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Interactive Charipinae Worldwide Database: a valuable tool for entomologists, agronomists and pest controllers

Mar Ferrer-Suay* & Luis Miguel Garrido-Salas*

* Universitat de Barcelona. Facultat de Biologia. Departament de Biologia Animal. Avda. Diagonal 645. 08028 Barcelona, Spain. A/e: mar.ferrer.suay@gmail.com

Rebut: 05.11.2014; Acceptat: 11.11.2014; Publicat: 29.12.2014

Abstract

The Charipinae (Hym.: Cynipoidea: Figitidae) is an important subfamily which members are hyperparasites of aphids and psyllids, and thus they are involved on biological control pest programs. After carried out a Charipinae worldwide revision we have prepared a complete website where all the information recompiled about this subfamily is included. This website contains all the information already known about the Charipinae: genera key, specific key, complete descriptions of each valid species, bibliography and application to check the specific names and get to know the valid ones. About 1000 figures (optical and SEM) are included to illustrate the diagnostic characters. The main objective is to provide to the scientific community interactive determination keys for agronomists, ecologists, phylogenetics, biologists, etc., (many of them unfamiliar with the taxonomy of the parasitic wasps) so that they could use them to advance in their studies as well as obtain determinations, figures and references. This website will be an important taxonomic tool which will help to conduct ecological, biological and phylogenetic research.

Key words: Charipinae, Database, Webpage.**Resum****Base de dades mundial interactiva dels Charipinae: una eina valuosa per als entomòlegs, agrònoms i controladors de plagues**

Els Charipinae (Hym.: Cynipoidea: Figitidae) són una subfamília d'himenòpters molt important, els seus membres són hiperparàsits d'àfids i psíl·lids, i per tant estan involucrats en programes de control biològic de plagues. Després d'haver dut a terme una revisió mundial dels Charipinae hem preparat una pàgina web completa, on s'inclou tota la informació sobre aquesta subfamília. Aquest lloc web conté tota la informació que ja es coneix sobre els Charipinae: clau genèrica, claus específiques, una descripció completa de cada espècie vàlida, bibliografia i una aplicació per comprovar els noms específics i conèixer els vàlids. Al voltant de 1000 figures (òptics i SEM) s'inclouen per il·lustrar els caràcters diagnòstics. L'objectiu principal és proporcionar a la comunitat científica de claus interactives per a la determinació d'espècies per part d'agrònoms, ecòlegs, filogenètics, biòlegs, etc., (molts d'ells no familiaritzats amb la taxonomia de les vespes parasitàries) perquè puguin utilitzar-los per avançar als seus estudis així com obtenir determinacions, figures i referències. Aquest lloc web serà una important eina taxonòmica que ajudarà a portar a terme la investigació ecològica, biològica i filogenètica.

Paraules clau: Charipinae, base de dades, pàgina web.**Introduction**

Members of the subfamily Charipinae (Hymenoptera: Cynipoidea: Figitidae) are widely distributed around the world. They are mainly characterized being very small wasp, with smooth and shiny body. Nowadays, eight genera are considered valid within this subfamily *Alloxysta* Förster, 1869 (cosmopolitan), *Apocharips* Fergusson, 1986 (Palaeartic and Neotropical), *Dilapothor* Paretas-Martínez & Pujade-Villar 2006, (Australia), *Dilyta* Förster, 1869 (cosmopolitan except Australia), *Lobopterocharips* Paretas-Martínez & Pujade-Villar, 2007 (Nepal), *Lytoxysta* Kieffer, 1909 (North America), *Phaenoglyphis* Förster, 1869 (cosmopolitan) and *Thoreauana* Girault, 1930 (Australia). The taxonomy of this subfamily, especially for *Alloxysta* genus, has been always

very chaotic making the determination at species level a very difficult task (Ferrer-Suay *et al.*, 2012a).

The Charipinae is an important subfamily which members are hyperparasites of aphids via Aphidiinae (Hymenoptera: Braconidae) and Aphelininae (Hymenoptera: Aphelinidae) and hyperparasites of psyllids via Encyrtidae (Hymenoptera: Chalcidoidea) (Menke & Evenhuis, 1991), thus they are involved on biological control pest programs. Charipines influence the effectiveness of the primary parasitoids by decreasing their abundance and modifying their behaviour. As a result, increase of host populations can cause severe yield losses in some of the most important crops. Therefore, studies on the subfamily Charipinae have great economic and biological importance.

