



## Study of conceptual and taxonomic aspects of Stephanidae family (Hymenoptera: Stephanidae)

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### Abstract

If you see them very rarely, they are difficult to catch, because of them the knowledge of this family is very poor. There are some references that they are parasitoids of wood beetles' larvae. Most of the parasites parasitize members of the Cerambycidae and Buprestidae families, only some gorgeous parasites (Curculionidae) and some use Hymenoptera. The purpose of this article is to obtain information on the characteristics and taxonomy of the Family Stephanidae (Insecta: Hymenoptera). To this end, a bibliographic survey of Ichneumonidae was carried out in the years 1982 to 2021. Only complete articles published in scientific journals and expanded abstracts presented at national and international scientific events, Doctoral Thesis and Master's Dissertation 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, Science and ERIC.

**Keywords:** Hyperparasitoid; Tree; Coleoptera; Prague; Natural enemy

### 1. Introduction

Stephanids (Stephanidae Family) are a small group of rare insects that are parasites of wood boring beetles' larvae. Adults measure about 5 mm to 19 mm in length, not counting the ovipositor, which is longer than the body. They are slender and peculiarly elongated, with deeply modified hind legs. The head is somewhat round and has a crown of five teeth around the middle ocelli. The hind thighs are long, and the hind femurs are indented at the bottom. This group is very common in the tropics (Figure 1) [1,2].

#### 1.1. Characteristics

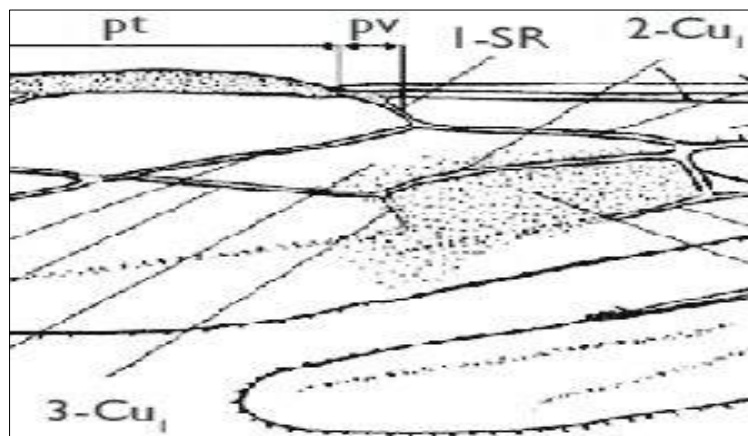
If you see them very rarely, they are difficult to catch, because of them the knowledge of this family is very poor. There are some references that they are parasitoids of wood beetles' larvae. Most of the parasites parasitize members of the Cerambycidae and Buprestidae families, only some gorgeous parasites (Curculionidae) and some use hymenopteran. For example, a species *Schlettererius cinctipes* (Cresson, 1880), is a parasitoid well known to wasp of the Siricidae Family and has been introduced in Tasmania as a biological control (Figures 2 and 3) [1,2].

In Australia and the Nearctic species *Schlettererius cinctipes* (Cresson, 1880) which characterizes the group as idiobiont ectoparasitoides of wood-boring insect larvae. Hosts include species from the families Cerambycidae and Buprestidae, in addition to some other beetles, Symphyta (Siricidae) and solitary bees (Figures 4 and 5) [3,4].

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**Figure 1** Crown wasp (Family Stephanidae); (Source: <https://www.biodiversity4all.org/taxa/198947-Stephanoidea>)



**Figure 2** Fore and hind wings of Stephanidae. pt=pterostigma; pv=parastigmal vein; bv=spiny setae or bristles near apex of vein M+CU1; dc1=first discal cell; sdc1=first subdiscal cell (van Achterberg 2002).; (Source: <file:///C:/Users/Sti/Downloads/ZooKeys-110-001.pdf>)



**Figure 3** *Foenatopus cf. turcomanorum* (Semenov, 1860), ♀: 23. Habitus, dorsal view; 24. Habitus, lateral view; 25, 26, 27. Head, frontal, dorsal & lateral views respectively. 28. Antenna (basal part); (Source: <file:///C:/Users/Sti/Downloads/ZooKeys-110-001.pdf>)



**Figure 4** Crown wasp ovipositioning (Stephanidae); (Source: <https://www.flickr.com/photos/nickadel/9484457792>)



**Figure 5** *Foenatopus* species; (Source: [http://www.waspweb.org/stephanoidea/stephanidae/foenatopus/Foenatopus\\_species\\_5.htm](http://www.waspweb.org/stephanoidea/stephanidae/foenatopus/Foenatopus_species_5.htm))



**Figure 6** *Stephanus serrator* (Fabricius, 1798): 1 = female, 2 =head of female, 3 = male; (Source: photo B. Holinka)

One species, *S. cinctipes*, is a known parasitoid of horntail wasps and has been introduced to Tasmania as a biological pest control agent. Members of the genus *Foenatopus* are parasitoids of *Agrilus sexsignatus* Fisher, 1921, wood-boring beetle larvae found infesting eucalyptus in the Philippines. The rate of parasitism for an *A. sexsignatus* population was recorded to vary from only 2% up to 50% of the population (Figure 6) [3,4].

