World Journal of
Advanced Science and Tehnology

Journal homepage: https://zealjournals.com/wjast/

(REVIEW ARTICLE)

Diversity and ecology of the Family Orussidae (Insecta: Hymenoptera)

Carlos Henrique Marchiori *

Department of Biological Science, Instituto Federal Goiano, Goias, Brazil.

World Journal of Advanced Science and Technology, 2023, 03(01), 014–031

Publication history: Received on 16 March 2023; revised on 25 April 2023; accepted on 28 April 2023

Article DOI: https://doi.org/10.53346/wjast.2023.3.1.0050

Abstract

The biology of the Siricoidea superfamily, a sister group of the Symphyta and the family Orussidae (Parasitica: Woodwasps), can be imagined as the evolution of parasitoids would have been. The larvae of the Siricoidea wasps generally feed on dead wood that has been previously digested by a fungal symbiont. For this reason, many species carry spores of the fungus that they leave on the wood during oviposition. Diversity and ecology of parasitoid insects of the Family Orussidae (Insecta: Hymenoptera). In summary, basically, the following steps of analysis were covered:

- Exhaustive reading of each national and international article aiming at a global understanding and discovery of the approach used by its authors;
- Identification of the central ideas of each article;
- Classification of ideas around nuclei of meaning;
- Comparison between the different nuclei of meaning present in the studied articles;
- Classification of the nuclei of meaning in broader axes (themes) around which the authors' discussions revolved and (e) writing of the interpretative syntheses of the theme.

Book scientific chapters, theses banks, university dissertations, national and international scientific articles, scientific journals book scientific chapters, theses banks, university dissertations, scientific journals and https://www.researchgate.net/post/How_to_increase_the_research_results_visibility were also used. https://goo.gl/gLTTTs), HAL (https://hal.archives-ouvertes.fr/submit/index, SSRN (https://hq.ssrn.com/login/pubsigninjoin.cfm and ResearchGate (https ://www.researchgate.net/signup.SignUp.html).

Keywords: Coleoptera; Ectoparasites; Hosts: Larvae; Wood

1 Introduction

The Orussidae family is a small group of Hymenoptera that includes some 85 species worldwide. Traditionally, included in the Symphyta suborder, their larvae deviate from the phytophagous regime of the group and are ectoparasites of xylophagous insect larvae. They are considered a rare group in which numerous species are known from few specimens from few localities, even in many species only the typical material is known. The phylogeny and the biogeography of the group have been analyzed in three excellent works by Vilhelmsen (Figures 1-3) [1,2,3].

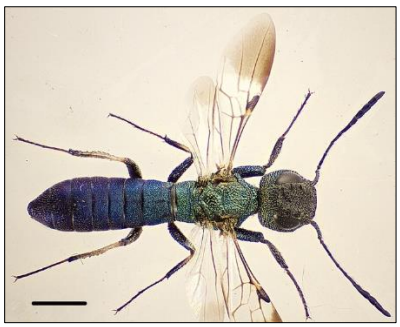
* Corresponding author: Carlos Henrique Marchiori

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

Figure 1 *Orussus coronatus* Fabricius, 1798, a junior synonym of *Orussus abietinus* (Scopoli, 1763) and type species of *Orussus* Latreille, 1797

Sources: Determined by Salvador Vitanza, Confirmed by Dr. Lars Vilhelmsen and https://elp.tamu.edu/ipm/bugs/family-orussidae/hymenoptera-orussidae-kulcania-tomentosa-parasitic-wood-wasps-female-l/

Figure 2 *Kulcania tomentosa* (Middlekauff, 1983). Parasitic woodwasps: Female

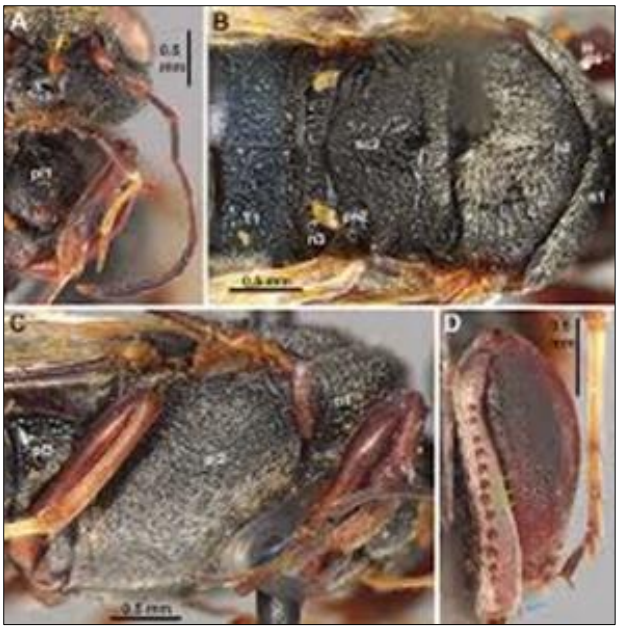


Source: http://www.waspweb.org/orussoidea/orussidae/Chalinus/Chalinus_albitibialis.htm

