenceID: 0E835BF1-D1C4-5AB4-B43E-95F851AC432C
- e. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Allorhogas*; specificEpithet: *marshi*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.496; decimalLongitude: -105.039; eventDate: 03-28-10; sex: female; catalogNumber: ASDOR763-10; recordedBy: Zaldívar, Salinas, Ramos; occurrenceID: 0C29FD79-7A51-52CA-9AD0-A3FCB62F8BFB
- f. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Allorhogas*; specificEpithet: *marshi*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.042; eventDate: 02-25-10; sex: female; catalogNumber: ASDOR776-10; recordedBy: Zaldívar; occurrenceID: 3B8762F2-ACB7-50B1-803F-EA9B3901282E

Holotype:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Allorhogas; specificEpithet: marshi; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.042; eventDate: 02-25-10; sex: female; catalogNumber: ASDOR777-10; recordedBy: Zaldívar; occurrenceID: 155D132F-E0F6-5D37-B8C0-178A0EFE92A9

Distribution: Chamela, Jalisco, Mexico

Notes: n.sp. described from specimens collected in this study (Martínez and Zaldívar-Riverón 2013)

***Allorhogas parvus* Martínez and Zaldívar-Riverón 2013**

- http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S1870-34532013000100008

Materials

Paratypes:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Allorhogas; specificEpithet: parvus; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.038; eventDate: 11-21-09; sex: female; catalogNumber: ASDOR458-10; recordedBy: Zaldívar; occurrenceID: 62896749-2D02-5805-947B-002BC952FFE1
- b. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Allorhogas; specificEpithet: parvus; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.042; eventDate: 02-20-10; sex: female; catalogNumber: ASDOR470-10; recordedBy: Zaldívar; occurrenceID: 3B8FF65E-0F63-5FF0-A5E0-510DB20B3CE9

Holotype:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Allorhogas; specificEpithet: parvus; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.042; eventDate: 02-25-10; sex: female; catalogNumber: ASDOR778-10; recordedBy: Zaldívar, Salinas, Ramos; occurrenceID: 494021F7-A209-5AB0-A5D9-DF2776F60D1F

Distribution: Chamela, Jalisco, Mexico

Notes: n.sp. described from specimens collected in this study (Martínez and Zaldívar-Riverón 2013)

***Allorhogas scotti* Martínez and Zaldívar-Riverón 2013**

- http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S1870-34532013000100008

Materials

Paratypes:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Allorhogas; specificEpithet: scotti; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.429; decimalLongitude: -104.98; eventDate: 09-05-09; sex: female; catalogNumber: ASDOR321-10; recordedBy: Clebsch, Zaldívar; occurrenceID: E6BA9408-FD36-5614-B23B-1A145914821D
- b. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Allorhogas; specificEpithet: scotti; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.042; eventDate: 02-20-10; sex: female; catalogNumber: ASDOR488-10; recordedBy: Zaldívar; occurrenceID: 0079957C-B460-51DA-ACEB-6C9E4FD915B3
- c. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Allorhogas; specificEpithet: scotti; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.505; decimalLongitude: -105.038; eventDate: 02-23-10; sex: female; catalogNumber: ASDOR607-10; recordedBy: Zaldívar; occurrenceID: EC13B373-A781-5AA2-A867-8B0BD7C542F8
- d. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Allorhogas; specificEpithet: scotti; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.496; decimalLongitude: -105.039; eventDate: 03-28-10; sex: female; catalogNumber: ASDOR745-10; recordedBy: Zaldívar, Salinas, Ramos; occurrenceID: E3EDC7D0-BF09-5221-A13A-19B6491AC203
- e. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Allorhogas; specificEpithet: scotti; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.504; decimalLongitude: -105.035; eventDate: 03-28-10; sex: male; catalogNumber: ASDOR768-10; recordedBy: Zaldívar, Salinas, Ramos; occurrenceID: 0F1A8AF1-76A1-51D2-8C41-CDF37677C8E4

Holotype:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Allorhogas; specificEpithet: scotti; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.504; decimalLongitude: -105.035; eventDate: 03-28-10; sex: female; catalogNumber: ASDOR767-10; recordedBy: Zaldívar, Salinas, Ramos; occurrenceID: F2DE87E2-A16C-5356-ACE7-9F566FB39DB4

Distribution: Chamela, Jalisco, Mexico

Notes: n.sp. described from specimens collected in this study (Martínez and Zaldívar-Riverón 2013)

***Ficobolus jaliscoi* Zaldivar-Riverón and Belokobylskij 2014**

- <http://onlinelibrary.wiley.com/doi/10.1111/syen.12078/abstract;jsessionid=0441E95BA6DBC93BF1257DF4E1A3B0D.f03t03?deniedAccessCustomisedMessage=&userIsAuthenticated=false>

Materials

Paratype:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Ficobolus*; specificEpithet: *jaliscoi*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.038; eventDate: 06-25-09; sex: female; catalogNumber: ASDOR446-10; recordedBy: Clebsch, Zaldivar, Polaszek; occurrenceID: F63F9DE2-CC5A-5403-A8AA-216AB3A0EC18

Holotype:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Ficobolus*; specificEpithet: *jaliscoi*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.038; eventDate: 06-25-09; sex: female; catalogNumber: ASDOR447-10; recordedBy: Clebsch, Zaldivar, Polaszek; occurrenceID: 9CFB5764-C5F4-5A04-BE63-5CAF83A347E0

Distribution: Chamela, Jalisco, Mexico

Notes: n.sp. described from specimens collected in this study (Zaldivar-Riverón et al. 2014)

***Heerz ecmahla* Martínez, Zaldivar-Riverón, Ceccarelli and Shaw 2012**

- <http://zookeys.pensoft.net/articles.php?id=2399>

Materials

Paratype:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Heerz*; specificEpithet: *ecmahla*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.498; decimalLongitude: -105.044; eventDate: 06-24-09; sex: female; catalogNumber: ASDOR075-09; recordedBy: Clebsch, Zaldivar, Polaszek; occurrenceID: 11B85EB3-04DD-5559-9574-B89CAA891259