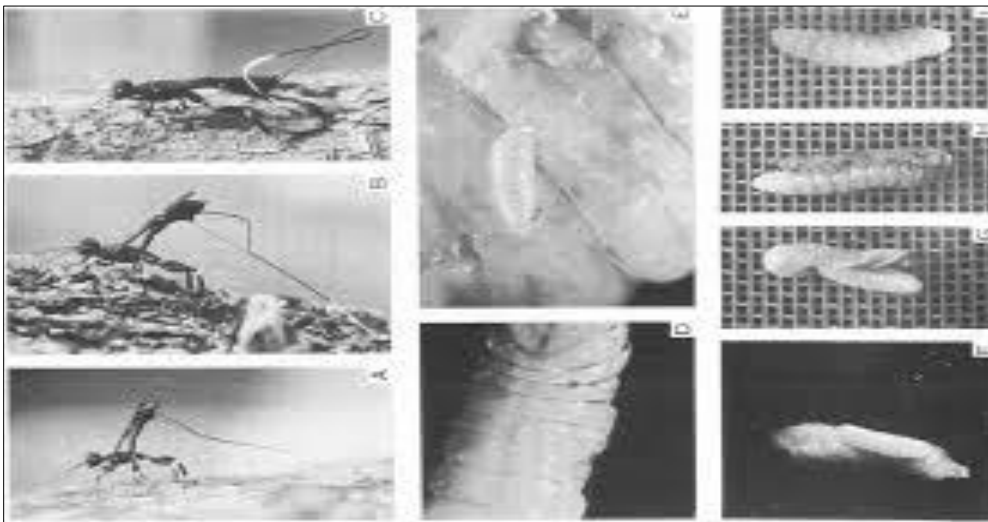
## 1.2. Biology

The egg is elongate (1 mm long) and has two appendages of different sizes (one is long and thin, the other one is shorter and thicker). Larval stages were not found during this study. However, a female and a male pupa of were extracted while splitting branches from the woodpile. The pupae lay freely and without a cocoon inside the slightly widened larval burrow. Rather heavily chitinized body parts of the hosts like the head capsules are not eaten by the parasitoid larva and are usually found lying in close proximity to the pupa. In the present study, however, no such remains could be found (Figure 7) [5,6].



**Figure 7** Wasp with a very long ovipositor (extends a little beyond the white mark) on a Palo Verde tree; (Source: <https://bugguide.net/node/view/1721293>)

One female which hatched in the terrarium lived for 21 days. Three large females, which were caught in the field, lived for 21 days (2 individuals) and 24 days (1 individual), respectively, in captivity. A large male also caught in the field) showed the longest observed lifespan of 30 days in the terrarium. Sleeping pattern periods of nightly rest of the individuals kept in the terrarium could not be observed apart from breaks during drilling activities. The insects drilled even in total darkness (Figure 8) [5,6].



**Figure 8** *Schlettererius cinctipes* (Cresson, 1880): (A-C) progressive stages of probing and oviposition (x ca 2); (D) egg attached to host larva (x ca 10); (E) 1st instar larva attached to host (x ca 18); (F-I) progressive stages of feeding. Note remains of sclerotized portions of host larva attached to fully fed parasite larva (I) (x ca 2.7); (Source: [hrome-extension://efaidnbmnnnibpajpcglclefindmkaj/viewer.html?pdfurl=https%3A%2F%2Fwww.fabinet.up.ac.za%2Fpublication%2Fpdfs%2F2716-taylor1967jnlautentsoc.pdf&clen=1840562&chunk=true](https://efaidnbmnnnibpajpcglclefindmkaj/viewer.html?pdfurl=https%3A%2F%2Fwww.fabinet.up.ac.za%2Fpublication%2Fpdfs%2F2716-taylor1967jnlautentsoc.pdf&clen=1840562&chunk=true))

*Schlettererius cinctipes* (Cresson, 1880) (Hymenoptera: Stephanidae), reputed to be a parasite of Coleoptera, has been successfully reared in Tasmania on *Sirex noctilio* Fabricius, 1793 (Hymenoptera, Siricidae). In *Pinw rudiata* from a single female. The adults emerge in late September and early October. Females begin to oviposit 12-24 days after emergence and the egg, which is deposited on the surface of the host larva, hatches in approximately 14 days. The larva destroys the host larva in 6-7 weeks after oviposition. Parasitized *Sirex* larvae were found at depths of up to 3.4 cm from the bark surface (Figure 9) [5,6].



(Source: <https://spinelesswonders.smugmug.com/Insects/NewGuineaInsects/New-Guinea-Hymenoptera-wasps/New-Guinea-Hymenoptera-Stephan/>)

**Figure 9** New Guinea wasps *Stephanie* (Stephanie Wasps) unidentified *Stephanie* wasp wood borer beetle parasitoid Gen. sp. TBC Female Sentani area West Papua Indonesia BL 63.0 mm;

### 1.3. Taxonomy

The family is noted to be the most basal group of hymenopterans in the Apocrite suborder. They are the only living group left over from the early diversification of Apocrita. In general, the family is considered rare, with close to 95% of the species known to have been described from single specimens. Until the early 1800s, members of Stephanidae were grouped into the parasitic wasp superfamily Ichneumonoidea based on the superficial resemblance between some members of the two groups. A new family grouping for the stephanids in the 1815 edition of the Edinburgh Encyclopedia (Figure 10) [5,6].



**Figure 10** General view of a Stephanidae; (Source: Taken from Aguiar (2006b) Download Scientific Diagram ResearchGate)

## 1.4. Phylogeny

### 1.4.1 *Symphyta*

The symphyte superfamilies are the most basal groups of hymenopteran, so the phytophagous habit is the most primitive of the order.

