

Ethology of the Leucospidae Family (Insecta: Hymenoptera)

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Abstract

The ovipositor of the female (Leucospidae) is sometimes very short, otherwise it is curved and extends along the dorsal part of the abdomen. The males have the peculiarity that the segments of the metasoma form a kind of capsule or shell. The female deposits an egg on or near the prey. When the larva hatches, it first seeks out and kills any competitors and only then begins to feed on the host. The objective of this article is to deal with the animal behavior of the Leucospidae Family. For this, a bibliographic survey of Leucospidae was carried out in the years 1883 to 2022. Only complete articles published in scientific journals and expanded abstracts presented in national and international scientific events were considered. Data were also obtained from platforms such as: Academia.edu, Frontiers, Qeios, Pubmed, Biological Abstract, Publons, Dialnet, World, Wide Science, Springer, RefSeek, Microsoft Academic and Science.

Keywords: Animal behavior; Apidae; Sphecidae; Megachillidae; Hosts

1. Introduction

Leucospids (Leucospidae, sometimes incorrectly called Leucospidae) are a family of apocrite hymenopterans in the superfamily Chalcidoidea. They are a small specialized group composed exclusively of ectoparasitoids of aculeate (stinging) wasp larvae and bees. More than 130 species in 4 genera in the world. Most are from the Neotropics (Figures 1, 2, 3 and 4) [1,2].



Source: <https://www.flickr.com/photos/harisprin/22203234081>

Figure 1 Specimens of Leucospidae Family

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Source: <https://twitter.com/bertonemyia/status/1273730108222775297?lang=fa>

Figure 2 Specimen of Leucospidae Family



Source: <http://www.waspweb.org/chalcidoidea/leucospidae/index.htm>

Figure 3 Specimen of Leucospidae Family

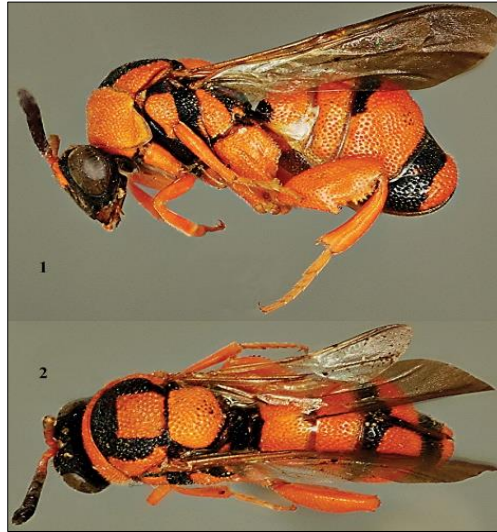


Source: https://commons.wikimedia.org/wiki/File:Chalcid_Wasp_-_Leucospidae_family_Gorongosa_National_Park_Mozambique_%284672872042%29.jpg

Figure 4 Specimen of Leucospidae Family

1.1. Characteristic

They mimic bees or wasps with stingers, with black colors, and designs in yellow, red or white tones generally; sometimes with metallic reflections. They measure 4-7 mm. The mesosoma is robust with strong carving. The femur of the hind legs is usually greatly enlarged, with rows of saw-like teeth along the lower margin, as in the family Chalcididae (Figures 5, 6, 7, 8 and 9) [3,4,5].



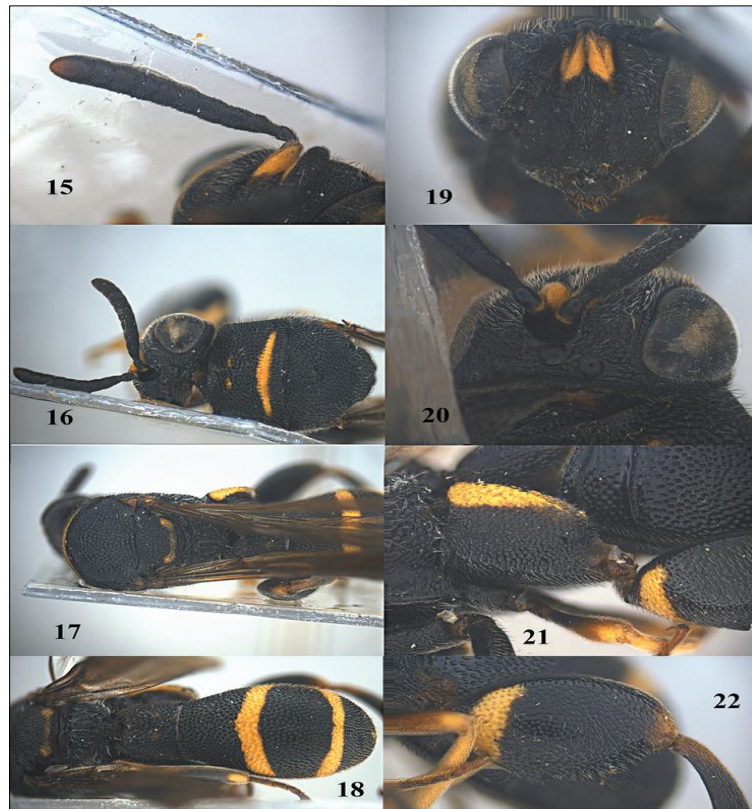
Source: Courtesy of Mr. Paolo Rosa

Figure 5 Female ♀, lectótipo. 1 habitus lateral 2 habitus dorsal (cortesia do Sr. Paolo Rosa)