Holotype:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Heerz*; specificEpithet: *ecmahla*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.498; decimalLongitude: -105.044; eventDate: 06-24-09; sex: female; catalogNumber: ASDOR076-09; recordedBy: Clebsch, Zaldivar, Polaszek; occurrenceID: 4B543DEF-298E-5837-9CE5-B451CA6207DC

Distribution: Chamela, Jalisco, Mexico

Notes: n.sp. described from specimens collected in this study (Zaldivar-Riveron et al. 2012)

***Heerz macrophthalma* Martínez, Zaldívar-Riverón, Ceccarelli and Shaw 2013**

- <http://zookeys.pensoft.net/articles.php?id=2400>

Materials

Paratypes:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Heerz; specificEpithet: macrophthalma; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.044; eventDate: 02-02-11; sex: male; catalogNumber: ASDOR551-10; recordedBy: Zaldívar; occurrenceID: 3F1DC6CA-BAD5-5E63-B8B9-93E66930D513
- b. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Heerz; specificEpithet: macrophthalma; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.044; eventDate: 02-02-11; sex: male; catalogNumber: ASDOR555-10; recordedBy: Zaldívar; occurrenceID: CCE2D501-738A-55EB-8670-4304AF3BEDDF
- c. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Heerz; specificEpithet: macrophthalma; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.042; eventDate: 02-25-10; sex: female; catalogNumber: ASDOR761-10; recordedBy: Zaldívar; occurrenceID: 61213CF3-4C85-5689-8EB9-F4BBB06DB0EE

Holotype:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Heerz; specificEpithet: macrophthalma; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.044; eventDate: 05-05-11; sex: female; catalogNumber: CNIN795; recordedBy: Zaldívar, Zaragoza, Ibarra; occurrenceID: 1F7E077C-E583-5B24-9493-75B17285355E

Distribution: Chamela, Jalisco, Mexico

Notes: n.sp. described from specimens collected in this study (Zaldivar-Riveron et al. 2012)

***lare belokobylskiji* Marsh 2002**

- <http://ejournal.narotama.ac.id/files/The%20genus%20lare%20Barbalho%20and%20Penteado->

Materials

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Iare*; specificEpithet: *belokobylskijii*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.498; decimalLongitude: -105.044; eventDate: 06-24-09; sex: female; catalogNumber: ASDOR022-09; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: 3C9A122F-8D90-53AA-8216-770873B17661
- b. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Iare*; specificEpithet: *belokobylskijii*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.498; decimalLongitude: -105.044; eventDate: 06-24-09; sex: female; catalogNumber: ASDOR023-09; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: DAA1BCEC-8B5A-5C40-9424-44082B716115
- c. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Iare*; specificEpithet: *belokobylskijii*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.498; decimalLongitude: -105.044; eventDate: 06-24-09; sex: female; catalogNumber: ASDOR025-09; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: 94152591-E1AF-5C69-81DC-21FE04170605
- d. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Iare*; specificEpithet: *belokobylskijii*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.498; decimalLongitude: -105.044; eventDate: 06-24-09; sex: male; catalogNumber: ASDOR026-09; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: 7275D7BE-53F8-5166-8464-4FCC2945370B
- e. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Iare*; specificEpithet: *belokobylskijii*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.498; decimalLongitude: -105.044; eventDate: 06-24-09; sex: female; catalogNumber: ASDOR029-09; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: 09465B7D-AE25-5BC6-B726-21FCDEC13755
- f. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Iare*; specificEpithet: *belokobylskijii*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.498; decimalLongitude: -105.044; eventDate: 06-24-09; sex: female; catalogNumber: ASDOR031-09; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: D97CEE78-F9DA-5D19-80CA-352267B31620
- g. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Iare*; specificEpithet: *belokobylskijii*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.498; decimalLongitude: -105.044; eventDate: 06-24-09; sex: male; catalogNumber: ASDOR035-09; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: 41E70DBB-C9C7-50E4-A2EB-B2972476B279

Distribution: Mexico and Costa Rica

Iare cheguevarai Martínez, Zaldívar-Riverón, Ceccarelli and Shaw 2010

- [http://ejournal.narotama.ac.id/files/The%20genus%20Iare%20Barbalho%20and%20Pentead-Dias%20\(Hymenoptera%20Braconidae%20Doryctinae\)%20in%20Mexico.%20with%20the%20description%20of%20two%20new%20species.pdf](http://ejournal.narotama.ac.id/files/The%20genus%20Iare%20Barbalho%20and%20Pentead-Dias%20(Hymenoptera%20Braconidae%20Doryctinae)%20in%20Mexico.%20with%20the%20description%20of%20two%20new%20species.pdf)

Materials

Paratypes:

- kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Iare*; specificEpithet: *cheguevarai*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.498; decimalLongitude: -105.044; eventDate: 06-24-09; sex: male; catalogNumber: ASDOR020-09; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: 926EE524-5700-51BB-BCDA-75297F123F62
- kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Iare*; specificEpithet: *cheguevarai*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.498; decimalLongitude: -105.044; eventDate: 06-24-09; sex: male; catalogNumber: ASDOR021-09; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: ECC2FD46-5600-523F-AC82-D2DF22E709E8
- kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Iare*; specificEpithet: *cheguevarai*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.498; decimalLongitude: -105.044; eventDate: 06-24-09; sex: female; catalogNumber: ASDOR027-09; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: A4486307-9079-558D-9742-1612554BD18D
- kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Iare*; specificEpithet: *cheguevarai*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.498; decimalLongitude: -105.044; eventDate: 06-24-09; sex: male; catalogNumber: ASDOR096-09; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: 272F1B1F-9A2B-50BF-B349-023CD3025C5A

Holotype:

- kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Iare*; specificEpithet: *cheguevarai*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.498; decimalLongitude: -105.044; eventDate: 06-24-09; sex: female; catalogNumber: ASDOR028-09; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: F8BE73D9-80F9-5D6A-AE2A-B0AEF4B4DA8C

