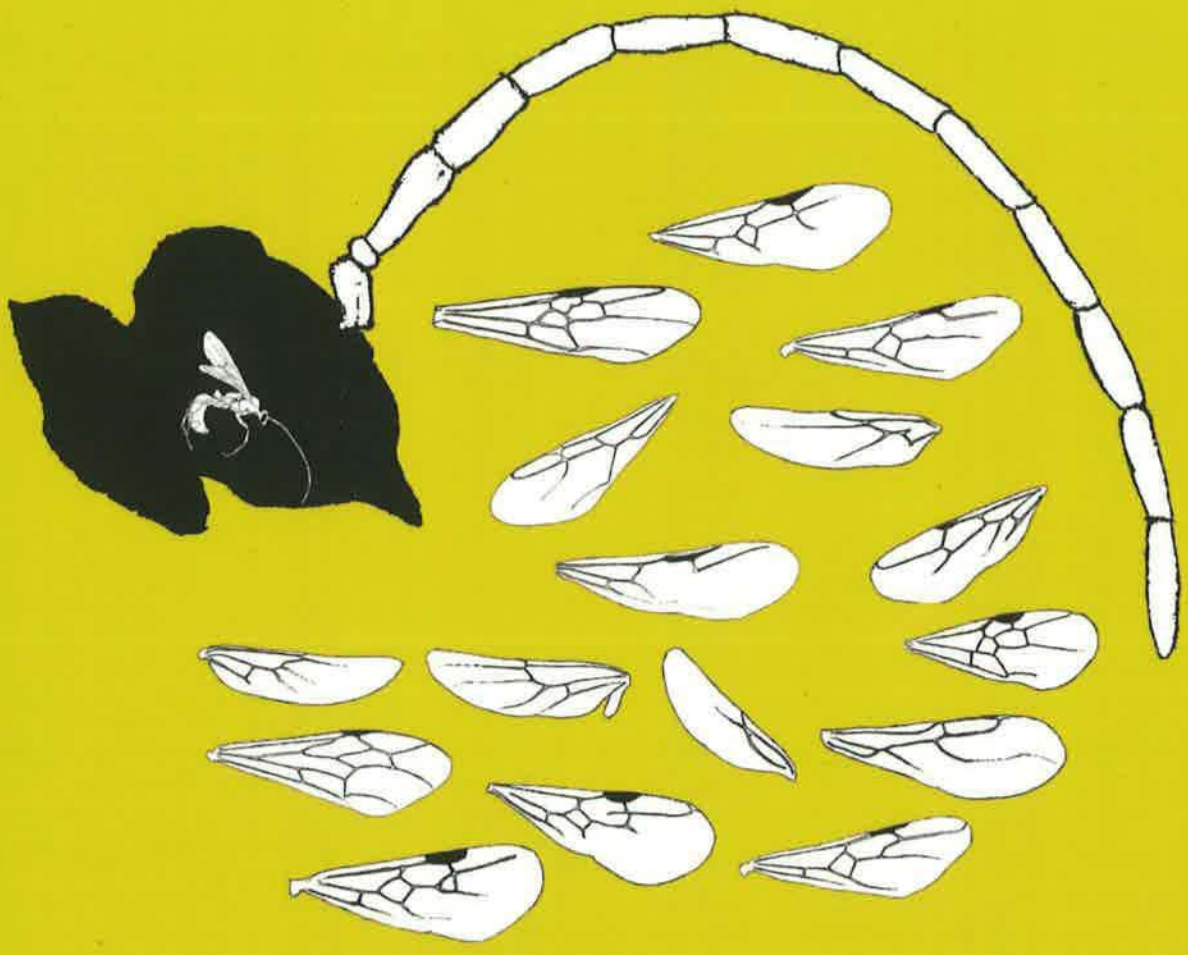
Winged Ants

The Male ♂♂

Dichotomous key to genera of winged ♂♂ ants in the World
Behavioral Ecology of Mating flight

Stefano Cantone



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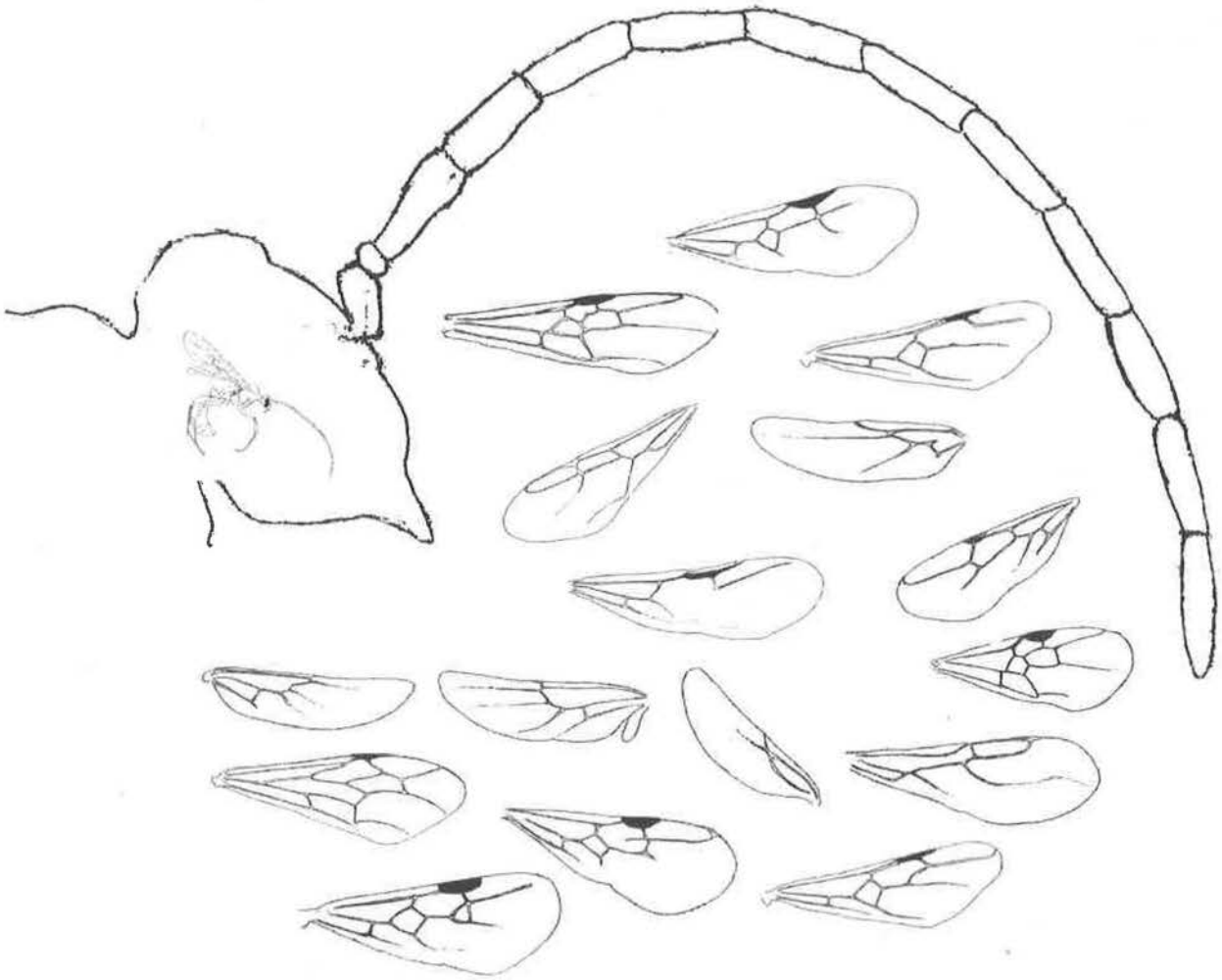

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Addendum “Errata Corrige”

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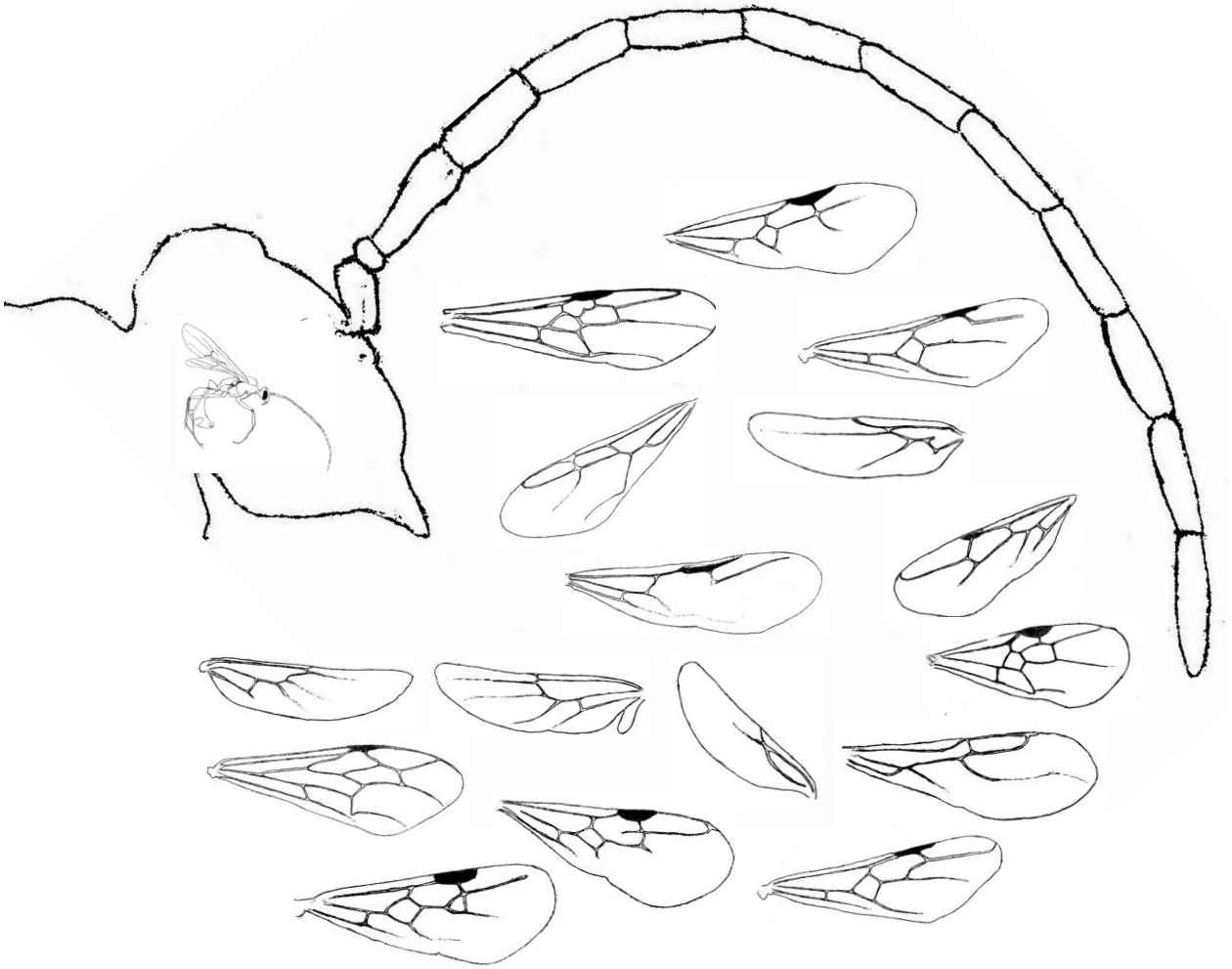

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I have taken care to compile a addendum “errata corrige” to the book, because I found some errors and inaccuracies. Unfortunately, other minor inaccuracies remain or aspects that could be improved, as for example the graphs and tables; this represents the goal of a future publication and of a second edition.

To facilitate use, of this addendum, below I quote the page and its correction.

Errata Corrige

p. 14

Table 2: delete genus *Adelomyrmex* and *Oxyepoecus*

p. 15

Table 3: delete genera *Notoncus* and *Podomyrma*

p. 16

Table 5: delete genus *Proceratium*

p. 17

Table 6: add genera *Notoncus, Podomyrma and Oxyepoecus*

p. 18

Table 8: add *Proceratium*

Table 10: forewings of Typology I, III and IV

Table 11: add Adelomyrmex

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Table 18: add genera *Notoncus* and *Podomyrma*

Table 18: delete genus *Leptomyrmex*

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- Pretarsal Claws simples…***Amblyopone***

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- Australian region…***Myrmecorhyncus*** and ***Notoncus***

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- Labial Palp with 4 articles…**21**
19. Forewing solenopsis type…***Proceratium***
- Forewing formica type…**20**
20. Palp formula 5:3, Australian region…***Papyrius***
- Palp formula 6:3, Madagascar region...***Ravavy***
21. Petiole laterally expanded, Mandibles edentate with 0-4 denticulate…***Ochetellus***
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Table 20: add genera *Dilobocondyla, Leptomyrmex* and *Oxyepoecus*

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23. delete genus ***Paraparatrechina***

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7. …***Daceton*** (delete genus *Wasmannia*)

10. Antennae Scape in length ≤ than the 2° article of the Funiculus…***Basiceros***
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28.
- Antennae with 1° article of the Funiculus in length < than the 2° article…
Megalomyrmex
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Oxyepoecus

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Table 22: add genus *Adelomyrmex*
Table 22: *Noonilla* (incorrect *Neonilla*, also in key pag. 100)

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- Mesonotum with Notauli absent…
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Mandibles edentate…***Adelomyrmex***

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♂ Genus ***Adetomyrma*** Ward, 1994

Antennae Scape in length > than the 2° article of the Funiculus,

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♂ Genus ***Amblyopone*** Erichson, 1842

Hindwings of Tipology I with Jugal lobe absent (Brown, 1960: 162)

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♂ Genus ***Leptomyrmex*** Mayr, 1862

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♂ Genus ***Calomyrmex*** Emery, 1895

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♂ Genus ***Lepisiota*** Santschi, 1926

Forewings of Typology III with Marginal cell closed and open?;

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♂ Genus ***Notoncus*** Emery, 1865

Forewings of Typology II and III with Marginal cell closed

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♂ Genus ***Opisthopsis*** Emery, 1893

p. 177

♂ Genus ***Noonilla*** Petersen, 1968

p. 185

♂ Genus ***Adelomyrmex*** Emery, 1897

Forewing of Typology II with SubMarginal 1 cell open and Typology IV, Marginal cell open; Hindwing of Typology III;

Neotropical and Galapagos Island, Oceania, Papua New Guinea, Solomon Island, Seychelles

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♂ Genus ***Dilobocondyla*** Santschi, 1910

Forewings of Typology II and III, Marginal cell closed;

p. 204

♂ Genus ***Leptothorax*** Mayr, 1855

References for Taxonomic identification incorrect, most refer to genus *Temnothorax*

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♂ Genus ***Myrmicocrypta*** Smith F., 1860

p. 223

♂ Genus ***Oxyepoecus*** Santschi, 1926

Forewings of Typology II and III, solenopsis type, Marginal cell open;

p. 226

♂ Genus ***Pheidole*** Westwood, 1839

Forewings of Typology I with Marginal cell open or rarely closed;

p. 227

♂ Genus ***Podomyrma***

Forewing Typology II and III,

p. 228

♂ Genus ***Pogonomyrmex***

Forewing of Typology I with Marginal cell closed and Typology II with Marginal cell open or rarely closed;

p. 238

♂ Genus ***Stereomyrmex*** Emery, 1901

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p. 248

♂ Genus ***Vollenhovia*** Mayr, 1865

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p. 249

♂ Genus ***Wasmannia*** Forel, 1893

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♂ Genus ***Pseudoponera*** Emery, 1900

MetaTibiae with one or two Spurs

p. 276

♂ Genus ***Proceratium*** Roger, 1863

Forewing of Typology I, II and III with Marginal cell open or closed;

Note

Winged Ants

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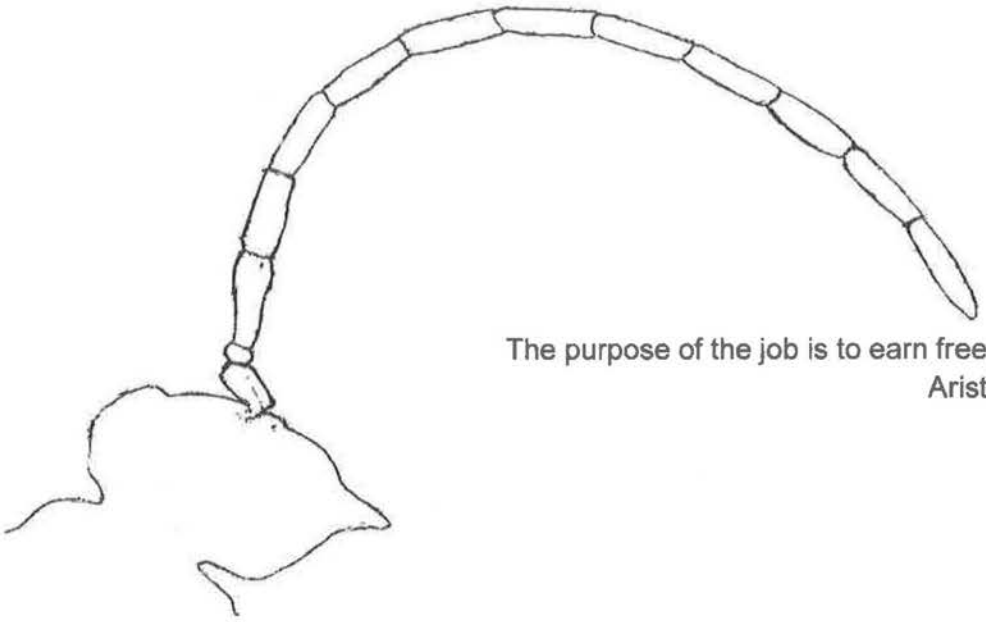


The purpose of the job is to earn free time
Aristotele

Stefano Cantone: Italian biologist, independent researcher with twenty years of experience in ethological and entomological studies wandering in the World.

Index

1. Introduction

Ants are eusocial insects that form colonies made up of individuals with different morphologies and functions. The abundance and behavior of ants in all land habitats is legendary, influencing the existence and evolution of innumerable animal and plant species, as extensively described in Hölldobler and Wilson's famous book "The Ants" (1990).

In an ant colony the individuals cooperate in parental care. Are found sterile and fertile individuals and there is always an overlapping of at least two generations that contribute to the various activities of the colony.

Individuals, who make an ant colony, are specialized morphologically and ethologically sometimes extreme, constituting the castes. An ant colony is divided, in most of the species, in two castes:

1. The caste of workers, sterile, always without wings, who carry out activities of defense, nest construction, nursing care, and search for food;
2. The royal caste, consisting of fertile females (♀♀) and males (♂♂).

The ♂♂ and ♀♀ of the majority of species of ants are provided with wings, two on front and two rear, which have the function of facilitating the meeting with individuals of the opposite sex of other colonies for coupling (mating flight), favoring, thus, the dispersion of the populations in the environment.

The goal of my work was to produce a dichotomous key to the identification of ♂♂ winged ants and an analysis of the periodicity of the mating flight. I present a study on the morphology of the male ants wings in 260 genera, which I will use as the main morphological characteristic for the writing of the dichotomous key. In the last chapter, I present a study on the periodicity of the mating flight with a comparative analysis, in different latitudes and habitats.

Why study the ♂♂ of ants?

I briefly expose my motives:

a. To better understand the phylogeny and systematic of the Formicidae family, expanding knowledge about ♂♂ that have little or very little known.

b. To help explain the great success of the ants in almost all terrestrial environments, where they occupy a leading ecological function, validating the biological function of ♂♂ as essential in determining gene flow among the populations of most species;

c. As an excellent method to record the species diversity of ants community;

d. To record the periodicity of the Mating flight and its strategies, representing a path to better understand the success of some species and as a possible indicator to detect the effects of climate change, since the flattening mating seems to be particularly affected by the climate.

2. Dichotomous key to genera of winged ♂♂ ants in the World

2.1 Morphology of winged ♂♂ ants

For an identification at the taxonomic level of genus, the ♂♂ of ants are known for external morphology easy-to-see characteristics with a simple optical stereo microscope. In the Formicidae family, I found morphological descriptions of ♂♂ in 260 from about 404 genera knowns, which in many cases are related to very few species and few described characteristics. This study is based on **260** genera belonging to all the **17** subfamilies of the Formicidae family (Hymenoptera) currently present in the World, and were used as a basis for it: publications of morphological descriptions, some specimens photos published on Antwiki and Antweb websites represent the Typus or Paratypus that have been deposited in entomological collections of various Museums and my personal collection of ♂♂.

In order to write up a dichotomous key of ♂♂ ants in the world, I have chosen some morphological characteristics that are encountered in the majority of published descriptions. For each genus studied I provide bibliographic references so is possible to confirm the taxonomic identification using other morphological features.

This dichotomous key of ♂♂ ants represents a courageous attempt to provide a simple and scientifically credible tool for a first identification, for this reason I always recommend an utmost caution in the definitive diagnosis completing the identification with the study of cited bibliographic references, which are easy to consult on various websites. I say this because, unfortunately, the ♂♂ descriptions of ants are in many cases superficial and describe only very few morphological features, which, in some cases, do not allow to distinguish some genera from another. In the following chapters, I will highlight these scientific shortcomings hoping to be a useful indication for future studies.

I present a description of the outer body morphology of the ♂♂ ants with some figures giving more attention to the terminology and morphological aspects used in the dichotomous key, and for further details are cited some bibliographic references.

2.2 The study of ♂♂ ants wings

In this study, I deepen the morphology aspects of the forewings and hindwings of ♂♂ ants, which represent the main characteristic on which my dichotomous key is written.

2.2.1 Brief review of ants' wings studies

The scholar Nylander (1846) was the first one to describe the wings of the European Formicidae family. Later, Mayr (1855), in the study of the morphology of the Formicidae family of the Austrian Empire, provided a more detailed description of the ants' wings giving the name to the nervation that forms the cells using as the model the forewings of the genus *Formica*.

The first real comparative analysis of the ants forewings was written by Prof. Carlo Emery (1877 and 1913), the most illustrious taxonomist of the Formicidae family.

Subsequently, other comparative studies of the ants forewings were published: by Brown and Nutting (1949) with a phylogenetic interpretation; by Ogata (1991) who classified the forewings of the Formicidae family into four types, according to the structure of the venation; and, recently, Perfilieva (2010) classifying the forewings into five types, relying, like Ogata, on the structure of some cells that are formed from the encounter of the veins.

The only comparative study on the hindwings of the Formicidae family was made by Kusnezov (1962).

2.2.2 Classification and analysis of the forewings and hindwings of ♂♂ ants

In this study, I presented a classification of the forewings of the ♂♂ ants divided into four Typologies and I classify the hindwings into three Typologies (see Table 12-13). In both cases, the diversity of Typology is represented by a gradual reduction in wing venation as studied by the aforementioned researchers.

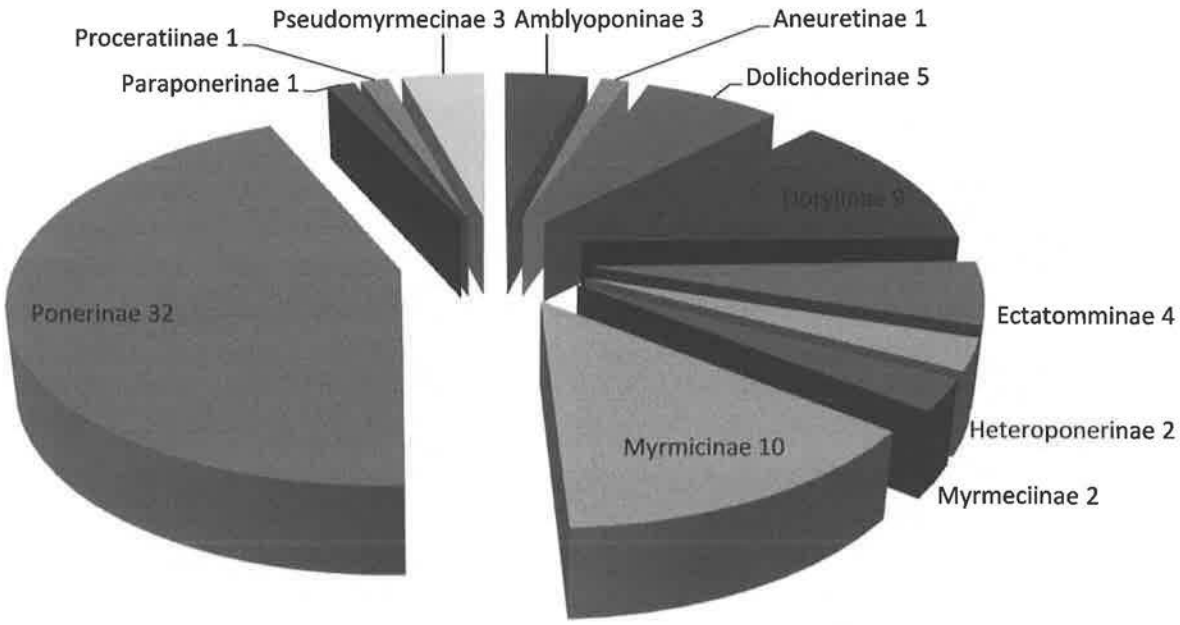
This study is based on the ♂♂ of 260 genera of ants belonging to all 17 subfamilies currently present in the World.

In reference to the forewings, I based my work in particular on the presence/absence of subMarginal cells and Discoidal cells in Typologies I, II and III and a drastic reduction of veins in Typology IV (see paragraph 2.2.3). Regarding the hindwings, I based my work on the presence/absence of M2 vein in Typology I and II and on a strong reduction of veins in Typology III (see paragraph 2.2.4). Below I describe the characteristics of the wings in the different Typologies:

Forewings of Typology I (figs 1-4)

The morphology represented by this Typology is called by some authors as "complete". In fact, it represents a more complex structure of ants' wings venations, where the two subMarginal cells, the Discoidal cell and the Marginal cell are always present, which can be opened or closed. In some cases, the subMarginal cell 2 is incomplete due to the reduction of the Rs 2 + 3 vein (see fig. 4).

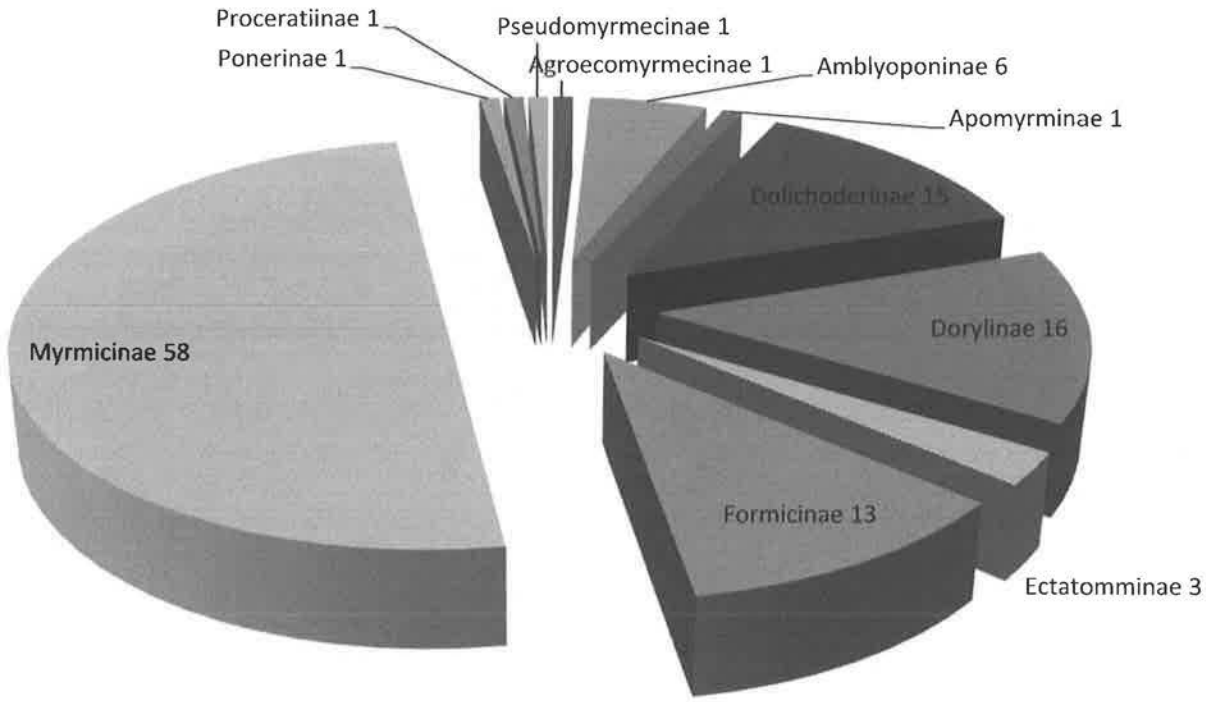
In the 260 genera I studied, Typology I in ♂♂ ants forewings is encountered in 73 genera belonging to 12 subfamilies (see Table 14-15 and Graphic 1).



Graphic 1 - Distribution by subfamily and its number of genera with Typology I forewings in ♂♂ ants.

Forewings of Typology II (figs 5-7)

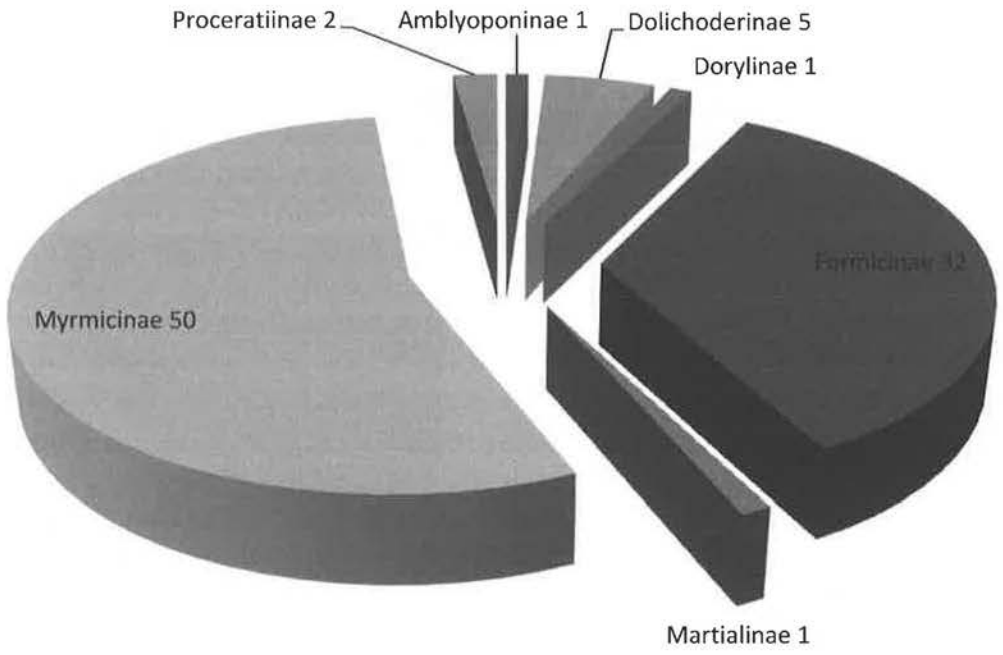
In this Typology, the forewings differ from the previous one Typology due to the absence of the SubMarginal 2 cell. In the 260 genera studied, it is known in ♂♂ of 116 genera belonging to 11 subfamilies (see Table 17-18 and Graphic 2). The structure of the venation differs in genera, and in rare cases in species belonging to the same genus, for the position of the vein M4 and for this reason, as described by Prof. Carlo Emery, they are respectively referred as "solenopsis type" or "formica type".



Graphic 2 - Distribution by subfamily and its number of genera with forewings of Typology II in ♂♂ ants.

Forewings of Typology III (figs 8-11)

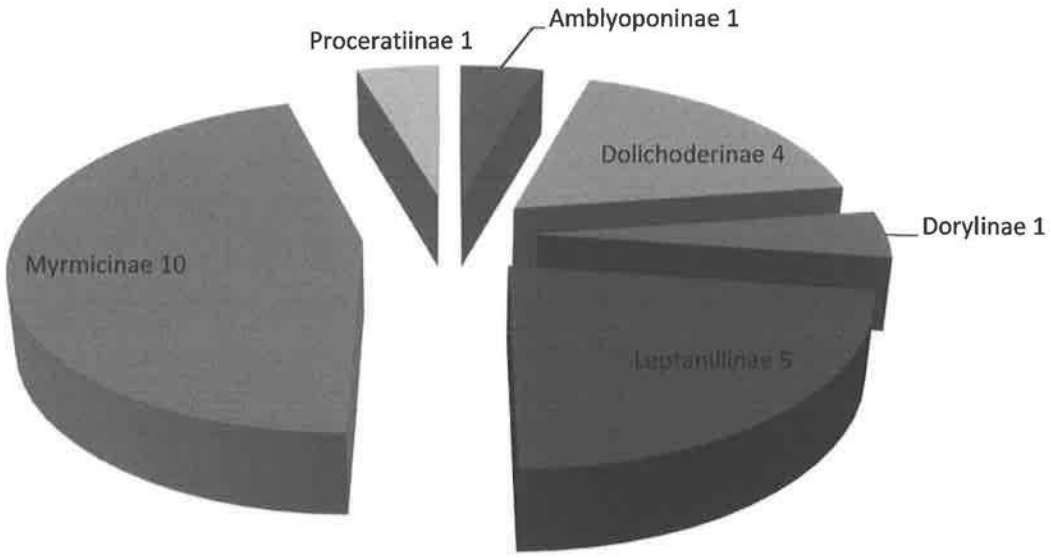
The wings of this Typology are characterized by the absence of subMarginal 2 and Discoidal cells. In the 260 genera studied there are ♂♂ of 97 genera belonging to 7 subfamilies (see Table 19-20 and Graphic 3). Also in this Typology as in the Typology II, it can be distinguish "solenopsis type" and "formica type" wings according to the position of the M4 vein.



Graphic 3 - Distribution by subfamily and number of genera with forewings of Typology III in ♂♂ ants.

Forewings of Typology IV (fig. 12 and Table 12)

In this latter Typology, there is a drastic decrease of the venation with the absence of subMarginal and Discoidal cells, the Marginal cell is open or absent. In this Typology are also included those genera that have very few veins. In the 260 genera studied there are ♂♂ of 22 genera belonging to 6 subfamilies (see Table 21-22 and Graphic 4).



Graphic 4 - Distribution by subfamily and number of genera with forewings of Typology IV in ♂♂ ants.

Hindwings of Typology I (figs 13-14)

In this Typology, are represented wings that have a more complete venation of the Formicidae family. Basal and subBasal cells are always present. They differ in genera for the presence/absence of the Jugal lobe. They are present in the genera of subfamilies Amblyoponinae, Dorylinae, Ectatomminae, Heteroponerinae, Mirmeciinae, Ponerinae and Paraponerinae. The Jugal lobe is present in some genera of subfamilies Ponerinae, Ectatomminae, Mirmeciinae and Paraponerinae.

Hindwings of Typology II (fig. 15)

In this Typology the wings differ from the Typology I due to the absence of the Media 2 vein and the never present Jugal lobe. They are present in the genera of subfamilies Amblyoponinae, Aneuretinae, Agroecomyrmecinae, Dolichoderinae, Dorylinae, Ectatomminae, Heteroponerinae, Formicinae, Myrmicinae, Ponerinae, Proceratiinae and Pseudomyrmecinae.

Hindwings of Typology III (fig. 16 and Table 13)

In this latter Typology there is such a drastic reduction of veins that in some genera there are no Anal vein and the subBasal cell and, in the most extreme cases not even one cell. They are present in the genera of subfamilies Amblyoponinae, Apomirminae, Dolichoderinae, Dorylinae, Leptanillinae, Martialinae, Myrmicinae and Proceratiinae.

Changes in the Typology of the forewings can be found in species belonging to the same genera and in some cases in individuals belonging to the same species.

In some cases there may be slight changes due to malformations in the development of the veins, which are clearly identifiable and which I do not consider in this study.

Below I list in tables and charts, among the 260 genera studied, the genera in which the species have ♂♂ forewings with an ever-present Typology and those genera where are recorded species with the presence of different Typologies.

I have recorded 61 genera with species that always have a forewing venation structure of Typology I (Table 1).

Genera of winged ♂♂ ants with Forewings always of Typology I		
Acanthoponera	*Hagensia*	*Nothomyrmecia*
Aenictogiton	*Harpegnathos*	*Odontomachus*
Aneuretus	*Heteroponera*	*Odontoponera*
Anillidris	*Hypoponera*	*Ophtalmopone*
Anochetus	*Labidus*	*Pachycondyla*
Aptinoma	*Leptogenys*	*Paltothyreus*
Bothroponera	*Liometopum*	*Paraponera*
Brachyponera	*Manica*	*Pheidole*
Centromyrmex	*Mayaponera*	*Phrynoponera*
Cheliomyrmex	*Megaponera*	*Plathytyrea*
Chrysapace	*Mesoponera*	*Plectroctena*
Cylindromyrmex	*Messor*	*Ponera*
Cryptopone	*Myopopone*	*Psalidomyrmex*
Diacamma	*Myrcidris*	*Pseudomyrmex*
Dinoponera	*Myrmecia*	*Pseudoneoponera*
Dolichoderus	*Myopias*	*Pseudoponera*
Eciton	*Mystrium*	*Rasopone*
Ectatomma	*Neivamyrmex*	*Rhytidoponera*
Ectomomyrmex	*Neoponera*	*Stigmatomma*
Euponera	*Nomamyrmex*	*Streblognathus*
Goniomma		

Table 1 - List of genera with species always presenting the forewings of Typology I.

I have registered 81 genera with species that always have a structure of forewings venation of Typology II (Table 2).

Genera of winged ♂♂ ants with Forewings always of Typology II			
Adelomyrmex	*Eburopone*	*Myrmecorhynchus*	*Procryptocerus*
Adetomyrma	*Epelysidris*	*Myrmicaria*	*Proformica*
Aenictus	*Eusphinctus*	*Myrmisaraka*	*Ravavy*
Amblyopone	*Eutetramorium*	*Myrmoteras*	*Rhytidoponera*
Anonycomyrma	*Formica*	*Neocerapachys*	*Rogeria*
Apomyrma	*Froggattella*	*Ochetellus*	*Rostromyrmex*
Atopomyrmex	*Gesomyrmex*	*Ochetomyrmex*	*Simopone*
Axinidris	*Harpagoxenus*	*Onychomyrmex*	*Sphinctomyrmex*
Azteca	*Huberia*	*Ooceraea*	*Strongylognathus*
Blepharidatta	*Iberoformica*	*Orectognathus*	*Syllophopsis*
Bondroitia	*Indomyrma*	*Oxyepoecus*	*Tanipone*
Calyptomyrmex	*Iridomyrmex*	*Oxyopomyrmex*	*Tatuidris*
Carebara	*Liomyrmex*	*Papyrius*	*Thaumatomyrmex*
Cephalotes	*Lioponera*	*Parasyscia*	*Tranopelta*
Cerapachys	*Lividopone*	*Paratopula*	*Turneria*
Cyatta	*Lophomyrmex*	*Patagonomyrmex*	*Veromessor*
Dacetinops	*Lordomyrma*	*Philidris*	*Vitsika*
Dilobocondyla	*Malagidris*	*Poliergus*	*Xymmer*
Doleromyrma	*Meranoplus*	*Prionopelta*	*Yunodorylus*
Dolopomyrmex	*Mesostruma*		*Zasphinctus*
Dorylus	*Metapone*		

Table 2 - List of genera with species always presenting forewings of Typology II.

I have registered 67 genera with species that always have a structure of forewings venation of Typology III (Table 3).

Genera of winged ♂♂ ants with Forewings always of Typology III		
Acromyrmex	*Melophorus*	*Podomyrma*
Allomerus	*Mycetophylax*	*Polyrhachys*
Anoplolepis	*Mycetagroicus*	*Prenolepis*
Aphomomyrmex	*Mycetarotes*	*Pristomyrmex*
Apterostigma	*Mycetophylax*	*Proatta*
Arnoldius	*Mycetosoritis*	*Proceratium*
Atta	*Myrmecina*	*Prolasius*
Brachymyrmex	*Myrmelachista*	*Pseudoatta*
Calomyrmex	*Myrmycocrypta*	*Pseudolasius*
Camponotus	*Nesomyrmex*	*Rhopalomastix*
Cataulacus	*Notoncus*	*Romblonella*
Cladomyrma	*Notostigma*	*Rossomyrmex*
Colobopsis	*Novomessor*	*Sericomyrmex*
Cyphomyrmex	*Nylanderia*	*Stereomyrmex*
Daceton	*Octostruma*	*Stigmacros*
Dinomyrmex	*Ocymyrmex*	*Tapinolepis*
Dyscothyrea	*Oecophylla*	*Technomyrmex*
Euprenolepis	*Overbeckia*	*Trachymyrmex*
Kalathomyrmex	*Paramycetophylax*	*Tropidomyrmex*
Lepisiota	*Paraparatrechina*	*Wasmannia*
Leptanilloides	*Paratrechina*	*Zatania*
Martialis	*Petalomyrmex*	
Melissotarsus	*Plagiolepis*	

Table 3 - List of genera with species always presenting Forewings of Typology III.

I have registered 9 genera with species that always have a structure of forewings venation of Typology IV (Table 4).

Genera of winged ♂♂ ants with Forewings always of Typology IV
Acanthognathus
Leptanilla
Noonilla
Phaulomyrma
Probolomyrmex
Scyphodon
Syscia
Xenomyrmex
Yavnella

Table 4 - List of genera with species always presenting Forewings of Typology IV.

I have registered 10 genera with species that have a structure of forewings venation which varies from Typology I to Typology II (Table 5).

Genera of winged ♂♂ ants with Forewings of Typology I and II
Acanthostichus
Aphaenogaster
Gnamptogenys
Linepithema
Myrmica
Pogonomyrmex
Proceratium
Stegomyrmex
Tetraponera
Typhlomyrmex

Table 5 - List of genera with species presenting Forewings of Typology I and II.

I have registered 18 genera with species that have a structure of forewings venation which varies from Typology II to Typology III (Table 6).

Genera of winged ♂♂ ants with Forewings of Typology II and III
Acanthomyrmex
Acropyga
Bajacadridis
Basiceros
Cataglyphis
Lasiophanes
Lasius
Leptothorax
Megalomyrmex
Mirmecocystus
Monomorium
Opistopsis
Royidris
Solenopsis
Tapinoma
Terataner
Tetramorium
Trichomyrmex

Table 6 - List of genera with species presenting Forewings of Typology II and III.

I have registered 7 genera with species that have a structure of forewings venation which varies from Typology III to Typology IV (Table 7).

Genera of winged ♂♂ ants with forewings of Typology III and IV
Cardiocondyla
Dorymyrmex
Eurhopalotrix
Forelius
Mycocepurus
Recurvidris
Strumigenys

Table 7 - List of genera with species presenting forewings of Typology III and IV.

I have registered 1 genus with species that have a structure of the forewings venation which varies from Typology I to Typology II and III (Table 8).

Genera of winged ♂♂ ants with forewings of Typology I, II and III
Stenamma

Table 8 – *Stenamma* is the only genus presenting forewings of Typology I, II and III.

I have registered 4 genera with species that have a structure of forewings venation which varies from Typology II to III and IV (Table 9).

Genera of winged ♂♂ ants with forewings of Typology II, III and IV
Bothriomyrmex
Crematogaster
Fulakora
Temnothorax

Table 9 - List of genera with species presenting forewings of Typology II, III and IV.

I have registered 1 genus with species that have a structure of forewings venation which varies from Typology I to II and IV (Table 10).

Genera of winged ♂♂ ants with forewings of Typology I, II and IV
Leptomyrmex

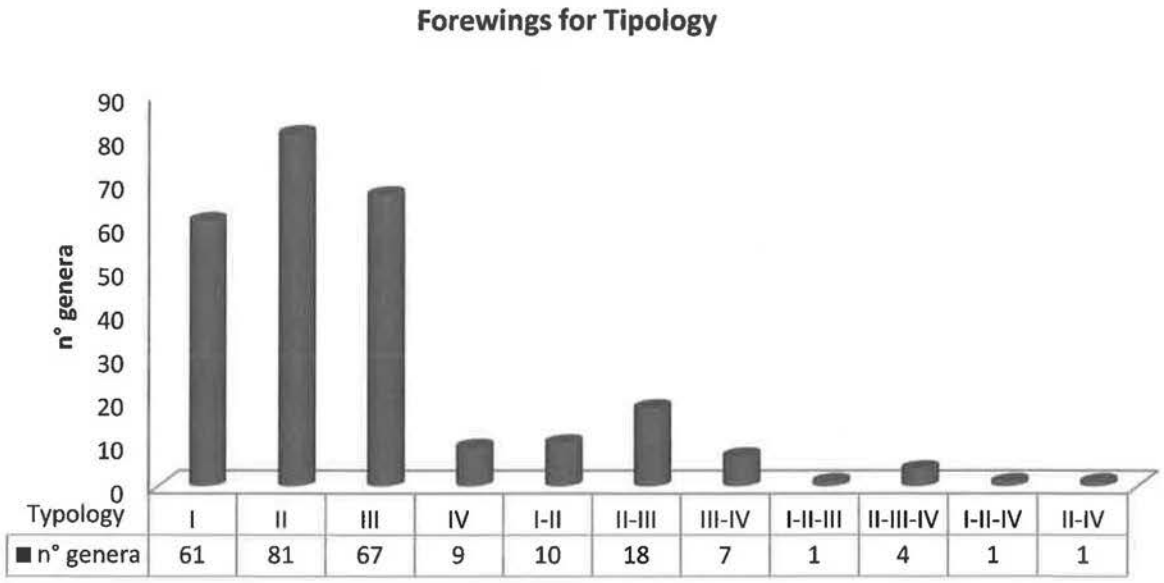
Table 10 – *Leptomyrmex* is the only genus presenting forewings of Typology I, II and IV.

I have registered 1 genus with species that have a structure of forewings venation which varies from Typology II to IV (Table 11).

Genera of winged ♂♂ ants with Forewings of Typology II and IV
Vollenhovia

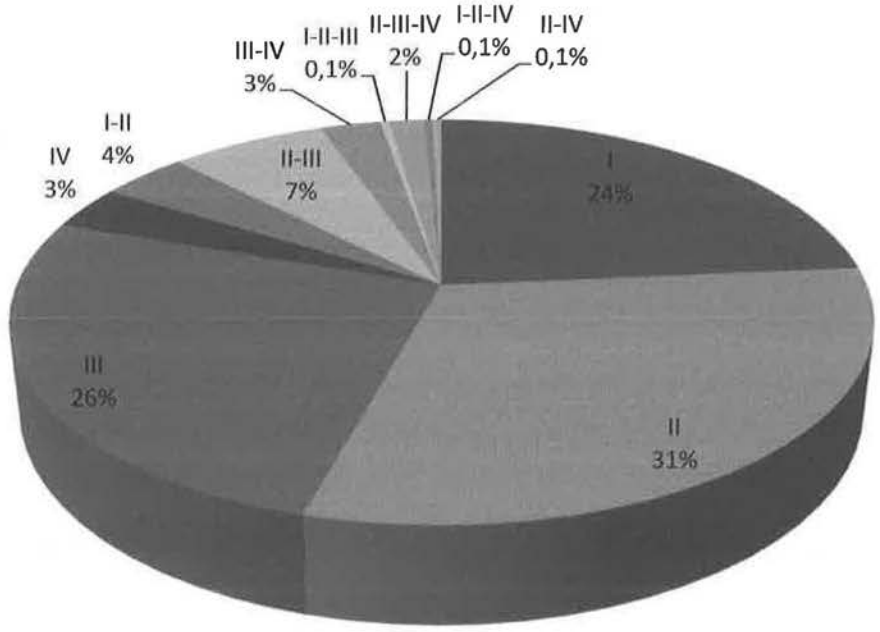
Table 11 – *Vollenhovia* is the only genus presenting forewings of Typology II and IV.

In summary, I represent, with graphs 6 and 7, how the wings of the ♂♂ ants of the 260 genera studied in the Formicidae family are distributed in the different Typologies.



Typology	I	II	III	IV	I-II	II-III	III-IV	I-II-III	II-III-IV	I-II-IV	II-IV
■ n° genera	61	81	67	9	10	18	7	1	4	1	1

Gaphic 6 –Distribution of the genera of the ♂♂ ants with different forewings Typologies.

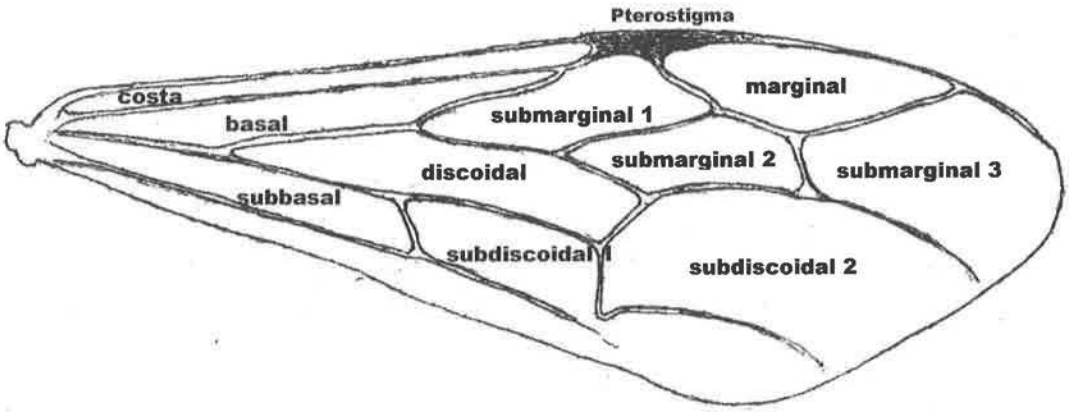


Graphic 7 – Distribution in % of the genera of the ♂♂ ants with different forewings Typologies.

2.2.3 Morphology description of Forewings of ♂♂ ants

Typology I

Cells



Veins and cross-veins

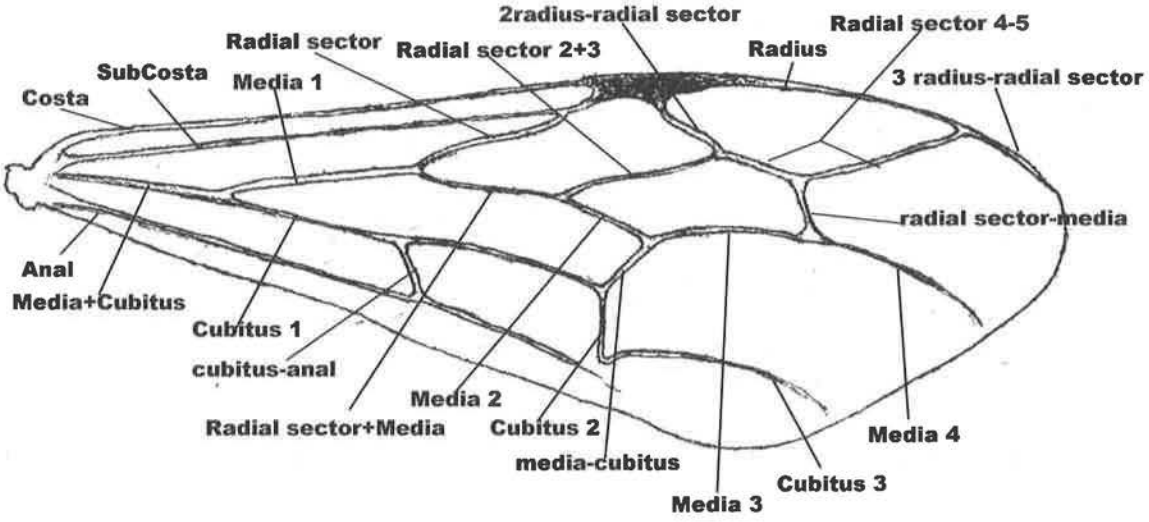
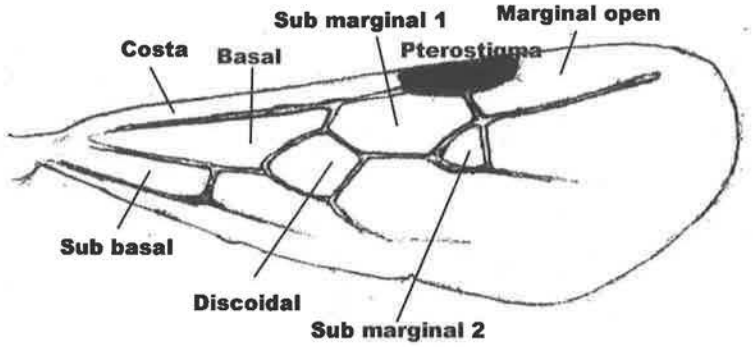


Figure 1: Forewing cells and veins of genus *Neivamyrmex* ♂.

Typology I

Cells



Veins and Cross-veins

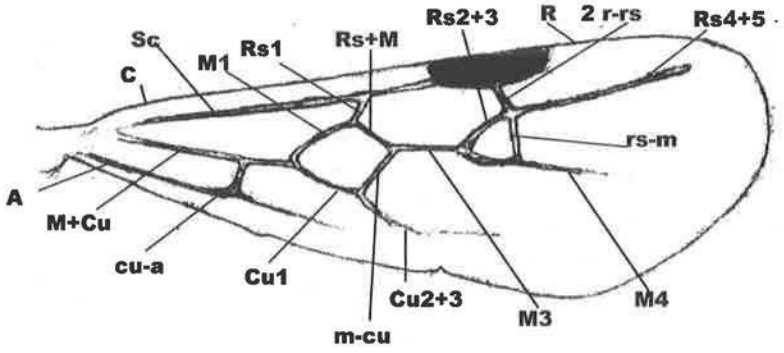
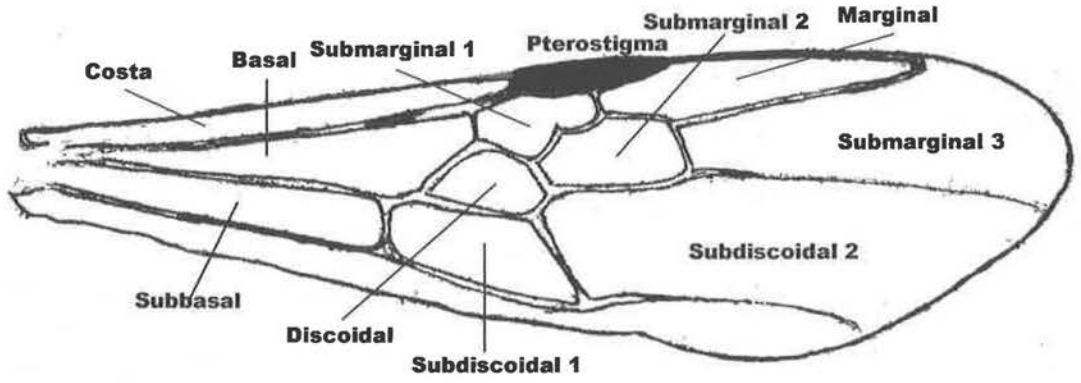


Figure 2: Forewing cells and veins of genus *Pheidole* ♂.
Veins: **C**: Costa; **Sc**: SubCosta; **M**: Media; **Cu**: Cubitus; **A**: Anal; **Rs**: Radial sector; **R**: Radius
Cross-veins: **cu-a**: cubitus+anal; **m-cu**: media+cubitus; **rs-m**: radial sector+media; **r-rs**: radius+radial sector.

Typology I

Cells



Veins and Cross-veins

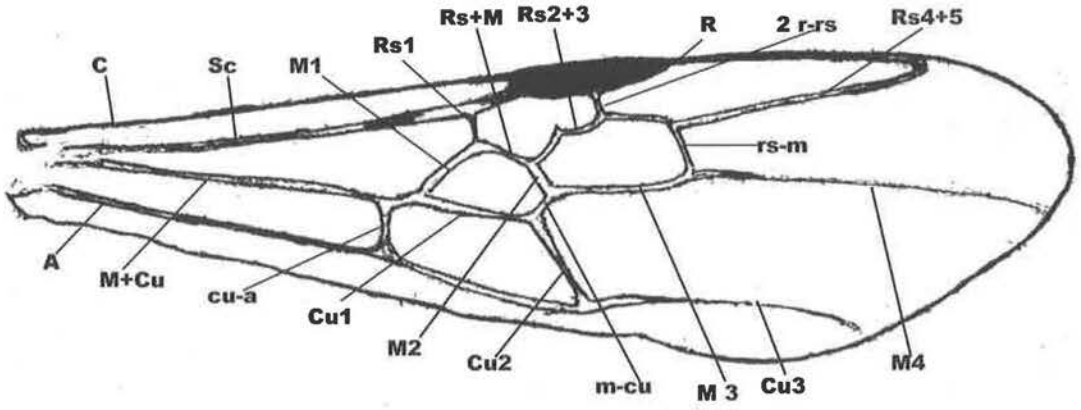
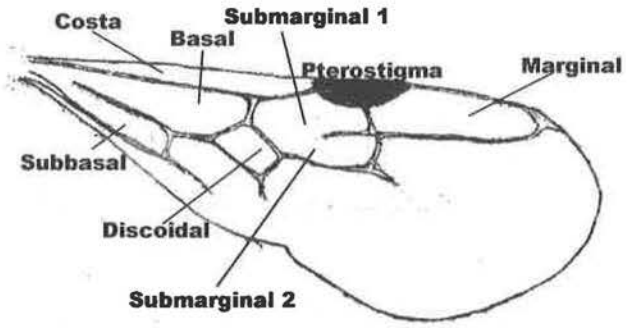


Figure 3: Forewing veins of *Pachycondyla striata* ♂, Brazil.
Veins: **C**: Costa; **Sc**: SubCosta; **M**: Media; **Cu**: Cubitus; **A**: Anal; **Rs**: Radial sector; **R**: Radius
Crossveins: **cu-a**: cubitus+anal; **m-cu**: media+cubitus; **rs-m**: radial sector+media; **r-rs**: radius+radial sector.

Typology I

Cells



Veins and Cross-veins

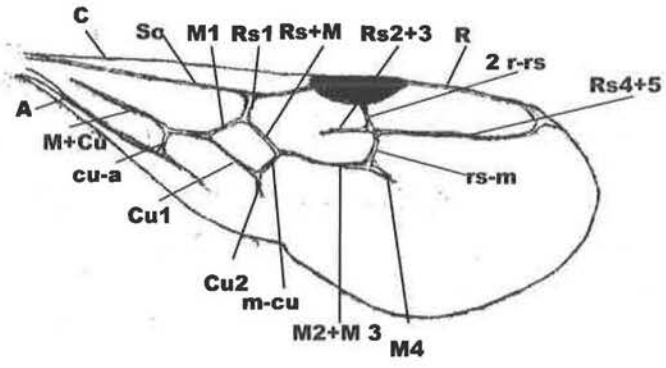
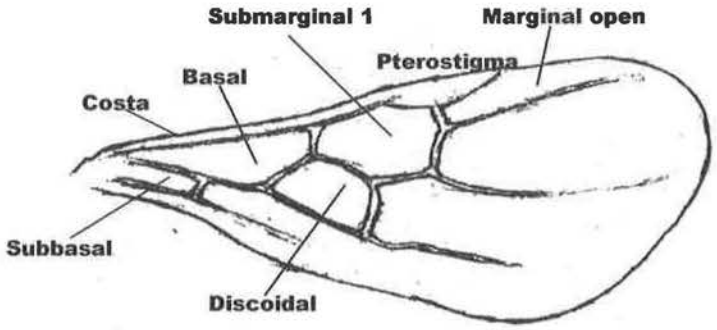


Figure 4: Forewing veins of *Gnamtogenys* sp. 336 ♂, Brazil.
Veins: **C**: Costa; **Sc**: Subcosta; **M**: Media; **Cu**: Cubitus; **A**: Anal; **Rs**: Radial sector; **R**: Radius
Crossveins: **cu-a**: cubitus+anal; **m-cu**: media+cubitus; **rs-m**: radial sector+media; **r-rs**: radius+radial sector.

Typology II

Cells



Veins and Cross-veins

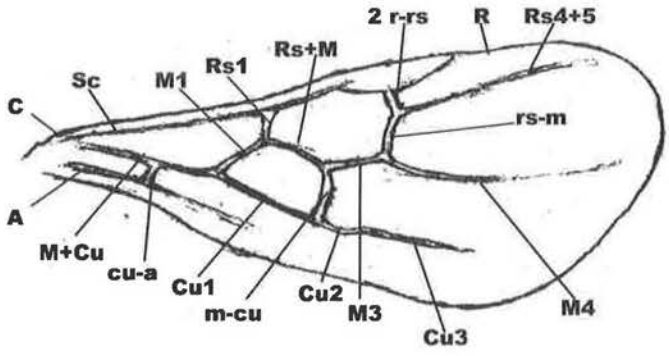
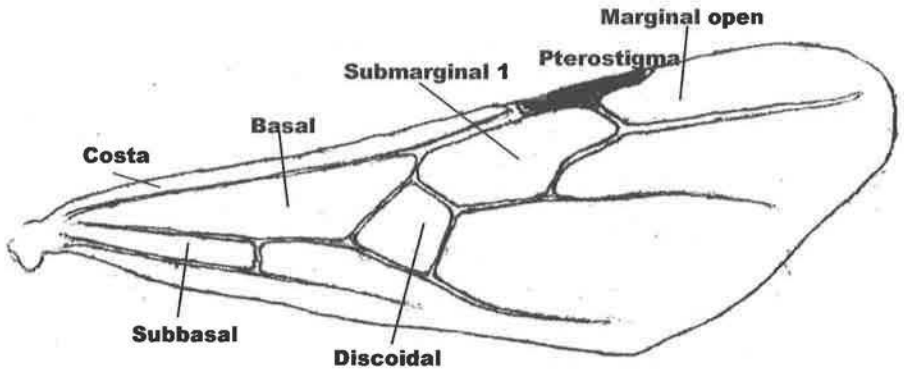


Figure 5: Forewing cells and veins of *Crematogaster* sp. 32 ♂, São Paulo, Brazil; "solenopsis type"
Veins: **C**: Costa; **Sc**: Subcosta; **M**: Media; **Cu**: Cubitus; **A**: Anal; **Rs**: Radial sector; **R**: Radius
Crossveins: **cu-a**: cubitus+anal; **m-cu**: media+cubitus; **rs-m**: radial sector+media; **r-rs**: rad*i*us+radial sector.

Typology II

Cells



Veins and Cross-veins

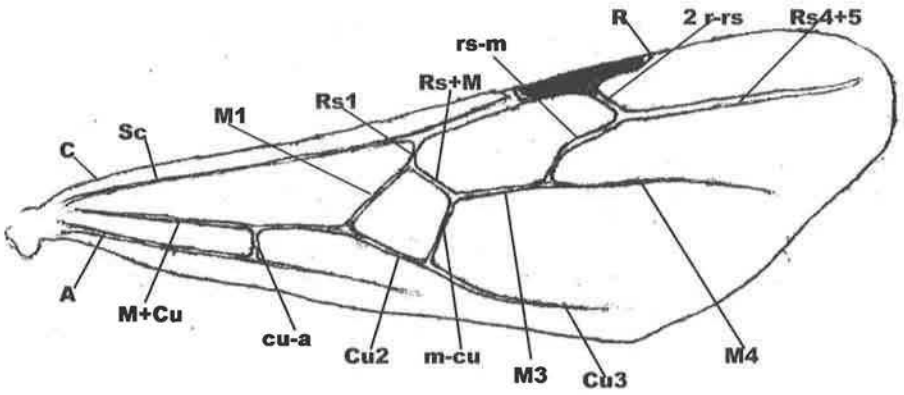
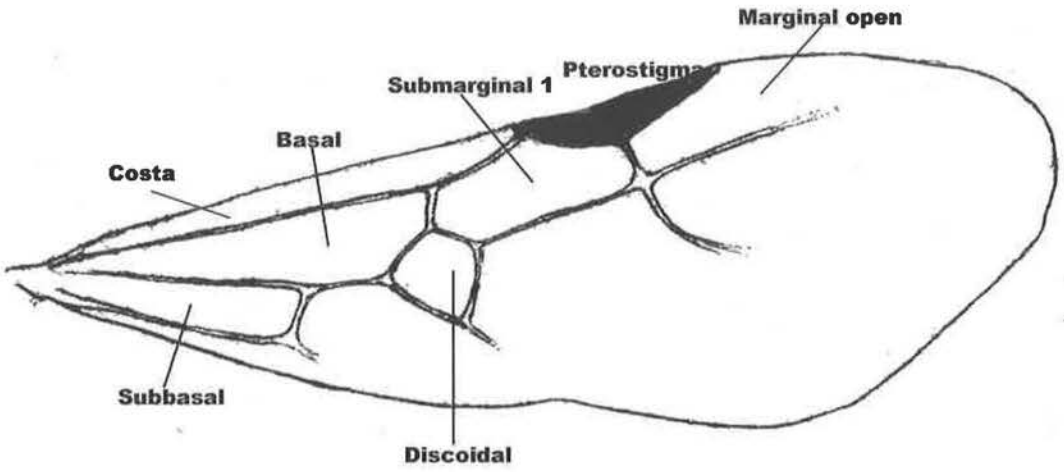


Figure 6: Forewing veins of *Tranopelta gilva* ♂, Brazil; "solenopsis type"
Veins: **C**: Costa; **Sc**: Subcosta; **M**: Media; **Cu**: Cubitus; **A**: Anal; **Rs**: Radial sector; **R**: Radius
Cross-veins: **cu-a**: cubitus+anal; **m-cu**: media+cubitus; **rs-m**: radial sector+media; **r-rs**: radius+radial sector.

Typology II

Cells



Veins and Cross-veins

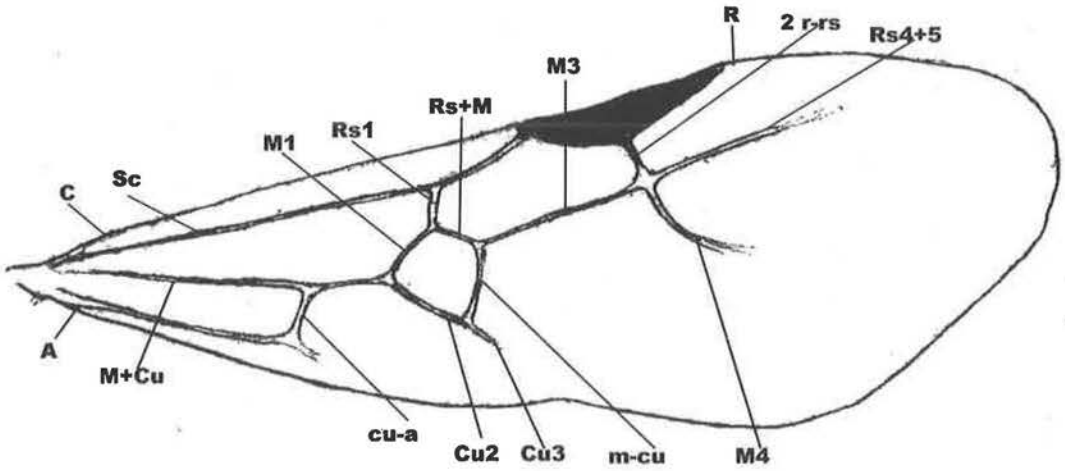
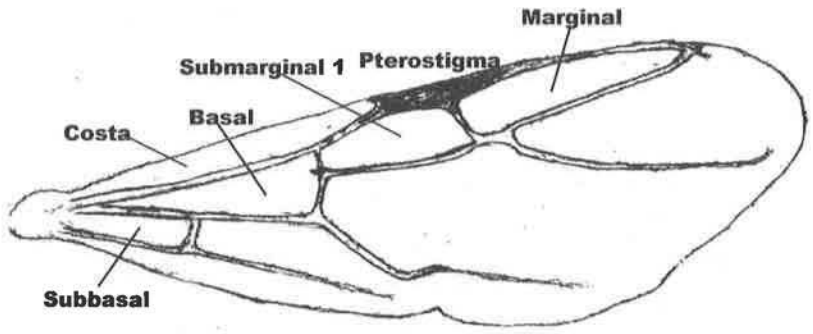


Figure 7: Forewing cells and veins of *Pogonomyrmex* sp. 280 ♂, Brazil; "formica type"
Veins: **C**: Costa; **Sc**: Subcosta; **M**: Media; **Cu**: Cubitus; **A**: Anal; **Rs**: Radial sector; **R**: Radius
Crossveins: **cu-a**: cubitus+anal; **m-cu**: media+cubitus; **rs-m**: radial sector+media; **r-rs**: radius+radial sector.