Source: Courtesy of Mr. Paolo Rosa

Figure 6 ♀, lectotype. 3 Head frontal 4 hind leg



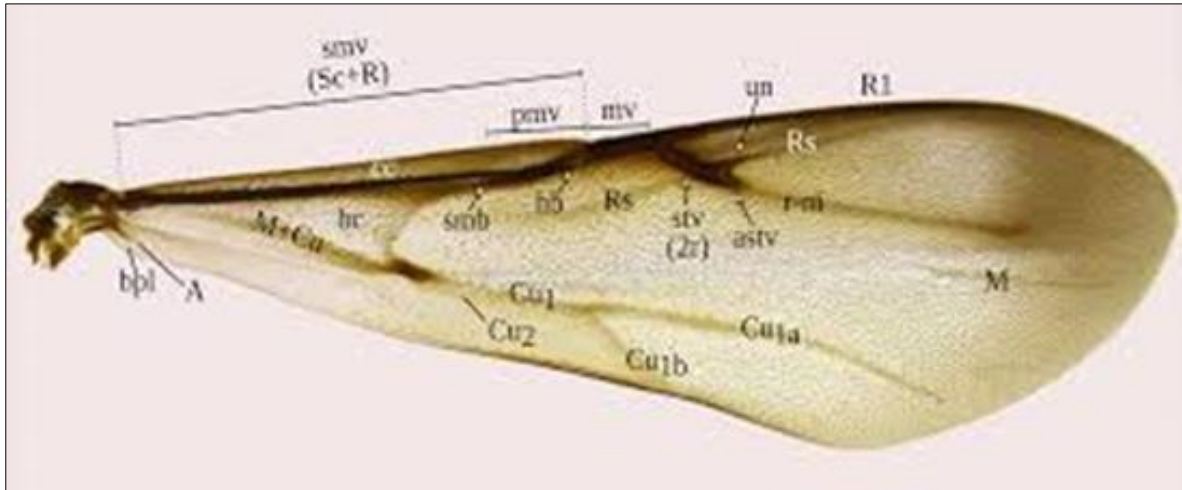
Source: <https://zookeys.pensoft.net/article/11235/element/2/12/>

Figure 7 Male ♂ from Guangdong, Guangyinshan. 15 Antenna 16 head and pronotum dorsal 17 mesosoma dorsal 18 propodeum and metasoma dorsal 19 head frontal 20 head latero-dorsal 21 hind coxa 22 hind femur



Source: <https://www.mindat.org/paleoimg.php?id=463291>

Figure 8 A. Habitus, lateral view. B. Habitus, dorsal view. Red arrow shows the pilosity pattern on tergite IV. C. Forewing. D. Forewing, stigma region in detail. E. Hind wing. F. Head, frontal view. G. Head and mesosoma, dorsal view. H. Scutellum and dorsellum, postero-dorsal view. I. Hind leg, lateral view. J. Hind femur and hind tibia, lateral view



Source: <https://www.ufmg.br/estacaoecologica/wp-content/uploads/2020/11/2018-LIMA.-DIAS-Leucospis-Fabricius.pdf>

Figure 9 Fore wing venation. Abbreviations: A, anal vein; astv, apical process of stigmal vein; bc, basal cell; bpl, basal posterior lobe; cc, Costal cell; Cu, cubital vein; hb, hyaline break; M, medial vein; mv, marginal vein; pmv, premarginal vein; R, radial vein; Rs, radial sector; Sc, subcosta vein; smb, submarginal break; smv, submarginal vein; stv, stigmal vein; un, uncus

2. Natural History

The ovipositor of the female (Leucospidae) is sometimes very short, otherwise it is curved and extends along the dorsal part of the abdomen. The males have the peculiarity that the segments of the metasoma form a kind of capsule or shell. The female deposits an egg on or near the prey. When the larva hatches, it first seeks out and kills any competitors and only then begins to feed on the host (Figures 10 and 11) [6,7,8,9].



Source: <https://bugguide.net/node/view/1023228/bgpage>

Figure 10 Leucospidae, ovipositor



<https://en.wikipedia.org/wiki/Leucospidae>

Figure 11 Pollination carried out by Leucospidae

3. Food

Parasitoids of Aculeate Hymenoptera (mainly solitary bees, less frequently solitary wasps, e.g. Vespidae and Sphecidae (Figure 12) [8,9].