### 1.4.2 *Parasitoidism*

The most important feature in the evolution of the Hymenoptera, which resulted in the enormous diversity of current species, was the development of parasitoidism.

### 1.4.3 *Apocrite*

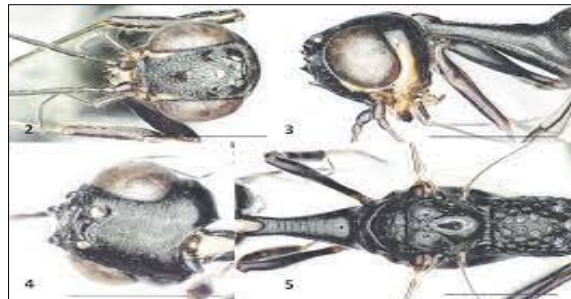
An important change in the morphology of hymenoptera was the appearance of the “wasp's waist”. This constriction allows a great mobility of the metasoma to control the ovipositor. The family Stephanidae (Stephanoidea) is the most basal group of Apocrite.

### 1.4.4 *Parasitica*

It is the largest group of Hymenoptera in number of species and there are still tens of thousands of species to be described. Most wasps in this group develop as parasitoids of other insects. Parasitoids are insects whose larvae parasitize a host, and which usually kill that host.

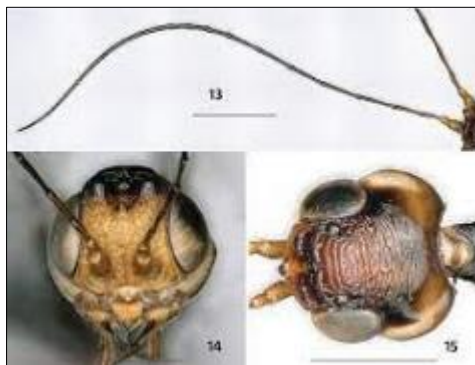
### 1.4.5 *Aculeata*

Genus *Foenatopus* Smith, 1861



**Figure 11** *Foenatopus* female. 2 Head frontal 3 head and pronotum lateral 4 head dorsal 5 mesosoma dorsal. Scale bars: 1 mm; (Source: [https://www.researchgate.net/figure/Figures-2-5-Foenatopus-weii-sp-n-holotype-female-2-Head-frontal-3-head-and-pronotum\\_fig2\\_307861833](https://www.researchgate.net/figure/Figures-2-5-Foenatopus-weii-sp-n-holotype-female-2-Head-frontal-3-head-and-pronotum_fig2_307861833))

Genus *Hemistephanus* Enderlein, 1906

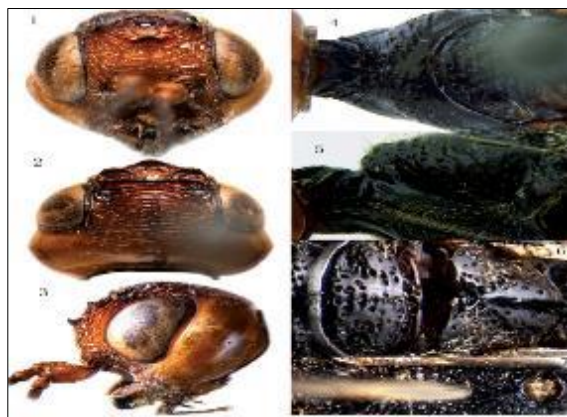


**Figure 12** *Parastephanellus*, male. 13 Antenna 14 head frontal 15 head dorsal. Scale bars: 1 mm; (Source: <https://zookeys.pensoft.net/article/9781/>)

A striking feature of Hymenoptera is the presence of an ovipositor, used to insert eggs into plant tissue (Symphyta) or into the host (Apocrite). However, in one of the Apocrite clades, the ovipositor lost the function of inserting eggs. Instead, it was used solely as a stinger, for injecting poisons into its prey. These are the Aculeata, which include wasps, ants, bees, and families with parasitoid habits.

The family has a cosmopolitan distribution, with 6 genera and about 300 known species. In the Neotropical Region there are 45 species in 3 genera: *Foenatopus*, *Hemistephanus* and *Megischus* (Figures 11, 12 and 13) [7,8,9].

Genus *Megischus* Brullé 1846



**Figure 13** *Megischus* ♂. 8 fore wing 9 first tergite 10 hind femur and tibia 11 hind tarsus 12 pygidial process; (Source: [https://www.semanticscholar.org/paper/A-new-species-of-Megischus-Brull%C3%A9-\(Hymenoptera%2C-a-Hong-Achterberg/97a45e94a25e67d7812e0a76f759ef01816d4b1b\)](https://www.semanticscholar.org/paper/A-new-species-of-Megischus-Brull%C3%A9-(Hymenoptera%2C-a-Hong-Achterberg/97a45e94a25e67d7812e0a76f759ef01816d4b1b)))

The family Stephanidae (Hymenoptera: Stephanoidea) is recorded for the first time from Saudi Arabia. It is represented by two species belonging to the genus *Foenatopus*, *Foenatopus bisignatus* Aguiar & Jennings, 2010 and *Foenatopus cf. Turkmanorum* (Semenov, 1891) (Figure 14).



**Figure 14** First record of the family Stephanidae (Hymenoptera: Stephanoidea) for the fauna of Saudi Arabia, with the description of a new species; (Source: <https://www.mapress.com/zt/article/view/zootaxa.4311.1.2>)

### Objective

The purpose of this article is to obtain information on the characteristics and taxonomy of the Family Stephanidae (Insecta: Hymenoptera).

