

(REVIEW ARTICLE)



## Studies of the Families Cleonymidae, Coelocybidae, Epichrysomallidae, Eunotidae, Heydeniidae, Megastigmidae, Neanastatidae, Pirenidae, Spalangiidae and Systasidae (Hymenoptera: Chalcidoidea)

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### Abstract

The family Pteromalidae (Hymenoptera: Chalcidoidea) is reviewed with the goal of providing nomenclatural changes and morphological diagnoses in preparation for a new molecular phylogeny and a book on world fauna that will contain keys to identification. Most subfamilies and some tribes of Pteromalidae are elevated to the family level or transferred elsewhere in the superfamily. The resulting classification is a compromise, with the aim of preserving the validity and diagnosability of other, well-established families of Chalcidoidea and forming the following families: Cleonymidae, Coelocybidae, Epichrysomallidae, Eunotidae, Heydeniidae, Megastigmidae, Neanastatidae, Pirenidae, Spalangiidae and Systasidae. From the methodological point of view, the research was conducted through the adoption of bibliometric approaches and content analysis. Bibliometrics is guided by the principle of analyzing scientific or technical activity through quantitative studies of publications, that is, through this approach that used databases, articles were published from 1979 to 2022 in indexed scientific research, scientific chapters of books, banks of theses, university dissertations, national and international scientific articles, scientific magazines, documents and even in general magazines when considered of interest. The main terms used were: Hymenoptera Parasitic, parasitoid, hosts and microhymenoptera.

**Keyword:** Subfamilies; Phylogeny; Parasitoids; Pteromalidae; Hosts

### 1. Introduction

The following former subfamilies and tribes of Pteromalidae are elevated to family rank: Boucekiidae, Ceidae, Cerocephalidae, Chalcedectidae, Cleonymidae, Coelocybidae, Diparidae, Epichrysomallidae, Eunotidae, Herbertiidae, Hetreulophidae, Heydeniidae, Idioporidae, Lyciscidae, Macromesidae, Melanosomellidae, Moranilidae, Neodiparidae, Ooderidae, Pelecinnellidae, Pirenidae, Spalangiidae and Systasidae [1,2].

The following subfamilies are transferred from Pteromalidae: Chremeurytominae and Keiraninae to Megastigmidae, Elatoidinae to Neodiparidae, Nefoeninae to Pelecinnellidae, and Erotolepsiinae to Spalangiidae. The subfamily Sycophaginae is transferred to Pteromalidae. The formerly incertae sedis tribe Lieparini is abolished and its single genus *Liepara* is transferred to Coelocybidae. The former tribe Tomocerodini is transferred to Moranilidae and elevated to subfamily status. The former synonym Tridyminae (Pirenidae) is treated as valid [1,2].

The following former Pteromalidae are removed from the family and, due to phylogenetic uncertainty, subfamilies or genera within Chalcidoidea: Austrosystasinae, Ditropinotellinae, Keryinae, Louriciinae, Micradelinae, Parasaphodinae, *Rivasia* and Storeyinae. Within the remaining Pteromalidae, Miscogastrinae and Ormocerinae are confirmed as separate from Pteromalinae, the former tribe Trigonoderini is elevated to subfamily status, the former synonym Pachyneurinae is recognized as a distinct subfamily, and as the senior synonym of Austroterobiinae [1,2].

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The tribe Termolampini is synonymized under Pteromalini, and the tribe Uzkini is synonymized under Colotrechnini. Most former Otitesellinae, Sycoecinae, and Sycoryctinae are retained in the tribe Otitesellini, which is transferred to Pteromalinae, and all other genera of Pteromalinae are treated as Pteromalini. Eriaporidae is synonymized with Pirenidae, with Eriaporinae and Euryischiinae retained as subfamilies [1,2].

Other nomenclatural acts performed here outside of Pteromalidae are as follows: Calesidae elevation to family rank. Eulophidae transfer of Boucekelimini and Platytetracampini to Ophelminae, and abolishment of the tribes Elasmini and Gyrolasomyiini. Baeomorphidae is recognized as the senior synonym of Rotoitidae. Khutelchalcididae is formally excluded from Chalcidoidea and placed as incertae sedis within Apocrita. Metapelmatidae and Neanastatidae are removed from Eupelmidae and treated as distinct families. *Eopelma* is removed from Eupelmidae and treated as an incertae sedis genus in Chalcidoidea [1,2].