Figure 3 *Chalinus albitibialis* Vilhelmsen, 2005

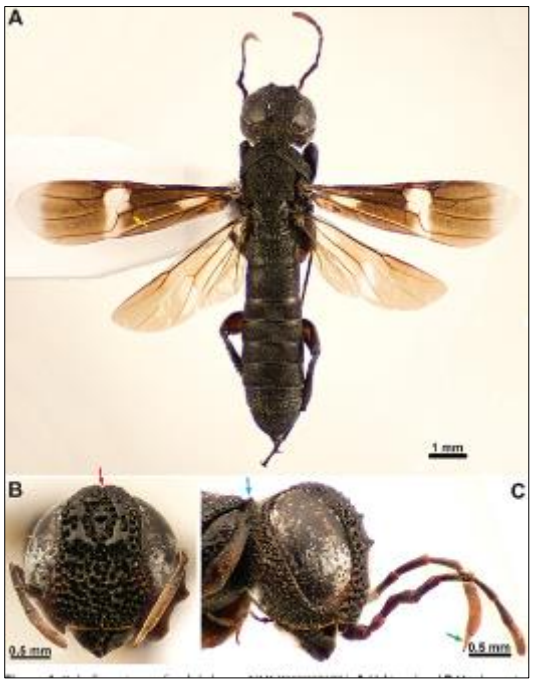
2 Description

The adults of this family are characterized by presenting cylindrical body, with very hard integuments, a head with two tubercles on the face, widely separated eyes located on both sides of jaws articulated, antennae short and stout inserted below the clypeus, under the eyes and at the level of the mouth, intermediate tibiae with two spurs, front tarsi with 5 knuckles in males and 3 knuckles in females, antennae divided into 11 segments in males and 10 in females and, in these last ones, a long and thin ovipositor; the forewings have a single mid-ulnar cell, the rest of the veins are greatly reduced and appear only lightly pigmented (Figure 4-12) [4,5,6].



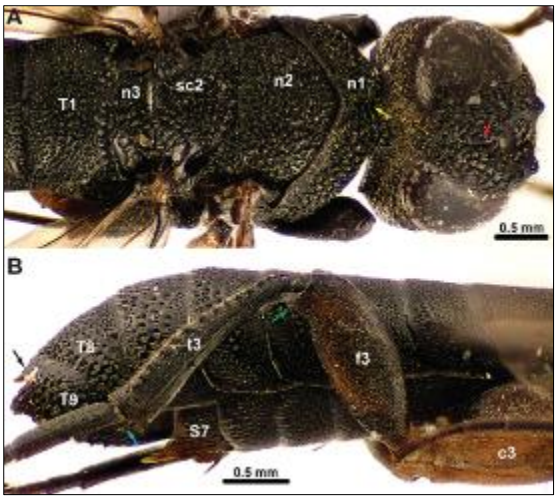
Source: https://www.semanticscholar.org/paper/A-new-species-of-Ophrella-Middlekauff%2C-1985-from-Vilhelmsen/34f875ea6fa0ec217795c20ce26160c90887570f

Figure 4 *Orussobaius nielspederi* sp. nov. (A): Antenna and mouthparts, ventral. (B): Thorax, dorsal. (C): Thorax, lateral. (D): Hind femur and tibia. — Abbreviations and arrows: (md)= mandible; (n1) = pronotum; (n2) = mesoscutum; (n3) = metanotum; (pl1) = propleuron; (pl2) = mesopleuron; (pl3) = metapleuron; (pn2) = mesopostnotum; (sc2) = mesoscutellum; (T1) = tergum (1); red arrow = maxillary palp; yellow arrow = labrum; green arrows = dorsal pegs on hind tibia; blue arrow = hind tibial apical spur



Source: https://www.semanticscholar.org/paper/A-new-species-of-Ophrella-Middlekauff%2C-1985-from-Vilhelmsen/34f875ea6fa0ec217795c20ce26160c90887570f

Figure 5 *Ophrella seagi* sp. nov., female. (A) Habitus dorsal (B) Head, anterior (C) Head and antenna, lateral. Yellow arrow = cross vein cu-a; red arrow = longitudinal furrow on top of the head; blue arrow = pronotal transverse carina; green arrow = antennomere 10

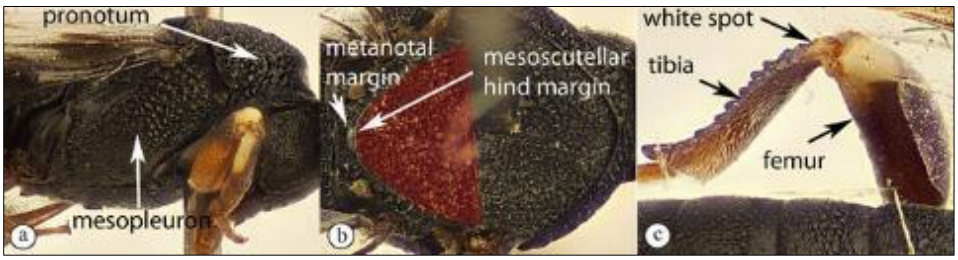


Sources: Photographs © Lars Vilhelmsen (Natural History Museum of Denmark, Copenhagen), photographs © Stephen M. Blank (Senckenberg Deutsches Entomologisches Institut) and photographs © Simon van Noort (Iziko Museums of South Africa)