Typology III

Cells



Veins and Cross-veins

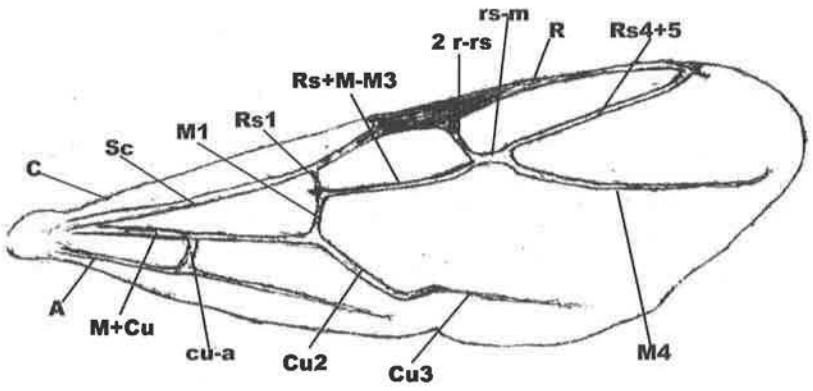
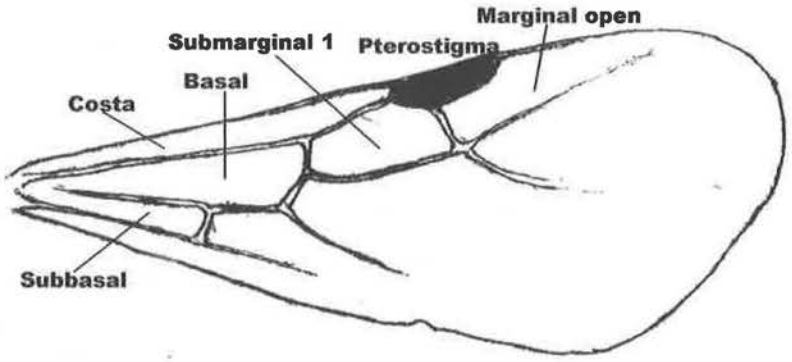


Figure 8: Forewing cells and veins of genus *Camponotus* ♂; "formica type"
Veins: **C**: Costa; **Sc**: Subcosta; **M**: Media; **Cu**: Cubitus; **A**: Anal; **Rs**: Radial sector; **R**: Radius
Crossveins: **cu-a**: cubitus+anal; **m-cu**: media+cubitus; **rs-m**: radial sector+media; **r-rs**: radius+radial sector.

Typology III

Cells



Veins and Cross-veins

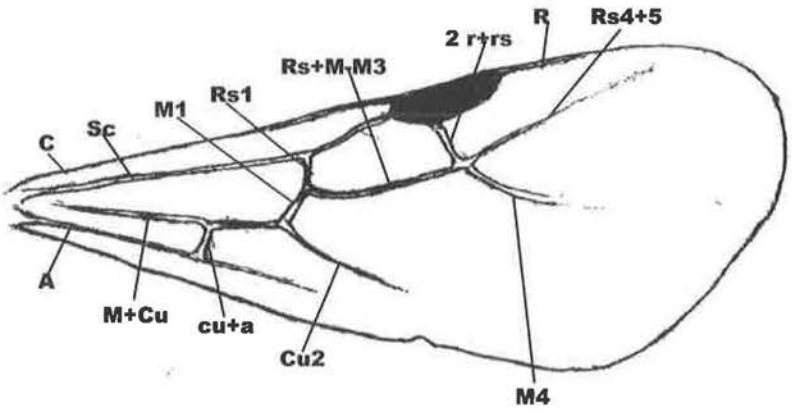
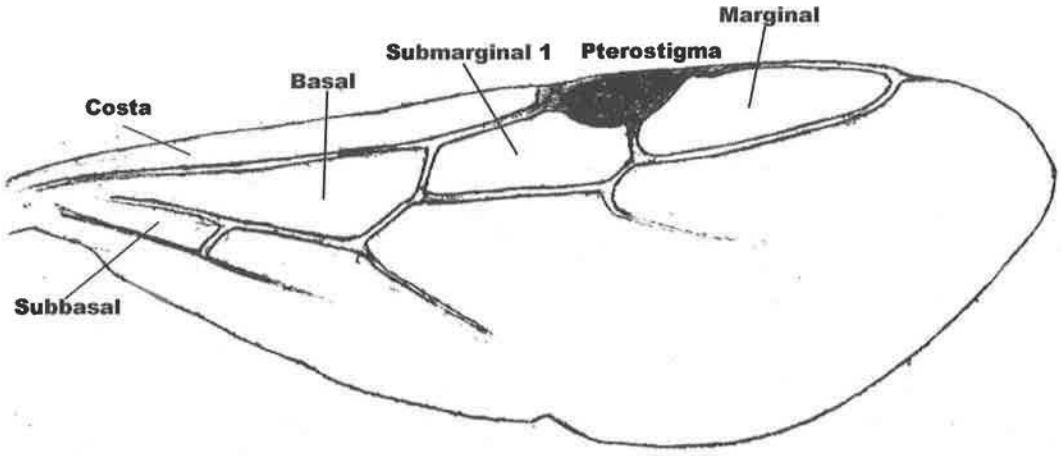


Figure 9: Forewing cells and veins of genus *Wasmannia* ♂; "formica type"
Veins: **C**: Costa; **Sc**: Subcosta; **M**: Media; **Cu**: Cubitus; **A**: Anal; **Rs**: Radial sector; **R**: Radius
Crossveins: **cu-a**: cubitus+anal; **m-cu**: media+cubitus; **rs-m**: radial sector+media.

Typology III

Cells



Veins and Cross-veins

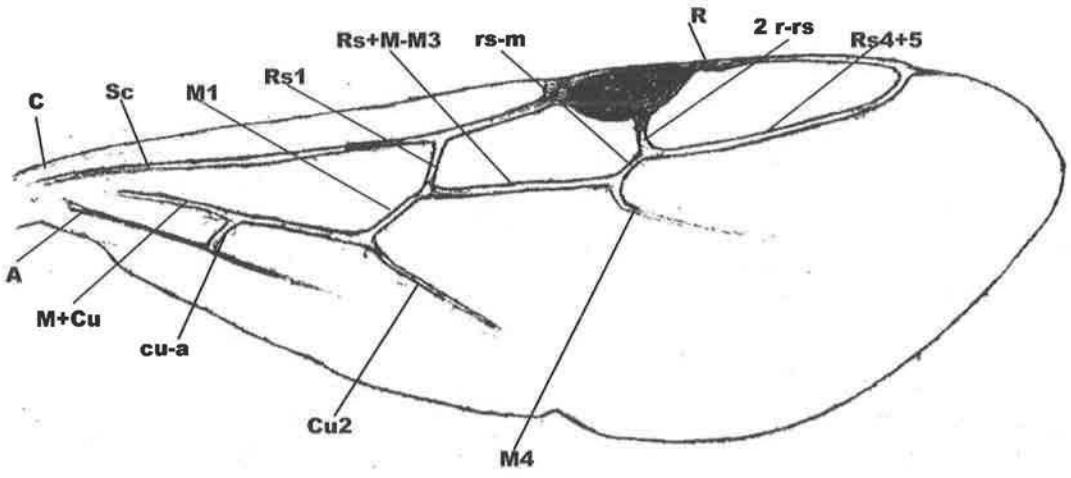
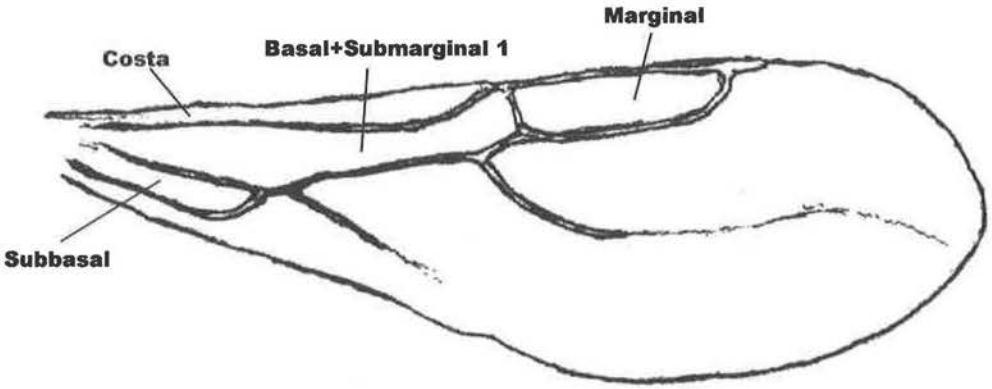


Figure 10: Forewing cells and veins of genus *Myrmelachista* ♂; "solenopsis type"
Veins: **C**: Costa; **Sc**: Subcosta; **M**: Media; **Cu**: Cubitus; **A**: Anal; **Rs**: Radial sector; **R**: Radius
Crossveins: **cu-a**: cubitus+anal; **m-cu**: media+cubitus; **rs-m**: radial sector+media; **r-rs**: radius+radial sector

Typology III

Cells



Veins and Cross-veins

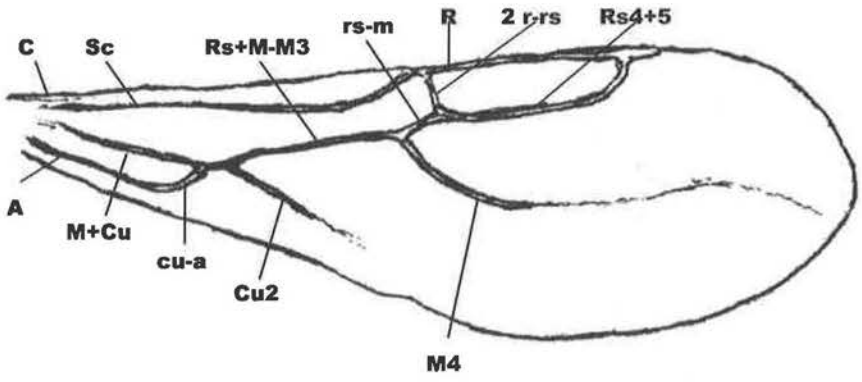
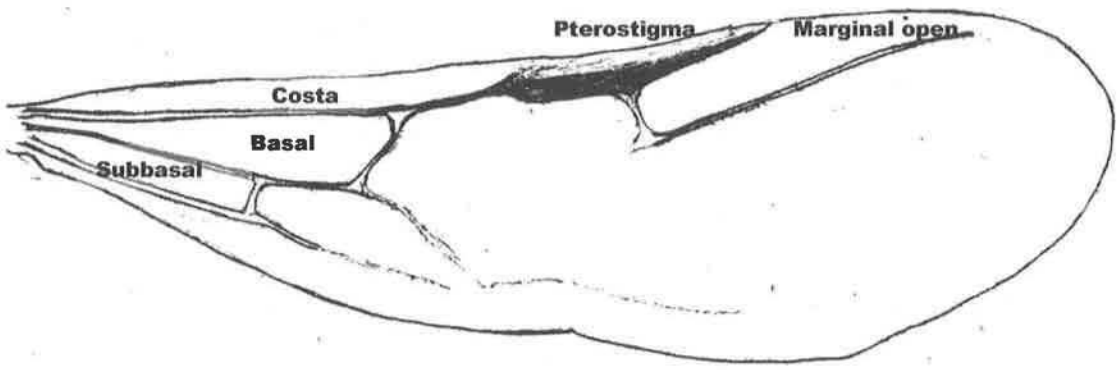


Figure 11: Forewing cells and veins of *Apterostigma* sp. ♂, Brazil; "solenopsis type"
Veins: **C**: Costa; **Sc**: Subcosta; **M**: Media; **Cu**: Cubitus; **A**: Anal; **Rs**: Radial sector; **R**: Radius
Crossveins: **cu-a**: cubitus+anal; **rs-m**: radial sector+media; ***r*-rs**: radius+radial sector

Typology IV

Cells



Veins and Cross-veins

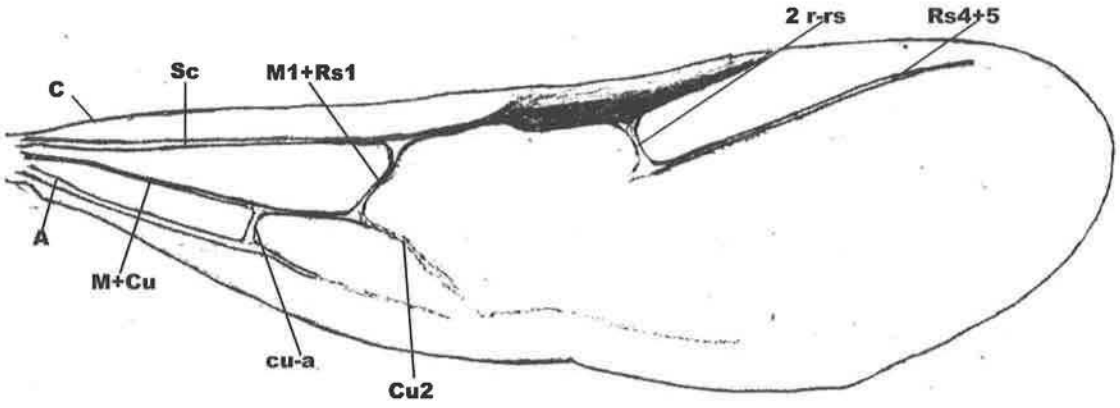
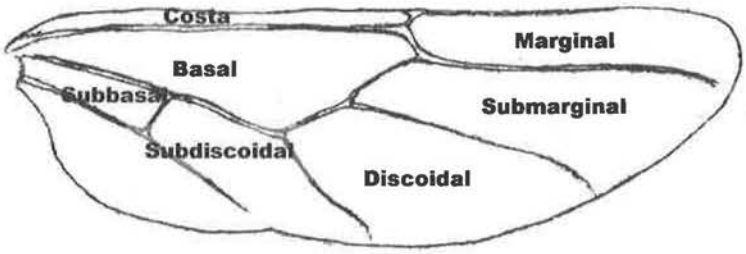


Figure 12: Forewing cells and veins of *Dorymyrmex* sp. 117 ♂, Brazil.
Veins: **C**: Costa; **Sc**: Subcosta; **M**: Media; **Cu**: Cubitus; **A**: Anal; **Rs**: Radial sector; **R**: Radius
Crossveins: **cu-a**: cubitus+anal; **r-rs**: radius+radial sector.

2.2.4 Morphology description of Hindwings of ♂♂ ants

Typology I

Cells



Veins and Cross-veins

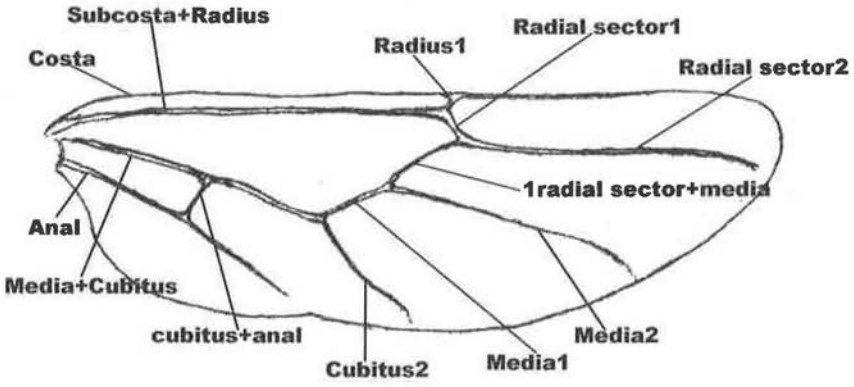
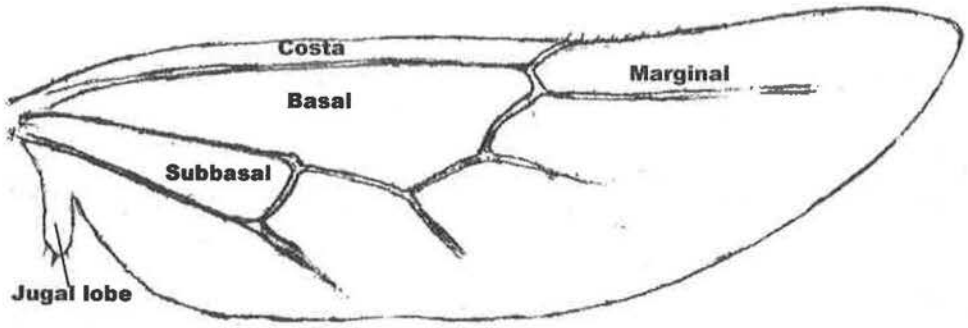


Figure 13: Hindwing cells and veins of genus *Neivamyrmex* ♂.

Typology I

Cells



Veins and Cross-veins

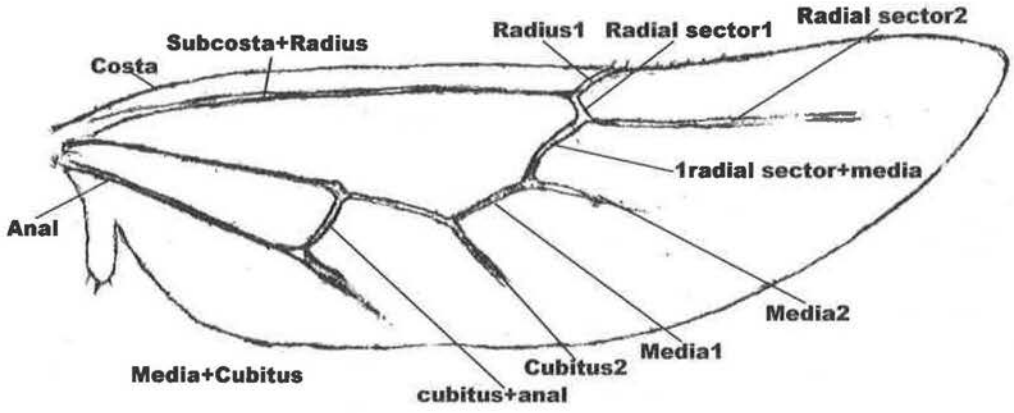
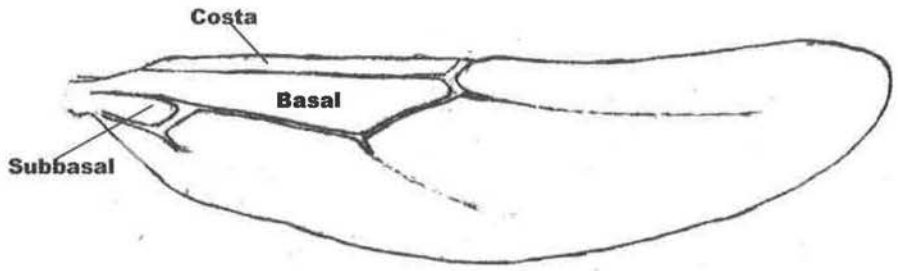


Figure 14: Hindwing cells and veins of genus *Ectatomma* ♂.

Typology II

Cells



Veins and Cross-veins

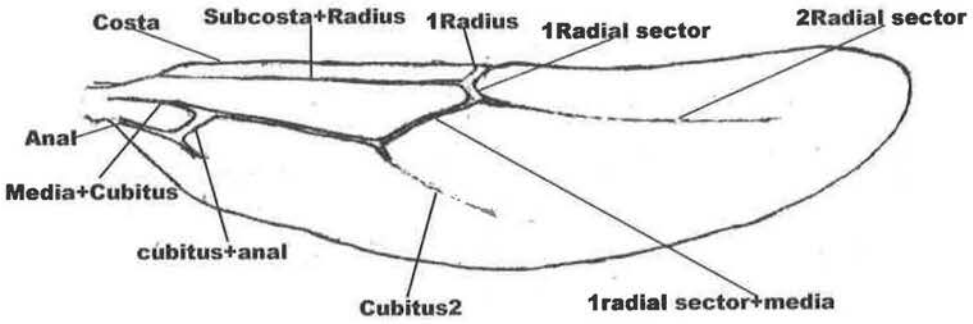
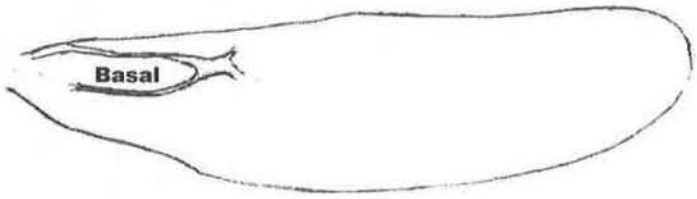


Figure 15: Hindwing veins of genus *Procryptocerus* ♂.

Typology III

Cells



Veins and Cross-veins

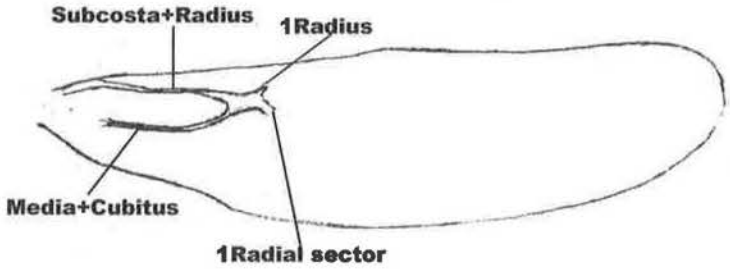
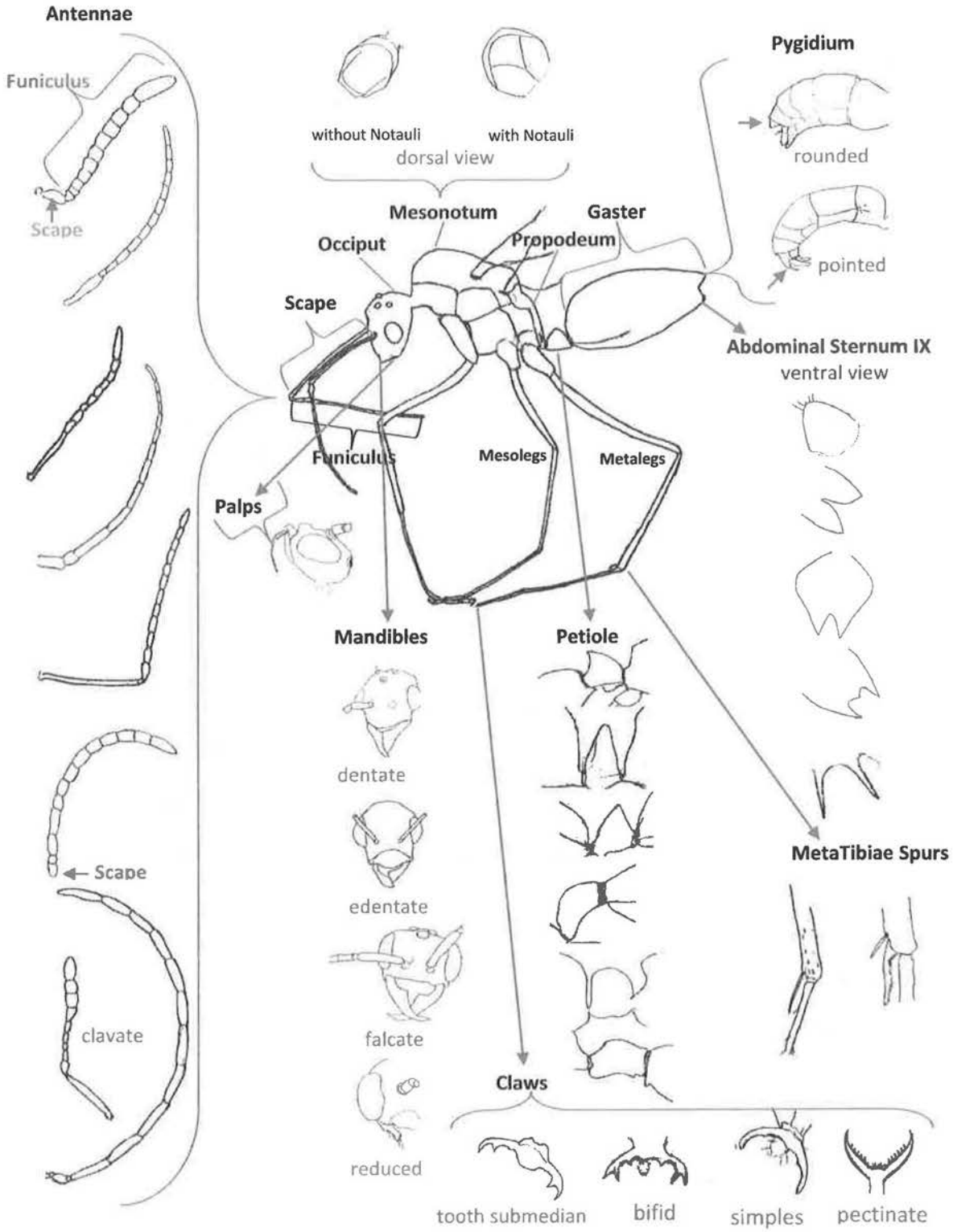
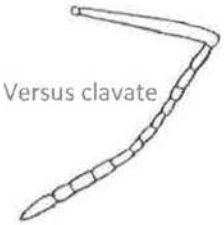
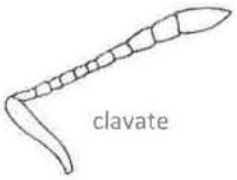


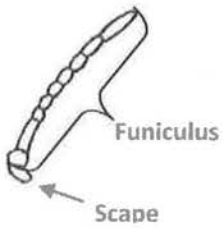
Figure 16: Hindwing cells and veins of genus *Cyphomyrmex* ♂.

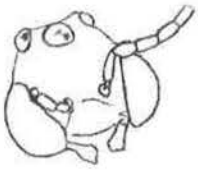
2.2.5 Terminology and morphological aspects used in the dichotomous key





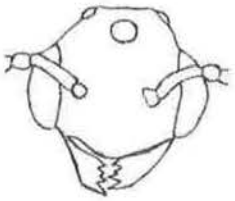




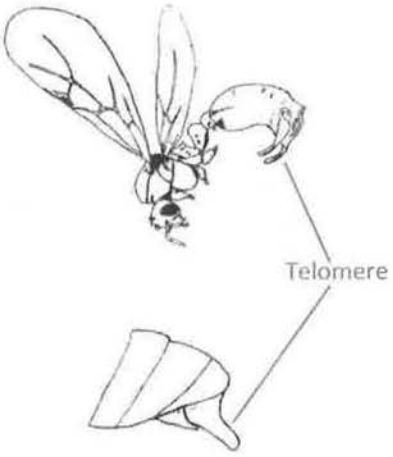


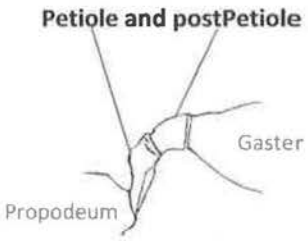
Mandibles edentate

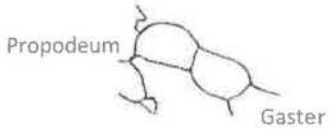
Mandibles dentate

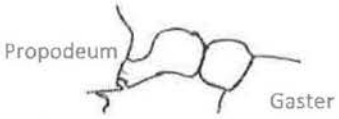


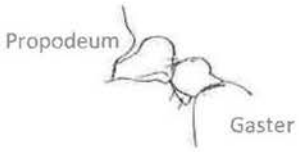
Mandibles dentate

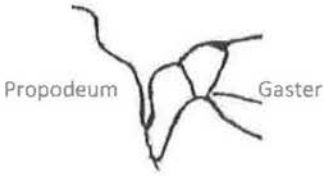












2.2.6 References

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2.3 Typologies summary of the ♂♂ ants' wings

The dichotomous key uses, as the main morphological characteristic, the Forewing Typology. In Table 12 and 13 are shown the Typologies summary of the Forewings and Hindwings.

Forewings Typologies Summary

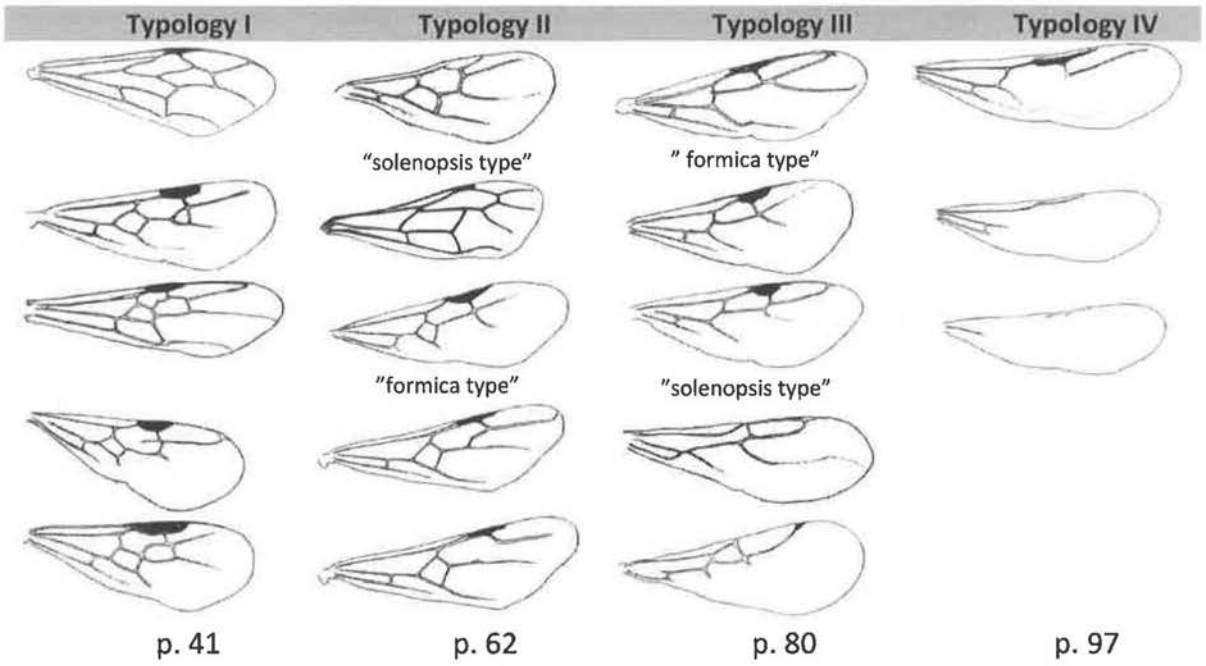


Table 12 – Forewing Typologies Summary to ♂♂ ants genera.

Hindwings Typologies Summary

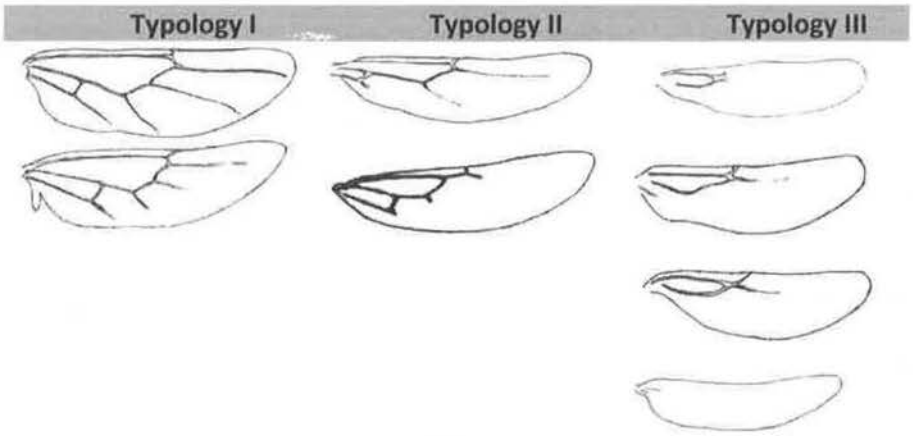
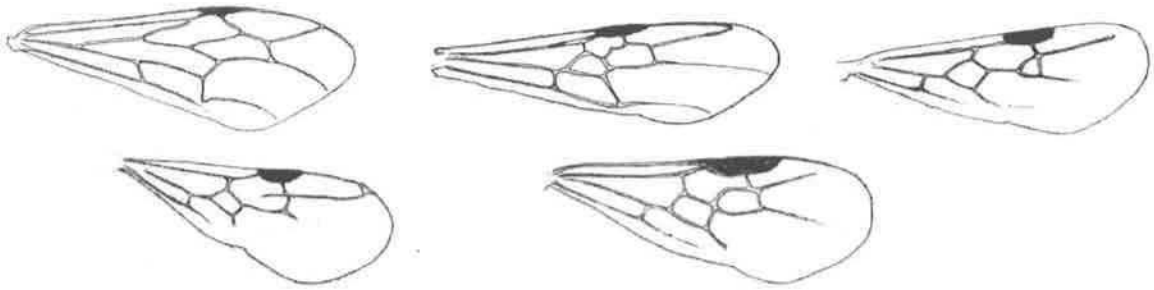


Table 13 – Hindwing Typologies Summary to ♂♂ ants genera.

2.4 Dichotomous key to forewings of Typology I



The male ants of 73 genera have a structure of the Forewing of Typology I (Table 15). These are taxonomically classified in 12 subfamilies (Table 14).

In Table 4 are shown the genera which present Forewings of Typology I.

Forewing of Typology I

sub-family	genera
Amblyoponinae	3
Aneuretinae	1
Dolichoderinae	5
Dorylinae	9
Ectatomminae	4
Heteroponerinae	2
Myrmeciinae	2
Myrmicinae	10
Ponerinae	32
Paraponerinae	1
Proceratiinae	1
Pseudomyrmecinae	3
12	**73**

Table 14 - The subfamilies of the family Formicidae and the respective numbers of genera which present Forewings of Typology I.

Genera of the ♂♂ winged ants with Forewings of Typology I

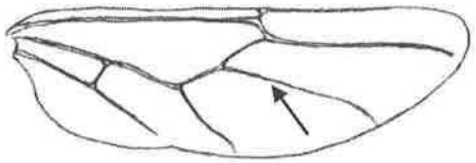
Acanthoponera	*Eciton*	*Mesoponera*	*Pheidole*
Acanthostichus (part)	*Ectatomma*	*Messor*	*Phrynoponera*
Aenictogiton	*Ectomomyrmex*	*Myopopone*	*Plathytyrea*
Aneuretus	*Euponera*	*Myrcidris*	*Plectroctena*
Anillidris	*Gnamtogenys* (part)	*Myrmecia*	*Pogonomyrmex* (part)
Anochetus	*Goniomma*	*Myrmica* (part)	*Ponera*
Aphaenogaster (part)	*Hagensia*	*Myopias*	*Proceratium* (part)
Aptinoma	*Harpegnathos*	*Mystrium*	*Psalidomyrmex*
Bothroponera	*Heteroponera*	*Neivamyrmex*	*Pseudomyrmex*
Brachyponera	*Hypoponera*	*Neoponera*	*Pseudoneoponera*
Centromyrmex	*Labidus*	*Nomamyrmex*	*Pseudoponera*
Cheliomyrmex	*Leptogenys*	*Nothomyrmecia*	*Rasopone*
Chrysapace	*Leptomyrmex* (part)	*Odontomachus*	*Rhytidoponera*
Cylindromyrmex	*Linepithema* (part)	*Odontoponera*	*Stegomyrmex* (part)
Cryptopone	*Liometopum*	*Ophtalmopone*	*Stenamma* (part)
Diacamma	*Manica*	*Pachycondyla*	*Stigmatomma*
Dinoponera	*Mayaponera*	*Paltothyreus*	*Streblognatus*
Dolichoderus	*Megaponera*	*Paraponera*	*Tetraponera* (part)
			Typhlomyrmex (part)

Table 15 - ♂♂ of 73 genera of the Formicidae family which present Forewings of Typology I. In brackets the term "part" means that species of the same genus have different Forewings Typology.

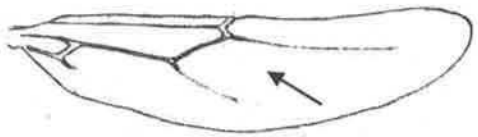
Forewing of Typology I

This key is divided into two Sections:
Alpha (α) and **Beta** (β)

Section α p. 44
Hindwing of Typology I



Section β p. 47
Hindwing of Typology II

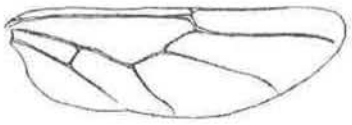


The difference between the two Typologies of the Hindwings is evidenced in the absence of the vein 2M indicated in the above figure with an arrow.

In *Megaponera* and *Paltothyreus* genera are not known by me the Hindwings of the ♂♂. I assume have Hindwings of Typology I, like the majority the subfamily Ponerinae genera.

Forewing of Typology I

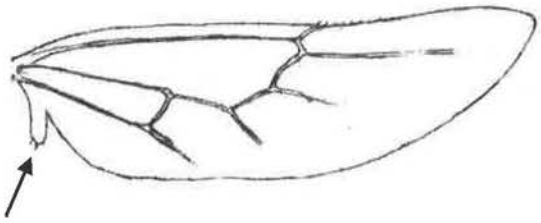
Section α



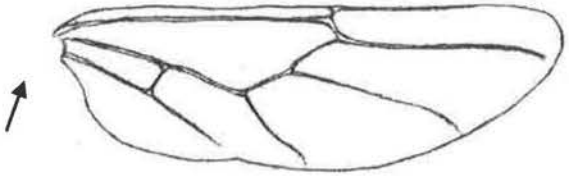
In this Section are presented genera which exhibit the Hindwing of Typology I.

This section is divided into two Parts: **A** and **B**

Part A p. 45



Part B p. 46



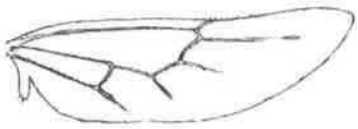
Part A: Hindwing of Typology I with Jugal lobe (arrow in figure)

Part B: Hindwings of Typology I without Jugal lobe (arrow in figure)

Forewing of Typology I

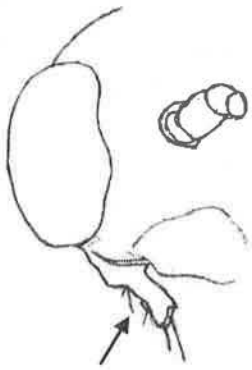
Section α

Part A

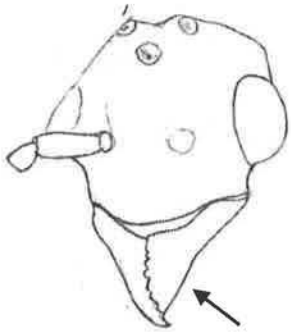


This part of the key is divided into two subSection based on the characteristics of the Mandibles of ♂♂ ants who have Hindwings of Typology I with Jugal lobe.

subSection 1 p. 48
Mandibles reduced



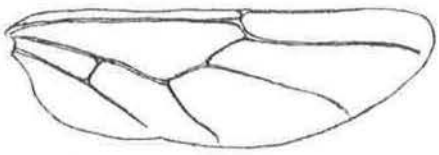
subSection 2 p. 49
Mandibles triangular dentate or edentate



Forewing of Typology I

Section α

Part B



This part of the key is divided into two subSection based on the characteristics of the length of the Scape present in the males ants who have Hindwings of Typology I without Jugal lobe.

subSection 1 p. 54

Antennae Scape ≤ that the length of 2° article of the Fuliculus

subSection 2 p. 55

Antennae Scape > that the length of 2° article of the Funiculus

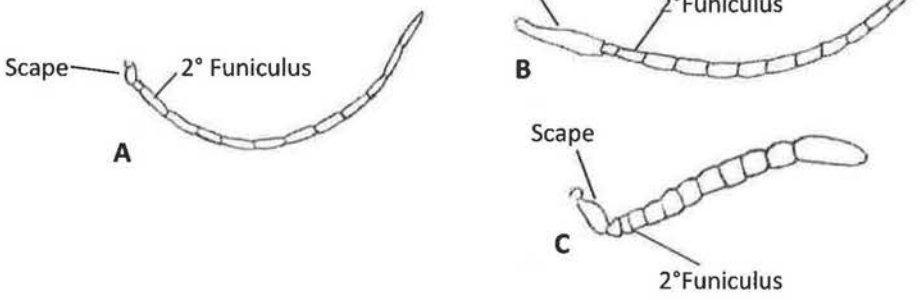
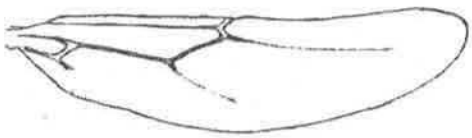


Figure: **A**: Antennae Scape in length < than the 2° article of the Fuliculus; **B** and **C**: Antennae Scape in length > than the 2° article of the Funiculus.

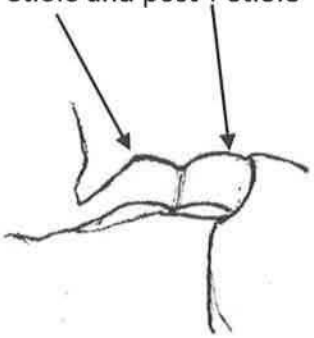
Forewing of Typology I

Section β

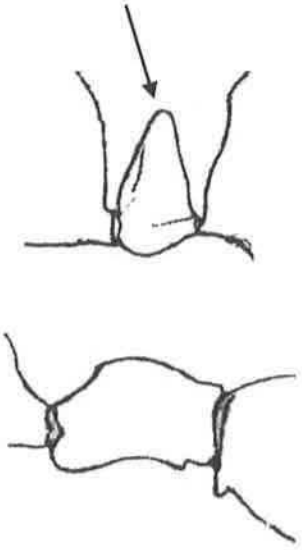


In this Section are presented genera which exhibit the Hindwings of Typology II.
This section is divided into two parts **A** and **B**

Part A p. 56
Petiole and post-Petiole



Part B p. 59
Petiole



Forewing of Typology I

Section α

Part A

subSection 1

Mandibles reduced

The genera, of the Ants with Forewing of Typology I, Section α, Part A, sub Section 1, has been divided by bio-geographical regions to facilitate the presentation of a key due to very little information about the morphology of ♂♂ of these genera (Table 16).

Afrotropical-Malagasy	**Indo-Australian-Australian Oriental**	**Neotropical**	**Paleartic**	**Neartic**
Hagensia	*Diacamma*	*Dinoponera*	----	----
Megaponera	*Ectomomyrmex*	*Mayaponera*		
Ophthalmopone	*Harpegnathos*	*Neoponera*	----	----
Paltothyreus	*Odontoponera*	*Pachycondyla*	----	
Phrynoponera	*Pseudoneoponera*	*Paraponera*	----	----
Plectroctena	----	*Rasopone*	----	----
Psalidomyrmex	----	----	----	----
Streblognathus	----	----	----	----
Anochetus	*Anochetus*	*Anochetus*	*Anochetus*	----
Bothroponera	*Bothroponera*	----	----	----
Brachyponera	*Brachyponera*	----	*Brachyponera*	*Brachyponera*
Centromyrmex	*Centromyrmex*	*Centromyrmex*	----	----
Euponera	*Euponera*	----	----	----
Mesoponera	*Mesoponera*	----	----	----
Odontomachus	*Odontomachus*	*Odontomachus*	----	*Odontomachus*
Key p. 50	Key p. 51	Key p. 52	Key p. 53	Key p. 53

Table 16 - Lists of genera, with Forewing of Typology I, Section α, Part A, subSection 1, based on geographical distribution. Highlighted are the genera present in most regions.

Forewing of Typology I

Section α
Part A

subSection 2

Mandibles triangular dentate

1. MetaTibiae with one Spur...**2**
- MetaTibiae with two Spurs...**3**
2. Neotropical region...***Ectatomma***
- Australian region... ***Rhytidoponera***
3. Abdominal Sternum IX distally bifurcated ...***Nothomyrmecia***
- Abdominal Sternum IX distally rounded, convex or with small median process ...**4**
4. Petiole sub rectangular in side view, Pygidium distally triangular or rounded ... ***Platythyrea***
- Mesonotum with Notauli present, Petiole not sub rectangular in side view, Pygidium always distally rounded ...**5**
5. ***Myrmecia***
- ***Rhytidoponera***

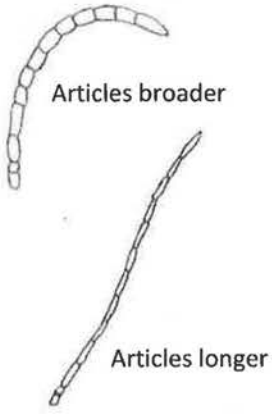
Forewing of Typology I

Section α
Part A

subSection 1

Mandibles reduced
Afrotropical-Malagasy region

1. Pygidium distally in the form of sting or sharp point ...**2**
- Pygidium distally rounded or subtriangular ...**6**
2. Mesonotum with Notauli present...**3.**
- Mesonotum with Notauli absent...**4**
3. Meta-Tibiae with two Spurs...***Euponera***
- Meta-Tibiae with one Spur...**Plectrocena**
4. Pretarsal Claws simple or with sub median tooth...**5**
- Pretarsal Claws bifid...***Phrynoponera***
5.Total lenght body above 18 mm...***Streblognathus***
-Total lenght body < of 18 mm...
Hagensia p. , ***Odontomachus*** p. , ***Mesoponera*** p. , ***Bothroponera*** p.
6. Mesonotum with Notauli present...***Centromyrmex*** (part) and ***Brachyponera***
- Mesonotum with Notauli absent...**7**
7. MetaTibiae with single Spur...**8**
- MetaTibiae with two Spurs...**10**
8. Pretarsal Claws bifid...***Psalidomyrmex***
- Pretarsal Claws simple...**9**
9. Antennae with 2° article of the Funiculus very long...***Ophtalmopone***
- Antennae with 2° article of the Funiculus not not very long...***Centromyrmex*** (part)
10. Pretarsal Claws bifid...***Paltothyreus***
- Pretarsal Claws simple or with sub median tooth...**11**
11. Total length of the body < to 11 mm...**12**
- Total length of the body > to 11 mm...***Megaponera***
12. Antennae with articles longer...***Anochetus***
- Antennae with articles broader...***Centromyrmex***



Forewing of Typology I

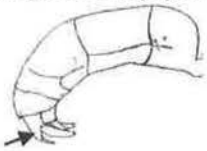
Section α
Part A

subSection 1

Mandibles reduced

Indo-Australian, Australia and Oriental regions

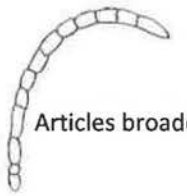
Pygidium distally in the form of sting or sharp point



1. Abdominal Sternum IX distally in the form of sting or sharp point ...***Harpegnathos***
- Abdominal Sternum IX distally rounded ...**2**
2. Mesonotum with Notauli present ...**3**
- Mesonotum with Notauli absent ...**4**
3. Total lenght body < of 5 mm... ***Ectomomyrmex***
- Total length body > of 5 mm ...***Euponera***
4. ...
Bothroponera
Odontomachus
Mesoponera p.
Pseudoneoponera
Diacamma

Pygidium distally rounded or subtriangular

1. Antennae with articles longer...**2**
- Antennae with articles broader... ***Centromyrmex***
2. Mesonotum with Notauli present...***Brachyponera***
- Mesonotum with Notauli absent...**3**
3. Antennae Scape in length < than the 2° article of the Funiculus ...***Anochetus***
- Antennae Scape sub equal in length than the 2° article of the Funiculus...***Odontoponera***



Articles broader

Articles longer

Forewing of Typology I

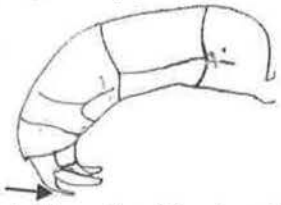
Section α
Part A

subSection 1

Mandibles reduced

Neotropical region

Pygidium distally in the form of sting, sharp point or Y



1. Total length of body > 19 mm ...***Dinoponera***

- Total length of body < 19 mm ...**2**

2. Abdominal Sternum IX distally in form of Y ... ***Paraponera***

- Abdominal Sternum IX distally rounded or subtriangular ...**3**

3. Mesonotum with Notauli absent...

Odontomachus

Neoponera *obethueri*

- Mesonotum with Notauli present...

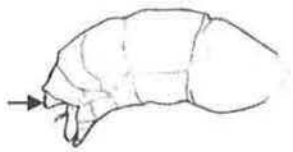
Mayaponera

Neoponera

Pachycondyla

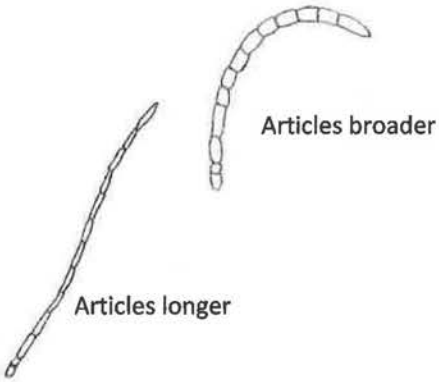
Rasopone

Pygidium distally rounded or subtriangular



1. Antennae with articles longer ... ***Anochetus***

- Antennae with articles broader ... ***Centromyrmex***



Forewing of Typology I

Section α

Part A

subSection 1

Mandibles reduced
Paleartic region

1. Mesonotum with Notauli absent...***Anochetus***
- Mesonotum with Notauli present...***Brachyponera***

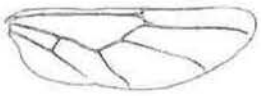
Neartic region

1. Mesonotum with Notauli absent...***Odontomachus***
- Mesonotum with Notauli present...***Brachyponera***

Forewing of Typology I

Section α

Part B



sub Section 1

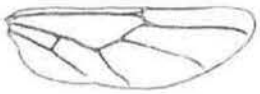
Antennae Scape in length ≤ than the 2° article of the Fuliculus

1. Mandibles developed triangular or falcate...**9**
- Mandibles reduced...**2**
2. MetaTibiae with one Spur **3**
- MetaTibiae with two Spurs ...**6**
3. Eyes with setae among ommatidia...***Hypoponera***
- Eyes without setae among ommatidia ...**4**
4. Pygidium rounded...***Cryptopone***
- Pygidium pointed...**5**
5. Mesonotum with Notauli absent...***Ponera***
- Mesonotum with Notauli present...***Pseudoponera***
6. Pygidium distally rounded ...**7**
- Pygidium distally pointed ...***Euponera***
7. Pretarsal Claws pectinate...***Leptogenys***
- Pretarsal Claws simple...**8**
8. Mesonotum with Notauli absent...***Cryptopone***
- Mesonotum with Notauli present...***Myopias***
9. MetaTibiae with two Spurs...**10**
- MetaTibiae with one Spur...**11**
10. Abdominal Sternum IX distally armed with two spines ...***Cylindromyrmex***
- Abdominal Sternum IX distally rounded ...***Rhytidoponera***
11. Pretarsal Claws bifids or with long submedian tooth...**12**
12. Genus Australian region...***Rhytidoponera***
- Gaster with ventral excavation, Petiole dorsally sharpened, Neotropical region...***Acanthoponera***
- Gaster and Petiole not as above...***Gnamptogenys***

Forewing of Typology I

Section α

Part B



subSection 2

Antennae Scape in length > than the 2° article of the Funiculus

1. Mandibles triangular...**2**
- Mandibles falcate...**3**

2. MetaTibiae with one Spur, Forewing with Marginal cell open, Antennae with 12 or rared 13 articles, Abdominal Sternum IX distally armed with two spines, Neotropical region... ***Acanthostichus***
- MetaTibiae with two Spurs, Marginal cell closed. Abdominal Sternite IX distally armed with two spines, Madagascar and Indo-Australian region...***Chrysapace***

3. Abdominal Sternum IX distally rounded ...**4**
- Abdominal Sternum IX distally armed with spines...**5**

4. ... ***Myopopone***, ***Stigmatomma***, ***Mystrium***

5. MetaTibiae with two Spurs, Forewing with Marginal cell open, Abdominal Sternum IX distally armed with two spines, Afrotropical region...***Aenictogiton***
- MetaTibiae with one Spur and Forewing with Marginal cell closed ...**6**

6. Abdominal Sternum IX distally armed with two spines and additional two medial inner teeth, Neotropical region...***Cheliomyrmex***
- Abdominal Sternum IX distally armed with two spines and one or without medial inner tooth...**7**

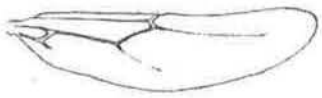
7. Abdominal Sternum III to VII with dense tufts setae...***Nomamyrmex***
- Abdominal Sternum III to VII without dense tufts setae...**8**

8. Petiole dorsum medially convex, flat or slightly depressed...***Neivamyrmex***
- Petiole dorsum medially strongly concave...**9**

9. Apex Penisvalve without setae...***Eciton***
- Apex Penisvalve with setae...***Labidus***

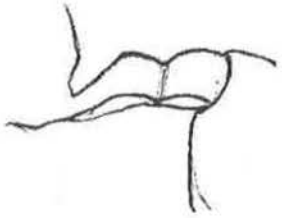
Forewing of Typology I

Section β



Part A

Petiole and post-Petiole



subSection 1 p. 57
MetaTibiae with pectinate Spur

subSection 2 p. 58
MetaTibiae with simple or absent Spur

Forewing of Typology I

Section β

Part A

Petiole and post-Petiole

subSection 1

MetaTibiae with pectinate Spur

1. Antennae with 13 articles...**2**

- Antennae with 12 articles...**4**

2. Forewings with Rs2+3 vein incomplete, Antennae with last 4/5 articles versus clavate...***Myrmica***

- Forewings with with Rs2+3 vein incomplete, Antennae filiform...***Manica***
- Forewings with with Rs2+3 vein complete, Antennae filiform...**3**

3. MetaTibiae with two Spurs...***Myrcidris***

- MetaTibiae with one Spur...***Pogonomyrmex***

4. Mandibles with more than 5 teeth, Neotropical region... ***Pseudomyrmex***

- Mandibles with less than 5 teeth, Indo-Australian and Australian regions...***Tetraponera***

Forewing of Typology I

Section β

Part A

Petiole and post-Petiole

subSection 2

MetaTibiae with simple or absent Spur

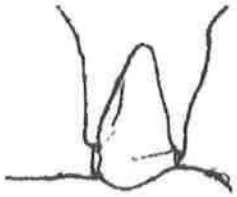
1. Antennae filiform, first article of the Funiculus in globular form...***Pheidole***
- Antennae filiform or versus clavate, first article of the Funiculus not in globular form...**2**
2. Antennae versus clavate...**3**
- Antennae filiform...**6**
3. Forewings with Marginal cell open...**4**
- Forewings with Marginal cell closed...5
5. Antennae with 1° article of the Funiculus in lenght < than the 2°...***Stegomyrmex***
- Antennae with 1° article of the Funiculus in length > than the 2°...***Stenamma***
4. First article of the Funiculus subequal in diameter than the second...***Aphaenogaster***
- First article of the Funiculus larger in diameter than the second...
Goniomma
Stenamma
6. Forewings with Marginal cell closed...***Pogonomyrmex***
- Forewings with Marginal cell open...***Messor***

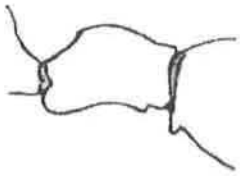
Forewing of Typology I

Section β

Part B

Petiole





subSection 1 p. 60
Pretarsal Claws simple

subSection 2 p. 61
Pretarsal Claws bifid

Forewing of Typology I

Section β

Part B

Petiole

sub Section 1

Pretarsal Claws simple

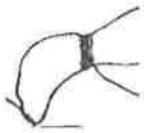
1. Forewings with Rs 2+3 vein incomplete...***Proceratium***
- Forewings with Rs 2+3 vein complete...**2**
2. Mandibles reduced...***Hypoponera***, ***Ponera***
- Mandibles not reduced...**3**
3. MetaTibiae with two Spurs, Abdominal Sternum IX distally bifurcated...***Aenictogiton***
- MetaTibiae with one or null Spur ...**4**
4. Mesonotum with Notauli present...***Heteroponera***
- Mesonotum with Notauli absent...**5**
5. Petiole with long anterior peduncle and low rounded petiole...**Aneuretus**
- Petiole without anterior peduncole...**6**
6. Maxillary Palp of 3 articles... ***Anillidris***
- Maxillary Palp of 6 articles...**7**
7. Anterolateral Hypostoma in the form of an expanded flange directed anteroventrally ...***Dolichoderus***
- Hypostoma not as above...**8**
8. Antennae Scape in length < than the 2° article of the Funiculus...***Linepithema*** Fuscum group
- Antennae Scape in length > than the 2° article of the Funiculus...**9**
9. Antennae frequently with 3° and 4° articles of the Funiculus S-shaped, Australian region ...***Leptomyrmex*** micro
- Antennae not as above...**10**
10. Madagascar region...***Aptinoma***
- Body total length 8-13 mm, Paleartic, Neartic, Oriental and Indo-Australia region...***Liometopum***

Forewing of Typology I

Section β

Part B

Petiole



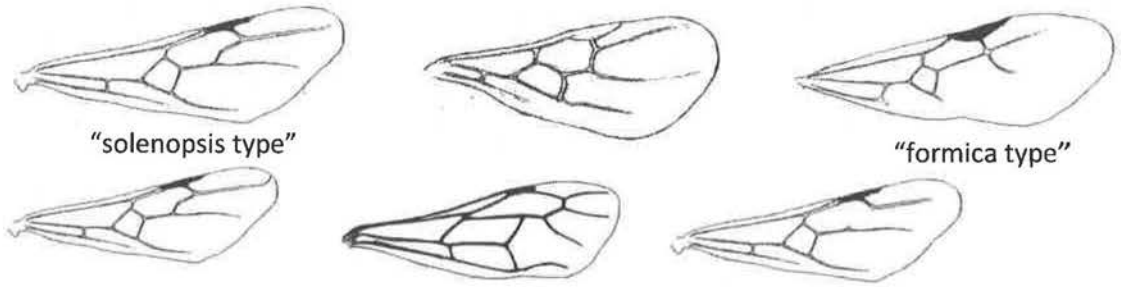
sub Section 2

Pretarsal Claws bifid

1. Antennae Scape in length ≤ than the 2° article of the Funiculus...***Gnamptogenys***

- Antennae Scape in length > than the 2° article of the Funiculus...***Typhlomyrmex***

2.5 Dichotomous key to forewings of Typology II



The ♂♂ of 116 genera of the ants that have Forewing structure of Typology II are taxonomically classified in eleven subfamilies of the family Formicidae distributed as in Table (17 and 18).

Forewing of Typology II

sub-family	genera
Agroecomyrmecinae	1
Amblyoponinae	6
Apomyrminae	1
Dolichoderinae	15
Dorylinae	16
Ectatomminae	3
Formicinae	13
Myrmicinae	58
Ponerinae	1
Proceratiinae	1
Pseudomyrmecinae	1
11	**116**

Table 17 – The subfamilies of the family Formicidae and the respective numbers of genera which present Forewings of Typology II.

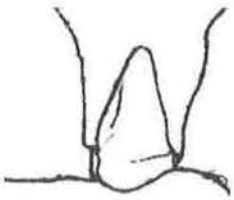
Genera of the ♂♂ winged ants with Forewings of Typology II			
Acanthomyrmex(part)	*Dorylus*	*Metapone*	*Rhytidoponera*
Acanthostichus (part)	*Eburopone*	*Monomorium* (part)	*Rogeria*
Acropyga(part)	*Epelysidris*	*Myrmecocystus*(part)	*Rostromyrmex*
Adelomyrmex	*Eusphinctus*	*Myrmecorhynchus*	*Royidris* (part)
Adetomyrma	*Eutetramorium*	*Myrmica* (part)	*Simopone*
Aenictus	*Formica*	*Myrmicaria*	*Solenopsis* (part)
Amblyopone	*Froggattella*	*Myrmisaraka*	*Sphinctomyrmex*
Anonycomyrma	*Fulakora* (part)	*Myrmoteras*	*Stegomyrmex* (part)
Aphaenogaster (part)	*Gesomyrmex*	*Neocerapachys*	*Stenamma* (part)
Apomyrma	*Gnamptogenys* (part)	*Ochetellus*	*Strongylognathus*
Atopomyrmex	*Harpagoxenus*	*Ochetomyrmex*	*Syllophopsis*
Axinidris	*Huberia*	*Onychomyrmex*	*Tanipone*
Azteca	*Iberoformica*	*Ooceraea*	*Tapinoma* (part)
Bajcaridris (part)	*Indomyrma*	*Opistopsis* (part)	*Tatuidris*
Basiceros (part)	*Iridomyrmex*	*Orectognathus*	*Temnothorax* (part)
Blepharidatta	*Lasiophanes* (part)	*Oxyepoecus*	*Terataner*(part)
Bondroitia	*Lasius* (part)	*Oxyopomyrmex*	*Tetramorium* (part)
Bothriomyrmex(part)	*Leptomyrmex* (part)	*Papyrius*	*Tetraponera* (part)
Calyptomyrmex	*Leptothorax* (part)	*Parasyscia*	*Thaumatomyrmex*
Carebara	*Linepithema* (part)	*Paratopula*	*Tranopelta*
Cataglyphis (part)	*Liomyrmex*	*Patagonomyrmex*	*Trichomyrmex* (part)
Cephalotes	*Lioponera*	*Philidris*	*Turneria*
Cerapachys	*Lividopone*	*Pogonomyrmex*(part)	*Typhlomyrmex* (part)
Crematogaster (part)	*Lophomyrmex*	*Poliergus*	*Veromessor*
Cyatta	*Lordomyrma*	*Prionopelta*	*Vitsika*
Dacetinops	*Malagidris*	*Proceratium* (part)	*Vollenhovia*
Dilobocondyla	*Megalomyrmex*(part)	*Procryptocerus*	*Xymmer*
Doleromyrma	*Meranoplus*	*Proformica*	*Yunodorylus*
Dolopomyrmex	*Mesostruma*	*Ravavy*	*Zasphinctus*

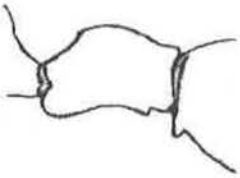
Table 18 - ♂♂ of 116 genera of the family Formicidae which present Forewings of Typology II. In brackets the term "part" means that species of the same genus have different Forewings Typology.

This key is divided into two Sections:
Alpha (α) and **Beta** (β)

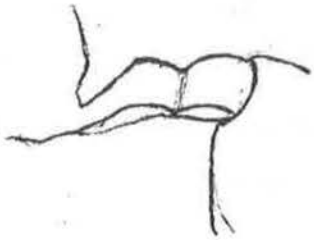
Forewing of Typology II

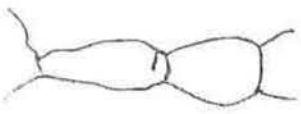
Section α p. 65
Petiole

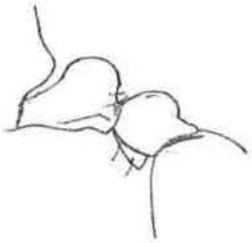




Section β p. 73
Petiole and postPetiole







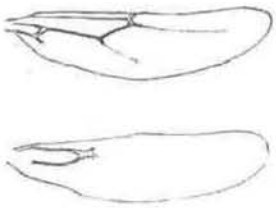
Forewing of Typology II

Section α

This section is divided into two parts **A** and **B,** based on the presence of Hindwings of Typology I (Part A) or Typology II and III (Part B).

Part **A** p. 66
Hindwing of Typology I

Part **B** p. 68
Hindwing of Typology II and III

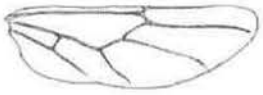


Forewing of Typology II

Section α

Part A

Hindwing of Typology I



This Part is divided into two subSection

subSection 1 p. 67

Abdominal Sternum IX distally armed with two lateral spines

subSection 2 p. 67

Abdominal Sternum IX distally rounded

Figure - **A**, **B** and **C**: Abdominal Sternum IX in ventral view.