Source: <https://thebeesneeds.wordpress.com/2014/09/06/insects-of-week-a-tale-of-two-parasites/>

Figure 12 A female *Leucospis bifasciata* Klug, 1814, ovipositing through completed nest plug in block 131068. Nest type: parasitizes available larvae usually Megachilidae (Hymenoptera). Giant Chalcidoid. Nest tunnels used: parasitizes any available tunnel. Looks like: a smooth bodied, black and yellow wasp, females have a bulbous abdomen (ovipositor wraps over it). Size: 7 to 12 mm. This week we profile two parasites, one that “attacks” after nests are completed and one that “attacks” as the nests are being made or even before nest construction begins

3.1. Life Cycle

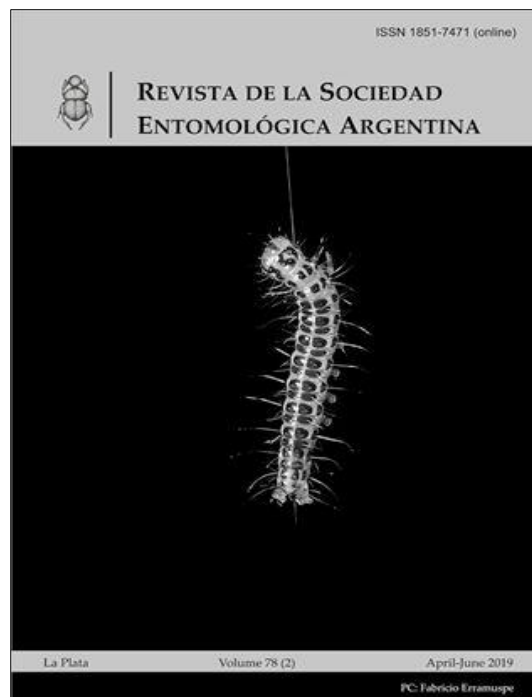
Eggs are deposited externally on the host larva or nearby. The first instar larva does not feed at first but searches the host cell for competitors; only one parasitoid larva survives and develops as an ectoparasitoid sucking the body fluids of the host. the position of the attacked cells was variable, suggesting that females of *Leucospis* species oviposit in recently built cells, and that the hatching of larvae is delayed, or that the first larval stage waits until the host larva reaches a sufficient size to attack (Figure 13) [9,10].



Source: <https://mobile.twitter.com/hashtag/leucospidae?src=hash>

Figure 13 Leucospidae parasitoid of our beloved solitary bees

In general, leukospiders are not very common and are only found in places where their hosts are abundant. They are sometimes found visiting flowers. The most common species is *Leucospis affinis* Say, 1824, which attacks megachilid bees (Figures 14 and 15).



Source: https://en.wikipedia.org/wiki/Xylocopa_micans

Figure 14 *Leucospis leucotelus* Walker, 1852 (Hymenoptera: Leucospidae) as a parasitoid of the large carpenter bee *Xylocopa lateralis* Say, 1837 (Hymenoptera: Apidae)



Source: <https://www.redalyc.org/journal/3220/322058500003/html/>

Figure 15 Habitus of species of *Xylocopa* and *Leucospis*. a. female of *Xylocopa* (*Schonnherria*) *lateralis* Say, 1837; b-c. *Leucospis leucotelus* walker 1852 valor female and male respectively (Hymenoptera: Apidae)

Leucospid leucotelus Walker, 1852: Material examined: 3♀, 1♂. Colombia, Norte de Santander, Pamplonita, 7° 27' 8.64" N; 72° 38' 69" W; 1610 m, 13-III-2014 [March 13th, 2014], ex. W. Hoffmann. Parasitoid of nests of *Xylocopa* (*Schonnherria*) *lateralis* Say, 1837. These specimens, as well as the two adult females of *X. lateralis*, are deposited in the Snow Entomological Collection, University of Kansas Natural History Museum, Lawrence, Kansas, U.S.A. The remaining adult bee female and male specimens are in the insect collection of the Universidad de Pamplona, Pamplona, Colombia.

3.2. Taxonomy, Phylogeny and Fossil

More than 130 species in 4 genera in the world. Most are from the Neotropics. One known fossil, *Leucospis glaesaria*, was found in early Miocene Dominican amber.

Genus: *Leucospis*, *Micrapion* and *Neleucospis* (Figures 16, 17 and 18).



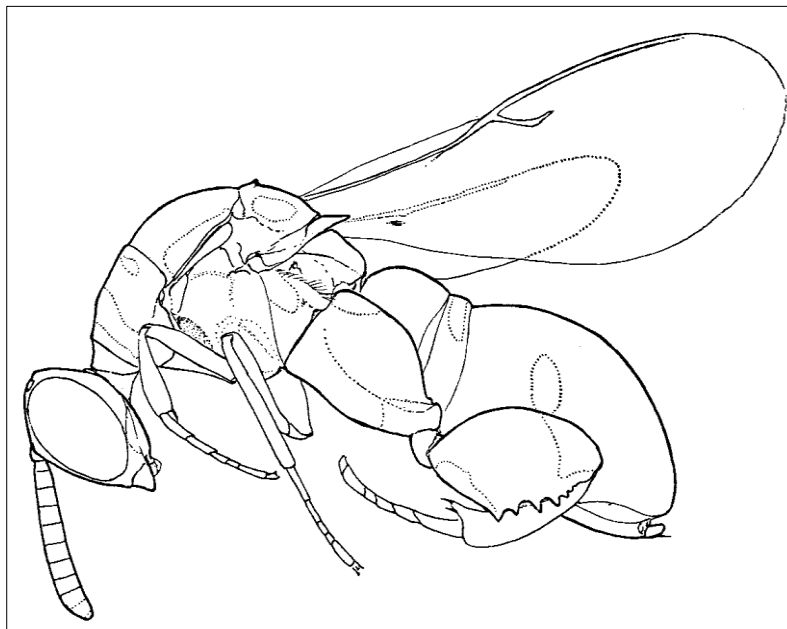
Source: <http://www.waspweb.org/chalcidoidea/leucospidae/index.htm>

Figure 16 *Leucospis* Fabricius, 1775



Source: <http://www.waspweb.org/chalcidoidea/leucospidae/index.htm>

Figure 17 *Micropion* Kriechbaumer, 1894



Source: <http://www.waspweb.org/chalcidoidea/leucospidae/index.htm>

Figure 18 *Neleucospis* Bouček, 1974

Distribution: Worldwide, predominantly in tropical and subtropical regions.