Figure 6 *Ophrella seagi* sp. n., female holotype. (A) Head and thorax, dorsal (B) Hind leg and abdomen, lateral. Yellow arrow = notch, pronotal transverse carina; red arrow = longitudinal furrow, top of the head; black arrow = projection, tergum 8; blue arrow = hind tibial apical spur; green arrow = triangular projection on hind femur. (c3) = hind coxa; (f3) = hind femur; (n1) = pronotum; (n2) = mesoscutum; (n3) = metanotum;(sc2) = mesoscutellum; (S7) = sternum (7); (t3) = hind tibia; T[x] = tergum [x]

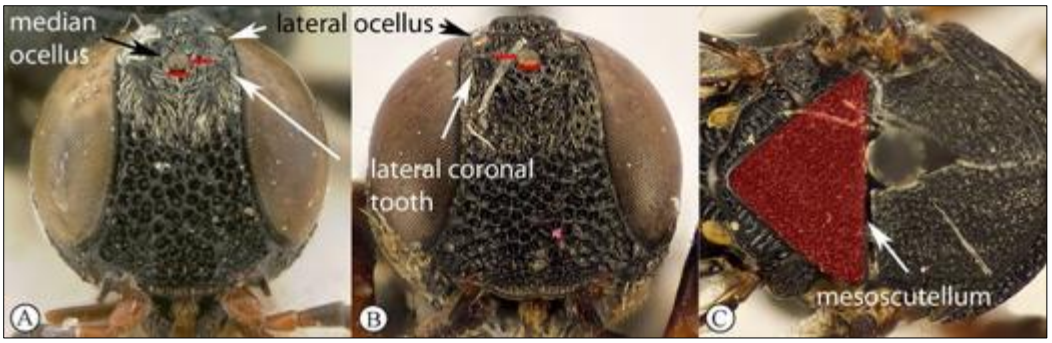
Source: http://www.waspweb.org/orussoidea/orussidae/Keys/Dichotomous_keys/Key_to_Orussus_species.htm

Figure 7 *Orussus tessmanni* Enslin, 1913 Antennomeres (1–2) dark brown, the same color as remaining antennomeres (male unknown) (A, B)



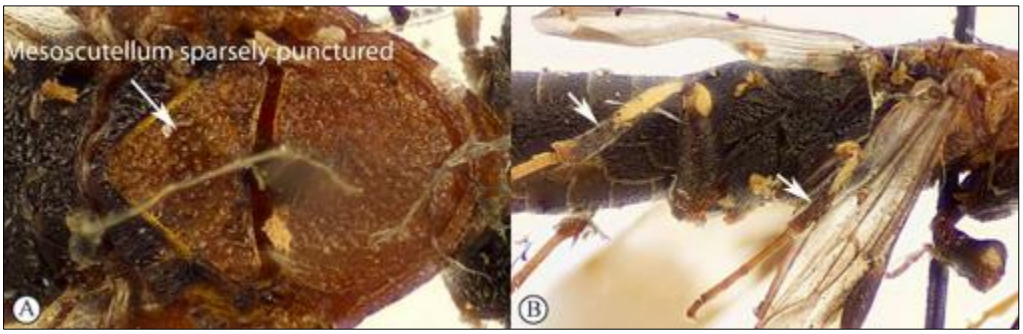
Sources: Photographs © Lars Vilhelmsen (Natural History Museum of Denmark, Copenhagen), photographs © Stephen M. Blank (Senckenberg Deutsches Entomologisches Institut) and photographs © Simon van Noort (Iziko Museums of South Africa)

Figure 8 *Orussus spinifer* (Benson, 1955). Mesoscutum with weakly developed longitudinal carina medially (a); mesoscutellum with hind margin not reaching anterior margin of metanotum, mesopostnotum continuous posteriorly (b); hind tibia with white spot proximally (male unknown) (c)



Sources: Photographs © Lars Vilhelmsen (Natural History Museum of Denmark, Copenhagen), photographs © Stephen M. Blank (Senckenberg Deutsches Entomologisches Institut) and photographs © Simon van Noort (Iziko Museums of South Africa)

Figure 9 Ocellar corona narrow, distance between median ocellus and lateral most coronal tooth less than 2x the diameter of former (red bars) (A), dorsal most coronal tooth situated at level with lateral ocellus; mesoscutellum triangular, angled posteriorly (B)