Forewing of Typology II

Section α

Part A

subSection 1

Abdominal Sternum IX distally armed with two lateral spines

Antennae 12 articles

1. Forewings with SubMarginal 1 cell closed, Antennae Scape in length > than the 2° article of the Funiculus... ***Eusphinctus***

- Forewings with SubMarginal 1 cell open, Antennae Scape in length ≤ than the 2° article of the Funiculus... ***Simopone***

subMarginal 1 cell open

subMarginal 1 cell closed

Antennae 13 articles

1. Mandibles falcate...**2**
- Mandibles triangular...**3**

2. MetaTibiae with one Spur pectinate. Femora flattened that contrast with Tibiae... **Dorylus**
- MetaTibiae Spur absent or with two Spurs, Femora not as above...***Aenictus***

3. Forewings with SubMarginal 1 cell open...**4**
- Forewings with SubMarginal 1 cell closed...**5**

4. Mandibles edentate...
Lioponera , ***Yunodorylus***

5. Forewings with Marginal cell closed...**6**
- Forewings with Marginal cell open...**7**

6. Indo-Australian and Oriental...***Cerapachys***
- Neotropical...***Neocerapachys***

7. Neotropical...***Acanthostichus***
- Afrotropical and Indo-Australian...***Parasiscya***

subSection 2

Abdominal Sternum IX distally rounded

- Pretarsal Claws bifid...***Gnamptogenys***

Forewing of Typology II

Section α

Part B

Hindwing of Typologies II and III

Hindwings of Typology II

subSection 1 p. 69
Antennae Scape overstep the Occiput

subSection 2 p. 70
Antennae Scape not overstep the Occiput

Hindwings of Typology III

subSection 1 p. 72
Antennae Scape overstep the Occiput

subSection 2 p. 72
Antennae Scape not overstep the Occiput

Forewing of Typology II

Section α

Part B

Hindwings of Typology II

subSection 1

Antennae Scape overstep the Occiput

1. Mandibles reduced...***Myrmoteras***
- Mandibles developed...**2**
2. Antennae with 8-12 articles...***Acropyga***
- Antennae with 13 articles...**3**
3. Maxillary Palp of six articles, with 4° article equal in length to the sum of the articles 5°and 6° ...**4**
- Maxillary Palp not as above...**5**
4. Neartic and Central America regions...***Myrmecocystus***
- Afrotropical, Paleartic, Oriental and Indo-Australian regions...***Cataglyphis***
5. Body total length < than 2 mm, North Africa...***Bajacadridis***
- Body total length > than 2 mm...**6**
6. Petiole, dorsally and ventrally articulated with first segment of the Gaster...***Proceratium***
- Petiole reduced and inclined forward, articulated only ventrally with first segment of the Gaster...***Tapinoma***
- Petiole articulated only ventrally with first segment of the Gaster but not as above...**7**
7. The first article of the Funiculus in lenght > than the second...**8**
- The first article of the Funiculus in lenght ≤ than the second...**9**
8. Neotropical region...***Lasiophanes***
- Neartic, Paleartic and Indo-Oriental regions...***Lasius***
- Australian region...***Myrmecorhyncus***
9. Forewing with Discoidal cell triangular and very small...***Opisthopsis***
- Forewing with Discoidal cell not as above...**10**
10. Paleartic and Oriental regions...***Proformica***
- Neartic, Central America, Paleartic, Mediterranean, Indo-Australian and Oriental regions...***Formica*** (part)
- Iberian Penisule and France regions...***Iberoformica***

Forewing of Typology II

Section α

Part B

Hindwings of Typology II

subSection 2

Antennae Scape not overstep the Occiput

1. Antennae with < than 13 articles...**2**
- Antennae with 13 articles...**5**
2. Mesonotum with Notauli present...**3**
- Mesonotum with Notauli absent...**4**
3. Antennae with 10 articles...***Fulakora*** (part)
- Antenne with 12 articles...***Zasphinctus*** (part)
4. Antennae with 11 articles, enormous eyes...***Gesomyrmex***
- Antennae with 8-12 articles, normal eyes...***Acropyga***
5. Abdominal Sternum IX distally armed with two spines...**6**
- Abdominal Sternum IX distally not as above...**7**
6. SubMarginal 1 cell open...***Eburopone***
- SubMarginal 1 cell closed...***Lividopone, Zasphinctus***
7. Mandibles short, narrow or falcate, edentate, dentate or denticulate marginally ...**8**
- Mandibles broad triangular dentate or edentate marginally...**14**
8. Pygidium in form of spine...***Taumathomyrmex***
- Pygidium not in form of spine...**9**
9. MetaTibiae with two Spurs...**10**
- MetaTibiae with one or null Spur...**11**
10. Forewings with Marginal cell open and subMarginal 1 cell open...***Adetomyrma***
- Forewings with Marginal cell closed...
Xymmer
Amblyopone
Fulakora
11. Petiole ventrally and dorsally articulated with the 1st segment of the Gaster, Australian region...***Onychomyrmex***
- Petiole articulated only ventrally with the 1st segment of the Gaster...**12**
12. Mandibles falcate edentate, Northern Hemisphere...***Poliergus***
- Mandibles narrow dentate or denticulate with 2-3 teeth, not falcate, Antennae Scape in lenght < than the 2° article of the Funiculus, 2° article of the Funiculus in length > than the following, Neotropical...***Azteca***
- Mandibles narrow edentate or denticulate, not falcate, Antennae Scape in length > than the 2° article of the Funiculus, Paleartic and Neotropical region...***Bothriomyrmex***
- Mandible edentate not falcate, Australian region...**13**

13. Antennae Scape in lenght ≤ than the 2° article of the Funiculus...***Froggattella***
- Antennae Scape in length > than the 2° article of the Funiculus...***Turneria***
14. Pretarsal Claws absent or reduced...***Anonycomyrma***
- Pretarsal Claws bifid...**15**
- Pretarsal Claws simple or with small subapical tooth...**16**
15. Antennae Scape in lenght ≤ than the 2° article of the Funiculus...***Gnamptogenys***
- Antennae Scape in lenght > than the 2° article of the Funiculus...***Typhlomyrmex***
16. Antennae Scape along minimum the length of the early four articles added together...***Formica*** (part)
- Antennae Scape of shorter length, not as above...**17**
17. Antennae Scape in length < than the 2° article of the Funiculus, Palp formula 6:4 ... ***Linepithema***
- Antennae Scape in lenght ≥ than the second article of the Funiculus...**18**
18. Palp formula 5:3, Australian region...***Papyrius***
- Palp formula 5:3, Neotropical region...***Leptomyrmex***
- Palp formula 6:3, Madagascar...***Ravavy***
- Palp formula 6:4, Australia, Indo-Australian and Oriental region...**19**
19. Petiole laterally expanded, Mandibles edentate with 0-4 denticoli...***Ochetellus***
- Petiole not expanded laterally...**20**
20. Mandibles with 4-7 teeth...***Doleromyrma***
- Mandibles without teeth or rarely with 25 denticulate...***Iridomyrmex***
- Mandible 10-12 dentaticulate...***Philidris***

subMarginal 1 cell open

subMarginal 1 cell closed

Forewing of Typology II

Section α

Part B

Hindwing of Typology III

sub-Section 1

Scape overstep the Occiput

Tapinoma

sub-Section 2

Scape not overstep the Occiput

1. Antennae with 11-12 articles...***Ooceraae***
- Antennae with 10 articles...***Fulakora*** (Part)
- Antennae with 13 articles...**2**

2. Mandibles strongly reduced...***Apomyrma***
- Mandibles triangular marginally dentate...***Axinidris***
- Mandibles triangular marginally edentate, Abdominal Sternite IX distally armed with two spines...**3**
- Mandibles edentate falcate or apically bidentate, Abdominal Sternite IX distally rounded...**4**

3. Forewing with subMarginal 1 cell closed and Marginal cell open...***Tanipone***
- Forewing with subMarginal 1 cell open and Marginal cell closed... ***Sphinctomyrmex***

4. MetaTibiae with one Spur...***Prionopelta***
- MetaTibiae with two Spurs...***Fulakora***

Forewing of Typology II

Section β

Petiole and postPetiole

Part A

Antennae ≤ 12 articles

subSection 1 p. 74

Antennae with 10-11 articles

subSection 2 p. 75

Antennae with 12 articles

Part B

Antennae 13 articles

subSection 1 p. 76

Mesonotum with Notauli present

sub-Section 2 p. 78

Mesonotum with Notauli absent

Forewing of Typology II

Section β

Part A

Antennae ≤ 12 articles

subSection 1

Antennae with 10-11 articles

1. PostPetiole dorsally articulated to the 1° segment of the Gaster, Antennae 10 or 11 articles...***Crematogaster***
- Petiole not as above and Antennae with 10 articles...**2**
- Petiole not as above and Antennae with 11 articles...**4**

2. Mesonotum with Notauli absent...***Rostromyrmex***
- Mesonotum with Notauli present...**3**

3. Mandibles dentate...***Tetramorium***
- Mandible edentate falcate...***Strongylognatus***

4. Mesonotum with Notauli present... ***Tetramorium***
- Mesonotum with Notauli absent...***Dolopomyrmex***

PostPetiole dorsally articulated

Forewing of Typology II

Section β

Part A

Antennae ≤ 12 articles

subSection 2

Antennae with 12 articles

1. Petiole dorsally articolate with 1° segment of the Gaster...***Crematogaster***
- Petiole not as above...**2**
2. Mesonotum with Notauli present...**3**
- Mesonotum with Notauli absent...**8**
3. Forewings with Marginal cell closed...***Leptothorax*** (part) and ***Temnothorax*** (part)
- Forewings with Marginal cell open...**4**
4. Antennae with last articles versus clavate...***Leptothorax*** and ***Temnothorax***
- Antennae filiform...**5**
5. Antennae Scape in length < than the 2° article of the Funiculus...***Huberia***
- Antennae Scape in length > than the 2° article of the Funiculus...**6**
6. Mandibles marginally dentate, Forewing formica type...**Calyptomyrmex**
- Mandibles marginally edentate ...**7**
7. Forewings formica type ...***Harpagoxenus***
- Forewings solenopsis type ...***Indomyrma***
8. Antennae Scape in lenght ≤ than the 2° article of the Funiculus...**9**
- Antennae Scape in lenght > than the 2° article of the Funiculus...**12**
9. Mandibles marginally edentate ...**Tatuidris**
- Mandibles marginally dentate ...**10**
10. MetaTibiae with two Spurs...***Tetraponera***
- MetaTibiae with one o null Spur...**11**
11. Forewings with Marginal cell open...***Myrmisaraka***
- Forewings with Marginal cell closed...***Liomyrmex***
12. Antennae with first article of the Funiculus globular form ...***Solenopsis***
- Antennae with first article of the Funiculus not globular form...**13**
13. Mandible marginally edentate ...**14**
- Mandibles marginally dentate ...**15**
14 Afrotropical region...***Bondroitia***
- Oriental, Indo-Australian and Australia regions...***Vollenhovia***
15. Forewing formica type...***Metapone***
- Forewings solenopsis type ...**16**
16. MetaTibiae with one Spur...***Aphenogaster*** *loriai and A. quadrispinus*
- MetaTibiae without Spur...***Oxyopomyrmex***

Forewing of Typology II

Section β

Part B

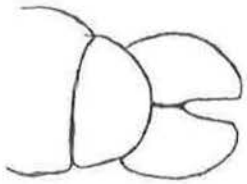
Antennae with 13 articles

sub-Section 1

Mesonotum with Notauli present

1. Forewings with Marginal cell open ...**2**
- Forewings with Marginal cell closed ...**17**
2. MetaTibiae with pectinate Spur...**3**
- MetaTibiae with simple Spur...**4**
- MetaTibiae without Spur...**7**
- Forewing with Rs2+3 vein incomplete...***Myrmica***
- Forewing with Rs2+3 vein complete...***Pogonomyrmex***
4. Antennae with last articles versus clavate...***Vitsika***
- Antennae filiform...**5**
5. Mesonotum with a longitudinal medial carina anteriorly bifurcated between the Notauli ...***Eutetramorium***
- Mesonotum not as above...**6**
6. Antennae with one or more articles in several cases kinked, Neotropical region... ***Megalomyrmex***
- Antennae not as above, Madagascar region...***Royidris***
7. Antennae with last articles versus clavate or clavate...**8**
- Antennae filiform...**9**
8. Petiole anteriorly strongly elongate (peduncolate)...***Stenamma*** (part)
- Petiole not as above...***Leptothorax*** (part) and ***Temnothorax*** (part)
9. Antennae Scape in length ≤ than the 2° article of the Funiculus...**10**
- Antennae Scape in length > than the 2° article of the Funiculus...**13**
10. Mandibles marginally dentate ...**11**
- Mandibles marginally edentate ...**12**
11. Petiole and post-Petiole similarly shaped...***Dilobocondyla***
- Petiole and post-Petiole not as above...***Basiceros***
12. Mandibles reduced...***Orectognathus***
- Mandibles narrow...***Mesostruma***
13. Mandibles marginally dentate ...***Rogeria***
- Mandibles marginally edentate ...**14**
14. Telomere large...***Procryptocerus***
- Telomere long and narrow, blade-lake...***Myrmicaria***

- Telomere not as above...**15**
15. Antennae with last two articles elongate...***Dacetinops***
- Antennae not as above...**16**
16. Forewings formica type...***Blepharidatta***
- Forewings solenopsis type...***Vollenhovia***
17. Antennae Scape overstep the Occiput... ***Cyatta***
- Antennae Scape not overstep the Occiput...**18**
18. Mesolegs severely reduced in size as compared to the Metalegs...***Teratanер***
- Mesolegs not as above...**19**
19. Antennae Scape in length > than the 2° article of the Funiculus...**20**
- Antennae Scape in length ≤ than the 2° article of the Funiculus...**24**
20. Mandibles marginally edentate ...***Lordomyrma*** (part)
- Mandibles marginally dentate ...**21**
21. Telomere elongate and prominent... ***Paratopula***
- Telomere not as above...**22**
22. Antennae clavate or versus clavate...
Leptothorax, ***Temnothorax*** and ***Stenamma***
- Antennae filiform...**23**
23. Neotropical region...***Patagonomyrmex***
- Indo-Australian and Oriental region...***Acanthomyrmex*** and ***Lordomyrma***
24. Mandibles marginally edentate ...***Meranoplus***
- Mandibles marginally dentate ... ***Cephalotes***



Telomere large dorsal view

Forewing of Typology II

Section β

Part B

Antennae with 13 articles

sub-Section 2

Mesonotum with Notauli absent

1. Forewing with Marginal cell open...**2**
- Forewing with Marginal cell closed...**17**

2. Antennae Scape overstep the Occiput...***Adelomyrmex***
- Antennae Scape in lenght ≤ than the 2° article of the Funiculus...**3**
- Antennae Scape in lenght > than the 2° article of the Funiculus...**7**

3. Antennae with first article of the Funiculus globular form...***Solenopsis*** (part)
- Antennae with first article of the Funiculus not globular form...**4**

4. MetaTibiae with one Spur pectinate (rarely simple Spur)...***Pogonomyrmex*** (part)
-MetaTibiae with one or without Spur...**5**

5. Indo-Australian or Afrotropical region...**6**
- Neotropical region...***Oxyepoecus***

6. Propodeum armed with teeth or weakly bituberculate...***Lophomyrmex***
- Propodeum not armed...***Syllophopsis***

7. Antennae with first article of the Funiculus globular form, Forewing solenopsis type...***Solenopsis*** and **Monomorium** scabriceps group
- Antennae with first article of the Funiculus globular form, Forewing formica type ...***Trychomyrmex***
- Antennae with first article of the Funiculus not globular form...**8**

8. MetaTibiae with one pectinate Spur (rarely simple Spur)...***Pogonomyrmex***
- MetaTibiae with one Spur simple or absent...**9**

9. Antennae with last articles versus clavate or clavate...**10**
- Antennae filiform...**12**

10. MetaTibiae without Spur...***Stenamma*** (part)
- MetaTibiae with one Spur...**11**

11. Forewing solenopsis type ...***Aphaenogaster*** (part)
- Forewing formica type ...***Veromessor***

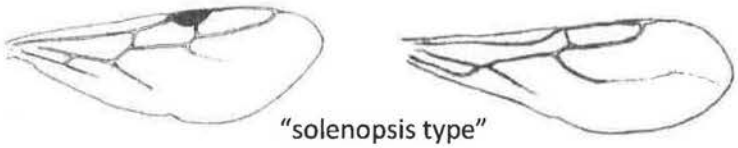
12. Forewing formica type ...**13**
- Forewing solenopsis type...**15**

13. Madagascar region...***Malagidris***
- Indo-Australian region...***Epelysidris***
- Neotropical region...**14**

Ochetomyrmex
Megalomyrmex (part)

15. Mandibles reduced edentate ...***Vollenhovia***
- Mandibles marginally dentate or denticulate...**16**
16. Mandibles large with 3 strong teeth...***Tranopelta***
- Mandibles narrow with 3-4 small teeth...***Monomorium***
- Mandibles large with 4-8 teeth...***Aphaenogaster***
- Mandibles large with 4 to numerous teeth...***Megalomyrmex***
17. Antennae calvate or versus clavate...**18**
- Antennae filiform...**19**
18. Antennae with 1° article of the Funiculus in length > than the 2°...***Stenamma***
- Antennae with 1° article of the Funiculus in length < than the 2°...***Stegomyrmex***
19. Propodeum armed with teeth...***Lophomyrmex***
- Propodeum unarmed...**20**
20. Eyes rather small, occupying 1/5 of the head... ***Atopomyrmex***
- Eyes not as above...***Carebara***

2.6 Dichotomous key to forewings of Typology III



"solenopsis type"

"formica type"

The male of 97 genera (Table 20) have a Forewing structure of Typology III and are taxonomically classified in seven subfamilies distributed as in Table 19.

Forewing of Typology III

sub-family	Genera
Amblyoponinae	1
Dolichoderinae	5
Dorylinae	1
Formicinae	37
Martialinae	1
Myrmecinae	50
Proceratiinae	2
7	**97**

Table 19 - The subfamilies of the family Formicidae and the respective numbers of genera which present Forewings of Typology III

Genera of the ♂♂ winged ant with Forewings of Typology III

Acanthomyrmex (part)	*Dorymyrmex* (part)	*Myrmelachista*	*Pseudoatta*
Acromyrmex	*Dyscothyrea*	*Myrmycocrypta*	*Pseudolasius*
Acropyga(part)	*Euprenolepis*	*Nesomyrmex*	*Recurvidris* (part)
Allomerus	*Eurhopalothryx* (part)	*Notoncus*	*Rhopalomastix*
Anoplolepis	*Forelius* (part)	*Notostigma*	*Romblonella*
Aphomomyrmex	*Fulakora* (part)	*Novomessor*	*Rossomyrmex*
Apterostigma	*Kalathomyrmex*	*Nylanderia*	*Royidris* (part)
Arnoldius	*Lasiophanes* (part)	*Octostruma*	*Sericomyrmex*
Atta	*Lasius* (part)	*Ocymyrmex*	*Solenopsis* (part)
Bajacadridis (part)	*Lepisiota*	*Oecophylla*	Stenamma (part)
Basiceros (part)	*Leptanilloides*	*Opistopsis* (part)	*Stereomyrmex*
Bothriomyrmex (part)	*Leptothorax* (part)	*Overbeckia*	*Stigmacros*
Brachymyrmex	*Martialis*	*Paramycetophylax*	*Strumigenys* (part)
Calomyrmex	Megalomyrmex (part)	*Paraparatrechina*	*Tapinolepis*
Camponotus	*Melissotarsus*	*Paratrechina*	*Tapinoma* (part)
Cardiocondyla (part)	*Melophorus*	*Petalomyrmex*	*Technomyrmex*
Cataglyphis (part)	*Mycetophylax*	*Plagiolepis*	*Temnothorax* (part)
Cataulacus	*Monomorium* (part)	*Podomyrma*	*Teratanер* (part)
Cladomyrma	*Mycetagroicus*	*Polyrhachys*	Tetramorium (part)
Colobopsis	*Mycetarotes*	*Prenolepis*	*Trachymyrmex*
Crematogaster (part)	*Mycetophylax*	*Pristomyrmex*	*Trichomyrmex* (part)
Cyphomyrmex	*Mycetosoritis*	*Proatta*	*Tropidomyrmex*
Daceton	*Mycocepurus* (part)	*Proceratium*	*Wasmannia*
Dinomyrmex	*Myrmecina*	*Prolasius*	*Zatania*
	Mirmecocystus (part)		

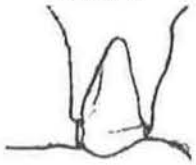
Table 20 - ♂♂ of 97 genera of the family Formicidae which present Forewings of Typology III. In brackets the term "part" means that species of the same genus have different Forewing of Typology.

Forewing of Typology III

This key is divided into two Sections: **Alfa** (α) and **Beta** (β)
and these in turn are divided into two Parts: A and B

Section α

Petiole

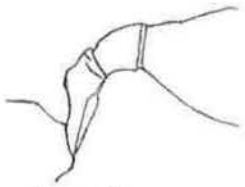


Part A p. 83
The Antennae Scape overstep the Occiput

Part B p. 87
The Antennae Scape not overstep the Occiput

Section β

Petiole and post petiole



Part A p. 90
Antennae with ≤ 12 articles

Part B p. 93
Antennae with 13 articles

Forewing of Typology III

Section α

Part A

The Antennae Scape overstep the Occiput

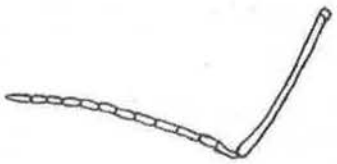
This Part is divided into two subSections

subSection 1 p. 84

Antennae with ≤ 12 articles

subSection 2 p. 85

Antennae with 13 articles



Forewing of Typology III

Section α

Part A

The Antennae Scape overstep the Occiput

subSection 1

Antennae with ≤ 12 articles

1. Forewings with Marginal cell open...**2**
- Forewings with Marginal cell closed...**3**
2. Antennae with 10 articles, Mandibles marginally edentate...***Brachymyrmex***
- Antennae with 12 articles, Mandibles marginally dentate...***Lepisiota***
3. Forewings solenopsis type, Antennae 8-12 articles...***Acropyga***
- Forewings formica type ...**4**
4. Antennae with 10 articles...***Aphomomyrmex***
- Antennae with 12 articles...**5**
5. Antennae with last four articles clavate...***Stigmacros***
- Antennae not clavate...**7**
7. Antennae with 1° article of the Funiculus in length ≥ than the 2° subequal in diameter...
Anoplolepis
- Antennae with 1° article of the Funiculus in length and diameter > than the 2°...
Plagiolepis
Tapinolepis

Forewing of Typology III

Section α

Part A

The Antennae Scape overstep the Occiput

subSection 2

Antennae with 13 articles

1. Pretarsal Claws absent...***Oecophylla***
- Pretarsal Claws present...**2**
2. Insertion of the Antennae distant from posterior edge of the Clypeus...**3**
- Insertion of the Antennae near or confluent with posterior edge of the Clypeus...**8**
3. Mandibles multi dentate... ***Notostigma***
- Mandibles edentate or with a few teeth...**4**
4. Antennae Funiculus with 1° article in length < than the 2°... ***Dinomyrmex***
- Antennae Funiculus with 1° article in length ≥ than the 2°...**5**
5. Antennae Funiculus with 1° article subequal in length and diameter than the 2°...
Camponotus
- Antennae Funiculus with 1° article ≥ in length but not bigger in diameter than the 2°
...***Polyrhachis***
- Antennae Funiculus with 1° article in length and diameter > than the 2°...
Calomyrmex
Colobopsis
Overbekia
8. Body Total length < 2 mm...***Bajacadridis***
- Body Total lenght > 2 mm...**9**
9. Antennae Scape with erect setae...**10**
- Antennae Scape without erect setae...**12**
10. Antennae Funiculus with 1° article in length ≥ than the 2° but not bigger in diameter...
Euprenolepis p.
- Antennae Funiculus with 1° article in length > than the 2° and bigger in diameter...**11**
11 Australian region...***Notoncus***
- Cosmopolitan region...***Nylanderia***
12. Antennae Funiculus with 1° article in length ≤ than the 2°...**13**
- Antennae Funiculus with 1° article in length > than the 2°...**17**
13. Petiole anteriorly strongly inclined ...***Tapinoma***
- Petiole anteriorly not inclined ...**14**
14. Big eyes, places to head back angles, Australia...***Opisthopsis***
- Eyes not as above...**15**

15. Maxillary Palp with 3 articles...***Pseudolasius***
- Maxillary Palp with 6 articles...**16**
16. Maxillary Palp with 4° article in length = 5°+6° articles...***Cataglyphis***
- Maxillary palp not as above...***Prenolepis***
17. Maxillary Palp with 3 articles...***Pseudolasius***
- Maxillary Palp with 5 or 6 articles...**18**
18. Maxillary Palp with 4° article in length = 5°+6° articles...***Myrmecocystus***
- Maxillary Palp with 4° article subequal to 5° and 6° articles...**19**
19. Insertion of the Antennae confluent with posterior edge of the Clypeus...**20**
- Insertion of the Antennae near posterior edge of the Clypeus...**21**
20. Neartic, Paleartic and Ind-Oriental regions...***Lasius***
- Australia region ...***Prolasius***
21. Neotropical region...**22**
- Other regions...**23**
22. Mandibles marginally dentate...***Lasiophanes***
- Mandibles marginally edentate...***Zatania***
23. Australian region...***Melophorus***
- Cosmopolitan...***Paratrechina***
- Afrotropical, Madagascar, Indo-Oriental and Australia...***Paraparatrechina***

Forewing of Typology III

Section α

Part B

The Antennae Scape not overstep the Occiput

This Part is divided in two subSections

subSection 1 p. 88
Forewings with Marginal cell open

subSection 2 p. 89
Forewings with Marginal cell closed

Forewing of Typology III

Section α

Part B

The Antennae Scape not overstep the Occiput

subSection 1

Forewings with Marginal cell open

1. Petiole entirely articulated with first segment of the Gaster...**2**
- Petiole articulated only ventrally with first segment of the Gaster...**3**

2. Maxillary Palp of two articles...***Leptanilloides***
- Maxillary Palp with a minimum of three articles ...***Proceratium***

3. Antennae with 10 articles... ***Brachymyrmex***
- Antennae with 13 articles...**4**

4. Maxillary Palp of 6 articles, with 3° article long as the sum of 4° and 5° articles...***Dorymyrmex***
- Maxillary Palp of 5 or 4 articles, Mandibles marginally dentate...***Forelius***
- Maxillary Palp of 4 or 2 articles, Mandibles marginally edentate or denticulate ...***Bothryomyrmex***

Forewing of Typology III

Section α

Part B

The Antennae Scape not overstep the Occiput

subSection 2

Forewings with Marginal cell closed

1. Antennae ≤ 12 articles...**2**
- Antennae with 13 articles...**3**
2. Antennae with 10-11 articles clavate or versus clavate; Mandibles edentate, Forewing solenopsis type ...***Myrmelachista***
- Antennae with 8-12 articles versus clavate or filiform, Mandibles marginally edentate or apically bi-tri dentate, Forewings solenopsis or formica type... ***Acropyga***
- Antennae with 10 articles versus clavate; Mandibles marginally dentate, Forewing formica type... ***Petalomyrmex***
3. Petiole posteriorly articoled dorsally and ventrally with first segment of the Gaster...**4**
- Petiole posteriorly articoled only ventrally with first segment of the Gaster...**7**
4. Mesonotum with Notauli present...**5**
- Mesonotum with Notauli absent...**6**
5. MetaTibiae with one Spur...***Martialis***
- MetaTibiae with two Spurs...***Fulakora***
6. ***Discothyrea*** and ***Proceratium***
7. Insertion of the Antennae near from posterior edge of the Clypeus...**8**
- Insertion of the Antennae confluent in the posterior edge of the Clypeus...**9**
8. Indo-Australian region...***Cladomyrma***
- Paleartic region...***Rossomyrmex***
9. Maxillary Palps with 5 or 6 articles...**10**
- Maxillary Palps with 4 or 2 articles...**12**
10. Mandibles with many teeth...***Technomyrmex***
- Mandibles marginally edentate with small tooth subapical...**11**
11. First article of the Funiculus in length < than the second...***Prenolepis***
- First article of the Funiculus in length > than the second... ***Prolasius***
12. Paleartic and Neotropical region...***Bothryomyrmex***
- Australian region...***Arnoldius***

Forewing of Typology III

Section β

Part A

Antennae ≤ 12 articles

This Part is divided in two subSections

subSection 1 p. 91

Antennae with 10-11 articles

subSection 2 p. 92

Antennae with 12 articles

Forewing of Typology III

Section β

Part A

Antennae ≤ 12 articles

subSection 1

Antennae with 10-11 articles

1. Petiole dorsally articulated to the 1° segment of the Gaster...***Crematogaster***
- Petiole not as above ...**2**
2. Mesonotum with Notauli present...**3**
- Mesonotum with Notauli absent...**6**
3. Antennae clavate...***Cataulacus***
- Antennae not clavate ...**4**
4. Antennae Scape not overstep the Occiput...**5**
- Antennae Scape overstep the Occiput... ***Mycocepurus*** castrator
5. Antennae with lasts 5 articles moniliform... ***Stereomyrmex***
- Antennae filiform...***Tetramorium***
6. First article of the Funiculus in length > than the second...***Pseudoatta***
- First article of the Funiculus in length < than the second...***Megalomyrmex*** *incisus*

Forewing of Typology III

Section β

Part A

Antennae ≤ 12 articles

subSection 2

Antennae with 12 articles

1. Petiole dorsally articulated to the 1° segment of the Gaster...***Crematogaster***
- Petiole not as above...**2**
2. Mesonotum with Notauli present...**3**
- Mesonotum with Notauli absent...**10**
3. Antennae with last 3-4 articles clavate or versus clavate ...**4**
- Antennae filiform...**7**
4. Antennae versus clavate...***Leptotorax*** p. and ***Temnothorax***
- Antennae clavate...**5**
5. Antennae Scape overstep the Occiput...**6**
- Antennae Scape not overstep the Occiput...***Sericomyrmex***
6. Mandibles with 5-7 teeth...***Mycetophylax***
- Mandibles with 3 teeth...***Mycetagroicus***
7. Forewings with Marginal cell open...**8**
- Forewings with Marginal cell closed...**9**
8. Antennae Scape in lenght > than the 2° of the Funiculus... ***Pristomyrmex***
- Antennae Scape in lenght < than the 2° of the Funiculus... ***Recurvidris***
9. Antennae Scape overstep the Occiput...***Cyphomyrmex***
- Antennae Scape not overstep the Occiput...***Nesomyrmex***
10. Forewings with Marginal cell closed...**11**
- Forewings with Marginal cell open...**13**
11. Second article of the Tarsus in length equal to the following...***Melissotarsus***
- Second article of the Tarsus in lenght > that the following...**12**
12. PostPetiole very short and in the form of bells, completely fused with the first segment of the Gaster...***Rhopalomastix***
- PostPetiole not as above...***Podomyrma***
13. Mandibles with one or two preapical teeth...***Solenopsis***
- Mandibles without preapical teeth...***Tropidomyrmex***

Forewing of Typology III

Section β

Part B

Antennae with 13 articles

This Part is divided into two subSections

subSection 1 p. 94
Antennae Scape overstep the Occiput

subSection 2 p. 95
Antennae Scape not overstep the Occiput

Forewing of Typology III

Section β

Part B

Antennae with 13 articles

subSection 1

Antennae Scape overstep the Occiput

1. Mesonotum with Notauli absent...**2**
- Mesonotum with Notauli present...**4**
2. Forewings with Marginal cell closed... ***Atta***
- Forewings with Marginal cell open...**3**
3. Mandibles marginally edentate ...
Kalathomyrmex
Paramycetophylax
4. Antennae filiform...**5**
- Antennae with last article clavate or versus clavate...**8**
5. Forewing solenopsis type ...**6**
- Forewing formica type ...**7**
6. Mandibles triangular marginally edentate, Forewing with Rs1 vein absent...***Apterostigma***
7. Mandibles marginally dentate, Propodeum with three teeth...***Proatta***
- Mandible marginally edentate...
Mycocepurus
Mycetarotes
Mycetosoritis
8. Body Total length > of 6 mm, Antennae with last 4 articles versus clavate ... ***Acromyrmex***
- Body Total length < of 6 mm, Antennae with last 3 articles clavate or versus clavate ...
Mycetophylax
Trachymyrmex

Forewing with Rs1 vein absent

Forewing of Typology III

Section β

Part B

Antennae with 13 articles

subSection 2

Antennae Scape not overstep the Occiput

1. Mesonotum with Notauli present...**2**
- Mesonotum with Notauli absent...**19**
2. Forewings with Marginal cell open...**3**
- Forewings with Marginal cell closed...**11**
3. Antennae with last articles clavate or versus clavate...**4**
- Antennae filiform...**5**
4. Leptotorax part), ***Temnothorax*** (part) and ***Stenamma*** (part)
5. Mandibles marginally edentate ...**6**
- Mandibles marginally dentate ...**10**
6. Forewing formica type ...**7**
- Forewing solenopsis type ...**8**
7. Antennae Scape in length ≤ than the 2° article of the Funiculus...***Daceton***
- Antennae Scape in length > than the 2° article of the Funiculus...***Wasmannia***
8. MetaTibiae with one Spur...***Royidris***
- MetaTibiae without Spur...**9**
9. Antennae Scape in length ≤ than the 2° article of the Funiculus...***Strumigenys***
- Antennae Scape in length > than the 2° article of the Funiculus...***Octostruma***
10. Antennae Scape in length ≤ than the 2° article of the Funiculus...***Basiceros***
- Antennae Scape in length > than the 2° article of the Funiculus...***Megalomyrmex*** (part)
11. Antennae with last articles clavate or versus clavate...
Leptotorax, ***Temnothorax*** and ***Stenamma*** (part)
- Antennae filiform...**12**
12. Mandibles marginally dentate ...**13**
- Mandibles marginally edentate ...**17**
13. Antennae Scape in length < than the 2° article of the Funiculus...***Romblonella***
- Antennae Scape in length > than the 2° article of the Funiculus...**14**
14. Mesolegs is severely reduced in size relative to the other two legs...***Teratanер***
- Mesolegs not as above...**15**
15. Propodeum unarmed...**16**
- Propodeum armed and Mesonotum with longitudinal carine...***Myrmycocrypta***
16. Forewing formica type, Neotropical and Afrotropical region...***Nesomyrmex***
- Forewing solenopsis type, Indo-Australian region...***Acanthomyrmex***

17. Forewing formica type...***Mycetarotes***
- Forewing solenopsis type ...**18**
18. Mandibles reduced...***Myrmecina***
- Mandibles triangular marginally edentate...***Apterostigma***
19. Forewing with Marginal cell closed...**20**
- Forewing with Marginal cell open...**22**
20. Forewing formica type ...**21**
- Forewing solenopsis type... ***Stenamma*** (part)
21. Mandibles marginally edentate...***Ocymyrmex***
- Mandibles marginally dentate...***Stenamma***
22. Forewing formica type ...**23**
- Forewing solenopsis type ...**26**
23. First article of the Funiculus globular form...***Trichomyrmex***
- First article of the Funiculus not globular form...**24**
24. Antennae with 1° article of the Funiculus > than the 2°...***Stenamma*** (part)
- Antennae with 1° article of the Funiculus ≤ than the 2°...**25**
25. Neotropical region...***Allomerus*** and ***Megalomyrmex*** (part)
- Neartic region...***Novomessor***
26. First article of the Funiculus globular form...***Solenopsis***
- First article of the Funiculus not globular form...**27**
27. Mandibles marginally edentate...***Eurhopalothrix***
- Mandibles marginally dentate...**28**
28. Antennae with 1° article of the Funiculus in length ≥ than the 2° article...
Cardiocondyla and ***Stenamma***
- Antennae with 1° article of the Funiculus in length < than the 2° article...
Megalomyrmex
Monomorium

2.7 Dichotomous key to forewings of Typology IV

The male ants of 22 genera (Table 22) have a Forewing structure of Typology IV and are taxonomically classified in six subfamilies of the family Formicidae (Table 21).

Forewing of Typology IV

sub-family	n° genus
Amblyoponinae	1
Dolchoderinae	4
Dorylinae	1
Leptanillinae	5
Myrmicinae	10
Proceratiinae	1
6	**22**

Table 21 - Subfamilies of the family Formicidae and the respective numbers of genera which present Forewings of Typology IV

Genera of the ♂♂ winged ants with Forewings of Typology IV

Acanthognathus
Bothryomyrmex (part)
Cardiocondyla (part)
Crematogaster (part)
Dorymyrmex (part)
Eurhopalotrix (part)
Forelius (part)
Fulakora (part)
Leptanilla
Leptomyrmex-macro (part)
Mycocepurus (part)
Neonilla
Phaulomyrma
Probolomyrmex
Recurvidris (part)
Scyphodon
Strumigenys (part)
Syscia
Temnothorax (part)
Vollenhovia (part)
Xenomyrmex
Yavnella

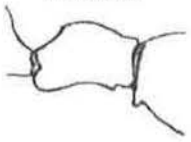
Table 22- ♂♂ of 22 genera of the family Formicidae which present Forewings of Typology IV. In brackets the term "part" means that species of the same genus have different Forewing of Typology.

Forewing of Typology IV

This key is divided into two Sections: **Alfa** (α) and **Beta** (β)
in turn divided into two Parts: A and B

Section α

Petiole

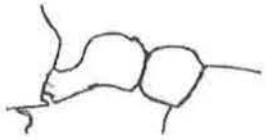


Part A p. 100
MetaTibiae with two Spurs

Part B p. 100
MetaTibiae with one Spur

Section β

Petiole and post petiole



Part A p. 101
Antennae with ≤ 12 articles

Part B p.101
Antennae with 13 articles

Forewing of Typology IV

Section α

Petiole

Part A

MetaTibiae with two Spurs

1. Mesonotum with Notauli present... ***Fulakora***
- Mesonotum with Notauli absent...**2**
2. Mandibles edentate large oval, paddle or spoon-shaped...***Scyphodon***
- Mandibles edentate not as above...**4**
4. Antennae Scape in length < than the 2° article of the Funiculus...***Yavnella***
- Antennae Scape in length > than the 2° article of the Funiculus...
Neonilla, Leptanilla, Phaulomyrma

Part B

MetaTibiae with one or null Spur

1. Petiole entirely articuled with the first segment of the Gaster...***Probolomyrmex***
- Petiole articuled only ventrally with first segment of the Gaster...**2**
2. Mesonotum with Notauli present...***Syscia***
- Mesonotum with Notauli absent...**3**
3. Maxillary Palp of 6 articles, with 3° article long as the sum of 4° and 5° articles...***Dorymyrmex***
- Maxillary Palp of 6 articles but not as above...***Leptomyrmex-macro***
- Maxillary Palp of 4 or 5 articles, Mandibles great...***Forelius***
- Maxillary Palp of 2 or 4 articles, Mandibles narrow...***Bothryomyrmex***

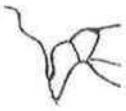
Forewing of Typology IV

Section β

Petiole and post petiole

Part A

Antennae with ≤ 12 articles



1. Petiole dorsally articulated to the 1° segment of the Gaster...***Crematogaster***
- Petiole not as above...**2**
2. Antennae with 11 articles...**Mycocepurus** *castrator*
- Antennae with 12 articles...**3**
3. Antennae with last 3-4 articles clavate...***Temnothorax***
- Antennae filiform...**4**
4. Antennae Scape in length > than the 2° article of the Funiculus...**5**
- Antennae Scape in length < than the 2° article of the Funiculus...**6**
5. Mandibles marginally edentate desenvolved...***Xenomyrmex***
- Mandibles marginally edentate reduced...***Vollenhovia***
6. Palp formula 1:1, Neotropical region...***Acanthognathus***
- Palp formula 4:2, Paleartic, Oriental and Indo-Australian regions...***Recurvidris***

Part B

Antennae with 13 articles

1. Antennae with last 3-4 articles clavate or versus clavate...**2**
- Antennae filiform...**3**
2. Mesonotum with Notauli present...***Temnothorax***
- Mesonotum with Notauli absent... ***Cardiocondyla*** (part)
3. Mesonotum with Notauli present...***Strumigenys***
- Mesonotum with Notauli absent...**4**
4. Mandibles marginally edentate ...
Eurhopalotrix
Vollenhovia
- Mandibles marginally dentate ...***Cardiocondyla***

3. Morphological description, data on mating flight and reference to winged ♂♂ ant genera

In this chapter, the morphological characteristics used to write the dichotomous key are presented, known data on Mating flight and bibliographic references for ♂♂ of all 260 genera which were been studied and divided into 17 subfamilies.

3.1 SubFamily Agroecomyrmecinae

This subfamily is represented by two genera: *Ankylomyrma* present in Afrotropical region and *Tatuidris* present in Neotropical region. Only in the genus Tatuidris is known the ♂.

♂ Genus ***Tatuidris*** Brown & Kempf, 1968

Morphological characters used in this dichotomous key

Antennae with 12 articles filiform; Antennae Scape in length ≤ than the 2° article of the Funiculus; Forewings of Typology II with Marginal cell open; Hindwings of Typology II; Mandibles reduced edentate pointed; Mesonotum with Notauli absent; MetaTibiae with single pectinate Spur; Abdominal sternum IX triangular in shape.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

- Donoso D.A. (2012) Additions to the taxonomy of the armadillo ants (Hymenoptera, Formicidae, Tatuidris). Zootaxa 3503:61-81.

3.2 Subfamily Amblyoponinae Forel, 1893

This subfamily is represented for nine genera and the ♂♂ are known in all genera.

The genera *Myopopone*, *Mystrium* and *Stigmatomma* have the Forewings of Typology I, I did not find any features that distinguish them in this key.

The genera *Amblyopone*, *Fulakora* and *Ximmer* have the Forewing of Typology II, I did not find any features that distinguish them in this key.

♂ Genus ***Adetomyrma*** Ward, 1994

Morphological characters used in this dichotomous key

Antennae with 13 articles; Antennae Scape in length ≤ than the 2° article of the Funiculus, not overstep the Occiput; Forewings of Typology II with Submarginal cell open for

absence of the vein rs-m and Marginal cell open; Hindwings of Typology II; Mandibles narrow edentate pointed or rounded apically; MetaTibiae with two Spurs; Mesonotum with Notauli absent or present; Abdominal sternum IX concave postero-medially.

Bio-geographical distribution

Madagascar

Behavioral Ecology of the mating flight

Strategy: unknown

Mating flight: Madagascar: *A. aureocuprea*: 22°28.9' S, 45°27.7' E, 725 meters sea level, January; *A. bressleri*: 12.51391° S, 49.17784° E, 984 meters sea level, March; *A. caputleae*: 18°28' S, 47°58' E, 1300 meters sea level, December; 21°15.99' S, 47°25.21' E, 1020 meters sea level, March and November; 20°35.6' S, 46°33.8' E, 1550 meters sea level, January; *A. cassis*: 16.77274° S, 49.26551° E, 450 meters sea level, February; *A. caudapinnigera*: 20.79266° S, 47.17566° E, 823 meters sea level, January; *A. cilium*: 24°46' S, 46°45' E, 900 meters sea level, January; *A. clarivida*: 14°26.29' S, 49°46.44' E, 488 meters sea level, March to May; *A. goblin*: 14°26.29' S, 49°46.44 E, 488 meters sea level, February; 12°19.5' S, 49°20' E, 150 meters sea level, February; 22°47'28'' S, 47°10'55'' E, 600 meters sea level, Abril; *A. venatrix*: 21°15.05' S, 47°24.43' E, 1130 meters sea level, October and November; 22°53.19' S, 44°41.53' E, 840 meters sea level, March. (Yoshimura and Fisher 2012 and AntWeb 2017).

References for Taxonomic identification

-AntWeb (2017) Photos: *A. aureocuprea* (Type), *A. bressleri* (Type), *A. caputleae* (Type), *A. cassis* (Type), *A. caudapinnigera* (Type), *A. cilium* (Type), *A. clarivida* (Type), *A. goblin* (Type) and *A. venatrix*.

-Yoshimura M. and Fisher B.L. (2012) A revision of the Malagasy endemic genus *Adetomyrma* (Hymenoptera: Formicidae: Amblyoponinae). Zootaxa 3341: 1-31

♂ Genus ***Amblyopone*** Erichson, 1842

Morphological characters used in this dichotomous key

Antennae with 13 articles, Antennae Scape in length ≥ than the 2° article of the Funiculus, not overstep the Occiput; Forewings of Typology II and with Marginal cell closed and appendiculate; Hindwings of Typology II; Mandibles elongate pointed or bi-dentate apically; Mesonotum with Notauli present; MetaTibie with two Spurs; Pygidium rounded distally.

Bio-geographical distribution

Australian

Behavioral Ecology of the mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification and Behavioral Ecology of the nuptial flight

-Brown W. L. (1960) Contributions toward a reclassification of the Formicidae, III. Tribe Amblyoponini (Hymenoptera). Bulletin of the Museum of Comparative Zoology at Harvard College Vol. 122, n° 4.

-Dlussky G.M. (2009) The ant subfamilies Ponerinae, Cerapachynae and Pseudomyrmecinae

(Hymenoptera, Formicidae) in the Late Eocene amber of Europe. Paleontological Journal, Vol. 43, N° 9: 1043-1086.
-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118
-Wheeler W. M. (1927) Ants of the genus *Amblyopone* Erichson. Prooceeding of the American Academy of Art and Sciences, vol. 62 n° 1

♂ Genus ***Fulakora*** Kusnezov, 1955

Morphological characters used in this dichotomous key

Antennae with 10 or 13 articles versus clavate, Antennae Scape in length > than the 2° article of the Funiculus, not overstep the Occiput; Forewings of Typology II, III and IV (*F. gnoma*) with Marginal cell closed; Hindwings of Typology II and III; Mandibles narrow pointed edentate; MetaTibiae with two Spurs; Mesonotum with Notauli present.

Bio-geographical distribution

Neotropical and Australian

Behavioral Ecology of the mating flight

Strategy: unknown

Mating flight: Argentine: 26°58'S, 64°51'W, 800 meters sea level, *F. egregia* and *F. minima*: November and December (Kusnezov 1962); Brazil: *F. armigera*, *F. elongata*: 23°38' S, 45°53' W, 900 meters sea level, February (Feitosa et al. 2016)

References for Taxonomic identification

-Feitosa R. M., Silva R. R. and Auiar A. P. (2016) Diurnal flight periodicity of a Neotropical ant assemblage (Hymenoptera, Formicidae) in the Atlantic Forest. Revista Brasileira de Entomologia 60, 241-247.
-Kusnezov N. (1955) Zwei neue Ameisengattungen aus Tucuman (Argentinien). Zoologischer Anzeiger, Bd 154, Heft 11/12.
-Kusnezov N. (1962) El ala posterior de las formigas. Acta zoologica Lilloana, tomo 28: 367-378.
- Kusnezov N. (1962) El vuelo nupcial de las hormigas. Acta Zoologica Lilloana, tomo 18, 385-442.
-Taylor R. W. (1978) Melanesian ants of the genus *Amblyopone* (Hymenoptera: Formicidae). Aust. J. Zool., 26: 823-39

♂ Genus ***Myopopone*** Roger, 1861

Morphological characters used in this dichotomous key

Antennae with 13 articles, Antennae Scape in length ≥ than the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I; Mandibles falcate edentate pointed apically; Mesonotum with Notauli present; MetaTibiae with two Spurs. Abdominal sternum IX rounded distally.

Bio-geographical distribution
Indo-Oriental and Australian
Behavioral Ecology of the mating flight
Strategy: unknown
Mating flight: unknown
References for Taxonomic identification
-Brown W. L. (1960) Contributions toward a reclassification of the Formicidae, III. Tribe Amblyoponini (Hymenoptera). Bulletin of the Museum of Comparative Zoology at Harvard College Vol. 122, n° 4.
-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118
-Donisthorpe H. (1942) *Myopone wollastoni* sp. n., with notes on other forms in the genus and description of the males of two species (Hym., Formicidae). The Entomologist's Monthly Magazine, vol. LXXVII

♂ Genus ***Mystrium*** Roger, 1862

Morphological characters used in this dichotomous key
Antennae with 13 articles, Antennae Scape in length ≥ than the 2° article of the Funiculus; Forewings Typology I with Marginal cell closed; Hindwings of Typology I; Mandibles falcate edentate pointed or rounded apically; Mesonotum with Notauli present or absent; MetaTibiae with two Spurs, rared with one Spur; Abdominal strernum IX rounded distally.
Bio-geographical distribution
Afrotropical, Madagascar, Indo-Australian and Australian
Behavioral Ecology of the mating flight
Strategy: unknown
Mating flight: Comoros: *M. rogeri*: 12.30353° S, 43.66827° E, 500 meters sea level, January. Madagascar: *M. janovitzi*: 19°01' S, 44°26' E, 20 meters sea level, November; *M mysticum*: 20.79528° S, 44.147° E, 80 meters sea level, December; *M. mirror*: 20.79528° S, 44.147°, 80 meters sea level, December; 16°00.6' S, 45°15.9' E, 10 meters sea level, November; *M. voeltzkowi*: 13°05.0' S, 49°54.5' E, 30 meters sea level, November. (Yoshimura and Fisher 2014 and AntWeb 2017)
References for Taxonomic identification
-Brown W. L. (1960) Contributions toward a reclassification of the Formicidae, III. Tribe Amblyoponini (Hymenoptera). Bulletin of the Museum of Comparative Zoology at Harvard College Vol. 122, n° 4.
-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118
-Menozzi C. (1929) Revisione delle formiche del genere *Mystrium* Roger. Zoologischen Anzeiger (Wasmann-Festband).
-Yoshimura M. and Fisher B.L. (2012) A revision of the malagasy endemic genus *Adetomyrma* (Hymenoptera: Formicidae: Amblyoponinae). Zootaxa 3341: 1-31

-Yoshimura M. and Fisher B.L. (2014) A revision of the ant genus *Mystrium* in the Malagasy region with description of six new species and remarks on Amblyopone and Stigmatomma (Hymenoptera, Formicidae, Amblyoponinae). Zookeys 394: 1-99.

♂ Genus ***Onychomyrmex*** Emery, 1895

Morphological characters used in this dichotomous key

Antennae with 13 articles, Antennae Scape in length ≥ than the 2° article of the Funiculus, not overstep the Occiput; Forewings of Typology II with Marginal cell closed and appendiculate; Hindwings of Typology II; Mandibles narrow bidentate apically; Mesonotum with Notauli present; MetaTIbiae with one or null Spur.

Bio-geographical distribution

Australian

Behavioral Ecology of the mating flight

Strategy: unknown

Mating flight: Australia: *O. mjobergi*: 27°55' S, 153° 11' E, 490 meters sea level, December (AntWeb 2017).

References for Taxonomic identification

-Brown W. L. (1960) Contributions toward a reclassification of the Formicidae, III. Tribe Amblyoponini (Hymenoptera). Bulletin of the Museum of Comparative Zoology at Harvard College Vol. 122, n° 4.

-Clark J. (1928) Australian Formicidae. Jour. Roy. Soc. Western Australia, Vol. 14, n° 4.

-Forel A. (1915) Result of Dr. E. Mjobergs Swedish Scientific Expeditions to Australia 1910-13. Arkiv For Zoology, Vol. 9, N° 16.

♂ Genus ***Prionopelta*** Mayr, 1866

Morphological characters used in this dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus; Forewings of Typology II with Marginal cell closed; Hindwings of Typology III; Mandibles narrow edentate pointed or bidentate apically; Mesonotum with Notauli present; MetaTibiae with one Spur.

Bio-geographical distribution

Neotropical, Afrotropical, Indo-Australian and Australian.

Behavioral Ecology of the mating flight

Strategy: unknown

Mating flight: Brazil: *Prionopelta* sp.: 20°45' S, 45°52' W, 700 meters sea level, October to January (Cardoso do Nascimento 2002); Argentine: *P. bruchi*: 26°58'S, 64°51'W, 800 meters sea level, November, December and January (Kusnezov 1962); Seychelles: *P. seychelles*: 4.48670° S, 55.23410° E, 520 meters sea level, January; Madagascar: *P. subtilis*: 15°17.3' S, 49°32.9' E, 600 meters sea level, March; *P. descarpentriesi*: 12°15.76' S, 49°23.85' E, 10 meters sea level, July (AntWeb 2017)

References for Taxonomic identification

-Bharti H. and Wachkoo A.A. (2012) First Record of *Prionopelta kraepelini* (Hymenoptera:

Formicidae) from India, with description of male caste. Sociobiology Vol. 59, n° 3.
-Cardoso do Nascimento I. (2002) Fenologia do voo nuptial e amostragem de comunidade de formigas (Hymenoptera: Formicidae) em area de Mata Atlantica do municipio de Viçosa, Minas Gerais. Universidade Federal de Viçosa, Dissertaçao (mestrado).
-Kusnezov N. (1955) Zwei neue Ameisengattungen aus Tucuman (Argentinien). Zoologischer Anzeiger, Bd 154, Heft 11/12
-Kusnezov N. (1962) El vuelo nupcial de las hormigas. Acta Zoologica Lilloana, tomo 18, 385-442.
-Terron G. (1974) Découverte au Cameroun de deux espéces nouvelles du genre *Prionopelta* Mayr (Hym., Formicidae). Extrait des Annales de la faculté des Sciences du Cameroun, n° 17.
-Yoshimura M. and Fisher B.L. (2012) A revision of the Malagasy endemic genus *Adetomyrma* (Hymenoptera: Formicidae: Amblyoponinae). Zootaxa 3341: 1-31

♂ Genus ***Stigmatomma*** Roger, 1859

Morphological characters used in this dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I; Mandibles falcate edentate; Mesonotum with Notauli present; MetaTibiae with two Spurs; Abdominal sternum IX rounded distally.

Bio-geographical distribution

Neartic, Paleartic, Indo-Australian, Oriental and Madagascar

Behavioral Ecology of the mating flight

Strategy: unknown

Mating flight: USA: *S. oregonense*: 38°30' N, 122°06' W in August and September (Ward 1988); *S. pallipes*: California, September and October; Singapore: 1°19'55N, 103°51E, *S. reclinatum*: January; Madagascar: *S. roahady*: 18°51.05' S, 48°19.2' E, 1075 meters sea level, December (AntWeb 2017).

References for Taxonomic identification

-Bondroit J. (1918) Les fourmis de France et de Belgique. Annales de La Societè Entomologique de France, Vol. 87.
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-Ogata K. (1987) A generic synopsis of the Poneroid complex of the family Formicidae in Japan (Hymenoptera). Part. I. Subfamilies Ponerinae and Cerapachynae.Esakia n° 25: 97-132.
-Yoshimura M. e Fisher B.L. (2012) A revision of male ants of the Malagasy Amblyoponinae (Hymenoptera: Formicidae) with resurrections of the genera *Stigmatomma* and *Xymmer*. PLoS ONE Vol. 7(3).
-Ward P. S. (1988) Mesic element in the Western Neartic ant fauna: taxonomy and biological notes on *Amblyopone*, *Proceratium* and *Smithistruma* (Hymenoptera: Formicidae). Journal of the Kansas Entomological Society 61(1): 102-124

♂ Genus ***Xymmer*** Santschi, 1914

Morphological characters used in this dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus; Forewings of Typology II with Marginal cell closed; Hindwings of Typology II; Mandibles narrow edentate rounded apically; Mesonotum with Notauli present; MetaTibiae with two Spurs.

Bio-geographical distribution

Afrotropical and Indo-Australian

Behavioral Ecology of the mating flight

Strategy: unknown
Mating flight: unknown

References for Taxonomic identification

-Yoshimura M. e Fisher B.L. (2012) A revision of male ants of the Malagasy Amblyoponinae (Hymenoptera: Formicidae) with resurrections of the genera *Stigmatomma* and *Xymmer*. PLoS ONE Vol. 7(3).

3.3 Subfamily Aneuretinae Emery, 1913

This subfamily is represented for one genus.

♂ Genus ***Aneuretus*** Emery, 1893

Morphological characters used in the dichotomous key

Antennae with 13 articles; Antennae Scape in length < than the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology II; Mandibles great dentate; Mesonotum with Notauli absent; Petiole with long anterior

peduncle and low rounded node; Pretarsal Claws simple.

Bio-geographical distribution

Sri Lanka

Behavioral Ecology of the mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

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-Boudinot B.E. (2015) Contribution to the knowledge of Formicidae (Hymenoptera, Aculeata): a new diagnosis of the family, the first global male-based key to subfamilies, and a treatment of early branching lineages. European Journal of Taxonomy 120:1-62.

3.4 Subfamily Apomyrminae Forel, 1893

This subfamily is represented for one genus.

♂ Genus ***Apomyrma*** Brown, Gotwald e Lévieux, 1970

Morphological characters used in this dichotomous key

Antennae with 13 articles, Antennae Scape in length ≥ than the 2° article of the Funiculus, not overstep the Occiput; Forewings of Typology II with Marginal cell closed; Hindwings of Typology III; Mandibles reduced rounded apically.

Bio-geographical distribution

Afrotropical

Behavioral Ecology of the mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Brown W.L., Gotwald W.H. and Lévieux J. (1970) A new genus of Ponerinae ants from west Africa (Hymenoptera: Formicidae) with ecological notes. Psyche September.

-Boudinot B.E. (2015) Contribution to the knowledge of Formicidae (Hymenoptera, Aculeata): a new diagnosis of the family, the first global male-based key to subfamilies, and a treatment of early branching lineages. European Journal of Taxonomy 120: 1-62.

3.5 Subfamily Dolichoderinae Forel, 1878

This subfamily is represented for 28 genera and the ♂♂ are known in 24 genera.

In the genera *Ecphorella*, *Gracilidris*, *Laweriella* and *Nebothriomyrmex* the ♂♂ are unknown. In the genus *Chronoxenus* the male description is insufficient for use in the key.

♂ Genus ***Anillidris*** Santschi, 1936

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, Scape long as the first two articles of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology II; Mandibles great dentate marginally with 6-7 teeth; Mesonotum with Notauli absent; Maxillary Palp of 3 articles and Labial Palp of 4 articles; Pretarsal Claws simple.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the mating flight

Strategy: unknown

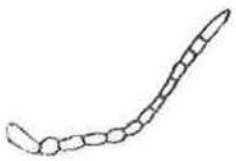
Mating flight: Argentine: 27°19' S, 55°32' W, 150 meters sea level, *A. bruchi*: September and October (Santschi 1937); Brazil: 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level and 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *A. bruchi*: September and October (Cantone, see chapter 4).

References for Taxonomic identification

-Santschi F. (1937) Les sexués du genre *Anillidris* Santschi. Bulletin de la Société Entomologiquè de la France.

-Schmidt F.A., Feitosa R.M., Moraes Rezende F. d. and Silva de Jesus R. (2013) New on the enigmatic ant genus *Anillidris* (Hymenoptera: Formicidae: Dolichoderinae: Leptomyrmecini). Myrmecological News, 19: 25-30.

-Shattuck S. O. (1992) Generic Revision of the ant subfamily Dolichoderinae (Hymenoptera: Formicidae. Sociobiology, vol. 21, n° 1.



♂ Genus ***Anonychomyrma*** Donisthorpe, 1946

Morphological characters used in the dichotomous key

Antennane with 13 articles, Antennae Scape in length < than the 2° article del Funiculus, not overstep the Occiput; Forewings of Typology II with Marginal cell closed; Hindwings of Typology II; Mandibles great dentate marginally; Mesonotum with Notauli absent; Pretarsal Claws absent or reduced in Typus species.

Bio-geographical distribution

Indo-Australian

Behavioral Ecology of the mating flight
Strategy: unknown
Mating flight: unknown
References for Taxonomic identification
-AntWeb (2016) Photos *A. dimorpha* Typus. www.antweb.org
-Donisthorpe H. (1946) Ants from New Guinea, including new species and a new genus. Annals and Magazine of Natural History, Ser. 11, vol. 13 1946
-Shattuck S. O. (1992) Generic Revision of the ant subfamily Dolichoderinae (Hymenoptera: Formicidae. Sociobiology, vol. 21, n° 1.

♂ Genus ***Aptinoma*** Fisher, 2009

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, not overstep the Occiput; Forewings of Typology I with Marginal cell closed; Hindwings of Typology II; Mandibles great dentate or denticulate marginally; Mesonotum with Notauli absent; Palp formula 6:3; MetaTibiae with one Spur; Pretarsal claws simple.
Bio-geographical distribution
Madagascar
Behavioral Ecology of the mating flight
Strategy: unknown
Mating flight: unknown
References for Taxonomic identification
-Fisher B.L. (2009) Two new Dolichoderinae ant genera from Madagascar: *Aptinoma* gen. N. and *Ravavy* gen. n. (Hymenoptera: Formicidae) Zootaxa 2118: 37-52
-Yoshimura M. and Fisher B. (2011) A revision of male of the Malagasy region (Hymenoptera: Formicidae): Key to genera of the subfamily Dolichoderinae. Zootaxa 2794: 1-34.

♂ Genus ***Arnoldius*** Dubovikoff, 2005

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus not overstep the Occiput, insertion of the Antennae confluent from posterior edge of the Clypeus; Forewings of Typology III with Marginal cell closed; Hindwings of Typology III; Mandibles edentate pointed or with 2-3 teeth; Palp formula 4:3 or 2:2.
Bio-geographical distribution
Australian
Behavioral Ecology of the mating flight
Strategy: unknown
Mating flight: unknown

References for Taxonomic identification

-Crawley W.C. (1922) New ants from Australia. Annals and magazine of Natural Hystory, ser. 9, vol. X.
-Dubovikoff D.A. (2005) The system of taxon *Bothriomyrmex* Emery, 1869 sensu lato (Hymenoptera: Formicidae) and relatives genera. Caucasian Entomological Bull., 1(1): 89-94.
-Forel A. (1902) Fourmis nouvelle d'Australie. Rev. Suisse Zool. Vol. 10.
-Mayr G. (1876) Die australischen Formiciden. J. Mus. Godeffroy, Vol. 12: 56-115.

♂ Genus ***Axinidris*** Weber, 1941

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, not overstep the Occiput; Forewings of Typology II with Marginal cell closed; Hindwings of Typology III; Mandibles great dentate marginally.

Bio-geographical distribution

Afrotropical

Behavioral Ecology of the mating flight

Strategy: unknown
Mating flight: unknown

References for Taxonomic identification

-Shattuck S. O. (1992) Generic Revision of the ant subfamily Dolichoderinae (Hymenoptera: Formicidae. Sociobiology, vol. 21, n° 1.

♂ Genus ***Azteca*** Forel, 1878

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length < than the 2° article of the Funiculus, 2° article of the Funiculus in length > than the following; Forewings of Typology II with Marginal cell closed, formica type; Hindwings of Typology II; Mandibles narrow dentate or denticulate with 2-3 teeth pointed.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the mating flight

Strategy: male aggregation (Shik and Kaspari 2009)
Mating flight: Panama: 9°'19'' N, 79°50'15'' W, 50-80 meters sea level, *Azteca* sp. 8: May to July and September to December; *A. instabilis*: all the year (Kaspari et al. 2001); Brazil: 20°45' S, 45°52' W, 700 meters sea level, *Azteca* sp.: October to Janeiro and March (Cardoso do Nascimento 2002); 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Azteca* sp. 503: January; *Azteca* sp. 530: September and October (Cantone see chapter 4); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *Azteca* sp.: February (Kusnezov 1962).

References for Taxonomic identification

-Cardoso do Nascimento I. (2002) Fenologia do voo nuptial e amostragem de comunidade

de formigas (Hymenoptera: Formicidae) em area de Mata Atlantica do municipio de Viçosa, Minas Gerais. Universidade Federal de Viçosa, Dissertaçao (mestrado).
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-Kaspari M., Pickering J. and Windsor D. (2001) The reproductive flight phenology of a neotropical ant assemblage. Ecological Entomology, 26, 245-257.
-Kusnezov N. (1962) El vuelo nupcial de las hormigas. Acta Zoologica Lilloana, tomo 18, 385-442.
-Guerrero R.J., Delabie J.H.C. e Dejean A. (2010) Taxonomic Contribution to the Aurita Group of the ant genus *Azteca* (Formicidae: Dolichoderinae). J. HYM. RES. Vol. 19 (1).
-Shik J. Z. and Kaspari M. (2009) Lifespan in male ants linked to mating syndrome. Insect. Soc. 56: 131-134.

♂ Genus ***Bothriomyrmex*** Emery, 1869

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, Scape long as the sum of three articles of the Funiculus not overstep the Occiput, insertion of the Antennae confluent from posterior edge of the Clypeus; Forewings of Typology II, III and IV with Marginal cell open or closed; Hindwings of Typology II; Mandibles narrow denticulate or edentate marginally, pointed or bidentate apically; Mesonotum with Notauli absent; Palp formula 4:2 or 2:2.

Bio-geographical distribution

Paleartic and Neotropical

Behavioral Ecology of the mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Emery C. (1869) Descrizione di una nuova formica italiana. Ann. Mus. Zool. R. Univ. Napoli, Vol. 5.
-Emery C. (1912) Hymenoptera, Fam. Formicidae, SubFam. Dolichoderinae. Genera Insectorum. Fasc. 137.
-Emery C. (1916) Fauna Entomologica Italiana, Hymenoptera – Formicidae. Bull. Soc. Entomol. It. 47: 79-275.
-Emery C. (1925) Les espéces européennes et orientales du genre *Bothriomyrmex*. Bulletin de la Société Vaudoise des Sciences Naturelles, Vol. 56, n° 216
-Dubovikoff D.A. e Longino J.T. (2004) A new species of the genus *Bothriomyrmex* Emery 1869 (Hymenoptera: Formicidae: Dolichoderinae) from Costa Rica. Zootaxa 776: 1-10

-Menozzi C. (1936) Nuovi contributi alla conoscenza della fauna delle isole italiane dell'Egeo. Bollettino del Laboratorio di Zoologia generale ed agraria, Portici, Vol. XXIX.
-Santschi F. (1920) Formis du genre *Bohriomyrmex* Emery. Extrait de la Revue Zoologique Africaine, vol. VII, Fasc. 3
-Santschi F. (1923) Messor et autres Fourmis paléartiques. Revue Suisse de Zoologie, Vol. 30 n° 12
-Tohmé H e Tohmé G (1981) Contribution à l'étude systématique et biologique de *Bothriomyrmex syrius* Forel, Formicoidea, Dolichoderinae. Bulletin de la Societé entomologique de France, tome 86.

♂ Genus ***Doleromyrma*** Forel, 1907

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in legth ≥ than the 2° article of the Funiculus; Forewings of Typology II with Marginal cell closed; Hindwings of Typology II; Mandibles great dentate with 4-7 teeth not denticulate; Palp formula 6:4.

Bio-geographical distribution

Australian

Behavioral Ecology of the mating flight

Strategy: unknown
Mating flight: unknown

References for Taxonomic identification

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-Emery C. (1912) Hymenoptera, Fam. Formicidae, SubFam. Dolichoderinae. Genera Insectorum. Fasc. 137.
-Shattuck S. O. (1992) Generic Revision of the ant subfamily Dolichoderinae (Hymenoptera: Formicidae. Sociobiology, vol. 21, n° 1.

♂ Genus ***Dolichoderus*** Lund, 1831

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≥ than the 2° article of the Funiculus not overstep the Occiput; Forewings of Typology I with Marginal cell closed; Hindwings of Typology II; Mandibles great dentate; Mesonotum with Notauli absent; Hypostoma antero-lateral in the form of an expanded flange directed; Maxillary Palp of 6 articles, Labial Palp of 4 articles; Metatibie with one Spur; Pretarsal Claws simple.

Bio-geographical distribution

Neotropical, Neartic, Paleartic, Indo-Australian, Oriental, Australian

Behavioral Ecology of the Mating flight

Strategy: the male fly before that female fly (Talbot 1956)
Mating flight: Usa: 42°27' N, 84° 0' W 290 meters sea level: *D. plagiatus* in August

(Kannowski 1967); *D. mariae* in August (Wheeler 1905; Talbot 1956); *D. taschenbergi* in June and July (Kannowski 1959); Brazil: 20°45' S, 45°52' W, 700 meters sea level, *Dolichoderus* sp. 01: all the year (Cardoso do Nascimento 2002); 14°37'04'' S, 39°04'07'' W, 10 meters sea level, *D. bibens*, November to March ; *D. diversus*: November to February (Cardoso do Nascimento 2006); 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Dolichoderus* sp. 59: June and October to April, *Dolichoderus* sp. 120: October and December; 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Dolichoderus* sp. 500: December; (Cantone see chapter 4); Panama: 9°'19'' N, 79°50'15'' W, 50-80 meters sea level, *D. bispinosus*: April to July and September, October, December and February; *D. debilis* and *D. lutosus*: all the year (Kaspari et al. 2001).

References for Taxonomic identification

-Cardoso do Nascimento I. (2002) Fenologia do voo nuptial e amostragem de comunidade de formigas (Hymenoptera: Formicidae) em area de Mata Atlantica do municipio de Viçosa, Minas Gerais. Universidade Federal de Viçosa, Dissertaçao (mestrado).

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-Clark J. (1930) The australlian ants of the genus *Dolichoderus* (Formicidae). Australin Zoologyst, vol. 6

-Dill M. Williams D.J. e Maschwitz U. (2002) Herdsmen Ants and their mealybug parteners. Abh. Senckenberg. Naturforsch Ges, Frankfurt, 557:1-373

-Donisthorpe H. (1917) *Dolichoderus* (*Hypoclinea*) *crawley* n.sp., a species of ant new to Science; with o few notes on the genus. The Entomologist's Record, vol. 29.

-Emery C. (1912) Hymenoptera, Fam. Formicidae, SubFam. Dolichoderinae. Genera Insectorum. Fasc. 137.

-Emery C. (1916) Fauna Entomologica Italiana, Hymenoptera – Formicidae. Bull. Soc. Entomol. It. 47: 79-275.

-Kannowski P.B. (1959) The flight activities of *Dolichoderus* (*Hypoclinea*) *taschenbergi* (Hymenoptera: Formicidae). Annales of the Entomological Society of America, Vol. 52.

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-Wheeler W.N. (1905) The North American ants of the genus *Dolichoderus*. Bolletin American Museum of Natural History, Vol. XXI.

-Shattuck S. O. (1992) Generic Revision of the ant subfamily Dolichoderinae (Hymenoptera: Formicidae. Socioniology, vol. 21, n° 1.

-Talbot M. (1956) Flight activities of the ant *Dolichoderus* (*Hyopoclinea*) *mariae* Forel. Psyche 63: 134-139.

-Wheeler W.N. (1905) The North American Ants of the genus *Dolichoderus*. Bulletin American Museum of Natural History, Vol. XXI.
-Wheeler W.N. (1934) Contribution to the fauna of Rottnest Island, Western Australia. Journal of the Royal Society of Western Australia. Vol. XX

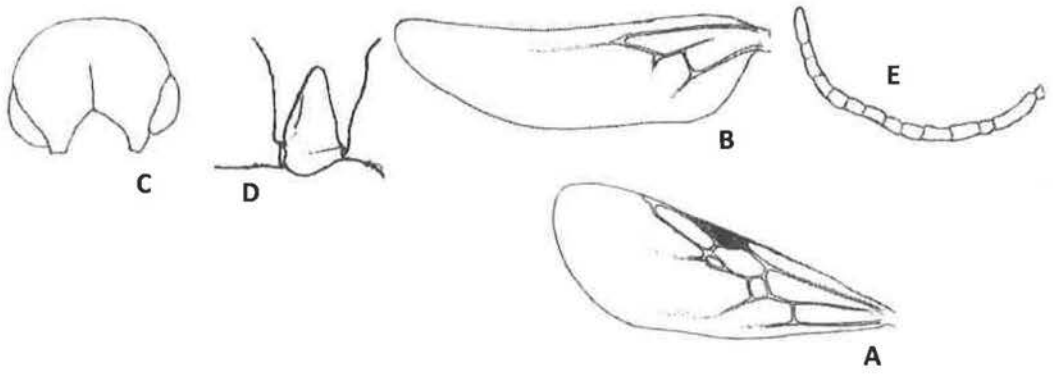

Figure – **A**: Forewing; **B**: Hindwing; **C**: Hypostoma ventral view; **D**: Petiole; **E**: Antennae of *Dolichoderus* sp. 59♂, São Paulo, Brazil.

♂ Genus ***Dorymyrmex*** Mayr, 1866

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus not overstep the Occiput, 1° article of the Funiculus in length ≥ that the 2°, insertion of the Antennae confluent from posterion edge of the Clypeus; Forewings of Typology III or IV with Marginal cell open or closed; Hindwings of Typology II or III; Mandibles dentate; Palp formula 6:4 with 3° article of the Maxillary Palp long as the sum of 4°and 5° articles; Mesonotum with Notauli absent; MetaTibiae with one Spur.

Bio-geographical distribution

Neartic and Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Puerto Rico: *Dorymyrmex* sp.: 17°58' N, 66°52' W, 130 meters sea level October-November and June-July (Torres et al. 2000); Argentine: 26°58'S, 64°51'W, 800 meters sea level: *D. pyramicus*: January, February, April, October to December; *D. planidens*: April; *D. thoracicus*: October to March (Kusnezov 1962); Brazil: 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Dorymyrmex* sp. 17: all the year; 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, sp. 502: November, February and March (Cantone see chapter 4).

References for Taxonomic identification

-Bruch C. (1921) Estudos Mirmecologicos. Universidade Nacional de La Plata, tomo 26.
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Insectorum. Fasc. 137.
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-Santschi F. (1916) Formigas Sudamericains. Physis (Rev. De la Soc Arg. De Ciencias naturales) tomo 2.
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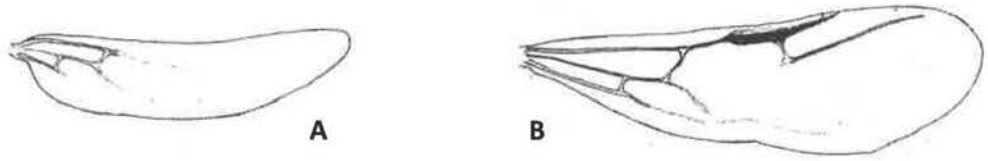
-Snelling R.R. (1975) Description of new Chilean ant taxa (Hymenoptera: Formicidae). Natural Histoty Museum of Los Angeles County, n° 274.
-Torres J. A., Snelling R. R. and Canals M. (2000) Seasonal and Nocturnal Periodicities in Ant Nuptial Flights in the Tropics (Hymenoptera: Formicidae). Sociobiology, Vol. 37, n° 3B.

Figure – **A**: Hindwing; **B**: Forewing of *Dorymyrmex* sp. 117♂, São Paulo, Brazil



♂ Genus ***Forelius*** Emery, 1888

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus not overstep the Occiput (except *F. brasiliensis*), Insertion of the Antennae confluent from the posterior edge of the Clypeus; Forewings of Typology III or IV with Marginal cell open; Hindwings of Typology II or III; Mandibles dentate marginally; Palp formula 5:3 (*F. albiventris* 4(3):2, *F. andinus* 4:2, *F. go/bachi* 0:0); Mesonotum with Notauli absent.

Bio-geographical distribution

Neartic and Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Argentine: 26°58'S, 64°51'W, 800 meters sea level, *F. nigriventris*: October to January (Kusnezov 1962)

References for Taxonomic identification

-Cuezzo F. (2000) Revision del genero *Forelius* (Hymenoptera: Formicidae: Dolichoderinae). Sociobiology, vol 35, n° 2°
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-Shattuck S. O. (1992) Generic Revision of the ant subfamily Dolichoderinae (Hymenoptera: Formicidae. Socioniology, vol. 21, n° 1.

♂ Genus ***Froggattella*** Forel, 1902

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than the 2° article of the Funiculus, not overstep the Occiput; Forewings of Typology II with Marginal cell closed; Hindwings of Typology II; Mandibles narrow edentate pointed apically.

Bio-geographical distribution

Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight : unknown

References for Taxonomic identification

-Emery C. (1912) Hymenoptera, Fam. Formicidae, SubFam. Dolichoderinae. Genera Insectorum. Fasc. 137.
-Shattuck S. O. (1992) Generic Revision of the ant subfamily Dolichoderinae (Hymenoptera: Formicidae. Sociobiology, vol. 21, n° 1.
-Wheeler W.M. (1936) The Australian ant genus *Froggattella*. American Museum Novitates, New York, N° 842

♂ Genus ***Iridomyrmex*** Mayr, 1862

Morphological characters used in the dichotomous key

Antennas with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus not overstep the Occiput; Forewings of Typology II with Marginal cell closed; Hindwings of Typology II; Mandibles edentate pointed apically or 25 denticulate; Palp formula 6:4.