Distribution: Chamela, Jalisco, Mexico

Notes: n.sp. described from specimens collected in this study (Martínez et al. 2010)

lare mexicanus Martínez, Zaldívar-Riverón, Ceccarelli and Shaw 2011

- [http://ejournal.narotama.ac.id/files/The%20genus%20lare%20Barbalho%20and%20Pentead-Dias%20\(Hymenoptera%20Braconidae%20Doryctinae\)%20in%20Mexico.%20with%20the%20description%20of%20two%20new%20species.pdf](http://ejournal.narotama.ac.id/files/The%20genus%20lare%20Barbalho%20and%20Pentead-Dias%20(Hymenoptera%20Braconidae%20Doryctinae)%20in%20Mexico.%20with%20the%20description%20of%20two%20new%20species.pdf)

Materials

Paratype:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *lare*; specificEpithet: *mexicanus*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.498; decimalLongitude: -105.044; eventDate: 06-24-09; sex: female; catalogNumber: ASDOR030-09; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: 8490807A-716D-5E5F-866F-7B1488CE18E3

Holotype:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *lare*; specificEpithet: *mexicanus*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.498; decimalLongitude: -105.044; eventDate: 06-24-09; sex: female; catalogNumber: ASDOR033-09; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: FDA58B8E-50E1-5106-9733-7B2E8D44248A

Distribution: Chamela, Jalisco, Mexico

Notes: n.sp. described from specimens collected in this study (Martínez et al. 2010)

Lissopsius jaliscoensis Zaldívar-Riverón, Martínez, Ceccarelli and Shaw 2012

- <http://zookeys.pensoft.net/articles.php?id=2399>

Materials

Paratypes:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Lissopsius*; specificEpithet: *jaliscoensis*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.044; eventDate: 06-24-09; sex: female; catalogNumber: CNIN741; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: 5BE06E50-C320-541A-8971-596FDF65507C
- b. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Lissopsius*; specificEpithet: *jaliscoensis*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.044; eventDate: 06-24-09; sex: female; catalogNumber: CNIN798; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: 2F5EF025-3AFA-5023-980F-8B58FE5ED678

- c. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Lissopsius; specificEpithet: jaliscoensis; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.044; eventDate: 06-24-09; sex: female; catalogNumber: CNIN799; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: C34F8D7F-1686-523F-9266-5853A6570A38
- d. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Lissopsius; specificEpithet: jaliscoensis; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.044; eventDate: 06-24-09; sex: male; catalogNumber: CNIN800; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: 9EEDCC6C-934C-5F3A-9DF9-1A58EFD6CBC3

Holotype:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Lissopsius; specificEpithet: jaliscoensis; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.044; eventDate: 06-27-09; sex: female; catalogNumber: CNIN798; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: A6C4CAAC-625F-5F12-9EDF-C7301C617CF5

Distribution: Chamela, Jalisco, Mexico

Notes: n.sp. described from specimens collected in this study (Zaldívar-Riveron et al. 2012)

***Lissopsius pacificus* Zaldívar-Riverón, Martínez, ceccarelli and Shaw 2013**

- <http://zookeys.pensoft.net/articles.php?id=2399>

Materials

Paratypes:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Lissopsius; specificEpithet: pacificus; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.044; eventDate: 05-05-11; sex: female; catalogNumber: CNIN739; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: C79C1E24-B3E1-530C-B48B-442062467CAC
- b. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Lissopsius; specificEpithet: pacificus; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.044; eventDate: 05-05-11; sex: female; catalogNumber: CNIN742; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: 5EC18B55-ADA9-5D21-97F1-76F37B93B892
- c. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Lissopsius; specificEpithet: pacificus; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.044; eventDate: 05-05-11; sex: female; catalogNumber: CNIN743; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: 7E21E43A-2471-58B2-9883-227BFC67D522

Holotype:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Lissopsius; specificEpithet: pacificus; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.044; eventDate: 06-26-09; sex: female; catalogNumber: CNIN740; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: B55996A8-F6C1-508A-8ACA-FE01226C3CD8

Distribution: Chamela, Jalisco, Mexico

Notes: n.sp. described from specimens collected in this study (Zaldivar-Riveron et al. 2012)

***Monarea fridae* Belokobylskij, Zaldivar-Riverón, Coronado-Blanco 2014**

- <http://dx.doi.org/10.11646/zootaxa.3795.4.2>

Materials

Holotype:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Monarea; specificEpithet: fridae; country: Mexico; stateProvince: Morelos; municipality: Tepalcingo; locality: El Limón; decimalLatitude: 12.52; decimalLongitude: -98.94; eventDate: 10-13-12; sex: female; recordedBy: Toledo; occurrenceID: 2B28328E-7C15-5A35-92B6-2192D5E2E7EE

Paratypes:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Monarea; specificEpithet: fridae; country: Mexico; stateProvince: Puebla; municipality: Jolalpan; locality: Rancho el Salado; decimalLatitude: 18.33; decimalLongitude: -98.98; eventDate: 10-07-10; sex: male; recordedBy: Toledo, Hinterholzer, Martínez; occurrenceID: 6727DDAE-390D-5CAC-95F3-31F255D9E3DE
- b. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Monarea; specificEpithet: fridae; country: Mexico; stateProvince: Morelos; municipality: Tlaquitenango; locality: Santiopa; decimalLatitude: 18.44; decimalLongitude: -98.95; eventDate: 07-06-13; sex: male; recordedBy: Toledo; occurrenceID: FE84A6A9-4178-5154-8131-93793239DA0F
- c. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Monarea; specificEpithet: fridae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.49; decimalLongitude: -105.044; eventDate: 06-06-11; sex: male; recordedBy: Toledo; occurrenceID: C0BE9461-A3F0-51BD-A9A2-7CC6B29918B0

Distribution: Central Mexico and Jalisco

Notes: n.sp. described from specimens collected in this study (Belokobylskij et al. 2014)