After carried out a Charipinae worldwide revision, including taxonomic and faunistic revisions, we have prepared a

complete website where all the information recompiled about this subfamily is included. The main objective is to provide to the scientific community interactive determination keys for agronomists, ecologists, phylogenetics, biologists, etc., (many of them unfamiliar with the taxonomy of the parasitic wasps) so that they could use them to advance in their studies as well as obtain determinations, figures and references. This website comes out of a Ministry project (CGL2011-2288) as part of a doctoral fellowship FPU (AP2009-4833).

This website will be an important taxonomic tool which will help to conduct ecological, biological and phylogenetic research. It is already finished and opened to the general public on the Internet (www.charipinaedatabase.com).

Material and Methods

All the specimens were studied using a stereomicroscopy (NIKON SMZ-1). In case of type material borrowed from different institutions to avoid any damage they were photographed using a Zeiss Discovery V8 compound microscope with attached INFINITYX-21C digital camera feeding image files to a notebook or desktop computer; the program DeltaPix View-Pro AZ was then used to merge an image series (typically representing 20 focal planes) into a single in-focus image. In case of new species described from our faunistic studies the images were taken by the field-emission gun environmental scanning electron microscope (FEI Quanta 200 ESEM) to obtain high-resolution imaging without gold-coating of the specimens. Each figure uploaded to this website has a watermark of the University of Barcelona to avoid the uncontrolled use of our figures, this way anyone interested in using one of these figures has to ask us to get permission.

Morphological terms used are taken from Paretas-Martínez *et al.* (2007a). Measurements and abbreviations include F1–F12, first and subsequent flagellomeres. The width of the forewing radial cell is measured from the margin of the wing to the beginning of the Rs vein. Females and males have the same morphology unless where indicated.

The descriptions included in this webpage have been all already published, both for the museums material (Ferrer-Suay *et al.*, 2012b, c, 2013a, b, c, d, 2014a) and the new species described from our faunistic studies (Ferrer-Suay *et al.*, 2011, 2012d, e, f, 2013e, f, g, h, 2014b). Most of the keys are also already published; *Dilyta* key was published by Paretas-Martínez *et al.*, 2011, *Apocharips* by Ferrer-Suay *et al.*, 2013i. As for *Alloxysta*, *Phaenoglyphis* and *Thoreauana* keys are in progress to be published, so they have been made public for the first time here in this website.

An extensive bibliographic review has been done in order to get all references on Charipinae: (i) databases of Zoological records and Entomological Abstracts, (ii) published catalogues, and (iii) printed papers preserved in several institutions. These references were consulted and made public for the realization of the Worldwide Charipinae Catalogue (Ferrer-Suay *et al.*, 2012a).

For hosting and presentation of the website we have had the services of a hosting company (webhostingpad) with

which we have reserved the domain and hosted our website. This company guarantees the functionality of the network 99.9 %. They have a private data centre in Chicago (USA). Their servers are connected to the Internet with four OC-48 connections across multiple operators to ensure network reliability. Its Dual Xeon Intel RAID servers are protected and backup of all data done weekly. The hosting service includes a control panel installed on a Linux distribution; the panel provides complete management of all services (email, firewall, protection of directories, domains, databases, etc.).

The content management system (CSM) chosen is WordPress, one of the main reasons for choosing WordPress is that it incorporates a system that offers great variety and flexibility in the design and structure of the web. As the number of plugins that enhance the use of WordPress beyond a simple blog, with which we have achieved our purpose. The programming languages used are HTML, CSS, JavaScript and PHP.

Also it has been chosen to protect the site's content under a copy left license, which allows users to copy the contents of the website for any purpose as long as the source is acknowledged, in this case the author and website.

Results

Below are explained each of the sections that are included in this website.

Home section (Fig. 1)

This is the main section, which includes general information about what Charipinae are, how they look like, how they act in their trophic relationships and which is their main taxonomic problem. This section gives an overview about the Charipinae history, as well as their morphological and biological aspects.

Firstly a brief summary of the general features of the Charipinae is given as well as two pictures of Charipinae species in their environment. Before opening our webpage to the public we have asked for permission to include these great pictures of the Charipinae species. These pictures have been obtained from a webpage on the Internet: http://www.flickr.com/photos/panoramique/galleries/72157628722665859/#photo_7184395027. These photos were taken by Brian Valentine and «TheSonofDarwin».