The following subfamilies and tribes are described as new: Cecidellinae (in Pirenidae), Enoggerinae (incertae sedis in Chalcidoidea), Erixestinae (in Pteromalidae), Eusandalinae (in Eupelmidae), Neapterolelapinae, Solenurinae (in Lyciscidae), Trisecodinae (in Systasidae), Diconocarini (in Pteromalidae: Miscogastrinae), and Trigonoderopsini (in Pteromalidae: Colotrechninae) [1,2].

### Objective

The objective was to determine the reclassification of the superfamily Chalcidoidea (Insecta: Hymenoptera) and raise the former subfamilies and tribes of Pteromalidae and form the following families: Cleonymidae, Coelocybidae, Epichrysomallidae, Eunotidae, Heydeniidae, Megastigmidae, Neanastatidae, Pirenidae, Spalangiidae and Systasidae.

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## 2. Methods

From the methodological point of view, the research was conducted through the adoption of bibliometric approaches and content analysis. Bibliometrics is guided by the principle of analyzing scientific or technical activity through quantitative studies of publications, that is, through this approach that used databases, articles were published from 1972 to 2022 in indexed scientific research, scientific chapters of books, banks of theses, university dissertations, national and international scientific articles, scientific magazines, documents and even in general magazines when considered of interest. The main terms used were: Hymenoptera Parasitic, parasitoid, hosts and microhymenoptera.

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## 3. Subfamilies and tribes of Pteromalidae formed the following families

### 3.1. Cleonymidae

#### 3.1.1. Description

Antenna with 11 flagellomeres. Mandibles with 3 teeth. Subforaminal bridge with postgena separated by the lower tentorial bridge. Mesoscutellum with frenum indicated and with a pair of strong setae. Mesopleural area without an expanded acropleuron; mesepimeron not extending over the anterior margin of metapleuron. All legs with 5 tarsomeres; protibial spur stout and curved; basitarsal comb longitudinal (Figure 1) [1,2,3].



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

**Figure 1** Cleonymidae Family

### 3.1.2. Genus

*Amotura* Cameron, *Callocleonymus* Masi, *Cleonymus* Latreille, *Notanisis* Walker, *Thaumasura* Westwood and *Zolotarewskyia* Alves (Figure 2).



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

**Figure 2** *Amotura* species

### 3.1.3. Distribution

Worldwide (Central African Republic, South Africa, Indo-Australasian, Nearctic, Neotropical and Palearctic regions) [1,2,3].

### 3.1.4. Biology

Parasitoids of wood-boring beetles larva or stem or mud nesting Hymenoptera (Sphecidae, Megachilidae and Eumeninae) [1,2,3].

- *Callocleonymus pulcher* Masi, 1940.

### 3.1.5. Distribution

Somalia, Australasian, Oriental and Palaeartic regions.

### 3.1.6. Hosts

Buprestidae, Curculionidae and Scolytinae (Figure 3) [1,2,3].



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

**Figure 3** *Cleonymus* Latreille

### 3.1.7. Species

*Cleonymus albomaculatus* Hedqvist, 1960, *Cleonymus viridicyaneus* (Risbec, 1952) and *Ceonymus* species.

### 3.1.8. Distribution

Madagascar, South Africa, Australasian, Oriental and Palaeartic regions.

### 3.1.9. Hosts

Anthidiinae, Anthribidae, Anobiidae, Bostrichidae, Buprestidae, Bostrichidae, Cerambycidae, Lamiidae, Scolytinae and Xoridinae (Insecta: Coleoptera) (Figures 4-5) [1,2,3].



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

**Figure 4** Genus *Cleonymus* Latrielle



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

**Figure 5** *Cleonymus* specie

- Genus: *Notanisus* Walker (Figure 6).



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

**Figure 6** Genus *Notanisus* Walker

### 3.1.10. Distribution

Madagascar, Mozambique, Tanzania, United Arab Emirates, Uganda, Yemen, Zambia and Zimbabwe. [1,2,3].

- Hosts: Aphididae, wood-born beetles or stem or mud-nesting Hymenoptera (Sphecidae, Megachilidae, Eumeninae, Eurytominae) [1,2,3].
- Some species: *Notanisis brevipetiolus* Gibson, 2015, *Notanisis longipetiolus* Gibson, 2015 and *Notanisis vanharteni* Gibson, 2015 (Figures 7-8) [1,2,3].