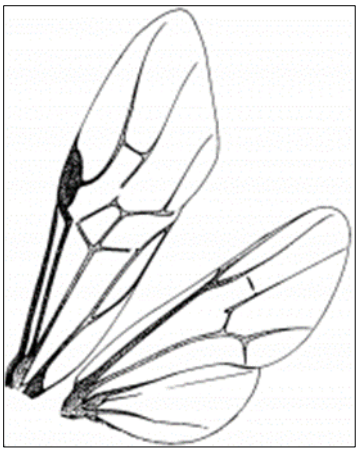


Sources: Photographs © Lars Vilhelmsen (Natural History Museum of Denmark, Copenhagen), photographs © Stephen M. Blank (Senckenberg Deutsches Entomologisches Institut) and photographs © Simon van Noort (Iziko Museums of South Africa)

Figure 10 Mesoscutellum sparsely punctured, with broad shining interspaces (A). Tibiae on all legs predominantly blackish-brown, sometimes with yellow patches (B)

Sources: Photographs © Lars Vilhelmsen (Natural History Museum of Denmark, Copenhagen), photographs © Stephen M. Blank (Senckenberg Deutsches Entomologisches Institut) and photographs © Simon van Noort (Iziko Museums of South Africa)

Figure 11 *Orussus taorminensis* Trautmann, 1922. Female with pronotum, mesonotum, and anterodorsal part of mesopleuron reddish-brown, contrasting with the colour of other body parts (male unknown) (A, B). *O. taorminensis*



Source: http://drawwing.org/insects/hymenoptera/orussidae

Figure 12 Wings of Orussidae from Goulet and Huber (1993)

2.1 Biology

This is the only family in the Symphyta suborder whose larvae do not feed on plants. Habits are unknown for very few species and these have a parasitic or predatory association with various wood-boring insects, especially Coleoptera beetles such as Buprestidae, Cerambycidae and Hymenoptera such as Siricidae and Xiphydriidae. Adults have been seen emerging from various trees and shrubs. Some Nearctic species can be found scouring dead-standing trees, resembling ants. Orusids are parasitoids of wood larvae, especially. Adults are often found running rapidly along the trunks of dead trees (Figure 13) [7,8,9].

Source: https://onh.eugraph.com/insects/hymenop/orussus/index.html

Figure 13 Male Parasitic wood wasp hiding in an old buprestid beetle hole

The biology of the Siricoidea superfamily can be imagined as the evolution of parasitoidism would have been. The larvae of the Siricoidea wasps generally feed on dead wood that has been previously digested by a fungal symbiont. For this reason, many species carry spores of the fungus that they leave on the wood during oviposition (Figure 14) [10,11,12].

Source: https://bugspray.com/article/horntail.html

Figure 14 Horntail woodwasps active on a tree

2.2 Life cycle

Females vibrations with their antennae by rapidly tapping the wood (a form of ultrasound) to locate larvae hidden in the wood. They have vibration receptors in their feet. When the female locates a suitable host she pierces the wood with her long ovipositor and deposits an egg. The egg is elongated with a small enlargement at the anterior end and a larger one at the posterior end. The egg coils around the host. In some species, the egg may be deposited in a tunnel in the vicinity of the host and the orusid larva has to crawl to its host [13,14,15].