Below in the Home section, there are three links which redirect to additional Charipinae information that could be useful for the user: Historical review, Morphological Features and Biology.

In the Historical review link the user can find information about the first described species within this subfamily. Additionally, there is a review about the first authors who focused on the study of this interesting group of Hymenoptera. The historical study of the subfamily Charipinae began in the 19th Century with the description of *Allotria victrix* (Westwood, 1833), now included in *Alloxysta*, and was continued mainly by Hartig (1840, 1841), Thomson (1862, 1877) and

Interactive Charipinae Worldwide Database



HOME GENERA KEY GENERA VALID NAMES BIBLIOGRAPHY

Members of the subfamily Charipinae (Hymenoptera: Cynipoidea: Figitidae) are morphologically characterized being very small wasp (0.8-2.0mm), with shiny and smooth body and with very few diagnostic features. This has led on a very big, chaotic and diverse subfamily. The taxonomical chaos of the subfamily Charipinae has been always a problem and an obstacle to identify correctly at species level. The limits between species are not always very clear; the main reason is that the first authors give special attention to size and coloration of specimens, forgetting important characters that are needed to distinguish between them. For these reasons, there are many taxonomic inconsistencies and numerous synonymies that need to be tackled.



- Historical Review
- Morphological Features
- Biology



This research was supported by the projects CGL2008-00180 and CGL2011-22889 of the Ministerio de Ciencia e Innovación (Spain) and the grant AP2009-4833 of the Ministerio de Educación (Spain). Right picture provided by Brian Valentine.
University of Barcelona



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Figure 1. Screenshot of the main page of the website (Home).

Kieffer (1902a, b, 1904 a, b) with the discovery of a high number of species. Also a review about the different catalogues of Charipinae is also done and we did a revision in time of the different genera included in this subfamily and the change of these genera during the early studies. The earli-

est catalogue of this group was made by Dalla Torre (1893). The first complete revision and catalogue was made by Dalla Torre and Kieffer (1910), updating the knowledge of global Cynipoidea, where six genera of Charipinae were studied (*Alloxysta*, *Pezophycta*, *Charips*, *Nephycta*, *Hemicrisis*,

Phaenoglyphis), including specific keys. Later, Weld (1952) updated the catalogue of Dalla Torre and Kieffer, publishing a list of nine genera of Charipinae (*Pezophycta*, *Nephycta*, *Lytoxysta*, *Charips*, *Alloxysta*, *Glyptoxysta*, *Hemicrisis*, *Phaenoglyphis*, *Charipsella*), and giving an illustrated key to genera. Hellén (1963) published the Finnish species, included in three genera (*Dilyta*, *Phaenoglyphis*, *Alloxysta*), with generic and specific keys. Andrews (1978) studied the Nearctic species of the four genera of 'Alloxystini' (*Lytoxysta*, *Hemicrisis*, *Alloxysta*, *Phaenoglyphis*), including a key to genera, and keys for the species of *Phaenoglyphis* and *Alloxysta*, with additional data on distribution, morphology and biology of each Nearctic species. Fergusson (1986) revised the English Charipinae, included in four genera (*Dilyta*, *Apocharips*, *Alloxysta*, *Phaenoglyphis*), providing specific keys and figures. Menke and Evenhuis (1991) revised North American Charipinae included in five genera (*Phaenoglyphis*, *Alloxysta*, *Lytoxysta*, *Apocharips*, *Dilyta*), with descriptions of several new species and new combinations; this work also gives a checklist of the species of 'Alloxystini' in North America and a world checklist of the 'Charipini'. During the second half of the 20th century, Evenhuis made a huge work on Charipinae, publishing many works dedicated to the description of new species and the revision of previously described types, establishing many synonyms.