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

**Figure 7** *Notanisis brevipetiolus* Gibson, 2015



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

**Figure 8** *Notanisis longipetiolus* Gibson, 2015

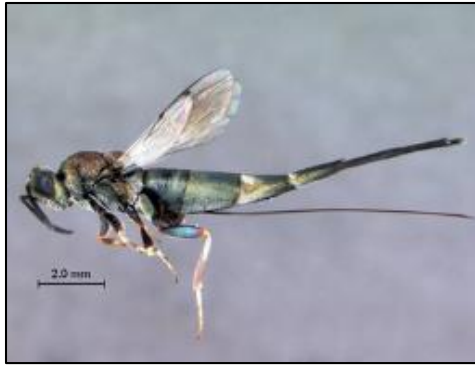
### 3.1.11. Source

van Noort S. Wasp Web: Hymenoptera of the Afrotropical region. URL: [www.waspweb.org](http://www.waspweb.org) (accessed on <17/02/2023> and Burks R, Mircea-Dan M, Fusu L, et al. From hell's heart, I stab at thee! A determined approach towards a monophyletic Pteromalidae and reclassification of Chalcidoidea (Hymenoptera). Journal Hymenopteran Research. 2022; 94:13-88.

## 3.2. Coelocybidae Family

### 3.2.1. Description

Antenna with 11 flagellomeres. Mandibles with 3 teeth. Subforaminal bridge with postgena separated by a lower tentorial bridge. Mesoscutellum with frenum indicated and with a pair of strong setae on or adjacent to the frenal groove, and with axillular sulcus. Mesopleural area without an expanded acropleuron; mesepimeron not extending over the anterior margin of metapleuron. All legs with 5 tarsomeres; protibial spur stout and curved; basitarsal comb longitudinal (Figure 9) [4,5].



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

**Figure 9** Coelocybidae Family

### 3.2.2. Genus

*Acoelocyba* Bouček, *Ambogaster* Heydon, *Ariasina* Heydon, *Coelocyba* Ashmead, *Coelocyboides* Girault, *Cooloolana* Bouček, *Cytopella* Bouček, *Erotolepsiella* Girault, *Eucoelocybomyia* Girault, *Fusiterga* Bouček, *Lanthanomyia* De Santis, *Lelapsomorpha* Girault, *Liepara* Bouček, *Nerotolepsia* Girault, *Ormyromorpha* Girault, *Paratomicobia* Girault and *Tomicobomorphella* Girault (Figure 10) [4,5].



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

**Figure 10** Genus *Notanisis* Walker

### 3.2.3. Distribution

Central African Republic, South Africa, Indo-Australasian, Nearctic, Neotropical and Palaearctic regions [4,5].

**Hosts:** Parasitoids of wood-boring beetle larva (Figure 11) [4,5].



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

**Figure 11** *Amotura* species

Some species: *Cleonymus albomaculatus* Hedqvist, 1960, *Notanisus brevipetiolus* Gibson, 2015, *Thaumasura australia* Westwood, 1874 and *Zolotarewskyia seyrigi* Risbec, 1956 (Figures 12-13) [4,5].



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

**Figure 12** *Cleonymus* species

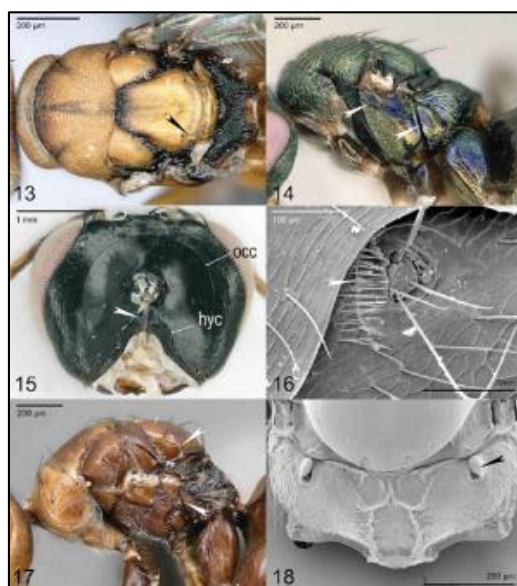
### 3.2.4. Source

van Noort S. WaspWeb: Hymenoptera of the Afrotropical region. URL: [www.waspweb.org](http://www.waspweb.org) (accessed on <17/02/2023> and Burks R, Mircea-Dan M, Fusu L, et al. From hell's heart I stab at thee! A determined approach towards a monophyletic Pteromalidae and reclassification of Chalcidoidea (Hymenoptera). *Journal Hymenopteran Research*. 2022; 94:13-88.