Bio-geographical distribution

Oriental, Indo-Australian and Australian.

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Australia: 33°52'S, 151°12'E, *I. purpureus*, October (Lowne 1865)

References for Taxonomic identification

-Crawley B.A. (1918) Some New Australian Ants. The Entomologist's Record and Journal of Variation.
-Crawley B.A. (1921) New ants from Australia. Annals and Magazine of Natural History, Ser.

9, Vol. X.
-Donisthorpe H. (1943) The ants (Hym., Formicidae) of Waigeu Island, North Dutch New Guinea. Annals and Magazine of Natural History, Ser. 11, Vol. X.
-Emery C. (1912) Hymenoptera, Fam. Formicidae, SubFam. Dolichoderinae. Genera Insectorum. Fasc. 137.
-Lowne B.T. (1865) Contributions to the Natural History of Australian Ants. The Entomologist, N° 19.
-Shattuck S. O. (1992) Generic Revision of the ant subfamily Dolichoderinae (Hymenoptera: Formicidae. Socioniology, vol. 21, n° 1.
-Wheeler W.N. (1927) The ants of Lord Howe Island and Norfork Island. American Academy of Arts and Sciences, Vol. 62, N° 4.

♂ Genus ***Leptomyrmex*** Mayr, 1862

Morphological characters used in the dichotomous key

Antennae with 13 articles or rarely 12, Antennae Scape in length > than the 2° article of the Funiculus not overstep the Occiput, frequently 3° and 4° articles of the Funiculus S-shaped; Forewings of Typology I in micro-*Leptomyrmex* with Pterostigma and Marginal cell closed, Typology II in *L. relictus* and Typology IV in macro-*Leptomyrmex* without Pterostigma with the union of the cell Marginal and SM1; Hindwings of Typology II or III; Mandibles great denticulate; Maxillary Palp of 6 articles or 5 in *L. relictus*; Mesonotum with Notauli absent.

Bio-geographical distribution

Australian and Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Boudinot B.E., Probst R.S., Brandão C.R.F., Feitosa R.M. and Ward P. (2016) Out of the Neotropics: newly discovered relictual species sheds light on the biogeographical history of spider ants (*Leptomyrmex*, Dolichoderinae, Formicidae). Systematic Entomology, 41: 658-671.
-Emery C. (1912) Hymenoptera, Fam. Formicidae, SubFam. Dolichoderinae. Genera Insectorum. Fasc. 137.
-Forel A. (1910) Formicides australiens reçus de MM. Frogatt et Rowland Turner. Revue Suisse de Zoologie, Tome 18, Fascicule 1.
-Lucky A. and Ward P. (2010) Taxonomic revision of the ant genus *Leptomyrmex* Mayr (Hymenoptera: Formicidae). Zootaxa 2688: 1-67.
-Shattuck S. O. (1992) Generic Revision of the ant subfamily Dolichoderinae (Hymenoptera: Formicidae. Sociobiology, vol. 21, n° 1.
-Wheeler W. N. (1915) The Australian honey-ants of the genus *Leptomyrmex* Mayr. American Academy of Arts and Sciences, Vol. 51, N° 5.
-Wheeler W. N. (1934) A second revision of the ants of the genus *Leptomyrmex* Mayr. Bulletin of the Museum of Comparative Zoology at Harvard College, Vol. 57, N° 3.

♂ Genus ***Linepithema*** Mayr, 1866

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length < than the 2° article of the Funiculus; Forewings of Typology I only in Fuscum-group and Typology II with Marginal cell closed; Hindwings of Typology II; Mandibles dentate; Palp formula 6:4; Mesonotum with Notauli absent; Volsella typical form in *Linepithema* Fuscum group.

Bio-geographical distribution

Cosmopolitan

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Puerto Rico: 18°17' N, 66°07' W, *L. iniquum*: November to May and July to September (Torres et al. 2000); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *L. humile*: November to January (Kusnezov 1962); Brazil: 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *L. humile*: September to December, March and April, *Linepithema* sp. 51: July to April; *Linepithema* sp. 7 group Fuscum: January to August; 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Linepithema* sp. 51: December to February (Cantone see chapter 4).

References for Taxonomic identification

-Arnold G. (1915) A Monograph of the Formicidae of South Africa. Annals of the South African Museum, Vol. XVI.

-Chopard L. (1921) La Fourmi d'Argentine *Iridomyrmex humilis* var. Arrogans Santschi dans le midi de la France. Annals Epiphyties 7: 237-265.

-Emery C. (1912) Hymenoptera, Fam. Formicidae, SubFam. Dolichoderinae. Genera Insectorum. Fasc. 137.

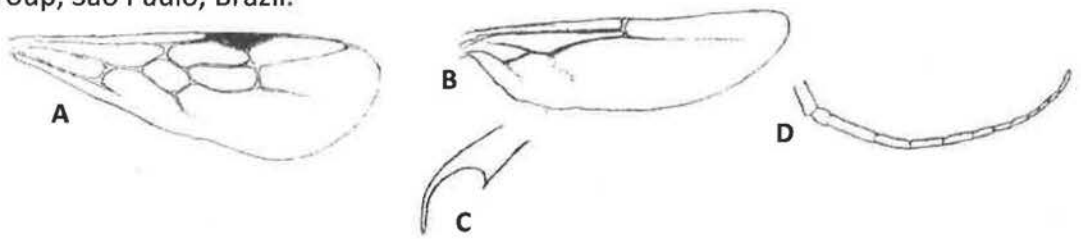
-Kusnezov N. (1962) El vuelo nupcial de las hormigas. Acta Zoologica Lilloana, tomo 18, 385-442.

-Torres J. A., Snelling R. R. and Canals M. (2000) Seasonal and Nocturnal Periodicities in Ant Nuptial Flights in the Tropics (Hymenoptera: Formicidae). Sociobiology, Vol. 37, n° 3B.

-Wild A. L. (2004) Taxonomy and Distribution of the Argentine ant, *Linepithema humile* (Hymenoptera: Formicidae). Ann. Entomol. Soc. Am. 97(6): 1204-1215.

-Wild A. L. (2007) Taxonomic Revision of the Ant genus *Linepithema* (Hymenoptera: Formicidae). University of California Press, Paper Vol. 126.

Figure – **A**: Forewing; **B**: Hindwing; **C**: Volsella; **D**: Antennae of *Linepithema* sp. 14 ♂ Fuscum group, São Paulo, Brazil.



♂ Genus ***Liometopum*** Mayr, 1861

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus not overstep the Occiput; Forewings of Typology I with Marginal cell closed; Hindwings of Typology II; Mandibles dentate with 8-12 teeth; Palpal formula 6:4; Mesonotum with Notauli absent; MetaTibiae with one Spur; Pretarsal Claws simple; Body total length 8-13 mm.

Bio-geographical distribution

Neartic, Oaleartic, Oriental and Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Usa: 44°4'5.52"N, 114°44'31.35"W, 2000 meters sea level, *L. luctuosum*:, June and July (Del Toro et al. 2009)

References for Taxonomic identification

-Bingham C. T. (1903) The Fauna of British India – Hymenoptera, Vol. II, edited by W. T. Blanford.

-Creighton W. S. (1950) The ants of North America. Bulletin of the Museum of Comparative Zoology.

-Emery C. (1912) Hymenoptera, Fam. Formicidae, SubFam. Dolichoderinae. Genera Insectorum. Fasc. 137.

-Emery C. (1916) Fauna Entomologica Italiana, Hymenoptera – Formicidae. Bull. Soc. Entomol. It. 47: 79-275.

-Del Toro I., Pacheco J.A. and Mackay W.P. (2009) Revision of the ant genus *Liometopum* (Hymenoptera: Formicidae). Sociobiology, Vol. 53, N° 2A.

-Shattuck S. O. (1992) Generic Revision of the ant subfamily Dolichoderinae (Hymenoptera: Formicidae. Sociobiology, vol. 21, n° 1.

♂ Genus ***Ochetellus*** Shattuck, 1992

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≥ than the 2° article of the Funiculus, not overstep the Occiput; Forewings of Typology II with Marginal cell closed; Hindwings of Typology II; Mandibles denticulate; petiole expanded laterally; Palp formula 6:4.

Bio-geographical distribution

Indo-Australian, Australian and Madagascar

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-AntWeb (2017) Photos *O. democles* and *O. glaber* Typus. www.antweb.org

-Mann W.M. (1921) The Ants of the Fiji Insland. Bulletin Museum of Comparative Zoology,

n° 5.
-Shattuck S. O. (1992) Generic Revision of the ant subfamily Dolichoderinae (Hymenoptera: Formicidae. Sociobiology, vol. 21, n° 1.
-Yoshimura M. and Fisher B. (2011) A revision of male of the Malagasy region (Hymenoptera: Formicidae): Key to genera of the subfamily Dolichoderinae. Zootaxa 2794: 1-34.

♂ Genus ***Papyrius*** Shattuck, 1992

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape ≥ than the 2° article of the Funiculus, not overstep the Occiput; Forewings of Typology II with Marginal cell open; Hindwings of Typology II; Mandibles edentate; Palp formula 5:3.

Bio-geographical distribution

Australia

Behavioral Ecology of the Mating flight

Strategy: unknown
Mating flight: unknown

References for Taxonomic identification

-Shattuck S. O. (1992) Generic Revision of the ant subfamily Dolichoderinae (Hymenoptera: Formicidae. Sociobiology, vol. 21, n° 1.

♂ Genus ***Philidris*** Shattuck, 1992

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≥ than the 2° article of the Funiculus not overstep the Occiput; Forewings of Typology II with Marginal cell closed; Hindwings of Typology II; Mandibles 10-12 denticulate; Palp formula 6:4.

Bio-geographical distribution

Indo-Australian and Australia

Behavioral Ecology of the Mating flight

Strategy: unknown
Mating flight: unknown

References for Taxonomic identification

-Shattuck S. O. (1992) Generic Revision of the ant subfamily Dolichoderinae (Hymenoptera: Formicidae. Sociobiology, vol. 21, n° 1.

♂ Genus ***Ravavy*** Fisher, 2009

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus not overstep the Occiput; Forewings of Typology II with Marginal cell closed, formica type;

Hindwings of Typology II; Mandibles board edentate with small tooth apically; Palp formula 6:3.

Bio-geographical distribution

Madagascar

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Madagascar: 20.045° S, 44.66222°E, 100 meters sea level, *R. miafina*: November and December; 12.52028° S, 49.17917° E, 1125 meters sea level, *R. miafina*: March, May, June; 12.26278° S, 49.3975° E, 10 meters sea level, *R. miafina*: May and August (Fisher 2009).

References for Taxonomic identification

-Fisher B.L. (2009) Two new Dolichoderinae ant genera from madagascar: *Aptinoma* gen. N. and *Ravavy* gen. n. (Hymenoptera: Formicidae) Zootaxa 2118: 37-52.

-Yoshimura M. and Fisher B. (2011) A revision of male of the Malagasy region (Hymenoptera: Formicidae): Key to genera of the subfamily Dolichoderinae. Zootaxa 2794: 1-34.

♂ Genus ***Tapinoma*** Foerster, 1850

Morphological characters used in the dichotomous key

Antennae with 13 articles; Scape > to the 2° article of the Funiculus overstep the Occiput, 1° article of the Funiculus in length < than the 2°, insertion of the Antennae confluent from posterior edge of the Clypeus; Forewings of Typology II or III with Marginal cell closed; Hindwings of Typology II or III; Mandibles dentate; Palp formula 6:4; Mesonotum with Notauli absent; Petiole strongly inclined anteriorly; Petiole reduced and inclined forward.

Bio-geographical distribution

Cosmopolitan

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Puerto Rico: 18°17' N, 66°07' W, 300 meters sea level, *T. melanocephalum*: March and July (Torres et al. 2000).

References for Taxonomic identification

-Emery C. (1912) Hymenoptera, Fam. Formicidae, SubFam. Dolichoderinae. Genera Insectorum. Fasc. 137.

-Emery C. (1925) Revision des espéces paléarctiques du genre *Tapinoma*. Revue Suisse de Zoologie, Vol. 32, n° 2.

-Espandaler G. (1977) Descriocion de los Sexuados de *Tapinoma pygmaeum* (dofour 1857) (Hymenoptera, Formicidae). Vie et Milieu , vol. XXVII, fasc. 1, ser. C, pp. 119-128

-Seifert B. (1984) A method for Differentiation of the Female Castes of *Tapinoma ambiguum* Emery and *Tapinoma erraticuma* (Latr.) and Remarks on their distribution in Europe North of the Mediterranean Region. Faunistische Abhandlungen, n° 11.

-Seifert B. (2012) Clarifyng naming and identification of the outdoor species of the ant genus *Tapinoma* Forster, 1850 (Hymenoptera: Formicidae) in Europe north of the

Mediterranean region with description of a new species. Myrmecological News 16: 139-147.
-Shattuck S. O. (1992) Generic Revision of the ant subfamily Dolichoderinae (Hymenoptera: Formicidae. Sociobiology, vol. 21, n° 1.
-Torres J. A., Snelling R. R. and Canals M. (2000) Seasonal and Nocturnal Periodicities in Ant Nuptial Flights in the Tropics (Hymenoptera: Formicidae). Sociobiology, Vol. 37, n° 3B.
-Yoshimura M. and Fisher B. (2011) A revision of male of the Malagasy region (Hymenoptera: Formicidae): Key to genera of the subfamily Dolichoderinae. Zootaxa 2794: 1-34.

♂ Genus *Technomyrmex* Mayr, 1892

Morphological characters used in the dichotomous key

Antennae with 13 articles filiform, Antennae Scape in length > than the 2° article of the Funiculus not overstep the Occiput, insertion of the Antennae confluent from posterior edge of the Clypeus; Forewings of Typology III with Marginal cell closed; Hindwings of Typology III; Mandibles dentate with 19 teeth; Palp formula 6:4 or 5:4; Mesonotum with Notauli absent.

Bio-geographical distribution

Neotropical, Afrotropical, Oriental, Indo-Australian and Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Puerto Rico: *T. albipes*: 17°58' N, 66°52' W, 130 meters sea level, November (Torres et al. 2000)

References for Taxonomic identification

-Arnold G. (1915) A Monograph of the Formicidae of South Africa. Annals of the South African Museum, Vol. XVI.
-Emery C. (1912) Hymenoptera, Fam. Formicidae, SubFam. Dolichoderinae. Genera Insectorum. Fasc. 137.
- Forel A. (1902) Fourmis nouvelles d'Australie. Rev. Suisse Zool., Vol. 10.
-Karawajew W. (1926) Ameisen Aus Dem Indo-Australischen Gebiet. Treubia, Vol. 8.
-Shattuck S. O. (1992) Generic Revision of the ant subfamily Dolichoderinae (Hymenoptera: Formicidae. Sociobiology, vol. 21, n° 1.
-Torres J. A., Snelling R. R. and Canals M. (2000) Seasonal and Nocturnal Periodicities in Ant Nuptial Flights in the Tropics (Hymenoptera: Formicidae). Sociobiology, Vol. 37, n° 3B.
-Yoshimura M. and Fisher B. (2011) A revision of male of the Malagasy region (Hymenoptera: Formicidae): Key to genera of the subfamily Dolichoderinae. Zootaxa 2794: 1-34.
-Wheeler W. N. (1922) Ants of the American museum Congo Expedition. A contribute to the myrmecology of Africa. Bulletin of the American Museum of Natural history, Vol XLV.

♂ Genus ***Turneria*** Forel, 1895

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus not overstep the Occiput; Forewings of Typology II with Marginal cell closed; Hindwings of Typology II; Mandibles narrow edentate rounded apically.

Bio-geographical distribution

Australia

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Emery C. (1912) Hymenoptera, Fam. Formicidae, SubFam. Dolichoderinae. Genera Insectorum. Fasc. 137.

-Shattuck S.O. (1990) Revision of the Dolichoderinae ant genus *Turneria* (Hymenoptera: Formicidae). Systematic Entomology 15, 101-117.

-Shattuck S. O. (1992) Generic Revision of the ant subfamily Dolichoderinae (Hymenoptera: Formicidae. Sociobiology, vol. 21, n° 1.

3.6 Subfamily Dolyrinae Leach, 1815

This subfamily is represented for 27 genera and the ♂♂ are known in 26 genera; in the genus *Vicinopone* the male is unknown.

♂ **Genus *Acanthostichus*** Mayr, 1887

Morphological characters used in the dichotomous key

Antennae with 12 articles versus clavate (13 segments in *A. texanus* and *A. davisi*), Antennae Scape in lenght > than the 2° article of the Funiculus, Scape long as the sum of the firsts two or three articles of the Funiculus; Forewings of Typology I (or II in *A. davisi*) with Marginal cell open; Hindwings of Typology I; Mandibles triangular edentate; Mesonotum with Notauli absent or present; MetaTibiae with one pectinate Spur; Abdominal Sternum IX distally armed with two spines.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Brazil: 20°45' S, 45°52' W, 700 meters sea level, *A. fuscipennis*: all the year, February to May (Cardoso do Nascimento 2002); 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Acantostichus* sp. 381: November to May (Cantone see chapter 4); Argentine:

26°58'S, 64°51'W, 800 meters sea level, *A. brevicornis*: November to January, March to June, September (Kusnezov 1962).

References for Taxonomic identification

-Antwiki (2016) Photos *A. davisi* Typus. www.antwiki.org

-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.

-Brown, W. L., Jr. 1975. Contributions toward a reclassification of the Formicidae. V. Ponerinae, tribes Platythyreini, Cerapachyini, Cylindromyrmecini, Acanthostichini, and Aenictogitini. Search Agric. (Ithaca N. Y.) 5(1): 1-115.

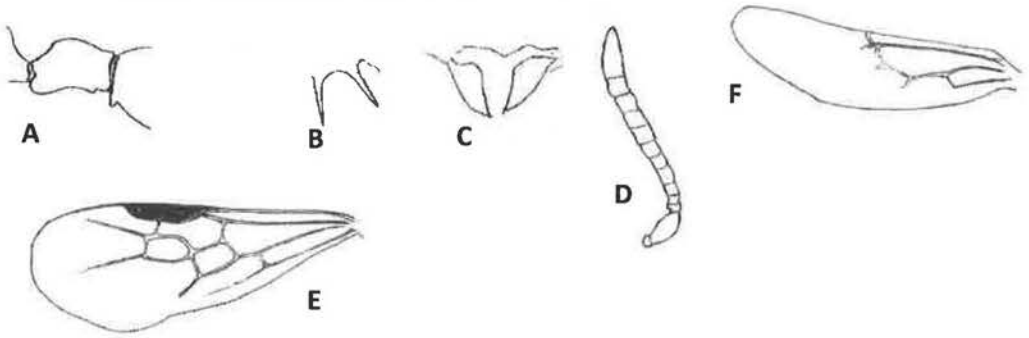
-Cardoso do Nascimento I. (2002) Fenologia do voo nuptial e amostragem de comunidade de formigas (Hymenoptera: Formicidae) em area de Mata Atlantica do municipio de Viçosa, Minas Gerais. Universidade Federal de Viçosa, Dissertação (mestrado).

-Kusnezov N. (1962) El genero *Acanthostichus* Mayr (Hymenoptera, Formicidae). Acta Zoologica Lilloana, tomo XVIII, pags 121-138.

-Kusnezov N. (1962) El vuelo nupcial de las hormigas. Acta Zoologica Lilloana, tomo 18, 385-442.

-MacKay, W.P. 1996. A revision of the ant genus *Acanthostichus*. Sociobiology 27: 129-179.

Figure – A. Petiole; B: Abdominal Sternum IX (ventral view); C: Mandibles; D: Antennae; E: Forewing; F: Hindwing of *Acanthostichus* sp. 381 ♂, São Paulo, Brazil.



♂ Genus *Aenictogiton* Emery, 1901

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, Scape long as the sum of the first three segments of the Funiculus; Forewings of Typology I with Marginal cell open; Hindwings of Typology I; Mandibles falcate edentate; Mesonotum with Notauli absent; MetaTibiae with two pectinate and simple Spurs; Abdominal Sternum IX distally armed with two spines.

Bio-geographical distribution

Afrotropical

Behavioral Ecology of the Mating flight
Strategy: unknown
Matig flight: unknown
References for Taxonomic identification
-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.
-Brown, W. L., Jr. 1975. Contributions toward a reclassification of the Formicidae. V. Ponerinae, tribes Platythyreini, Cerapachyini, Cylindromyrmecini, Acanthostichini, and Aenictogitini. Search Agric. (Ithaca N. Y.) 5(1): 1-115.
-Emery C. (1910) Hymenoptera Fam. Formicidae SubFam. Dorylinae. Genera Insectorum, Wytsman P., Fasc. 102.
-Santschi F. (1919) Fourmis nouvelles du Congo. Revue Zoologique africaine, Vol. VI, fasc. 3.
-Santschi F. (1924) Description de nouveaux Formicides Africains et notes diverses – II. Revue Zoologique Africaine, Vol. XII, fasc. 2.

♂ **Genus *Aenictus*** Shuckard, 1840

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, Scape long as the sum of the first three segments of the Funiculus; Forewings of Typology II with Marginal cell open; Hindwings of Typology I; Mandibles falcate edentate; Mesonotum with Notauli absent; MetaTibiae with two simple Spurs or without Spur; Abdominal Sternum IX distally armed with two spines.

Bio-geographical distribution
Paleartic, Oriental, Indo-Australian and Australia.
Behavioral Ecology of the Mating flight
Strategy: unknown
Mating flight: unknown
References for Taxonomic identification
-Arnold G. (1915) A Monograph of the Formicidae of South Africa. Annals of the South African Museum, Vol. XVI.
-Bingham C. T. (1903) The Fauna of British India Including Cylon and Burma. Hymenoptera, Vol. II, Ants and Cuckoo-Wasps. Edited by W. T. Blanford.
-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.
-Santschi, F. 1910d. Nouvelles fourmis de Tunisie (suite). Bull. Soc. Hist. Nat. Afr. Nord 1: 70-72
-Emery C. (1910) Hymenoptera Fam. Formicidae SubFam. Dorylinae. Genera Insectorum, Wytsman P., Fasc. 102.

♂ Genus *Cerapachys* F. Smith, 1857

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, Scape long as the sum of the first two or three segments of the Funiculus; Forewings of Typology II with Marginal cell closed; Hindwings of Typology I; Mandibles triangular edentate; Mesonotum with Notauli present; Abdominal Sternum IX distally armed with two spines; MetaTibiae with one pectinate Spur.

Bio-geographical distribution

Indo-Australian and Oriental

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.

-Brown, W. L., Jr. 1975. Contributions toward a reclassification of the Formicidae. V. Ponerinae, tribes Platythyreini, Cerapachyini, Cylindromyrmecini, Acanthostichini, and Aenictogitini. Search Agric. (Ithaca N. Y.) 5(1): 1-115.

-Emery C. (1899) Formiche di Madagascar. Bull. Soc. Ent. Ital. 31.

-Ogata K. (1983) The ant genus *Cerapachys* F. Smith of Japan with description of a new species (Hymenoptera, Formicidae). ESAKIR, (20): 131-137.

-Ogata K. (1987) A generic synopsis of the Ponerois complex of the family Formicidae in Japan (Hymenoptera). Part I. Subfamilies Ponerinae and Cerapachynae. ESAKIA n° 25: 97-132.

♂ Genus *Cheliomyrmex* Mayr, 1870

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length **>** than the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I; Mandibles falcate edentate; Mesonotum with Notauli absent; Abdominal Sternum IX distally armed with two spines and two inner teeth; MetaTibiae with one pectinate Spur.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-AntWeb (2017) Photos *C. audax* and *C. morosus* Typus. www.antweb.org

-Borgmeier T. (1955) Die Wanderameisen der Neotropischen Region. Studia Entomologica, N° 3.

-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.
-Watkins J.F. (1976) Identification and Distribution of New World Army Ants (Dorylinae: Formicidae). The Markham press fund of Baylor University press Waco, Texas 76703.
-Wheeler W. M. (1921) Observation on Army ants in British Guiana. American Academy of Art and Sciences, Vol. 56, N° 8.

♂ Genus *Chrysapace* Crawley, 1924

Morphological characters used in the dichotomous key

Antennae with 13 articles; Antennae Scape in length > than the 2° article of the Funiculus, Scape long as the sum first three articles of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I; Mandibles triangular edentate; Mesonotum with Notauli present; MetaTibiae with two pectinate Spurs; Abdominal Sternum IX distally armed with two spines.

Bio-geographical distribution

Madagascar and Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.

♂♂ Genus *Cylindromyrmex* Mayr, 1870

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed and Rs 2+3 vein incomplete; Hindwings of Typology I; Mandibles triangular edentate; Mesonotum with Notauli present or absent; MetaTibiae with two pectinate Spurs; Abdominal Sternum IX distally armed with two spines.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Brazil: 15°40' S, 38°58' W, *C. brasiliensis*: November, *C. brevitarsus*: August to December; *C. longiceps*: November and December (Delabie and Reis 2000)

References for Taxonomic identification

-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.

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-De Andrade M.L. (1998) Fossil and extant species of *Cylindromyrmex* (Hymenoptera: Formicidae). Revue Suisse de Zoologie 105 (3): 581-664.
-De Andrade M.L. (2001) A remarkable Dominican amber species of *Cylindromyrmex* with Brazilian affinities and addition to the generic revision. Beitr. Ent. 51 (1): 51-63.
-Delabie J.H.C. and Reis Y. T. (2000) Sympatry and mating flight synchrony of three species of *Cylindromyrmex* (Hymenoptera, Formicidae) in southern Bahia, Brazil, and the importance of Malaise trap for rare ants inventory. Revista Brasieira de Entomologia, São Paulo, 44 (3/4): 109-110.
-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118.
-Gallardo A. (1918) Las hormigas de la Republica Argentina, SubFamilia Ponerinas. Anales del Museo Nacional de Historia de Buenos Aires, Tomo XXX: 1-112.

♂ Genus *Dorylus* Fabricius, 1793

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus; Forewings of Typology II with Marginal cell open; Hindwings of Typology I; Mandibles falcate edentate; Mesonotum with Notauli absent; MetaTibiae with one pectinate Spur; Femura extremely flattened that contrast with Tibiae; Abdominal Sternum IX distally armed with two spines.

Bio-geographical distribution

Afrotropical, Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: female calling

Mating flight: Uganda: 0° 2'42.25"N, 32°27'9.51"E, 1140 meters sea level; *D. moestus*, *D. nigricans*, *D. fulvus*, *D. alluaudi*, *D. katanensis*, *D. burmeisteri*: throughout the year (Haddow et al. 1966); Ghana: 5°40'1.17"N, 0°11'27.50"W, D. atriceps, D. fulvus, D. nigricans, *Dorylus* sp.: all the year (Leston 1979)

References for Taxonomic identification

-Arnold G. (1915) A Monograph of the Formicidae of South Africa. Annals of the South African Museum, Vol. XVI.
-Barr D. and Gotwald W.H (1982) Phenetic affinities of males of the army ant genus *Dorylus* (Hymenoptera: Formicidae: Dorylinae). Can. J. Zool. Vol. 60.
-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.
-Emery C. (1910) Hymenoptera Fam. Formicidae, SubFam. Dorylini. Genera Insectorum diriges par P. Wytsman, Fascicule 102.
-Haddow A. J., Yarrow I. H. H., Lancaster G. A. and Corbet P. S. (1966) Nocturnal flight cycle

in the males of African Dorylinae ants (Hymenoptera: Formicidae). Proc. R. ent. Soc. Lond., 41(7-9): 103-106.
-Leston D. (1979) Dispersal by male Dorylinae ants in West Africa. Psyche 86: 63-78.
-Santschi F. (1910) Nouveaux Dorylines africains. Annales de la Societe Zoologique Suisse, Tome 18, Fasc. 4.
-Santschi F. (1919) Fourmis nouvelles du Congo. Revue Zoologique africaine, Vol. VI, fasc. 3.

♂ Genus *Eburopone* Borowiec, 2016

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, not overstep the Occiput; Forewings of Typology II with SubMarginal 1 cell open and Marginal cell open; Hindwings of Typology II; Mandibles triangular dentate or falcate; Mesonotum with Notauli present rarely absent; MetaTibiae with one pectinate Spur; Abdominal Sternum IX distally armed with two spines.

Bio-geographical distribution

Afrotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.

♂ Genus *Eciton* Latreile, 1804

Morphological characters used in the dichotomous key

Antennae of 13 articles, Antennae Scape in length > than the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I; Mandibles falcate; Mesonotum with Notauli absent; MetaTibiae with one pectinate Spur; Abdominal Sternum IX distally armed with two spines.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: female calling

Mating flight: Brazil: 14°37'04''S, 39°04' 07''W, 10 meters sea level, *E. burchelli*: all year except September; *E. mexicanum*: January, February, October to December; *E. vagans*: January to June (Cardoso do Nascimento et al. 2011); 20°45' S, 45°52' W, 700 meters sea level, *E. vagans*: January to March (Cardoso do Nascimento 2002); Panama: 9°'19'' N,

79°50'15'', 50-80 meters sea level, *E. burchelli*: March and April, *E. jansoni*: April (Kannowski 1969); 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *E. burchelli*: December, *E. quadriglume*: April and May (Cantone see chapter 4).

References for Taxonomic identification

-Borgmeier T. (1955) Die Wanderameisen der Neotropischen Region. Studia Entomologica, N° 3.

-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.

-Cardoso do Nascimento I. (2002) Fenologia do voo nuptial e amostragem de comunidade de formigas (Hymenoptera: Formicidae) em area de Mata Atlantica do municipio de Viçosa, Minas Gerais. Universidade Federal de Viçosa, Dissertação (mestrado).

-Cardoso do Nascimento I., Delabie J. H.C. and Della Lucia T. M.C. (2011) Phenology of mating flight in Ecitoninae (Hymenoptera: Formicinae) in a Brazilian Atlantic Forest location. Ann. Soc. entomol. Fr., 47 (1-2): 112-118.

-Emery C. (1910) Hymenoptera Fam. Formicidae, SubFam. Dorylini. Genera Insectorum diriges par P. Wytsman, Fascicule 102.

-Kannowski P. B. (1969) Daily and Seasonal Periodicities in the Nuptial Flights of Neotropical Ants. I. Dorylinae. Intarnational Union for the study of social insects, VI Congress, Bern 15-20 September.

-Watkins J.F. (1976) Identification and Distribution of New World Army Ants (Dorylinae: Formicidae). The Markham press fund of Baylor University press Waco, Texas 76703.

Figure – **A**: Head; **B**: Pretarsal Claw; **C**: Abdominal Sternum IX (ventral wiew); **D**: Antennae of *Eciton* sp. 493 ♂, Brazil

♂ Genus *Eusphinctus* Emery, 1893

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape in length > than the 2° article of the Funiculus; Forewings of Typology II with Marginal cell open; Hindwings of Typology I; Mandibles triangular edentate; Mesonotum with Notauli present; MetaTibiae with one pectinate Spur; Abdominal Sternum IX distally armed with two spines.

Behavioral Ecology of the nuptial flight

Indo-Australian

Eco-Ethology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.

♂ Genus *Labidus* Jurine, 1807

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I; Mandibles falcate edentate; Mesonotum with Notauli absent; MetaTibiae with one pectinate Spur; Abdominal Sternum IX distally armed with two spines.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: *female calling*

Mating flight: Brazil: 20°45'S, 45°52'W, 700 meters sea level, *L. coecus*: July to September, *L. predator*: October to May, *L. mars*: October to December (Cardoso do Nascimento et al. 2004); 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *L. mars*: August, *L. coecus*: October (Cantone see chapter 4); 14°37'04" S, 39°04'07" N, 10 meters sea level, *L. coecus*: June to September, *L. praedator*: December to May; Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *L. coecus*: March and April, *L. praedator*: March (Kannowski 1969).

References for Taxonomic identification

-Borgmeier T. (1955) Die Wanderameisen der Neotropischen Region. Studia Entomologica, N° 3.

-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.

-Cardoso do Nascimento I., Delabie J.H.C., Fiuza Ferreira P.S. and Castro della Lucia T.M. (2004) Mating flight seasonality in the genus *Labidus* (Hymenoptera: Formicidae) at Minas Gerais, in the Brazilian Atlantic Forest biome, and *Labidus nero*, Junior Synonym of *Labidus mars*. Sociobiologi, Vol. 44, N° 3.

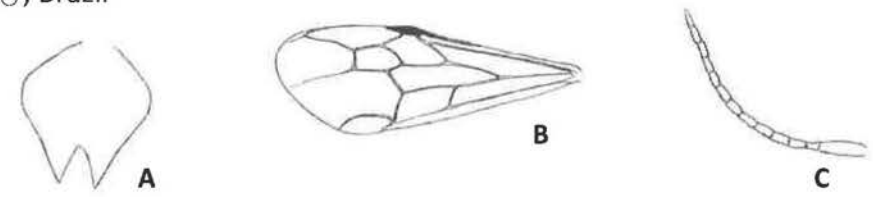
-Cardoso do Nascimento I., Delabie J. H.C. and Della Lucia T. M.C. (2011) Phenology of mating flight in Ecitoninae (Hymenoptera: Formicinae) in a Brazilian Atlantic Forest location. Ann. Soc. entomol. Fr., 47 (1-2): 112-118.

-Emery C. (1910) Hymenoptera Fam. Formicidae, SubFam. Dorylini. Genera Insectorum diriges par P. Wytsman, Fascicule 102.

-Kannowski P. B. (1969) Daily and Seasonal Periodicities in the Nuptial Flights of Neotropical Ants. I. Dorylinae. Intarnational Union for the study of social insects, VI Congress, Bern 15-20 September.

-Watkins J.F. (1976) Identification and Distribution of New World Army Ants (Dorylinae: Formicidae). The Markham press fund of Baylor University press Waco, Texas 76703.

Figure – **A**: Abdominal Sternum IX (ventral wiew); **B**: Forewing; **C**: Antennae of *Labidus* sp. 407 ♂, Brazil



♂ **Genus *Leptanilloides*** Mann, 1923

♂ **Genus *Amyrmex*** Kusnezov, 1953

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, Scape long as the sum first two or three articles of the Funiculus, not overstep the Occiput; Forewings of Typology III with Marginal cell open; Hindwings of Typology III; Mandibles falcate edentate; Mesonotum with Notauli absent; MetaTibiae with one pectinate Spur; Abdominal Sternum IX with posterior margin broadly developed but not bifurcate.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Argentine: 26°58'S, 64°51'W, 800 meters sea level, *Amyrmex goldbachi*: January, February, April, May, July, October to December (Kusnezov 1962).

References for Taxonomic identification

-Borowiec M.L., Longino J.T. (2011) Thre new species and reassessment of the rare Neotropical ant genus *Leptanilloides* (Hymenoptera, Formicidae, Leptanilloidinae). ZooKey 133: 19-48.

-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.

-Donoso D. A., Vieira J. M. and Wild A. L. (2006) Three new species of *Leptanilloides* Mann from Andean Ecuador (Formicidae: Leptanilloidinae). Zootaxa 1201: 47-62.

-Kusnezov N. (1953) Lista de las hormigas de Tucuman con descripcion de dos nuevos generos (Hymenoptera, Formicidae). Acta Zoologica Lilloana, Tomo XIII: 327-339.

-Kusnezov N. (1962) El genero *Acanthostichus* Mayr (Hymenoptera, Formicidae). Acta Zoologica Lilloana, tomo XVIII, pags 121-138.

-Ward P. S. (2007) The ant genus *Leptanilloides*: discovery of the male and evaluation of phylogenetic relationships based on DNA sequence data, pp. 639-649. In Snelling R. R., Fisher B. L. and Ward P. S. (eds) Advances in ant systematic /hymenoptera: Formicidae): homage to E. O. Wilson – 50 years of contribution. Memoirs of the American Entomological Institute, 80.

-Ward P. S. and Brady S. G. (2009) Rediscovery of the ant genus *Amyrmex* Kusnezov (Hymenoptera: Formicidae) and its transfer from Dolichoderinae to Leptanilloidinae. Zootaxa 2063: 46-54.

♂ Genus *Lioponera* Mayr, 1879

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, Scape long not overstep the Occiput; Forewings of Typology II with subMarginal 1 cell open and Marginal cell open; Hindwings of Typology I; Mandibles triangular edentate or dentate; Mesonotum with Notauli absent or present; MetaTibiae with one pectinate Spur; Abdominal Sternum IX cleft or modified into two spines.

Bio-geographical distribution

Afrotropical, Indo-Australian, Oriental and Australian.

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-AntWeb (2017) Photos *L. longitarsus, L. similis, L. suscitata* Typus. www.antweb.org

-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.

♂ Genus *Lividopone* Fisher and Bolton, 2016

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, Scape long as the sum first two or three articles of the Funiculus, not overstep the Occiput; Forewings of Typology II with Marginal cell open; Hindwings of Typology II; Mandibles triangular edentate; Mesonotum with Notauli present; MetaTibiae with one pectinate Spur; Abdominal Sternum IX distally armed with two spines.

Bio-geographical distribution

Madagascar

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.

♂ Genus *Neivamirmex* Borgmeier, 1940

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, Scape long as the sum first two or three articles of the Funiculus; Forewings of

Typology I with Marginal cell closed; Hindwings of Typology I; Mandibles falcate edentate; Mesonotum with Notauli absent; MetaTibiae with one pectinate Spur; Abdominal Sternum IX distally armed with two spines and one or null median inner tooth.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: female calling

Mating flight: Brazil: 14°37'04''S, 39°04' 07''W, 10 meters sea level, *N. clavifemur*: January, February, November and December, *N. guerini*: January, February, November and December, *N. leptognathus*: January to March, November and December, *N. pilosus*: January, February and December, *N. spinolai*: January, November and December, *Neivamyrmex* sp.: November, *N. swainsoni*: January, February, November and December (Cardoso et al. 2011); 20°45' S, 45°52' W, 700 meters sea level, *N. pertyi*: January to May, *N. jermanni*: March, August to December, *N. clavifemur*: November to January, *N. spinolai*: October to December, *N. pilosus*: November and December, *N. hopei*: October to December, *N. guerini*: October and November, *N. latiscapus*: July, October and December, (Cardoso 2002); 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Neivamyrmex* sp. 490: December, *Neivamyrmex* sp. 491: November, *Neivamyrmex* sp. 494: February and April, *Neivamyrmex* 496: January (Cantone see chapter 4); Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *N. pilosus*: April, *N. poliator*: April and May, *N. swainsoni*: April and May, *N. scutellaris*: May, *N. klugi*: May, *N. pullus*: May, *M. guyanensis*: May, *Neivamyrmex* sp: May, (Kannowski 1969), *N. pseudops*: January to September and November (Kaspari et al. 2001); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *N. pertyi*: January and December, *N. romandi*: January, February and December, *N. swainsoni*: January, *Neivamyrmex* sp.: January to April and October to December, (Kusnezov 1962).

References for Taxonomic identification

-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.

-Cardoso do Nascimento I. (2002) Fenologia do voo nuptial e amostragem de comunidade de formigas (Hymenoptera: Formicidae) em area de Mata Atlantica do municipio de Viçosa, Minas Gerais. Universidade Federal de Viçosa, Dissertaçao (mestrado).

-Cardoso do Nascimento I, Delabie J. H.C. and Della Lucia T. M.C. (2011) Phenology of mating flight in Ecitoninae (Hymenoptera: Formicinae) in a Brazilian Atlantic Forest location. Ann. Soc. entomol. Fr., 47 (1-2): 112-118.

-Emery C. (1910) Hymenoptera Fam. Formicidae, SubFam. Dorylini. Genera Insectorum diriges par P. Wytsman, Fascicule 102.

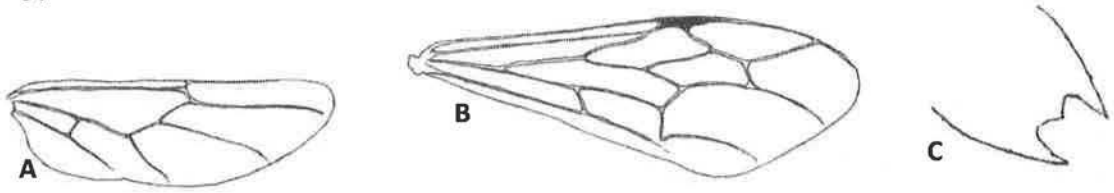
-Kannowski P. B. (1969) Daily and Seasonal Periodicities in the Nuptial Flights of Neotropical Ants. I. Dorylinae. Intarnational Union for the study of social insects, VI Congress, Bern 15-20 September.

-Kaspari M., Pickering J., Longino J.T and Windsor D. (2001) The phenology of a Neotropical ant assemblage: evidence for continuous and overlapping reproduction. Behav. Ecol. Sociobiol., 50: 382-390.

-Kusnezov N. (1962) El vuelo nupcial de las hormigas. Acta Zoologica Lilloana, tomo 18, 385-442.

-Smith M. R. (1942) The Legionary ants of the Inited States belonging to *Eciton* subgenus *Neivamyrmex* Borgmeier. The American Midland Naturalist, Vol. 27, N° 3: 537-590.
-Snelling G.C. and Snelling R.R. (2007) New synonym, new species, new key to *Neivamyrmex* army ants of the United States. In Snelling R. R., Fisher B. L. and Ward P. S. (eds) Advances in ant systematic (Hymenoptera: Formicidae): homage to E. O. Wilson – 50 years of contribution. Memoirs of the American Entomological Institute, 80.
-Watkins J. F. (1972) The Taxonomy of *Neivamyrmex texanus* n. sp., *N. nigrescens* and *N. californicus* (Formicidae: Dorylinae), with distribution map and keys to the species of *Neivamyrmex* of the United States. Journal of the Kansas Entomological Society, Vol. 45, N° 3: 347-372.
-Watkins J. F. (1985) The identification and Distribution of the army ants of the United States of America (Hymenoptera, Formicidae, Ecitoninae). Juornal of the Kansas Entomological Society, Vol. 58 (3): 479-502.

Figure – **A**: Hindwing; **B**: Forewing; **C**: Abdominal Sternum IX (ventral view) of *Neivamyrmex* sp. ♂, Brazil.



♂ Genus ***Neocerapachys*** Borowiec, 2016

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape > than the 2° article of the Funiculus, Scape long as the sum first two or three articles of the Funiculus; Forewings of Typology II with Marginal cell closed; Hindwings of Typology I; Mandibles triangular edentate; Mesonotum with Notauli present; Abdominal Sternum IX distally armed with two spines.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown
Mating flight: unknown

References for Taxonomic identification

-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.

♂ Genus *Nomamyrmex* Borgmeier, 1936

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I; Mandibles falcate edentate; Mesonotum with Notauli absent; MetaTibiae with one pectinate Spur; Abdominal Sternum IX distally armed with two spines; Abdominal Sternum III to VII with dense tufts setae.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: female calling

Mating flight: Brazil: 14°37'04''S, 39°04' 07''W, 10 meters sea level: *N. esenbeckii*: September to December, (Cardoso do Nascimento et al. 2011); 20°45' S, 45°52' W, 700 meters sea level, *N. hartigi*: September to January (Cardoso 2002); 20°14'59.29" S, 46°21'51.11"W, 820 meters sea level, *Nomamyrmex* sp.: November; 21°38'43.07"S, 46°22'29.20"W, 1000 meters sea level, *Nomamyrmex* sp.: December, (Cantone S.); Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *N. hartigi*: April and May; *N. esenbecki*: May, (Kannowski 1969).

References for Taxonomic identification

-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.

-Cardoso do Nascimento I. (2002) Fenologia do voo nuptial e amostragem de comunidade de formigas (Hymenoptera: Formicidae) em area de Mata Atlantica do municipio de Viçosa, Minas Gerais. Universidade Federal de Viçosa, Dissertação (mestrado).

-Cardoso do Nascimento I, Delabie J. H.C. and Della Lucia T. M.C. (2011) Phenology of mating flight in Ecitoninae (Hymenoptera: Formicinae) in a Brazilian Atlantic Forest location. Ann. Soc. entomol. Fr., 47 (1-2): 112-118.

-Kannowski P. B. (1969) Daily and Seasonal Periodicities in the Nuptial Flights of Neotropical Ants. I. Dorylinae. Intarnational Union for the study of social insects, VI Congress, Bern 15-20 September.

-Watkins J. F. (1977) The species and subspecies of *Nomamyrmex* (Dorylinae: Formicidae). Juornal of the Kansas Entomological Society, Vol. 50, N° 2.

♂ Genus *Ooceraea* Roger, 1862

Morphological characters used in the dichotomous key

Antennae with 11 articles rarely 12, Antennae Scape in lenght > than the 2° article of the Funiculus, Scape long as the sum first two or three articles of the Funiculus, not overstep the Occiput; Forewings of Typology II with subMarginal 1 cell open and Marginal cell open; Hindwings of Typology III; Mandibles triangular edentate; Mesonotum with Notauli present; MetaTibiae with one pectinate Spur; Abdominal Sternum IX cleft or modified into two spines.

Bio-geographical distribution
Indo-Australian and Australian
Behavioral Ecology of the Mating flight
Strategy: unknown
Mating flight: unknown
References for Taxonomic identification
-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.

♂ Genus *Parasyscia* Emery, 1882

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, Scape long as the sum first two or three articles of the Funiculus; Forewings of Typology II with Marginal cell open; Hindwings of Typology I; Mandibles triangular edentate; Mesonotum with Notauli absent; MetaTibiae with one pectinate Spur; Abdominal Sternum IX distally armed with two spines.

Bio-geographical distribution
Afrotropical and Indo-Australian
Behavioral Ecology of the Mating flight
Strategy: unknown
Mating flight: unknown
References for Taxonomic identification
-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.

♂ Genus *Simopone* Forel, 1891

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape in length ≤ than the 2° article of the Funiculus; Forewings of Typology II with subMarginal 1 cell open and Marginal cell open; Hindwings of Typology I; Mandibles triangular edentate; Mesonotum with Notauli present; MetaTibiae with one pectinate Spur; Abdominal Sternum IX distally armed with two spines.

Bio-geographical distribution
Afrotropical and Indo-Australian
Behavioral Ecology of the Mating flight
Strategy: unknown
Mating flight: unknown

References for Taxonomic identification

-Bolton B. and Fisher B. L. (2012) Taxonomy of the Cerapachyine ant genera *Simopone* Forel, *Vicinopone* gen. n. and *Tanipone* gen. n. (Hymenoptera: Formicidae). Zootaxa 3283: 1-101.
-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.

♂ Genus *Sphinctomyrmex* Mayr, 1866

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, Scape long as the sum first two articles of the Funiculus, not overstep the Occiput; Forewings of Typology II with subMarginal 1 cell open and Marginal cell closed; Hindwings of Typology III; Mandibles triangular edentate; Mesonotum Notauli present; MetaTibiae with one pectinate Spur; Abdominal Sternum IX distally armed with two spines.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown
Mating flight: unknown

References for Taxonomic identification

-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.
-Santschi F. (1915) Nouvelles Fourmis D'Afrique. Annales de La Societé Entomologique de France, Vol. 84.

♂ Genus *Syscia* Roger, 1861

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape > than the 2° article of the Funiculus, Scape long as the sum first two or three articles of the Funiculus; Forewings of Typology IV with Marginal cell open; Hindwings of Typology III; Mandibles triangular edentate; Mesonotum with Notauli present; MetaTibiae with one pectinate Spur; Abdominal Sternum IX distally armed with two spines.

Bio-geographical distribution

Neotropical and Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown
Mating flight: unknown

References for Taxonomic identification

-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.

♂ Genus *Tanipone* Santschi, 1936

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, Scape long as the sum first two articles of the Funiculus, not overstep the Occiput; Forewings of Typology II with Marginal cell open; Hindwings of Typology III; Mandibles triangular edentate; Mesonotum with Notauli absent; MetaTibiae with one pectinate Spur; Abdominal Sternum IX distally armed with two spines.

Bio-geographical distribution

Madagascar

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.

-Bolton B. and Fisher B. L. (2012) Taxonomy of the Cerapachyine ant genera *Simopone* Forel, *Vicinopone* gen. n. and *Tanipone* gen. n. (Hymenoptera: Formicidae). Zootaxa 3283: 1-101.

♂ Genus *Yunodorylus* Xu, 2000

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, Scape long as the sum first two or three articles of the Funiculus; Forewings of Typology II with subMarginal 1 cell open and Marginal cell open; Hindwings of Typology I; Mandibles triangular to falcate edentate; Mesonotum with Notauli absent; MetaTibiae with one pectinate Spur; Abdominal Sternum IX distally armed with two spines.

Bio-geographical distribution

Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.

♂ Genus *Zasphinctus* Wheeler W. M., 1918

Morphological characters used in the dichotomous key

Antennae with 12 or 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, Scape long as the sum first three or four articles of the Funiculus, not overstep

the Occiput; Forewings of Typology II with Marginal cell open; Hindwings of Typology II; Mandibles triangular edentate; Mesonotum with Notauli present; MetaTibiae with one pectinate Spur; Abdominal Sternum IX distally armed with two spines.

Bio-geographical distribution

Afrotropical, Indo-Australian and Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Borowiec M.L. (2016) Generic revision of the ant subfamily Dorylinae (Hymenoptera, Formicidae). ZooKey 608: 1-280.

3.7 Subfamily Ectatomminae Emery, 1895

This subfamily is represented for 4 genera and the ♂♂ are known in all.

♂ Genus *Ectatomma* F. Smith, 1858

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length < than the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present (*E. lugens* is describe without Jugal lobe); Mandibles dentate; Mesonotum with Notauli present; Pygidium (Abdominal Tergum VIII) rounded distally; Abdominal Sternum IX rounded or triangular distally; MetaTibiae with single pectinate Spur; Pretarsal Claws bifid.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: female calling (Shik and Kaspari, 2009)

Mating flight: Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *E. ruidum*: all year except February, *E. tuberculatum*: April and June to December (Kaspari et al. 2001); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *E. edentatum*: December and January, *E. triangulare*: January, *E. quadridens*: November and December (Kusnezov 1962); Brazil: 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Ectatomma* sp.: April (Cantone see chapter 4).

References for Taxonomic identification

-Almeida A. J. (1986) Descrição de quatro machos do gênero *Ectatomma* Smith, 1858 (Hymenoptera, Formicidae, Ponerinae). Quid, 6 (1): 24-38.

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-Borgmeier T (1934) Contribuição para o conhecimento da fauna mirmeclogica dos cafezais

de Paramaribo, Guiana Holandesa (Hym. Formicisae). Arq. Inst. Biiol. Veget., Vol. 1, N° 2, Rio de Janeiro.
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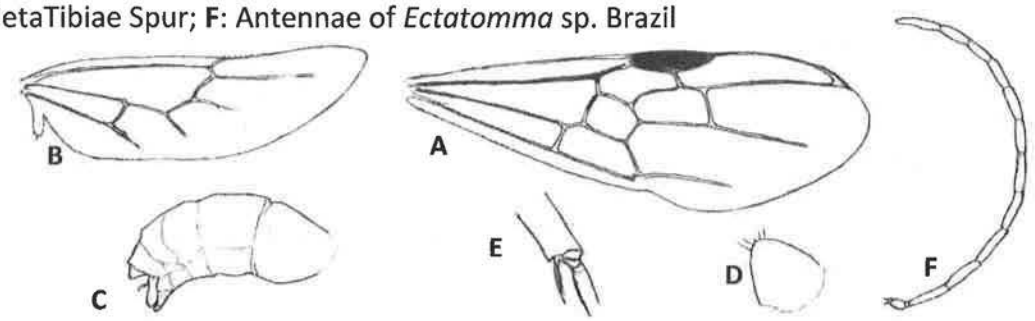
-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118.
-Gallardo A. (1918) Las hormigas de la Republica Argentina, SubFamilia Ponerinas. Anale del Museo Nacional de Historia de Buenos Aires.
-Kaspari M., Pickering J., Longino J.T and Windsor D. (2001) The phenology of a Neotropical ant assemblage: evidence for continuous and overlapping reproduction. Behav. Ecol. Sociobiol., 50: 382-390.
-Kusnezov N. (1962) El vuelo nupcial de las hormigas. Acta Zoologica Lilloana, tomo 18, 385-442.
-Mann W. M. (1916) The Stanford expedition to Brazil, 1911, John C. Branner, Director. The ants of Brazil. Bulletin of the Museum of Comparative Zoology at Harvard College, Vol. LX, N° 11.
-Norton E. (1868) Description of Mexican ants noticed in the American Naturalist.Communications of the Essex Institute, Vol. VI.
-Smith F. (1858) Catalogue of Hymenopterous Insects in the Collection of the British Museum. Part VI Formicidae. London.
-Weber N. A. (1946) Two common Ponerinae ants of possible economic significance, *Ectatomma tuberculatum* (Oliver) and *E. rudium* Roger. Entomological Society of Washington, Vol. 48, N° 1.

Figure – **A**: Forewing; **B**: Hindwing; **C**: Gaster; **D**: Abdominal Sternum IX (ventral view); **E**: MetaTibiae Spur; **F**: Antennae of *Ectatomma* sp. Brazil



♂ **Genus *Gnamptogenys*** Roger, 1863

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ that the half of the 2° article or ≤ than the 2 ° article of the Funiculus; Forewings of Typology I, in some cases subMarginal 1 cell open, or Typology II with Marginal cell closed; Hindwings of Typology I or II with Jugal lobe absent; Mandibles triangular dentate; Mesonotum with Notauli present; Petiole often in elongate shape, Pygidium (Abdominal Tergum VIII) rounded; Abdominal Sternum IX rounded or triangular distally; MetaTibiae with single Spur; Pretarsal Claws bifid.

Bio-geographical distribution

Neotropical, Oriental, Indo-Australian and Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *G. continua*: all year, *G. hartmani*: January, March to July, September and November (Kaspari et al. 2001); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *G. striatula*: December and January (Kusnezov 1962); Brazil: 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Gnamptogenys* sp. 43: September, *Gnamptogenys* sp. 149: February, *Gnamptogenys* sp. 336: March; 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Gnamptogenys* sp. 379: January, March and November, *Gnamptogenys* sp. 401: February, *Gnamptogenys* sp. 465: March (Cantone see chapter 4).

References for Taxonomic identification

-Brown W. L. (1958) Contributions toward a reclassification of the Formicidae. II. Tribe Ectatommini (Hymenoptera). Bulletin of the Museum of Comparative Zoology at Harvard College, Vol. 118, N° 5.

-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118

-Camacho G. P. (2013) Estudo taxonômico do grupo striatula de *Gnamptogenys* Roger (Hynmenoptera: Formicidae: Ectatomminae) para o Brasil. Universidade Federal de Viçosa, Dissertaçao (mestrado), f. 109-119.

-Kaspari M., Pickering J., Longino J.T and Windsor D. (2001) The phenology of a Neotropical ant assemblage: evidence for continuous and overlapping reproduction. Behav. Ecol. Sociobiol., 50: 382-390.

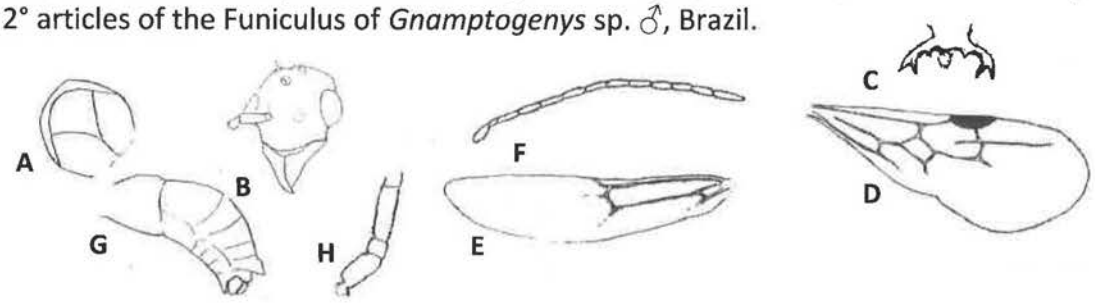
-Kusnezov N. (1962) El vuelo nupcial de las hormigas. Acta Zoologica Lilloana, tomo 18, 385-442.

-Lattke J. E. (1995) Revision of the ant genus *Gnamptogenys* in the New World (Hymenoptera: Formicidae). J. HYM. RES, Vol. 4: 137-193.

-Lattke J. E. (2004) A taxonomic revision and phylogenetic analysis of the ant genus *Gnamptogenys* Roger in Southeast Asia and Australia (Hymenoptera: Formicidae: Ponerinae). Entomology, Vol. 122

-Santschi F. (1929) Revision du genre *Holcoponera* Mayr. Zoologischen Anzeiger, Vol. 82.

Figure – A: Mesonotum with Notauli; B: Head; C: Pretarsal Claw bifid; D: Forewing with subMarginal 1 cell incomplete; E: Hindwing; F: Antennae; G: Gaster; H: Antennae Scape, 1° and 2° articles of the Funiculus of *Gnamptogenys* sp. ♂, Brazil.



♂ Genus *Rhytidoponera* Mayr, 1862

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe absent (Brown 1958) or present (Boudinot 2015); Mandibles dentate; Mesonotum with Notauli present; Pygidium (Abdominal Tergum VIII) rounded; Abdominal Sternum IX rounded distally MetaTibiae with one or two Spurs; Pretarsal Claws bifid or with long submedian tooth.

Bio-geographical distribution

Australian and Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: female calling

Mating flight: Australia: 26°37'25.31"S, 152°57'31.57"E, 50 meters sea level, *R. metallica*: April and May (Haskins 1978).

References for Taxonomic identification

-AntWeb (2017) Photos *R. aurata* and *R. violacea* Typus. www.antweb.org

-Boudinot B. E. (2015) Contributions to the knowledge of Formicidae (Hymenoptera, Aculeata): a new diagnosis of the family, the first global male-based key to subfamilies, and a treatment of early branching lineages. European Journal of Taxonomy 120: 1-62.

-Brown W. L. (1958) Contributions toward a reclassification of the Formicidae. II. Tribe Ectatommini (Hymenoptera). Bulletin of the Museum of Comparative Zoology at Harvard College, Vol. 118, N° 5.

-Clark J. (1936) A revision of Australian species of *Rhytidoponera* Mayr (Formicidae). Mem. Nat. Mus. Vict., IX.

-Crawley W. C. (1918) Some new australian ants. The Entomologist's Record, Vol. XXX, N° 5.

-Donisthorpe H. (1943) The ants (Hym., Formicidae) of Waigeu Island, North Dutch New Guinea.

-Emery C. (1897) Viaggio di Lamberto Loria nella Papuasia Orientale. XVIII. Formiche raccolte nella Nuova Guinea. Annali del Museo Civico di Storia Naturale, Serie 2, Vol. 18 (38): 547-594.

-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118.

-Emery C. (1914) Les formis de la Nouvelle-Caledonie & des iles Loyalty. Sarasin ans Roux, Nova Caledonia, A. Zoologie Vol. I –L. IV.

-Haskins C. P. (1978) Sexual calling behavior in highly primitive ants. Psyche, 85: 407-415.

-Ward P. S. (1984) A revision of the ant genus *Rhytidoponera* (Hymenoptera: Formicidae) in New Caledonia. Aust. J. Zool., 32: 131-175.

♂ Genus *Typhlomyrmex* Mayr, 1862

Morphological characters used in the dichotomous key

Antennae with 13 articles (*T. meire* Antennae with 12); Antennae Scape in length > than the 2° article of the Funiculus, Scape generally long as the first three articles of the

Funiculus ot overstep the Occiput; Forewings of Typology I, or II only in *T. rogenhoferi* in Brown 1965, with Marginal cell open or closed; Hindwings of Typology II with Jugal lobe absent; Mandibles dentate; Mesonotum with Notauli present; Pygidium (Abdominal Tergum VIII) rounded; MetaTibiae with one Spur; Pretarsal Claws bifid.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *T. rogenhoferi*: all year (Kaspari et al. 2001); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *T. pusillus*: January, April and December; Brazil: 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Typhlomyrmex* sp. 155: September, *Typhlomyrmex* sp. 461: December; 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Typhlomyrmex* sp. 473: January (Cantone see chapter 4).

References for Taxonomic identification

-Brown W. L. (1965) Contribution to a reclassification of the Formicidae. IV. Tribe Typhlomytmecini (Hymenoptera). Psyche, Vol. 72, N° 1.

-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118.

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-Kaspari M., Pickering J., Longino J.T and Windsor D. (2001) The phenology of a Neotropical ant assemblage: evidence for continuous and overlapping reproduction. Behav. Ecol. Sociobiol., 50: 382-390.

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-Locau S., Villemant C. and Delabie J. H.C. (2004) *Typhlomyrmex meire*, a remarkable new species endemic to Southern Bahia, Brazil (Formicidae: Ectatomminae)

3.8 Subfamily Formicinae Latreille, 1809

This subfamily is represented for 53 genera and the ♂♂ are known in 43 genera. In the genera *Agraulomyrmex*, *Alloformica*, *Bregmatomyrma*, *Echinopla*, Forelophilus, *Gigantiops*, Phasmomyrmex, *Pseudonotoncus*, *Santschiella* and *Teratomyrmex* the ♂♂ are unknown.

♂ Genus ***Acropyga*** Roger, 1862

Morphological characters used in the dichotomous key

Antennae with 8-9-10-11 and 12 articles; Antennae Scape in length > than the 2° article of the Funiculus, overstep the Occiput or not, firs article of the Funiculus in length > than the second; Forewings of Typology II and III with Marginal cell closed, solenopsis or formica type; Hindwings of Typology II; Mandibles edentate or dentate only apically; Mesonotum

with Notauli absent; MetaTibiae with single spur.

Bio-geographical distribution

Neotropical, Afrotropical and Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: male aggregation

Mating flight: Usa: 31°53.028' N, 109°12.378' W, 1645 meters sea level, *A. epedana*: July (Smith et al. 2007); Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *Acropyga* sp. b2: March to June, August, September and December, *Acropyga* sp. bmt2: May, June, August and September (Kaspari et al. 2001); Brazil: 14°37'04''S, 39°04' 07''W, 10 meters sea level, *Acropyga* sp.: May and June (Cardoso do Nascimento 2006); 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Acropyga* sp 317: January, *Acropyga* sp. 339: February (Cantone see chapter 4); *A. goeldi*: 23°38' S, 45°53' W, 900 meters sea level, February (Feitosa et al. 2016); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *Acropyga* sp.: January and December (Kusnezov 1962).

References for Taxonomic identification

-Cardoso do Nascimento I. (2006) Fenologia dos voos de acasalamento em formigas Tropicais. Universidade Federal de Viços, Tese (doutorado).

-Donisthorpe H. (1936) *Acropyga* (Rhizomyrma) robae sp. nov. (hym. Formicidae), a new S. American Ant, with remarks on the genus, etc. The Entomologist Vol. 69

-Emery C. (1925) Hymenoptera, Fam. Formicidae, SubFam. Formicinae. Genera Insectorium, Fasc. 183.

-Feitosa R. M., Silva R. R. and Auiar A. P. (2016) Diurnal flight periodicity of a Neotropical ant assemblage (Hymenoptera, Formicidae) in the Atlantic Forest. Revista Brasileira de Entomologia 60, 241-247.

-Forel A. (1910) Formicides australiens reçus de MM. Frogatt et Rowland Turner. Revue Suisse de Zoologie, Vol. 18, Fasc. 1.

-Kaspari M., Pickering J., Longino J.T and Windsor D. (2001) The phenology of a Neotropical ant assemblage: evidence for continuous and overlapping reproduction. Behav. Ecol. Sociobiol., 50: 382-390.

-Kusnezov N. (1962) El vuelo nupcial de las hormigas. Acta Zoologica Lilloana, tomo 18, 385-442.

-LaPolla J. (2006) Description of the male of *Acropyga paleartica* Menozzi 1936 (Hymenoptera: Formicidae). Myrmecologische Nachrichten 8: 171-173

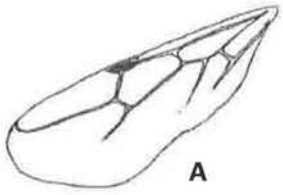
-Prins A. J. (1982) Review of *Anoplolepis* with reference to male genitalia and notes on *Acropyga* (Hymenoptera, Formicidae). Annales of the South African Museum Vol. 89, part 3

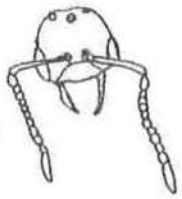
-Smith C.R., Oettler J, Kay A. and Deans C. (2007) First recorded mating flight of the hypogeic ant, *Acropyga epedana*, with its obligate mutualist mealybug, *Rhizoecus colombiensis*. Journal of Insect Science 7: 11.

-Terayama M., Fellowes J.R. e Zhou S. (2002) the East Asian species of the ant genus *Acropyga* Roger 1862 (Hymenoptera: Formicidae: Formicinae). Edaphologia n° 70

-Weber N.A. (1944) The neotropical Coccid-Tending ants of the genus *Acropyga* Roger. Annals Entomological Society of America Vol 37.

Figure – **A**: Forewing; **B**: Head and Antennae of *Acropyga* sp. ♂, Brazil.





♂ Genus ***Anoplolepis*** Santschi, 1914

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape overstep the Occiput, first article of the Funiculus subequal in length than the second, insertion of antennae near from posterior edge of the Clypeus; Forewings of Typology III with Marginal cell closed; Hindwings of Typology II; Mandibles triangular dentate; Palp formula 6:4; Mesonotum with Notauli absent.

Bio-geographical distribution

Neotropical, Afrotropical and Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Papua New Guinea: 9°1'0.15"S, 148° 9'38.64"E, 300 meters sea level, *A. longipes*: October to December (Baker 1976).

References for Taxonomic identification

AntWeb (2017) Photos *A. gracipilis* and *A. nuptialis* Typus. www.antweb.org

-Baker G. L. (1976) The seasonal life cycle of *Anoplolepis longipens* Jerdon (Hymenoptera: Formicidae) in a Cacao plantation and under brushed rain forest in the Northern District of Papua New Guinea. Insectes Sociaux, Tome 23, n° 3: 253-262.

-Prins A. J. (1982) Review of *Anoplolepis* with reference to male genitalia and notes on *Acropyga* (Hymenoptera, Formicidae). Annales of the South African Museum Vol. 89, part 3.

♂ Genus ***Aphomomyrmex*** Emery, 1899

Morphological characters used in the dichotomous key

Antennae with 10 articles, Antennae Scape in length > than the 2° article of the Funiculus, not overstep the Occiput, insertion of the Antenne near from posterior edge of the Clypeus; Forewings of Typology III with Marginal cell closed, formica type; Hindwings of Typology II; Mandibles triangular dentate; Mesonotum with Notauli absent, Abdominal Sternum IX deeply excised.

Bio-geographical distribution

Afrotropical

Behavioral Ecology of the Mating flight
Strategy: unknown
Mating flight: unknown
References for Taxonomic identification
-Emery C. (1899) Fourmis D'Afrique. Extrait des Annales de la Societe Entomologique de belgique, Tome XLIII.
-Emery C. (1925) Hymenoptera, Fam. Formicidae, SubFam. Formicinae. Genera Insectorium, Fasc. 183.
-Snelling R. R. (1979) *Aphomomyrmex* and a related new genus of arboreal African ants (Hymenoptera: Formicidae). Contrib. Sci. Natur. Hist. Mus. Los Angeles, 316: 1-8.

♂ Genus ***Bajacaridris*** Agosti, 1994

Morphological characters used in the dichotomous key
Antennae with 13 articles, Antennae Scape overstep the Occiput; Forewings of Typology II or III with Marginal cell open or closed; Hindwings of Typology II; Mandibles elongate edentate; Mesonotum with Notauli absent; Body total length < than 2 mm; Abdominal Sternum IX with median distally truncated processus.
Bio-geographical distribution
North Africa
Behavioral Ecology of the Mating flight
Strategy: unknown
Mating flight: Marocco: 33°21'35.99"N, 5° 8'27.60"W, 2000 meters sea level, *B. theryi*: May (Espadaler X. and Cagniant H. (1987).
References for Taxonomic identification
-Agosti D. (1994) The phylogeny of the ant tribe Formicini (Hymenoptera: Formicidae) with the description of a new genus. Systematic Entomology 19: 93-117.
-Emery C. (1899) Glanures myrmecologiques (Hymenoptera). Bull. Soc. Ent. Fr.
-Espadaler X. and Cagniant H. (1987) Contribution a la connaissance des fourmis marocaines. Description du male de *Proformica theryi* Santschi, 1936 (Hymenoptera, Formicidae). Nouv. Revue Ent, Tomo 4, Fasc. 2: 133-138.

♂♂ Genus ***Brachymyrmex*** Mayr, 1868

Morphological characters used in the dichotomous key
Antennae with 10 articles, Antennae Scape in length > that the 2° article of the Funiculus, Scape overstep the Occiput or not, insertion of the Antennae confluent from posterior edge of the Clypeus; Forewings of Typology III with Marginal cell open; Hindwings of Typology II; Mandibles edentate; Mesonotum with Notauli absent; MetaTibie with one Spur.
Bio-geographical distribution
Neotropical and Neartic
Behavioral Ecology of the Mating flight
Strategy: male aggregation

Mating flight: Puerto Rico: 18°17' N, 66°07' W, 300 meters sea level, *B. obscurior*: May, June, August to October, *B. heeri*: all year; 17°58' N, 66°52' W, 130 meters sea level, *B. heeri*: January and March to December, *B. obscurior*: September and October (Torres et al. 2000); Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *Brachymyrmex* sp. bcilt1: January, February, April to June and October to December, *Brachymyrmex* sp. bcilt3: May, June, August to October and December, *Brachymyrmex* sp. bcilt4: February to September and November and December, *Brachymyrmex* sp. mt1: April to August and November (Kaspari et al. 2001); Brazil: 20°45' S, 45°52' W, 700 meters sea level, *Brachymyrmex* sp. 01: October to July (Cardoso 2002); 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Brachymyrmex* sp. 22: September to July, *Brachymyrmex* sp. 260: December; 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Brachymyrmex* sp. 541: November (Cantone see chapter 4); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *Brachymyrmex* sp. (negra): January, February, May, August and October to December, *Brachymyrmex* sp. (amarilla): December (Kusnezov 1962).