***Neoheterospilus chamelae* Marínez and Zaldívar-Riverón 2010**

- http://www.conabio.gob.mx/institucion/proyectos/resultados/HB033_Neoheterospilus%202010.pdf

Materials

Holotype:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Neoheterospilus*; specificEpithet: *chamelae*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.498; decimalLongitude: -105.044; sex: female; catalogNumber: ASDOR053-09; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: 2A5DAD6D-CF49-5343-8AE9-EC5AF2C7361C

Paratypes:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Neoheterospilus*; specificEpithet: *chamelae*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.498; decimalLongitude: -105.044; sex: female; catalogNumber: ASDOR054-09; recordedBy: Zaldívar; occurrenceID: 2D25FAB6-78C8-5660-9A18-82949A1167EB
- b. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Neoheterospilus*; specificEpithet: *chamelae*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.038; sex: female; catalogNumber: ASDOR095-09; recordedBy: Zaldívar; occurrenceID: AA0FDC25-E535-5361-8B24-0E20E950AEC3
- c. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Neoheterospilus*; specificEpithet: *chamelae*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.038; sex: female; catalogNumber: ASDOR202-10; recordedBy: Zaldívar; occurrenceID: 3996C45E-2A65-53BA-B4BD-C4E9AE6D3933
- d. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Neoheterospilus*; specificEpithet: *chamelae*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.498; decimalLongitude: -105.045; sex: male; catalogNumber: ASDOR216-10; recordedBy: Zaldívar; occurrenceID: 17E025EB-C6DA-5508-BB3D-EDAD7BFD2507
- e. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Neoheterospilus*; specificEpithet: *chamelae*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.429; decimalLongitude: -104.98; sex: male; catalogNumber: ASDOR343-10; recordedBy: Zaldívar; occurrenceID: 5CF2B98B-AE4C-597E-9011-2F906A93BE31
- f. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Neoheterospilus*; specificEpithet: *chamelae*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation;

- decimalLatitude: 19.499; decimalLongitude: -105.044; sex: male; catalogNumber: ASDOR392-10; recordedBy: Zaldívar; occurrenceID: 7B43BC66-1C2C-5850-A929-F44046910CE6
- g. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.038; sex: male; catalogNumber: ASDOR418-10; recordedBy: Zaldívar; occurrenceID: A6F52334-C900-52B9-9D2A-652755E6BBEA
- h. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.042; sex: female; catalogNumber: ASDOR473-10; recordedBy: Zaldívar; occurrenceID: 4F1763C4-81E2-5DFE-AAC4-0E805BB8B4C2
- i. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.042; sex: female; catalogNumber: ASDOR482-10; recordedBy: Zaldívar; occurrenceID: 58602A93-2885-5609-8E60-A709C7EFFF21
- j. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.042; sex: male; catalogNumber: ASDOR492-10; recordedBy: Zaldívar; occurrenceID: 719780CE-BEBE-59A3-8EE3-12AD0AF340AC
- k. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.509; decimalLongitude: -105.037; sex: male; catalogNumber: ASDOR549-10; recordedBy: Zaldívar; occurrenceID: 0AB23109-2538-550C-86C1-FF1F012B1827
- l. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.509; decimalLongitude: -105.037; sex: male; catalogNumber: ASDOR550-10; recordedBy: Zaldívar; occurrenceID: 9734149B-7ED6-5563-A564-50A2087EC408
- m. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.044; sex: female; catalogNumber: ASDOR565-10; recordedBy: Zaldívar; occurrenceID: 30CE318B-74B1-59E3-AC16-29207A35C975
- n. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.044; sex: female; catalogNumber:

- ASDOR566-10; recordedBy: Zaldivar; occurrenceID: D72479DB-E2F9-52E4-A1D6-DBEEAD3F9EB6
- o. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.044; sex: male; catalogNumber: ASDOR567-10; recordedBy: Zaldivar; occurrenceID: C7A45737-CA00-5E90-A8A6-50A44DD7C551
- p. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.505; decimalLongitude: -105.038; sex: male; catalogNumber: ASDOR601-10; recordedBy: Zaldivar; occurrenceID: BDD8CD65-CFA6-52E5-B260-602A4856F05A
- q. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.505; decimalLongitude: -105.038; sex: male; catalogNumber: ASDOR625-10; recordedBy: Zaldivar; occurrenceID: 31968417-0F41-5967-A706-D5B31F184FA6
- r. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.505; decimalLongitude: -105.038; sex: male; catalogNumber: ASDOR627-10; recordedBy: Zaldivar; occurrenceID: 7EABFCCE-10DF-5423-B8A6-B58665BCEEDE
- s. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.505; decimalLongitude: -105.038; sex: female; catalogNumber: ASDOR632-10; recordedBy: Zaldivar; occurrenceID: B34C7A02-AD54-5507-B7ED-81D8DAA1FAC8
- t. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.505; decimalLongitude: -105.038; sex: female; catalogNumber: ASDOR633-10; recordedBy: Zaldivar; occurrenceID: F3C8B3FF-A44A-5CCE-BF41-2701D81E6A94
- u. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.042; sex: male; catalogNumber: ASDOR697-10; recordedBy: Zaldivar; occurrenceID: D6CDD7AA-4CCF-5B6C-9EAF-BB731A47534A

Other materials:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.038; sex: female; catalogNumber:

- ASDOR108-09; recordedBy: Zaldivar; occurrenceID: F7522EDF-929C-5C03-BC2A-4C5A231804BF
- b. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.497; decimalLongitude: -105.038; sex: female; catalogNumber: ASDOR148-09; recordedBy: Zaldivar; occurrenceID: E7D18BC0-08B2-50DF-9D01-66CBEE60A808
- c. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.504; decimalLongitude: -105.035; sex: male; catalogNumber: ASDOR718-10; recordedBy: Zaldivar; occurrenceID: 71CA2A56-54D9-5AB1-ACFD-A076DFE3837B
- d. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.496; decimalLongitude: -105.039; sex: male; catalogNumber: ASDOR737-10; recordedBy: Zaldivar; occurrenceID: 7F338B3E-4276-567A-B953-A283B94C4D25
- e. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.042; sex: female; catalogNumber: ASDOR769-10; recordedBy: Zaldivar; occurrenceID: A43F5232-8FD9-5CF0-BF2C-187A19BB4915
- f. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.042; sex: male; catalogNumber: ASDOR770-10; recordedBy: Zaldivar; occurrenceID: 773C584A-237F-5941-8FFD-0CB58047D32D
- g. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.5; decimalLongitude: -105.039; sex: female; catalogNumber: ASDOR772-10; recordedBy: Zaldivar; occurrenceID: 56F9B79B-EF4A-5F5D-A72C-C6AF8F428222
- h. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.038; sex: female; catalogNumber: ASDOR773-10; recordedBy: Zaldivar; occurrenceID: C5B73DD4-8563-568C-9422-CDE7DA1B92BA
- i. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.038; sex: male; catalogNumber: ASDOR775-10; recordedBy: Zaldivar; occurrenceID: CBDD468A-69A0-5152-BFA3-3206744CA872

- j. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.044; sex: male; catalogNumber: ASDOR789-10; recordedBy: Zaldívar; occurrenceID: EA537411-5D0D-5FCC-83BC-0C0F06B0795A
- k. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.044; sex: male; catalogNumber: ASDOR816-10; recordedBy: Zaldívar; occurrenceID: D3178E24-A5CE-5C93-A695-D1DE92A1741D
- l. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.044; sex: male; catalogNumber: ASDOR820-10; recordedBy: Zaldívar; occurrenceID: 1FD6B47E-6723-56F7-989B-68CF97FB8546
- m. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.49; decimalLongitude: -105.038; sex: male; catalogNumber: ASDOR822-10; recordedBy: Zaldívar; occurrenceID: 3EAC5511-C802-55DC-B0CE-D13F9E366C1E
- n. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Neoheterospilus; specificEpithet: chamelae; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.044; sex: female; catalogNumber: ASDOR853-10; recordedBy: Zaldívar; occurrenceID: 634D8100-B348-5FCA-8176-49D6F88FDC16

Distribution: Chamela, Jalisco, Mexico

Notes: n.sp. described from specimens collected in this study (Martínez and Zaldívar-Riverón 2010)

***Notiospathius crypticus* Reséndiz-Flores, Nunes and Zaldívar Riverón 2014**

- http://www.ib.unam.mx/m/revista/pdfs/05.-_1581_1.pdf

Materials

Holotype:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Notiospathius*; specificEpithet: *crypticus*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.038; eventDate: 06-25-09; sex: female; catalogNumber: ASDOR016-09; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: 2DCF3587-FDEA-5F87-AB21-EB821848CD4E

Paratype:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Notiospathius; specificEpithet: crypticus; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.038; eventDate: 06-26-09; sex: female; catalogNumber: ASDOR017-09; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: 80B6B5B8-68BB-5BC1-9251-A83141ADEA49

Distribution: Chamela, Jalisco, Mexico

Notes: n.sp. described from specimens collected in this study (Reséndiz-Flores et al. 2014)

***Notiospathius mariachi* Reséndiz-Flores, Nunes and Zaldívar Riverón 2014**

- http://www.ib.unam.mx/m/revista/pdfs/05.-_1581_1.pdf

Materials

Paratypes:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Notiospathius; specificEpithet: mariachi; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.038; eventDate: 06-26-09; sex: female; catalogNumber: ASDOR018-09; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: 0D415CAE-D8E2-5D94-9542-5BDCAB63E343
- b. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Notiospathius; specificEpithet: mariachi; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.499; decimalLongitude: -105.038; eventDate: 06-27-09; sex: male; catalogNumber: ASDOR019-09; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: D7311855-4A55-509B-944A-8F5EAC3DD9C6
- c. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Notiospathius; specificEpithet: mariachi; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.505; decimalLongitude: -105.038; eventDate: 09-04-09; sex: female; catalogNumber: ASDOR355-10; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: AEB44FA8-0E32-530A-A5AB-A4423407FB3A
- d. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Notiospathius; specificEpithet: mariachi; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.505; decimalLongitude: -105.038; eventDate: 09-03-09; sex: male; catalogNumber: ASDOR357-10; recordedBy: Clebsch, Zaldívar, Polaszek; occurrenceID: 1AAEB6D8-D01B-52B8-BF37-0C82B72B1AC6

Holotype:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: Notiospathius; specificEpithet: mariachi; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.504; decimalLongitude: -105.038; eventDate: 11-20-09; sex: female;

catalogNumber: ASDOR463-10; recordedBy: Zaldívar; occurrenceID: A65E6E1D-B05A-53B9-B04C-E629DE56BDFC

Distribution: Chamela, Jalisco, Mexico

Notes: n.sp. described from specimens collected in this study (Reséndiz-Flores et al. 2014)

***Ondigus cuixmalensis* Zaldívar-Riverón, Martínez, ceccarelli and Shaw 2014**

- <http://zookeys.pensoft.net/articles.php?id=2399>

Materials

Holotype:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Ondigus*; specificEpithet: *cuixmalensis*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.419; decimalLongitude: -104.973; eventDate: 09-03-09; sex: female; catalogNumber: ASDOR464-10; recordedBy: Clebsch, Zaldívar; occurrenceID: 915F8315-B719-542F-9153-5CD335D65879

Paratype:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Ondigus*; specificEpithet: *cuixmalensis*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.505; decimalLongitude: -105.038; eventDate: 02-20-10; sex: male; catalogNumber: ASDOR514-10; recordedBy: Zaldívar; occurrenceID: 0D73CED0-23D2-5C4B-8AC3-55AB81C6ABE7

Distribution: Chamela, Jalisco, Mexico

Notes: n.sp. described from specimens collected in this study (Zaldivar-Riveron et al. 2012)