Biology: Ectoparasitoids of solitary bees (Apidae) and wasps (Eumeninae and Sphecidae).

Leucospis dorsigera Fabricius, 1775

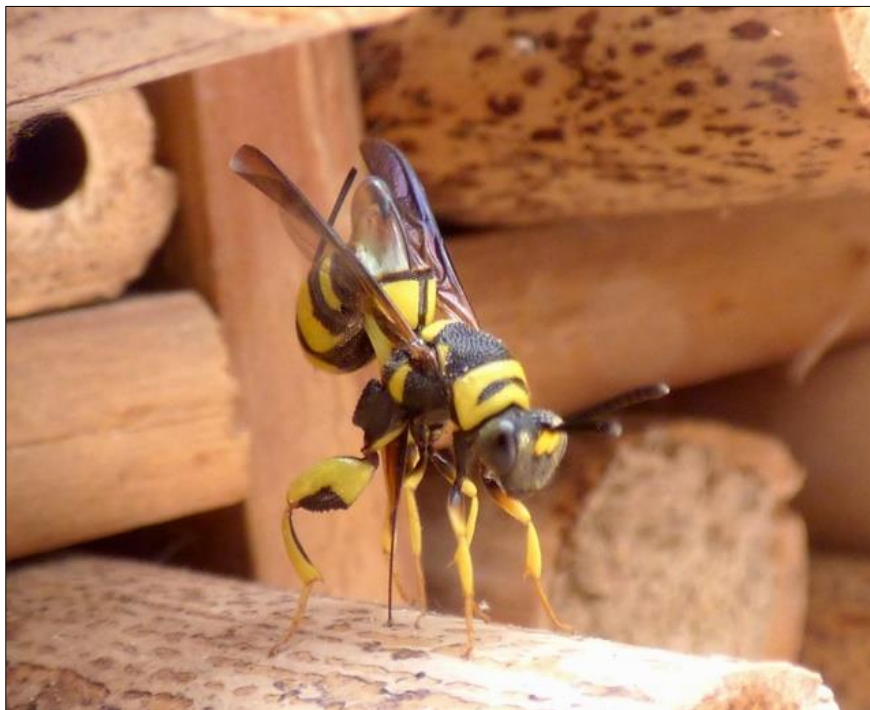
Surpalaeartic element. In Spain it has been cited in multiple provinces including Huesca and Zaragoza. Parasitoid species of solitary bees (Hymenoptera, Megachilidae)

Material Studied: 4 1. Malaise Trap: 6-VII-91: 1. Sweep: in the *Carduo pycnocephali-Hordeetum leporini*: 22-V-93: 2; in *Retama sphaerocarpa*: 11-VI-92: 2. (Figures 19, 20, 21, 22, 23, 24, 25 and 26) [12,13,14,15].



Source: https://www.researchgate.net/figure/Leucospis-dorsigera-Fabricius-1775-female-lateral-view_fig1_346052779

Figure 19 *Leucospis dorsigera* Fabricius, 1775, female, lateral view



Source: <https://www.flickr.com/photos/110220694@N02/20577549205/>

Figure 20 *Leucospis dorsigera* Fabricius, 1775: Parasitising my bees



Source: Photographs © Simon van Noort (Iziko Museums of South Africa)

Figure 21 *Leucospis dorsigera* Fabricius, 1775: Parasitising my bees



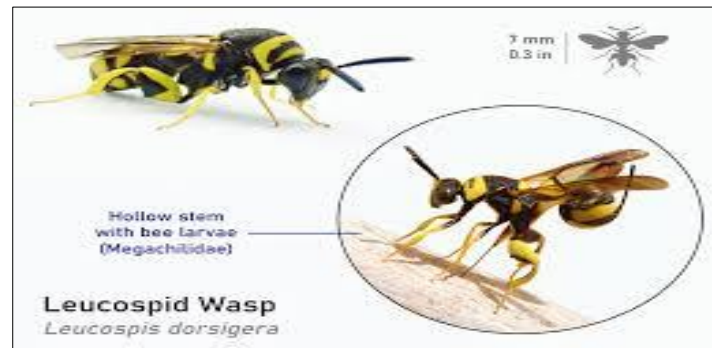
Source: Photographs © Simon van Noort (Iziko Museums of South Africa)

Figure 22 *Leucospis dorsigera* Fabricius, 1775: Parasitising my bees



Source: Photographs © Simon van Noort (Iziko Museums of South Africa)