References for Taxonomic identification

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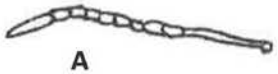

Figure – **A**: Antennae of *Brachymyrmex* sp. ♂, Brazil. **A**

♂ Genus ***Calomyrmex*** Emery, 1895

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput without erect setae, firsts articles of the Funiculus of equal length, with the 1° a little bigger, insertion of the Antennae distant from the posterior edge of the Clypeus; Forewings of Typology III; Marginal cell closed; Hindwings of Typology II; Mandibles edentate marginally, pointed or bidentate apically; Notauli absent.

Bio-geographical distribution

Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Emery C. (1925) Hymenoptera, Fam. Formicidae, SubFam. Formicinae. Genera Insectorium, Fasc. 183.

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♂ Genus ***Camponotus*** Mayr, 1861

Morphological characters used in the dichotomous key

Antennae of 13 articles, Antennae Scape overstep the Occiput, insertion of the Antennae distant from the posterior edge of the Clypeus, the first article of the Funiculus usually no bigger of the following; Forewings Typology III with Marginal cell closed; Hindwings Typology II; Mandibles triangular edentate; Mesonotum with Notauli absent.

Bio-geographical distribution

Cosmopolitan

Behavioral Ecology of the Mating flight

Strategy: *female calling*

Matinf flight: Usa: 39°57' N, 74°10' W, *C. pennsylvanicus*: March to July (Fowler and Roberts 1982); Israel: 33°06' N, 35° 39' E and 32°49' N, 35°39' E, *Camponotus* sp.: June to August (Levin E. et al. 2008); Puerto Rico: 18°17' N, 66°07' W, 300 meters sea level, *C. kaura*: all year, *C. sexguttatus*: all year, *C. taino*: all year; Brasil: 20°45' S, 45°52' W, 700 meters sea level, *C. cingulatus*: August and October to May, *C. renggeri*: March and October to January, *C. melanoticus*: August and October to April, *C. rufipes*: October to March, *Camponotus* sp. 01: October to February (Cardoso do Nascimento 2002); 14°37'04''S, 39°04' 07''W, 10 meters sea level, *C. apicalis*: November to March, *Camponotus* sp.1: February, November and December, *Camponotus* sp. 20: Novenber to February, *Camponotus* sp. 23: Novemeber, (Cardoso do Nascimento 2006); 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Camponotus* sp. 363: September, *Camponotus* sp. 106: October to February, *Camponotus* sp. 284: January, February and November, *Camponotus* sp 109: October, *Camponotus* sp 283: December; 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Camponotus* sp. 288:

September, October and December, *Camponotus* sp. 525: September, *Camponotus* sp. 526: October, *Camponotus* sp. 535: November, *Camponotus* sp. 533: December, *Camponotus* sp. 9: all year, *Camponotus* sp. 23: September, October, January, February and May, *Camponotus* sp. 331: August, February (Cantone see chapter 4); Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *C. atriceps*: May to July, *Camponotus* sp. bicilt 19: May, June, September and October, *Camponotus* sp. bicilt 4: May, June and December, *C. cingulatus*: May to July, *C. sanfictifidei*: May to August and October, December, *C. novogranadensis*: May to December, *C. mucronatus*: May, June and October, *C. curviscapus*: May to July, *C. claviscapus*: May to October, (Kaspari et al. 2001); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *C. bonariensis*: November and December, *C. borelii*: December, *C. leydigi*: December, *C. sexguttatus*: January and December, *C. substitutus*: December, *C. mus*: January and October to December, *C. punctulatus*: January and February, *C. renggeri*: October, (Kusnezov 1962); Australia: 34°59'S, 138°37'E, *C. consobrinus*: January; 34°47'S, 138°38'E, *C. consobrinus*: December, February; 34°28'S, 150°53'E, *C. consobrinus*: February; 35°4'S, 138°51'E, *C. claripes*: April; 33°47'S, 140°34'E, *C. gouldianus*: October; 33° 8'S, 136°25'E, *C. evae zeuxis*: October; 35°4'S, 138°51'E, C. piliventris: March; 35°46'S, 137°12'E, *C. terebrans*: October (McArthur 2014).

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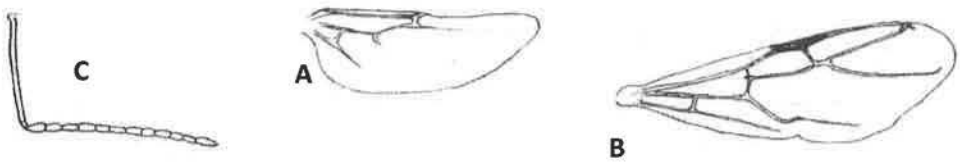
Figure – **A**: Hindwing; **B**: Forewing; **C**: Antennae of *Camponotus* sp. ♂, Brazil.



♂ Genus ***Cataglyphis*** Foerster, 1850

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput, 1° article of the Funiculus in length ≤ than the 2°, insertion of the Antennae near from the posterior edge of the Clypeus; Maxillar Palp with 6 articles, the 4° long as the sum of the following two; Forewings of Typology II with Discoidal cell small or Typology III, Marginal cell closed; Hindwings of Typology II; Mandibles edentate triangular; Mesonotum with Notauli absent; Abdominal Sternum IX three lobed.

Bio-geographical distribution

Afrotropical, Paleartic, Oriental and Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: *female calling*

Mating flight: France: 44° 3'23.42"N, 5° 8'35.54"E, 500 meters sea level high, 43°28'3.53"N, 6°14'15.34"E, 150-200 meters sea level, 42°47'5.94"N, 2°57'49.53"E, 20 meters sea level, *C. cursor*: June and July, (Lenoir et al. 1988); Spain: 41°25'13.77"N, 2° 7'43.76"E, *C. cursor*: June, (Lenoir et al. 1988).

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♂ Genus ***Cladomyrma*** W.M. Wheeler, 1920

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° articles of the Funiculus, not overstep the Occiput, Insertion of the Antennae near from posterior edge of the Clypeus; Forewings of Typology III with Marginal cell closed; Hindwings of Typology II; Mandibles edentate or dentate; Mesonotum with Notauli absent.

Bio-geographical distribution

Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

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♂ Genus ***Colobopsis*** Mayr, 1861

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput, insertion of the Antennae distant from the posterior edge of the Clypeus, Funiculus remarkably short with articles sub equal, the first article swollen and piriformis; Forewings of Typology III with Marginal cell closed; Hindwings of Typology II; Mandibles edentate; Mesonotum with Notauli absent.

Bio-geographical distribution

Neotropical, Afrotropical and Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Emery C. (1925) Hymenoptera, Fam. Formicidae, SubFam. Formicinae. Genera Insectorium, Fasc. 183.

♂ Genus ***Dinomyrmex*** Ashmead, 1905

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput, insertion of the Antennae distant from the posterior edge of the Clypeus, first article of the Funiculus shorter of the following except the last two; Forewings of Typology III with Marginal cell closed; Hindwing of Typology II; Mandibles edentate; Mesonotum with Notauli absent.

Bio-geographical distribution

Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: *female calling*

Mating flight: Indonesia: 6°5'40.52"N, 116°58'39.65"E, 200 meters sea level, *D. gigas*: January to March, May, June, September to November (Pfeiffer and Linsenmair 1997).

References for Taxonomic identification

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(Hymenoptera, Formicidae). Ecotropica, 3: 21-32.

♂ Genus ***Euprenolepis*** Emery, 1906

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput, 1° article of the Funiculus in length ≥ than the 2° but subequal in diameter, Scape with erect setae, insertion of the Antennae distant from posterior edge of the Clypeus; Forewing of Typology III with Marginal cell closed; Hindwing of Typology II; Mandibles edentate and in *E. negronensis* with 4 teeth; Mesonotum with Notauli absent.

Bio-geographical distribution

Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-LaPolla J. (2009) Taxonomic Revision of the Southeast Asian Ant genus *Euprenolepis*. Zootaxa 2046:1-25

♂ Genus ***Formica*** Linaeus, 1758

Morphological characters used in the dichotomous key

Antennae of 13 articles, Antennae Scape overstep the Occiput or not, 1° article of the Funiculus in length ≤ than the 2° insertion of the Antennae near from the posterior edge of the Clypeus; Forewings Typology II with Marginal cell closed; Hindwing Typology II; Mandibles edentate or with 1-5 teeth; Mesonotum with Notauli absent. Poliformism in *F. exsecta*; Abdominal Sternum IX with cranial-medial appendace.

Bio-geographical distribution

Neartic and central America, Paleartic and Mediterranea, Indo-Australian and Oriental.

Behavioral Ecology of the Mating flight

Strategy: *female calling*

Mating flight: USA: 45°45' N, 111°35' W, 1500 meters sea level, *F. subpolita*: June and July (O'Neill 1994); 38°29'34.14"N, 107°12'18.96"W, 2650 meters sea level, *F. obscuripes*: July (Conway, 1996); 40°29'1.78"N, 119°36'12.67"W, 1550 meters sea level, *F. obscuripes*: April and May (Clark and Comanor 1972); 43°4'33 N, 107°17'W, *F. opaciventris*: August; 43° 4'33 N, 107°17'W, *F. obscuripes*: June, *F. ulkey*: June and July, *F. pallidifulva*: July and August, *F. fusca*: August; 47°19'N, 100°23'W, *F. obscuripes*: June, *F. subintegra*: August, *F. montana*: July and August; 40°25'N, 82°54'W, *F. subintegra*: July, *F. pallidifulva*: July; 35°31' N, 86°34'W, *F. exsectoides*: July; Switzerland: 46°44'N 7°57'E, *F. cinerea*: June and July, *F. pratensis*: May and August, *F. rufibarbis*: July, *F. sanguinea*: July; England: 52°21'N, 1°10'W, *F. rufibarbis*: April, *F. rufa*: June; Germany: 51°10'N, 10°25'E, *F. pratensis*: May, June and October, *F. rufa*: May(Kannowski 1961)

References for Taxonomic identification

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♂ Genus ***Gesomyrmex*** Mayr, 1868

Morphological characters used in the dichotomous key

Antennae with 11 articles, Antennae Scape in length > than the 2° article of the Funiculus, not overstep the Occiput, 1° article of the Funiculus piriformis and in length > than the 2° article; Forewings of Typology II with Marginal cell closed; Hindwings of Typology II; Mandibles elonged edentate; Enormous eyes.

Bio-geographical distribution

Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

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♂ Genus ***Iberoformica*** Tinaut, 1990

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput, 1° article of the Funiculus < than the 2°; Forewings of Typology II with Marginal cell closed; Hindwings of Typology II; Mandibles edentate; Maxilary Palp of 5 articles; Mesonotum with Notauli absent.

Bio-geographical distribution

Paleartic: Iberian Peninsula and France

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-ANTWEB (2016) *Iberoformica subrufa* ♂ photos speciments kg03006-4. www.antweb.org

-Tinaut A. (1989) Descripcion del macho de *Formica subrufa* Roger 1859 y creacion de un nuevo subgenero (Hymenoptera: Formicidae). Eos t. 65(2), pags. 281-291

♂ Genus ***Lasiophanes*** Emery, 1895

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput, 1° article of the Funiculus in length > than the 2° article, insertion of the Antennae near from posterior edge

of the Clypeus; Forewings of Typology II and III with Marginal cell closed; Hindwings of Typology II; Mandibles dentate with 3-5 teeth; Mesonotum with Notauli absent.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Argentina: 40° 7'7.04"S, 71°38'10.89"W, 1200 meters sea level, *L. nigriventris* 29/01/1949 (Kusnezov 1952).

References for Taxonomic identification

-ANTWEB (2016) *L. picinus* photos, casent0903226 Syntype ♂. www.antweb.org.

-Emery C. (1925) Hymenoptera, Fam. Formicidae, SubFam. Formicinae. Genera Insectorium, Fasc. 183.

-Donisthorpe H. (1933) On a small Collection of Ants made by Dr. F. W. Edwaeds in Argentina. Annals and magazine of natural History, Ser. 10, Vol. 12.

-Emery C. (1885) Deuxieme note sur les fourmis du Chili. Actes de la Societe Scientifique du Chili, Tome V, 1.

-Kusnezov N. (1952) *Lasiophanes* Emery en la Patagonia. Acta Zoologica Lilloana, Tomo XII.

♂ Genus ***Lasius*** Fabricius, 1804

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput, insertion of the Antennae confluent from posterior edge of the Clypeus, Antennae Funiculus with 1° article in length > that the 2°; Forewings of Typology II, not very rare anomalies (Emery 1887), and Typology III with Marginal cell closed; Hindwings of Typology II; Mandibles edentate or dentate/denticulate; Mesonotum with Notauli absent.

Bio-geographical distribution

Neartic and Central America, Paleartic and North Africa, Indo-Oriental.

Behavioral Ecology of the Mating flight

Strategy: male aggregation

Mating flight: USA: 41°6'52.20"N, 83°10'40.71"W, 230 meters sea level, *L. claviger*: September, *L. latipes*: August (Talbot 1963, Wing 1968); 37°25'N 78°39'W, *L. claviger*: January; 35°45' N, 79°1' W. *L. claviger*: February (Wing 1968); 41°52'N, 93° 5'W, *L. claviger*: August, September and October, *L. interjectus*: July and August, (Buren 1944, Wing 1968); 41°19'N, 76°55'W, *L. claviger*: December (Wing 1968); 42°27'28.04"N, 84° 0'36.08"W, *L. claviger*: June to September (Wing 1968); 35°45'34.46"N 79° 1'9.48"W, *L. interjectus*: April (Wing 1968); 47° 8'1.05"N, 94°48'20.16"W, *L. umbratus*, *L. subumbratus*, *L. neoniger*, *L. claviger*: August (Kannowski, 1971); 47°19'0 N, 100°23'39 W, *L. umbratus*: August, September and November, *L. sitkaensis*: August and September; 34°31' N 105°52'1 W, *L. sitkaensis*: July; 37°14'N, 120°29'W, *L. neoniger*: July; 44°17'N, 84°54'W, *L. neoniger*: September; *L. minutes*: August and September; *L. speculiventris*: August (Kannowski 1961), Switzerland: 46°44'N 7°57'E, *L. umbratus*: May, August and September, *L. fuliginosus*: June, July, *L. brunneus*: May, June, *L. niger*: July, August, *L. emarginatus*: July, August, *L. flavus*: July, August, *L. carniolicus*: October; England: 52°21'N, 1°10'W, *L. umbratus*: July, October, *L.*

fuliginosus: May, *L. niger*: July, September and October, *L. flavus*: August and September, *L. alienus*: August; Germany: 51°10'N, 10°25'E, *L. umbratus*: October, *L. niger*: July, August, *L. alienus*: September; Sweden: 59°25'N,15° 8'E, *L. brunneus*: June; China: 24°28' N, 101°36' E, *L. niger*: August; Holand: 52°40'46''N, 4°40'17''E, *L. platythorax*: July, *L. psammophilus*: June, *L. flavus*: August and September, *L. mixtus*: October (Kannowski 1961).

References for Taxonomic identification

Collingwood C.A. (1963) The *Lasius* (*Chthonolasius*) *umbratus* (Hym, Formicidae) species complex in North Europe. The Entomologist, july.

-Emery C. (1887) Formiche della regione Indo-Malese e dell'Australia. Catalogo delle formiche esistenti nelle collezioni del Museo Civico di Genova. Parte terza.

-Emery C. (1925) Hymenoptera, Fam. Formicidae, SubFam. Formicinae. Genera Insectorium, Fasc. 183.

-Collingwood C. A. (1957) The species of ants of the genus *Lasius* in Britain. Society for British Entomology, Vol. 5, Part 7.

-Collingwood C. A. (1982) Himalayan ants of the genus *Lasius* (Hymenoptera: Formicidae). Systematic Entomology 7:283-296.

-Creighton W.S. (1950) The ants of North America. Bulletin of the Museum of Comparative Zoology at Harvard College, Vol. 104.

-Kannowski P. B. (1961) The flight activities of Formicine ants. Estratto dal Volume XII, Atti IV Congresso U.I.E.I.S. – Pavia.

-Kannowski P. B. (1971) Unusual Occurrence of winged ants in Beach Drift. The Prairie Naturalist, Vol. 3, N° 2: 61-64.

-Seifert B. (1983) The taxonomical and ecological status of *Lasius myops* Forel (Hymenoptera, Formicidae) and first description of its males. Abh. Ber. Naturkundemus. Gorlitz 57, 6: 1-16.

-Wilson E. O. (1955) A monographic revision of the ant genus *Lasius*. Bulletin of the Museum of Comparative Zoology at Harvard College Vol. 113, n° 1.

-Wing M. W. (1968) Taxonomic revision of the Neartic genus *Acanthomyops* (Hymenoptera: Formicidae). Cornell University, Agricoltural Experiment Station, New York State College of Agriculture, Ithaca. Memoir 405.

♂ Genus ***Lepisiota*** Santschi, 1926

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape overstep the Occiput, Antennae Funiculus with 1° article in length ≥ than the 2°; Forewings of Typology III with Marginal cell open; Hindwing of Typology II; Mandibles dentate; Notauli absent.

Bio-geographical distribution

Afrotropical and Malagasy, Paleartic, Indo-Australian, Oriental.

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Emery C. (1925) Hymenoptera, Fam. Formicidae, SubFam. Formicinae. Genera Insectorium, Fasc. 183.

-Tohmé H. e Tohmé G. (1980) Contribution a l'étude systématique et biologique de *Acantholepis syriaca* André (Hymenoptera, Formicidae, Formicinae). Bull. Mus. Natn. Hist. Nat, Paris 4° ser., 2.

-Wheeler W. M. (1922) Ants of the American museum Congo Expedition. A contribute to the myrmecology of Africa. Bulletin of the American Museum of Natural history, Vol XLV.

♂ Genus ***Melophorus*** Lubbock, 1883

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput, insertion of the Antennae near from the posterior edge of the Clypeus, Antennae Funiculus with 1° article in length > than the 2°; Forewings of Typology III with Marginal cell ?; Hindwings of Typology ?; Mandibles edentate.

Bio-geographical distribution

Australia

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Australia: 23°43'56.70"S, 133°52'29.25"E, *M. bagoti*: January (Schultheiss et al. 2010).

References for Taxonomic Identification

-Emery C. (1925) Hymenoptera, Fam. Formicidae, SubFam. Formicinae. Genera Insectorium, Fasc. 183.

-Forel A. (1910) Formicides australiens reçus de MM. Frogatt et Rowland Turner. Revue Suisse de Zoologie, Vol. 18, Fasc. 1

-Kusnezov N. (1952) *Lasiophanes* Emery en la Patagonia. Acta Zoologica Lilloana, Tomo XII: 89-100.

-McAreavey J. J. (1949) Australian Formicidae. New genera and species. Linnean Society of New South Wales, Vol. LXXIV, Parts 1-2.

-Schultheiss P., Schwarz S. and Wystrach A. (2010) Nest reclocation and colony founding in the Australian Desert ant, *Melophorus bagoti* Lubbock (Hymenoptera: Formicidae). Psyche, doi: 10.1155/2010/435838

♂ Genus ***Myrmecocystus*** Wesmael, 1838

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput, insertion of the Antennae near from posterior edge of the Clypeus, Antennae Funiculus with 1° article in length and diameter > than the 2°; Forewings of Typology II or III with Marginal cell closed; Hindwings of Typology II; Mandibles edentate or dentate; Maxillary Palp with 3° and 4°

articles long, 4° article in length = 5°+6°.

Bio-geographical distribution

Neartic and Central America

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Creighton W.S. (1950) The ants of North America. Bulletin of the Museum of Comparative Zoology at Harvard College, Vol. 104.

-Emery C. (1925) Hymenoptera, Fam. Formicidae, SubFam. Formicinae. Genera Insectorium, Fasc. 183.

-Snelling R.R. (1976) A revision of the honey ants genus *Myrmecocystus* (Hymenoptera: Formicidae). Bulletin of Los Angeles county Museum of Natural Hystory n° 24.

-Snelling R.R. (1982) A revision of the honey ants, genus *Myrmecocystus*, first supplement (Hymenoptera: Formicidae). Bull. Southern Califormia Acad. Sci. 81(2): 69-86.

♂ Genus ***Myrmecorhyncus*** André, 1896

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput, insertion of the Antennae confluent from posterior edge of the Clypeus, 1° article of the Funiculus in length > than the 2° article; Forewings of Typology II; Marginal cell closed; Hindwings of Typology II; Mandibles edentate; Mesonotum with Notauli absent

Bio-geographical distribution

Australia

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Clark J. (1934) New Australian Ant. Mem. Nat. Mus. Vict., VIII.

♂ Genus ***Myrmelachista*** Roger, 1863

Morphological characters used in the dichotomous key

Antennae with 10-11 articles, when of 10 articles last 4 articles clavate, Antennae Scape in length > than the 2° article of the Funiculus, not overstep the Occiput; Forewings of Typology III with Marginal cell closed; Hindwings of Typology II; Mandibles edentate marginally, bidentate apically; Mesonotum with Notauli absent.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Puerto Rico: 18°17' N, 66°07' W, 300 meters sea level, *M. ramulorum:* all year; 17°58' N, 66°52' W, 130 meters sea level, *M. ramulorum:* April to October and December (Torres et al. 2000); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *Myrmelachista* sp.: November and Desember (Kusnezov 1962); Brazil: 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Myrmelachista* sp. 63: October, *Myrmelachista* sp. 485: January and March, *Myrmelachista* sp. 365: August; 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Myrmelachista* sp. 520: December, *Myrmelachista* sp. 521: November, *Myrmelachista* sp. 523: December and January (Cantone see chapter 4).

References for Taxonomic identification

-Emery C. (1925) Hymenoptera, Fam. Formicidae, SubFam. Formicinae. Genera Insectorium, Fasc. 183.

-Gallardo A. (1915) Observaciones sobre algunas hormigas de la Republica Argentina. Anales Del Museo Nacional de historia Natural de Buenos Aires, Tomo 27: 1-35.

-Kusnezov N. (1962) El vuelo nupcial de lãs hormigas. Acta Zoologica Lilloana, tomo 18, 385-442.

-Longino J. T.(2006) A taxonomic review of the genus *Myrmelachista* (Hymenoptera: Formicidae) in Costa Rica. Zootaxa 1141:1-54.

-Torres J. A., Snelling R. R. and Canals M. (2000) Seasonal and Nocturnal Periodicities in Ant Nuptial Flights in the Tropics (Hymenoptera: Formicidae). Sociobiology, Vol. 37, n° 3B.

-Wheeler W.M. (1934) Neotropical ants colected by Dr Elisabeth Skwarra and others. Bullein of the Museum of Comparative Zoology at Harvard College Vol 77, n° 5

Figure – **A**: Forewing; **B**: Hindwing; **C**: Antennae of *Myrmelachista* sp. ♂, Brazil.

♂ Genus ***Myrmoteras*** Forel, 1893

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput; Forewings of Typology II with Marginal cell closed; Hindwings of Typology II; Mandibles reduced; Mesonotum with Notauli absent.

Bio-geographical distribution

Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Antweb (2016) Photos *M. indicum* casent 01022162 Paratype. www.antweb.org

-Bharti H. e Akbar S.A. (2014) Taxonomic studies on the genus *Myrmoteras* Forel (Hymenoptera: Formicidae), with desciptiion of two new species from India. J. Entoml. Res. Soc., 16(2): 71-80.
-Emery C. (1925) Hymenoptera, Fam. Formicidae, SubFam. Formicinae. Genera Insectorium, Fasc. 183.
-Moffet M.W. (1985) Revision of the genus *Myrmoteras* (Hymenoptera: Formicidae). Bulletin of the Museum of Comparative Zoology 151:1-53.

♂♂ Genus ***Notoncus*** Emery, 1865

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput with erect setae, insertion of the Antennae near from posterior edge of the Clypeus, 1° article of the Funiculus in length and diameter > than the 2° article; Forewings of Typology III with Marginal cell closed; Hindwings of Typology II; Mandibles narrow edentate pointed apically.

Bio-geographical distribution

Australia

Behavioral Ecology of the Mating flight

Strategy: female calling

Mating flight: Australia: 26°41'9 S, 152°53'4 E: *N. ectatommoides* and *N. enormis*: May (Brown 1955)

References for Taxonomic identification

-Andre E. (1896) Fourmis nouvelle d'Asie et D'Australie. Rev. Entomol. (Caen) 15: 251-256.
-Antweb (2017) Photos *N. capitatus* and *N. ectatommoides* Typus
-Brown W.L. (1955) A revision of the Australian ant genus *Notoncus* Emery, with notes on the other genera of Melophorini.

♂ Genus ***Notostigma*** Emery, 1920

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape very long overstep the Occiput, insertion of the Antennae distant from posterior edge of the Clypeus; Forewings of Typology III with Marginal cell closed; Hindwings of Typology II; Mandibles multi-dentate; Mesonotum with Notauli absent; Eyes placed posteriorly.

Bio-geographical distribution

Australia

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Emery C. (1920) Le genre *Camponotus* Mayr. Revue Zoologique Africane vol. VIII, fasc. 2.
-Emery C. (1925) Hymenoptera, Formicidae, SubFam. Formicinae. Genera Insectorium,Fasc. 183.

♂ Genus ***Nylanderia*** Emery, 1906

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput, insertion of the Antennae near from the posterior edge of the Clypeus, 1° article of the Funiculus in length and diameter > than the 2° article; Forewings of Typology III with Marginal cell closed; Hindwings of Typology II; Mandibles edentate, dentaticulate marginally or reduced in some species; Mesonotum with Notauli absent; Antennae Scape and Tibiae with erect setae; Palp formula 6:4.

Bio-geographical distribution

Cosmopolitan

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Brazil: 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Nylanderia sp.* 15: all year, *Nylanderia sp.* 206 and 232: October, *Nylanderia sp.* 341: February; 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Nylanderia sp.* 508: September (Cantone see chapter 4); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *N. fulva*: January, February, April, May, August to December, *N. silvestri*: January, November and December (Kusnezov 1962).

References for Taxonomic identification

-Emery C. (1925) Hymenoptera, Fam. Formicidae, SubFam. Formicinae. Genera Insectorium, Fasc. 183.

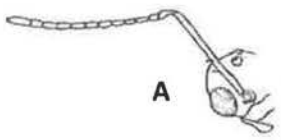
-Kallal R. J. and LaPolla J. S. (2012) Monograph of *Nylanderia* (Hymenoptera: Formicidae) of the World, Part II: Nylanderia in the Nearctic. Zootaxa 3508: 1-64

-Kusnezov N. (1962) El vuelo nupcial de las hormigas. Acta Zoologica Lilloana, tomo 18, 385-442.

-LaPolla J., Brady S.G. e Shattuck S.O. (2011) Monograph of *Nylanderia* (Hymenoptera: Formicidae) of the World: An introduction to the systematics and biology of the genus. Zootaxa 3110:1-9.

-La Polla J. S., Hawkes P. G., and Fisher B. L. (2011) Monograph of *Nylanderia* (Hymenoptera: Formicidae) of the World, Part I: *Nylanderya* in the Afrotropics. Zootaxa 3110: 10-36.

Figure – **A**: Antennae of *Nylanderia* sp. ♂, Brazil.



♂ Genus ***Oecophylla*** Smith, 1860

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput, 1° article of the Funiculus in the form of clava and in length > than the 2°; Forewings of Typology III with Marginal cell closed; Hindwings of Typology II; Mandibles narrow or spatulate; Pretarsal

Claw reduced, last article of the Tarsus elongated and club-shaped.

Bio-geographical distribution

Afrotropical, Indo-Australian and Australian

Behavioral Ecology of the Mating flight

Strategy: female calling?

Mating flight: Tanzania: 10°21'22.49S, 40°09'57.05''E, 140 meters sea level, *O. longinodata*: November to March (Nene et al. 2016); 5°19'58 S, 38° 9'37 E, *O. longinodada*: all year (Rwegasira et al. 2014).

References for Taxonomic identification

-Emery C. (1921) Formiche tessistrici del genere *Oecophylla* fossili e viventi. Nota letta alla R. Accademia delle Scienza dell'Istituto di Bologna nella Sessione del 22 maggio.

-Emery C. (1925) Hymenoptera, Fam. Formicidae, SubFam. Formicinae. Genera Insectorium, Fasc. 183.

-Nene W. A., Rwegasira G. M., Nielsen M. G., Mwatawala M. and Offenberg J. (2016) Nuptial flights behavior of the African weaver ant, *Oecophylla longinodada* Latreille (Hymenoptera: Formicidae) and weather factors triggering flights. Insectes Sociaux, DOI 10.1007/s00040-015-0456-9.

-Rwegasira R.G., Mwatawala M., Rwegasira G.M. and Offenberg J. (2014) Occurrence of sexual of African weaver ant (*Oecophylla longinodada* Latreille) (Hymenoptera: Formicidae) under a bimodal rainfall pattern in eastern Tanzania. Bulletin of Entomological Research, doi: 10.1017/S00074853140000868.

-Wheeler, W. M. (1922). Ants of the American Museum Congo expedition. A contribution to the myrmecology of Africa. VII. Keys to the genera and subgenera of ants. Bull. Am. Mus. Nat. Hist. 45: 631-710

♂ Genus ***Opisthopsis*** Dalla Torre, 1893

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput, insertion of the Antennae near from posterior edge of the Clypeus, 1° article of the Funiculus in length subequal than the 2° but bigger in diameter; Forewings of Typology II and III in *O. respiciens moestus* with Marginal cell closed and Discoidal cell triangular very small; Hindwings of Typology II; Mandibles usually edentate; Palp formula 6:4; Big eyes, places to head back angles.

Bio-geographical distribution

Australia

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Emery C. (1925) Hymenoptera, Fam. Formicidae, SubFam. Formicinae. Genera Insectorium, Fasc. 183.

-Wheeler W. N. (1918) The ants of the genus *Opisthopsis* Emery Bulletin of the Museum of

Comparative Zoology at Harvard College Vol. 62 n° 7.

♂ Genus ***Overbeckia*** Viehmeyer, 1916

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput, 1° article of the Funiculus longer and bigger of the following; Forewings of Typology III with Marginal cell closed; Hindwings of Typology II; Mandibles edentate.

Bio-geographical distribution

Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-AntWeb (2016) Photos *O. subclavata* Typus.www.antweb.org

-Emery C. (1925) Hymenoptera, Fam. Formicidae, SubFam. Formicinae. Genera Insectorium, Fasc. 183.

♂ Genus ***Paraparatrechina*** Donisthorpe, 1947

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput, 1° article of the Funiculus in length and diameter > than the 2° article; Forewings of Typology III with Marginal cell closed; Hindwings of Typology II; Mandibles edentate.

Bio-geographical distribution

Afrotropical and Madagascar, Indo-Australian and Australia

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-La Polla J. S., Cheng C.H. e Fischer B.L. 2010 Taxonomic revision of the ant (Hymenoptera: Formicidae) genus *Paraparatrechina* in the Afrotropical and Malagasy Region. Zootaxa 2387:1-27.

-La Polla J.S., Fisher B.L. (2014) Two new *Paraparatrechina* (Hymenoptera, Formicidae) species from the Seychelles, with notes on the hypogaeic weissi species-group. ZooKey 414: 139-155

♂ Genus ***Paratrechina*** Motschoulsky, 1863

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput, insertion of the Antennae near from posterior edge of the Clypeus, 1° article of the Funiculus in length and

diameter > than the 2° article; Forewings of Typology III with Marginal cell closed; Hindwings of Typology II; Mandibles edentate; Palp formula 6:4.

Bio-geographical distribution

Cosmopolitan

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Puerto Rico: 18°17' N, 66°07' W, 300 meters sea level, *P. longicornis:* March to January; 17°58' N, 66°52' W, 130 meters sea level, *P. longicornis:* January, April, June to August, October to December (Torres et al. 2000); Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *Paratrechina* sp. mt1 : January, May, July, August, October to December (Kaspari et al. 2001)

References for Taxonomic identification

-LaPolla J. S., Hawkes P. G., Fisher J. N. (2013) Taxonomic review of the ant genus *Paratrechina* with a description of a new species from Africa. Jurnal of Hymenoptera, 35: 71-82.

-Kaspari M., Pickering J., Longino J.T and Windsor D. (2001) The phenology of a Neotropical ant assemblage: evidence for continuous and overlapping reproduction. Behav. Ecol. Sociobiol., 50: 382-390.

-Torres J. A., Snelling R. R. and Canals M. (2000) Seasonal and Nocturnal Periodicities in Ant Nuptial Flights in the Tropics (Hymenoptera: Formicidae). Sociobiology, Vol. 37, n° 3B.

-Trager J. C. (1984) A revision of the genus *Paratrechina* (Hymenoptera: Formicidae) of the Continental Unided States. Sociobiology, Vol 9, N° 2.

♂ Genus ***Petalomyrmex*** Snelling, 1979

Morphological characters used in the dichotomous key

Antennae with 10 articles, Antennae Scape reaching the Occiput, 1° article of the Funiculus in length and diameter > than the 2° article, insertion of the Antennae confluent from posterior edge of the Clypeus, 1° article of the Funiculus in length and diameter > than the 2° article; Forewings of Typology III with Marginal cell closed, formica type; Hindwings of Typology II; Mandibles dentate; Palp formula 4:3; Abdominal Sternum IX deeply excised; Mesosoma conspicouosly flattened.

Bio-geographical distribution

Afrotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Antwiki (2016) Photos *P. phylax*. www.antwiki.org

-Snelling R.R. (1979) *Aphomomyrmex* and a related new genus of arboreal African ants (Hymenoptera: Formicidae). Contrib. Sci. Natur. Hist. Mus. Los Angeles Country, 316:1-8

♂ Genus ***Plagiolepis*** Mayr, 1861

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape overstep the Occiput, 1° article of the Funiculus in length and diameter > than the 2° article; Forewings of Typology III with Marginal cell closed; Hindwings of Typology II; Mandibles edentate, bidented apically or dentate; Mesonotum with Notauli absent.

Bio-geographical distribution

Afrotropical, Paleartic, Oriental, Indo-Australian and Australia

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Emery C. (1925) Hymenoptera, Fam. Formicidae, SubFam. Formicinae. Genera Insectorium, Fasc. 183.

-Menozzi C. (1936) Nuovi contribute alla conoscenza della Fauna delle Isole italiane dell'Egeo. R. Laboratorio di Entomologia Agraria, Portici.

-Santschi F. (1926) Description de nouveaux formicides Ethiopiens, 3° Partie. Revue Zoologique Africaine, Vol XIII, Fasc. 3-4.

-Wheeler, W. M. (1922). Ants of the American Museum Congo expedition. A contribution to the myrmecology of Africa. VII. Keys to the genera and subgenera of ants. Bull. Am. Mus. Nat. Hist. 45: 631-710.

-Wheeler W. M. (1934) Contribution to the fauna of Rottnest Island, western Australia. N° IX – The Ants. Journal of the Royal society of Western Australia,Vol. XX.

♂ Genus ***Polyergus*** Latreille, 1804

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape not reaching the Occiput; Forewings of Typology II with Marginal cell closed; Hindwings of Typology II; Mandibles edentate falcate; Abdominal Sternum IX with short apico-cranial appendage.

Bio-geographical distribution

Neartic, Paleartic and Indo-Oriental

Behavioral Ecology of the Mating flight

Strategy: female calling

Mating flight: Italy: 44°38' N, 9°54' E, 700 meters sea level, *P. rufescens*: July and Agust (Mori et al. 2009); USA: 31°53' N, 109°12' W, 1646 meters sea level, *P. breviceps*: July and August (Topoff and Greenberg 1988); Japan: 35°36'N, 140°7'E, *P. samurai*: July and August (Hasegava and Yamaguchi 1994).

References for Taxonomic identification

-Agosti D. (1994) The phylogeny of the ant tribe Formicini (Hymenoptera: Formicidae) with the description of a new genus. Systematic Entomology 19: 93-117.

-Creighton W.S. (1950) The ants of North America. Bulletin of the Museum of Comparative

Zoology at Harvard College, Vol. 104.
-Emery C. (1925) Hymenoptera, Fam. Formicidae, SubFam. Formicinae. Genera Insectorium, Fasc. 183.
-Hasegava E. and Yamaguchi T. (1994) Raiding behavior of the Japanese slave-making and *Polyergus samurai*. Ins. Soc. 41: 279-289.
-Marikovsky, P. I. (1963) A new ant, *Polyergus nigerrimus* Marik., sp. n., (Hymenoptera, Formicidae) and some features of its biology. Entomol. Rev. (Wash.) 42: 58-59
-Mori A., D'Ettore P. and le Moli F. (2009) Mating and post-mating behaviour of the European amazon ant, *Polyergus rufescens* (Hymenoptera, Formicidae). Boll. Zool. 61: 203-206.
-Topoff H. and Greenberg L. (1988) Mating behavior of the socially-parasitic ant *Polyergus breviceps*: The role of the mandibular gland. Psyche 95: 81-87.
-Wheeler J. (1968) Male genitalia and the taxonomy of *Poliergus*. Proc. Ent. Soc. Wash., Vol. 70, N° 2.

♂ Genus ***Polyrhachis*** F. Smith, 1857

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput, insertion of the Antennae distant from posterior edge of the Clypeus, 1° article of the Funiculus in length ≥ than the 2° article, not bigger; Forewings of Typology III with Marginal cell closed; Hindwings of Typology II; Mandibles edentate.

Bio-geographical distribution

Afrotropical, Indo-Australian and Australia

Behavioral Ecology of the Mating flight

Strategy: *female calling*

Mating flight: Cameroon: 3°51'N, 11°30'E, *P. laboriosa*: November and December (Burnat and Godzinska 1997)

References for Taxonomic identification

-AntWeb (2017) Photos *P. hector* and *P. hortensis* Typus. www.antweb.org
-Burnat K. and Godzinska E. J. (1997) Laboratory observations of nuptial flights of the ant *Polyrachis laboriosa*. Acta Neurobiol. Exp., 57: 157-162.
-Donisthorphe H. (1942) Descriptions of a few ants from the Philippine Island, and a male of *Polyrhachis bihamata* Drury from India. Annals ans magazine of Natural History, Ser, 11, Vol. IX.
-Donisthorpe H. (1943) The ants (Hym., Formicidae) of Waigeu Island, North Dutch New Guinea. Annals and Magazine of Natural History, Ser. 11, Vol. X.
-Emery C. (1925) Hymenoptera, Fam. Formicidae, SubFam. Formicinae. Genera Insectorium, Fasc. 183.
-Hung A. C. F. (1970) A revision of ants of the subgenus *Polyrhachis* Fr. Smith (Hymenoptera: Formicidae: Formicinae). Oriental Insects, Vol. 4 (1): 1-36.
-Wheeler, W. M. (1922). Ants of the American Museum Congo expedition. A contribution to

the myrmecology of Africa. VII. Keys to the genera and subgenera of ants. Bull. Am. Mus. Nat. Hist. 45: 631-710.

♂ Genus ***Prenolepis*** Mayr, 1861

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape not reaching or overstep the Occiput, first article of the Funiculus in length < than the second, insertion of the Antennae confluent from posterior edge of the Clypeus; Forewings of Typology III with Marginal cell closed; Hindwings of Typology II; Mandibles elongate edentate; Palp formola 6:4.

Bio-geographical distribution

Neartic and Central America, Paleartic, Oriental and Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic Identification

-AntWeb (2016) Photos *P. nitens* Typus. www.antweb.org

-Bharti H., Wachkoo A.A. (2012) *Prenolepis fisheri*, an Intriguing New ant species, with a re-description of *Prenolepis naoroji* (Hymenoptera: Formicidae) from India.

-Creighton W.S. (1950) The ants of North America. Bulletin of the Museum of Comparative Zoology at Harvard College, Vol. 104.

-Emery C. (1925) Hymenoptera, Fam. Formicidae, SubFam. Formicinae. Genera Insectorium, Fasc. 183.

♂ Genus ***Proformica*** Ruzky, 1902

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput, 1° article of the Funiculus in length < than the 2°; Forewings of Typology II with Marginal cell closed; Hindwings of Typology II; Mandibles edentate elongate; Abdominal Sternum IX cranially either straight.

Bio-geographical distribution

Paleartic and Oriental

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-AntWeb (2016) Photos *P. oculatissima* Typus. www.antweb.org

-Agosti D. (1994) The phylogeny of the ant tribe Formicini (Hymenoptera: Formicidae) with the description of a new genus. Systematic Entomology 19: 93-117.

-Bondroit J. (1918) Les fourmis de France et de Belgique. Annales de La Societè Entomologique de France, Vol. 87.

-Espadaler X. and Cagniant H. (1987) Contribution a la connaissance des fourmis marocaines

Description du male de *Proformica theryi* Santschi 1936 (Hymenoptera, Formicidae). Nouv.Revue Ent. T.4, Fasc. 2, p. 133-138, Paris.
-Forel A. (1886) Nouvelle Fourmis de Grece recoltees par M. E. Von Oertzen. Societe Entomologique de Belgique. Serie III, N° 77.

♂ Genus ***Prolasius*** Forel, 1892

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput or not, first article of the Funiculus in length > than the second, insertion of the Antennae confluent from posterior edge of the Clypeus; Forewings of Typology III with Marginal cell closed; Hindwings of Typology II; Mandibles edentate with small tooth sub-apical; Palp formula 6:4.

Bio-geographical distribution

Australia

Behavioral Ecology of the Mating flight

Strategy: unknown
Mating flight: unknown

References for Taxonomic identification

-Emery C. (1925) Hymenoptera, Fam. Formicidae, SubFam. Formicinae. Genera Insectorium, Fasc. 183.
-McAreavey S. J. (1947) New species of the genera *Prolasius* Forel and *Melophorus* Lubbock (Hymenoptera, Formicidae). Mem. Nat. Mus. Vict., 15.

♂ Genus ***Pseudolasius*** Emery, 1887

Morphological characters used in the dichotomous key

Antennae with 13 articles with all their joint longer than broad, 1° article of the Funiculus in length ≥ than the 2°, Antennae Scape overstep the Occiput, insertion of the Antennae near from the posterior edge of the Clypeus; Forewings of Typology III with Marginal cell closed; Hindwings of Typology II; Mandibles edentate; Palp formula 3:3; Mesonotum with Notauli absent.

Bio-geographical distribution

Afrotropical, Indo-Australian and Australia

Behavioral Ecology of the Mating flight

Strategy: unknown
Mating flight: unknown

References for Taxonomic identification

-AntWeb (2016) Photos *P. butteli*, *P. fallax* Typus. www.antweb.org
-Emery C. (1887) Formiche della regione Indo-Malese e dell'Australia. Catalogo delle formiche esistenti nelle collezioni del Museo Civico di Genova. Parte terza.
-Emery C. (1925) Hymenoptera, Fam. Formicidae, SubFam. Formicinae. Genera Insectorium,

Fasc. 183.
-Santschi F. (1932) Formicidae. Extrait des Resultats scientifiques du Voyage aux Indes Orientales Néerlandaises de LL. AA. RR. Le Prince et La Princesse Leopold de belgique, Vol. IV, fascicule 5.
-Wheeler, W. M. (1922). Ants of the American Museum Congo expedition. A contribution to the myrmecology of Africa. VII. Keys to the genera and subgenera of ants. Bull. Am. Mus. Nat. Hist. 45: 631-710.

♂ Genus ***Rossomyrmex*** Arnoldi, 1928

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape reaching the Occiput not overstep, 1° article of the Funiculus subequal than the 2°, insertion of the Antennae near from posterior edge of the Clypeus; Forewings of Typology III with Marginal cell closed; Hindwings of Typology ?; Mandibles edentate with three denticule.

Bio-geographical distribution

Paleartic

Behavioral Ecology of the Mating flight

Strategy: *female calling*

Mating flight: Spain: 37°2'N, 3°9'W, 2000 meters sea level, *R. minuchae*: July and August (Ruano and Tinaut 2005).

References for Taxonomic identification

-Ruano F., Tinaut A. (2005) Mating behavior in a slave-making ant, *Rossomyrmex minuchae* (Hymenoptera, Formicidae). Naturwissenschaften, 92: 328-331.
-Tinaut A., Ruano F., e Fernandez Escudero I. (1994) Descripcion del macho del genero *Rossomyrmex* Arnoldi 1928 (Hymenoptera, Formicidae). Nuov. Revue Ent., T. 11, Fasc. 4, P 347-351, Paris.

♂ Genus ***Stigmacros*** Forel, 1905

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape overstep the Occiput, 1° article of the Funiculus as long as the sum of the two or three following, last four article versus clavate; Forewings of Typology III with Marginal cell closed; Hindwings of Typology II; Mandibles dentate, denticulate or edentate; Mesonotum with Notauli absent.

Bio-geographical distribution

Australia

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Emery C. (1925) Hymenoptera, Fam. Formicidae, SubFam. Formicinae. Genera Insectorium,

Fasc. 183.
-McAreavey S.J. (1957) Revision of the genus *Stigmacros* Forel. Memoirs of the National Museum of Victoria Melbourne, n° 21.

♂ Genus ***Tapinolepis*** Emery, 1925

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape overstep the Occiput, 1° article of the Funiculus longer of the following; Forewings of Typology III with Marginal cell closed, formica type; Hindwings of Typology II; Mandibles edentate.

Bio-geographical distribution

Afrotropical and Madagascar

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Arnold G. (1926) A monograph of the Formicidae of South Africa. Annals of the South African Museum, Vol. 23.
-Arnold G. (1962) New species of African Hymenoptera N° 16. Occasional papers of the National Museum of Souther Rhodesia, N° 26B.
-Emery C. (1915) Formiche raccolte nell'Eritrea dal Prof. F. Silvestri. Boll. Lab. Zool. Gen. Agrar. R. Sc. Super. Agric., 10: 3-26, Portici.
-Emery C. (1925) Hymenoptera, Fam. Formicidae, SubFam. Formicinae. Genera Insectorium, Fasc. 183.
-Santschi F. (1908) Nouvelles fourmis de l'Afrique du Nord (Egypte, Canaries, Tunisie). Ann. Soc. Entomol. De France, 77.

♂ Genus ***Zatania*** La Polla, Kallal e Brady, 2012

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput and very long, insertion of the Antennae distant from posterior edge of the Clypeus, 1° article of the Funiculus in length ≥ than the 2° not bigger; Forewings of Typology III with Marginal cell closed; Hindwings of Typology II; Mandibles edentate; Palp formula 6:4.

Bio-geographical distribution

Central America

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-LaPolla J. S., Kallal R.J. e Brady S.G. (2012) A new ant genus from the Greater Antilles and Central America, *Zatania* (Hymenoptera: Formicidae), exemplifies the utility of male and

molecular character system. Systematic Entomology, 37, 200-214.

3.9 Subfamily Heteroponerinae Bolton, 2003

This subfamily is represented for three genera and the ♂♂ are known in two genera. In the genus *Aulocopone* the ♂ are unknown.

♂ Genus ***Acanthoponera*** Mayr, 1862

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length < than the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe absent; Mandibles dentate; Mesonotum with Notauli present; Petiole dorsal sharpened; Pygidium (Abdominal Tergum VIII) rounded distally; Abdominal Sternum IX rounded or triangular distally; Gaster with ventral excavation; MetaTibiae with one simple or pectinate spur; Pretarsal Claws bifid.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Argentine: 26°58'S, 64°51'W, 800 meters sea level, *A. mucronata*: January and December (Kusnezov 1962); Brazil: 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Acanthoponera* sp. 402 and sp. 405: February (Cantone see chapter 4).

References for Taxonomic identification

-Brown W. L. (1958) Contribution toward a reclassification of the Formicidae. II Tribe Ectatommini (Hymenoptera). Bulletin of the Museum of Comparative Zoology at Harvard College, Vol. 118, N° 5.

-Feitosa R. (2011) Revisão taxonômica e analise filogenética de Heteroponerinae (Hymenoptera, Formicidae). Tese de Doutorado – Facultade de Filosofia Ciências e Letras de Riberão Preto da USP. Departamento de Biologia. Programa de Pos-Graduaçao em Entomologia.

-Ketterl J. and Verhaagh M. (2004) *Acanthoponera mucronata* (Roger, 1860) (Hymenoptera: Formicidae), first record in Perù and Rio Grande do Sul, Brazil, with description of its male. Rev. per Ent. 44: 65-68.

-Kusnezov N. (1962) El vuelo nupcial de las hormigas. Acta Zoologica Lilloana, tomo 18, 385-442.

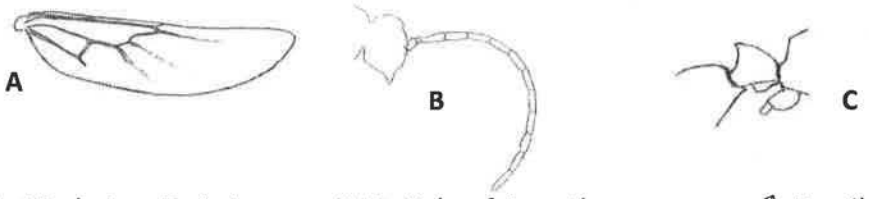


Figure – **A**: Hindwing; **B**: Antennae; **C**: Petiole of *Acanthoponera* sp. ♂, Brazil.

♂ Genus ***Heteroponera*** Mayr, 1887

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length < than the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology II with Jugal lobe absent; Mandibles dentate; Mesonotum with Notauli present; Pygidium (Abdominal Tergum VIII) rounded distally; Abdominal Sternum IX rounded or triangular distally; MetaTibiae with single simple or pectinate spur; Pretarsal Claws simple or with median small tooth.

Bio-geographical distribution

Australia and Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Brazil: 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Heteroponera* sp. 408: February, *Heteroponera* sp. 389: September (Cantone see chapter 4); 23°38' S, 45°53' W, 900 meters sea level, *Heteroponera* sp.: February (Feitosa et al. 2016)

References for Taxonomic identification

-Brown W. L. (1958) Contribution toward a reclassification of the Formicidae. II Tribe Ectatommini (Hymenoptera). Bulletin of the Museum of Comparative Zoology at Harvard College, Vol. 118, N° 5.

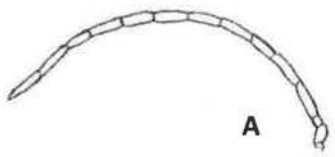
-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118.

-Feitosa R. (2011) Revisão taxonômica e analise filogenética de Heteroponerinae (Hymenoptera, Formicidae). Tese de Doutorado – Facultade de Filosofia Ciências e Letras de Riberão Preto da USP. Departamento de Biologia. Programa de Pos-Graduaçao em Entomologia.

-Feitosa R. M., Silva R. R. and Auiar A. P. (2016) Diurnal flight periodicity of a Neotropical ant assemblage (Hymenoptera, Formicidae) in the Atlantic Forest. Revista Brasileira de Entomologia 60, 241-247.

-Gallardo A. (1918) Las hormigas de la Republica Argentina, SubFamilia Ponerinas. Anales del Museo Nacional de Historia de Buenos Aires, Tomo XXX: 1-112.

Figure – **A**: Antennae of *Hereroponera* sp. ♂, Brazil.



3.10 Subfamily **Leptanillinae** Emery, 1910

This subfamily is represented for nine genera and the ♂♂ are known in five genera. In the genera *Anomalomyrma*, *Furcotanilla*, *Opamyrma* and *Protanilla* the ♂♂ are unknown.

♂ Genus ***Leptanilla*** Emery, 1870

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus; Forewings of Typology IV with Pterostigma absent and with only weakly developed vein Sc+R+Rs sometime vestige of crossvein cu-a and Anal vein; Hindwings of Typology III narrow without any veins; Mandibles edentate; Mesonotum with Notauli absent; Abdominal Sternum IX with rounded apical projection or bifurcated distally; MesoTibiae with one simple Spur and MetaTibiae with two simple Spurs.

Bio-geographical distribution

Afrotropical, Mediteranean region, Indo-Australian and Australian.

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Sicily: 36°43'N, 15°06'E: *Leptanilla* sp. Sic-1: August (Scupola and Ballarin, 2009).

References for Taxonomic identification

-Baroni Urbani C. (1977) Materiali per la revisione della sottofamiglia Leptanillinae Emery (Hymenoptera: Formicidae). Entomologica Basiliensia, 2.

-Bolton B. (1990) The higher classification of the ant subfamily Leptanillinae (Hymenoptera: Formicidae). Systematic Entomology, 15: 267-282.

-Petersen B. (1968) Some novelties in presumed males of Leptanillinae (Hym., Formicidae). Entomologiske meddelelser 36: 577-598.

-Dlussky, G. M. (1969) First finding of an ant from the subfamily Leptanillinae (Hymenoptera, Formicidae) in the USSR. Zool. Zh. 4 48: 1666-1671.

-Emery C. (1910) Hymenoptera Fam. Formicidae, SubFam. Dorylini. Genera Insectorum diriges par P. Wytsman, Fascicule 102.

-Ogata K., Terayama M. and Masuko K. (1995) The ant genus *Leptanilla*: Discovery of the worker-associated male of *L. japonica*, and a description of a new species from Taiwan (Hymenoptera: Formicidae: Leptanillinae). Systematic Entomology, 20: 27-34.

-Santschi F. (1907) Fourmis de Tunisie captures en 1906. Annales de La Societé Zoologique Suisse et Du Museum d'Histoire Naturelle de Geneve, Tome 15, Fascicule 2.

-Scupola A. and Ballarin R. (2009) The genus *Leptanilla* Emery, 1870 in Sicily (Hymenoptera: Formicidae). Myrmecological News, 12: 129-132.

♂ Genus ***Neonilla*** Petersen, 1968

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≥ than the 2° article of the Funiculus; Forewings of Typology IV with Pterostigma absent and Marginal cell open;

Hindwings of Typology III narrow without any veins; Mandibles edentate; Mesonotum with Notauli absent; Abdominal Sternum IX bifurcated distally; MesoTibiae and MetaTibiae with two small simple Spurs.

Bio-geographical distribution

Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Baroni Urbani C. (1977) Materiali per la revisione della sottofamiglia Leptanillinae Emery (Hymenoptera: Formicidae). Entomologica Basiliensia, 2.

-Bolton B. (1990) The higher classification of the ant subfamily Leptanillinae (Hymenoptera: Formicidae). Systematic Entomology, 15: 267-282.

-Petersen B. (1968) Some novelties in presumed males of Leptanillinae (Hym., Formicidae). Entomologiske meddelelser 36: 577-598.

♂ Genus ***Phaulomyrma*** Wheeler and Wheeler, 1930

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus; Forewings of Typology IV with Pterostigma absent and only weakly developed vein Sc+R+Rs sometime vestige of crossvein cu-a and Anal vein; Hindwings of Typology III narrow without any veins; Mandibles edentate; Mesonotum with Notauli absent; Abdominal Sternum IX bifurcated distally; MesoTibiae and MetaTibiae with two small simple Spurs.

Bio-geographical distribution

Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Baroni Urbani C. (1977) Materiali per la revisione della sottofamiglia Leptanillinae Emery (Hymenoptera: Formicidae). Entomologica Basiliensia, 2.

-Bolton B. (1990) The higher classification of the ant subfamily Leptanillinae (Hymenoptera: Formicidae). Systematic Entomology, 15: 267-282.

-Petersen B. (1968) Some novelties in presumed males of Leptanillinae (Hym., Formicidae). Entomologiske meddelelser 36: 577-598.

-Wheeler G. C. and Wheeler. E. W. (1930) Two new ants from Java. Psyche, Vo. 37, N° 3.

♂ Genus ***Scyphodon*** Brues, 1925

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus; Forewings of Typology IV with Pterostigma absent and Marginal cell open;

Hindwings of Typology III narrow without any veins; Mandibles edentate large oval, paddle- or spoon-shaped; Mesonotum with Notauli absent; Abdominal Sternum IX ?; MesoTibiae and MetaTibiae with two simple Spurs.

Bio-geographical distribution

Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Baroni Urbani C. (1977) Materiali per la revisione della sottofamiglia Leptanillinae Emery (Hymenoptera: Formicidae). Entomologica Basiliensia, 2.

-Bolton B. (1990) The higher classification of the ant subfamily Leptanillinae (Hymenoptera: Formicidae). Systematic Entomology, 15: 267-282.

-Brues C. T. (1925) *Scyphodon*, an anomalus genus of Hymenoptera of doubtful affinities. Treubia, Vol. VI, Livr. 2.

-Petersen B. (1968) Some novelties in presumed males of Leptanillinae (Hym., Formicidae). Entomologiske meddelelser 36: 577-59

♂ Genus ***Yavnella*** Kugler, 1987

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length < than the 2° article of the Funiculus; Forewings of Typology IV with Pterostigma absent and Marginal cell open; Hindwings of Typology III narrow without any veins; Mandibles edentate; Mesonotum with Notauli absent; Abdominal Sternum IX?; MesoTibiae and MetaTibiae with two simple Spurs; Head Vertical with large bulge on vertex.

Bio-geographical distribution

Indo-Australian, Saudi Arabia

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Israel: 31°52'56.75"N, 34°43'17.64"E, 40 meters sea level, *Y. argamani*: August and October; 32°28'21.39"N, 35°28'49.76"E, -120 meters sea level, *Y. argamani*: June (Kugler 1987).

References for Taxonomic identification

-ANTWIKI (2017) Photos *Y. argamani* Typus. www.antwiki.org

-Bolton B. (1990) The higher classification of the ant subfamily Leptanillinae (Hymenoptera: Formicidae). Systematic Entomology, 15: 267-282.

-Collingwood C. A. and Agosti D. (1996) Formicidae (Insecta: Hymenoptera) of Saudi Arabia (Part 2). Fauna of Saudi Arabia, 15.

Kugler, J. (1987) The Leptanillinae (Hymenoptera: Formicidae) of Israel and a description of a new species from India. Isr. J. Entomol. 20: 45-57

3.11 Subfamily **Martialinae** Rabeling and Verhaagh, 2008

This subfamily is represented for one genus and the ♂♂ is known.

♂♂ Genus ***Martialis*** Rabeling and Verhaagh, 2008

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, not overstep the Occiput, 1° article of the Funiculus in length ≤ than the 2°; Forewings of Typology III with Marginal cell closed; Hindwings of Typology III; Mandibles narrow bidentate apically; Mesonotum with Notauli present, Meso and MetaTibiae with one simple Spur; Palp formula 2:1; Petiole ventrally and dorsally articoled with first segment of the Gaster.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Boudinot B.E. (2015) Contribution to the knowledge of Formicidae (Hymenoptera, Aculeata): a new diagnosis of the family, the first global male-based key to subfamilies, and a treatment of early branching lineages. European Journal of Taxonomy 120: 1-62.

3.12 Subfamily **Myrmeciinae** Emery, 1877

This subfamily is represented for two genera and the ♂♂ are known.

♂ Genus ***Myrmecia*** Fabricius, 1804

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in lenght ≤ than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles great dentate or edentate; Mesonotum with Notauli present; Pygidium (Abdominal Tergum VIII) rounded distally; Abdominal Sternum IX rounded slightly convex distally or with single postero-medial process; MetaTibiae with two simple and pectinate Spurs; Pretarsal Claws with strong median tooth or bifid.

Bio-geographical distribution

Australia

Behavioral Ecology of the Mating flight

Strategy: male aggregation syndrome

Mating flight: Australia: 37°52'46.53"S, 145°18'43.76"E, 400 meters sea level, *M. forficate*: March (Clark 1951); 35°17'S, 148°59'51.60"E, *M. croslandi*, *M. tarsata*, *M. nigriceps* and *M. pyriformis*: December to March (Narendra et al. 2010).

References for Taxonomic identification

-Clark J. (1934) Notes on Australian ants, with description of new species and new genus. Mem. Nat. Mus. Vict., Melbourne, N° 8.

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-Ward P. S. and Brady S. G. (2003) Phylogeny and biogeography of the ant subfamily Myrmeciinae (Hymenoptera: Formicidae). Invertebrate Systematics, 17: 361-386.

♂ Genus ***Nothomyrmecia*** Clark, 1934

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles dentate marginally; Mesonotum with Notauli present; Pygidium (Abdominal Tergum VIII) rounded distally; Abdominal Sternum IX has a bifid apex; MetaTibiae with two simple and pectinate Spurs; Pretarsal Claws with strong median tooth or bifid.

Bio-geographical distribution

Australia

Behavioral Ecology of the nuptial flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Taylor R. W. (1978) *Nothomyrmecia macrops* a living-fossil ant rediscovered. Science, Vol. 201: 979-985.

-Ward P. S. and Brady S. G. (2003) Phylogeny and biogeography of the ant subfamily Myrmeciinae (Hymenoptera: Formicidae). Invertebrate Systematics, 17: 361-386

3.13 Subfamily Myrmicinae Lepeletier de Saint-Fargeau, 1835

This subfamily is represented for 143 genera and the ♂♂ are known in 98 genera.
In the genera *Adlerzia, Ancyridris, Anillomyrma, Aretidris, Austromorium, Baracidris, Bariamyrma, Chimaeridris, Colobostruma, Cryptomyrmex, Cyphoidris, Dacatria, Diaphoromyrma, Dicroaspis, Diplomorium, Epopostruma, Erromyrma, Formicoxenus, Formosimyrma, Gaoligongidris, Gauromyrmex, Hylomyrma, Ishakidris, Kartidris, Kempfidris, Lachnomyrmex, Lasiomyrma, Lenomyrmex, Mayriella, Microdaceton, Perissomyrmex, Peronomyrmex, Phalacromyrmex, Pilotrochus, Poecilomyrma, Propodilobus, Protalaridris, Rhopalotrhix, Rotastruma, Secostruma, Talaridris, Tetheamyrma, Tricytarus, Tyrannomyrmex* and *Vombisidris* the ♂♂ are unknown or with insufficient descriptions.

♂ Genus ***Acanthognathus*** Mayr, 1887

Morphological characters used in the dichotomous key

Antennae with 12 articles filiform, Antennae Scape in length < than the 2° article of the Funiculus; 1° article of the Funiculus in length < than the 2°; Forewings of Typology IV with Marginal cell open; Hindwings of Typology III; Mandibles reduced; Palp formula 1:1; Mesonotum with Notauli present; Propodeum unarmed; MetaTibiae without Spur.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Brazil: 23°38'53.31"S, 46°37'9.90"W, 800 meters sea level, *A. rudis*: February (Brown and Kempf 1969); *A. rudis* and *Acanthognathus* sp.: February 23°38' S, 45°53' W, 900 meters sea level, February (Feitosa et al. 2016).

References for Taxonomic identification

-Brown W.L. and Kempf W.W. (1969) A revision of the Neotropical Dacetine ant genus *Acanthognathus* (Hymenoptera: Formicidae). Psyche, Vol. 76, n° 2.

-Feitosa R. M., Silva R. R. and Auiar A. P. (2016) Diurnal flight periodicity of a Neotropical ant assemblage (Hymenoptera, Formicidae) in the Atlantic Forest. Revista Brasileira de Entomologia 60, 241-247.

♂ Genus ***Acanthomyrmex*** Emery, 1893

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, Scape not overstep the Occiput, 3° and 5° articles of the Funiculus somewhat compressed, the 5° article curved; Forewings of Typology II (*A. ferox*) and III (*A. glabfemoralis*) with Marginal cell closed, solenopsis type; Hindwings of Typology II;

Mandibles triangular dentate with 6-8 teeth; Mesonotum with Notauli present.

Bio-geographical distribution
Indo-Australian
Behavioral Ecology of the Mating flight
Strategy: unknown
Mating flight:
Vientnam: 21°18'36 N, 106°37'42 E, 445 and 200 meters sea level, *A. glabfemoralis*: March; 20°19'52.43"N, 105°34'49.90"E, 370 meters sea level, *A. glabfemoralis*: November; 19°13'13 N, 104°53'48 E, 350 meters *A. glabfemoralis*: March (Eguchi et al. 2008); Indonesia: 3°36'5 S, 115°11'59 E, *A. ferox*: July (Moffett 1986); Malaysia: 3°16'18.30"N, 101°48'26.24"E *A. ferox*: February (AntWeb 2016)
References for Taxonomic identification
-Eguchi K., Bui T.V. & Yamane S. (2008) Vietnamense species of the genus *Acanthomyrmex* Emery 1893 – *A. humilis* sp. N and *A. glabfemoralis* Zhou & Zheng, 1997 (Hymenoptera: Formicidae: Myrmicinae). Myrmecological News, 11, 231-241.
-Moffett M.W. (1986) Revision of the Myrmicinae genus *Acanthomyrmex* (Hymenoptera: Formicidae). Bulletin of the Museum of Comparative Zoology, Vol. 151, n° 2, Harvard University Cambridge, Massachusetts.

♂ Genus ***Acromyrmex*** Mayr, 1865

Morphological characters used in the dichotomous key

Antennae with 13 articles with last four articles versus clavate; Antennae Scape in length > than the 2° article of the Funiculus, overstep the Occiput; Forewings of Typology III with Marginal cell closed; Hindwings of Typology II; Mandibles triangular dentate; Mesonotum with Notauli present.

Bio-geographical distribution
Neotropical
Behavioral Ecology of the Mating flight
Strategy: male aggregation
Mating flight: Brazil: 19°17'S; 44°29'W, *A. ameliae*: throughout the year, social parasite the leaf-cutting ants *A. subterraneus* and *A. subterraneus brunneus* (De Souza et al. 2007 and 2011); 29°46'S, 51°08'W and 29°29'S, 49°44'W. *A. heyeri*: October to Deceber, *A. striatus*: November to January (Diehl-Fleig 1993); 14°46'17 S, 39° 4'28 W, 10 meters sea level, *A. rugosus*: all year, social parasite; *A. balzani*: November to June, *A. coronatus*: January and February, *A. rugosus*: December to March, *Acromyrmex* sp.: October to June (Delabie et al. 2002); 14°37'04''S, 39°04' 07''W, 10 meters sea level, *A. balzani*: October to January, *A. rugosus*: September to January (Cardoso do Nascimento 2006); 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *A. striatus*: December, *Acromyrmex* sp. 275: December; *Acromyrmex* sp. 419: November and December, *Acromyrmex* sp. 436: October (Cantone see chapter 4); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *A. lundi*: September to January, *A. striatus*: November to January, *A. fracticornis*: December

(Kusnezov 1962).

References for Taxonomic identification

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-Forel A. (1893) Note sur les "Attini". Ann. Soc. Entomol. Belg. 37: 586-607

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-De Souza D.J., Marques Ramos Ribeiro M., Mello A., Lino-Neto J., Cotta Dangelo R.A. Castro Della Lucia T. M. (2011) A laboratory observation of nuptial flight and mating behaviour of the parasite ant *Acromyrmex ameliae* (Hymenoptera: Formicidae). Italian Journal of Zoology, iFirst, 1-4.

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-Fowler H.G. (1988) Taxa of the Neotropical grass-cutting ants, *Acromyrmex* (*Moellerius*) (Hymenoptera: Formicidae: Attini). Cientifica, Sao Paulo, 16(2): 281-295.

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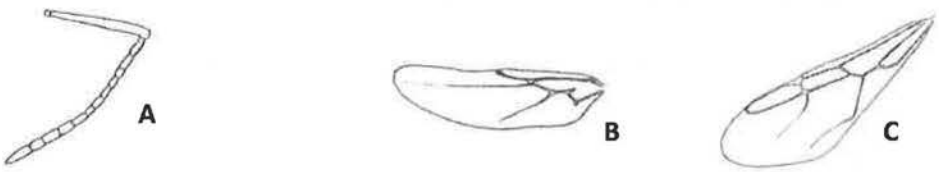
-Kusnezov N. (1962) El vuelo nupcial de las hormigas. Acta Zoologica Lilloana, tomo 18, 385-442.

-Wheeler W. M. (1907) The fungus-growing ants of North America. Bulletin of the American Museum of Natural History, Vol. 23, article 31, 669-807.

Figure – **A**: Antennae; **B**: Hindwing; **C**: Forewing of *Acromyrmex* sp. ♂, Brazil.



♂ Genus ***Adelomyrmex*** Emery, 1897

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus and overstep the Occiput, last three articles of the Funiculus versus clavate; Forewings of Typology II with SubMarginal 1 cell open and Marginal cell open; Hindwings of Typology?; Mandibles edentate; Palp formula 2:2; Mesonotum with Notauli absent.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Fernandez F.C. (2003) Revision of the Myrmicinae ants of the *Adelomyrmex* genus-group (Hymenoptera: Formicidae). Zootaxa, 361: 1-52.

♂ Genus ***Allomerus*** Mayr, 1878

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than the 2° article of the Funiculus; Forewings of Typology III with Marginal cell open, formica type; Hindwings of Typology II; Mandibles triangular dentate; Mesonotum with Notauli absent.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Perù: 3°58' S, 73°25' W, 120 meters sea level, *A. octoarticulatus*: May to February (Frederickson 2006).

References for Taxonomic identification

-AntWeb (2016) Photos *A. vogeli* Paratypus. www.antweb.org.

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♂ Genus ***Aphaenogaster*** Mayr, 1853

Morphological characters used in the dichotomous key

Antennae with 13 articles or 12 in *A. loriai* and *A. quadrispina* (Smith M. R. 1961), Antennae Scape in length > than the 2° article of the Funiculus, not overstep the Occiput; last 4-5 articles of the Funiculus clavate or filiform; Forewings of Typology I and II,

solenopsis type, with Marginal cell open, venation in *Aphaenogaster* variations are known (Emery 1915); Hindwings of Typology II; Mandibles triangular dentate with 4-8 teeth; Mesonotum with Notauli absent or present; MetaTibiae with one simple Spur.