In the Morphological Features link we give a review about the main morphological characters which are diagnostic and useful to distinguish between genera and species. The characters useful to distinguish between Charipinae genera are (i) the body surface: smooth in all the genera except in *Lytoxysta* which is very fine reticulate sculptured; (ii) antenna: number of flagellomeres in female-male: 9-10 (*Thoreauana*) / 10-11 (*Dilapothor*) / 11-11 (*Lytoxysta*) / 11-12 (all other). Shape of last two flagellomeres: wider than the rest and broadly jointed (*Apocharips*, *Dilapothor*, *Dilyta*, *Thoreauana*) / wide as the previous with constriction between them (*Alloxysta*, *Lobopterocharips*, *Lytoxysta*, *Phaenoglyphis*). Pedicel: cup-shaped (*Lobopterocharips*) / cylindrical (all other); (iii) mesopleura: mesopleural triangle absent (*Lytoxysta*) / present (all other). Mesopleural sulcus present (*Phaenoglyphis*) / absent (all other); (iv) mesoscutum: notauli present (only in †*Protocharips* and some *Phaenoglyphis*) / absent (all other); (v) scutellum: scutellar foveae present (only in some *Phaenoglyphis*) / absent (all other). Posterodorsal extensions of axillar strip present (*Alloxysta*, *Lobopterocharips*, *Lytoxysta*, *Phaenoglyphis*) / absent (*Apocharips*, *Dilapothor*, *Dilyta*, *Thoreauana*). Carinae on scutellum apex: absent (*Phaenoglyphis*, *Lobopterocharips* and some *Alloxysta*) / longitudinal carinae at centre (some *Alloxysta*) / irregular carinae (*Lytoxysta*) / M-shaped carinae at centre (*Apocharips*) / \cap -shaped carinae or two long symmetrical carinae (*Dilyta*) / two short symmetrical carinae (*Thoreauana*) / three small carinae at each side (*Dilapothor*); (iv) fore wing: undulation in posteroapical margin of wing present (*Lobopterocharips*) / absent (all other). Areola present (only in †*Protocharips*) / absent (all other); (vii) metasoma: visible metasoma with two large terga with subequal dorsomedian lengths (*Al-*

loxysta, *Lobopterocharips*, *Lytoxysta*, *Phaenoglyphis*; also in †*Protocharips*) / with a small basal tergum, terminating just posterior to ring of setae (*Apocharips*) / not segmented, only one tergite visible (*Dilapothor*, *Dilyta*, *Thoreauana*).

The characters useful to distinguish between Charipinae species are (i) head: radial carinae on face (only for *Apocharips hansonii*) / smooth (all others); (ii) Proportions (length and width) of pedicel, F1, F2, F3 and F4. Number of flagellomeres forming of club (in some species some flagellomeres are wider resembling a club). Number of flagellomeres with rhinaria. Males: F1, F2, F3 modified or not (curved, excavated, humped); (iii) pronotum: Lateral carinae: absent or present (short or long, reaching mesoscutum or not); (iv) mesoscutum: notauli present or absent (only for *Phaenoglyphis* species). Presence or absence of very fine imbricate sculpture in basal areas of scutum (for *Phaenoglyphis* species); (v) scutellum: scutellar foveae absent or present (fused, or not) (for *Phaenoglyphis*). Carinae on scutellum apex: absent or present (from a single carina to several longitudinal carinae) (for *Alloxysta* species); two long symmetrical carinae (African *Dilyta*) or \cap -shaped carinae (*Dilyta* of the rest of the world); (vi) propodeum: presence or absence of longitudinal carinae; if present, shape of carinae (short, long, thin, broad, forming a plate). Pubescence; (vii) fore wing: shape, size and length of radial cell; (viii) metasoma: punctuation on distal area absent or present (for *Dilyta* species).

There is a well and complete explanation of the character within this Morphological section and besides or below a plate with the different states that this character can present within this subfamily. In total 41 images are included to illustrate the different states of the morphological characters important to distinguish genera and Charipinae species. This way in this section we did a review about the main morphologic characters which have to be taken in care while studying the Charipinae subfamily to be able to identify correctly the specimen.