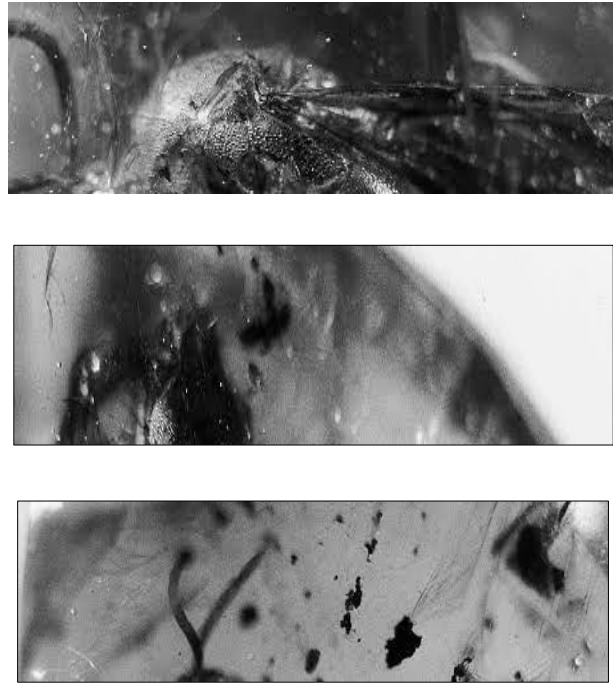
Figure 23 *Leucospis dorsigera* Fabricius, 1775: Parasitising my bees



Source: <https://www.facebook.com/FocusWildlife/posts/leucospid-wasps-are-capable-of-finding-solitary-bee-larvae-even-when-theyre-hidd/806729569864314/>

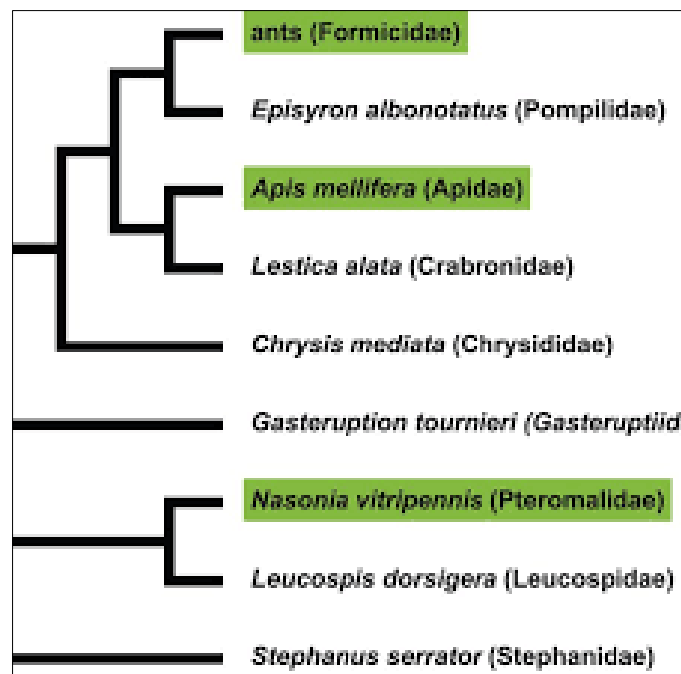
Figure 24 Leucospid wasps are able to find solitary bee larvae even when they are hiding in wooden stems. Once located, the female wasp unsheathes her ovipositor (oviposition tube) and pierces the wood, laying an egg in the bee larvae. The wasp larvae themselves hatch and begin to consume (and eventually kill) the bee





Source: <https://www.tandfonline.com/doi/abs/10.1080/00222930110059682?journalCode=tnah20>

Figure 25 The first leucospid wasp from the fossil record (Hymenoptera: Leucospidae)



Source: https://www.researchgate.net/figure/Hypothesized-phylogenetic-relationships-of-apocritan-Hymenoptera-studied-in-this_fig5_228331727

Figure 26 Hypothesized phylogenetic relationships of apocritan Hymenoptera studied in this investigation. Taxa with sequenced genomes are highlighted in green; their genome sequences were analyzed to identify single-copy genes and to design degenerate oligonucleotide PCR primers. DNA of non-highlighted species was used to assess the functionality of the inferred PCR and sequencing primers

Objective

The objective of this article is to deal with the animal behavior of the Leucospidae Family.

4. Methods

The method used to prepare this mini review was Marchiori 2021 methodology [16].

Studies carried out and selected

4.1. Study 1

4.1.1. Distribution

Afrotropical region: Burundi, Central African Republic, Congo, Democratic Republic of Congo, Eritrea, Ethiopia, Gabon, Ghana, Ivory Coast, Kenya, Lesotho, Liberia, Malawi, Madagascar, Mozambique, Namibia, Nigeria, Saudi Arabia, South Africa, Sudan, Tanzania, Uganda, Yemen, Zambia, Zimbabwe. Also, worldwide.

4.1.2. Biology

Parasitoids of solitary bees and wasps.

Leucospis africana Cameron, 1907; *Leucospis arabica* Gadallah and Soliman, 2018; *Leucospis carinifera* Kriechbaumer, 1894; *Leucospis elegans* Klug, 1834; *Leucospis fallax* Bouček, 1974; *Leucospis fuelleborniana* Enderlein, 1903; *Leucospis holubi* Bouček, 1974; *Leucospis incarnata* Westwood, 1839; *Leucospis insularis* Kirby, 1900; *Leucospis namibica* Bouček, 1974; *Leucospis obsolete* Klug, 1834; *Leucospis ornata* Westwood, 1839; *Leucospis osmia* Bouček, 1974; *Leucospis parvula* Bouček, 1974; *Leucospis pubescens* Bouček, 1974; Reverse *Leucospis* Bouček, 1974; *Leucospis rostrata* Bouček, 1974; *Leucospis schlettereri* Schulthess-Schindler, 1899; *Leucospis tricolor* Kirby, 1883; *Leucospis varicollis* and Cameron, 1909 (Figures 27, 28, 29, 30 and 31) [17,18,19].