Bio-geographical distribution

Paleartic, Oriental, Indo-Australian, Neartic, Neotropical, Australian and Madagascar

Behavioral Ecology of the Mating flight

Strategy:

Mating flight: Italy: 43°32'55 N, 13°36'7 E, 400 meters sea level, *A. picena*: nomadic specie, male in the nest April to October (Baroni-Urbani 1966); 45°38' N, 13°50' E, *A. ovaticeps*: July; Croatia: 42°45'59.94"N, 16°30'34.60"E, *A. pallida*: September 43°30'37 N 16°27'51 E, *A. pallida*: July (Finzi 1927); Spain: 37° 8'24 N, 3°23'57 W, 1400 meters sea level: August (Tinaut 1985).

References for Taxonomic identification

-Baroni-Urbani C. (1966) Osservazioni diverse intorno al nomadismo dell' *Aphaenogaster picena* Baroni con particolare riguardo all'orientamento (Hymenoptera, Formicidae). Insectes Sociaux, Vol. 13, n° 2.

-Boer P. (2013) Revision of the European ants of the *Aphaenogaster testaceopilosa*-group (Hymenoptera: Formicidae). Tijdshrift voor Entomologie 156, 57-93.

-Cagniant H. (1966) Nouvelle description d'*Aphaenogaster* (*Attomyrma*) *crocea* (André) Hymenoptera Formicidae. Representation des trois castes notes biologiques. Bolletin de la Societé Zoologique de France, Tome 91, n° 1, p. 61.

-Cagniant H. (1986) Contribution à la connaissance des fourmis marocaines: Description des sexués et complements à la definition de l'espéce *Aphaenogaster theryi* Santschi 1923 (Hymenoptera, Formicidae, Myrmicinae). Societé d'Histoire Naturelle de Touluse, 122:139-143.

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-Tinaut A. (1985) Descripcion del macho de *Aphaenogaster cardenai* Espadaler, 1981 (Hymenoptera, Formicidae). Miss. Zool., 9:245-249.

♂ Genus ***Apterostigma*** Mayr, 1865

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≥ than the 2° article of the Funiculus not overstep the Occiput normally, but in some species overstep the Occipiput, insertion of the Antennae distant from posterior edge of the Clypeus; firs article of the Funiculus in length < than the second; Forewings of Typology III often Rs1 vein absent with Basal and subMarginal cell not divided, Marginal cell closed and Pterostigma absent, solenopsis type; Hindwings of Typology II; Mandibles triangular edentate; Mesonotum with Notauli ordinarily present but hidden by other structures.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Brazil: 14°46'17 S, 39° 4'28 W, 10 meters sea level, *A. urichii*: January, March to May, November, *Apterostigma* sp.: May, *A. ierense*: May, *A. auriculatum*: February to June and November, *A. depressum*: January, *A. madidiense*: Agugust to October, *Apterostigma* sp. Compl. Pilosum: September; *Apterostigma* sp. gp Pilosum: May (Delabie et al. 2002); 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Apterostigma* sp. 418: September (Cantone see chapter 4); Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level *Apterostigma* mt2: January to May (Kaspari et al 2001); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *Apterostigma* sp.: January, October to December (Kusnezov 1962).

References for Taxonomic identification

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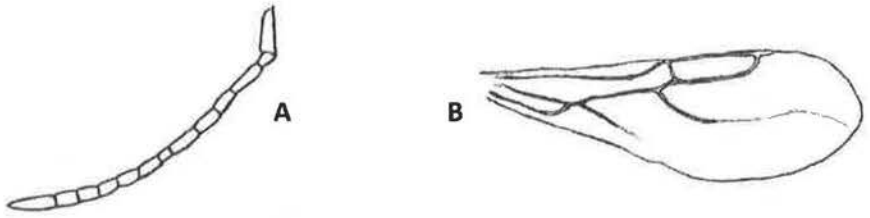
-Wheeler W. M. (1907) The fungus-growing ants of North America. Bulletin of the American Museum of Natural History, Vol. 23, article 31, 669-807.

Figure – **A**: Antennae; **B**: Forewing of *Apetrostigma* sp. ♂, Brazil.



♂ Genus ***Atopomyrmex*** André, 1889

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape not overstep the Occiput; Forewings of Typology II with Marginal cell closed, solenopsis type; Hindwings of Typology?; Mandibles short denticulate; Eyes rather small occupying 1/5 of the head; Mesonotum with Notauli absent and strongly convex; Propodeum unarmed.
Uncertain description.

Bio-geographical distribution

Afrotropical

Behavioral Ecology of the Mating flight

Strategy: unknown
Mating flight: unknown

References for Taxonomic identification

-Arnold G. (1916) A monograph of the Formicidae of South Africa (Myrmicinae). Annals of the South African Museum, Vol. XIV, Part II.
-Wheeler W. M. (1922) Ants of the American museum Congo Expedition. A contribute to the myrmecology of Africa. Bulletin of the American Museum of Natural history, Vol XLV.

♂ Genus ***Atta*** Fabricius, 1804

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus and overstep the Occiput; Forewings of Typology III with Marginal closed; Hindwings of Typology II; Mesonotum with Notauli absent; Mandibles triangular dentate.

Bio-geographical distribution

Neotropical and Neartic

Behavioral Ecology of the Mating flight

Strategy: male aggregation (Autuori 1941, Moser 1967, Cunha 1988, Stabb and Kleineidam 2014)

Mating flight: Brazil: 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Atta sexdens*: December; 20°18'13.66"S, 46°31'17.59"W, 950 meters sea level, *A. sexdens*: November (Cantone see chapter 4); 23°35'S, 46°38'W, *Atta sexdens*: September to November (Autuori 1941); 14°46'17 S, 39° 4'28 W, 10 meters sea level, *A. cephalotes*: March, June to September; *A. sexdens sexdens*: November to March (Delabie et al. 2002); Argentine: 26°18'S, 58°49'W, 68 meters sea level, *A. wollenweideri*: October to December (Stabb and Kleineidam 2014), 26°58'S, 64°51'W, 800 meters sea level, *A. wollenweideri*: January and December (Kusnezov 1962); USA, 31°2'52 N, 92°8'22 W, *Atta texana*: May to July (Moser 1967); Suriname: 3°51'12 N, 56°14'32 W, *A. sexdens*: January, *A. cephanotes*: May (Moser 1967); Mexico: 19°11'11 N, 96°30'30 W, *A. mexicana*: August (Moser 1967); 18°59'N, 99° 5'W, *A. mexicana*: June (Mintzer et al. 1991); Panama, 9°9'19'' N, 79°50'15'' W, *A. colombica*: May (Shik and Kaspari 2009).

References for Taxonomic identification

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♂ Genus ***Basiceros*** Shultz W.A., 1906

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than the 2° article of the Funiculus; Forewings of Typology II and III with Marginal open; Hindwings of Typology II; Mesonotum with Notauli present; Mandibles triangular dentate; MetaTibiae without Spur.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Brazil: 0°56'5N, 51°59'42W, 100 meters sea level; *B. scambognathus*: November; 4°31'33 S, 71°34'33 W, 100 meters sea level; *B. scambognathus*: September; 3° 0'21.12"S, 59°56'27.34"W, 100 meters sea level; *B. scambognathus*: September and November; 13°27'10 S, 40°26'27W, 950 meters sea level, *B. scambognathus*: November; 14°01'S, 48°12'W, 500 meters sea level; *B. scambognathus*: December; 12°31'S, 55°37'W, 370 meters sea level, *B. scambognathus*: October; 16°36'53S, 49°16'26W, 850 meters sea level, *B. scambognathus*♂ 10/1973; 0°55'38 S, 47°23'55.78"W, 25 meters sea level, *B. scambognathus*: January; 9°53'52.87"S, 63° 1'19.84"W, 125 meters sea level, *B. scambognathus*: November; 3°21'13.58"N, 61°25'31.69"W, sea level 90 meters, *B. scambognathus*: August (Feitosa et al. 2007).

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♂ Genus ***Blepharidatta*** Wheeler W.N., 1915

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, not overstep the Occiput; Forewings of Typology II with Marginal open, formica type; Hindwings of Typology III; Mandibles edentate; Mesonotum with Notauli present; MetaTibiae without Spur.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Brandão C.R.F., Feitosa R.M. and Diniz J.L.M. (2015) Taxonomic revision of the Neotropical Myrmicinae ant genus *Blepharidatta* Wheeler. Zootaxa 4012 (1): 33-56

♂ Genus ***Bondroitia*** Forel, 1911

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape in length ≥ than the 2° article of the Funiculus; Forewings of Typology II with Marginal cell open; Hindwings of Typology II; Mandibles edentate marginally; Mesonotum with Notauli absent.

Bio-geographical distribution

Afrotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174: 207-397.

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♂ Genus ***Calyptomyrmex*** Emery, 1887

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape ≥ than the 2° article of the Funiculus, second article of the Funiculus along twice the following; Forewings of Typology II with Marginal open, formica type; Hindwings of Typology ?; Mesonotum with Notauli present and versus carenate laterally; Mandible great triangular dentate marginally.

Bio-geographical distribution

Afrotropical, Indo-Australian and Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

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♂ Genus ***Cardiocondyla*** Emery, 1869

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape > than the 2° article of the Funiculus not overstep the Occiput, 1° article of the Funiculus in length > than the 2°, Antennae filiform or with last articles versus clavate; Forewings of Typology III and IV with Marginal cell open, solenopsis type; Hindwings of Typology III; Mesonotum with Notauli absent; Mandibles triangular dentate.

Bio-geographical distribution

Cosmopolitan

Behavioral Ecology of the Mating flight

Strategy: Male polymorphism is presently: under good condition, colonies produce exclusively wingless males but, when environmental conditions turn bad, colonies start to produce winged dispersal males (Kinomura and Yamauchi 1987; Heinze et al. 1998; Cremer and Heinze 2003; Du et al. 2007; Schrempf and Heinze 2008; Cremer et al. 2011))

Mating flight: unknown

References for Taxonomic identification

-Arnold G. (1916) A monograph of the Formicidae of South Africa (Myrmicinae). Annals of the South African Museum, Vol. XIV, Part II.

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-Schrempf A, Heinze J. (2008) Mating with stressed males increases the fitness of ant queens. PLoS ONE Vol. 3, Issue 7.

♂ Genus ***Carebara*** Westwood, 1840

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length < or ≥ than the 2° article of the Funiculus; Forewings of Typology II with Marginal cell closed, solenopsis type; Hindwings of Typology II; Mandibles dentate; Mesonotum with Notauli absent

Bio-geographical distribution

Neotropical, Paleartic (Mediterranean), Afrotropical, Orietal, Indo-Australian, Australian

Behavioral Ecology of the Mating flight

Strategy: female calling

Mating flight: South Africa: 27°36'S, 32°13'E, *C. vidua*: September and October (Robertson and Villet 1989); Brazil: 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Carebara* sp. 462: March and April (Cantone see chapter 4)

References for Taxonomic identification

-Arnold G. (1916) A monograph of the Formicidae of South Africa (Myrmicinae). Annals of the South African Museum, Vol. XIV, Part II.
-Consani M. (1951) Formiche dell'Africa Orientale. Boll. Ist. Entomol. Univ. Studi Bologna 18: 167-172.
-Creighton W.S. (1950) The ants of North America. Bulletin of the Museum of Comparative Zoology at Harvard College, Vol. 104.
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-Ettershank G. (1966) A generic revision of the World Myrmicinae related to *Solenopsis* and

Pheidologeton (Hymenoptera: Formicidae). Australian Journal of Zoology, 14: 73-171.
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Figure – **A**: Antennae of *Carebara* sp. ♂, Brazil.

♂ Genus ***Cataulacus*** Smith F., 1853

Morphological characters used in the dichotomous key

Antennae with 11 articles, Antennae Scape in length > than the 2° article of the Funiculus, last three articles clavate; Forewings of Typology III with Marginal cell open (in Bolton 1974 *C. egenus* Santschi marginal closed), Cu+A vein very close wing insertion; Hindwings of Typology II; Mesonotum with Notauli present; Mandibles dentate.

Bio-geographical distribution

Afrotropical, Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Madagascar: 22°18.8'S, 45°17.5'E, *C. ebrardi*: February (AntWeb 2017); Comoros: 12.32717°S, 43.65952° E, *C. voeltzkowi*: January (AntWeb 2017).

References for Taxonomic identification

-AntWeb (2017) Photos *C. voelzkowi* (DNA) and *C. ebrandi*. www.antweb.org
-Bolton B. (1974) A revision of the Paleotropical arboreal ant genus *Cataulacus* F.Smith (Hymenoptera: Formicidae). Bulletin of the British Museum (Natural History) Entomology London, Vol. 30, N° 1.
-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174

♂ Genus ***Cephalotes*** Latreile, 1802

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape usually in length ≤ than the 2° article of the Funiculus; Forewings of Typology II with Marginal cell closed and appedinculate; Hindwings of Typology II; Mesonotum with Notauli present; Mandibole dentate marginally; MetaTibiae usually without Spur.

Bio-geographical distribution
Neotropical
Behavioral Ecology of the Mating flight
Strategy: female calling
Mating flight: Brazil: 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Cephalotes* sp. 413: November; 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Cephalotes* sp.: March and April (Cantone see chapter 4); Argentina: 26°58'S, 64°51'W, 800 meters sea level, *Cephalotes* sp.: May (Kusnezov 1962).
References for Taxonomic identification
-Andrade M.L. de and Baroni Urbani C. (1999) Diversity and Adaptation inthe Ant Genus *Cephalotes*, Past and Present. Stuttgarter Beitr. Naturk. Ser. B, Nr. 271.
-Creighton W.S. (1950) The ants of North America. Bulletin of the Museum of Comparative Zoology at Harvard College, Vol. 104.
-Kempf W.W. (1951) A Taxonomic study on the ant Tribe Cephalotini (Hymenoptera: Formicidae). Rev. de Entomologia, Vol. 22, fasc. 1-3, Rio de Janeiro, Brasil.
-Kusnezov N. (1962) El vuelo nupcial de las hormigas. Acta Zoologica Lilloana, tomo 18, 385-442.

♂ Genus ***Crematogaster*** Lund, 1831

Morphological characters used in the dichotomous key
Antennae with 12, 10 or 11 articles, Antennae Scape in length ≤ than the 2° article of the Funiculus; Forewings of Typology II, III and IV in *C. subnuda subnuda* with Marginal cell closed or open; Hindwings of Typology II or III; Mesonotum with Notauli present or absent; Mandibles reduced, bi-tridentate apically and edentate marginally; Post-Petiole articulate dorsally with the first segment of the Gaster.
Bio-geographical distribution
Cosmopolitan
Behavioral Ecology of the Mating flight
Strategy: male aggregation
Mating flight: South Africa: 26°09'S, 28°00'E, *Crematogaster* sp.: February (Robertson and Villet 1989); Brazil: 14°37'04''S, 39°04' 07''W, 10 meters sea level, *Crematogaster* sp. 1: October to March, *Crematogaster* sp. 3: October to February (Cardoso do Nascimento 2006); 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Crematogaster* sp. 6: July to February, April and May, *Crematogaster* sp. 25: September to November, March and May, *Crematogaster* sp. 84: October to December, July and August, *Crematogaster* sp. 85: October to April, *Crematogaster* sp. 1: all year; 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Crematogaster* sp. 453: September to January, *Crematogaster* sp. 454: September and October (Cantone see chapter 4); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *C. brevispinosa*: January, February, April, October to December, *C. quadriformis*: November to January, *Crematogaster* sp.: October to January (Kusnezov 1962); Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *Crematogaster* sp. bl1: January, May, July to September and December, *Crematogaster* sp. bl3: April to June, August and October,

Crematogaster sp. bl4: May to January, *C. stolii*: July to August and October to December (Kaspari et al. 2001); Puerto Rico: 18°17' N, 66°07' W, 300 meters sea level, *C. steinhelii*: May to December; 17°58' N, 66°52' W, 130 meters sea level, *C. steinhelii*: May to January and March (Torres et al. 2000);

References for Taxonomic identification

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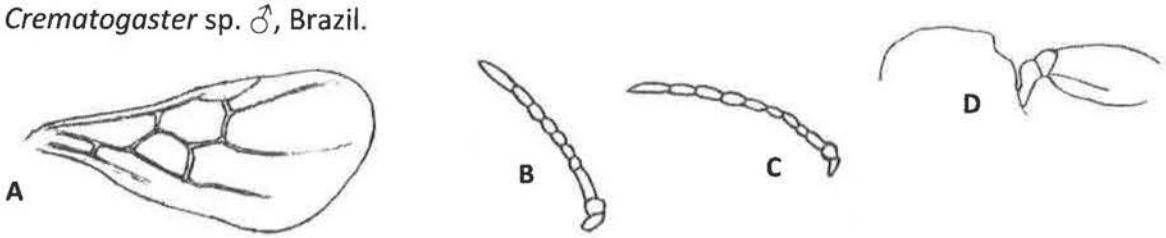
Figure – **A**: Forewing; **B**: Antennae of 10 articles; **D**: Antennae of 11 articles; **D**: Petiole of *Crematogaster* sp. ♂, Brazil.



♂ Genus ***Cyatta*** Sosa-Calvo, Schultz, Brandão et al., 2013

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput; Forewings of Typology II with Marginal cell closed; Hindwings of Typology II; Mesonotum with Notauli present; Mandibles triangular dentate.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Sosa-Calvo J., Schultz T.R., Brandão C.R.F., Klingenberg C., Feitosa R.M., Rabeling C., Bacci M., Lopes C.T., Vasconcelos H.L. (2016) *Cyatta abscondita*: Taxonomy, Evolution, and Natural History of a New Fungus-Farming ant genus from Brazil. PLOS ONE, Vol. 8, Issue 11.

♂ Genus ***Cyphomyrmex*** Mayr, 1862

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape overstep the Occiput; Forewings of Typology III with Marginal cell closed; Hindwings of Typology III; Mandible triangular dentate; Frontal lobe desenvolved; Mesonotum with Notauli present.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: male aggregation

Mating flight: Brazil: 14°46'17 S, 39° 4'28 W, 10 meters sea level, *C. peltatus*: January and December, *C. occultus*: March, April, Agugust and September, *C. dentatus*: December and February, *C. rimosus*: Ouctober to May and July, *C. trasversus*: all year (Delabie et al. 2002); 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Cyphomyrmex* sp 3: September to April (Cantone see chapter 4); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *C. rimosus*: November to May, *C. quebrade*: January and December, *C. nemei*: February,

Cyphomyrmex sp.: November to January and March (Kusnezov 1962); Puerto Rico: 18°17' N, 66°07' W, 300 meters sea level, *C. minutus*: April to December (Torres et al. 2000); Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *C. costatus*: January to April and October, *Cyphomyrmex* sp. rimosus group: January and March to August (Kaspari et al. 2001)

References for Taxonomic identification

-Creighton W.S. (1950) The ants of North America. Bulletin of the Museum of Comparative Zoology at Harvard College, Vol. 104.

-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.

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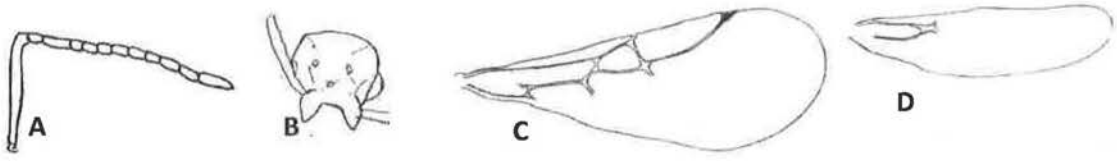
-Torres J. A., Snelling R. R. and Canals M. (2000) Seasonal and Nocturnal Periodicities in Ant Nuptial Flights in the Tropics (Hymenoptera: Formicidae). Sociobiology, Vol. 37, n° 3B.

-Wheeler W. M. (1907) The fungus-growing ants of North America. Bulletin of the American Museum of Natural History, Vol. 23, article 31, 669-807.

Figure – **A**: Antennae; **B**: Frontal lobe (dorsal view); **C**: Forewing; **D**: Hindwing of *Cyphomyrmex* sp. ♂, Brazil.



♂ Genus ***Dacetinops*** Brown and Wilson, 1957

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, the two articles apical elongate; Forewings of Typology II with Marginal cell open;

Hindwings of Typology II; Mandibles edentate; Palp formula 2:2; Mesonotum with Notauli present; MetaTibiae without Spur.

Bio-geographical distribution

Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Taylor R.W. (1985) The ants of the Papuasian genus *Dacetinops* (Hymenoptera: Formicidae: Myrmicinae). G.E. Ball (ed), Taxonomy, Phylogeny and Zoogeography of Beetles and Ants. Dordrecht ISBN 90-6193-511-3

♂ Genus ***Daceton*** Perty, 1833

Morphological characters used in the dichotomous key

Antennae with 13 article, Antennae Scape in length ≤ than the 2° article of the Funiculus; Forewings of Typology III with Marginal cell open, formica type; Hindwings of Typology II; Body total length 10 mm; Mandibles reduced truncaded apically; Mesonotum with Notauli present.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.

-AntWiki (2016) Photos *D. armigerum*. www.antwiki.org

♂ Genus ***Dilobocondyla*** Santschi, 1910

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than the 2° article of the Funiculus; Forewings of Typology II with Marginal cell open; Hindwings of Typology II; Mandible dentate; Mesonotum with Notauli present; Petiole and postPetiole similary shaped; MetaTibiae without Spur.

Bio-geographical distribution

Indo-Australian and Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Bharti H. and Kumar R. (2013) Five new species of *Dilobocondyla* (Hymenoptera: Formicidae) with a revised key to the known species. Asian Myrmecology, Vol. 5, 29-44.
-Varghese T. (2006) A new species of the ant genus *Dilobocondyla* (Hymenoptera: Formicidae) from India with notes on its nesting behavior. Oriental Insect, Vol. 40: 23-32.
-Wheeler W. M. (1935) News ants from the Philippines. Psyche, Vol. XLII, N° 1.

♂ Genus ***Dolopomyrmex*** Cover & Deyrup, 2007

Morphological characters used in the dichotomous key

Antennae with 11 articles, Antennae Scape in length > than the 2° article of the Funiculus, last 3 articles clavate; Forewings of Typology II with Marginal cell open and Discoidal cell small; Hindwings of Typology II; Mandibles dentate; Mesonotum with Notauli absent.

Bio-geographical distribution

Neartic

Behavioral Ecology of the Mating flight

Strategy: unknown
Mating flight: unknown

References for Taxonomic identification

-Cover S. and Deyrup M.(2007) A new ant genus from the SoutWestern Unided States. Memoirs of the American Entomological Institute, Vol. 80.

♂ Genus ***Epelysidris*** Bolton, 1987

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus; Forewings of Typology II with Marginal cell open, formica type; Hindwings of Typology II; Mandible dentate with 4 teeth; Mesonotum with Notauli absent.

Bio-geographical distribution

Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown
Mating flight: unknown

References for Taxonomic identification

-Ito F. and Yamane S. (2014) Reproduction by ergatoid queens in the Myrmicinae ant *Monomorium brocha* (Bolton) (Hymenoptera: Formicidae) in West Java, Indonesia, with a description of the male. Asian Myrmecology, Vol 6, 105-113.

♂ Genus ***Eurhopalotrix*** Brown & Kempf, 1961

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length < than the 2° article of the Funiculus; Forewings of Typology III and IV with Marginal cell open, solenopsis type; Hindwings of Typology III; Mandible edentate; Palp formula 1:1; Mesonotum with Notauli absent or weakly incised; MetaTibiae without Spur.

Bio-geographical distribution

Neotropical and Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: USA: 27°39' N, 81°30' W, *E. floridiana*: July to December (Deyrup et al. 1997)

References for Taxonomic identification

-AntWeb (2016) Photos *E. floridiana* Typus. www.antweb.org

-Brown W.L. and Kempf W.W. (1960) A World revision of the ant Tribe Basicerotini (Hym. Formicidae). Studia Ent., Vol. 3, fasc. 1-4.

-Deyrup M., Johnson C., Davis L. (1997) Notes on the ant *Eurhopalothrix floridiana*, with a description of the male (Hymenoptera: Formicidae). Ent. News 108(3): 183-189.

-Mann W. M. (1919) The ants of the British Solomon Island. Bulletin of the Museum of Comparative Zoology at Harvard College, Vol. 63, N° 7.

♂ Genus ***Eutetramorium*** Emery, 1899

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than the 2° article of the Funiculus; Forewings of Typology II with Marginal cell open; Hindwings of Typology II; Mandibles triangular dentate; Palp formula 4:3; Mesonotum with Notauli present weakly and anteriorly, with a longitudinal median carine anteriorly bifurcated between the Notauli; MetaTibiae with one Spur.

Bio-geographical distribution

Madagascar

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Bolton B. and Fisher B. (2014) The Madagascan endemic Myrmicine ants related to *Eutetramorium* (Hymenoptera: Formicidae): taxonomy of the genera *Eutetramorium* Emery, *Malagidris* nom.n., *Myrmisaraka* gen. n., *Royidris* gen. n., and *Vitsika* gen. n. Zootaxa 3791 (1): 001-099

♂ Genus ***Goniomma*** Emery, 1895

Morphological characters used in the dichotomous key

Antennae with 13 articles, last articles of the Funiculus versus clavate, Antennae Scape in length > than the 2° article of the Funiculus, not overstep the Occiput, 1° article of the Funiculus larger in diameter than the 2°; Forewings of Typology I with Marginal cell open; Hindwings of Typology II; Mandibles dentate; Palp formula 4:3; Mesonotum with Notauli absent.

Bio-geographical distribution

Mediterranean

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-AntWeb (2016) Photos *G. collingwood* Typus. www.antweb.org

-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.

-Espadaler G. (1984) *Leptothorax nadigi* Kutter, 1925 y *Goniomma blanci* (Andrè, 1881); Description de los machos (Hym. Formicidae). Boletin Asoc. Esp. Entom,, Vol. 8: 135-141.

-Espadaler X. (1986) *Goniomma kugleri*, a new granivorous ant from the Iberian Penisula (Hymenoptera: Formicidae). Istrael Journal of Entomology, Vol. 19: 61-66.

-Reyes Lopes J.L. and Porras Castillo A. (1984) Alar biometry in the Taxonimy of the species *Goniomma hispanicum* and *G. baeticum*. Insectes Sociaux, Vol. 31, n° 4, PP. 473-475.

-Reyes J.L., Espadaler X. and Rodriguez A. (1987) Description de *Goniomma baeticum* nov, sp. (Hym. Formicidae). Eos, Tomo 63, 269-276.

♂ Genus ***Harpagoxenus*** Forel, 1893

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape in length > than the 2° article of the Funiculus; Forewings of Typology II with Marginal cell open, formica type; Hindwings of Typology II; Mandibles short edentate; Mesonotum with Notauli present.

Bio-geographical distribution

Neartic, Paleartic and Oriental

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Creighton W.S. (1927) The slave-raid of *Harpagoxenus americanus*. Psyche, February.

-Emery C. (1916) Fauna entomologica italiana – Hymenoptera, Formicidae. Bull. Soc. Entomol. It. 47:79-275.

-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.

-Smith M. R. (1939) The Nord American ants of the genus *Harpagoxenus* Forel, with the description of a new species (Hymenoptera: Formicidae). Entomological Society of Washington, Vol. 41 N° 5.

♂ Genus ***Huberia*** Forel, 1890

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape in length < than the 2° article of the Funiculus; Forewing of Typology II with Marginal cell open; Hindwing of Typology II; Mandibles dentate; Mesonotum with Notauli present.

Bio-geographical distribution

New Zeland

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.

-Ettershank G. (1966) A generic revision of the World Myrmicinae related to *Solenopsis* and *Pheidologeton* (Hymenoptera: Formicidae). Australian Journal of Zoology, 14: 73-171.

-Forel A. (1894) Qualques Fourmis. Ann. Soc. Ent. Belg. Vol. 38.

♂ Genus ***Indomyrma*** Brown, 1986

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape in length > than the 2° article of the Funiculus, deformity of antennomere VII s-shaped; Forewing of Typology II with Marginal cell open, solenopsis type; Hindwing of Typology II; Mandible edentate elongate; Mesonotum with Notauli present.

Bio-geographical distribution

Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Brown W.L. (1986) *Indomyrma dasypyx*, new genus and species a Myrmicinae ant from Peninsular India (Hymenoptera: Formicidae). Israel Journal of Entomology, Vol. 19: 37-49.

♂ Genus ***Kalathomyrmex*** Klingenberg & Brandão, 2009

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape Overstep the Occiput, last three article

clavate; Forewing of Typology III with Marginal cell open; Hindwing of Typology II; Mandibles edentate; Mesonotum with Notauli absent.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Klingenberg C. and Brandão C.R.F. (2009) Revision of the fungus-growing ant genera *Mycetophylax* Emery and *Paramycetophylax* Kusnezov rev. stat., and description of *Kalathomyrmex* n. gen. (Formicidae:Myrmicinae: Attini). Zootaxa 2052: 1-31.

♂ Genus ***Leptothorax*** Mayr, 1855

Morphological characters used in the dichotomous key

Antennae with 12-13 articles, Antennae Scape > than the 2° article of the Funiculus not overstep the Occiput, last four articles of the Funiculus versus clavate; Mandible dentate; Forewing of Typology II and III with Marginal closed or open, formica or solenopsis type; Hindwing of Typology II; Mesonotum with Notauli present; MetaTibiae without Spur.

Bio-geographical distribution

Neartic, Paleartic, Indo-Oriental

Behavioral Ecology of the Mating flight

Strategy: female calling (Oberstadt and Heinze 2003)

Mating flight: United Kingdom: 53°18'13.79"N, 4°42'12.94"W, *L. acervorum*: July; Germany: *L. acervorum:* 49°11'50.23"N, 13°6'50.32"E, 1293 meters sea level, *L. acervorum*: September (Franks et al. 1991); Poland: 49°22'50.62"N, 20°33'19.93"E, *L. acervorum*: July and August, *L. nigriceps*: October (Woyciechowski 1987); Canada: 48°8'N, 69°43'W, *L. canadensis*: August (Heinze 1993).

References for Taxonomic identification

-Arnold G. (1916) A monograph of the Formicidae of South Africa (Myrmicinae). Annals of the South African Museum, Vol. XIV, Part II.

-Cagniant H. (1966) Description des trois castes de *Leptothorax tyndalei* (Forel) (Hym. Formicidae). Bulletin de la Societe entomologique de France, Vol. 71.

-Cagniant H. (1966) Description des males de *Lepthotorax annibalis* et *Camponotus atlantis* (Hym. Formicidae). Representation des trois castes chez ces deux especes. Ann. Soc. Ent. Fr., II(4): 967-974.

-Cagniant H. (1968) Description de *Leptothorax monjauzei* n. sp. d'Algerie (Hym. Formicidae). Bulletin de la Societe entomologique de France, Tome 73.

-Cagniant H. (1969) Nouvelle description de *Leptothorax spinosus* (Forel) d'Algerie. Representation des trois castes et note biologiques. Bulletin de la Societe Entomologique de France, Tome 74: 201-208.

-Cagniant H. and Espadaler X. (1997) Les *Leptothorax, Epimyrma* et *Chalepoxenus* du Maroc

(Hymenoptera: Formicidae). Clé et catalogue des espèces. Ann. Soc. Entomol. Fr. 33 (3): 259-284.
-Creighton W.S. (1950) The ants of North America. Bulletin of the Museum of Comparative Zoology at Harvard College, Vol. 104.
-Emery C. (1916) Fauna entomologica italiana – Hymenoptera, Formicidae. Bull. Soc. Entomol. It. 47:79-275.
-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.
-Espadaler X. and Collingwood C.A. (1982) Notas sobre *Leptothorax* Mayr, 1855, con descripcion de *L. gredosi* n. sp. (Hym. Formicidae). Boletin Asoc. Esp. Entom., Vol. 6: 41-48 - Salamanca.
-Espadaler G. (1984) *Leptothorax nadigi* Kutter, 1925 y *Goniomma blanci* (Andrè, 1881); Description de los machos (Hym. Formicidae). Boletin Asoc. Esp. Entom,, Vol. 8: 135-141.
-Espadaler X. and Rodriguez R. (1989) The male of *Leptothorax risi* Forel, 1892 (Hymenoptera, Formicidae). Orsis, 4: 141-144.
-Espadaler X. and Cagniant H. (1996) Leptothorax mirabilis n. sp. Une espèce enigmatique du Maroc (Hymenoptera, Formicidae). Bull. Soc. Zool. Fr. 12 (4): 331-337.
-Franks N.R., Sendova-Franks A.B., Sendova-Vassileva M. and Vassilev L. (1991) Nuptial flights and calling behaviour in the ant *Leptothorax acervorum* (Fabr). Ins. Soc. 38:327-330.
-Finzi B. (1939) Quinto contributo alla conoscenza della fauna mirmecologica della Venezia Giulia. Bollettino della Società Entomologica Italiana, Vol. 71, n° 5.
-Heinze J. (1993) Habitat structure, dispersal strategies and queen number in two boreal *Leptothorax* ants. Oecologia, 96: 32-39.
-Oberstadt B. and Heinze J. (2003) Mating biology and population structure of the ant, *Leptothorax gredleri*. Insect. Soc. 50: 340-345.
-Woyciechowski M. (1987) The phenology of nuptial flights of ants (Hymenoptera, Formicidae). Acta Zool. Cracov., 30, 10: 137-140.

♂ Genus ***Liomyrmex*** Mayr, 1865

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape in length ≤ than the 2° article of the Funiculus; Forewings of Typology II with Marginal cell closed; Hindwings of Typology II; Mesonotum with Notauli absent; Mandibles dentate; MetaTibiae without Spur.

Bio-geographical distribution

Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.
-Ettershank G. (1966) A generic revision of the World Myrmicinae related to *Solenopsis* and

Pheidologeton (Hymenoptera: Formicidae). Australian Journal of Zoology, 14: 73-171.
-Donisthorpe H. (1940) Description of new species of ant (Hym. Formicidae). Annals and Magazine of Natural History, Ser. 11, Vol. V.

♂ Genus ***Lophomyrmex*** Emery, 1892

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than the 2° article of the Funiculus, 1° article of the Funiculus conical form; Forewings of Typology II with Marginal cell open (Rigato 1994) or closed (Emery 1922); Hindwings of Typology II; Mandibles weakly developed serrate; Palp formula 2:2; Mesonotum with Notauli absent; Propodeum armed with teeth or weakly bituberculate; MetaTibiae without Spur.

Bio-geographical distribution

Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.
-Ettershank G. (1966) A generic revision of the World Myrmicinae related to *Solenopsis* and *Pheidologeton* (Hymenoptera: Formicidae). Australian Journal of Zoology, 14: 73-171.
-Rigato F. (1994) Revision of the Myrmicine ant genus *Lophomyrmex* with a review of its taxonomic position (Hymenoptera: Formicidae). Systematic Entomology 19:47-60

♂ Genus ***Lordomyrma*** Mann, 1921

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, not overstep the Occiput; Forewings of Typology II with Marginal cell closed and appendiculate; Hindwings of Typology II; Mandibles triangular edentate or dentate; Mesonotum with Notauli present.

Bio-geographical distribution

Indo-Australian and Oriental

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-AntWeb (2016) Photos *L. rugosa* and *L. tortuosa.* www.antweb.org
-Ogata K. (1991) A generic synopsis of the Poneroid complex of the family Formicidae in Japan (Hymenoptera). Part II. Subfamily Myrmicinae. Bull. Inst. Trop. Agr., Kyushu Univ. !4: 61-149.

-Wheeler W. M. (1927) The ants of Lord Howe Island and Noefolk Island. American Academy of Art and Sciences, Vol. 62, N° 4.

♂ Genus ***Malagidris*** Bolton & Fisher, 2014

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, not overstep the Occiput; Forewings of Typology II with Marginal cell open, formica type; Hindwings of Typology II; Mandibles dentate with 6-11 teeth; Mesonotum with Notauli absent; Metatibia with one Spur.

Bio-geographical distribution

Madagascar

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Bolton B. and Fisher B. (2014) The Madagascan endemic Myrmicine ants related to *Eutetramorium* (Hymenoptera: Formicidae): taxonomy of the genara Eutetramorium Emery, Malagidris nom.n., *Myrmisaraka* gen. n., *Royidris* gen. n., and *Vitsika* gen. n. Zootaxa 3791 (1): 001-099

♂ Genus ***Manica*** Jurine, 1807

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ subequal than the 2° article of the Funiculus; Forewings of Typology I with Rs2+3 vein incomplete and Marginal cell open; Hindwings of Typology II; Mandibles triangular dentate; Mesonotum with Notauli present; MetaTibiae with one pectinate Spur.

Bio-geographical distribution

Neartic, Paleartic and Oriental

Behavioral Ecology of the Mating flight

Strategy: female calling

Mating flight: Poland: 51°42' N, 19°44 E, *M. rubida*: June to August rarely in May or September (Depa 2006); USA: 40°29'1 N, 119°36'12 W, 1950 meters sea level, *M. bradleyi* and *M. mutica*: September (Wheeler and Wheeler 1970).

References for Taxonomic identification

-Cole A.C. (1957) description of sexual castes of some ants in the genera *Myrmica*, *Manica* and *Xiphomyrmex* from the Western Unided States (Hymenoptera: Formicidae). Journal of the Tennesee Academy of Science, Vol. 32, N° 3.

-Creighton W.S. (1950) The ants of North America. Bulletin of the Museum of Comparative Zoology at Harvard College, Vol. 104.

-Depa L. (2006) Weather conditions during nuptial flight of *Manica rubida* (Latraille, 1802)

(Hymenoptera: Formicidae) in Souther Poland. Myrmecologische Nachrichten, 9: 27-32, Wien.
-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.
-Ogata K. (1991) A generic synopsis of the Poneroid complex of the family Formicidae in Japan (Hymenoptera). Part II. Subfamily Myrmicinae. Bull. Inst. Trop. Agr., Kyushu Univ. !4: 61-149.
-Wheeler G. and Wheeler J. (1970) The Natural History of *Manica* (Hymenoptera: Formicidae), Journal of the Kansas Entomological Society, Vol. 43, N° 2.
-Wheeler W.M. (1914) The American species of *Myrmica* allied to *M. rubuda* Latrelle.Psyche, August.

♂ Genus ***Megalomyrmex*** Forel, 1885

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus not overstep the Occiput, one of various antennomeres are in several cases kinked (*M. symmetochus*: Antennae Scape overstep the Occiput; *M. incisus*: Antennae with 11 articles and clavate), first article of the Funiculus in length < than the second; Forewings of Typology II and III with Marginal cell open, formica or solenopsis type; Mesonotum with Notauli present or absent; Hindwings of Typology II; MetaTibiae with one Spur; Mandibles dentate; Palp formula 4:3, 3:3, 3:2.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *Megalomyrmex* sole 1: July, September to February, *Megalomyrmex* sole 3: January to October, *M. symmetochus*: April to August; Argentine: 26°58'S, 64°51'W, 800 meters sea level, *M. silvestri*: February (Kusnezov 1962).

References for Taxonomic identification

-Boudinot B. E., Sumnicht T.P. and Adams R.M.M. (2013) Central American ants of the genus *Megalomyrmex* Forel (Hymenoptera: Formicidae): six new species and keys to workers and males. Zootaxa 3732 (1): 1-82.
-Brandão C.R.F. (1990) Systematic revision of the Neotropical ant genus *Megalomyrmex* Forel (Hymenoptera: formicidae: Myrmicinae) with the description of thirteen new species. Arquivo de Zoologia, Vol. 31, Fasc. 5, São Paulo.
-Brandão C.R.F. (2003) Further revisionary studies on the ant genus *Megalomyrmex* Forel (Hymenoptera: Formicidae: Myrmicinae: Solenopsidini). Papeis Avulso de Zoologia, Vol. 43(8): 145-159, São Paulo, Brazil.
-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.
-Ettershank G. (1966) A generic revision of the world Myrmicinae related to *Solenopsis* and

Pheidologeton (Hymenoptera: Formicidae). Aust. J. Zool., 14:73-171.
-Longino J.T. (2010) A taxonomic review of the ant genus *Megalomyrmex* Forel (Hymenoptera: Formicidae) in Central America. Zootaxa 2720: 35-58.
-Kaspari M., Pickering J., Longino J.T and Windsor D. (2001) The phenology of a Neotropical ant assemblage: evidence for continuous and overlapping reproduction. Behav. Ecol. Sociobiol., 50: 382-390.
-Kusnezov N. (1962) El vuelo nupcial de las hormigas. Acta Zoologica Lilloana, tomo 18, 385-442.

♂ Genus ***Melissotarsus*** Emery, 1877

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape in lenght > than the 2° article of the Funiculus, first article of the Funiculus in length < than the second; Forewings of Typology III with Marginal closed; Mandibles edentate; Hindwing of Typology II; Mesonotum with Notauli absent; Size Habitus 2,5 mm; second article of the Tarsus small in length and equal to following.

Bio-geographical distribution

Afrotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Arnold G. (1916) A monograph of the Formicidae of South Africa. Annals of the South African Museum, Vol. 14, Part. II.
-Delage-Darchen B. (1972) Une formi de Cote D'Ivoire *Melissotarsus titubans* Del., n. sp. Insect. Soc., Vol. 19, N° 3.
-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.
-Santschi F. (1911) Nouvelle fourmis de Madagascar. Annales Societè Zoologique Suisse, Vol. 19,n° 4.

♂ Genus ***Meranoplus*** Smith F., 1853

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than the 2° article of the Funiculus; Forewings of Typology II with Marginal cell closed and apendiculate; Hindwings of Typology II; Mesonotum with Notauli present; MetaTibiae with one Spur; Mandibles edentate; Size Habitus 2,5 mm

Bio-geographical distribution

Afrotropical, Madagascar, Indo-Australian and Australia

Behavioral Ecology of the Mating flight
Strategy: male aggregation syndrome
Mating flight: South Africa: 26°09'S, 28°00'E, *M. peringueyi*: November (Robertson and Villet 1989).
References for Taxonomic identification
-Boudinot B.E. and Fisher B.L. (2013) A taxonomic revision of the *Meranoplus* F. Smith of Madagascar (Hymenoptera: Formicidae: Myrmicinae) with keys to species and disgnosis of the males. Zootaxa 3635 (4): 301-339.
-Boudinot B.E. (2014) Rediscovery of *Tricytarsus* Donisthorpe, 1947, a new genus-level synonym of *Meranoplus* Smith F., 1853 (Hymenoptera: Formicidae: Myrmicinae). Myrmecological news, 20: 95-100.
-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.
-Robertson H. G. and Villet M. (1989) Mating behavior in three species of Myrmicine ants (Hymenoptera: Formicidae). Journal of Natural History, 23: 767-773.
-Wheeler W.M. (1922) Ants of the American Museum Congo Expedition. A contribution to the Myrmecology of Africa. The American museum of natural History, Vol XLV.

♂ Genus ***Mesostruma*** Brown, 1948

Morphological characters used in the dichotomous key
Antennae with 13 articles, Antennae Scape in length ≤ than the 2° article of the Funiculus; Forewings of Typology II with Marginal cell open, solenopsis type; Hindwings of Typology II; Mandibles edentate; Mesonotum with Notauli present; MetaTibiae without Spur.
Bio-geographical distribution
Australian
Behavioral Ecology of the Mating flight
Strategy: unknown
Mating flight: unknown
References for Taxonomic identification
-Taylor R.W. (1962) New Australian Dacetine ants of the genera *Mesostruma* Brown and *Codiomirmex* Wheeler (Hymenoptera-Formicidae). Cambridge, Mass., N° 152.

♂ Genus ***Messor*** Forel, 1890

Morphological characters used in the dichotomous key
Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus; Forewings of Typology I and Marginal cell open; Hindwings of Typology II; Mandible dentate; MetaTibiae with simple Spur.
Bio-geographical distribution
Paleartic, Afrotropical and Indo-Oriental

Behavioral Ecology of the Mating flight
Strategy: male aggregation
Mating flight: Spain: 40°27'N, 3°44'W, *M. barbatus*: September and October (Gomez and Abril 2012).
References for Taxonomic identification
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♂ Genus ***Metapone*** Forel, 1911

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape > than the 2° article of the Funiculus, 2° article of the Funiculus extremely short; Forewings of Typology II with Marginal cell open. formica type; Hindwings of Typology II, Mandibles dentate; Mesonotum with Notauli absent.

Bio-geographical distribution
Afrotropical and Indo-Australian
Behavioral Ecology of the Mating flight
Strategy: unknown
Mating flight: unknown

References for Taxonomic identification

-Alpert G. D. (2007) A review of the ant genus *Metapone* Forel from Madagascar. Pp. 8-18 in Snelling R.R., Fisher B.L. and Ward P.S: (eds). Advances in ant systematic (Hymenoptera: Formicidae): homage to E.O. Wilson – 50 years of contribution. Memoirs of the American Entomological Institute, 80.
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♂ Genus ***Monomorium*** Mayr, 1855

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus not overstep the Occiput; Forewings of Typology II and III with Marginal cell open, solenopsis type; Hindwings of Typology II, Mandibles dentate (edentate in *M. hospitum*); Mesonotum with Notauli absent.

Bio-geographical distribution

Cosmopolitan

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Puerto Rico: 18°17' N, 66°07' W, 300 meters sea level, *M. ebeninum*: May, August and December. *M. floricola*: November (Torres et al. 2000).

References for Taxonomic identification

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(Hymenoptera: Formicidae). Invertebrate Taxonomy, 15: 353-459.
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♂ Genus ***Mycetagroicus*** Brandão & Mayhé-Nunes, 2001

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape overstep the Occiput, last three articles of Funiculus clavate; Forewings of Typology III with Marginal cell open; Hindwings of Typology II; Mesonotum with Notauli present; Mandibles triangular dentate.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Brazil: 23°35'23.91"S, 46°39'37.06"W, 760 meters sea level, *M. urbanus*: October (Brandao and Mayhé-Nunes 2001)

References for Taxonomic identification

-Brandão and Mayhé-Nunes (2001) A new fungus-growing ant genus, *Mycetagroicus* gen. n., with the description of three new species and comments on the monophyly of the Attini (Hymenoptera: Formicidae). Sociobiology, Vol. 38, N° 3B.
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♂ Genus ***Mycetarotes*** Emery, 1913

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus overstep the Occiput or not, first article of the Funiculus in length < than the second, Forewings of Typology III with Marginal cell closed, formica type; Hindwings of Typology II; Mesonotum with Notauli present; Mandibles triangular edentate; Propodeum armed.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Argentine: 26°58'S, 64°51'W, 800 meters sea level, *Mycetarotes* sp.: Novemeber to January (Kusnezov 1962); Brazil: 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Mycetarotes* sp. 208: January (Cantone see chapter 4).

References for Taxonomic identification

-Mayhé-Nunes A.J. and Brandão C.R.F. (2006) Revisionary notes on the fungus-growing ant genus *Mycetarotes* Emery (Hymenoptera, Formicidae). Revista Brasileira de Entomologia 50(4): 463-472.

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♂ Genus ***Mycetophylax*** Emery, 1913

Morphological characters used in the dichotomous key

Antennae with 12 or 13 articles; Scape overstep the Occiput, last three article of Funiculus clavate or versus clavate; Forewings of Typology III with Marginal cell open and closed; Hindwings of Typology III; Mesonotum with Notauli present; Mandibles triangular dentate; MetaTibiae without Spur; Propodeum armed or unarmed.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Brazil: 14°46'17 S, 39° 4'28 W, 10 meters sea level, *M. conformis*: January March to May and August; *Mycetophylax* sp.: January (Delabie et al. 2002); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *M. emeryi*: November to February (Kusnezov 1962).

References for Taxonomic identification

-Delabie J.H.C., Nascimento I.C. and Mariano C.S.F. (2002) Estrategias de reprodução e dispersão em formiga Attines, com exsemplos do Sul da Bahia. CD – Resumos do 19° Congresso Brasileiro de Entomologia, Manaus, Amazonas, Brasil.

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♂ Genus ***Mycetosoritis*** Wheeler W.N., 1907

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput; Forewings of Typology

III with Marginal cell closed and appendiculate, formica type; Hindwings of Typology II; Mesonotum with Notauli present; Mandibles edentate; Propodeum armed with two spines.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-AntWeb (2017) Photos *M. hortmani* Typus. www.antweb.org

-Wheeler W. M. (1907) The fungus-growing ants of North America. American Museum of Natural History, Vol. 23, art. 31: 669-807.

♂ Genus ***Mycocepurus*** Forel, 1893

Morphological characters used in the dichotomous key

Antennae with 13 articles or 11 in *M. castrator*, Antennae Scape overstep the Occiput,; Forewings of Typology III and IV in *M. castrator* with Marginal cell closed, formica type; Hindwings of Typology II; Mesonotum with Notauli present; Mandibles edentate; Propodeum armed.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Brazil: 22°28'6.32"S, 48°59'16.73"W, 600 meters sea level, *M. goeldii*: October (Kemf 1963); 14°46'17 S, 39° 4'28 W, 10 meters sea level, *M. smithi*: December to June and Ouctober (Delabie et al. 2002); Brazil: 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Mycocepurus* sp. 470: January, March and April (Cantone see chapter 4); Puerto Rico: 18°17' N, 66°07' W, 300 meters sea level, *M. smithii*: July (Torres et al. 2000).

References for Taxonomic identification

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-Delabie J.H.C., Nascimento I.C. and Mariano C.S.F. (2002) Estrategias de reprodução e dispersão em formiga Attines, com exemplos do Sul da Bahia. CD – Resumos do 19° Congresso Brasileiro de Entomologia, Manaus, Amazonas, Brasil.

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Figure – **A**: Antennae; **B**: Forewing of *Mycocepurus* sp. ♂, Brazil.

♂ Genus ***Myrmecina*** Curtis, 182ɔ

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus not overstep the Occiput; Forewings of Typology III with Marginal cell closed and apendicolata, solenopsis type; Hindwings of Typology II, Mandibles reduced, Mesonotum with Notauli present; Propodeum armed.

Bio-geographical distribution

Neartic, Paleartic, Oriental, Indo-Australian and Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Emery C. (1916) Fauna entomologica italiana – Hymenoptera, Formicidae. Bull. Soc. Entomol. It. 47:79-275.

-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.

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-Lyu D.P. and Cho S. (2003) Review of genus *Myrmecina* (Hymenoptera: Formicidae: Myrmicinae) of Korea. Ins. Koreana, 20 (2): 187-193.

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♂ Genus ***Myrmica*** Latreille, 1804

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, last 4-5 articles of the Funiculus clavate; Forewings of Typology I and II with Marginal cell open, Rs2+3 vein incomplete; Hindwings of Typology II; Mandibles triangular dentate; Mesonotum with Notauli present; Metatibie with pectinate Spur.

Bio-geographical distribution

Neartic, Paleartic, Oriental, Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: male aggregation (Kannowski and Kannowski 1957); multi mating (Sliwinska et al. 2008).

Mating flight: Paleartic: *M. rubra*: August to October, *M. ruginodis*: August and September, *M. sulcinodis*: August and September, *M. lobicornis*: July and August, *M. rugulosa*: August to October, *M. specioides*: August and September, *M. scabrinodis*: July to October, *M. sabuleti*: August and September, *M. schencki*: August and September (Radchenko et al. 1997, Seifert B. 1988); Italy: 44°16'32.40"N, 11°21'24.34"E, 600 meters sea level, *M. scabrinodis*: September; Poland: 49°22'50.62"N, 20°33'19.93"E, *M. scabrinodis*, *M. rubra*, *M. ruginodis* and *M. sabuleti*: August and September, *M. schenki* and *M. lobicornis*: August (Woyciechowski 1987); USA: 42°17'3.02"N, 83°45'1.53"W, 240 meters sea level, *M. americana*: September and October; 41°22'52.18"N, 83°38'32.36"W, 200 meters sea level, *M. americana*: September and October, *M. emeryana*: July (Kannowski and Kannowski 1957)

References for Taxonomic identification

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♂ Genus ***Myrmicaria*** Saunders W.W., 1842

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, not overstep the Occiput; Forewings of Typology II with Marginal cell open; Hindwings of Typology II; Mesonotum with Notauli present; Mandibles edentate marginally; Telomere long and narrow, blade-like; MetaTibiae without Spur.

Bio-geographical distribution

Afrotropical. Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Cameroon: 3°51'33.73"N, 11°29'57.71"E, *M. opaciventris*: March and April (Kenne and Dejean 1998).

References for Taxonomic identification

-AntWeb (2016) Photos *M. flava* Typus. www.antweb.org
-Arnold G. (1916) A monograph of the Formicidae of South Africa. Annals of the South African Museum, Vol. 14, Part. II.
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♂ Genus ***Myrmycocrypta*** Smyh F., 1860

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, not overstep the Occiput, first article of the Funiculus in length < than the second; Forewings of Typology III with Marginal cell closed; Hindwings of Typology III; Mandibles triangular dentate; Mesonotum with Notauli present and longitudinal carine; Propodeum armed.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Brazil: 14°46'17 S, 39° 4'28 W, 10 meters sea level *M. microphtalma*: February to April and June to October; *Myrmicocrypta* sp.: February and July (Delabie et al. 2002); 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Myrmicocrypta* sp. 356: April; 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Myrmicocrypta* sp. 445: October (Cantone see chapter 4); Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *Myrmicocrypta* sp. bmtcbm: January and May to November, *M. dilacerate*: January, February and April to June (Kaspari et al. 2001); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *M. bruchi*: October to January (Kusnezov 1962).

References for Taxonomic identification

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-Sosa-Calvo J. and Schultz T.R. (2010) Three remarkable new fungus-growing ant species of the genus *Myrmicocrypta* (Hymenoptera: Formicidae), with a reassessment of the characters that define the genus and its position within the Attini. Annales of the Entomological society of America, Vol. 103, N° 2.

Figure – **A**: Antennae; **B**: Hindwing; **C**: Forewing of *Myrmicocrypta* sp. ♂, Brazil.

♂ Genus ***Myrmisaraka*** Bolton & Fisher, 2014

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape in length < than the 2° article of the Funiculus; Forewings of Typology II with Marginal cell open; Hindwings of Typology II; Mandibles triangular strongly dentate; Notauli absent or reduced; MetaTibiae with one Spur.

Bio-geographical distribution

Madagascar

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Bolton B. and Fisher B. (2014) The Madagascan endemic Myrmicine ants related to *Eutetramorium* (Hymenoptera: Formicidae): taxonomy of the genara *Eutetramorium* Emery, *Malagidris* nom.n., *Myrmisaraka* gen. n., *Royidris* gen. n., and *Vitsika* gen. n. Zootaxa 3791 (1): 001-099.

♂ Genus ***Nesomyrmex*** W.N. Wheeler, 1910

Morphological characters used in the dichotomous key

Antennae with 12-13 articles, if 13, sometimes, of the intermediate segment partly ankylosed, Antennae Scape > than the 2° article of the Funiculus, not overstep the Occiput; Forewings of Typology III with Marginal cell closed and short, formica type; Hindwings of Typology II; Mandibles dentate; Mesonotum with Notauli present.

Bio-geographical distribution

Neotropical and Afrotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Brazil: 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, Nesomyrmex sp. 468: January to March (Cantone).

References for Taxonomic identification

-AntWeb (2016) Photos *N. asper* Typus. www.antweb.org

-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.

-Kempf W.W. (1959) A synopsis of the New World species belonging to the *Nesomyrmex*-Group pf the ant genus *Leptotorax* Mayr (Hymenoptera: Formicidae). Studia entomol., 2.

♂ Genus ***Novomessor*** Emery, 1915

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, not overstep the Occiput, 1° article of the Funiculus ≤ than the 2°; Forewings of

Typology III with Marginal cell open, formica type; Hindwings of Typology II; Mesonotum with Notauli absent; Mandibles dentate.

Bio-geographical distribution

Neartic

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References

-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.

-Creighton W.S. (1950) The ants of North America. Bulletin of the Museum of Comparative Zoology at Harvard College, Vol. 104.

-Wheeler W. M. (1910) Ants, their structure, development and behavior. Columbia University Biological Series IX. pp 273, 284, fig. 155.

-Wheeler W. N. and Mann W. M. (1914) The ants of Haiti. American Museum of Natural History, Vol. 33, art. I: 1-61.

-Wheeler W.M. and Creighton W.S. (1934) A study of the ant genera *Novomessor* and *Veromessor*. American Academy of Arts and Sciences, Vol. 69, N° 9.

♂ Genus ***Ochetomyrmex*** Mayr, 1868

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, not overstep the Occiput; Forewings Typology II with Marginal cell open, formica type; Hindwings of Typology II; Mandible dentate; Palp formula 3:2; Mesonotum with Notauli absent.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Ettershank G. (1966) A generic revision of the World Myrmicinae related to *Solenopsis* and *Pheidologeton* (Hymenoptera: Formicidae). Australian Journal of Zoology, 14: 73-171.

-Fernandez F. (2003) Myrmicinae ants of genera *Ochetomyrmex* and *Tranopelta* (Hymenoptera: Formicidae). Sociobiology, Vol. 41, N° 3.

-Kempf W. W. (1975) Miscellaneous Studies on Neotropical Ants. VI. (Hymenoptera: Formicidae). Studia Ent., Vol. 18, fasc. 1-4.

-Kusnezov N. (1957) Die Solenopsidinen-Gattungen von Sudamerika (Hymenoptera, Formicidae). Sonderdruck aus, Zoologischer Anzeiger Bd. 158, Heft 11/12.

♂ Genus ***Octostruma*** Forel, 1912

Morphological characters used in the dichotomous key

First description: Antennae with 13 articles, Antennae Scape in lenght > than the 2° article of the Funiculus, not overstep the Occiput; Forewings of Typology III with Marginal cell open, solenopsis type; Hindwings of Typology II; Mesonotum with Notauli present; Mandible reduced; Palp formula 1:2; Propodeum armed; MetaTibiae without Spur.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Brazil: 23°38', 45°53'W, 900 meters sea level, *O. rugifera*: February (Feitosa et al. 2016)

References for Taxonomic identification

Undescribed

-ANTWEB (2016) Photo *O. amrishi* Makhan 2007. www.antweb.org

-AntWiki (2017) Description O. amrishi. www.antwiki.org

-Feitosa R. M., Silva R. R., Auiar A. P. (2016) Diurnal flight periodicity of a Neotropical ant assemblage (Hymenoptera, Formicidae) in the Atlantic Forest. Revista Brasileira de Entomologia 60, 241-247.

♂ Genus ***Ocymyrmex*** Emery, 1886

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length < than the 2° article of the Funiculus; Forewings of Typology III with Marginal cell closed, formica type; Hindwings of Typology II; Mesonotum with Notauli absent; Mandibles narrow edentate.

Bio-geographical distribution

Afrotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-AntWeb (2017) Photos *O. fortior* Typus. www.antweb.org

-Arnold G. (1916) A monograph of the Formicidae of South Africa. Annals of the South African Museum, Vol. 14, Part. II.

-Bolton B. and Marsh A.C. (1989) The Afrotropical thermophilic ant genus *Ocymyrmex* (Hymenoptera: Formicidae). Journal of Natural Hystory, 23:1267-1308.

-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.

♂ Genus ***Orectognathus*** F. Smith, 1853

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length < than the 2° articles of the Funiculus; Forewings of Typology II with Marginal cell open; Hindwings of Typology II; Mandibles reduced; Mesonotum with Notauli present; Propodeal teeth reduced; Petiole elongate anteriorly; MetatTibiae without Spur.

Bio-geographical distribution

Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Brown W.L. (1953) A revision of the Dacetine ant genus *Orectognatus*. Memoirs of the Queensland Museum, 13: 84-104.

-Emery C. (1914) Les formis de la Nouvelle-Caledonie & des iles Loyalty. A. Zoologie, Vol. I, L. IV, Wiesbaden.

-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.

♂ Genus ***Oxyepoecus*** Santschi, 1926

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than the 2° articles of the Funiculus; Forewings of Typology II with Marginal cell open; Hindwings of Typology II; Mesonotum with Notauli absent; Mandibles dentate; Palp formula 2:2; Propodeal spines with wide base short or absent; MetaTibiae without Spur.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Argentine: 26°58'S, 64°51'W, 800 meters sea level, *O. bruchi*: November to January (Kusnezov 1962).

References for Taxonomic identification

-Albuquerque N.L.d. and Brandão C.L.F. (2004) A revision of the Neotropical Solenopsidini ant genus *Oxyepoecus* Santschi, 1926 (Hymenoptera: Formicidae: Myrmicinae). 1. The Vezenyii species-group. Papeis Avulso de Zoologia, Vol. 44(4): 55-80.

-Albuquerque N.L.d. and Brandão C.L.F. (2009) A revision of the Neotropical Solenopsidini ant genus *Oxyepoecus* Santschi, 1926 (Hymenoptera: Formicidae: Myrmicinae). 2. Final. Key for species and revision of the Rastratus species-group. Papeis Avulso de Zoologia, Vol. 49(23): 289-309.

-Ettershank G. (1966) A generic revision of the World Myrmicinae related to *Solenopsis* and *Pheidologeton* (Hymenoptera: Formicidae). Australian Journal of Zoology, 14: 73-171.

-Kempf W.W. (1974) A review of the Neotropical Ant genus *Oxyepoecus* Santschi (Hym. Formicidae). Studia Entomologica, Vol. 17.
-Kusnezov N. (1962) El vuelo nupcial de las hormigas. Acta Zoologica Lilloana, tomo 18, 385-442.

♂ Genus ***Oxyopomyrmex*** André, 1881

Morphological characters used in the dichotomous key

Antennae with 12 articles with last articles versus clavate, Antennae Scape in length > than the 2° article of the Funiculus reaching the Occiput; Forewings of Typology II with Marginal cell open, solenopsis type; Hindwings of Typology II; Mandibles dentate; Mesonotum with Notauli absent; ventral surface of the head with a long psammophore; MetaTibiae without Spur.

Bio-geographical distribution

Afrotropical and Mediterranean

Behavioral Ecology of the Mating flight

Strategy: unknown
Mating flight: unknown

References for Taxonomic identification

-Bondroit J. (1918) Les Formis de France et de Belgique. Annales de La Societè Entomologique de France, Vol. 87.
-Délye G. (1971) *Oxyopomyrmex emeryi* Santschi (Hym. Formicidae) dans le grand ERG Occidental. Description des sexues. Nouv. Rev. Ent., 1: 211-214.
-Emery C. (1889) Intorno ad alcune formiche della fauna paleartica. Annali del Museo Civico di Storia Naturale di Genova, Serie 2°, Vol. VII(XXVII).
-Salata S. and Borowiec L. (2015) A taxonomic revision of the genus *Oxyopomyrmex* André, 1881 (Hymenoptera: Formicidae). Zootaxa 4025(1): 1-66.

♂ Genus ***Paramycetophylax*** Kusnezov, 1956

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput, last articles versus clavate; Forewings of Typology III with Marginal cell open; Hindwings of Typology II?; Mandibles edentate marginally and bidentate apically; Mesonotum with Notauli absent. In the dichotomous key, I hypothesize that the Hindwings are like in *Mycetophylax*, how old classification of the Santschi (1922).

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown
Mating flight: unknown

References for Taxonomic identification

-Klingenberg C. and Brandão C.R.F. (2009) revision of the fungus-growing ant genera

Mycetophylax Emery and *Paramycetophylax* Kusnezov rev, stat., and description of *Kalathomyrmex* n. gen. (Formicidae: Myrmicinae: Attini). Zootaxa 2052: 1-31.
-Santschi F. (1922) Myrmicines, Dolichoderines et autres formicides Neotropiques. Bulletin de la Societé Vaudoise des Sciences Naturelles, Vol. 54,N° 205

♂ Genus ***Paratopula*** W.M. Wheeler, 1919

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape the double in length of the 2° article del Funiculus, not overstep the Occiput; Forewings of Typology II with Marginal cell closed and appendiculate, SubMarginal 1 cell can be opened; Hindwings of Typology II; Mandibles broad and strongly developed dentate; Palp formula 5:3; Mesonotum with Notauli present; Telomere elongate and prominent.

Bio-geographical distribution

Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown
Mating flight: unknown

References for Taxonomic identification

-ANTWEB (2016) Photos of *P. adamenensis* Typus, *P. macta*, *P. oculata* Holotypus. www.antweb.org
-Bolton B. (1988) A review of *Paratopula* Wheeler, a forgotten genus of Myrmicine ants (Hymenoptera, Formicidae). Entomologist's Monthly Magazine, Vol. 124.

♂ Genus ***Patagonomyrmex*** Johnson & Moreau, 2016

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape as long as the sum first 4-5 articles of Funiculus, not overstep the Occiput; Forewings of Typology II with Marginal cell closed; Hindwings of Typology II; Mandibles wide dentate; Mesonotum with Notauli present.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown
Mating flight: unknown

References for Taxonomic identification

-Johnson R.A. and Moreau C.S. (2016) A new ant genus southern Argentina and souther Chile, *Patagonomyrmex* (Hymenoptera: Formicidae). Zootaxa 4139(1): 1-31.

♂ Genus ***Pheidole*** Westwood, 1839

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≥ than the 2° article of the Funiculus, first article of the Funiculus globose, last 4 articles of the Funiculus gradually increasing in lenght; Forewings of Typology I with Marginal cell closed; Hindwings of Typology II and III, Mandibles dentate; Mesonotum with Notauli present.

Bio-geographical distribution

Cosmopolitan

Behavioral Ecology of the Mating flight

Strategy: female calling?

Mating flight: USA: 34°8'21N, 107°50'27W, 2000 meters sea level, *Pheidole sitarches*: August (Wilson 1957); Puerto Rico: 18°17' N, 66°07' W, 300 meters sea level, P. moerens: all year, *P. subarmata*: all year (Torres et al. 2000); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *P. bruchi, P. descolei, P. flavens, P. fallax, P. vallifica, P. radoszkwskii, P. triconstricta* and *P. scapulata*: January and December, *P. fimbriata, P. silvestrii*: November to January, *P. spininodis*: December, *Pheidole* sp.: November to April (Kusnezov 1962); Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *Pheidole* sp. bcilt1: May to July, *Pheidole* sp. bcilt11, *Pheidole* sp. bcilt14: May to October, *Pheidole* sp. bcilt12 *Pheidole* sp. bcilt16: May to January, *Pheidole* sp. bcilt15: July to January, *Pheidole* sp. bcilt5: March, May, July to September, *Pheidole* sp. bcilt6: March to January, *P. christopherseni*: December to March, *P. diligens* group: May, June, September and October (Kaspari et al 2001); Brasil: 20°45' S, 45°52' W, 700 meters sea level, *Pheidole* sp. 1: October to July (Cardoso do Nascimento 2002); 14°37'04''S, 39°04' 07''W, 10 meters sea level, *Pheidole* sp.1: September to April and June, *Pheidole* sp.2: October to June, *Pheidole* sp.11: December to July; *Pheidole* sp. 5: all year (Cardoso do Nascimento 2006); 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Pheidole* sp. 203 and 204: October, *Pheidole* sp. 216: October to December, *Pheidole* sp. 248 and 257: November, *Pheidole* sp. 302: December to March, *Pheidole* sp. 342: February and March, *Pheidole* sp. 45: October, December, January and June, *Pheidole* sp. 54: September to April, *Pheidole* sp. 67: October to April; 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Pheidole* sp. 54: November to March, *Pheidole* sp. 114: December, January, March and April (Cantone see chapter 4).

References for Taxonomic identification

-Cardoso do Nascimento I. (2002) Fenologia do voo nuptial e amostragem de comunidade de formigas (Hymenoptera: Formicidae) em area de Mata Atlantica do municipio de Viçosa, Minas Gerais. Universidade Federal de Viçosa, Dissertação (mestrado).

-Cardoso do Nascimento I. (2006) Fenologia dos voos de acasalamento em formigas Tropicais. Universidade Federal de Viços, Tese (doutorado).

-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.

-Forel A. (1910) Formicides australiens reçus de MM. Frogatt et Rowland Turner. Annales de la Societé Zoologique Suisse,Tome 18, Fasc. I.

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Sociobiol., 50: 382-390.
-Kusnezov N. (1962) El vuelo nupcial de las hormigas. Acta Zoologica Lilloana, tomo 18, 385-442.
-Ogata K. (1991) A generic synopsis of the Poneroid complex of the family Formicidae in Japan (Hymenoptera). Part II. Subfamily Myrmicinae. Bull. Inst. Trop. Agr., Kyushu Univ. !4: 61-149.
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-Torres J. A., Snelling R. R. and Canals M. (2000) Seasonal and Nocturnal Periodicities in Ant Nuptial Flights in the Tropics (Hymenoptera: Formicidae). Sociobiology, Vol. 37, n° 3B.
-Wheeler W.M. (1922) Ants of the American Museum Congo Expedition. A contribution to the Myrmecology of Africa. The American museum of natural History, Vol XLV.
-Wilson E.O. (1957) The organization of a nuptial flight of the ant *Pheidole sitarches* Wheeler. Psyche 64:46-50.

Figure – **A**: Forewing; **B**: Hindwing; **C**: Antennae; **D**: Petiole and PostPetiole of *Pheidole* sp. ♂, São Paulo, Brazil.

♂ Genus ***Podomyrma*** F. Smith, 1859

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape in length > than the 2° article of the Funiculus, first article of the Funiculus in length < than the second; Forewings of Typology III with Marginal cell closed; Hindwings of Typology II, Mandibles edentate; Mesonotum with Notauli absent.