## 3.3. Epichrysomallidae Family

### 3.3.1. Description

Antenna with 10–12 flagellomeres. Labrum hidden behind clypeus, flexible. Mandibles with 3 teeth. Subforaminal bridge with postgenal bridge separating secondary posterior tentorial pits from hypostoma. Notauli. Mesoscutellum with frenum indicated laterally, Mesopleural area without an expanded acropleuron; mesepimeron extending over anterior margin of metapleuron. All legs with 5 tarsomeres in most, except tarsi 4-segmented in; protibial spur stout and curved; basitarsal comb longitudinal. Metasoma with syntergum, therefore without epipygium (Figure 13) [6,7].



Source: <https://jhr.pensoft.net/article/94263/>

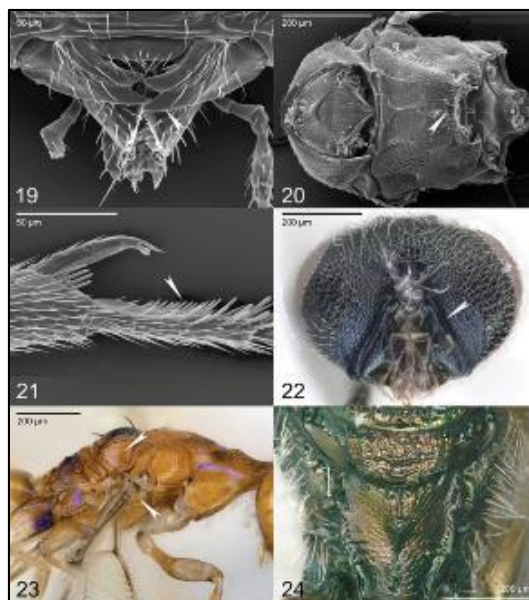
**Figures 13** *Coelocyboides* sp. (Coelocybidae): mesosoma in dorsal view, an arrow indicating setae on or adjacent to frenal groove a (14) *Ormyromorpha trifasciata* Girault, 1913 (Coelocybidae): mesosoma in lateral view *Lelaps* sp.

(Diparidae) (15) head posterior view (16) cercal brush (17) *Eufroggattisca polita* (Ashmead, 1904) (Epichrysomallidae): Mesosoma lateral view (18) *Odontofroggattia* sp. (Epichrysomallidae): Propodeum female dorsal view

### 3.3.2. Source

Burks R, Mircea-Dan M, Fusu L, et al. From hell's heart I stab at thee! A determined approach towards a monophyletic Pteromalidae and reclassification of Chalcidoidea (Hymenoptera). *Journal Hymenopteran Research*. 2022; 94:13-88.

### 3.4. Eunotidae Family



Source: <https://jhr.pensoft.net/article/94263/>

**Figure 14** *Eunotus* sp. (Eunotidae) (19) mandible and labrum in frontal view (20) mesosoma ventral view (21) protibial spur and basitarsal comb

Antenna with at most 11 flagellomeres. Labrum either exposed and well-sclerotized (most species), or hidden behind clypeus, subrectangular, with marginal setae in a row. Mandibles with 2 or rarely 3 teeth. Subforaminal bridge with postgena separated by the lower tentorial bridge. Pronotum was transverse. Mesoscutellum with frenum indicated laterally, with axillular sulcus. Mesopleural area without an expanded acropleuron; mesepimeron not extending over an anterior margin of metapleuron; only one mesofurcal pit present. All legs with 5 tarsomeres; protibial spur stout and curved; basitarsal comb longitudinal. Metasoma with syntergum, therefore without epipygium (Figure 14) [8,9].

#### 3.4.1. Genus

*Eunotus* Walker, *Mesopeltita* Ghesquière and *Scutellista* Motschulsky.

Distribution: Worldwide.

Host: Unknown.