***Sabinita mexicana* Belokobylskij, Zaldivar-Riverón and Martínez 2014**

- <http://onlinelibrary.wiley.com/doi/10.1111/syen.12078/abstract;jsessionid=0441E95BA6DBC93BF1257DF4E1A3B0D.f03t03?deniedAccessCustomisedMessage=&userIsAuthenticated=false>

Material

Holotype:

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Sabinita*; specificEpithet: *mexicana*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.497; decimalLongitude: -105.038; eventDate: 07-02-12; sex: female; catalogNumber:

ASDOR082-09; recordedBy: Zaldivar; occurrenceID:
9F119431-1A54-5BB0-8ED0-0882D441F89E

Distribution: Chamela, Jalisco, Mexico

Notes: n.sp. described from specimens collected in this study (Zaldivar-Riverón et al. 2014)

Spathius chamelae Belokobylskij and Zaldivar-Riverón 2014

- <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4137313/pdf/zookeys-427-059.pdf>

Materials

Paratypes:

- kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Spathius*; specificEpithet: *chamelae*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.505; decimalLongitude: -105.038; sex: male; catalogNumber: ASDOR371-10; recordedBy: Clebsch, Zaldivar; occurrenceID: E83F5144-B81A-54CD-93E6-8D938971B396
- kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Spathius*; specificEpithet: *chamelae*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.505; decimalLongitude: -105.038; sex: female; catalogNumber: ASDOR372-10; recordedBy: Clebsch, Zaldivar; occurrenceID: E8A38E8C-09FF-5C65-93C3-5D0C5B70B3C7
- kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Spathius*; specificEpithet: *chamelae*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.505; decimalLongitude: -105.038; sex: female; catalogNumber: ASDOR373-10; recordedBy: Clebsch, Zaldivar; occurrenceID: 02972FE5-86A4-5F76-989C-B03521C9C20D
- kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Spathius*; specificEpithet: *chamelae*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.505; decimalLongitude: -105.038; sex: male; catalogNumber: ASDOR375-10; recordedBy: Clebsch, Zaldivar; occurrenceID: 8022B3F7-3737-51F1-9837-453E226A4A03
- kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Spathius*; specificEpithet: *chamelae*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.505; decimalLongitude: -105.038; sex: male; catalogNumber: ASDOR432-10; recordedBy: Clebsch, Zaldivar; occurrenceID: BD8DEFFA-2FB3-58A3-ADFA-128C88B9FE7E

Holotype:

- kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Spathius*; specificEpithet: *chamelae*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.505; decimalLongitude: -105.038; sex: female; catalogNumber: ASDOR433-10; recordedBy: Zaldivar; occurrenceID: B8D84924-907D-57C9-A266-5A1AF75791F1

Distribution: Chamela, Jalisco, Mexico

Notes: n.sp. described from specimens collected in this study (Belokobylskij and Zaldivar-Riveron 2014)

***Whitfieldiellus variegata* Marsh 1993**

- <http://doryctinaekey.myspecies.info/file/339>

Material

- a. kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Hymenoptera; family: Braconidae; genus: *Whitfieldiellus*; specificEpithet: *variegata*; country: Mexico; stateProvince: Jalisco; municipality: La Huerta; locality: Chamela Biostation; decimalLatitude: 19.498; decimalLongitude: -105.044; eventDate: 06-24-09; sex: female; catalogNumber: ASDOR001-09; recordedBy: Clebsch, Zaldivar, Polaszek; occurrenceID: F4C81F71-90B3-58CA-83E3-B3D0C0CB73FC

Distribution: Mexico, Guatemala, Panama and Costa Rica

Analysis

Species boundaries

A total of 961 specimens were collected during the ten field trips, of which 883 COI sequences were generated. Fifteen of these sequences had a length lower than 500 bp and thus did not receive a BIN, though they were included in the analysis. The sequences generated belonged to 289 barcoding species and 30 identified genera, though four barcoding species could not be assigned to any genus (Table 2). *Heterospilus* Haliday was the most speciose genera with 170 barcoding species, followed by *Ecphylyus* Förster (19 spp.), *Allorhogas* Gahan (15 spp.) and *Callihormius* Ashmead (14 spp.). Two species belonging to two additional genera (*Doryctinus* Roman; *Monarea fridae*, Belokobylskij et al. 2014) were found in the entomological collection at the CBS, increasing the diversity of doryctine genera and species present in the region to 33 and 289, respectively.

The reconstructed NJ tree recovered the megadiverse genus *Heterospilus* as non-monophyletic with respect to *Heterospathius* and *Neotherospilus* (Fig. 2). The accumulation curve estimations of species richness (Fig. 3) indicates that the number of species that occur in the region has not been reached.

Twenty new species and two new genera (*Sabinita* Belokobylskij, Zaldivar-Riverón et Martínez, *Ficobolus* Martínez, Belokobylskij et Zaldivar-Riverón) have been described by AZR and collaborators from the doryctine specimens collected for this study (Table 3). An update on Zaldivar-Riverón et al. 2010) generic identification was performed. Specimens assigned to *Hansonorum* Marsh were transferred to *Notiospathius*, since the former genus is now considered its junior synonym (De Jesús-Bonilla et al. 2011). Moreover, the specimens assigned in the above study to *Barbalhoa* Marsh and *Platydoryctes* Barbalho et Pentead-Dias actually belong to *Concurtisella* and *Callihormius*, respectively.

Discussion

The Mexican dry tropical forest is known for containing a considerably high species richness and endemism rates for various plant and animal groups (Ceballos et al. 2010). Despite that the current available information does not allow to determine what proportion of the richness registered for insects in Mexico occurs in dry tropical forests, the gathered data for other taxa suggest that it is considerably high (Zaragoza-Caballero et al. 2010). This work represents one of various DNA barcoding species inventories that are being carried out for selected braconid subfamilies (Agathidinae, Braconinae, Rogadinae) and for other insect taxa (e.g. Coleoptera: Cerambycidae, Elateridae) in the CBS, one of which has already been published (Microgastrinae, Fernández-Flores et al. 2013).