Bio-geographical distribution

Australia

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-ANTWIKI (2016) Photos of *P. carinata* Typus. www.antwiki.org
-Emery C. (1897) Viaggio di Lamberto Loria nella Papuasia Orientale. Ann. Mus. Civ. Stor. Nat. 38: 546-576.
-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.
-Donisthorpe H. (1947) Ants from New Guinea, including new species and new genus. Annals and Magazine of Natural Hisory, Ser. II, Vol.13.

♂ Genus ***Pogonomyrmex*** Mayr, 1868

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > that the 2° article of the Funiculus or ≤ in some species with Forewing of Typology II; Forewings of Typology I with Marginal cell closed and II with Marginal cell open; Hindwings of Typology II; Mandibles dentate; Mesonotum with Notauli present or absent; MetaTibiae with one Spur pectinate rarely simple.

Bio-geographical distribution

Neartic and Neotropical

Behavioral Ecology of the Mating flight

Strategy: male aggregation (Wiernasz et al. 1995) (Wheeler Ants 1910: 288)

Mating flight: USA: 39°58'46.31"N, 111°56'51.95"W, 1640 meters, *P. occidentalis*: July (Allred 1979); 39° 16'N, 108° 45' W, 1470 meters sea level, *P. occidentalis*: July and August; 30°15'21 N, 97°59'30 W, *P. molefaciens*: June and July (Wheeler 1910); 34°16'9.18"N, 116°56'32.61"W, 2100 meters sea level, *P. montanus*: August and; 34°10'51.59"N, 116°55'46.12"W, 1500 meters sea level, *P. montanus*: August; 33°57'51.62"N, 117°20'20.30"W, 300 meters sea level, *P. rugosus*: October (MacKay 1981); 31°53'3.33"N 109°12'22.12"W 1500-1600 meters sea level, *P. barbatus*, *P. rugosus*, *P. desertorum*: July and August (Hölldobler 1976); Argentine: 41°0'43.24"S, 62°46'54.07"W, 15 meters sea level, *P. coarctatus*: January (Kusnezov, 1951); 24°13'24.10"S, 66°19'30.52"W, 3800 sea level, *P. longibarbis andinus*: December (Kusnezov, 1951); Brazil: 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Pogonomyrmex* sp. 280: December to January, *Pogonomyrmex* sp. 319: January, *Pogonomyrmex* sp. 248: November (Cantone see chapter 4).

References for Taxonomic identification

-Allred D. M. (1979) Swarming of the Western harverster ant, *Pogonomyrmex occidentalis*. Great Basin Naturalist, Vol. 40, N° 2.

-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.

-Creighton W.S. (1950) The ants of North America. Bulletin of the Museum of Comparative Zoology at Harvard College, Vol. 104.

-Kusnezov N. (1949) *Pogonomyrmex* del grupo *Ephebomyrmex* en la fauna de la Patagonia. Acta Zoologica Lilloana, Tomo VIII: 291-307.

-Kusnezov N. (1951) El genero *Pogonomyrmex* Mayr. Acta Zoologica Lilloana, Tomo XI, 227-333.

-Kusnezov N. (1954) Descripcion de *Pogonomyrmex marcusi* Kusnezov. Folia Universitaria, Vol. 7, Bolivia.

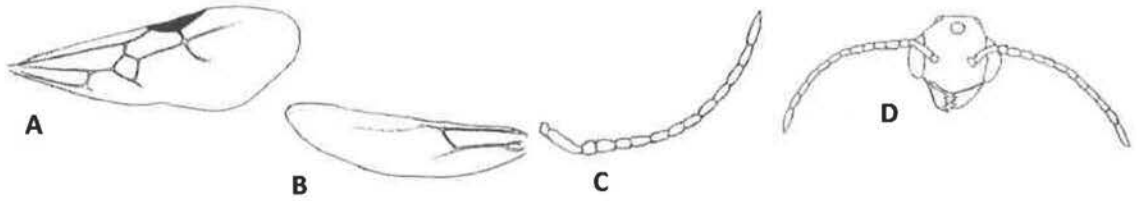
-Hölldobler B. (1976) The behavioral ecology of mating in harvester ants (Hymenoptera: Formicidae: *Pogonomyrmex*). Behav. Ecol. Sociobiol. I, 405-423.

-MacKay W.P. (1981) A comparason of the nest phenology of three species of *Pogonomyrmex* harvaster ants (Hymenoptera: Formicidae). Psyche, Vol. 88, N° 1-2.

-Snelling R.R. (1982) The Taxonomy and distribution of some North American *Pogonomyrmex* and description of two new species (Hymenoptera: Formicidae). Bull.

Southern California Acad. Sci., 80(3): 97-112.
-Snelling R.R., Snelling G.C., Schmidt J.O. and Cover S.P. (2009) The sexual castes of *Pogonomyrmex* anzensis Cole (hymenoptera: Formicidae). J. Hym. Res., Vol. 18(2): 315-321.
-Wheeler W.M. (1910) Ants. Columbia University Biological Series, IX.
-Wiernasz D.C., Yencharis J and Cole B.J. (1995) Size and mating success in male of the Western Harvester ant, *Pogonomyrmex occidentalis* (Hymenoptera: Formicidae). Journal of Insect Behavior, Vol. 8 N° 4.

Figure – **A**: Forewing; **B**: Hindwing; **C**: Antennae; **D**: Head of *Pogonomyrmex* sp. ♂, Brazil.



♂ Genus ***Pristomyrmex*** Mayr, 1866

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape in length > than the 2° article of the Funiculus, not overstep the Occiput; Forewings of Typology III with Marginal cell open; Hindwings of Typology II; Mandibles edentate; Mesonotum with Notauli present.

Bio-geographical distribution

Afrotropical, Oriental, Indo-Australian and Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-AntWeb (2016) Photos *P. trispinatus*, *P. pollux* and *P. reticulatus*, Typus; *P. bispinosus* DNA. www.antweb.org.
-Emery C. (1887) Catalogo delle formiche del Mueo Civico di Genova. Parte terza, Formiche della regione Indo-Malese e dell'Australia. 25(2): 449-464.
-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.
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-Ogata K. (1991) A generic synopsis of the Poneroid complex of the family Formicidae in Japan (Hymenoptera). Part II. Subfamily Myrmicinae. Bull. Inst. Trop. Agr., Kyushu Univ. !4: 61-149.
-Wang M. (2003) A monographic revision of the ant genus *Pristomyrmex* (Hymenoptera: Formicidae). Bull. Mus. Comp. Zool., 157(6): 383-542.
-Wheeler W. M. (1928) Ants collected by Professor F. Silvestri in Japan and Korea. Boll. Lab.

Zool. Gen. ed Agr. Del R. Istituto superiore agrario di Portici, Vol. XXI.

♂ Genus ***Proatta*** Forel, 1912

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape overstep the Occiput, 1° and 2° articles of the Funiculus subequal; Forewings of Typology III with Marginal cell closed, formica type; Hindwings of Typology II; Propodeum armed with three teeths; Mesonotum with Notauli present; Mandibles triangular dentate.

Bio-geographical distribution

Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.

-Forel A. (1912) Description provisoires de genres, sous-genres et especes de Formicides des Indes orientales. Revue Suisse de Zoologie, Vol. 20, N° 15.

-Moffet M.W. (1986) Behavior of the group-predatory ant *Proatta butteli* (Hymenoptera: Formicidae): na Old World reltive of the Attine ants. Insectes Sociaux, Vol. 33, N° 4: 444-457.

♂ Genus ***Procryptocerus*** Emery, 1887

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus; Forewings of Typology II with Marginal cell open (closed and appendiculate in *P. marginatum*); Hindwings of Typology II; Mandibles edentate; Mesonotum with Notauli present; Petiole similar form to PostPetiole; Telomere large; MetaTibiae without Spur.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Brazil: 20°45' S, 45°52' W, 700 meters sea level, *P. pictipes*: December to October (Cardoso do Nascimento 2002); 14°37'04''S, 39°04' 07''W, 10 meters sea level, *Procryptocerus* sp. 1: December to February, *Procryptocerus* sp. 5: January to April and June to November (Cardoso do Nascimento 2006); 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Procryptocerus* sp. 382: December to March and May, *Procryptocerus* sp. 439: December to February, April and June, *Procryptocerus* sp. 460: December, February to April (Cantone see chapter 4); Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *P. belti*: May, July, September and December (Kaspari et al. 2001).

References for Taxonomic identification

-Cardoso do Nascimento I. (2002) Fenologia do voo nuptial e amostragem de comunidade de formigas (Hymenoptera: Formicidae) em area de Mata Atlantica do municipio de Viçosa, Minas Gerais. Universidade Federal de Viçosa, Dissertação (mestrado).

-Cardoso do Nascimento I. (2006) Fenologia dos voos de acasalamento em formigas Tropicais. Universidade Federal de Viços, Tese (doutorado).

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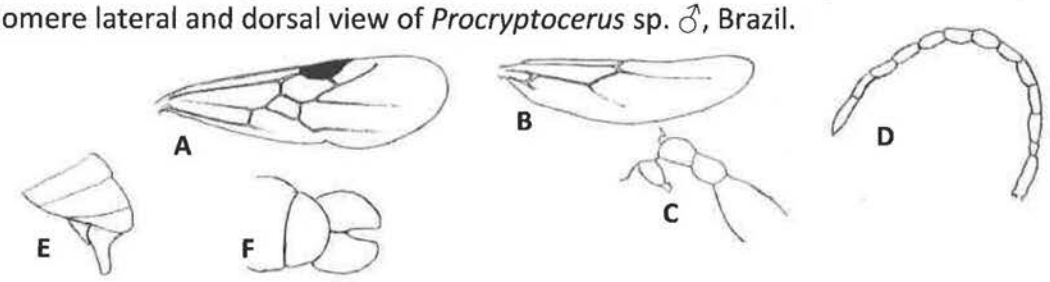
Figure – **A**: Forewing; **B**: Hindwing; **C**: Petiole and PostPetiole; **D**: Antennae; **E** and **F**: Telomere lateral and dorsal view of *Procryptocerus* sp. ♂, Brazil.



♂ Genus ***Pseudoatta*** Gallardo, 1916

Morphological characters used in the dichotomous key

Antennae with 11 articles versus clavate, Antennae Scape overstep the Occiput, insertion of the Antennae confluent from posterior edge of the Clypeus, first article of the Funiculus in length > than the second; Forewings of Typology III with Marginal closed, without Pterostigma; Hindwings of Typology II; Mandibles triangular dentate; Pronotum and Propodeum armed with teeth; Mesonotum with Notauli absent.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: mating in the nest (Aldephogamy), dispersal flight only female, genus parasite (Gallardo, 1929).

Mating flight: Argentine: 27°2'1.19"S, 65°18'26.96"W, 360 meters sea level, *P. argentina*: January and February; 32°57'37.01"S, 60°38'38.70"W, 30 meters sea level, *P. argentina*: April (Gallardo, 1929).

References for Taxonomic identification

-AntWeb (2016) Photos *P. argentina* Typus. www.antweb.org

-Gallardo A. (1916) Notes Systematiques et Ethologiques sur les Formis Attines de la Republique Argentine. Anales del Museo Nacional de Historia Natural de Buenos Aires, Tome 28: 317-344.
-Gallardo A. (1929) Note sur lês moeurs de La Fourmi *Pseudoatta argentina*. Revista de la Sociedad Entomologica argentina, N° 10

♂ Genus ***Recurvidris*** Bolton, 1992

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape in length < than the 2° article of the Funiculus; Forewings of Typology III and IV with Marginal cell open; Hindwings of Typology III; Mandibles small edentate; Palp formula 4:2; Mesonotum with Notauli present but faintly impressed.

Bio-geographical distribution

Indo-Australian, Paleartic and Oriental

Behavioral Ecology of the Mating flight

Strategy: unknown
Mating flight: unknown

References for Taxonomic identification

-Ettershank G. (1966) A generic revision of the World Myrmicinae related to *Solenopsis* and *Pheidologeton* (Hymenoptera: Formicidae). Australian Journal of Zoology, 14: 73-171.
-Wheeler W.M. (1927) Chinese ants collected by Professor S. F. Light and Professor N. Gist Gee. The American Museum of Natural History, New York City, N° 255.

♂ Genus ***Rhopalomastix*** Forel, 1900

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape in length ≥ than the 2° article of the Funiculus; Forewings of Typology III with Marginal cell closed and appendicolate; Hindwings of Typology II; Mandibles reduced; Mesonotum with Notauli absent; PostPetiole very short and in the form of bells, completely fused with the first segment of the Gaster.

Bio-geographical distribution

Indo-Australian and Australian

Behavioral Ecology of the Mating flight

Strategy: unknown
Mating flight: unknown

References for Taxonomic identification

-Donisthorpe H. (1936) *Rhopalomastix janeti* (Hym. Formicidae) a species of ant new to Science. Entomologist Record J., 48:55-56.
-Mann W. M. (1919) The ants of the British Solomon Island. Bulletin of the Museum of Comparative Zoology at Harvard College, Vol. 63, N° 7.
-Wheeler W. M. (1929) The ant genus *Rhopalomastix*. Psyche

♂ Genus ***Rogeria*** Emery, 1894

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus; Forewings of Typology II with Marginal cell open; Hindwings of Typology II; Mandibles dentate; Mesonotum with Notauli present; MetaTibiae without Spur.

Bio-geographical distribution

Indo-Australian and Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Puerto Rico: 18°17' N, 66°07' W, 300 meters sea level, *R. carinata*: June and October (Torres et al. 2000); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *R. minima*: January and December (Kusnezov 1962); Brazil: 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Rogeria* sp. 415: October to December (Cantone see chapter 4).

References for Taxonomic identification

-Kugler C. (1994) Revision of the ant genus *Rogeria* (Hymenoptera: formicidae) with description of the sting apparatus. J. Hym. Res., Vol. 3: 17-89.

-Kusnezov N. (1962) El vuelo nupcial de las hormigas. Acta Zoologica Lilloana, tomo 18, 385-442.

-Mann W. M. (1919) The ants of the British Solomon Island. Bulletin of the Museum of Comparative Zoology at Harvard College, Vol. 63, N° 7.

-Mann W. M. (1921) The ants of the Fiji Island. Bulletin Museum of Comparative Zoology, n° 5.

-Torres J. A., Snelling R. R. and Canals M. (2000) Seasonal and Nocturnal Periodicities in Ant Nuptial Flights in the Tropics (Hymenoptera: Formicidae). Sociobiology, Vol. 37, n° 3B.

♂ Genus ***Romblonella*** W.N. Wheeler, 1935

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length < than the 2° article of the Funiculus; Forewings of Typology III with Marginal cell closed and appendiculate, solenopsis type; Hindwings of Typology?; Mandibles dentate; Palp formula 5:3; Mesonotum with Notauli present only anteriorly.

Bio-geographical distribution

Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Smith M.R. (1953) A new *Romblonella* from Palau, and the first description of a *Romblonella* male (Hymenoptera, Formicidae). Journal of the New York Entomological Society, Vol. LXI: 163-167.

♂ Genus ***Rostromyrmex*** Rosciszewski, 1994

Morphological characters used in the dichotomous key

Antennae with 10 articles, Antennae Scape in length > than the 2° article of the Funiculus; Forewings of Typology II with Marginal cell open; Hindwings of Typology III; Mandibles edentate; Mesonotum with Notauli absent.

Bio-geographical distribution

Malaysia and Singapore.

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Rosciszewski K. (1994) *Rostromyrmex*, a new genus of Myrmicine ants from Peninsular Malaysia (Hymenoptera: Formicidae). Ent. Scand. 25: 159-168.

♂ Genus ***Royidris*** Bolton and Fisher, 2014

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than the 2° article of the Funiculus; Forewings of Typology II and III with Marginal cell open, solenopsis type; Hindwings of Typology II; Mandibles narrow edentate marginally, bi-dentate apically; Palp formula 5:3; Metatibiae with one simple Spur; Mesonotum with Notauli present.

Bio-geographical distribution

Madagascar

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-AntWeb (2016) Photos of *R. notorthotenes* Typus. www.antweb.org

-Bolton B. and Fisher B. (2014) The Madagascan endemic Myrmicine ants related to *Eutetramorium* (Hymenoptera: Formicidae): taxonomy of the genara *Eutetramorium* Emery, *Malagidris* nom.n., *Myrmisaraka* gen. n., *Royidris* gen. n., and *Vitsika* gen. n. Zootaxa 3791 (1): 001-099

♂ Genus ***Sericomyrmex*** Mayr, 1865

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape in length > than the 2° article of the Funiculus, longer the firsts 5 articles of the Funiculus not overstep the Occiput, lasts 3-4 articles clavate; Forewings of Typology III with Marginal cell closed; Hindwings of Typology ?; Mandibles dentate; Mesonotum with Notauli present.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Brazil: 14°46'17 S, 39° 4'28 W, 10 meters sea level, *S. bondari*: July, September and December, *Sericomyrmex* sp.: all year (Delabie et al. 2002).

References for Taxonomic identification

-Delabie J.H.C., Nascimento I.C. and Mariano C.S.F. (2002) Estrategias de reprodução e dispersão em formiga Attines, com exemplos do Sul da Bahia. CD – Resumos do 19° Congresso Brasileiro de Entomologia, Manaus, Amazonas, Brasil.

-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.

-Forel A. (1905) Miscellanea Myrmecologiques II. Ann. Soc. ent. Belg., 49: 155-185.

-Wheeler W.M. (1916) Ants collected in British Guiana by Expedition of the American Museum of Natural History during 1911. American Museum of Natural History, Vol. 35, art. I: 1-14, New York.

♂ Genus ***Solenopsis*** Westwood, 1840

Morphological characters used in the dichotomous key

Antennae with 12 articles or rare with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus (or ≤ in Antennae with 13 articles); first articles of the Funiculus globular form; Mandibles bi-tridentate apically; Palp formula 2:2 or 1:2; Forewings of Typology II and III with Marginal cell open; Hindwings of Typology II; Mesonotum with Notauli absent.

Bio-geographical distribution

Cosmopolitan

Behavioral Ecology of the Mating flight

Strategy: male aggregation? *S. saevissima*: Each colony can generate up to 5000 sexual in a year. Some major mating flight in summer, were highly coordinated with flight taking place simultaneously from mound in multi-state areas. Males normally emerged from the nest before females. Both forms readily took flight with a minimum of preflight activity. Female were captured in the air up to a height of 240 meters and males up to a height of 300 meters. Males formed a layer covering the entire area over which the flight was taking place (Markin et al 1971). Mating flight can occur any time of the year (Burns et al. 2007).

Mating flight: USA: Southeastern: Alabama, Missisipi, Georgia, Florida, Luisiana, *S. saevissima richteri* produz nuptial flight during all months of the year; the most intense and extensive flight took place in May, June July and August; Brasil: 20°45' S, 45°52' W, 700 meters sea level, *Solenopsis* sp. 1: October to March and May to August (Cardoso do Nascimento 2002); 14°37'04''S, 39°04' 07''W, 10 meters sea level, *S. geminata*: November to March and May, *S. saevissima*: November to March, Solenopsis sp. 1: October to July (Cardoso do Nascimento 2006); 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Solenopsis* sp. 218 and 240: October, *Solenopsis* sp. 279: December, *Solenopsis* sp. 253, 256, 259: November, *Solenopsis* sp. 348: March; 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Solenopsis* sp. 459: August to February, *Solenopsis* sp. 481: March (Cantone see

chapter 4); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *S. saevissima*: September to July, *S. interrupta*: November, *S. clytemnestra*: November and December, *Solenopsis* sp.: October to April (Kusnezov 1962); Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *Solenopsis* sp. bcilt3: March, June to September and December (Kaspari et al. 2001); Puerto Rico: 18°17' N, 66°07' W, 300 meters sea level, *S. geminata*: all year, *S. azteca*: April to November, *S. corticalis*: April to December, *S. pigmea*: June (Torres et al. 2000).

References for Taxonomic identification

-Arnold G. (1916) A monograph of the Formicidae of South Africa. Annals of the South African Museum, Vol. 14, Part. II.

-Cardoso do Nascimento I. (2002) Fenologia do voo nuptial e amostragem de comunidade de formigas (Hymenoptera: Formicidae) em area de Mata Atlantica do municipio de Viçosa, Minas Gerais. Universidade Federal de Viçosa, Dissertação (mestrado).

-Cardoso do Nascimento I. (2006) Fenologia dos voos de acasalamento em formigas Tropicais. Universidade Federal de Viços, Tese (doutorado).

-Creighton W.S. (1930) The New World species of the genus *Solenopsis* (Hymenoptera: Formicidae). American Academy of Art and Sciences, Vol. 66. N° 2.

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-Burns S.N., Vander Meer R.K. and Teal P.E.A. (2007) Mating flight activity a dealation factors for red imported Fire Ants (Hymenoptera: formicidae) female alate. Ent. Soc. of America, Vol. 100, N° 2.

-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.

-Ettershank G. (1966) A generic revision of the World Myrmicinae related to *Solenopsis* and *Pheidologeton* (Hymenoptera: Formicidae). Australian Journal of Zoology, 14: 73-171.

-Kaspari M., Pickering J., Longino J.T and Windsor D. (2001) The phenology of a Neotropical ant assemblage: evidence for continuous and overlapping reproduction. Behav. Ecol. Sociobiol., 50: 382-390.

-Kusnezov N. (1953) *Bisonelopsis sea*, un Nuevo genero y especie de hormigas y sus relaciones con los generous vecinos (Hymenoptera, Formicidae). Memorias del Musu de Entre Rios, N° 31.

-Kusnezov N. (1954) Un genero Nuevo de hormigas (*Paranamyrma solenopsidis* nov. gen. nov. sp.) y los problemas relacionados. Memorias del Musu de Entre Rios, N° 30.

-Kusnezov N. (1962) El vuelo nupcial de las hormigas. Acta Zoologica Lilloana, tomo 18, 385-442.

-Markin G.P., Dillier J.H. and Hill S.O. and Blum M.S. and Hermann H.R. (1971) Nuptial flight and flight ranges of the imported Fire ant *Solenopsis saevissima richteri* (Hymenopter: Formicidae). J. Georgia Entoml. Soc., Vol. 6, N° 3.

-Ogata K. (1991) A generic synopsis of the Poneroid complex of the family Formicidae in Japan (Hymenoptera). Part II. Subfamily Myrmicinae. Bull. Inst. Trop. Agr., Kyushu Univ. !4: 61-149.

-Pacheco J. A. and MacKay W.P. (2013) The Systematic and Biology of the New World Thief ants of the genus *Solenopsis* (Hymenoptera: Formicidae). The Edwin Mellen press Lewiston, Queebston, Lampeter.

-Sanschi F. (1911) Formicides nouveaux de l'Afrique Mineure. Bull. Soc. Hist. Nat. Afr. N. Vol. 2.
-Sanschi F. (1923) *Solenopsis* et autres Fourmis neotropicales. Revue Suisse de Zoologie, Vol. 30,N° 8.
-Tohmé H. and Tohmé G. (1980) Les Fourmis du genre *Solenopsis* en Syrie description de deux nouvelle sous-especies et d'ailé inedits. Rv fr. Ent., Vol. 2(3).
-Torres J. A., Snelling R. R. and Canals M. (2000) Seasonal and Nocturnal Periodicities in Ant Nuptial Flights in the Tropics (Hymenoptera: Formicidae). Sociobiology, Vol. 37, n° 3B.

Figure – **A**: Forewing; **B**: Hindwing of *Solenopsis* sp. ♂, Brazil.

♂ Genus ***Stegomyrmex*** Emery, 1912

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, last articles of the Funiculus versus clavate, 1° article of the Funiculus in length < that the 2°; Forewings of Typology I and II with Marginal cell closed; Hindwings of Typology II; Mandibles dentate; Metatibie without Spur; Mesonotum with Notauli absent.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown
Mating flight: unknown

References for Taxonomic identification

-AntWeb (2016) Photos *S. connectens* Typus. www.antweb.org
-Diniz Machado J.L. (1990) Revisão sistematica da tribo Stegomyrmicini, com a descrição de uma nova especie (Hymenoptera, Formicidae). Ver. Bras. Ent., 34(2): 277-295.
-Emery C. (1912) Etudes sur les Myrmicinae. Annales de la societé Entomologique de Belgique, Vol. 56: 94-105.
-Feitosa R.M., Brandão C.R.F. and Diniz J.L.M. (2008) Revisionary studies on the enigmatic Neotropical ant genus *Stegomyrmex* Emery, 1912 (Hymenoptera: Formicidae: Myrmicinae), with the description of two new species. J. Hym. Res., Vol. 17(1): 64-82.

♂ Genus ***Stenamma*** Westwood, 1839

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus not overstep the Occiput, lasts articles versus clavate or clavate, 1° article of the Funiculus

in length > than the 2°; Forewings of Typology I, II and III with Marginal cell open or closed and appendiculata, solenopsis or formica type; Hindwings of Typology II; Mandibles dentate; Mesonotum with Notauli present or absent; MetaTibiae without Spur; Petiole elongate anteriorly.

Bio-geographical distribution

Neartic, Neotropical, Paleartic, Indo-Oriental

Behavioral Ecology of the Mating flight

Strategy: male aggregation

Mating flight: USA: 42°27'28N, 84° 0'36W, *S. brevicorne*: May (Kannowski 1958); Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *Stenamma* sp. mt1: February to November (Kaspari et al. 2001).

References for Taxonomic identification

-AntWeb (2017) Photos *S. occidentale* Typus. www.antweb.org

-Bondroit J. (1918) Les fourmis de France et de Belgique. Annales de La Societè Entomologique de France, Vol. 87.

-Branstetter M. G. (2013) Revision of the Middle American clade of the genus *Stenamma* Westwood (Hymenoptera, Formicidae, Myrmicinae). ZooKey 295: 1-277.

-Cagniant H. (1971) Description du male de *Stenamma africanum* Santschi. Bulletin de la Societé entomologique de France, Tome 76: 98-101.

-Dubois M.B. (1998) A revision of the ant genus *Stenamma* in the Paleartic and Oriental Region. Sociobiology, Vol. 32, N° 2, 1998.

-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.

-Kannowski P.B. (1958) Swarming of the ant *Stenamma brevicorne*, Mayr. Entomological News.

-Kaspari M., Pickering J., Longino J.T and Windsor D. (2001) The phenology of a Neotropical ant assemblage: evidence for continuous and overlapping reproduction. Behav. Ecol. Sociobiol., 50: 382-390.

-Ogata K. (1991) A generic synopsis of the Poneroid complex of the family Formicidae in Japan (Hymenoptera). Part II. Subfamily Myrmicinae. Bull. Inst. Trop. Agr., Kyushu Univ. !4: 61-149.

-Smith M.R. (1957) Revision of the genus *Stenamma* Westwood in America North of Mexico (Hymenoptera, formicidae). The American Midland Naturalist, 57(1).

♂ Genus ***Stereomyrmex*** Emery, 1901

Morphological characters used in the dichotomous key

Antennae with 10 article, lasts 5 articles moniliform, Antennae Scape in length > than the 2° article of the Funiculus, insertion of the Antennae confluent from posterior edge of the Clypeus; Forewings of Typology III with Marginal cell closed, solenopsis type; Hindwings of Typology II; Mesonotum with Notauli present; Mandibles dentate.

Bio-geographical distribution

Australia

Behavioral Ecology of the Mating flight
Strategy: unknown
Mating flight: unknown
References for Taxonomic identification
-Emery C. (1901) Ameisen gesammelt in Cylon von W. Horn 1899. Deutsche Entomologische Zeitschrift.
-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.

♂ Genus ***Strongylognathus*** Mayr, 1853

Morphological characters used in the dichotomous key
Antennae of 10 articles, Antennae Scape in length ≤ that the 2° article of the Funiculus, 2° article of the Funiculus very long; Forewings of Typology II with Marginal cell open, formica type; Hindwings of Typology II; Mandibles edentate falcate; Propodeum with two strong teeth; Mesonotum with Notauli present; MetaTibiae with one Spur.
Bio-geographical distribution
Paleartic, Indo-Oriental and Sicily
Behavioral Ecology of the Mating flight
Strategy: unknown
Mating flight: unknown
References for Taxonomic identification
-Baroni-Urbani C. (1969) Gli *Strongylognathus* del grupo Huberi nell'Europa Occidentale: Saggio di una revisione basata sulla casta operaia. Boll. Soc. Entomol. Italiana, Vol XCIX.CI, N° 7-8.
-Emery C. (1916) Fauna entomologica italiana – Hymenoptera, Formicidae. Bull. Soc. Entomol. It. 47:79-275.
-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.
-Forel A. (1900) Formis du Japon. Nids en toile. *Strongylognathus* Huberi et voisins. Formiliere triple. *Cyphomyrmex* Wheeleri. Fourmis importees. Mitt. Schweiz Entoml. Ges. 10:267-287.
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-Radchenko A. G. (1991) Ants of the genus *Strongylognathus* (Hymenoptera, Formicidae) of the USSR fauna. Zool. Zh. 70(1 10: 84-90.

♂ Genus ***Strumigenys*** F. Smith, 1860

Morphological characters used in the dichotomous key
Antennae with 13 articles, Antennae Scape in length ≤ than the 2° article of the

Funiculus, first article of the Funiculus in length < than the second; Forewings Typology III and IV, solenopsis type, with Marginal cell open; Hindwings of Typology III; Mandibles edentate; Mesonotum with Notauli anteriorly only; Propodeum with dilatation in the form of lamella in the inferior-posterior extremity; MetaTibiae without Spur.

Bio-geographical distribution

Neotropical, Neartic, Afrotropical, Indo-Australian, Australian and Oriental

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *S. biolleyi*: March to October, *S. dolichognata*: March to January, S. elongata: February, April to September, *Strumigenys* sp. mt10: May to July, *Strumigenys* sp. mt11: January to June and August to October, *Strumigenys* sp. mt 6: all year, *S. gundlachi*: April to October, *S. zeteki*: January to September and November (Kaspary et al. 2001); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *Strumigenys* sp: November to January, *S. lilloana*: December (Kusnezov 1962); Brazil: 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Strumigenys* sp. 444: December (Cantone see chapter 4).

References for Taxonomic identification

-Borgmeier T. (1934) Contribuiçao para o conhecimento da fauna mirmecologica dos cafesais de Paramaribo, Guiaba Holandesa (Hym. Formicidae). Arq. Inst. Biol. Veget., Rio de Janeiro, Vol. 1, N° 2.

-Brown W.L. (1954) The Neotropical species of the ant genus *Strumigenys* Fr. Smith: group of Saliens (Mayr). New York Entomological Society, Vol. LXII.

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-Consani M. (1951) Formiche dell'Africa Orientale. Boll. Ist. Entomol. Univ. Studi Bologna 18: 167-172.

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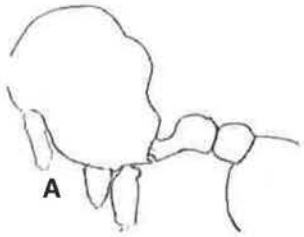
Figure – **A**: Torax and Petiole of *Strumygenis* sp. ♂, Brazil.



♂ Genus ***Syllophopsis*** Santschi, 1915

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than the 2° article of the Funiculus; Forewings of Typology II with Marginal cell open; Hindwings of Typology II, Mandibles dentate; Mesonotum with Notauli absent; MetaTibiae without Spur.

Bio-geographical distribution

Afrotropical, Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-ANTWIKI (2016) Photos of *S. fisheri* Heterick, 2006. www.antwiki.org

-Heterick B. (2006) A revision of the Malagasy ants belonging to genus *Monomorium* Mayr, 1855 (Hymenoptera: Formicidae). Proceedings of the California Academy of Science, Vol. 57, N° 3: 69-202.

♂ Genus ***Temnothorax*** Mayr, 1861

Morphological characters used in the dichotomous key

Antennae with 12-13 articles, Antennae Scape in length > than the 2° article of the Funiculus, lasts 3-4 article versus clavate; Forewings of Typology II, III and IV, Marginal cell open or closed, formica or solenopsis type; Hindwings Typology II or III; Mandibles dentate; Mesonotum with Notauli present.

Bio-geographical distribution

Neartic, Neotropical, Paleartic, Oriental, Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Croatia: 45°26'16.75"N, 13°42'29.29"E, 200 meters sea level, *T. gordiagini*: September (Finzi 1924); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *Temnothorax* sp.: November to January; Brazil: 20°45' S, 45°52' W, 700 meters sea level, *Temnothorax* sp.: January to June and October (Cardoso do Nascimento 2002); Puerto Rico: 18°17' N, 66°07' W, 300 meters sea level, *T. torrei*: May, June, August, September and November

(Torres et al. 2000).

References for Taxonomic identification

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-Wheeler W. M. (1914) The ants of Haiti. American Museum of Natural History, Vol. 33, art. 1: 1-61.

♂ Genus ***Teratataner*** Emery, 1912

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, not overstep the Occiput; Forewings of Typology II and III with Marginal cell closed and appendicolate, formica type; Hindwings of Typology II, the wings are attached abnormally low on its sides; Mandibles dentate; Mesonotum with Notauli present; MetaTibiae with one Spur; Mesolegs severely reduced in size as compared to the Metalegs; Eyes strongly developed.

Bio-geographical distribution

Afrotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

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Formicidae). Psiche, Vol. 99.
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♂ Genus ***Tetramorium*** Mayr, 1855

Morphological characters used in the dichotomous key

Antennae with 10 articles (11 articles in *T. antipodum* and *T. rotschildi*), Antennae Scape in length > than the 2° article of the Funiculus not overstep the Occiput, 2° article of the Funiculus very long; Forewings of Typology II and III, Marginal cell open or closed; Hindwings of Typology II; Mandible dentate; Mesonotum with Notauli present; MetaTibiae with one Spur.

Bio-geographical distribution

Cosmopolitan

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Poland: *T. caespitum*: May to September (Radchenko et al. 1998); Puerto Rico: 18°17' N, 66°07' W, 300 meters sea level, *T. bicarinatum*: June, July and November (Torres et al. 2000).

References for Taxonomic identification

-Bondroit J. (1918) Les fourmis de France et de Belgique. Annales de La Societè Entomologique de France, Vol. 87.
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(Hymenoptera, Formicidae) in Poland – A survey of species and a key for their identification. Annales Zoologici, 48 (1/2): 107-118, Warszawa.
-Ettershank G. (1966) A generic revision of the World Myrmicinae related to *Solenopsis* and *Pheidologeton* (Hymenoptera: Formicidae). Australian Journal of Zoology, 14: 73-171.
-Torres J. A., Snelling R. R. and Canals M. (2000) Seasonal and Nocturnal Periodicities in Ant Nuptial Flights in the Tropics (Hymenoptera: Formicidae). Sociobiology, Vol. 37, n° 3B.
-Wheeler W.M. (1922) Ants of the American Museum Congo Expedition. A contribution to the Myrmecology of Africa. The American museum of natural History, Vol XLV.
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♂ Genus ***Trachymyrmex*** Forel, 1893

Morphological characters used in the dichotomous key

Antennae with 13 articles with lasts four articles clavate or versus clavate, Antennae Scape overstep the Occiput; Forewings of Typology III with Marginal cell closed; Hindwings of Typology II; Mandibles dentate; Propodeum armed; Mesonotum with Notauli present.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Brazil: 14°46'17 S, 39° 4'28 W, 10 meters sea level, *T. relictus*: January, February, April, May, October and November, *T. cornetzi*: February and June, *Trachymyrmex* sp. 194: January, February, August and September, *Trachymyrmex* sp. 354: March, July and August (Delabie et al. 2002); 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Trachymyrmex* sp. 441: September and October (Cantone see chapter 4); Puerto Rico: 18°17' N, 66°07' W, 300 meters sea level, *T. jamaicensis*: October and November(Torres et al. 2000); Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *Trachymyrmex* sp. mt1: July (Kaspari et al. 2001); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *Trachymyrmex* sp.: October to January (Kusnezov 1962).

References for Taxonomic identification

-Creighton W.S. (1950) The ants of North America. Bulletin of the Museum of Comparative Zoology at Harvard College, Vol. 104.
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Trachymyrmex Forel. Part. 2: The Iheringi group (Hymenoptera: Formicidae). Sociobiology Vol. 45, N° 2.
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-Kusnezov N. (1962) El vuelo nupcial de lãs hormigas. Acta Zoologica Lilloana, tomo 18, 385-442.
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-Torres J. A., Snelling R. R. and Canals M. (2000) Seasonal and Nocturnal Periodicities in Ant Nuptial Flights in the Tropics (Hymenoptera: Formicidae). Sociobiology, Vol. 37, n° 3B.
-Wheeler W. M. (1907) The Fungus-Growing ants of North America. American Museum of Natural History, Vol. 23, art. 31: 669-807.

Figure – **A**: Antennae of *Trachymirmex* sp. ♂, Brazil.

♂ Genus ***Tranopelta*** Mayr, 1866

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus not overstep the Occiput; Forewings of Typology II with Marginal open, solenopsis type; Hindwings of Typology II; Mandibles dentate with 3 strong teeth; Mesonotum with Notauli absent.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

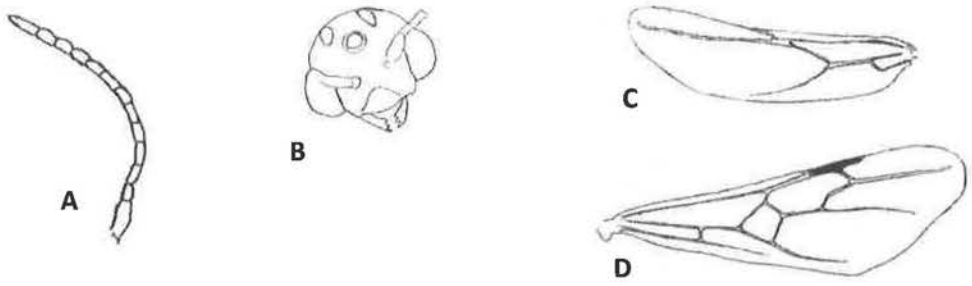
Mating flight: Brazil: 20°14'59.29"S, 46°21'51.11"W, 830 meters sea level, *T. gilva*: November (Cantone S.).

References for Taxonomic identification

-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174.
-Ettershank G. (1966) A generic revision of the World Myrmicinae related to *Solenopsis* and *Pheidologeton* (Hymenoptera: Formicidae). Australian Journal of Zoology, 14: 73-171.
-Fernandez F. (2003) Myrmicinae ants of genera *Ochetomyrmex* and *Tranopelta* (Hymenoptera: Formicidae). Sociobiology, Vol. 41, N° 3.
-Kusnezov N. (1957) Die Solenopsidinen-Gattungen von Sudamerika (Hymenoptera, Formicidae). Sonderdruck aus, Zoologischer Anzeiger Bd. 158, Heft 11/12.

-Santschi F. (1922) Description de nouvelles formis de l'Argentine et pays limitrophes. Anales de la sociedad Cientifica Argentina, Vol. XCIV: 241.

Figure – A: Antennae; B: Head; C: Hindwing; D: Forewing of *Tranopelta gilva* ♂, Brazil.



♂ Genus ***Trichomyrmex*** Mayr, 1865

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus not overstep the Occiput, first article of the Funiculus globular form; Forewings of Typology II and III with Marginal cell open, formica type; Hindwings of Typology II; Mandibles bi-tridentate apically; Mesonotum with Notauli absent.

Bio-geographical distribution

Afrotropical, India, Arabia Saudita, Mediteranean, Madagascar, Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

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-Delye G. (1961) *Monomorium* (*Equesimessor*) chobauti Emery (Hymenoptera Formicidae) a Beni-Abbes (Saoura) Nid. Sexues (= *Holcolomyrmex Faf* Forel). Bulletin de la Societe d'Histoire Naturalle de l'Afrique du Nord, 52:67-72.

-Forel A. (1902) Les fourmis du Sahara Algerien. Ann. Soc. Ent. Belg., 46.

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-Radchenko A.G. (1997) Review of the ants of Scabriceps group of the genus *Monomorium* Mayr (Hymenoptera, Formicidae). Annales Zoologici 46:211-224

-Santschi F. (1907) Fourmis de Tunisie capture en 1906. Annales de La Societe Zoologique Suisse, Tome 15, Fasc. 2.

♂ Genus ***Tropidomyrmex*** Silva, Feitosa, Brandão & Diniz, 2009

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape in length > than the 2° article of the Funiculus not overstep the Occiput, first article of the Funiculus in length and diameter > than the second; Forewings of Typology III with Marginal cell open; Hindwings of Typology III; Mandible edentate falcate; Palp formula 1:2; Mesonotum with Notauli absent.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Silva R.R., Feitosa R. M., Brandão C.R.F. and Diniz J.L.M. (2009) *Tropidomyrmex elianae*, a new Myrmicine ant genus and species from Brazil, tentatively assigned to Solenopsidini (Hymenoptera, Formicidae). Zootaxa 2052: 32-48.

♂ Genus ***Veromessor*** Forel, 1917

Morphological characters used in the dichotomous key

Antennae with 13 articles with lasts 4-5 articles versus clavate, Antennae Scape in length > than the 2° article of the Funiculus not overstep the Occiput; Forewings of Typology II with Marginal cell open, formica type; Hindwings of Typology II; Mandibles dentate; Mesonotum with Notauli absent; Propodeum armed with broad short teeth.

Bio-geographical distribution

Neartic

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: USA: 33°27'36.47"N, 111°56'52.68"W, 400 meters sea level: *V. pergandei*: January to March (Pollock and Rissing 1985).

References for Taxonomic identification

-Creighton W.S. (1950) The ants of North America. Bulletin of the Museum of Comparative Zoology at Harvard College, Vol. 104.

-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174

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-Wheeler W.M. and Creighton W.S. (1934) A study of the ant genera *Novomessor* and *Veromessor*. American Academy of Arts and Sciences, Vol. 69, N° 9.

♂ Genus ***Vitsika*** Bolton & Fisher, 2014

Morphological characters used in the dichotomous key

Antennae with 13 articles with last three articles versus clavate and 9° article of the Funiculus strikingly elongate; Antennae Scape in length > than the 2° article of the Funiculus not overstep the Occiput; Forewings of Typology II with Marginal cell open; Hindwings of Typology II; Mandibles dentate; Palp formula 5:3; Mesonotum with Notauli present variabily developed; MetaTibiae with one Spur.

Bio-geographical distribution

Madagascar

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Bolton B. and Fisher B. (2014) The Madagascan endemic Myrmicine ants related to *Eutetramorium* (Hymenoptera: Formicidae): taxonomy of the genara *Eutetramorium* Emery, *Malagidris* nom.n., *Myrmisaraka* gen. n., *Royidris* gen. n., and *Vitsika* gen. n.. Zootaxa 3791 (1): 001-099.

♂ Genus ***Vollenhovia*** Mayr, 1865

Morphological characters used in the dichotomous key

Antennae with 13 articles (12 articles *V. emery cosenicha* and *V. rufiventris*), Antennae Scape in length > than the 2° article of the Funiculus not overstep the Occiput; Forewings of Typology II and IV with Marginal cell open, solenopsis type; Hindwings of Typology III; Mandibles reduced edentate; Mesonotum with Notauli present or absent; Pronotum armed com teeth large; MetaTibiae without Spur.

Bio-geographical distribution

Oriental, Indo-Australian, Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174

-Ettershank G. (1966) A generic revision of the World Myrmicinae related to *Solenopsis* and *Pheidologeton* (Hymenoptera: Formicidae). Australian Journal of Zoology, 14: 73-171.

-Forel A. (1912) Fourmis des Seychelles et des Aldabras, Reçues de M. Hugh Scott. Trans Linn. Soc. Lond. Zool. (2) 16: 159-167.

-Mann W.M. (1919) The ants of the British Solomon Island. Bulletin Museum of Comparative Zoology at Harvard College, Vol. LXIII, N° 7.

-Ogata K. (1991) A generic synopsis of the Poneroid complex of the family Formicidae in Japan (Hymenoptera). Part II. Subfamily Myrmicinae. Bull. Inst. Trop. Agr., Kyushu Univ. 14:

61-149.

♂ Genus ***Wasmannia*** Forel, 1893

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, not overstep the Occiput; Forewings of Typology III with Marginal cell open, formica type; Hindwings of Typology II, Mandibles edentate; Mesonotum with Notauli present; Telomere strongly desenvolved and curved anteriorly.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Brazil: 14°37'04''S, 39°04' 07''W, 10 meters sea level, *Wasmannia* sp. 1: October and November (Cardoso do Nascimento 2006); 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Wasmannia* sp. 99: October to Decenmber, *Wasmannia* sp. 347: March (Cantone see chapter 4); Puerto Rico: 18°17' N, 66°07' W, 300 meters sea level, *W. auropunctata*: February to December, *W. sigmoidea*: all year (Torres et al. 2000); Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *W. auropunctata*: April to July, October and December (Kaspari et al. 2000); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *W. auropunctata*: November to January, *W. sulcaticeps*: October to January (Kusnezov 1962).

References for Taxonomic identification

-Cardoso do Nascimento I. (2006) Fenologia dos voos de acasalamento em formigas Tropicais. Universidade Federal de Viços, Tese (doutorado).

-Cuezzo F., Calcaterra L.A., Chifflet L., Follett P. (2015) *Wasmannia* Forel (Hymenoptera: Formicidae: Myrmicinae) in Argentina: Systematics and distribution. Sociobiology 62(2): 246-265.

-Emery C. (1906) Studi sulle formiche della fauna Neotropica. Bull. Soc. Entomol. Ital. 37:107-194.

-Emery C. (1922) Hymenoptera. Fam. Formicidae. Subfam. Myrmicinae. Genera Insectorum Fasc. 174

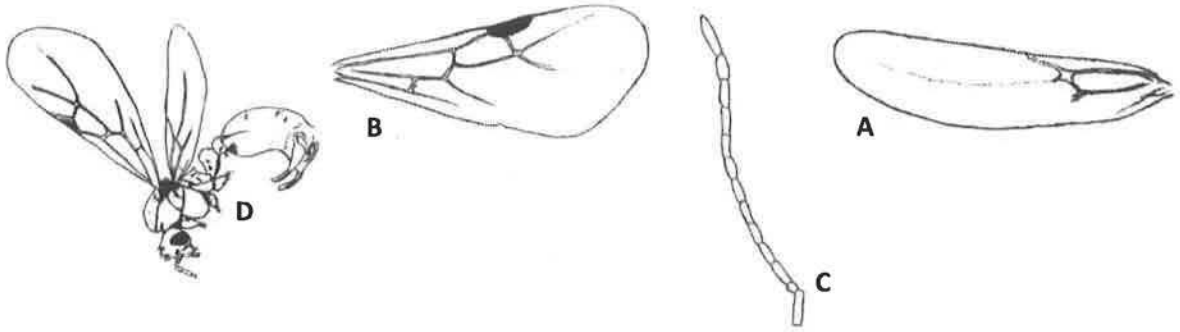
-Forel A. (1893) Formicides de l'Antille St. Vincent. Recoltees par Mons. H. H. Smith. Trans. Entomol. Soc. Lond., 333-418.

-Kaspari M., Pickering J., Longino J.T and Windsor D. (2001) The phenology of a Neotropical ant assemblage: evidence for continuous and overlapping reproduction. Behav. Ecol. Sociobiol., 50: 382-390.

-Kusnezov N. (1962) El vuelo nupcial de las hormigas. Acta Zoologica Lilloana, tomo 18, 385-442.

-Torres J. A., Snelling R. R. and Canals M. (2000) Seasonal and Nocturnal Periodicities in Ant Nuptial Flights in the Tropics (Hymenoptera: Formicidae). Sociobiology, Vol. 37, n° 3B.

Figure – **A**: Hindwing; **B**: Forewing; **C**: Antennae; **D**: Habitus of *Wasmannia* sp. ♂, Brazil.



♂ Genus ***Xenomyrmex*** Forel, 1885

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape in length > than the 2° article of the Funiculus not overstep the Occiput; Forewings of Typology IV; Hindwing of Typology III whitout veins; Mandibles edentate; Mesonotum with Notauli absent.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Mexico, 22°9'57.72"N, 100°59'58.37"W, 1900 meters sea level, *X. Floridianus skwarrae*: April and May (Creighton 1957); Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *X. stolii*: all year (Kaspari et al. 2001).

References for Taxonomic identification

-Creighton W.S. (1950) The ants of North America. Bulletin of the Museum of Comparative Zoology at Harvard College, Vol. 104.

-Creighton W.S. (1957) A study of the genus *Xenomyrmex* (Hymenoptera, Formicidae). American Museum of Natural History, New York, N° 1843.

-Ettershank G. (1966) A generic revision of the World Myrmicinae related to *Solenopsis* and *Pheidologeton* (Hymenoptera: Formicidae). Australian Journal of Zoology, 14: 73-171.

-Kaspari M., Pickering J., Longino J.T and Windsor D. (2001) The phenology of a Neotropical ant assemblage: evidence for continuous and overlapping reproduction. Behav. Ecol. Sociobiol., 50: 382-390.

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3.14 Subfamily Paraponerinae Emery, 1901

This subfamily is represented for one genus and the ♂♂ are known.

♂ Genus ***Paraponera*** F. Smith, 1858

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length < than the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles narrow rounded in the form of spatule; Mesonotum with Notauli present; Pygidium (Abdominal Tergite VIII) rounded distally; Abdominal Sternite IX in the form of Y; MetaTibiae with two Spurs; Pretarsal Claws bifid.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: *female calling*; Survival of males out of the nest: > 100 days (Shik and Kaspari 2009)

Mating flight: Costa Rica: 10°25'49.23"N, 84° 0'12.65"W, 50 meters sea level, *P. clavata*: June (Kannowski 1991); Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level,: *P. clavata*: March to May (Kannowski 1991), June to December (Shik and Kaspari 2009).

References

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-Shik J. Z. and Kaspari M. (2009) Lifespan in male ants linked to mating syndrome. Insect. Soc. 56: 131-134.

3.15 Subfamily Ponerinae Lepeletier de Saint-Fargeau, 1835

This subfamily is represented for 47 genera and the ♂♂ are known in 33 genera.

In the genera *Asphinctopone, Austroponera, Belonopelta, Boloponera, Buniapone, Dolioponera, Emeryopone, Feroponera, Fisheropone, Iroponera, Loboponera, Parvaponera, Promyopias* and *Simopelta* the male are unknown.

The characteristics I met by studying literature, concerning the morphology of the ♂♂ ants of this subfamily, are very few and insufficient to construct a dichotomous key. In this study

I make an attempt to be able to identify males, which is an incentive to increase knowledge of ♂♂ of this subfamily.

♂ Genus ***Anochetus*** Mayr, 1861

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ that half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles reduced; Mesonotum with Notauli absent; Pygidium (Abdominal Tergum VIII) distally rounded; Abdominal Sternum IX distally rounded; MetaTibiae with two Spurs; Pretarsal Claws simple.

Bio-geographical distribution

Neotropical, Afrotropical, Indo-Australian, Australia, Spain.

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Puerto Rico: 18°17' N, 66°07' W, 300 meters sea level, *A. kempfi*: every month except March (Torres et al. 2000); Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *Anochetus* sp. smt1: January to July (Kasparu et al 2001); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *A. altisquamis*: January and December, *A. mayri*: November to January (Kusnezov 1962); Brazil: 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Anochetus* sp. 62: October to March; 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Anochetus* sp. 463: March and April (Cantone see chapter 4).

References for Taxonomic identification

-Arnold G. (1915) A Monograph of the Formicidae of South Africa. Annals of the South African Museum, Vol. XVI.

-Brown W. L. (1978) Contributions toward a reclassification of the Formicidae, Part IV. Ponerinae, Tribe Ponerini, Subtribe Odontomachiti. Section B. Genus *Anochetus* and Bibliography. Studia Ent., Vol. 20, fasc. 1-4.

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-Fisher B. L. and Smith M. A. (2008) A revision of Malagasy species of *Anochetus* Mayr and *Odontomachus* Latreille (Hymenoptera: Formicidae). Plos One, Vol. 3, Issue 5.

-Kaspari M., Pickering J., Longino J.T and Windsor D. (2001) The phenology of a Neotropical ant assemblage: evidence for continuous and overlapping reproduction. Behav. Ecol. Sociobiol., 50: 382-390.

-Kugler J. and Ionescu A. (2007) *Anochetus bytinskii*, a new ant species from Israel (Hymenoptera: Formicidae). Israel Journal of Entomology, Vol. 37: 287-298.

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-Torres J.A., Snelling R. R. and Jones T. H. (2000) Distribution, Ecology and Behavior af *Anochetus kempfi* (Hymenoptera: Formicidae) and Description of the sexual form.

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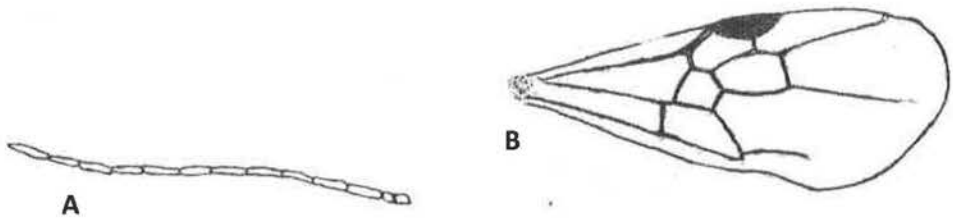
-Torres J. A., Snelling R. R. and Canals M. (2000) Seasonal and Nocturnal Periodicities in Ant Nuptial Flights in the Tropics (Hymenoptera: Formicidae). Sociobiology, Vol. 37, n° 3B.
-Yoshimura M. and Fisher B. L. (2007) A revision of male ants of the Malagasy region (Hymenoptera: formicidae): Key to subfamilies and treatment of the genera of Ponerinae. Zootaxa 1654: 21-40.

Figure – **A**: Antennae; **B**: Forewing of *Anochetus* sp. ♂, Brazil.



♂ Genus ***Bothroponera*** Mayr, 1862

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles reduced; Mesonotum with Notauli absent; Pygidium (Abdominal Tergum VIII) distally pointed in the form of spine; Abdominal Sternum IX distally rounded.

Bio-geographical distribution

Afrotropical and Indo-Australian

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-ANTWEB (2016) Photos: *B. cambuei, B. wasmannii, B. granosa* Typus. www.antweb.org.
-Arnold G. (1915) A Monograph of the Formicidae of South Africa. Annals of the South African Museum, Vol. XVI.
-Arnold G. (1926) A Monograph of the Formicide of South Africa. Annals of the South African Museum, Vol. XXIII.
-Bingham C. T. (1903) The fauna of British India including Ceylon and Burma. Hymenoptera, Vol. II, Edited by W. T. Blanford.
-Forel A. (1900) Les formicides de l'Empire des Indes et de Ceylan, Part VII. J. Bombay Nat. Hist. Soc. 13: 303-332.
-Joma A. and Mackay W.P. (2015) Revision of the African Ants of the *Bothroponera pumicosa* species complex (Hymenoptera: Formicidae: Ponerinae). Sociobiology 62 (4): 538-563.
-Joma A. and Mackay W.P. (2017) Revision of the African ants of the *Bothroponera sulcata* species complex (Hymenoptera: Formicidae: Ponerinae). TAES 143: 7-71.

-Wheeler W. M. (1922) Ants of the American Museum Congo Expedition. A contribution to the Myrmecology of Africa. Bulletin of the American Museum of Natural History, Vol. XLV.

♂ Genus ***Brachyponera*** Emery, 1900

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≥ than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles reduced; Mesonotum with Notauli present; Pygidium (Abdominal Tergum VIII) distally triangular versus pointed; Abdominal Sternum IX distally rounded.

Bio-geographical distribution

Neartic, Afrotropical, Indo-Australian, Australian and Oriental

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: USA: 34°40'37.37"N, 82°50'18.35"W, 200 meters sea level, *B. chinensis*: May to September (Zungoli and Benson 2008).

References for Taxonomic identification

-ANTWEB (2016) Photos: *B. sennearensis* ♂ SAM-HYM COO2312. www.antweb.org.

-Arnold G. (1915) A Monograph of the Formicidae of South Africa. Annals of the South African Museum, Vol. XVI.

-Bingham C. T. (1903) The fauna of British India including Ceylon and Burma. Hymenoptera, Vol. II, Edited by W. T. Blanford.

-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118.

-Ogata K. (1987) A generic synopsis of the Poneroid complex of the Family Formicidae in Japan (Hymenoptera). Part I. SubFamilies Ponerinae and Cerapachyinae.ESAKIA N° 25: 97-132.

-Yashiro T., Matsuura K., Guenard B., Terayama M., and Dunn R. R. (2010) on the evolution of the species complex *Pachycondyla chinensis* (Hymenoptera: Formicidae: ponerinae), including the origin of its invasive form and description of a new species.

-Zungoli P. A. and Benson E. P. (2008) Seasonal occurrence of swarming acrivity and worker abundance of *Pachycondyla chinensis* (Hymenoptera: Formicidae). Proceeding of the sixth International Conference on Urban Pests, Robinson W. H. and Bajomi D. editors.

♂ Genus ***Centromyrmex*** Mayr, 1866

Morphological characters used in the dichotomous key

Antennae of 13 articles, Antennae Scape in length ≤ that half of the 2° article of the Funiculus (*C. feae*) or ≤ that the 2° article of the Funiculus (*C. sellaris);* Forewings Typology I with Marginal cell closed; Hindwings Typology I with Jugal lobe present; Mandibles reduced; Mesonotum with Notauli present or absent; Pygidium (Abdominal Tergum VIII)

distally rounded; MetaTibiae with one or two Spurs; Pretarsal Claws simple.

Bio-geographical distribution

Neotropical, Afrotropical, Indo-Australian and Oriental

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Brazil: 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Centromyrmex* sp. 135: November to January; 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Centromyrmex* sp. 4: April (Cantone)

References for Taxonomic identification

-AntWiki (2016) Photos C. sellaris ♂ Typus, South African Museum. www.antwiki.org

-Arnold G. (1915) A Monograph of the Formicidae of South Africa. Annals of the South African Museum, Vol. XVI.

-Arnold G. (1926) A Monograph of the Formicide of South Africa. Annals of the South African Museum, Vol. XXIII.

-Bingham C. T. (1903) The fauna of British India including Ceylon and Burma. Hymenoptera, Vol. II, Edited by W. T. Blanford.

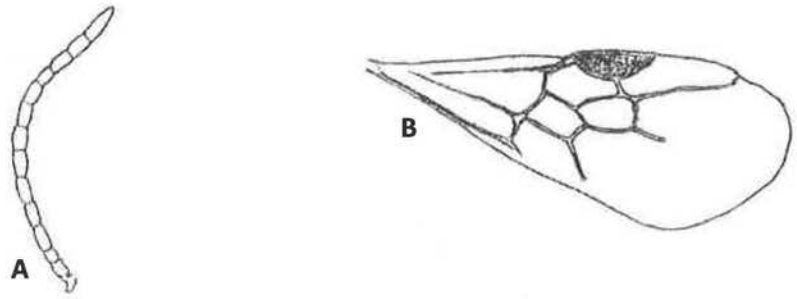
-Bolton B. and Fisher B. L. (2008) Afrotropical ants of the Ponerinae genera *Centromyrmex* Mayr, *Promyopias* Santschi gen rev. and *Feroponera* gen. n., with a revised key to genera of African Ponerinae (Hymenoptera: Formicidae). Zootaxa 1929: 1-37.

-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118.

-Forel A. (1900) Les formicides de l'Empire des Indes et de Ceylan, Part VII. J. Bombay Nat. Hist. Soc. 13: 303-332.

-Wheeler W. M. (1936) Ecological relation of Ponerinae and other ants to termites. American Academy of Arts and Sciencies, Vol. 71, N° 3.

Figure – **A**: Antennae; **B**: Forewing of *Centromyrmex* sp. ♂, Brazil.



♂ Genus ***Cryptopone*** Emery, 1893

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe absent; Mandibles reduced; Mesonotum with Notauli absent; Pygidium (Abdominal Tergum VIII) distally rounded; MetaTibiae with one or two Spur; Pretarsal Pretarsal Claws simple or with sub median tooth.

Notes: male description in Brown 1963 and Ogata 1987 with pygidial spine, in truth the Pygidium is rounded in *C. gilva* Emery, *C. ochracea* Emery, *C. sauteri* Wheeler and *C. testacea* Emery (Emery, 1916; Creighton and Tulloch, 1930, Ogata, 1987) with figure of the male of *C. gilva* without pygidial spine and photos of *C. testacea* Typus (Antwiki 2016). *C. gilva*, *C. ochracea* and *C. ochracea sicula* (Emery, 1916; Mackay and Mackay, 2010, Ogata 1987) with Forewing of Typology I. *C. gilva* with Forewing of Typology II in figure of Creighton and Tulloch (1930) I do not consider.

Bio-geographical distribution

Cosmopolitan

References for Taxonomic identification

-AntWiki (2016) Photos *C. testacea* Typus. www.antwiki.org

-Brown W. L. (1963) Character and synonymies among the genera of ants. Part III. Some members of the tribe Ponerini (Ponerinae, Formicidae). Breviora, Museum of Comparative Zoology, N° 190, Cambrige, Mass. USA.

-Creighton W. S. and Tulloch G. S. (1930) Notes on *Euponera gilva* (Roger) (Hymenoptera, Formicidae). Psyche, March.

-Donisthorpe H. (1942) Ants from the Colombo Museum Expedition to Southern India, September-October 1938. Annals and Magazine of Natural history, Ser. 11, Vol. IX.

-Emery C. (1916) Fauna Entomologica Italiana I. Himenoptera. Formicidae. Bull. Soc. Entomol. It. 47: 79-275.

-Mackay W. P. and Mackay E. E. (2010) The systematic and biology of the New World Ants of the genus *Pachycondyla* (Hymenoptera: Formicidae). The Edwin Mellen Press, Lewiston, Queenston, Lampeter.

-Ogata K. (1987) A generic synopsis of the Poneroid complex of the Family Formicidae in Japan (Hymenoptera). Part I. SubFamilies Ponerinae and Cerapachyinae.ESAKIA N° 25: 97-132.

-Wheeler W. M. (1933) Three obscure genera of Ponerine ants. American Museum Novitates, N° 672, The American Museum of Natural History, New York city.

Figure – **A**: Antennae of *Cryptopone* sp. ♂, Brazil.

♂ Genus ***Diacamma*** Mayr, 1862

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length < than half of the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles reduced; Mesonotum with Notauli absent; Pygidium (Abdominal Tergum VIII) distally pointed; MetaTibiae with two Spur; Pretarsal Claws with submedian tooth.

Bio-geographical distribution

Indo-Australian and Australia

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Bingham C. T. (1903) The fauna of British India including Ceylon and Burma. Hymenoptera, Vol. II, Edited by W. T. Blanford.

-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118.

-Ogata K. (1987) A generic synopsis of the Poneroid complex of the Family Formicidae in Japan (Hymenoptera). Part I. SubFamilies Ponerinae and Cerapachyinae.ESAKIA N° 25: 97-132.

♂ Genus ***Dinoponera*** Roger, 1861

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≥ than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles reduced; Mesonotum with Notauli absent; Pygidium (Abdominal Tergum VIII) distally pointed; Abdominal Sternum IX distally rounded to truncate or medially convex with lateral process; MetaTibiae with two Spurs; Pretarsal Claws with tooth sub-median. Body Total leght > 19 mm.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: female calling

Mating flight: Brazil: 6°7'S, 34°45'W, *D. quadriceps*: all year (Vasconcellos et al. 2004); 22°54'S, 47°3'W, 650 meters sealevel, *D. australias*: May (Borgmeier 1937).

References for Taxonomic identification

-Borgmeier T. (1937) Formigas novas ou pouco conhecidas da America do Sul e Central, principalmente do Brasil (Hym. Formicidae). Arch. Inst. Biol. Veget., Vol. 3, N° 2, Rio de Janeiro.

-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118.

-Kempf W.W. (1971) A preliminary review of the Ponerine ant genus *Dinoponera* Roger (Hym. Formicidae). Studia Entomologica, Vol. 14, fasc. 1.4.
-Lenhart P. A., Dash S. T., Mackay W. P. (2013) A revision of the giant Amazonian ants of the genus *Dinoponera* (Hymenoptera, Formicidae). Journal of Hymenoptera Research 31: 119-164.
-Vasconcellos A., Santana G. G. and Souza A. K. (2004) Nest spacing and architecture and swarming of males of *Dinoponera quadriceps* (Hymenoptera, Formicidae) in a remnant of the Atlantic Forest in Northeast Brazil. Braz. J. Biol., 64(2): 357-362.

♂ Genus ***Ectomomyrmex*** Mayr, 1867

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length < than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles reduced; Mesonotum with Notauli present; Pygidium (Abdominal Tergum VIII) distally pointed; Abdominal Sternum IX distally rounded or sub triangular; MetaTIbiae with two Spurs; Pretarsal Claws simples.

Bio-geographical distribution

Indo-Australian, Australian and Oriental

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118.
-Ogata K. (1987) A generic synopsis of the Poneroid complex of the Family Formicidae in Japan (Hymenoptera). Part I. SubFamilies Ponerinae and Cerapachyinae.ESAKIA N° 25: 97-132.
-Teranishi C. (1940) Work of Cho Teranishi Memorial Volume. Osaka: Kansai entomological Society.

♂ Genus ***Euponera*** Forel, 1891

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than half of the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present or not; Mandibles reduced; Mesonotum with Notauli present; Pygidium (Abdominal Tergum VIII) distally pointed; MetaTIbiae with two Spurs; Pretarsal Claws simple.

Bio-geographical distribution

Afrotropical, Indo-Australian and Oriental

Behavioral Ecology of the Mating flight
Strategy: unknown
Mating flight: unknown
References for Taxonomic identification
-ANTWEB (2016) Photos *E. brunei* Typus. www.antweb.org
-Arnold G. (1915) A Monograph of the Formicidae of South Africa. Annals of the South African Museum, Vol. XVI.
-Bondroit J. (1918) Les fourmis de France et de Belgique. Annales de La Societè Entomologique de France, Vol. 87.
-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118.
-Forel A. (1901) Nouvelle species de Ponerinae. Rev. Suisse Zool., Vol. 9.
-Ogata K. (1987) A generic synopsis of the Poneroid complex of the Family Formicidae in Japan (Hymenoptera). Part I. SubFamilies Ponerinae and Cerapachyinae.ESAKIA N° 25: 97-132.

♂ Genus ***Hagensia*** Forel 1901

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles reduced; Mesonotum with Notauli absent; Pygidium (Abdominal Tergum VIII) distally pointed; MetaTibiae with two Spurs; Pretarsal Claws simple or with tooth sub median.

Bio-geographical distribution
South Africa
Behavioral Ecology of the Mating flight
Strategy: unknown
Mating flight: unknown
References for Taxonomic identification
-Arnold G. (1915) A Monograph of the Formicidae of South Africa. Annals of the South African Museum, Vol. XVI.
-Arnold G. (1926) A Monograph of the Formicide of South Africa. Annals of the South African Museum, Vol. XXIII.

♂ Genus ***Harpegnathos*** Jerdon 1851

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles reduced; Mesonotum with Notauli present; Pygidium (Abdominal Tergum VIII) distally pointed; Abdominal Sternum IX fairly long, distally bluntly pointed; MetaTibiae with two Spurs; Pretarsal Claws with tooth sub median.

Bio-geographical distribution
Indo-Australian
Behavioral Ecology of the Mating flight
Strategy: unknown
Mating flight: unknown
References for Taxonomic identification
-ANTWEB (2016) Photos: *H. pallipes* and *H. medioniger* Typus. www.antweb.org
-Donisthorpe H. (1942) Description of a few ants from the Phillipine Island, ans a Male of *Polyrachis bihamata* Druny from India. Annals and Magazine of Natural History, Sr. 11, Vol. IX.
-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118.

♂ Genus ***Hypoponera*** Santschi, 193

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I or II with Jugal lobe absent; Mandibles reduced; Mesonotum with Notauli absent, occasionally present; Pygidium (Abdominal Tergum VIII) distally rounded or triangular versus pointed; Abdominal Sternum IX distally rounded; MetaTibiae with one Spur; Pretarsal Claws simple; Eyes with minute setae projecting from between the ommatidia (ocular setae). Present ergatoid male wingless.

Bio-geographical distribution
Cosmopolitan
Behavioral Ecology of the Mating flight
Strategy: *H. punctatissima*: clearly shows a high potency for long-range flight dispersal in temperate climate (Seifert 2003).
Mating flight: Puerto Rico: 18°17' N, 66°07' W, 300 meters sea level, *H. opacior*: October, *H. punctatissima*: October to April (Torres et al 2000); Europe: *H. punctatissima*: May to August; Germany: 51° 9'5.30"N 14°58'18.12"E, *H. punctatissima*: August and in greenhouses: October to March (Seifert 2003); Japan: 35°1'33.59"N, 135°46'50.95"E, 60 meters sea level, *H. nipponica*: August (Onoyama 1989); Brazil: 20°45' S, 45°52' W, 700 meters sea level, *Hypoponera* sp. 3: November to March (Cardoso do Nascimento 2002); 14°37'04''S, 39°04' 07''W, 10 meters sea level, *Hypoponera* sp. 1: November to June, *Hypoponera* sp. 2: November to February and May to August (Cardoso do Nascimento 2006); 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Hypoponera* sp. 97: October to March, *Hypoponera* sp. 161: October, December and February; *Hypoponera* sp. 163: November and January to March; 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Hypoponera* sp. 385: January (Cantone see chapter 4); Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *Hypoponera* sp. bm3: all year, *Hypoponera* sp. bm6: January to September and November, *Hypoponera* sp. or: April, May, July, December and January, *Hypoponera* sp. q6: September to February and July (Kaspari et al. 2001); Argentine:

26°58'S, 64°51'W, 800 meters sea level, *H. trigona*: November to June, *Hypoponera* sp. 1: November and January, *Hypoponera* sp. 2: December, *Hypoponera* sp. 3: November to January, April to May (Kusnezov 1962).