Source: van Noort S. WaspWeb: Hymenoptera of the Afrotropical region. URL: [www.waspweb.org](http://www.waspweb.org) (accessed on <17/02/2023> and Burks R, Mircea-Dan M, Fusu L, et al. From hell's heart I stab at thee! A determined approach towards a monophyletic Pteromalidae and reclassification of Chalcidoidea (Hymenoptera). *Journal Hymenopteran Research*. 2022; 94:13-88.

### 3.5. Heydeniidae Family

Antenna with 10 or 11 flagellomeres, including 3 clavomeres. Clypeus without transverse subapical groove. Mandibles with 3 teeth. Pronotum expanded laterally and forming a subrectangular or laterally expanded structure from dorsal view. Mesoscutellum either without a frenum, or with frenum laterally indicated by a frenal arm, with metapleuron. All



legs with 5 tarsomeres; profemur strongly or only mildly expanded; protibial spur stout and curved; metasoma with syntergum, therefore without epipygium (Figure 15) [10,11].



Source: <https://jhr.pensoft.net/article/94263/>

**Figure 15** *Heydenia longicollis* (Cameron) (Heydeniidae) (67) mesosoma dorsal view (68) mesosoma lateral view (69) fore leg, (71) antenna and (72) wing

### 3.5.1. Genus

*Heydenia* Förster.

### 3.5.2. Species

*Heydenia burgeoni* (Risbec, 1955), *Heydenia madagascariensis* (Hedqvist, 1961), *Heydenia mateui* (Hedqvist, 1967), *Heydenia natalensis* (Westwood, 1874), *Heydenia ornata* (Risbec, 1952), *Heydenia seyrigi* (Risbec, 1952) and *Heydenia* species.

### 3.5.3. Distribution

Chad, Democratic Republic of Congo, Madagascar, South Africa. Also Australasian, Oriental and Palaeartic regions.

### 3.5.4. Biology

Hosts: Buprestidae, Cerambycidae, Curculioninae, Lamiinae, Scytinae and Scolytidae (Insecta: Coleoptera) (Figures 16-17).



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

**Figure 16** Genus *Heydenia* Förster



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

**Figure 17** *Heydenia* species

### 3.6. Megastigmidae Family

#### 3.6.1. Description

Antenna with 12 flagellomeres, including a 4th clavomere. Mesoscutellum with frenum defined by a distinct frenal groove, with or without axillular sulcus. Postmarginal vein longer than stigmal vein. Basal fold usually pigmented, in a few genera developed into a basal vein curved outwards (Megastigminae). All legs with 5 tarsomeres, protibial spur stout and curved; basitarsal comb longitudinal. Gaster, while sometimes rigidly convex, not strongly sclerotized; metasomal apex usually with a separate epipygium in females [12,13,14].

- **Subfamilies:** Chromeurytominae, Keiraninae and Megastigminae.
- **Distribution:** Worldwide.
- **Biology:** Mostly phytophagous in seeds of Rosaceae, Pinaceae, Anacardiaceae and Cupressaceae, though some are gall formers, or are parasitoids of gall-forming or seed-feeding Hymenoptera and Diptera.
- **Hosts:** Cynipinae (cynipid galls), Eriococcidae, Eurytominae, bud galls, Diptera (dipterous galls), Diptera (flies), Lasiocampinae, Ormocerinae, Cecidomyiidae, Synerginae, Toryminae and Eulophidae.
- **Some species:** *Megastigmus aculeatus* (Swederus, 1795), *Megastigmus copelandi* Roques & Copeland, 2016, *Megastigmus grewianae* Roques & Copeland, 2016, *Megastigmus helinae* Roques & Copeland, 2016, *Megastigmus hypogeus* (Hussey, 1956) *Megastigmus lanneae* Roques & Copeland, 2016 (Kenya), *Megastigmus laventhali* Roques & Copeland, 2016 (Kenya), *Megastigmus ozoroae* Roques & Copeland, 2016 (Kenya), *Megastigmus pistaciae* Walker, 1871 (Kenya: introduced. Native to Palaearctic region. Introduced to Nearctic region), *Megastigmus pretorianensis* Doğanlar, 2011 (South Africa) and *Megastigmus zebrinus* Grissell, 2006 (Figures 18-25) (South Africa).