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## 2. Methods

The method used to prepare this mini review was Marchiori 2021 methodology [10].

### 3. Studies conducted and selected

#### 3.1. Study 1

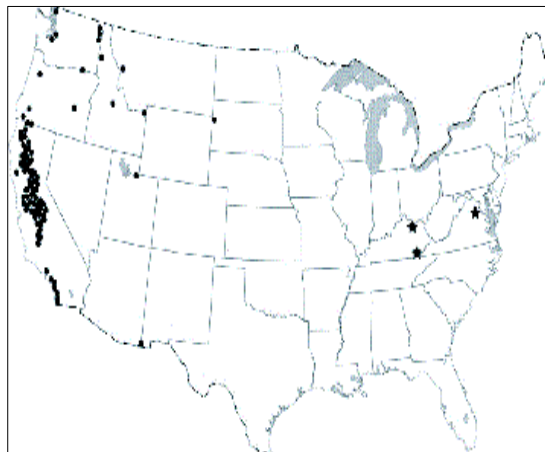
Crown wasp (Family Stephanidae) *Schlettererius cinctipes* (Cresson, 1880) (Hymenoptera: Stephanidae). Members of this family have an elongate pronotum (the things that looks like a long neck), legs with a very elongated femur and what appear to be spines on the super thick tibia, as if the wasp had worked out. Are parasitoids to some beetles and even other wasps and can be used as pest biological control. Natural enemies *Monochamus scutellatus* (Say, 1824) (Coleoptera: Cerambycidae) and *Sirex noctilio* Fabricius, 1793 (Hymenoptera; Siricidae) at larvae stage [11,12].



**Figure 15** *Schlettererius cinctipes* (Cresson, 1880) (Hymenoptera: Stephanidae); (Source: <https://bugguide.net/node/view/676247/bgpage>)



**Figure 16** Intraspecific aggressive behaviour between females, field observation; (c) fighting females, observation in captivity; (d) fighting males, field observation; (Source: [https://www.zobodat.at/pdf/JoanZoo\\_15\\_0015-0038.pdf](https://www.zobodat.at/pdf/JoanZoo_15_0015-0038.pdf))



**Figure 17** Distribution of *Schlettererius cinctipes* in the United States of America; (Source: <https://academic.oup.com/aesa/article/103/4/548/166191>)



It is a parasitoid of wood-boring insects in western North America, it is a clear indicator of the intercontinental transport of its hosts. *Schlettererius cinctipes* is native to the western United States as well as far west Canada. *Schlettererius cinctipes* an idiobiont primary ectoparasitoid potentially attacking a variety of hymenopterous and coleopterous wood borers. *Schlettererius cinctipes* was observed ovipositing into a log infested with high densities of *M. scutellatus* and *Sirex noctilio* Fabricius, 1793 (Hymenoptera, Siricidae). The only definitive host record for *S. cinctipes* is *S. noctilio* (Figures 15, 16, and 17) [11,12].

*Sirex noctilio* is a species of hymenopteran insects, more specifically sawflies belonging to the Siricidae family. The scientific authority of the species is Fabricius, having been described in the year 1773. It is a species present in Portuguese territory. *Monochamus scutellatus* (Say 1824) (Coleoptera: Cerambycidae) commonly known as the white-spotted sawyer or spruce sawyer or spruce bug, is a common wood-boring beetle found throughout North America. It is a species native to North America [11,12].

### 3.2. Study 2

With the contribution of these new data, the known distribution of *Stephanus serrator* (Fabricius, 1798) (Hymenoptera, Stephanidae) in Spain expands to the provinces of Jaén, Cáceres, Valencia and Cantabria, constituting the first of them in the southernmost citation. The first precise locations are also arriving in Catalonia, specifically from the province of Barcelona. In total, in the actuality we get to know new locations in several provinces in Spain where this species is present (Figure 18) [13].