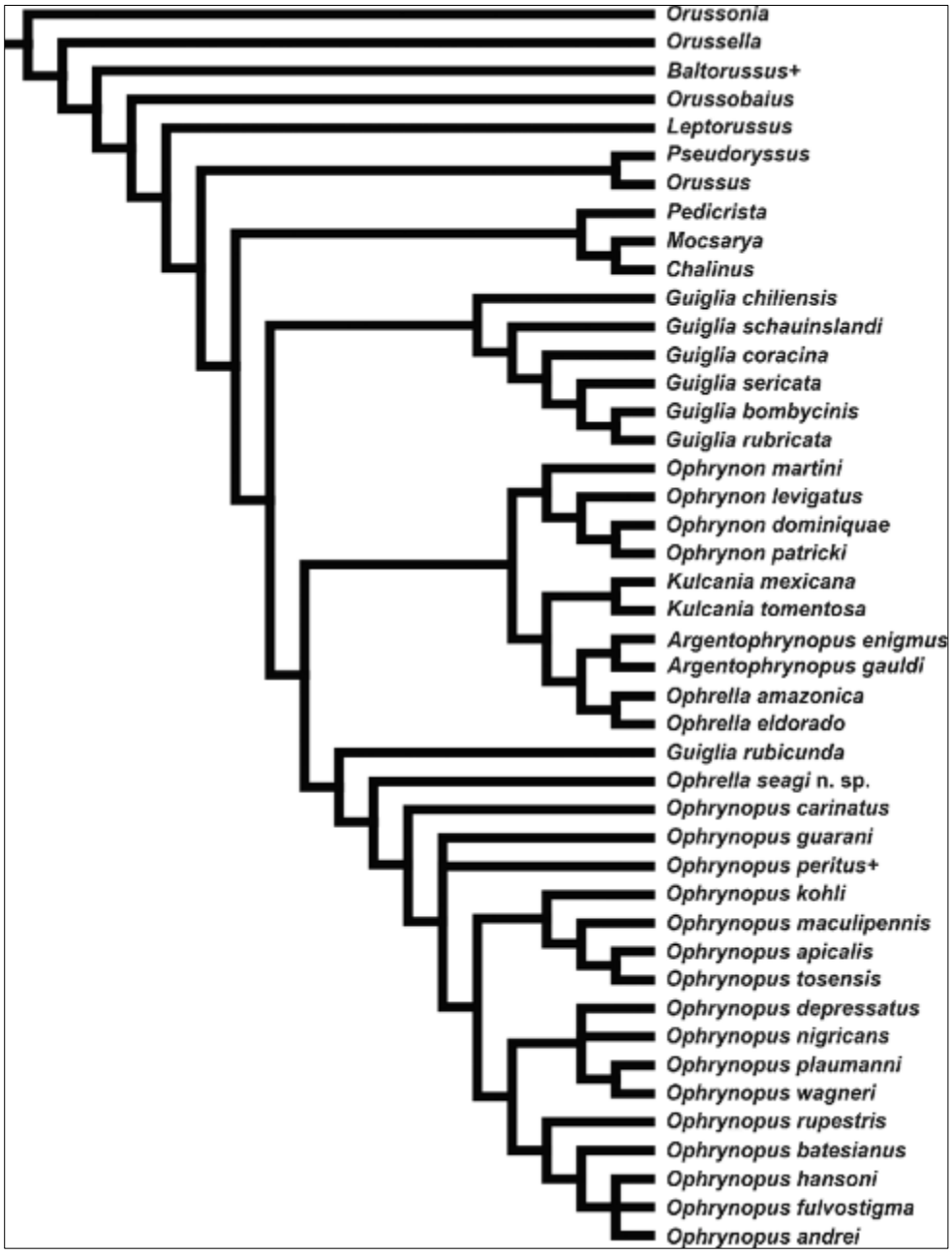
2.3 Taxonomy

Most species are black, sometimes with partially reddish legs. Around 100 species are known worldwide and are found on all continents. Five genera and 12 species are known from the Neotropics. Two species have been found in Costa Rica, *Kukulcania mexicana* Magalhaes & Ramírez, 2019 (Arachnida: Araneae: Filistatidae) and an unidentified species of the genus *Ophrynopus*. However, Orussidae is rarely collected and probably more species will be found in the future (Figure 15) [16,17].

Source: https://www.researchgate.net/figure/Ophrynopus-guarani-sp-nov-female-holotype-A-B-habitus-dorsal-and-lateral-C_fig10_256461381

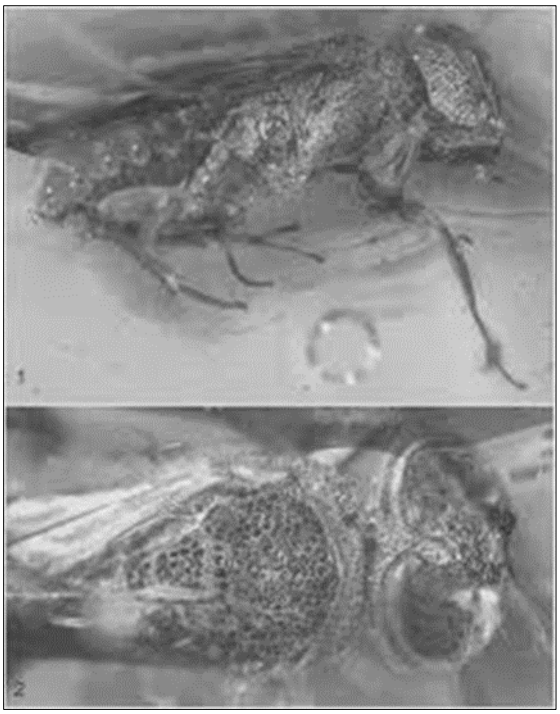
Figure 15 *Ophrynopus* female, holotype: (A, B) habitus, dorsal and lateral; (C) antenna; (D) wings, cells and veins identified in the text; (E) abdominal terga 3-5

Orussidae used to be placed in a separate suborder, Idiogastra but is now placed in its own superfamily Orussoidea. Orussidae is decidedly monophyletic. The tribes and subfamilies of Orussidae have been abandoned as early subdivisions have not been corroborated by phylogenetic analyses (Figures 16-17) [18,19].



Source: https://www.semanticscholar.org/paper/A-new-species-of-Ophrella-Middlekauff%2C-1985-from-Vilhelmsen/34f875ea6fa0ec217795c20ce26160c90887570f/figure/1

Figure 16 Consensus tree of 9 trees of fit 41,51167 produced by implied weighting analysis with k = 10. Only crown group Orussidae shown; genera outside the Ophrynopine clade have been collapsed to single terminals



Source: https://www.jstor.org/stable/20476340

Figure 17 The first Dominican amber fossil of the parasitoid family Orussidae (Euhymenoptera: Orussomorpha) is described and figured from a single individual preserved in Early Miocene (Burdigalian) amber from the Dominican Republic. *Ophrynopus peritus* Engel, 2008, new species, is the first orussid fossil described from Tertiary amber and the first species documented from the West Indies

Objective

As seen previously, the objective of this manuscript is to study the biological and taxonomic characteristics of the Family Orussidae.