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

**Figure 18** Genus *Megastigmus* Dalman



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

**Figure 19** *Megastigmus aculeatus* (Swederus, 1795)



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

**Figure 20** *Megastigmus copelandi* roques & Copeland, 2016



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

**Figure 21** *Megastigmus grewianae* Roques & Copelan, 2016



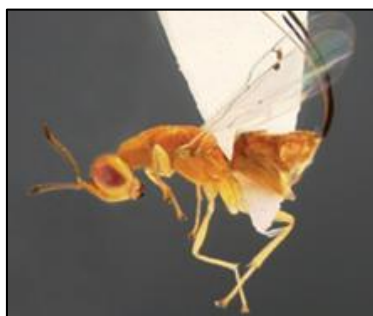
Source: Photographs © Simon van Noort (Iziko Museums of South Africa)

**Figure 22** *Megastigmus helinae* Roques & Copeland, 2016



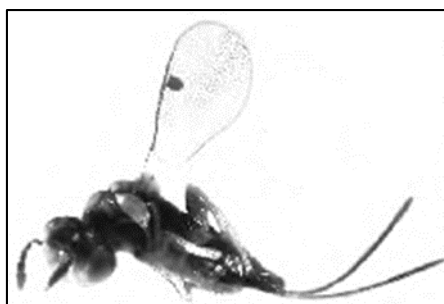
Source: Photographs © Simon van Noort (Iziko Museums of South Africa)

**Figure 23** *Megastigmus hypogeus* (Hussey, 1956)



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

**Figure 24** *Megastigmus laventhali* Roques & Copeland, 2016



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

**Source:** van Noort S. WaspWeb: Hymenoptera of the Afrotropical region. URL: [www.waspweb.org](http://www.waspweb.org) (accessed on <17/02/2023> and Burks R, Mircea-Dan M, Fusu L, et al. From hell's heart I stab at thee! A determined approach towards a monophyletic Pteromalidae and reclassification of Chalcidoidea (Hymenoptera). Journal Hymenopteran Research. 2022; 94:13-88.

**Figure 25** *Megastigmus pretorianensis* Doğanlar, 2016

### 3.7. Neanastatidae Family

#### 3.7.1. Description

Antenna with 7 flagellomeres. Clypeus without transverse subapical groove. Labrum hidden behind clypeus, flexible. Mandibles with 3 teeth. Subforaminal bridge with postgenal bridge separating secondary posterior tentorial pits from hypostoma. Axilla transverse, approximated or widely separated medially. Mesoscutellum with a downwards-projecting hook-like apex; axillular groove or carina present. All legs with 5 tarsomeres; protibial spur stout and curved; basitarsal comb longitudinal; ventral membranous area anterior to mesocoxal attachment absent; mesotibial spur stout; mesotarsus with 1 row of pegs anteroventrally (Figure 26) [15,16].



Source: <https://jhr.pensoft.net/article/94263/>

**Figure 26** *Keirana* sp. (Megastigmidae) (115) wing (116) metasoma lateral view *Metapelma* sp. (Metapelmatidae) (117) mesosoma lateral view (118) apex of mesotibia and mesotarsus *Neanastatus* sp. (Neanastatidae) (119) mesosoma lateral view (120) mesosoma ventral view

**Genus:** *Neanastatus* Girault.

**Distribution:** Worldwide, but most diverse in the Old World.

**Biology:** Parasitoids or hyperparasitoids (through Platygasteridae) of Cecidomyiidae larvae (Diptera), or parasitoids of larvae of wood-boring beetles (Cerambycidae, Buprestidae).

**Species:** *Neanastatus africanus* Ferrière, 1938, *Neanastatus gracilipes* Risbec, 1952, *Neanastatus maiwalei* Ferrière, 1938, *Neanastatus obscuratus* Ferrière, 1938, *Neanastatus occidentalis* Ferrière, 1938, *Neanastatus robustus* Ferrière, 1938, *Neanastatus rufatus* Ferrière, 1938, *Neanastatus tenuis* Ferrière, 1938 and *Neanastatus turneri* Ferrière, 1938 (Figure 27).



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

**Source:** van Noort S. WaspWeb: Hymenoptera of the Afrotropical region. URL: [www.waspweb.org](http://www.waspweb.org) (accessed on <17/02/2023> and Burks R, Mircea-Dan M, Fusu L, et al. From hell's heart I stab at thee! A determined approach towards a monophyletic Pteromalidae and reclassification of Chalcidoidea (Hymenoptera). Journal Hymenopteran Research. 2022; 94:13-88.