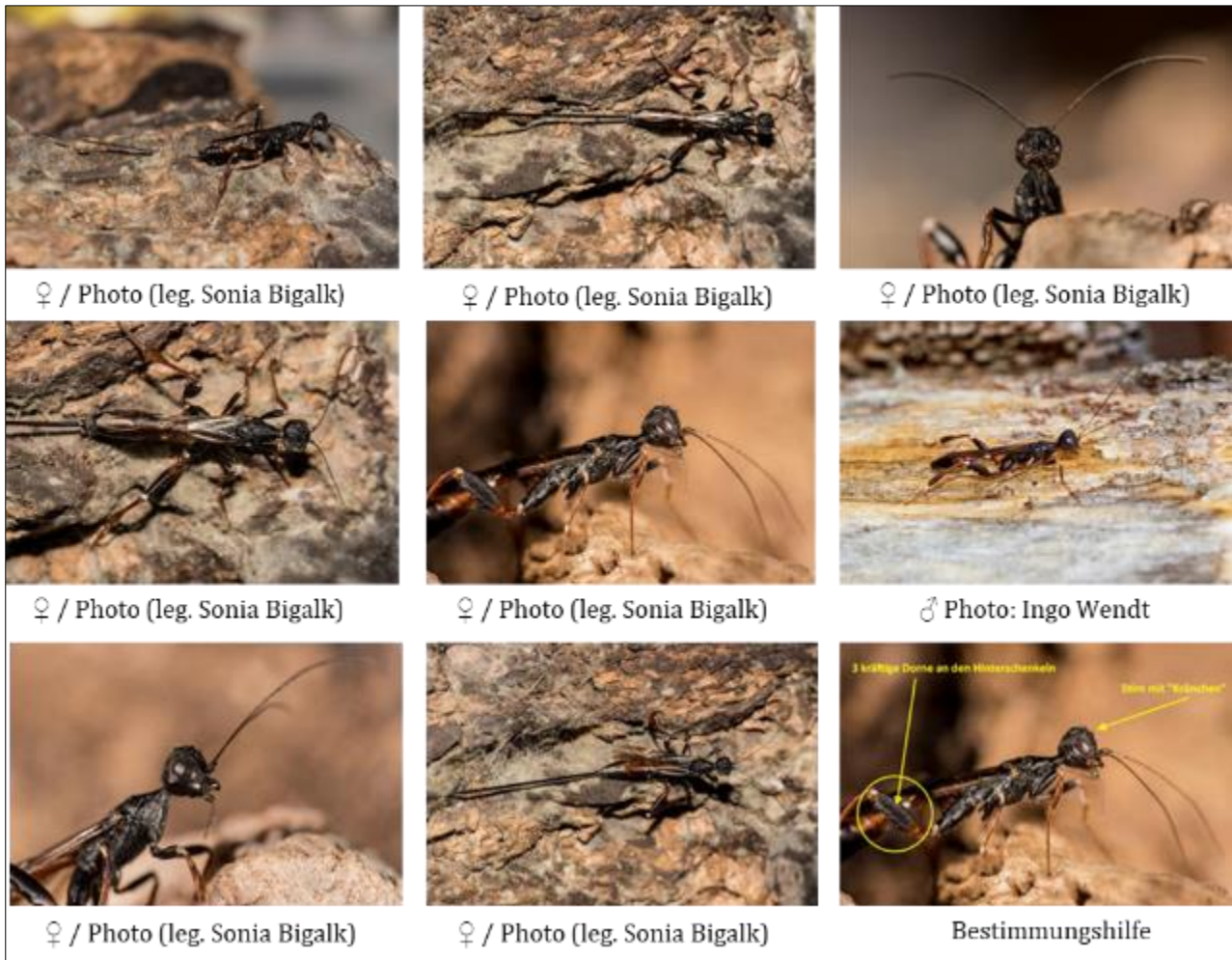
**Figure 18** *Stephanus serrator* (Fabricius, 1798) (Hymenoptera, Stephanidae); (Source: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/viewer.html?pdfurl=https%3A%2F%2Fwww.zobodat.at%)

With the contribution of these new data, the known distribution of *S. serrator* in Spain expands to the provinces of Jaén, Cáceres, Valencia and Cantabria, constituting the first of them in the southernmost citation. The first precise locations are also arriving in Catalonia, specifically from the province of Barcelona [13]. In total, in the actuality we get to know new locations in all of Spain's provinces where this species is present. This species presents, according to the data known until the moment, a very disjoint distribution with many of the very different localities and environments and climatic conditions very different [13]. Everything suggests that its distribution is close to occupying the totality of the surface of Spain and the Iberian Peninsula, hence it is possible to find suitable habitats for its existence. Its presence in collections is very scarce, as its sighting in nature is rare and sporadic. It is also a species that is sparsely captured with passive methods of interception, very efficient for flying insects, such as these [13].

### 3.3. Study 3

*Stephanus serrator* Leach, 1815 is widespread in Germany, but only more common regionally. The females look for larvae of longhorn beetles (Cerambycidae) in dead or dying wood (Figures 18A and 18B).

Once she has located one in the wood, she uses her long laying apparatus to lay an egg on it. The stephanid larvae develop as ectoparasitoids on the beetle larvae. I am not aware of other hosts (Buprestidae, Siricidae) that may also be considered. Food: Imago; Larvae: ectoparasitoids in longhorn beetle larvae endangerment and protection In Europe only one species from the family. Despite their appearance and their way of life, the stephanids are not closely related to the Ichneumonidae [14].



**Figure 18A** *Stephanus serrator* Leach, 1815; (Source: <http://www.waspweb.org/Stephanoidea/Stephanidae/index.htm>)



**Figure 18B** *Sirex noctilio* Fabricius, 1793 (Hymenoptera; Siricidae) at larvae stage host of *Schlettererius cinctipes* (Cresson, 1880) (Hymenoptera: Stephanidae). Note: Hyperparasitism (A hyperparasite is a parasite whose host, often an insect, is also a parasite, often specifically a parasitoid. Hyperparasites are mainly found among wasp girdle Apocrites; (Source: [https://link /10.1007/978-3.springer.com/chapter -030-24733-1\\_9](https://link /10.1007/978-3.springer.com/chapter -030-24733-1_9))

### 3.4. Study 4

We are currently recording the distribution and host attachment of the parasitic wasp *Stephanus serrator* (Fabricius, 1798) (Stephanidae) in Germany. For this purpose, we ask all readers to provide us with their find data as well as

observations and information on finding places, egg-laying substrate, and possible hosts. So far there is only a little comprehensive work on this remarkable species (Figure 19).



**Figure 19** *Stephanus serrator* Leach, 1815; (Source; <https://de.wikipedia.org/wiki/Stephanidae>)

At first glance, *Stephanus serrator* Leach, 1815 can be confused with an ichneumon wasp and can be recognized relatively easily by the thorns on the underside of the hind legs and the "crown" on the head. The species parasitizes wood-dwelling beetles [15,16,17,18,19].