Our updated study identified 14 additional genera and increased 53% the number of barcoding species found in the CBS with respect to the results obtained in Zaldivar-Riverón et al. 2010 preliminary study. Though most of the doryctine species that were discriminated remain undescribed, 20 of them and two new genera (*Sabinita* and *Ficobolus*) were already described by AZR and collaborators based on the material collected in this work. Most of these new described species belong to small, poorly known genera. The published records for the Chamela region indicate that the species richness of the Doryctinae is considerably higher than the those observed for Microgastrinae (103 spp.; Fernández-Flores et al. 2013), considered to be the second largest subfamily of Braconidae (Jones et al. 2009), and Rogadinae (27 spp.; Aguilar-Velasco 2013).

A vast species richness found for the subfamily Doryctinae was reported for Costa Rica (458 spp.; Marsh 2002, Marsh et al. 2013). This species richness, however, was reported for the whole country, whereas in our study the species richness found for the subfamily (290 spp.) was limited to about 3,000 ha. Particularly, we delimited 170 barcoding species for the genus *Heterospilus* for the CBS, whereas for Costa Rica, Marsh et al. 2013 described 280 species (Marsh et al. 2013).

Similar to our preliminary study, paraphyly of *Heterospilus* with respect to *Heterospathius* and *Neoheterospilus* was again recovered. A non-monophyletic *Heterospilus* was also recovered in a recent multi locus phylogenetic study (Wild et al. 2013). Our results therefore support that, though it is not appropriate to reconstruct phylogenetic relationships only based on a single mitochondrial marker, barcoding data represents an accessible, comprehensive system for species identification (Hebert and Gregory 2005).

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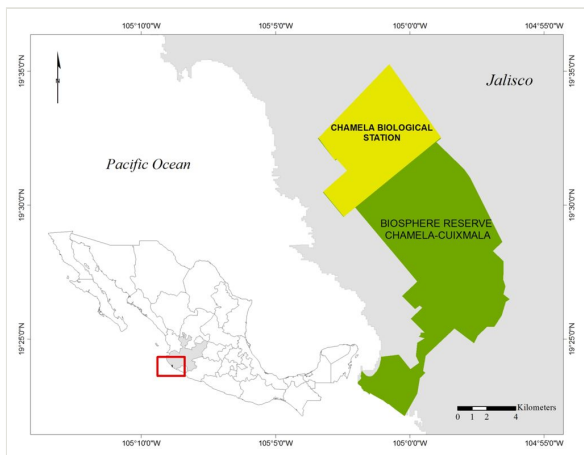


Figure 1. Study area. The Chamela Biological Station (IB-UNAM), located within the Chamela-Cuixmala Biosphere Reserve in the estate of Jalisco, Mexico.



Figure 2.

Neighbour-joining tree obtained from BOLD that includes 883 nucleotide sequences belonging to doryctine specimens. The distance model used was the Kimura 2 Parameter, the marker was COI-5P, and the 1st , 2nd and 3rd codon positions were included. The sequences had a length greater than 200bp. See Suppl. material 1.

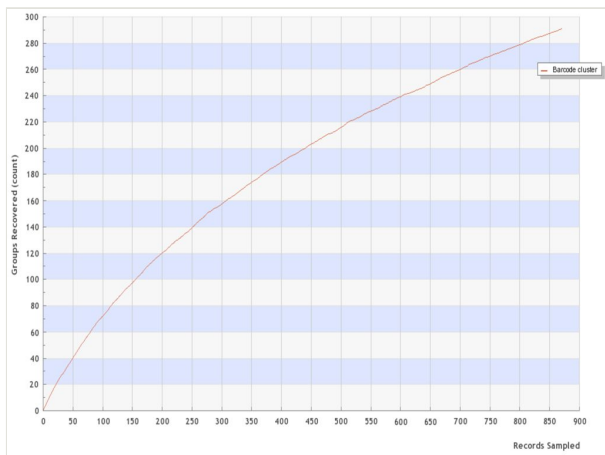


Figure 3.

DNA barcoding species accumulation curve for the Doryctinae from the CBS (Suppl. material 1).

Table 1.

Sampling sites and collecting techniques employed in this study.

| SITE | LATITUDE | LONGITUDE | ALTITUDE | TRAP TYPE |
|--|----------|-----------|----------|--|
| Near CBS | 19.4985 | -105.0441 | 92 | Yellow pan trap |
| Camino Zarco/ Chachalaca | 19.4956 | -105.0393 | 30 | Sweep net |
| Camino Búho | 19.4990 | -105.0412 | 74 | Malaise |
| | 19.4988 | -105.0404 | 65 | Light trap |
| Camino Chachalaca | 19.4993 | -105.0383 | 56 | Sweep net, Malaise trap, Yellow pan trap |
| | 19.4978 | -105.0445 | 120 | Sweep net |
| Camino Calandria | 19.5084 | -105.0378 | 120 | Yellow pan trap, sweep net, light trap, Malaise trap |
| Eje central/Camino Calandria | 19.5002 | -105.0425 | 49 | Yellow pan |
| | 19.5039 | -105.0335 | 52 | Sweep net |
| Camino Calandria/ Camino Chachalaca | 19.5049 | -105.0377 | 52 | Sweep net |
| Fundación-Cuixmala/ Poza del Jaguar | 19.4292 | -104.9796 | 66 | Sweep net |
| Fundación-Cuixmala/El Sendero | 19.4192 | -104.9732 | 61 | Sweep net, Malaise trap |
| Behind CBS dinning room | 19.4978 | -105.0445 | 120 | Sweep net |
| Camino Ardilla | 19.5042 | -105.0379 | 39 | Sweep net |
| Eje central | 19.5085 | -105.0366 | 32 | Sweep net |
| Calandria(Arroyo Calandria) | 19.5036 | -105.0364 | 62 | Sweep net |
| | 19.5002 | -105.0353 | 109 | Sweep net |
| Camino Búho/ Chachalaca | 19.4991 | -105.0421 | 68 | "O" Trap |
| | 19.4978 | -105.0444 | 106 | Sweep net |
| Camino Antiguo | 19.5047 | -105.0367 | 59 | Sweep net |

Table 2.