Finally, in the Biology link we give a review of the Charipinae life style, stating that they are solitary obligate hyperparasitoids of aphids (Aphididae) and psyllids (Psyllidae). According to the host, charipines were previously divided in two major tribes, the Alloxystini (hyperparasitoids of aphids) and the Charipini (hyperparasitoids of psyllids), but after the study of the phylogeny of the subfamily these tribes are now considered invalid (Paretas-Martínez *et al.*, 2007a). How they are distributed in the planet, the Charipinae have a wide continental and insular distribution mainly in the temperate areas, ranging from above the Arctic Circle (Lapland and Alaska) to 47° S in Argentina, and have found at 2.750 m (Andrews, 1978). How the members of the subfamily Charipinae interact in their trophic relationships in the environment and how they influence the primary parasitoids effects in the aphid biological control programs. It is important to note that as hyperparasitoids the Charipinae could modify the correct biological control done by the primary parasitoids on aphids. They could decrease the abundance and modify the behaviour of these primary parasitoids resulting in a significant increase of the host populations (Müller

Alloxysta
Apocharips
Dilapothor
Dilyta
Loboptercharips
Lytoxysta
Phaenoglyphis
Thoreauana

Dilyta Förster, 1869

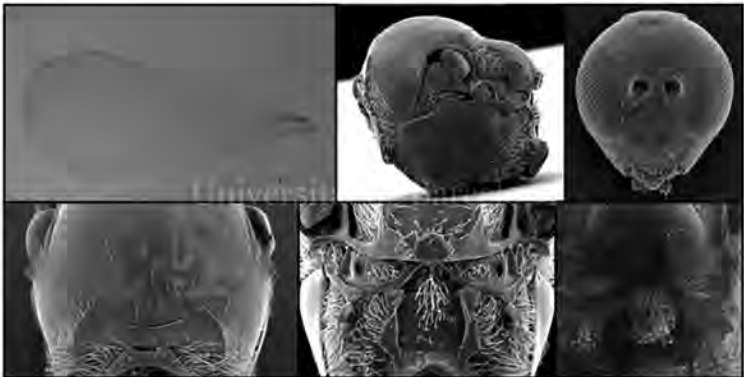
Dilyta Förster, 1869: 340. Type: *Dilyta subclavata* Förster, 1869: 340.
Dylita Förster, 1869: 338. An incorrect original spelling (rejected by Menke & Evenhuis, 1991:152, first revisers), unavailable.
Charips Haliday *IN* Marshall, 1870: 181. Type: *Charips microcera* Haliday in Marshall, 1870. Synonymized by Hellén (1963: 4).
Allotria (*Glyptoxysta* Thomson, 1877: 881).
Glyptoxysta Thomson, 1877 in Asmead (1903: 142). Type: *Glyptoxysta heterocera* Thomson, 1877. Synonymized by Hellén (1963: 4).

Head: Rounded in anterior view, eyes located at middle line of head, malar space subequal to OOC. Surface completely smooth, without any strigae, malar impression, epistomal sulcus or clypeo-pleurostomal lines. Clypeus almost straight, slightly projecting over mandibles, without marginal inflection. Setae sparse, concentrated principally below toruli.

Antennae: Size of pedicel and flagellomeres variable among species. **Female:** 13-segmented, slightly clavate; two last segments (F10–F11) broadly jointed. **Male:** 14-segmented, slightly clavate or filiform; two last segments (F11–F12) broadly jointed.

Mesosoma: Pronotum with setae only in anterior part; pronotal carinae long, clearly indicated, going from scutum to anterior part of pronotum. Mesoscutum smooth, shining, almost without setae. Mesopleuron smooth, without any longitudinal ridge in lower part. Scutellum smooth with scarce setae at posterior and lateral parts. Propodeum with two strong and broad carinae. Apex of scutellum: **HOLARCTIC SPECIES:** with an \cap -shaped carina. **AFROTROPICAL SPECIES:** with one carina at each side, both symmetrical and parallel, distance between them equivalent to distance between propodeal carinae.

Forewing: Large, longer than body, covered with dense pubescence; marginal setae present and long. Veins brown. Radial cell small and completely open along anterior margin; R1 very short, barely reaching costal.



- Specific Key
- Valid Species

Figure 2. Screenshot of one Genus (*Dilyta*) within the website.

et al., 1999; van Veen *et al.*, 2001). The presence of Charipinae can modify the biological control done by hymenopteran parasitoids of aphid pests in at least three ways: (i) increasing primary parasitoid mortality, (ii) increasing the growth rate of the aphid population indirectly and (iii) increasing the propensity for primary parasitoids to disperse (van Veen *et al.*, 2001). For these reasons, studies on subfamily Charipinae are economic and biologically very important.

This way anyone interested on this subfamily can easily get this basic information with only one «click». For more information they could find all of our papers in the Bibliography section of this website.