3 Methods

In summary, basically, the following steps of analysis were covered: (a) exhaustive reading of each national and international article aiming at a global understanding and discovery of the approach used by its authors; (b) identification of the central ideas of each article; (b) classification of ideas around nuclei of meaning; (c) comparison between the different nuclei of meaning present in the studied articles; (d) classification of the nuclei of meaning in broader axes (themes) around which the authors' discussions revolved and (e) writing of the interpretative syntheses of the theme. Book scientific chapters, theses banks, university dissertations, national and international scientific articles, scientific journals book scientific chapters, theses banks, university dissertations, scientific journals and https://www.researchgate.net/post/How_to_increase_the_research_results_visibility were also used. https://goo.gl/gLTTTs), HAL (https://hal.archives-ouvertes.fr/submit/index, SSRN (https://hq.ssrn.com/login/pubsigninjoin.cfm and ResearchGate (https ://www.researchgate.net/signup.SignUp.html).

4 Selected searches

4.1.1 Study 1

Hymenoptera of the Afrotropical region

Subfamily: Ophrynopinae and Orussinae

Genus: *Chalinus, Leptorussus, Orussus, Pedicrista* and *Pseudoryssus* (Figures 18-19).

Source: http://www.waspweb.org/orussoidea/Orussidae/Chalinus/Chalinus_schulthessi.htm

Figure 18 Genus: *Chalinus* Konow, 1897

Sources: Photographs © Simon van Noort (Iziko Museums of South Africa) and © Stephen M. Blank (Senckenberg Deutsches Entomologisches Institut)

Figure 19 Genus *Leptorussus* Benson, 1955

Sources: Photographs © Simon van Noort (Iziko Museums of South Africa) and © Stephen M. Blank (Senckenberg Deutsches Entomologisches Institut)

Figure 20 Genus *Orussus* Latreille, 1796

Sources: Photographs © Simon van Noort (Iziko Museums of South Africa) and © Stephen M. Blank (Senckenberg Deutsches Entomologisches Institut)

Figure 21 Genus *Pedicrista* Benson, 1935

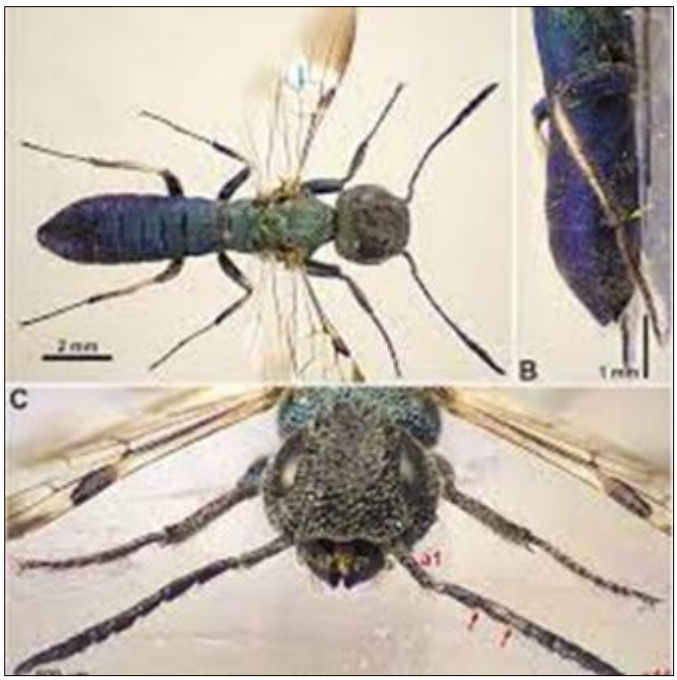
Sources: Photographs © Simon van Noort (Iziko Museums of South Africa) and © Stephen M. Blank (Senckenberg Deutsches Entomologisches Institut)

Figure 22 Genus *Pseudoryssus*

Distribution: Angola, Benin, Botswana, Canary Islands, Central African Republic, Democratic Republic of Congo, Equatorial Guinea, Gabon, Ghana, Guinea, Ivory Coast, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Nigeria, Reunion, Senegal, Sierra Leone, Somalia, South Africa, Tanzania, Zimbabwe. Palaearctic region: Algeria, Bulgaria, France, Egypt, Greece, Iran, Iraq, Italy, Israel, Italy, Morocco, Spain, Tunisia, Turkey, Turkmenistan. Worldwide, with the greatest species richness in Africa. Species were usually rare.

Biology: Parasitoids of wood-boring Coleoptera and Hymenoptera larvae.

Some species: *Chalinus albitibialis* Vilhelmsen, 2005, *Chalinus berlandi* Guiglia, 1935 and *Chalinus oberthueri* (Saussure, 1890) (Figure 23).