Doryctine genera and number of barcoding species identified in this study (Total 289).

* Species identified only based on morphological evidence.

| Genera | Barcoding species |
|--|-------------------|
| <i>Allorhogas</i> Gahan | 15 |
| <i>Caenophanes</i> Förster | 1 |
| <i>Callihormius</i> Ashmead | 14 |
| <i>Coiba</i> Marsh | 7 |
| <i>Concurtisella</i> Roman | 1 |
| <i>Curtisella</i> Spinola | 4 |
| <i>Doryctinus</i> * Roman | 1 |
| <i>Ecphylus</i> Förster | 19 |
| <i>Ficobolus</i> Martínez, Belokobylskij et Zaldívar-Riverón | 1 |
| <i>Glyptocolastes</i> Ashmead | 8 |
| <i>Heerz</i> Marsh | 2 |
| <i>Heterospathius</i> Barbalho et Penteado-Dias | 1 |
| <i>Heterospilus</i> Haliday | 170 |
| <i>Iare</i> Barbalho et Penteado-Dias | 6 |
| <i>Janzenia</i> Marsh | 1 |
| <i>Leluthia</i> Cameron | 1 |
| <i>Lissopsius</i> Marsh | 2 |
| <i>Masonius</i> Marsh | 2 |
| <i>Monarea</i> * Szépligeti | 1 |
| <i>Neoheterospilus</i> Belokobylskij | 3 |
| <i>Nervellius</i> Roman | 1 |
| <i>Notiospathius</i> Matthews et Marsh | 5 |
| <i>Odontobracon</i> Cameron | 2 |
| <i>Ondigus</i> Braet, Barbalhoa et Van Achterberg | 2 |
| <i>Panama</i> Marsh | 1 |
| <i>Psenobolus</i> Reinhard | 2 |
| <i>Ptesimogaster</i> Marsh | 1 |
| <i>Rhaconotus</i> Ruthe | 3 |
| <i>Sabinita</i> Belokobylskij, Zaldívar-Riverón et Martínez | 1 |
| <i>Spathius</i> Nees | 1 |
| <i>Stenocorse</i> Marsh | 3 |
| <i>Vanderentiellus</i> Marsh | 2 |

| | |
|------------------------------|---|
| <i>Whitfieldiellus</i> Marsh | 1 |
| Unidentified | 4 |

Table 3.

List of the new species described from specimens collected in this study

| SPECIES | REFERENCE |
|---|--|
| <i>Allorhogas coccolobae</i> Martínez and Zaldívar-Riverón | Martínez and Zaldívar-Riverón 2013 |
| <i>Allorhogas crassifemur</i> Martínez and Zaldívar-Riverón | Martínez and Zaldívar-Riverón 2013 |
| <i>Allorhogas jaliscoensis</i> Martínez and Zaldívar-Riverón | Martínez and Zaldívar-Riverón 2013 |
| <i>Allorhogas marshi</i> Martínez and Zaldívar-Riverón | Martínez and Zaldívar-Riverón 2013 |
| <i>Allorhogas parvus</i> Martínez and Zaldívar-Riverón | Martínez and Zaldívar-Riverón 2013 |
| <i>Allorhogas scotti</i> Martínez and Zaldívar-Riverón | Martínez and Zaldívar-Riverón 2013 |
| <i>Ficobolus jaliscoi</i> Zaldívar-Riverón and Belokobylskij | Martínez and Zaldívar-Riverón 2013, Zaldívar-Riverón et al. 2014 |
| <i>Heerz ecmahla</i> Martínez, Zaldívar-Riverón, Ceccarelli and Shaw | Zaldivar-Riveron et al. 2012 |
| <i>Heerz macrophthalma</i> Martínez, Zaldívar-Riverón, Ceccarelli and Shaw | Zaldivar-Riveron et al. 2012 |
| <i>Iare cheguevarai</i> Martínez, Zaldívar-Riverón and Ceccarelli | Martínez et al. 2010 |
| <i>Iare mexicanus</i> Martínez, Zaldívar-Riverón and Ceccarelli | Martínez et al. 2010 |
| <i>Lissopsius jaliscoensis</i> Zaldívar-Riverón, Martínez, Ceccarelli et Shaw | Zaldivar-Riveron et al. 2012 |
| <i>Lissopsius pacificus</i> Zaldívar-Riverón, Martínez, Ceccarelli et Shaw | Zaldivar-Riveron et al. 2012 |
| <i>Monarea fridae</i> Belokobylskij, Zaldivar-Riveron et Coronado-Blanco | Belokobylskij et al. 2014 |
| <i>Neoheterospilus chamelae</i> Martínez et Zaldívar-Riverón | Martínez and Zaldívar-Riverón 2010 |
| <i>Notiospathius crypticus</i> Reséndiz-Flores, Nunes and Zaldívar-Riverón | Reséndiz-Flores et al. 2014 |
| <i>Notiospathius mariachi</i> Reséndiz-Flores, Nunes and Zaldívar-Riverón | Reséndiz-Flores et al. 2014 |
| <i>Ondigus cuixmalensis</i> Zaldívar-Riverón, Martínez, Ceccarelli and Shaw | Zaldivar-Riveron et al. 2012 |
| <i>Sabinita mexicana</i> Belokobylskij, Zaldívar-Riverón and Martínez | Zaldívar-Riverón et al. 2014 |
| <i>Spathius chamelae</i> Belokobylskij and Zaldívar-Riverón | Belokobylskij and Zaldivar-Riveron 2014 |

Supplementary material

Suppl. material 1: Accumulation Curve Data

Authors: A. Zaldívar-Riverón, C.R. Gutiérrez-Arellano, D. Gutiérrez-Arellano

Data type: Table of records

Brief description: Table containing the Process ID of specimens sampled and Barcode Index Number (BIN) used for the species accumulation curve.

Filename: Supp_mat.xls - [Download file](#) (78.50 kb)