Genera Key section

In this section it is included the generic key with illustrative plates. This generic key has been already published in Paretas-Martínez *et al.* (2007b). Within the key there are several links which show the morphological features of which are being talked about in the key. The user could use these links with images to assure each step in the key to know if he or she is following correctly the key and also to compare these features which the specimen the user is holding and want to determine. We think this interactive key is a very useful tool for anyone interested in determine any Charipinae specimen. This Genera Key section is the first step to begin addressing the Charipinae studied in any field. Additionally, each genus has a link which redirects to the specific genus section within this website and where the complete information of the genus is included. Thus, once the user has correctly identified the Charipinae genus which is holding can embark on the identification of the specific species. Below is explained which type of information is compiled in each genus section within this website. With this section anyone could easily specify which genus of Charipinae is holding.

Genera section (Fig. 2)

This is one of the most important sections in this website, where it is included most of the information related with the subfamily Charipinae. Within this section it is included all the species information. In total, 161 valid Charipinae species are nowadays recognized (101 *Alloxysta*, 6 *Apocharrips*, 1 *Dilapothor*, 13 *Dilyta*, 1 of *Lytoxysta*, 1 *Lobopterocharrips*, 34 *Phaenoglyphis* and 4 *Thoreauana*). Firstly, when we click on the top link of Genera we arrive to a different page, now we have on the top the eight names of the Charipinae genera and below a plate with one diagnostic character of each genus. To select a genus the user only has to click on the name he or she is interested or in the specific figure of the diagnostic character of the genus in the plate below. Then the user is redirected to the specific genus page.

Each genus is here completely characterized, at the beginning there is the taxonomic information of the genus extracted from the Charipinae Worldwide Catalogue (Ferrer-Suay *et al.*, 2012a), below the diagnosis of the genus is presented with its main general diagnostic features completely explained and at the bottom of this genus page there is a plate showing these generic features in order to make more visual

to the user the characterization of the genus he or she is interested. Additionally, each genus is compound by a submenu with two options:

Specific Key (Fig. 3)

This section has the complete key of the genus including all the considered valid species after the Charipinae worldwide revision. The key has been built as easy as possible so that anyone can follow it. In order to make easier for the user to follow the key some pictures have been added as a links within the key, this way if the user has any doubt clicking to this link will have an idea on how the character which is being talked about in the key is and compare with the specimen the user is holding through the microscope. Moreover, as it was done in the genera key, once the user has determined the species, there is a link with the name of the species available to be redirected to the species corresponding page within this website. The information included in the species page is explained in the section below.

Valid Species (Fig. 3)


In this section there is a complete list of all the species considered valid within each genus. The list is composed by several links of each different species so if the user is sure about the species he or she wants to consult only has to click on this link, instead of being redirectioned from the genus key. Each valid species is completely described with all the morphological features important to distinguish one species from the others. Each species is illustrated in a complete plate besides the description, this way the reader could see the characters at the same time that he/she is reading the description content. Within the description different links with figures have been included so the user can see the specific character extended in the screen with a better resolution. These figures are part of the plate that it is besides the description of the species.

Finder (Fig. 4)

To facilitate the search of a particular taxon this website has a browser named Valid Names section. This section is a valid name finder within the subfamily Charipinae. In this case it is included all the names that have been addressed for the Charipinae species through the years. Initially all the information about taxon names was compiled in the «Worldwide Charipinae Catalogue» (Ferrer-Suay *et al.*, 2012a). All this information is included in this finder completed with the new information acquired after the revision of all the type series of each considered valid species and the faunistic studies from all the biogeographic regions. Due to the chaotic taxonomic status of this subfamily with this tool it will be easier to check the present valid name of each Charipinae species. This way the user will be sure of using the correct name of the species. The search can be done by genus or species. Once the name has been add in the grid by clicking in the button «submit» a list with the results will appear with the names of the genera or species in different colours. In green will appear the valid name which can be used and in red the invalid names or synonymies of the valid name. It will be

Alloxysta *Apocharips* *Dilapothor* ***Dylita*** *Lobopterocha*

Dylita




1. Apex of scutellum with one carina on each side, both symmetrical and parallel higher than axillar strip, distance between them equivalent to distance between propodeal carinae (Fig.).....2
- Apex of scutellum with a \cap -shaped projected plate (Fig.).....6