### 3.5. Study 5

Stephanoidea included only Family Stephanidae. Most species of the family Stephanidae are believed to be parasites of the large wood boring Coleoptera. The family contains about nine genera and 100 species, mostly in the tropics, eight species occur in Palaearctic region. In the Palaearctic Region the Family Stephanidae (Superfamily: Stephanoidea) comprises four genera and nine species.

Wood-boring Coleoptera (Buprestidae) or Hymenoptera (Siricidae) are recorded as hosts. During our survey of the Hymenoptera of Turkey the first record of the Family Stephanidae has been made. The occurrence of further species (*Stephanus serrator* Panzer 1801, *Megischus anomalipes* Förster 1855, *Megischus gigas* Schletterer 1889) is possible. This material is deposited in the Entomology Museum, Erzurum, Turkey (Emet).

Results In this study, one species of genus of *Foenatopus* Smith 1861 (Stephanidae, Subfamily, Foenatopinae) were reported in Turkey (Figure 20) [20].



**Figure 20** *Megischus anomalipes* Förster 1855; (Source: <https://www.gbif.org/pt/species/4498246>)

Results In this study, one species of genus of *Foenatopus* Smith 1861 (Stephanidae, Subfamily Foenatopinae) were reported in Turkey. *Foenatopus turcomanorum* Semenov 1891 It is distinguished from the other species by the following: body length 12,5 mm; pronotum longer than wide apically, transversally striated and sculptured; hind femur

from below with some small and two large teeth; first abdominal segment (petioli). Transversally striated, approximately as long as the rest part of abdomen; coloration dark brown, with two yellow spots on third abdominal tergite (Figure 21) [20].

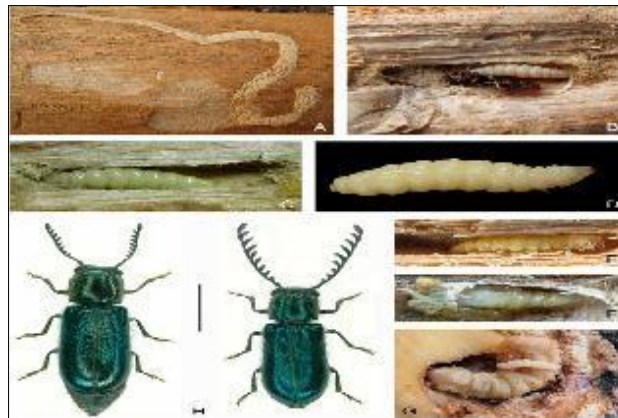


**Figure 21** *Foenatopus turcomanorum* Semenov 1891; (Source: <https://www.flickr.com/photos/124930081@N08/14852471788/>)

### 3.6. Study 6

The sampling point was determined in the adjacent forest, in the border of the crop and inside of the crop, in which the Malaise and four Moerick trap was installed.

These are wasps of the Stephanidae family, they are parasitoids of beetles that live inside wood. Brazil has a flag of Brazil. The giant "stinger" at the end is an ovipositor. It is long to reach woody beetles (Buprestidae, Curculionidae and Cerambycidae) (Figures 21A, 21B, 21C, 21D and 21E) [21].



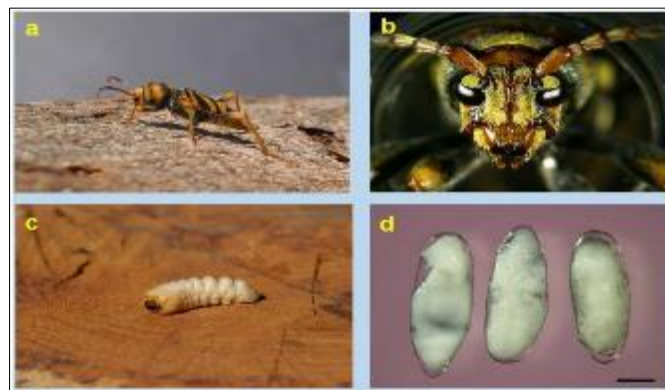
**Figure 21A** Egg, larva, pupa, and adult of emerald ash borer (Coleoptera: Buprestidae) in northeast China, with notes on two species of parasitic Coleoptera; (Source: <https://www.cambridge.org/core/journals/canadian-entomologist/article/abs/natural-enemies-of-emerald-ash-borer-coleoptera-buprestidae-in-northeast-china-with-notes-on-two-species-of-parasitic-coleoptera/47AA16F3346AE98CB04CE9480D02893D>)

In the cultivation of conventional guarana, 10,828 parasitoid hymenoptera were collected, distributed in 35 families and 11 superfamilies. The cultivation of organic guarana was more abundant, with a total of 15,123 parasitoids, distributed in 37 families and 12 superfamilies. In both cultures the most abundant and frequent families were Encyrtidae and Platygasteridae [21].

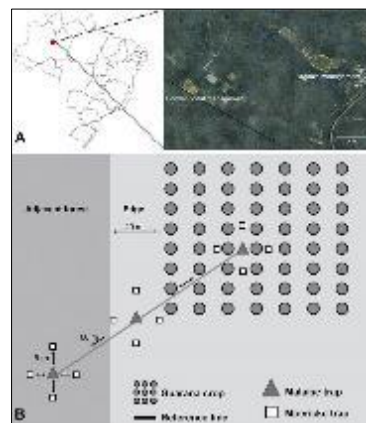
Of the collected families, 34 were common to the studied managements. The rest, Gasteruptionidae (2), Leucospidae (1) and Stephanidae (1/0.01%) were collected only in the organically managed guarana, while Ampulicidae (3) was collected only in the conventionally managed guarana [21].