Source: <http://www.waspweb.org/chalcidoidea/leucospidae/Leucospis/index.htm>

Figure 27 *Leucospis tricolor* Kirby, 1883



Source: <http://www.waspweb.org/chalcidoidea/leucospidae/Leucospis/index.htm>

Figure 28 *Leucospis varicollis* Cameron, 1909



Source: <http://www.waspweb.org/chalcidoidea/leucospidae/Leucospis/index.htm>

Figure 29 *Leucospis* species



Source: <http://www.waspweb.org/chalcidoidea/leucospidae/Leucospis/index.htm>

Figure 30 *Leucospis africana* Cameron, 1907



Source: <http://www.waspweb.org/chalcidoidea/leucospidae/Leucospis/index.htm>

Figure 31 *Leucospis carinifera* Kriechbaumer, 1894

4.2. Study 2

4.2.1. Distribution

Afrotropical region: Cameroon, Democratic Republic of Congo, Gabon, Ghana, Kenya, Liberia, Nigeria, Madagascar, Mozambique, Saudi Arabia, South Africa, Tanzania and Zimbabwe.

4.2.2. Biology

Parasitoids of solitary bees (*Ceratina Latreille*) (Bouček, 1974; Daly, 1988).

Micrapion biimpressum Bouček, 1974; *Micrapion bilineatum* Kriechbaumer, 1894; *Micrapion clavaforme*; Steffan, 1948; *Micrapion congoense* Steffan, 1948; *Micrapion dalyi* Bouček, 1974; *Micrapion dolichum* Bouček, 1974; *Micrapion flavocinctum* (Kieffer, 1905); *Micrapion lugubre* Bouček, 1974; *Micrapion nasutum* Bouček, 1974; *Micrapion punctulatum* Bouček, 1974; *Micrapion richardsi* Bouček, 1974; *Micrapion steffani* Bouček, 1974 and *Micrapion* species (Figures 32, 33, 34 and 35) [20,21,22].



Source: <http://www.waspweb.org/chalcidoidea/leucospidae/Micrapion/index.htm>

Figure 32 *Micrapion bilineatum* Kriechbaumer, 1894



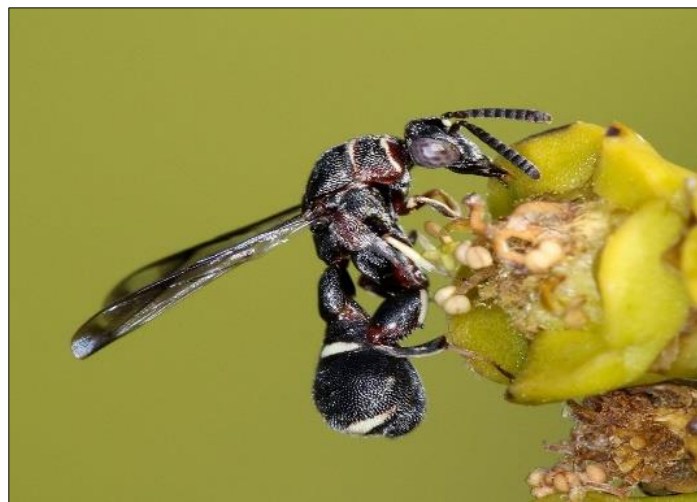
Source: <http://www.waspweb.org/chalcidoidea/leucospidae/Micrapion/index.htm>

Figure 33 *Micrapion clavaforme* Steffan, 1948



Source: <http://www.waspweb.org/chalcidoidea/leucospidae/Micrapion/index.htm>

Figure 34 *Micrapion steffani* Bouček, 1974



Source: <http://www.waspweb.org/chalcidoidea/leucospidae/Micrapion/index.htm>

Figure 35 *Micrapion* species

4.3. Study 3

4.3.1. Distribution

Ivory Coast, Nigeria and Sierra Leone.

4.3.2. Biology

Host: *Pison* sp. (Crabronidae) (Figure 36) [23,24,25,26,27,28].



Source: <http://www.waspweb.org/chalcidoidea/leucospidae/Neleucospis/index.htm>

Figure 36 *Neleucospis masculina* Bouček, 1974

4.4. Study 4

The collection of Hymenoptera calcidoids deposited in the Museum of Zoology of Barcelona has been loaned by various entomologists, mainly from the Catalan area, such as Antiga, Sagarra, Codina, Zariquiey, Iiofill, Maluquer and Vilarrúbia, among many others.

The objective of this note is the study of the family Leucospidae. This family, fundamentally tropical, is represented in Europe by the genus *Leucospis* Fabricius, who is cosmopolitan, with a total of six species.