Source: https://www.researchgate.net/figure/Chalinus-albitibialis-male-Morocco-NHMD-A-Habitus-dorsal-B-Hind-leg-and-abdomen_fig6_322283845

Figure 23 *Chalinus albitibialis* Vilhelmsen, 2005, male, Morocco (NHMD). (A), Habitus dorsal. (B), Hind leg and abdomen, lateral. (C), Head and antenna anterior. Blue arrow = discal cell; yellow arrow = hind tibial apical spur; red arrows = basal constrictions on antennomeres. a[x] = antennomere[x]

Distribution: Afrotropical region: Botswana, Central African Republic, Democratic Republic of Congo, Ethiopia, Gabon, Ghana, Ivory Coast, Kenya, Liberia, Madagascar, Mozambique, Nigeria, Reunion, Somalia, South Africa and Tanzania, Zimbabwe. Also in the Palaearctic region (Israel, Morocco).

Biology: Parasitoids of wood-boring beetle larvae (Cerambycidae). *Chalinus somalicus* Guiglia, 1935, was reared from Rinorea convallariiflora Brandt (Violaceae) infested with Cerambycidae.

Some Species: *Leptorussus africanus* Benson, 1955, *Leptorussus kwazuluensis* Vilhelmsen, 2003 *and Leptorussus madagascarensis* Vilhelmsen, 2007 (Figure 24) [20,21,23].

Sources: Photographs © Simon van Noort (Iziko Museums of South Africa) and © Robert Copeland (ICIPE)

Figure 24 *Leptorussus africanus* Benson, 1955

Distribution: Kenya, Madagascar, Mozambique, South Africa and Zimbabwe.

Biology: Unknown.

Some Species: *Orussus abietinus* (Scopoli, 1763), *Orussus smithi* Blank, Kraus & Taeger, 2006 and *Orussus unicolor* Latreille, 1811 (Figure 25).

Sources: Photographs © Simon van Noort (Iziko Museums of South Africa) and © Robert Copeland (ICIPE)

Figure 25 *Orussus abietinus* (Scopoli, 1763)

Distribution: Afrotropical, Oriental and Palaearctic regions.

Biology: Ectoparasites of woodboring insect larvae, usually Buprestidae (Coleoptera). Females make use of echolocation to locate hosts and hence oviposition is restricted to dry, bark-free wood.

Specie: *Pedicrista hyalina* Benson, 1935 (Figure 26).

Sources: Photographs © Simon van Noort (Iziko Museums of South Africa) and © Robert Copeland (ICIPE)

Figure 26 *Pedicrista Hyalina* Benson, 1935

Distribution: Malawi, South Africa and Zimbabwe.

Biology: Unknown, but probably a parasitoid of wood-boring beetle larvae.

Species: *Pseudoryssus henschii* (Mocsary, 1910) and *Pseudoryssus niehuisorum* Kraus, 1998 (Figure 27).

Sources: Photographs © Simon van Noort (Iziko Museums of South Africa) and © Robert Copeland (ICIPE)

Figure 27 *Pseudoryssus henschii* (Mocsary, 1910)

Distribution: Algeria, Egypt, Israel, Morocco, Senegal. Also in central and southern Europe extending eastwards to Iran, Iraq, Turkey and Turkmenistan.

Biology: Host unknown [24,25].

4.1.2 Study 2

Iberian Orussidae (Hymenoptera: Symphyta, Orussoidea, Orussidae).

This paper provides new data on the Iberian distribution of the two species, new possible hosts of *Orussus taorminensis* and are provided habitus photographs of the two Iberian species [25,26,27].

Orussus abietinus (Scopoli, 1763) (Figure 28).

Source: https://insecta.pro/taxonomy/1015027

Figure 28 *Orussus abietinus* (Scopoli, 1763)

Distribution: Species widely distributed throughout the Palearctic region, reaching from North Africa and the Iberian Peninsula to Central Asia.

Hosts: *Orussus abietinus* have been cited: *Buprestis haemorrhoidalis* Herbst, 1780 (Coleoptera: Buprestidae), *Semanotus undatus* (Linnaeus, 1758), *Asemum* sp. and *Arhopalus* sp. (Coleoptera: Cerambycidae).

Biology: Once the female has located an occupied gallery for a larva, it deposits an egg inside it, as close as possible to the xylophagous larva. In this way, when she is born her own larva, she is going to parasitize the larva or pupa of the xylophagous insect, completing her cycle inside the wood.

Orussus taorminensis (Trautmann, 1922) (Figure 29).

Source: https://www.biodiversidadvirtual.org/insectarium/Orussus-taorminensis-Trautmann-1922-img416979.html

Figure 29 *Orussus taorminensis* (Trautmann, 1922)

Distribution: Western Mediterranean species are initially known from the area initially know Nance, such as northwestern Italy and Sicily. Cited from southern Spain and Morocco recently has been collected very recently in Algeria.

Biology: The species is unknown, and they are not known with their hosts for sure. Point out two species of cerambycid beetles of the genus *Trichoferus* Wollaston, 1854 as possible hosts. The capture data from the specimens that we cite, which emerged from dry branches of various plant species, allow us to venture that the number of possible hosts must be much larger.