**Figure 21B** Different stages of *Euplatypus parallelus* (Fabricius, 1801) (Coleoptera: Curculionidae: Platypodinae) eggs (a), mature larva (b), pupae in pupal chambers (c), and male adults (d); (Source: Hevea brasiliensis clone PB 235, Farm Jangada, Sud. Mennucci/SP (Brazil), January 2013.)

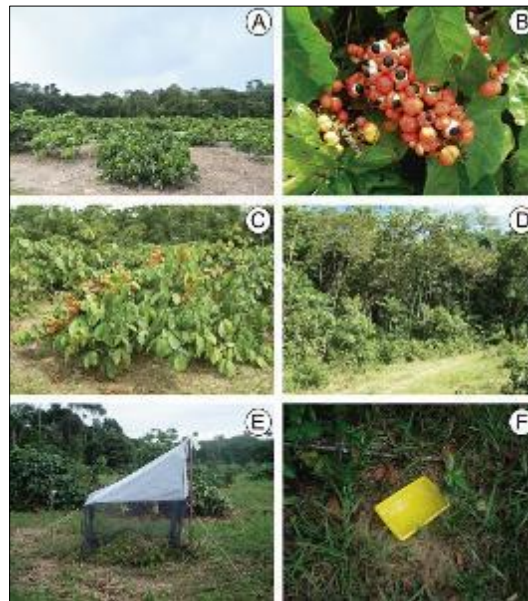


**Figure 21C** *Xylotrechus chinensis* Bates, 1884. (Coleoptera: Cerambycidae) life stages: (a) Female beetle walking on mulberry trunk; (b) Close-up of a beetle's head, showing its widely separated antennae; (c) Last instar larva (extracted from its cavity); (d) Eggs (unfertilized), showing the oocyte mass protected by a transparent flexible chorion. Scale bar 0.5 mm. The pupa is not photographed; (Source: Photos V. Sarto i Monteys)

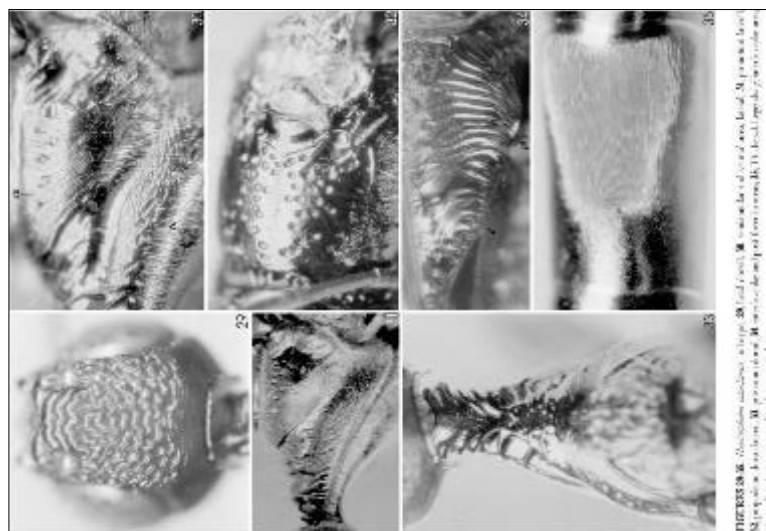


**Figure 21D** Location of the experimental areas of conventional (left) and organic (right) guarana cultivation at Embrapa Amazônia Ocidental, in the city of Manaus, Amazonas, Brazil. Source: modified from Google maps and Google Earth; (B) Sampling design for parasitoid wasp survey in each guarana cultivation area. This figure is in color in the electronic version; (Source: <https://www.scielo.br/j/aa/a/phYJBksBtTscxxvdFhqLQXb/abstract/?lang=pt&format=html#>)

In the guarana culture evaluated here, Malaise traps obtained greater richness and abundance of individuals, being also responsible for collecting groups of Hymenoptera not obtained with Möerick, namely Gasteruptionidae, Leucospidae, Megaspilidae, Perilampidae, Proctotrupidae, Sclerogibbidae, Stephanidae and Tanaostigmatidae. The Möerick trap, in turn, was particularly efficient in collecting a large number of individuals belonging to the Encyrtidae, Platygasteridae and Ceraphronidae (Figure 21E) [21].



**Figure 21E** Images of the guarana plantations sampled in the study: conventional cultivation area (A); fructification of guarana (B); fruiting guarana plant in the organic cultivation area (C); adjacent forest and forest-crop edge in the organic plantation area (D); Malaise trap (E); Moericke trap (F).; (Source: <https://www.scielo.br/j/aa/a/phYJBksBtTscxxvdFhqLQXb/abstract/?lang=pt&format=html#ModalTablesFigures>)



**Figure 22** *Hemistephanus* Enderlein (Hymenoptera: Stephanidae); (Source: <https://www.scielo.br/j/paz/a/gBgLRJG7pScNBn7wyWQ4gcb/abstract/?lang=pt>)

In the guarana culture evaluated here, Malaise traps obtained greater richness and abundance of individuals, being also responsible for collecting groups of Hymenoptera not obtained with Möerick, namely Gasteruptionidae, Leucospidae, Megaspilidae, Perilampidae, Proctotrupidae, Sclerogibbidae, Stephanidae and Tanaostigmatidae. The Möerick trap, in turn, was particularly efficient in collecting many individuals belonging to the Encyrtidae, Platygasteridae and Ceraphronidae [21].