**Figure 27** *Neanastatus* Girault

### 3.8. Pirinidae Family

Subfamilies: Cecidellinae, Eriaporinae, Euryischiinae, Pireninae and Tridyminae [17,18].

### 3.8.1. Distribution

Worldwide, but most diverse in the Old World. Democratic Republic of Congo, South Africa, Tanzania.

### 3.8.2. Biology

Parasitoids or hyperparasitoids (through Platygasteridae) of Cecidomyiidae larvae (Diptera), or parasitoids of larvae of wood-boring beetles (Cerambycidae, Buprestidae). Parasitoids or hyperparasitoids of insect eggs and larvae. Parasitoids of *Pseudococcus* Westwood (Pseudococcidae).

- Subfamily Cecidellinae.

Genus: *Cecidellis* Hanson.

Subfamily Eriaporinae.

Genus: *Eunotiscus* Compere and *Promuscidea* Girault.

Species: *Eunotiscus gahani* Compere, 1928, *Eunotiscus hypogaeus* Ghesquière, 1954 and *Eunotiscus* species.

- Subfamily Euryischiinae.

Genus: *Euryischia* Riley, *Euryischomyia* Girault and *Myiocnema* Ashmead.

- Subfamily Pireninae.

Some Genus: *Watshamia* Bouček, *Keesia* Mitroiu, *Lasallea* Bouček, and *Petipirene* Bouček. [17,18].

Species: *Watshamia gero* Mitroiu, 2013, *Watshamia turneri* Bouček, 1974 and *Watshamia versicolor* Bouček, 1974.

Subfamily Tridyminae.

Some Genus: *Calyconotiscus* Narendran & Saleem, *Ecrizotes* Forster, *Gastrancistrus* Westwood, *Premiscogaster* Girault and *Spathopus* Ashmead, 1904 (Figures 28-30).



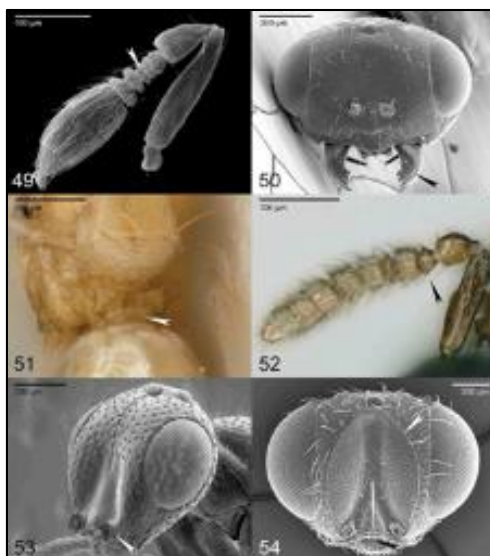
Source: Photographs © Simon van Noort (Iziko Museums of South Africa)

**Figure 28** *Eunotiscus* species



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**Figure 29** *Watshamia* Bouček



Source: <https://jhr.pensoft.net/article/94263/element/4/410/>

**Source:** van Noort S. WaspWeb: Hymenoptera of the Afrotropical region. URL: [www.waspweb.org](http://www.waspweb.org) (accessed on <17/02/2023> and Burks R, Mircea-Dan M, Fusu L, et al. From hell's heart I stab at thee! A determined approach towards a monophyletic Pteromalidae and reclassification of Chalcidoidea (Hymenoptera). Journal Hymenopteran Research. 2022; 94:13-88.

**Figure 30** *Macroglenes varicornis* (Haliday) (Pirenidae): antenna (50) *Gastrancistrus* sp. (Pirenidae, Tridyminae): head frontal view (51) *Cecidellis* sp. (Pirenidae, Cecidellinae): petiole with lamina (52) *Spathopus* sp. (Pirenidae, Tridyminae): antenna (53) *Spalangia alycia* Gibson (Spalangiidae): head anterolateral view (54) *Erotolepsia* sp. (Spalangiidae, Erotolepsiinae): head frontal view

### 3.9. Spalangiidae Family

#### 3.9.1. Description

Antenna usually with 8 flagellomeres, including a 1-segmented clava, with 11 flagellomeres including 3 clavomeres. Mandibles with 2 or 3 teeth, or undivided. Subforaminal bridge with postgenal bridge or with postgena separated by the lower tentorial bridge. Mesoscutellum with frenum indicated at least laterally and without axillular sulcus. Mesopleural area without an expanded acropleuron; mesepimeron extending over the anterior margin of metapleuron [19,20].