- *Leucospis biguetina* Jurine, 1807

L. jurinei Tourn., in littera n.syn.

Biology: Unknown

Distribution species: Palearctic (Europe and Mediterranean subregion). New species for Catalonia (Barcelona). Known in the Spanish state from the provinces of Ávila, Burgos, Madrid, Orense and Salamanca (Figure 37).



Source: Ramon M Batlle

Figure 37 *Leucospis biguetina* Jurine, 1807

- *Leucospis gigas* Fabricius, 1793

Biology: Parasitic species of several Megachilinos (Hym., Megachilidae).

Distribution: Mediterranean and Species cited in Catalonia (Lleida), its distribution is extended to the provinces of Barcelona and Tarragona. Known in the Spanish state for numerous provinces (Figure 38).



Source: https://www.researchgate.net/figure/Female-of-Leucospis-gigas-FaBricius-1793-body-length-21-mm-photo-B-Wisniowski-Ryc_fig1_332104298

Figure 38 *Leucospis gigas* Fabricius, 1793

- *Leucospis dorsigera* Fabricius, 1775

Biology: Parasitic species of several Megachilins (Hym., Megachilidae).

Distribution: Palearctic (all of Europe and the Sub-Mediterranean region). New species for Catalonia (Barcelona and Tarragona). Known in the Spanish state from numerous provinces (Figure 39).



Source: https://www.researchgate.net/figure/Leucospis-dorsigera-Fabricius-1775-female-lateral-view_fig1_346052779

Figure 39 *Leucospis dorsigera* Fabricius, 1775

- *Leucospis brevicauda* Fabricius, 1804

Biology: Unknown.

Distribution: Mediterranean (Europe and North Africa). Species cited in Catalonia (Barcelona and Girona). In the Spanish state it has been cited, for these mentioned authors, in several provinces (Alicante, Almeria, Granada, Madrid, Malaga and Valencia) (Figure 40).



Source: <https://www.biodiversidadvirtual.org/insectarium/Leucospis-brevicauda-img79437.html>

Figure 40 *Leucospis brevicauda* Fabricius, 1804

- *Leucospis intermedia* Illiger, 1807

Biology: Unknown, although cited in *Osmia (Osmia) emarginata* Lepeletier 1841 (Hymenoptera: Megachilidae).

Distribution: Mediterranean. New species for Catalonia (Barcelona). In the Spanish state it has been widely found in several provinces (Figure 41).



Source: <https://www.biodiversidadvirtual.org/insectarium/Leucospis-intermedia-Illiger-1807-img909138.html>

Figure 41 *Leucospis intermedia* Illiger, 1807

- *Leucospis antigana antiga*, 1885 (nomen nudum).

This species was in a list of Hymenoptera collected in Montseny. No description found in the literature. In the Museum of Zoology, presumed place of find the type specimens, there is neither one with that name [29,30,31,32].

4.5. Study 5

Such aspects and the few works of this nature in the State of Minas Gerais, justify this study that aimed to generate a greater knowledge about the diversity of the entomofauna of Hymenoptera, a parasitic group, in the municipality of Barroso, including Mata do Baú and the most preserved fragments of riparian forest adjacent to Rio of Deaths. The areas to be studied are located in priority regions for the conservation of the flora and invertebrates in the State.

We collected 610 individuals of parasitoids distributed in 26 identified families. In the riparian forest, 309 specimens were collected, distributed in 19 families and in the Mata do Chest, 301 specimens distributed in 24 families (Figure 42).



Source: <https://trilhasviagens.com.br/sao-bento-do-sapucaia-pedra-do-bau-atrativos/>

Figure 42 Mata do Baú, Minas Gerais, Brazil

Mata do Baú, privately owned, has approximately 400 hectares with formations of cerrado and semideciduous forest, with three streams that are tributaries of the Rio das Mortes. A Malaise trap was installed in the Baú forest and another in the Mata Ciliar in March 2010, and the collections were carried out twice a month, totaling nine collections in each area (Figure 43).



Source: https://en.wikipedia.org/wiki/Rio_das_Mortes_%28Minas_Gerais%29

Figure 43 Rio das Mortes, Minas Gerais, Brazil

The most abundant family was Ichneumonidae, represented by 24.6% of the individuals collected in Mata do Baú and 29.4% of those collected in the Mata Ciliar, followed by Braconidae with 20.2% in Mata do Baú, and by Platygastridae with 15% in Ciliary Forest (Figure 44).



Source: https://www.researchgate.net/figure/Large-Malaise-trap-utilizing-a-prefabricated-aluminum-frame-After-Marston-1965-used_fig2_347172209

Figure 44 Malaise trap

In Mata do Baú, a specimen of Leucospidae was collected, considered a rare family. These insects are occasionally found in flowers and constitute ectoparasites of Hymenoptera of the Apidae and Vespidae families [33,34,35].

4.6. Study 6

This family is divided into 4 genera for 134 species, the *Leucospis* genus only comprises 84% of the species (112 species).

- Cosmopolitan *Leucospis* Fabricius 1775 mainly parasite of Megachillidae (Figure 45).



Source: <http://www.waspweb.org/Apoidea/Megachilidae/index.htm>

Figure 45 Host Megachillidae Family

- *Micrapion* Kriechbaumer 1894 restricted to Africa in *Ceratina* (Xylocopinae) and *Ceratinella* (Spider) (Figures 46 and 47).