#### 4. Conclusion

If you see them very rarely, they are difficult to catch, because of them the knowledge of this family is very poor. There are some references that they are parasitoids of wood beetles' larvae. Most of the parasites parasitize members of the Cerambycidae and Buprestidae families, only some gorgogeous parasites (Curculionidae) and some use hymenoptera. For example, a species *Schlettererius cinctipes* (Cresson, 1880), is a parasitoid well known to wasp of the Siricidae family and has been introduced in Tasmania as a biological control.

#### References

- [1] Hong Chun-dan, van A, Cornelis Xu, Zai-fu. A revision of the Chinese Stephanidae (Hymenoptera, Stephanoidea). ZooKeys. 2011; 110: 1-108.
- [2] Aguiar AP. World catalog of the Stephanidae (Hymenoptera: Stephanoidea). Zootaxa. 2004; 753: 1–120.
- [3] Townes H. The Nearctic species of the family Stephanidae (Hymenoptera). Proceedings of the United States National Museum. 1949; 99: 361-371.
- [4] Aguiar AP, Johnson NF. Stephanidae (Hymenoptera) of North America of Mexico Proceedings of the Entomological Society of Washington. 2003; 105(2): 467-483.
- [5] Aguiar AP, Deans AR, Engel MS, Forshage M, Huber JT, Jennings JT, Johnson NF, Lelej AS, Longino JT, Lohrmann V, Mikó I, Ohl M. Order Hymenoptera. Animal biodiversity: An outline of higher-level classif and survey of taxonomic richness. Zootaxa. 2013; 3703: 51–62.
- [6] Ulrike HS, Hans-Peter B. Behavior, biology, and morphology of *Stephanus serrator* (Fabricius, 1798) (Hymenoptera: Stephanidae). Joanea Zoologie. 2016; 15: 15–38.
- [7] Aguiar AP. Familia Stephanidae Family. Memoirs of the American Entomological Institute. 2006; 77: 1-994.
- [8] Goulet H, Huber JT. Hymenoptera of the world: An identification guide to families. Ottawa: Research Branch Agriculture Canada. 1993.
- [9] Soliman AM, Gadallah NS, Dhafer HMA. First record of the family Stephanidae (Hymenoptera: Stephanoidea) for the fauna of Saudi Arabia, with the description of a new species. Zootaxa. 2017; 4311(1): 23–38.
- [10] Marchiori CH. Biology and feeding behavior of ceratopogonid adult (Diptera: Ceratopogonidae). International Journal of Frontiers in Science and Technology Research. 2021; 1(2): 007–024.
- [11] Deczynski AM. A New Eastern Record for the Stephanid Wasp *Schlettererius cinctipes* (Cresson) (Hymenoptera: Stephanidae) in Maryland," Proceedings of the Entomological Society of Washington. 2016; 118(4): 645-646.
- [12] Kacie J, Johansen MJ, Sharkey JRF. Molecular Evidence from a parasitoid wasp, *Schlettererius cinctipes* (Hymenoptera: Stephanidae), for a North American West-to-East Transcontinental Conduit for Wood-Boring Insects. Annals of the Entomological Society of America. 2010; 103(4): 548-554.
- [13] Engel MS. The crown wasp genus *Electrostephanus* (Hymenoptera: Stephanidae): Discovery of the female and a new species. Polskie Pismo Entomologiczne. 2005; 74(3): 317-332.
- [14] Bigalk S. *Tephanus serrator* Leach, 1815. 1st ed: Naturspaziergang: Photo. 2019.
- [15] Ewald J, Reder G. Bitte um Mitarbeit: *Stephanus serrator* - Recording of the German distribution Call for data: *Stephanus serrator* - recent distribution in Germany. Ampulex Journal. 2012; 53.
- [16] Literature BH. *Xylotrechus vicola* (Col. Cerambycidae) and *Stephanus serrator* (Hym., Stephanidae): Occurrence in Germany. Co mmunications from the German Society for General and Entomological. 1993; 7: 110.
- [17] Jansen E, Bense U, Schrameyer K. *Stephanus serrator* (Fabricius, 1798) in the Federal Republic of Germany (Hymenoptera, Stephanidae). Entomological fauna. 1988; 9: 421-428.
- [18] Reder G. On the distribution of *Stephanus serrator* (F.) in Rhineland-Palatinate and a new site of *Megischus anomalipes* (Forst.) In Greece (Hymenoptera: Stephanidae). Fauna flora Rhineland Palatinate. 2011; 12(1): 135-148.
- [19] Völlger E. *Stephanus serrator* (Fabricius, 1798) in Saxony-Anhalt (Hym., Stephanidae). Entomological News and Reports. 1994; 38: 276.
- [20] Yildirim E, Kolarov J. First record of the family Stephanidae (Hymenoptera, Stephanoidea) from Turkey. Linzer biologische Beiträge. 2006; 38(2): 1729-1730.
- [21] Schoeninger k. Himenópteos parasitoides coletados em cultivo comercial e orgânico de guaraná (*Paullinia cupava* var. sorbeles em Manaus, Amazonas, Brasil [Master's Dissertation]. Manaus: Federal University of Amazonas. 2014.