Subfamilies: Erotolepsiinae and Spalangiinae.

Subfamily Erotolepsiinae:

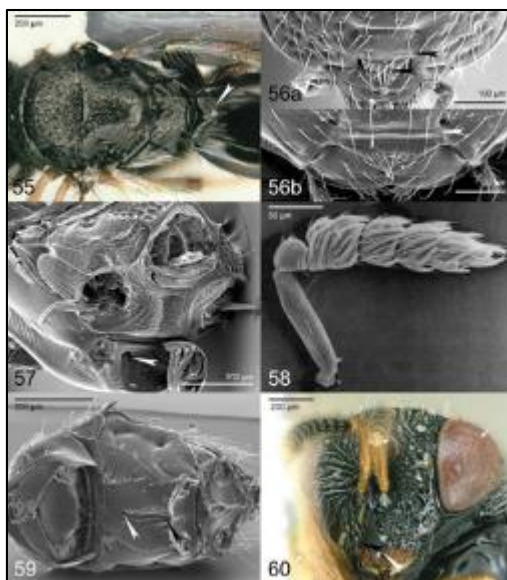
Genus: *Baogia* Hedqvist, *Erotolepsia* Howard, *Eunotopsia* Bouček and *Papuopsia* Bouček.

Subfamily Spalangiinae.

Genus: *Playaspalangia* Yoshimoto, *Spalangia* Latreille, 1805

Distribution: Worldwide.

Hosts: Parasitoids of Diptera (Figure 31).



Source: <https://jhr.pensoft.net/article/94263/element/4/410/>

**Source:** van Noort S. WaspWeb: Hymenoptera of the Afrotropical region. URL: [www.waspweb.org](http://www.waspweb.org) (accessed on <17/02/2023> and Burks R, Mircea-Dan M, Fusu L, et al. From hell's heart I stab at thee! A determined approach towards a monophyletic Pteromalidae and reclassification of Chalcidoidea (Hymenoptera). Journal Hymenopteran Research. 2022; 94:13-88.

**Figure 31** (55) *Erotolepsia* sp. (Spalangiidae, Erotolepsiinae): mesosoma and base of metasoma dorsal view (56)a, (57) *Systasis* sp. (Systasidae) (56b) apex of clypeus without subapical groove (57) mesosoma ventral, mesotrochantal plate and mesofurcal pit 58 *Trisecodes africanum* Gumovsky (Pirenidae, Trisecodinae): antenna (56b), (59) *Asaphes* sp. (Asaphesinae, incertae sedis) (56b) clypeal subapical groove (59) mesosoma ventral (60) *Austrosystasis atricorpus* Girault (Austrosystasinae, incertae sedis) (60) head frontal view, mesosoma lateral view

### 3.10. Systasidae Family

Subfamilies: Systasinae and Trisecodinae.

Subfamily Systasinae:

Genus: *Systasis* Watch.

Subfamily Trisecodinae.

Genus: *Trisecodes* Delvare & LaSalle.

Distribution: Worldwide.

Hosts: Parasitoids of gall-formers or phytophagous primary gall-formers on a variety of plants (Gramineae, Myrtaceae, Casuarinaceae, Celastraceae and Mimosaceae) (Figure 32) [21,22].





Source: <https://ru.wikipedia.org/wiki/Systasidae>

Source: van Noort S. WaspWeb: Hymenoptera of the Afrotropical region. URL: [www.waspweb.org](http://www.waspweb.org) (accessed on <17/02/2023> and Burks R, Mircea-Dan M, Fusu L, et al. From hell's heart I stab at thee! A determined approach towards a monophyletic Pteromalidae and reclassification of Chalcidoidea (Hymenoptera). Journal Hymenopteran Research. 2022; 94:13-88.

**Figure 32** *Systasis annulipes* (Walker, 1834)

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#### 4. Conclusion

The resulting classification is a compromise, with the aim of preserving the validity and diagnosability of other, well-established families of Chalcidoidea. and form the following families: The following former subfamilies and tribes of Pteromalidae are elevated to the family Cleonymidae, Coelocybidae, Epichrysomallidae, Eunotidae, Heydeniidae, Megastigmidae, Neanastatidae, Pirenidae, Spalangidae and Systasidae.

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