In the same trunks in which the individuals hatched from *O. taorminensis*, the following beetles did: *Opilo domesticus* (Sturm, 1837) (Family Cleridae), *Tillus ibericus* Bahillo de la Puebla, 2003, *Trichodes leucopsideus* (Olivier, 1795). Family Buprestidae: *Anthaxia hungarica* (Scopoli, 1772), *Anthaxia polychloros* Abeille de Perrin, 1894 and *Acmaodera attuordecimpunctata* (Villers, 1789). Family Cerambycidae: *Chlorophorus ruficornis* (Olivier, 1790) [28,29].

4.1.3 Study 3

Orussus abietinus (Scopoli, 1763)

Dimensions: 14 mm.

Sources: @MacelllonRomano 2011 and http://www.entomologiitaliani.net/public/forum/phpBB3/viewtopic.php?f=370&t=26485

Figure 30 *Orussus abietinus* (Scopoli, 1763): I am struck, in this species, by the eyes with a truly particular shape, as indeed those "ridges" on the vertex are particular, in the point where the ocelli are found

Head: The eyes have a ridge at the apex, at the point where the ocelli with denticulations around the eyes meet, they belong to the metanotum, they are the cencris. Likely used by the newly emerged adult to exit the forest by digging a passage by moving its head. Echolocation is for host detection and restricts female wasps to oviposit in dry environments such as wood bark.

Sources: @MacelllonRomano 2011 and http://www.entomologiitaliani.net/public/forum/phpBB3/viewtopic.php?f=370&t=26485

Figure 31 *Orussus abietinus* (Scopoli, 1763): Here the same image at higher magnification

Biology: *Orussus abietinus* (Scopoli, 1763) are ectoparasites mainly of Buprestidae.

Oviposition: *Pinus silvestris* L. (Pineacea) and *Picea abies* Lindley (Pinaceae) killed by fire, usually in standing trees, and lasted an average of six minutes. Several times, females that laid eggs were attacked by other females. Eggs are deposited in excrement-filled tunnels, usually of *Buprestis haemorrhoidalis* Herbst, 1780 (Coleoptera: Buprestidae), but larvae have also sometimes been found in tunnels of Cerambicides (*Asemum* and *Arhopalus*) [30].

4.1.4 Study 4

Synoptic list of Symphyta (Hymenoptera) in Korea.

- Order Hymenoptera Linné, 1758
- Suborder Symphyta Gerstäcker, 1867
- Superfamily Cephoidea Newman, 1834
- Superfamily Orussoidea Newman, 1834
- Family Orussidae Newman, 1834
- Subfamily Ophrynopinae
- Genus *Ophrynopus* North, 1897

1-*Ophrynopus tosensis* (Tosawa and Suigihara, 1934) (Figure 32).

Source: https://www.researchgate.net/figure/Ophrynopus-tosensis-Tosawa-Sugihara-1934-female-A-head-in-frontal-view-B_fig4_270221658

Figure 32 *Ophrynopus tosensis* (Tosawa and Suigihara, 1934)

Host plant: *Quercus* sp.

Distribution: Korea (South), Japan.

2-*Orussus abietinus* (Scopoli, 1763) (Figure 33).

Source: https://www.hgsc.bcm.edu/arthropods/parasitic-wood-wasp-genome-project

Figure 33 *Orussus abietinus* (Scopoli, 1763)

Host plants. *Alnus glutinosa* (L.) Gaertn., *Betula pendula*, Roth, *Fagus sylvatica* L., *Spruce abies* (L.) H. Karst. *Pinus halepensis* Mill., *Pinus sylvestris* L. and *Quercus pyrenaica* Willd.

Distribution. Korea (North), Albania, Algeria, Austria, Belarus, Belgium, Bosnia Herzegovina, Bulgaria, China, Croatia, Czech Republic, Estonia, Finland, France, Germany, Greece, Hungary, Iran, Italy, Kazakhstan, Latvia, Lithuania, Poland, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Syria, Turkey and Ukraine.

Subfamily Orussinae Newman, 1834.

Genus *Orussus* Latreille, 1797.

3-*Orussus coreanus* Takeuchi, 1938.

Host plants: *Alnus glutinosa* (L.) Gaertn., *Betula pendula* Roth, *Fagus sylvatica* L., *Spruce abies* (L.) H. Karst, *Pinus halepensis* Mill*., Pinus sylvestris* L. and *Quercus pyrenaica* Willd.

Distribution: Korea (North), Albania, Algeria, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, China, Croatia, Czech Republic, Estonia, Finland, France, Germany, Greece, Hungary, Iran, Italy, Kazakhstan, Latvia, Lithuania, Poland, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Syria and Turkey.

4-*Orussus melanosoma* Lee and Wei, 2014.

Host plant. Unknown.

Distribution: Korea (South) [31].

5 Conclusion

The Orussidae family is a small group of Hymenoptera that includes some 85 species worldwide. Traditionally included in the Symphyta suborder, their larvae deviate from the phytophagous regime of the group and are ectoparasites of xylophagous insect larvae. They are considered a rare group in which numerous species are known from few specimens from few localities, even in many species only the typical material is known. The phylogeny and the biogeography of the group have been analyzed in three excellent works by Vilhelmsen.

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