2. Metasoma with a punctated area on distal part (Fig.).....3
- Metasoma without punctures (Fig.).....4

3. Female: F1 subequal or slightly longer than pedicel, F2 and F3 much shorter than F1, F4 longer than F3 but shorter than F1; F5-F11 wider than previous segments, antenna slightly clavate from F5; sensilla beginning on F4-F5 (Fig.). Male Male: F1 subequal or slightly longer than pedicel, F2 and F3 much shorter than F1, F4 longer than F3 but shorter than F5 to F12.....*D. africana* (Benoit, 1956)
F1 subequal in length to F1 but wider, F3-F11 wider than previous segments, antenna slightly clavate from F5; sensilla beginning on F3 (Fig.). Male unknown.....*D. ghanana* Paretas-Martínez, Pujade-Villar & Melika, 2009


***Dylita africana* (Benoit, 1956)**



Redescription.
Head. Rounded in anterior view, eyes located at the middle line of the head, malar space subequal to OOC. Surface completely smooth, without any striae and without malar impression, epinotal sulcus or clypeo-genaestomal lines. Clypeus almost straight, slightly projecting over mandibles, without marginal inflexion. Setae sparse, concentrated principally below the vertex.
Colouration. Head, mesosoma and metasoma dark brown. Antennae and legs brown or light brown.
Antennae. Female: F1 subequal or slightly longer than pedicel, F2 and F3 much shorter than F1, F4

Figure 3. Screenshot of the part of *Dylita* Specific key within the website, including also the screenshot of the Valid species (*D. africana*) within the website.

Interactive Charipinae Worldwide Database



Buscar

HOME GENERA KEY GENERA **VALID NAMES** BIBLIOGRAPHY

- *Allotria* Westwood 1833
- *Xystus* Hartig 1840
- *Alloxysta* (*Alloxysta*) Förster 1869
- *Alloxysta* Förster 1869
- *Pezophycta* Förster 1869
- *Nephycta* Förster 1869
- *Adelixysta* Kierych 1988
- ***Carvercharips* Carver 1992**

Genus: **Carvercharips**

- *Allotria* (*Allotria*) *arcuata* Kieffer 1902
- *Charips* (*Charips*) *arcuatus* Dalla Torre & Kieffer 1910
- *Alloxysta unicolor* Ionescu 1969
- ***Alloxysta ligustri* Evenhuis 1976**
- *Alloxysta arcuata* Evenhuis & Barbotin 1977

Species: **ligustri**

Submit

Figure 5. Screenshot of the Valid names section of the website where it is shown independently the results of the search by genus (*Carvercharips*) and by species (*A. ligustri*). The correct taxon is marked in black.

faster and a very useful tool which will help anyone to use the correct name of each species. In this case the model of the «Universal Chalcidoidea Database» has been followed.

Bibliography section

In this section it is comprised all the references related in any way with the subfamily Charipinae. Mainly the bibliography included in the «Worldwide Charipinae Catalogue» (Ferrer-Suay *et al.*, 2012a) is here presented which reflect the worldwide study of this subfamily. When it has been possible a link which redirects to a webpage where the reference can be consulted or downloaded has been also added. In case in which it will be legal a scanned copy of the reference will be included and in the most recent papers the PDF document also will be added. This list of references will be continuously updated with new information coming out related with the subfamily Charipinae.

Discussion

This website will not be only a database which collects mere data of species' name and distribution. This website will be an important taxonomic tool with complete descriptions and updated keys. This project intends to complete and improve other databases which have some data of this subfamily.

The main objective is to provide to the scientific community interactive determination keys for agronomists, ecologists, phylogenetic, biologists, etc., (many of them unfamiliar with the taxonomy of the parasitic wasps) so that they could use them to advance in their studies as well as obtain determinations, figures and references. This website will be an important taxonomic tool which will help to conduct ecological, biological and phylogenetic research. It is already finished and opened to the general public on the Internet (www.charipinaedatabase.com).

It is intended to continue expanding this database with other subfamilies of Figitidae family and also, if possible, with the Cynipidae family; so that at the end of this project the Cynipoidea superfamily will be fully digitalized to be consulted online.

Acknowledgements

We are very grateful for the photos that Brian Valentine and «TheSonofDarwin» allow us to include in this website. This research was supported by the project CGL2011-2288 of the Ministerio de Ciencia e Innovación (Spain) and the grant AP2009-4833 of the Ministerio de Educación.

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