Source: https://en.wikipedia.org/wiki/Ceratina_smaragdula

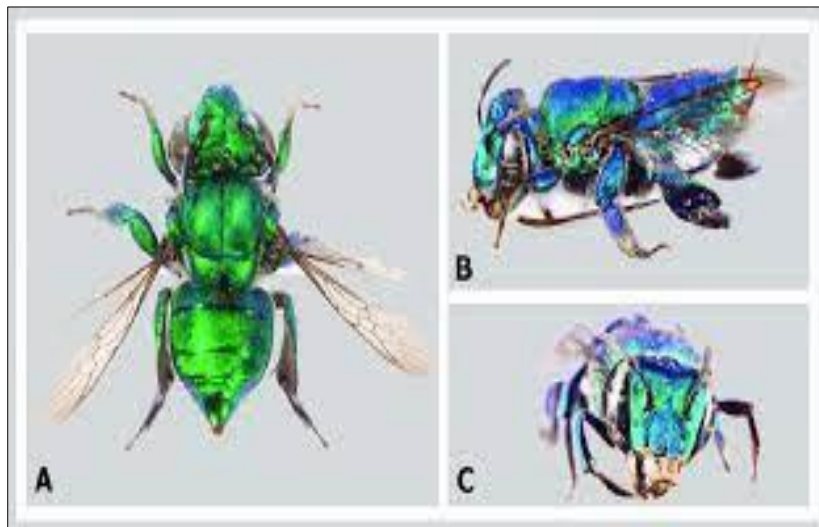
Figure 46 Host *Ceratina* (Xylocopinae) (Hymenoptera: Apidae)



Source: <https://bugguide.net/node/view/1320765/bgpage>

Figure 47 Host *Ceratinella* (Spider)

- *Polistomorpha* Westwood 1839 present only in South America in *Euglossa* (Apidae) (Figure 48).



Source: Photos: Sidney Cardoso (2020).

Figure 48 A specimen of the genus *Euglossa* (Apidae: Euglossini). Body length: 1.1 cm. B) Side view. C) Front view

All Leucospidae species are ectoparasites of Hymenoptera aculea larvae, mainly Megachillidae, but are found parasitizing the following families:

Apidae (genera *Antophora*, *Euglossa*, *Xylocopa*), Eumenidae (*Xenorynchium*), Megachillidae (*Anthidiellum*, *Anthidium*, *Chalicodoma*, *Hoplitis*, *Megachille*, *Osmia*, *Stelis*), Mellitidae (*Ctenoplectra*), Sphecidae (*Chalybion*, *Psenulus*, *Sphex*) and Vespidae (*Ancistrocerus*, *Anterhynchium*, *Calligaster*) (Figures 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61 and 62) [36,37].



Source: <https://pt.dreamstime.com/foto-de-stock-abelha-peludo-footed-da-flor-plumipes-de-anthophora-perfil-image90350338>

Figure 49 Host *Antophora* (Apidae)



Source: <https://pxhere.com/pt/photo/1535445>

Figure 50 Host Eumenidae, Eumeninae, *Xenorynchium*



Source: <https://www.biodiversity4all.org/taxa/52777-Megachilidae>

Figure 51 Host *Anthidiellum* (Megachillidae)



Source: <https://pt.dreamstime.com/abelhas-de-mel-anthidium-sticticum-megachilidae-isolados-em-fundo-branco-colmeia-col%C3%B4nia-image225615285>

Figure 52 Host *Anthidium* (Megachillidae)



Source: <https://www.wikiwand.com/en/Chalicodoma>

Figure 53 Host *Chalicodoma* (Megachillidae)



Source: https://en.wikipedia.org/wiki/Hoplitis_fulgida

Figure 54 *Hoplitis* (Megachillidae)



Source: https://www.wikiwand.com/en/Osmia_uncinata

Figure 55 Host *Osmia* (Megachillidae)



Source: <https://elp.tamu.edu/ipm/bugs/bees/hymenoptera-megachilidae-stelis-dark-bees-a/>

Figure 56 Host *Stelis* (Megachillidae)



Source: <https://en.wikipedia.org/wiki/Ctenoplectra>

Figure 57 Host *Ctenoplectra* (Mellitidae)



Source: <https://bugguide.net/node/view/1379075>

Figure 58 Host *Chalybion* (Sphecidae)



Source: <https://jhr.pensoft.net/article/55832/>

Figure 59 Host *Psenulus* (Sphecidae)



Source: <https://sciencepress.mnhn.fr/en/periodiques/european-journal-taxonomy/796/1>

Figure 60 Host *Sphecx* (Sphecidae)



Source: <https://twitter.com/invertophiles/status/1498245792515391490>

Figure 61 Host *Ancistrocerus* (Vespidae)



Source: https://www.brisbaneinsects.com/brisbane_vespoidwasps/FireTailedPotterWasp.htm

Figure 62 Host *Anterhynchium* (Vespidae)

5. Conclusion

The ovipositor of the female (*Leucospidae*) is sometimes very short, otherwise it is curved and extends along the dorsal part of the abdomen. The males have the peculiarity that the segments of the metasoma form a kind of capsule or shell. The female deposits an egg on or near the prey. When the larva hatches, it first seeks out and kills any competitors and only then begins to feed on the host.

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