References for Taxonomic identification

-Bolton B. and Fisher B. L. (2011) Taxonomy of Afrotropical and West Paleartic ants of the ponerine genus *Hypoponera* Santschi (Hymenoptera: Formicinae). Zootaxa 2843: 1-118.

-Cardoso do Nascimento I. (2002) Fenologia do voo nuptial e amostragem de comunidade de formigas (Hymenoptera: Formicidae) em area de Mata Atlantica do municipio de Viçosa, Minas Gerais. Universidade Federal de Viçosa, Dissertação (mestrado).

-Cardoso do Nascimento I. (2006) Fenologia dos voos de acasalamento em formigas Tropicais. Universidade Federal de Viços, Tese (doutorado).

-Donisthorpe H. (1943) The ants (Hym., Formicidae) of Waigeu Island, North Dutch New Guinea. Annals and Magazine of Natural History, Ser. 11, Vol. X.

-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118.

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-Kaspari M., Pickering J., Longino J.T and Windsor D. (2001) The phenology of a Neotropical ant assemblage: evidence for continuous and overlapping reproduction. Behav. Ecol. Sociobiol., 50: 382-390.

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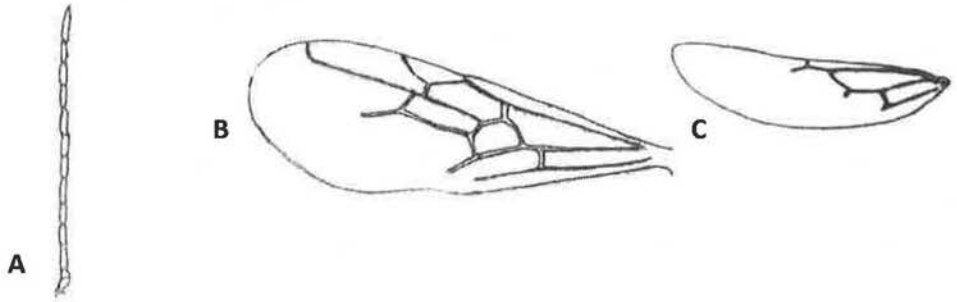
Figure – **A**: Antennae; **B**: Forewing; **C**: Hindwing of *Hypoponera* sp. ♂, Brazil.



♂ Genus ***Leptogenys*** Roger, 1861

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe absent; Mandibles reduced; Mesonotum with Notauli present; Pygidium (Abdominal Tergum VIII) distally rounded; Abdominal Sternum IX distally rounded; MetaTibiae with two Spurs; Pretarsal Claws pectinate.

Bio-geographical distribution

Neotropical, Afrotropical, Indo-Australian, Australia, Oriental

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Puerto Rico: 18°17' N, 66°07' W, 300 meters sea level, *L. pubiceps*: July to November (Torres et al. 2000); Usa: 31°5'N, 100°2'W, *L. elongate*: May, June and October; 27°39'N, 81°30'W, *L. manni*: May to October (Trager and Johnson 1988); Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *L. ambigua*: January to May, July to September and November, *Leptogenys* sp. bm3: January to May and luly to October (Kaspari et al. 2001); Brazil: 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Leptogenys* sp. 464: March (Cantone see chapter 4); Argentine: 26°10'34.23"S, 58°11'20.79"W, 60 meters sea level, January and December (Kusnezov 1962).

References for Taxonomic identification

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-Mann W. M. (1921) the ants of the Fiji Island. Bulletin Museum of Comparative Zoology, N° 5.

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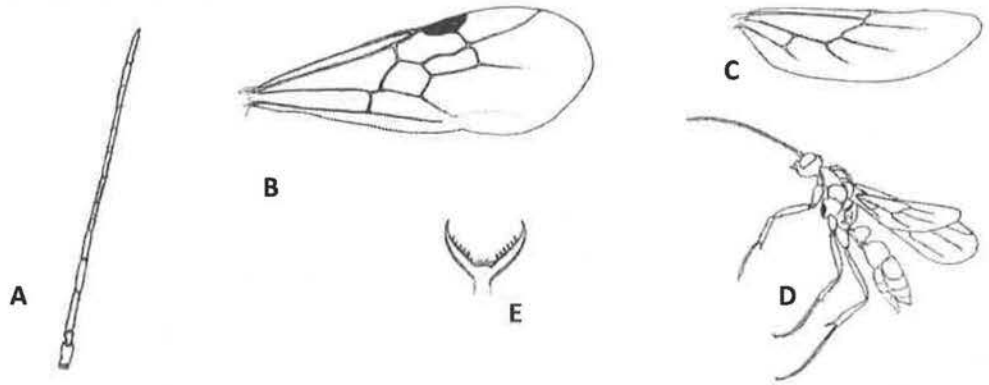
-Ogata K. (1987) A generic synopsis of the Poneroid complex of the Family Formicidae in Japan (Hymenoptera). Part I. SubFamilies Ponerinae and Cerapachyinae.ESAKIA N° 25: 97-132.

-Trager J, C. and Johnson C. (1988) The ant genus *Leptogenys* (Hymenoptera: Formicidae, Ponerinae) in the United States.
-Torres J. A., Snelling R. R. and Canals M. (2000) Seasonal and Nocturnal Periodicities in Ant Nuptial Flights in the Tropics (Hymenoptera: Formicidae). Sociobiology, Vol. 37, n° 3B.

Figure – **A**: Antennae; **B**: Forewing; **C**: Hindwing; **D**: Habitus **E**: Pretarsal Claws pectinate of *Leptogenys* sp. ♂, Brazil.



♂ Genus ***Mayaponera*** Schmid & Shattuck, 2014

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles reduced; Mesonotum with Notauli present; Pygidium (Abdominal Tergum VIII) distally pointed; MetaTibiae with two Spurs.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *M. constricta*: all year (Kaspari et al. 2001).

References for Taxonomic identification

-Kaspari M., Pickering J., Longino J.T and Windsor D. (2001) The phenology of a Neotropical ant assemblage: evidence for continuous and overlapping reproduction. Behav. Ecol. Sociobiol., 50: 382-390.
-Mackay W. P. and Mackay E. E. (2010) The systematic and biology of the New World Ants of the genus *Pachycondyla* (Hymenoptera: Formicidae). The Edwin Mellen Press, Lewiston, Queenston, Lampeter.

♂ Genus ***Megaponera*** Mayr, 1862

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with

Jungal lobe present; Mandibles reduced; Mesonotum with Notauli absent; Pygidium (Abdominal Tergum VIII) distally rounded; Meta-Tibiae with two Spurs; Pretarsal Claws with sub median tooth or 3-4 minute teeth near the base.

Bio-geographical distribution

Afrotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: South Africa: 24°27'S, 30°44'E, *M. analis*: November (ANTWEB 2016)

References for Taxonomic identification

-Arnold G. (1915) A Monograph of the Formicidae of South Africa. Annals of the South African Museum, Vol. XVI.

-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118.

-Wheeler W. M. (1936) Ecological relation of Ponerinae and Other ants to termites. American academy of Arts and Sciences, Vol. 71, N° 3.

♂ Genus ***Mesoponera*** Emery, 1900

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles reduced; Mesonotum with Notauli absent; Pygidium (Abdominal Tergum VIII) distally pointed; MetaTibiae with two Spurs.

Bio-geographical distribution

Afrotropical, Indo-Australian and Australia

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Donisthorpe H. (1942) Ants from the Colombo Museum Expedition to Southern India, September-October, 1938. Annals and Magazine of Natural History, Ser. 11, Vol. X.

-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118.

-Arnold G. (1915) A Monograph of the Formicidae of South Africa. Annals of the South African Museum, Vol. XVI.

♂ Genus ***Myopias*** Roger, 1861

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe absent; Mandibles reduced; Mesonotum with Notauli present; Pygidium

(Abdominal Tergum VIII) distally rounded; Abdominal Sternum IX distally rounded; MetaTibiae with two Spurs.

Bio-geographical distribution

Indo-Australian and Australia

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Probst R.S., Guenard B., Boudinot B. E. (2015) Toward understanding the predatory ant genus *Myopias* (Formicidae: Ponerinae), Including a key to global specie, male-based generic diagnosis, and new species description. Sociobiology, 62 (2): 192-212.

♂ Genus ***Neoponera*** Emery, 1901

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles reduced; Mesonotum with Notauli present (*N. oberthueri* Notauli absent); Pygidium (Abdominal Tergum VIII) distally pointed; Abdominal Sternum IX distally rounded; Meta-Tibiae with two Spurs; Pretarsal Claws simple or with sub-median tooth.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Brazil: 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Neoponera* sp. 147 and 165: January to April, *Neoponera* sp. 129: November; 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Neoponera* sp. 404: February, *Neoponera* sp. 397: January and February (Cantone see chapter 4).

References for Taxonomic identification

-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118.

-Fernandes I. O., Oliveira M. L. D. and Delabie J.H.C. (2014) Description of two new species in the Neotropical *Pachycondyla foetida* complex (Hymenoptera: Formicidae: Ponerinae) and taxonomic notes on the genus. Myrmecological News, 19: 133-163.

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-Wheeler W. N. (1936) Ecological relation of Ponerinae and other ants to Termites. American Academy of Art and Sciences, Vol. 71, N° 3.

Figure – **A:** Forewing; **B**: Hindwing; of *Neoponera* sp. ♂, Brazil.

♂ Genus ***Odontomachus*** Latreille, 1804

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles reduced; Mesonotum with Notauli absent; Pygidium (Abdominal Tergum VIII) distally pointed; Abdominal Sternum IX distally rounded or sub-truncate; MetaTibiae with two Spurs; Pretarsal Claws simple or with sub-median tooth.

Bio-geographical distribution

Neotropical, Neartic, Afrotropical, Indo-Australian, Australian and Oriental

Behavioral Ecology of the Mating flight

Strategy: female calling

Mating flight: Brasil: 20°45' S, 45°52' W, 700 meters sea level, *O. bauri*: November to May and May, *O. meinerti*: October to March (Cardoso do Nascimento 2002); 14°37'04''S, 39°04' 07''W, 10 meters sea level, *O. meinerti*: all year, *O. haematodus*: November to March, July and September (Cardoso do nascimento 2006); 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Odontomachus* sp. 136: November, December and April, *Odontomachus* sp. 150: February to April, *Odontomachus* sp. 83: October to February; 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Odontomachus* sp. 376: November to February, *Odontomachus* sp. 383: January and February (Cantone see chapter 4); Puerto Rico: 18°17' N, 66°07' W, 300 meters sea level, *O. ruginodis*: all year (Torres et al. 2000); Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *O. bauri*: all year, *Odontomachus* sp. imt1: December to May (Kaspari et al. 2001); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *O. haematodus*: November to January (Kusnezov 1962); USA: 27° 9'53.22"N, 81°21'19.72"W, 30 meters sea level, *O. clarus*: July to December; *O. bruneus*: May, June and December (Deyrup et al. 1985).

References for Taxonomic identification

-Brown W. L. (1976) Contribution toward a reclassification of the Formicidae. Part VI. Ponerinae, Tribe Ponerini, Subtribe Odontomachiti. Section A. Introduction, Subtribal characters. Genus *Odontomachus*. Studia Entomologica, Vol. 19, fasc. 1-4.

-Cardoso do Nascimento I. (2002) Fenologia do voo nuptial e amostragem de comunidade de formigas (Hymenoptera: Formicidae) em area de Mata Atlantica do municipio de Viçosa, Minas Gerais. Universidade Federal de Viçosa, Dissertaçao (mestrado).

-Cardoso do Nascimento I. (2006) Fenologia dos voos de acasalamento em formigas Tropicais. Universidade Federal de Viços, Tese (doutorado).

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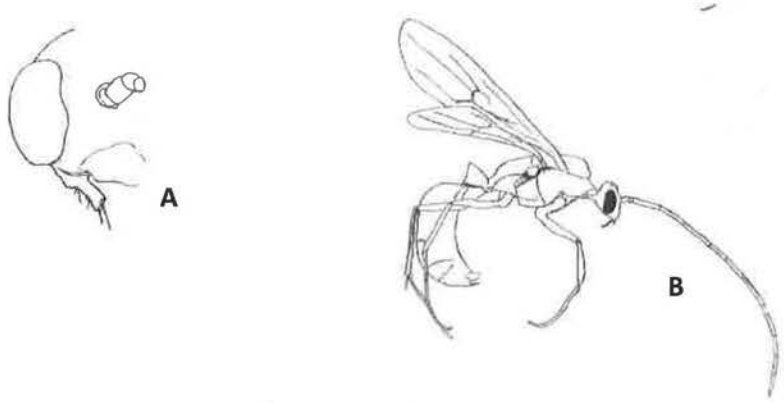
-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118.
-Fisher B. L., Smith M. A. (2008) A revision species of *Anochetus* Mayr and *Odontomachus* Latreille (Hymenoptera: Formicidae). Plos One, Vol. 3, Issue 5.
-Kaspari M., Pickering J., Longino J.T and Windsor D. (2001) The phenology of a Neotropical ant assemblage: evidence for continuous and overlapping reproduction. Behav. Ecol. Sociobiol., 50: 382-390.
-Kusnezov N. (1962) El vuelo nupcial de lãs hormigas. Acta Zoologica Lilloana, tomo 18, 385-442.
-Mcgown J. A., Boudinot B., Deyrup M. and Sorger D. M. (2014) A review of the Neartic *Odontomachus* (Hymenoptera: Formicidae: Ponerinae) with a treatment of the males. Zootaxa 3802 (4): 515-552.
-Ogata K. (1987) A generic synopsis of the Poneroid complex of the Family Formicidae in Japan (Hymenoptera). Part I. SubFamilies Ponerinae and Cerapachyinae.ESAKIA N° 25: 97-132.
-Torres J. A., Snelling R. R. and Canals M. (2000) Seasonal and Nocturnal Periodicities in Ant Nuptial Flights in the Tropics (Hymenoptera: Formicidae). Sociobiology, Vol. 37, n° 3B.
-Yoshimura M. and Fisher B. L. (2007) A revision of male ants of the Malagasy region (Hymenoptera: formicidae): Key to subfamilies and treatment of the genera of Ponerinae. Zootaxa 1654: 21-40.

Figure – **A**: Mandibles reduced; **B**: Habitus of *Odontomachus* sp. ♂, Brazil.



♂ Genus ***Odontoponera*** Mayr, 1862

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles reduced; Mesonotum with Notauli absent; Pygidium (Abdominal Tergum VIII) distally rounded; Abdominal Sternum IX distally rounded; MetaTibiae with two Spurs; Pretarsal Claws simple.

Bio-geographical distribution

Indo-Australian

Behavioral Ecology of the Mating flight
Strategy: unknown
Mating flight: unknown
References for Taxonomic identification
-ANTWEB (2016) Photos of *O. transversa* Typus. www.antweb.org.
-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118.

♂ Genus ***Ophthalmopone*** Forel, 1890

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles reduces; Mesonotun with Notauli absent; Pygidium (Abdominal Tergum VIII) distally pointed.

Bio-geographical distribution
Afrotropical
Behavioral Ecology of the Mating flight
Strategy: unknown
Mating flight: South Africa: 27°39'32.39"S, 32°14'16.93"E, *O. berthoudi*: January to April (Peeters and Crewe 1986).
References for Taxonomic identification
-ANTWIKI (2016) Photos *O. berthoudi*. www.antwiki.org
-Arnold G. (1915) A Monograph of the Formicidae of South Africa. Annals of the South African Museum, Vol. XIV.
-Arnold G. (1916) A Monograph of the Formicidae of South Africa. Annals of the South African Museum, Vol. XIV, Part II.
-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118.
-Peeters C. and Crewe R. (1986) Male biology in the queenless Ponerinae ant *Ophthalmopone berthoudi* (Hymenoptera: Formicidae). Psyche, 93: 277-284.

♂ Genus ***Pachycondyla*** F. Smith, 1858

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles reduced; Mesonotum with Notauli present; Pygidium (Abdominal Tergum VIII) distally pointed; Abdominal Sternum IX distally rounded; Meta-Tibiae with two Spurs; Pretarsal Claws simple or with sub-median tooth.

Bio-geographical distribution
Neotropical

Behavioral Ecology of the Mating flight

Strategy: *P. striata*: male aggregation (Cantone 2015)

Mating flight: Brazil: 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *P. striata*: August to September (Cantone 2015); 14°37'04''S, 39°04' 07''W, 10 meters sea level, *P. harpax*: November to March (Cardoso do Nascimento 2006).

References for Taxonomic identification

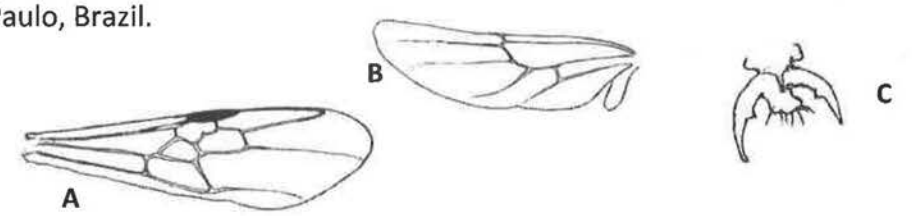
-Cantone S. and Campos A.E.C. (2015) Nesting and reproduction of *Pachycondyla striata* (Formicidae: Ponerinae). Acta Scientiarum, v. 37, n. 3, p. 337-344.

-Cardoso do Nascimento I. (2006) Fenologia dos voos de acasalamento em formigas Tropicais. Universidade Federal de Viços, Tese (doutorado).

-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118.

-Mackay W. P. and Mackay E. E. (2010) The systematic and biology of the New World Ants of the genus *Pachycondyla* (Hymenoptera: Formicidae). The Edwin Mellen Press, Lewiston, Queenston, Lampeter.

Figure – **A**: Forewing; **B**: Hindwing; **C**: Pretarsal Claws of *Pachycondyla striata* ♂, São Paulo, Brazil.



♂ Genus ***Paltothyreus*** Mayr, 1862

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles reduced; Mesonotum with Notauli absent; Pygidium (Abdominal Tergum VIII) distally triangular versus pointed; MetaTibiae with two Spurs; Pretarsal Claws bifid.

Bio-geographical distribution

Afrotropical

Behavioral Ecology of the Mating flight

Strategy: female calling

Mating flight: South Africa: 27°,36'S, 32°13'E *P. tarsatus*: September (antweb 2016)

References for Taxonomic identification

-ANTWEB (2016) Photos *P. tarsatus* Typus. www.antweb.org

-Arnold G. (1915) A Monograph of the Formicidae of South Africa. Annals of the South African Museum, Vol. XIV.

-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118.

-Mackay W. P. and Mackay E. E. (2010) The systematic and biology of the New World Ants of the genus *Pachycondyla* (Hymenoptera: Formicidae). The Edwin Mellen Press, Lewiston, Queenston, Lampeter.

♂ Genus ***Phrynoponera*** Wheeler, 1920

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles reduced; Mesonotum with Notauli absent; Pygidium (Abdominal Tergum VIII) distally pointed; Abdominal Sternum IX distally triangular; MetaTibiae with two Spurs; Pretarsal Claws bifid.

Bio-geographical distribution

Afrotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Bolton B. and Fisher B. L. (2008) The Afrotropical Ponerinae ant genus *Phrynoponera* Wheeler (Hymenoptera: Formicidae). Zootaxa 1892: 35-52.

♂ Genus ***Platythyrea*** Roger, 1863

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length < than the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles triangular marginally dentate or edentate; Mesonotum with Notauli present; Pygidium (Abdominal Tergum VIII) distally rounded; Abdominal Sternum IX distally rounded or triangular; MetaTibiae with two Spurs; Pretarsal Claws bifid or with submedian tooth.

Bio-geographical distribution

Neotropical, Afrotropical, Indo-Australian and Australia.

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Arnold G. (1915) A Monograph of the Formicidae of South Africa. Annals of the South African Museum, Vol. XIV.

-Arnold G. (1926) A monograph of the Formicidae of South Africa. Appendix. Annales of the South African Museum, Vol. 23.

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Ponerinae, Tribe Platythyreini, Cerapachyni, Cylindromyrmecini, Acanthostichini and Aectogitini. Search Agriculture, Cornell University, Vol. 5, N° 1: 1-115.
-Donisthorpe H. (1943) The ants (Hym., Formicidae) of Waigeu Island, North Dutch New Guinea. Annals and Magazine of Natural History, Ser. 11, Vol. X.
-Emery C. (1899) Fourmis D'Afrique. Annales de la Societé Entomologique de Belgique, Tome XLIII.
-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118.
-Wheeler W. M. (1922) Ants of the American Museum Congo Expedition. A contribution to the Myrmecology of Africa. Bulletin of the American Museum of Natural History, Vol. XLV.

♂ Genus ***Plectroctena*** F. Smith, 1858

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles reduced; Mesonotum with Notauli present; Pygidium (Abdominal Tergum VIII) distally pointed; Abdominal Sternum IX distally rounded; MetaTibiae with one Spur.

Bio-geographical distribution

Afrotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Arnold G. (1915) A Monograph of the Formicidae of South Africa. Annals of the South African Museum, Vol. XIV.
-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118.
-Wheeler W. M. (1922) Ants of the American Museum Congo Expedition. A contribution to the Myrmecology of Africa. Bulletin of the American Museum of Natural History, Vol. XLV.

♂ Genus ***Ponera*** Latreille, 1804

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I or II with Jugal lobe absent; Mandibles reduced; Mesonotum with Notauli absent; Pygidium (Abdominal Tergum VIII) distally pointed; Abdominal Sternum IX distally rounded or bluntly pointed; MetaTibiae with one Spur.

Bio-geographical distribution

Neartic, Paleartic, Oriental, Indo-Australian and Australia

Behavioral Ecology of the Mating flight
Strategy: unknown
Mating flight: unknown
References for Taxonomic identification
-Bondroit J. (1918) Les fourmis de France et de Belgique. Annales de La Societè Entomologique de France, Vol. 87.
-Ogata K. (1987) A generic synopsis of the Poneroid complex of the Family Formicidae in Japan (Hymenoptera). Part I. SubFamilies Ponerinae and Cerapachyinae.ESAKIA N° 25: 97-132.
-Taylor R. W. (1967) A monographic revision of the ant genus *Ponera* Latreille (Hymenoptera: Formicidae). Pacific Insects Monograph 13: 1-112.

♂ Genus ***Psalidomyrmex*** André, 1890

Morphological characters used in the dichotomous key
Antennae with 13 articles; Antennae Scape in length ≤ than half the 2° article of the Funiculus; Forewings ofTypology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles reduced; Mesonotum with Notauli absent; Pygidium (Abdominal Tergum VIII) distally rounded; MetaTibiae with one Spur; Pretarsal Claws bifid.
Bio-geographical distribution
Afrotropical
Behavioral Ecology of the Mating flight
Strategy: unknown
Mating flight: unknown
References for Taxonomic identification
-ANTWEB (2016) Photos: *P. procerus*, Det. B. Bolton. www.antwiki.org.
-Emery C. (1899) Fourmis D'Afrique. Annales de la Societé Entomologique de Belgique, Tome XLIII.
-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118.
-Menozzi C. (1922) Miscellanea Mirmecologica. Ann. Mus. Civ. Stor. Nat. (3) 10.

♂ Genus ***Pseudoneoponera*** Donisthorpe, 1943

Morphological characters used in the dichotomous key
Antennae with 13 articles, Antennae Scape in length ≤ than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles reduced; Mesonotum with Notauli absent; Pygidium (Abdominal Tergum VIII) distally pointed; Abdominal Sternum IX distally pointed; MetaTibiae with two Spurs; Pretarsal Claws with submedian tooth.

Bio-geographical distribution
Indo-Australian and Australia
Behavioral Ecology of the Mating flight
Strategy: unknown
Mating flight: unknown
References for Taxonomic identification
-ANTWEB (2016) Photos *P. verecunde* Typus. www.antweb.org
-Donisthorpe H. (1943) the ants (Hym., Formicidae) of Waigeu Island, North Dutch New Guinea. Annals and Magazine of Natural History, Ser. 11, Vol. X.
-Wheeler W. M. (1919) The ants of Borneo. Bulletin of the Museum of Comparative Zoology at Harvard College, N° 3.

♂ Genus ***Pseudoponera*** Emery, 1900

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe absent; Mandibles reduced; Mesonotum with Notauli present; Pygidium (Abdominal Tergum VIII) distally pointed; Abdominal Sternum IX distally rounded; MetaTibiae with one Spur.

Bio-geographical distribution
Neotropical, Indo-Australian and Australia
Behavioral Ecology of the Mating flight
Strategy: unknown
Mating flight: unknown
References for Taxonomic identification
-ANTWEB (2016) Photos *P. succedanea* Typus. www.antweb.org.
-Mackay W. P. and Mackay E. E. (2010) The systematic and biology of the New World Ants of the genus *Pachycondyla* (Hymenoptera: Formicidae). The Edwin Mellen Press, Lewiston, Queenston, Lampeter.

♂ Genus ***Rasopone*** Schmid & Shattuck, 2014

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles reduced; Mesonotum with Notauli present; Pygidium (Abdominal Tergum VIII) distally pointed; MetaTibiae with two Spurs.

Bio-geographical distribution
Neotropical
Behavioral Ecology of the Mating flight
Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Mackay W. P. and Mackay E. E. (2010) The systematic and biology of the New World Ants of the genus *Pachycondyla* (Hymenoptera: Formicidae). The Edwin Mellen Press, Lewiston, Queenston, Lampeter.

♂ Genus ***Streblognathus*** Mayr, 1862

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than half the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology I with Jugal lobe present; Mandibles reduced; Mesonotum with Notauli absent; Petiole with ventral lamella pointed; Pygidium (Abdominal Tergum VIII) distally pointed; Abdominal Sternum IX distally rounded; MetaTibiae with two Spurs; Pretarsal Claws with submedian tooth; Body Total length ~18 mm.

Bio-geographical distribution

Afrotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Arnold G. (1915) A Monograph of the Formicidae of South Africa. Annals of the South African Museum, Vol. XIV.

-Emery C. (1911) Hymenoptera Fam. Formicidae, SubFam. Ponerinae. Genera Insectorum, P. Wytsman, Fasc. 118.

-Robertson H. G. (2002) Revision of the ant genus *Streblognathus* (Hymenoptera: Formicidae: Ponerinae). Zootaxa 97: 1-16.

♂ Genus ***Thaumatomyrmex*** Mayr, 1887

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than half of the length 2° article of the Funiculus; Forewings of Typology II with Marginal cell closed and appendiculata; Hindwings of Typology II with Jugal lobe absent; Mandibles reduced; Mesonotum with Notauli absent; Pygidium (Abdominal Tergum VIII) distally pointed; Abdominal Sternum IX distally rounded; MetaTibiae with one Spur; Pretarsal Claws simple.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Panama: 9°19' N, 79°50'15'', 50-80 meters sea level, *Thaumatomyrmex* sp. mt3: December to July and October (Kaspari et al. 2001)

References for Taxonomic identification

-Kempf W. W. (1954) A descoberta do primeiro macho do gênero *Thaumatomyrmex* Mayr (Hymenoptera, Formicidae). Rev. Brasil. Ent., 1: 47-52.

-Kaspari M., Pickering J., Longino J.T and Windsor D. (2001) The phenology of a Neotropical ant assemblage: evidence for continuous and overlapping reproduction. Behav. Ecol. Sociobiol., 50: 382-390.

-Kempf W. W. (1975) A revision of the Neotropical Ponerinae Ant genus *Thaumatomyrmex* Mayr (Hymenoptera: Formicidae). Studia Ent., Vol. 18, fasc. 1-4.

3.16 Subfamily Proceratiinae Emery, 1895

This subfamily is represented for 3 genera and the ♂♂ are all known.

♂ Genus ***Discothyrea*** Roger, 1863

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, not overstep the Occiput, first article of the Funiculus in length < than the second, insertion of the Antennae confluent from posterior edge of the Clypeus; Forewings of Typology III with Marginal cell closed; Hindwings of Typology III; Mandibles dentate or edentate; Palp formula 6:4 or 4:3 Mesonotum with Notauli absent; Pygidium (Abdominal Tergum VIII) distally rounded; Abdominal Sternum IX distally rounded; MetaTibiae with one Spur; Petiole entirely articulated with the first segment of the Gaster.

Bio-geographical distribution

Neotropical, Afrotropical, Indo-Australian and Australia

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *Discothyrea* sp. mt1: January to November, *Discothyrea* sp. mt2: January to May and July to October, *Discothyrea* sp. mt4: November to July and September (Kaspari et al. 2001).

References for Taxonomic identification

-Arnold G. (1926) A Monograph of the Formicide of South Africa. Annals of the South African Museum, Vol. XXIII.

-Emery C. (1901) Notes sul lês sub familles dês Dorylines et Ponerines (Famille dês Formicides). Extrait des Annales de la Societè Entomologique de Belgique, Tome XLV.

-Kaspari M., Pickering J., Longino J.T and Windsor D. (2001) The phenology of a Neotropical ant assemblage: evidence for continuous and overlapping reproduction. Behav. Ecol. Sociobiol., 50: 382-390.

-Ogata K. (1987) A generic synopsis of the Poneroid complex of the Family Formicidae in Japan (Hymenoptera). Part I. SubFamilies Ponerinae and Cerapachyinae.ESAKIA N° 25: 97-132.

-Yoshimura M. and Fisher B. L. (2009) A revision of male ants of the Malagasy region (Hymenoptera: Formicidae): Key to genera of the subfamily Proceratiinae. Zootaxa 2216.

♂ Genus ***Probolomyrmex*** Mayr, 1901

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than 2° article of the Funiculus, not overstep the Occiput; Forewings of Typology IV with Marginal cell open; Hindwings of Typology III; Mandibles dentate or edentate; Mesonotum with Notauli absent; Pygidium (Abdominal Tergum VIII) distally rounded; Abdominal Sternum IX distally rounded; MetaTibiae with one Spur; Pretarsal Claws simple; Petiole entirely articulated with the first segment of the Gaster.

Bio-geographical distribution

Neotropical, Afrotropical, Indo-Australian and Australia

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Puerto Rico: 18°17' N, 66°07' W, 300 meters sea level, *Probolomyrmex* sp.: June to December (Torres et al. 2000).

References for Taxonomic identification

-Eguchi K., Yoshimura M. and Yamane S. (2006) The Oriental species of the genus *Probolomyrmex* (Insecta: Hymennoptera: Formicinae: Proceratiinae). Zootaxa 1376: 1-35.

-Taylor R. W. (1965) A monographic revision of the rare trocopolitan ant genus *Probolomyrmex* Mayr (Hymenoptera: Formicidae). R. ent. Soc. Lond. 117 (12): 345-365.

-Torres J. A., Snelling R. R. and Canals M. (2000) Seasonal and Nocturnal Periodicities in Ant Nuptial Flights in the Tropics (Hymenoptera: Formicidae). Sociobiology, Vol. 37, n° 3B.

-Yoshimura M. and Fisher B. L. (2009) A revision of male ants of the Malagasy region (Hymenoptera: Formicidae): Key to genera of the subfamily Proceratiinae. Zootaxa 2216: 1-21.

♂ Genus ***Proceratium*** Roger, 1863

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length > than the 2° article of the Funiculus, not overstep the Occiput usually (*P. panamense* and *P. creek* the Scape slightly overstep the Occiput), first article of the Funiculus in length < than the second, insertion of the Antennae confluent from posterior edge of the Clypeus; Forewings of Typology III with Marginal cell open or closed; Hindwings of Typology II; Mandibles edentate or denticulate; Mesonotum with Notauli absent; Pygidium (Abdominal Tergum VIII) distally rounded; Abdominal Sternum IX distally rounded or bilobate; MetaTibiae with one Spur; Petiole entirely articulated with the first segment of the Gaster.

Bio-geographical distribution

Cosmopolitan

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Baroni Urbani C. and de Andrade M. L. (2003) The ant genus *Proceratium* in the extant and fossil record (Hymenoptera: Formicidae). Monografie XXXVI, Museo Regionale di Scienze Naturali, Torino.

-Bondroit J. (1918) Les fourmis de France et de Belgique. Annales de La Societè Entomologique de France, Vol. 87.

-Emery C. (1909) Beitrage zur Monographie der Formiciden des palaarktischen Faunengebietes (Hym.) Deutsch. Ent. Zeitschr.

-Ogata K. (1987) A generic synopsis of the Poneroid complex of the Family Formicidae in Japan (Hymenoptera). Part I. SubFamilies Ponerinae and Cerapachyinae.ESAKIA N° 25: 97-132.

-Smith M. R. (1930) A description of the male of *Proceratium croceum* Emery, with remarks. Annales of the Entomological Society of America, Vol. 23, N° 2.

-Yoshimura M. and Fisher B. L. (2009) A revision of male ants of the Malagasy region (Hymenoptera: Formicidae): Key to genera of the subfamily Proceratiinae. Zootaxa 2216: 1-21.

3.17 Subfamily Pseudomyrmecinae Smith M. R., 1952

This subfamily is represented for 3 genera and the ♂♂ are all known.

♂ Genus ***Myrcidris*** Ward, 1990

Morphological characters used in the dichotomous key

Antennae with 13 articles, Antennae Scape in length ≤ than the firsts two articles of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology II; Mandibles marginally dentate; Mesonotum with Notauli absent; Pygidium (Abdominal Tergum VIII) distally rounded; Abdominal Sternum IX distally rounded; MetaTibiae with two Spurs.

Bio-geographical distribution

Neotropical

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-ANTWEB (2016) Photos of *M. epicharis* ♂ Paratypus. www.antweb.org.

-Ward P. S. (1990) The ant subfamily Pseudomyrmecinae (Hymenoptera: Formicidae): generic revision and relationship to other formicids. Systematic Entomology 15, 449-489.

♂ Genus ***Pseudomyrmex*** Lund, 1831

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape in length < than the 2° article of the Funiculus; Forewings of Typology I with Marginal cell closed; Hindwings of Typology II; Mandibles dentate or denticulate; Mesonotum with Notauli absent; Pygidium (Abdominal Tergum VIII) distally rounded; Abdominal Sternum IX distally rounded; MetaTibiae with two Spurs; Pretarsal Claws simple or with submedian tooth.

Bio-geographical distribution

Neotropical and Neartic

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: Brazil, 14°37'04''S, 39°04' 07''W, 10 meters sea level, *Pseudomyrmex* sp. 11: July to May (Cardoso do Nascimento 2006); 23°35'17.46"S, 46°38'58.02"W, 800 meters sea level, *Pseudomyrmex* sp. 187: December to February, April and May, *Pseudomyrmex* sp. 188: December and January, *Pseudomyrmex* sp. 219: October, *Pseudomyrmex* sp. 168, 174 and 181: November to May, *Pseudomyrmex* sp. 177: October, December and January, *Pseudomyrmex* sp. 186: December to April and August; 23°27'33.35"S, 46°38'17.57"W, 900 meters sea level, *Pseudomyrmex* sp. 512: December to February, *Pseudomyrmex* sp. 511: March (Cantone see chapter 4); Puerto Rico: 18°17' N, 66°07' W, 300 meters sea level, *P. simplex*: May to December (Torres et al. 2000); Panama: 9°'19'' N, 79°50'15'', 50-80 meters sea level, *Pseudomyrmex* Oculatus group: July to September, December and January (Kaspari et al. 2001); Argentine: 26°58'S, 64°51'W, 800 meters sea level, *P. denticollis*, *P. gracilis*, *P. pallidus* and *P. muticus*: January and December (Kusnezov 1962).

References for Taxonomic identification

-Cardoso do Nascimento I. (2006) Fenologia dos voos de acasalamento em formigas Tropicais. Universidade Federal de Viços, Tese (doutorado).

-Gallardo A. (1932) Las hormigas de la Republica Argentina Subfamilia Mirmicinas, seccion Promyrmicinae. Anales del Museo Nacional de Historia natural, Buenos Aires, Tomo 37: 38-88.

-Kaspari M., Pickering J., Longino J.T and Windsor D. (2001) The phenology of a Neotropical ant assemblage: evidence for continuous and overlapping reproduction. Behav. Ecol. Sociobiol., 50: 382-390.

-Kusnezov N. (1962) El vuelo nupcial de las hormigas. Acta Zoologica Lilloana, tomo 18, 385-442.

-Torres J. A., Snelling R. R. and Canals M. (2000) Seasonal and Nocturnal Periodicities in Ant Nuptial Flights in the Tropics (Hymenoptera: Formicidae). Sociobiology, Vol. 37, n° 3B.

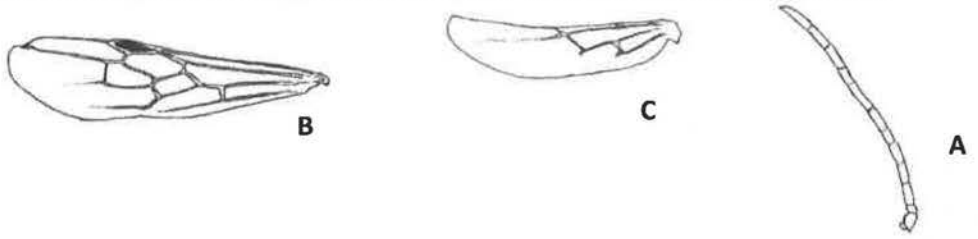
-Ward P. S. (1990) The ant subfamily Pseudomyrmecinae (Hymenoptera: Formicidae): generic revision and relationship to other formicids. Systematic Entomology 15, 449-489.

-Ward P. S. (1993) Systematic studies on *Pseudomyrmex* acacia-ants (Hymenoptera: Formicidae: Pseudomyrmecinae). J. Hym. Res. 2(1): 117-168.

-Ward P. S. (1996) A new woekerless social parasite in the ant genus *Pseudomyrmex* (Hymenoptera: Formicidae), with a discussion of the origin of social parasitism in ants. Systematic Entomology, 21: 253-263.

-Ward P. S. (1999) Systematic, biogeography and host plant associations of the *Pseudomyrmex* Viduus group (Hymenoptera: Formicidae), Triplaris- and Tachigali-inhabiting ants. Zoological Journal of the Linnean Society, 126: 451-540.

Figure – **A**: Antennae; **B**: Forewing; **C**: Hindwing; of *Pseudomyrmex* sp. ♂, Brazil.



♂ Genus ***Tetraponera*** F. Smith, 1852

Morphological characters used in the dichotomous key

Antennae with 12 articles, Antennae Scape in length ≤ than the 2° article of the Funiculus; Forewings of Typology I and II with Marginal cell closed; Hindwings of Typology II; Mandibles dentate; Mesonotum with Notauli absent; Pygidium (Abdominal Tergum VIII) distally rounded; Abdominal Sternum IX distally rounded; MetaTibiae with two Spurs.

Bio-geographical distribution

Afrotropical, Indo-Australian and Australia

Behavioral Ecology of the Mating flight

Strategy: unknown

Mating flight: unknown

References for Taxonomic identification

-Arnold A. (1916) A monograph of the Formicidae of South Africa (Myrmicinae). Annals of the South African Museum, Vol. XIV, Part II.

-Terron G. (1967) Description des castes de *Tetraponera anthracina* Santschi (Hym., Formicidae, Promyrmicinae). Insectes Sociaux, Vol. XIV, N° 4.

-Terron G. (1969) Description de *Tetraponera ledouxi* especе nouvelle Du Cameroun, parasite temporaire de *Tetraponera anthracina* Santschi (Hym., Formicidae, Promyrmicinae). Bulletin de l'Institut Fondamental d'Afrique Noire, Tome 31, serie A, n° 2.

-Terron G. (1971) Description des castes de *Tetraponera nasuta* Bernard (Hym. Formicidae, Promyrmicinae). Ann. De la Fac. Des Sciences du Cameroun, N° 6: 73-84.

-Ward P. S. (1990) The ant subfamily Pseudomyrmecinae (Hymenoptera: Formicidae): generic revision and relationship to other formicids. Systematic Entomology 15, 449-489.

-Ward P. S. (2001) Taxonomy, phylogeny and biogeography of the ant genus *Tetraponera* (Hymenoptera: Formicidae) in the Oriental and Australian regions. Invertebrate Taxonomy, 15: 589-665.

-Wheeler W. M. (1922) Ants of the American Museum Congo Expedition. A contribution to the Myrmecology of Africa. Bulletin of the American Museum of Natural History, Vol. XLV.

4. Behavior ecology of mating flight in ants

4.1 Introduction

In the ants colonies of most species, the mating flight is carried out once or several times during the year, depending on the reproductive strategy and the environmental characteristics. The winged caste of ants has the fundamental function to mate and to disperse in the environment: the males die after mating and females lose their wings and try to found a new colony. Females and males after leaving the nest are subject to dangers posed by adverse climatic conditions and predators. Therefore, the species of ants have developed, in the course of their evolution, different mating flight strategies to avoid these dangers and synchronize flight with other colonies, so that individuals of the opposite sex have greater opportunity to meet. The mating flight strategies presuppose, furthermore, a dispersion strategy not only to colonize other surrounding environments, in order to found a new colony, but also in determining gene flow, fundamental role of males. The encounter of winged individuals, in most species, uses two strategies: a) the males are attracted to the pheromone produced by females, known behavior as female calling syndrome; b) males and females meet in a Lek mating where they mate, a known behavior as male aggregation syndrome.

At high latitudes, in temperate regions of the Northern Hemisphere, the mating flight was recorded only in the warmer months, especially between the months of June and October, showing high synchrony among populations of the same species. At low latitude, in tropical regions, the mating flight was recorded all year in some species or just for a few months in others (see chapter 3). The mating flight may run at different hours of the day or night and it is species-specific. Summarizing, the mating flight patterns of ants, as well as analyzed by Wilson 1957, can be represented by four adaptive features: a) intraspecific sexual stimulation, b) exclusion of other species from the copulatory activity, c) synchronization and coordination of flight movements within the species and d) regulation of the dispersal rate. Mating flight represents one of the phenomena that assure the survival of the species and its geographical distribution, indeed, it seems that the diversity of mating flight strategies is not just a specific species, but it depends on intraspecific and interspecific competition relationships and climatic and trophic environmental variables. The mating flight represents a phenomenon as complex as unknown and fascinating.

4.2 Mating flight and habitat change

Habitat changes cause variations in the reproductive phenology of many plants and animals species, altering interspecific interactions at all trophic levels.

The ants perform multifarious ecological functions at all trophic levels, contributing to aeration and fertilization, in seed dispersal and implementing interspecific interactions such as, for example, the behavior of trophobiosis and mutualism with phytophagous insects and plants and predation of invertebrates. Ants are present in all terrestrial ecosystems and are sensitive to habitat changes, showing variations in the structure of the community and, therefore, are proposed as bioindicators.

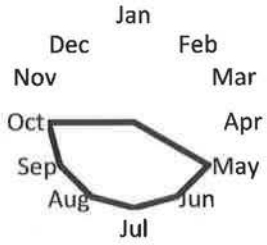
Based on the hypothesis that temporal gradients of diversity arise from the intervals superposition of reproductive phenology in the species, we can understand the temporal diversity patterns by studying the factors that control the intervals of the reproductive phenology. The changes in the reproductive phenology of biological communities are one of the first effects of habitat alterations that affect the structure of biological communities at all trophic levels. In the next paragraphs I represent, with graphics, the periodicity of mating flight of ants throughout the year and at different latitudes in the World. Furthermore, I show an example of how you can study the winged caste and the periodicity of mating flight to record the diversity and effects of habitat changes with a study in an urban ecosystem.

4.3 Annual periodicity analisys of mating flight in ants at different latitudes

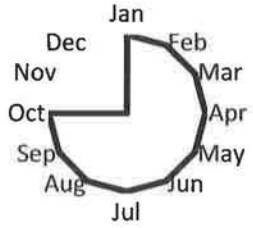
I represent, with graphics, the periodicity of mating flight of ants throughout the year and at different latitudes in the World. Mating flight data is listed in chapter 3 for each genus and it relates to data I have encountered in the review study, which certainly could be more complete, but at the moment they are meant to give a global representation of the mating flight in ants.

Mating flight Fam. Formicidae latitude 40°-60 NW based on 9 genera

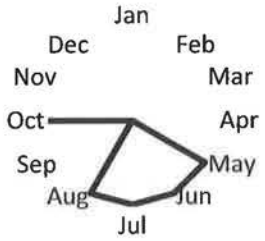
Mating flight Fam. Formicidae latitude 40°-60° NE based on 11 genera



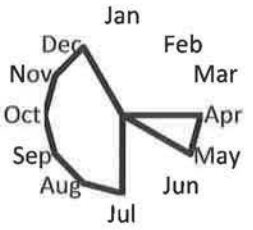
Mating flight Fam. Formicidae latitude 30°-40° NW based on 16 genera



Mating flight Fam, Formicidae latitude 30°-40° NE based on 4 genera

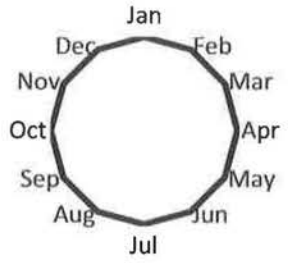


Mating flight Fam. Formicidae latitude 20°-30° NW based on 3 genera



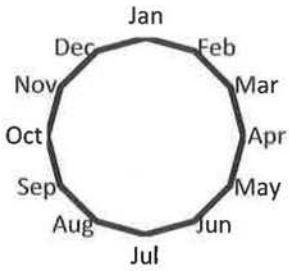
Mating flight Fam. Formicidae latitude 20°-30° NE based on 2 genera

Mating fligth Fam. Formicidae latitude 10°-20° NW
based on 27 genera

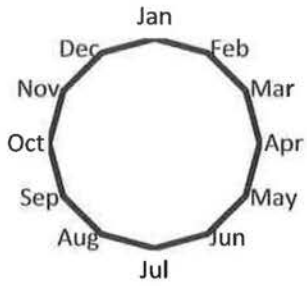


Matinh flight Fam. Formicidae latitide 10°-20° NE
based on 1 genera

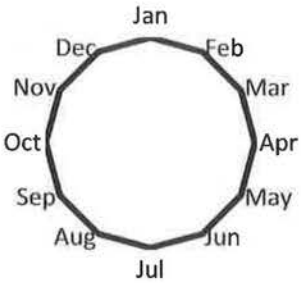
Mating flight Fam. Formicidae latitude 0°-10° NW
based on 37 genera



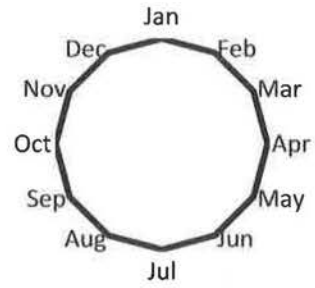
Mating flight Fam. Formicidae latitude 0°-10° NE
based on 6 genera



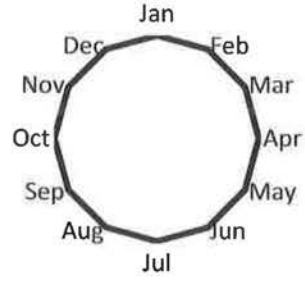
Mating flight Fam. Formicidae latitude 0°-10° SW
based on 3 genera



Mating flight Fam. Formicidae latitude 0°-10° SE
based on 5 genera

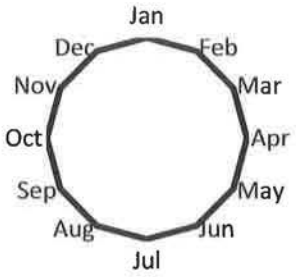


Mating flight Fam. Formicidae latitude 10°-20° SW
based on 31 genera

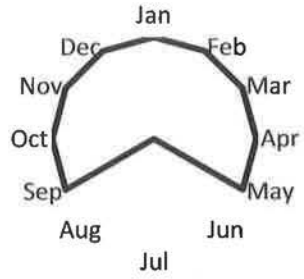


Mating flight Fam. Formicidae latitude 10°-20° SE
based on 7 genera

Mating flight Fam. Formicidae latitude 20°-30° SW
based on 62 genera

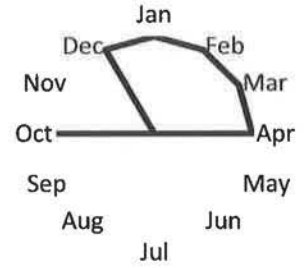


Mating flight Fam. Formicidae latitude 20°-30° SE
based on 14 genera

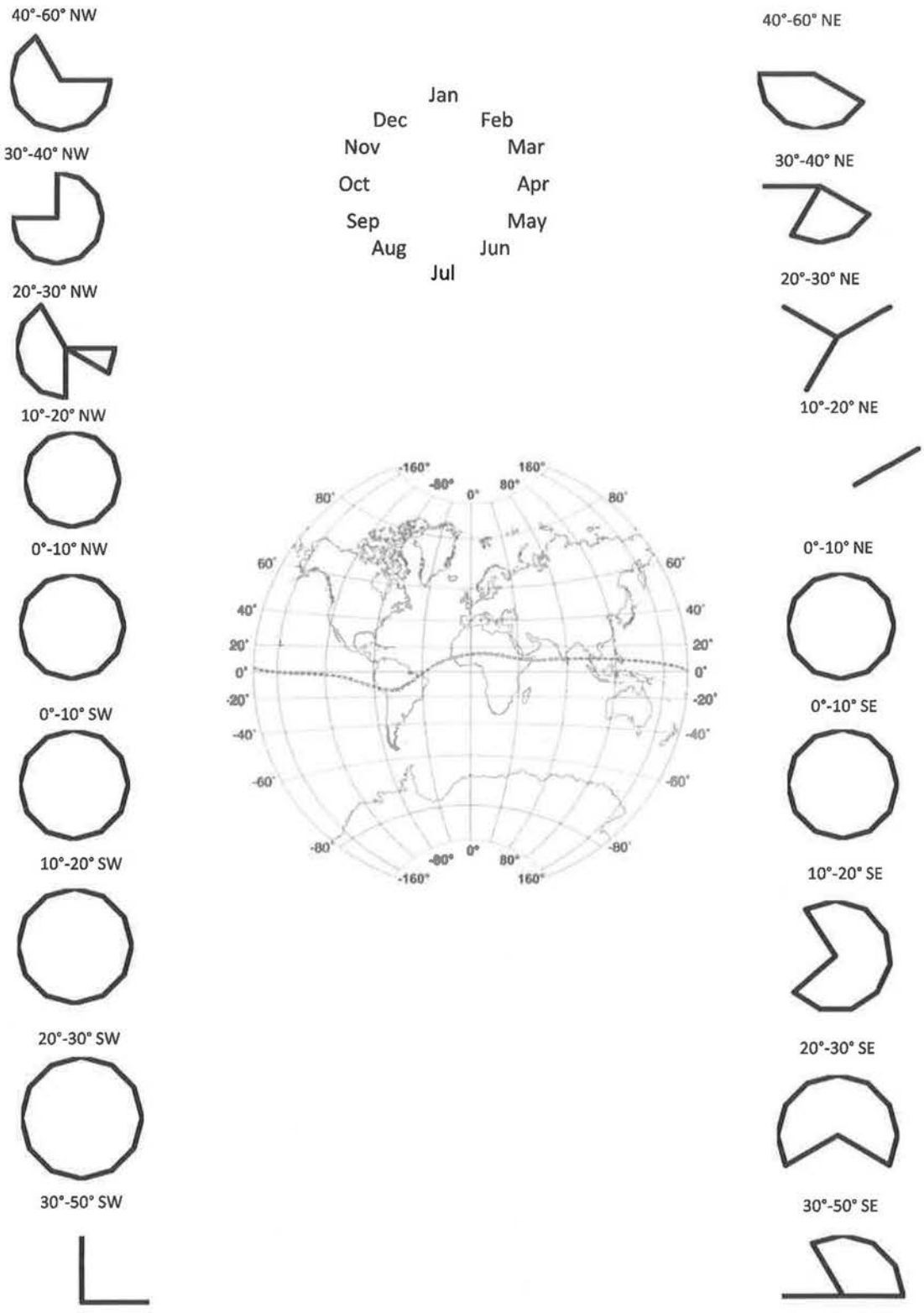


Mating flight Fam. Formicidae latitude 30°-50° SW
based on 3 genera

Mating flight Fam. Formicidae latitude 30°-50° SE
based on 3 genera



4.4 Summer annual periodicity of mating flight in ants in the World

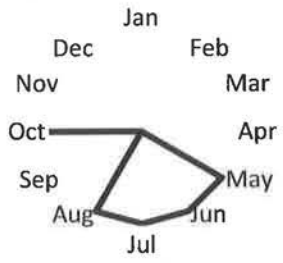


4.5 Annual periodicity of mating flight in some ant genera

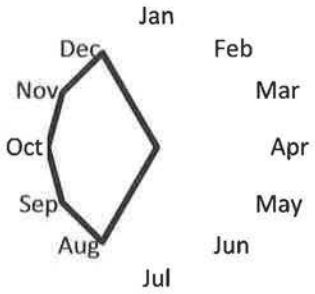
4.5.1 Mating flight genera *Formica* and *Lasius*

Genus *Formica* latitude 40°-60° NW

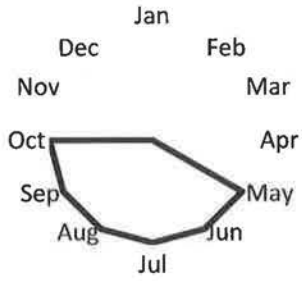
Genus *Formica* latitude 40°-60° NE



Genus *Lasius* latitude 40°-60° NW



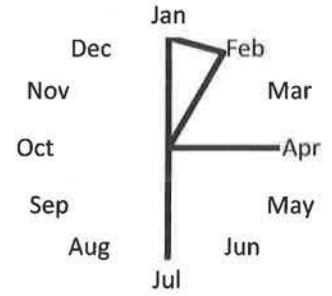
Genus *Lasius* latitude 40°-60° NE



Genus *Formica* latitude 30°-40° NW

Genus *Lasius* latitude 20°-30° NE

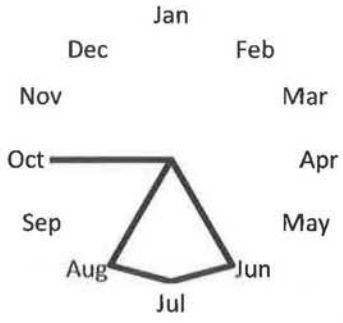
Genus *Lasius* latitude 30°40° NW



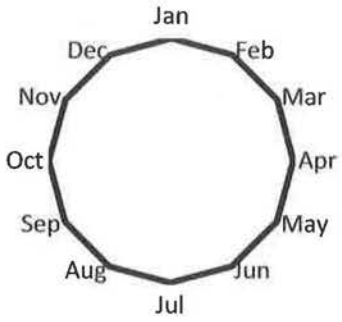
4.5.2 Mating flight genera *Dolichoderus* and *Pogonomyrmex*

Genus *Dolichoderus* latitude 40°-60° NW

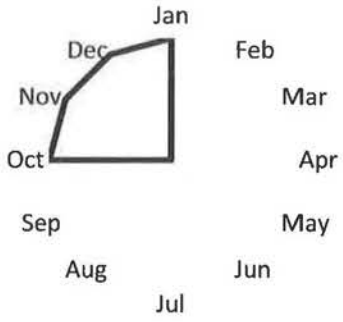
Genus *Pogonomyrmex* latitude 30°-40° NW



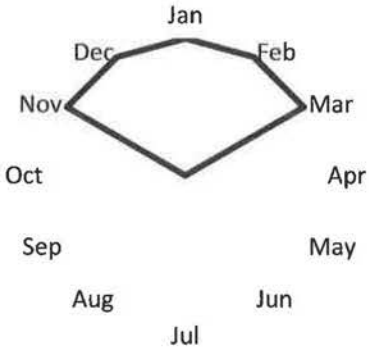
Genus *Dolichoderus* latitude 0°-10° NW



Genus *Pogonomyrmex* latitude 20°-30° SW

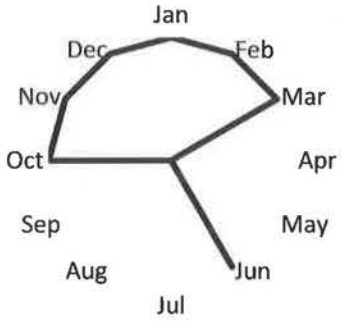


Genus *Dolichoderus* latitude 10°-20° SW



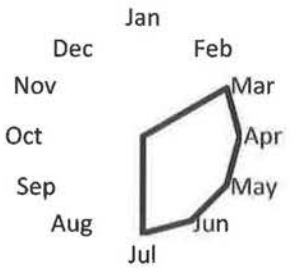
Genus *Pogonomyrmex* latitude 30°-50° SW

Genus *Dolichoderus* latitude 20°-30° SW

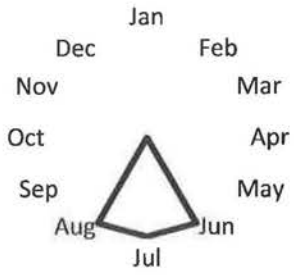


4.5.3 Mating fligth genus *Camponotus*

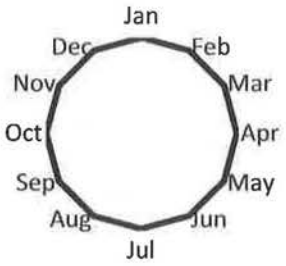
Genus *Camponotus* latitude 30°-40° NW



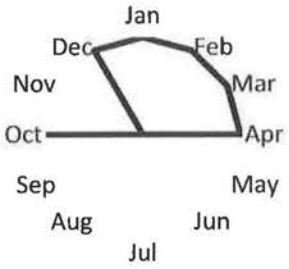
Genus *Camponotus* latitude 30°-40° NE



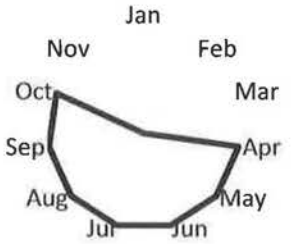
Genus *Camponotus* latitude 10°-20° NW



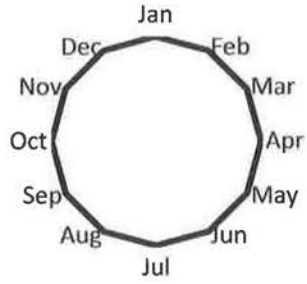
Genus *Camponotus* latitude 30°-40° SE



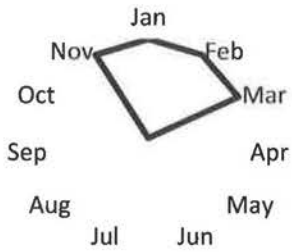
Genus *Camponotus* latitude 0°-10° NW



Genus *Camponotus* latitude 20°-30° SW

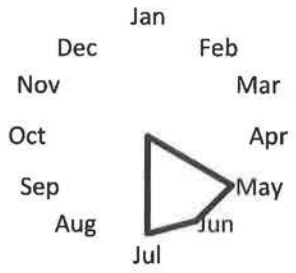


Genus *Camponotus* latitude 10°-20° SW

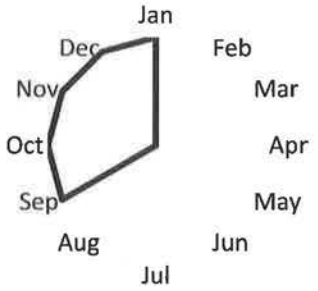


4.5.4 Mating flight genus *Atta*

Genus *Atta* latitude 30°-40° NW

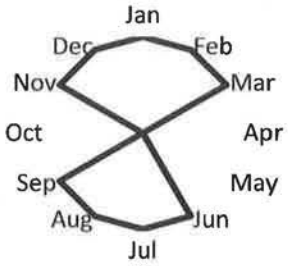


Genus *Atta* latitude 20°-30° SW

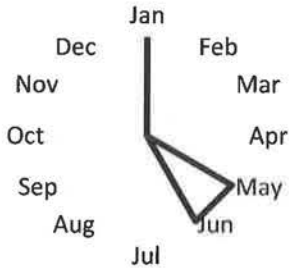


Genus *Atta* latitude 10°-20° NW

Genus *Atta* latitude 10°-20° SW



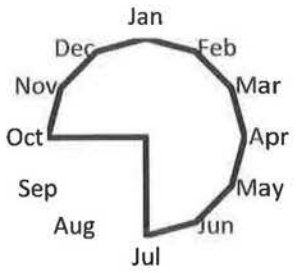
Genus *Atta* latitude 0°-10° NW



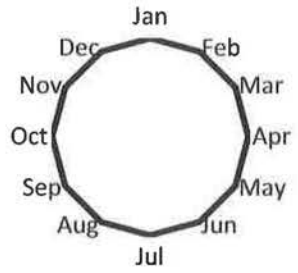
4.5.5 Mating flight genus *Pheidole*

Genus *Pheidole* latitude 30°-50° NW

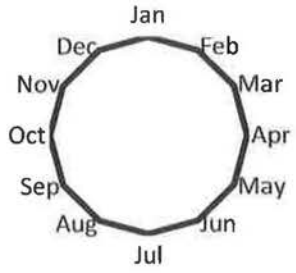
Genus *Pheidole* latitude 20°-30° SW



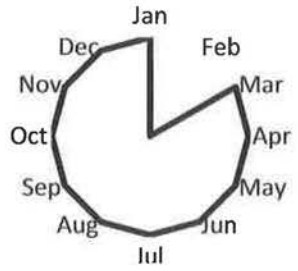
Genus *Pheidole* latitude 10°-20° NW



Genus *Pheidole* latitude 10°-20° SW

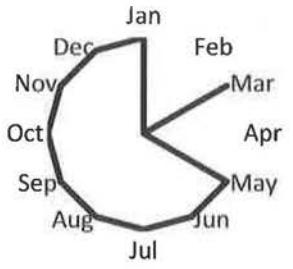


Genus *Pheidole* latitude 0°-10° NW

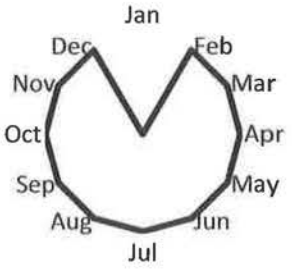


4.5.6 Mating flight genera *Crematogaster* and *Wasmannia*

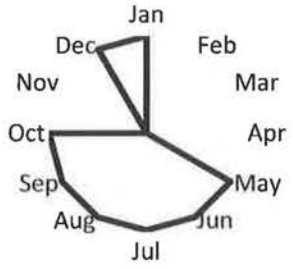
Genus *Crematogaster* latitude 10°-20° NW



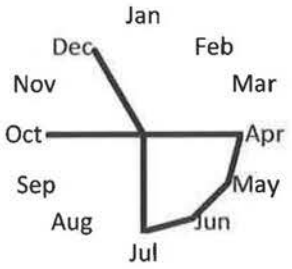
Genus *Wasmannia* latitude 10°-20° NW



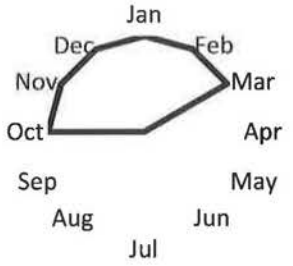
Genus *Crematogaster* latitude 0°-10° NW



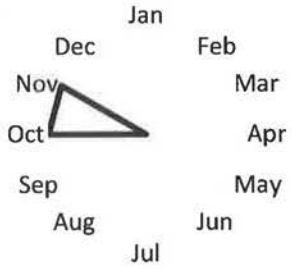
Genus *Wasmannia* latitude 0°-10° NW



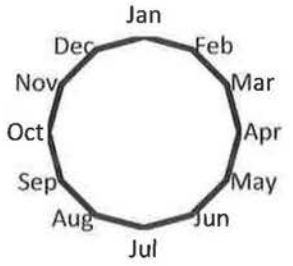
Genus *Crematogaster* latitude 10°-20° SW



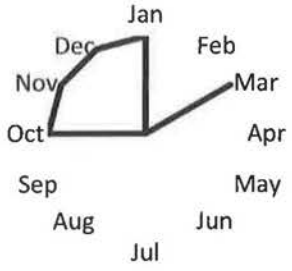
Genus *Wasmannia* latitude 10°-20° SW



Genus *Crematogaster* latitude 20°-30° SW

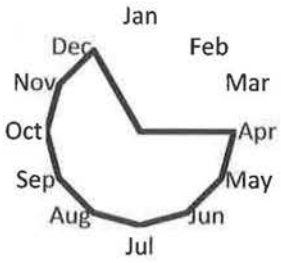


Genus *Wasmannia* latitude 20°-30° SW

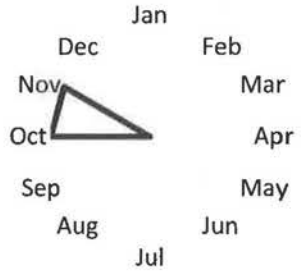


4.5.7 Mating flight genera *Cyphomyrmex* and *Trachymyrmex*

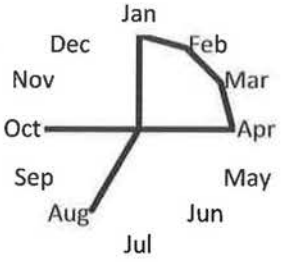
Genus *Cyphomyrmex* latitude 10°-20° NW



Genus *Trachymyrmex* latitude 10°-20° NW

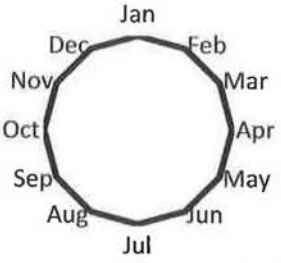


Genus *Cyphomyrmex* latitude 0°-10° NW

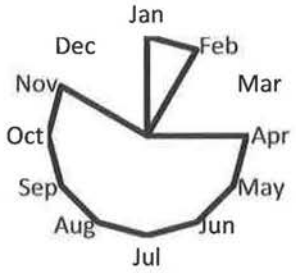


Genus *Trachymyrmex* latitude 0°-10° NW

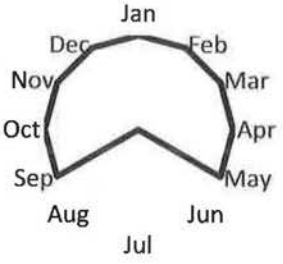
Genus *Cyphomyrmex* latitude 10°-20° SW



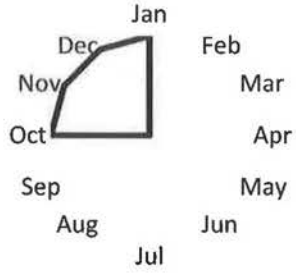
Genus *Trachymyrmex* latitude 10°-20° SW



Genus *Cyphomyrmex* latitude 20°-30° SW



Genus *Trachymyrmex* latitude 20°-30° SW



4.6 Mating flight and diversity of ants in urban ecosystem at São Paulo city, Brazil

4.6.1 Introduction

The great diversity of species and ecological niches, occupied by different species of ants, creates difficulties in monitoring studies of species diversity in any environment. The ants, in fact, occupy subterranean and arboreal environments and the workers, who are seen walking on the ground, represent more or less 50-60% of the real diversity of a given environment. The opportunity to capture individuals belonging to the winged caste, offers the possibility to record the presence of many species nesting on trees at several meters of height, subterranean species and species that, for their behavior and the small number of individuals in the colony, are hardly observed.

The process of urbanization, fragments, degrades and isolates natural areas, depending on the density and urban and economic development form, by generating different profiles of urban landscapes. Human activities that take place in the cities cause pollution of the air, light and sound that, together with the waterproofing of large surfaces and high concentration of buildings generates different microhabitats in relation to the density of urbanization. Furthermore, if degradation and changes in the ecosystem have a negative impact on biodiversity, it must emphasize that the urban landscape can offer some opportunities for the conservation of native biodiversity when compared with the agricultural landscape. Indeed, urban ecosystems are characterized by a great heterogeneity and they may offer ecological niches for many native species.

The objective of this study was to understand whether the environmental conditions, generated by different urbanization profiles, influence the mating flight of ants.

4.6.2 Materials and methods

Study site

São Paulo city is a metropolis of nearly 12 million people, with an area of 1,521 km^2 and an average demographic density of 7398.26 inhabitants/ km^2. São Paulo is located at the latitude of the Capricorn tropic (23°33'S, 46°38'W) at an average altitude of 770 meters sea level and about 60 km from the Atlantic Ocean coastline. The climate of the city is considered subtropical wet with dry winter (June to August) and wet summer (October to January).

At São Paulo, different climatic microregions have been highlighted, due to the effect of the pollution, the high concentration of buildings and the presence of urban parks. Indeed, São Paulo presents an urban ecosystem where the interference of human activities form a mosaic of landscapes: urban forests, urban parks, squares and green areas, small family farming areas, regions with vertical urbanization (buildings with many floors) and horizontal (houses), areas with industrial activities, areas destined for food markets and areas used for

logistical purposes. All this urban complexity generates a large amount of microhabitat with different biotic and abiotic characteristics.

The winged ants were caught in two places: I and H, 14,3 km away one from each other and located in different climatic regions (Fig. 17). The place I (23°35'17''S, 46°38'58''W, 800 meters sea level) is represented by a small urban park of about one hectare, headquarters of the Instituto Biologico, located in a central district of the city. This neighborhood has predominantly vertical urbanization with buildings of 20-30 floors and with an average demographic density of 15,173 inhabitants / km^2 and adjacent to an urban park (Ibirapuera park) of about 120 hectares. The place H (23°27'33''S, 46°38'17''W, 900 meters sea level) is an urban park (Albert Löfgren park) of about 187 hectares, located in the northern region of the city in a district with a predominant horizontal urbanization (houses) with an average demographic density of 7,800 inhabitants / km^2 and adjacent to a protected area of Tropical Rainforests (The Cantareira State Park) of about 7,900 hectares (Fig. 17).

São Paulo city, Brazil

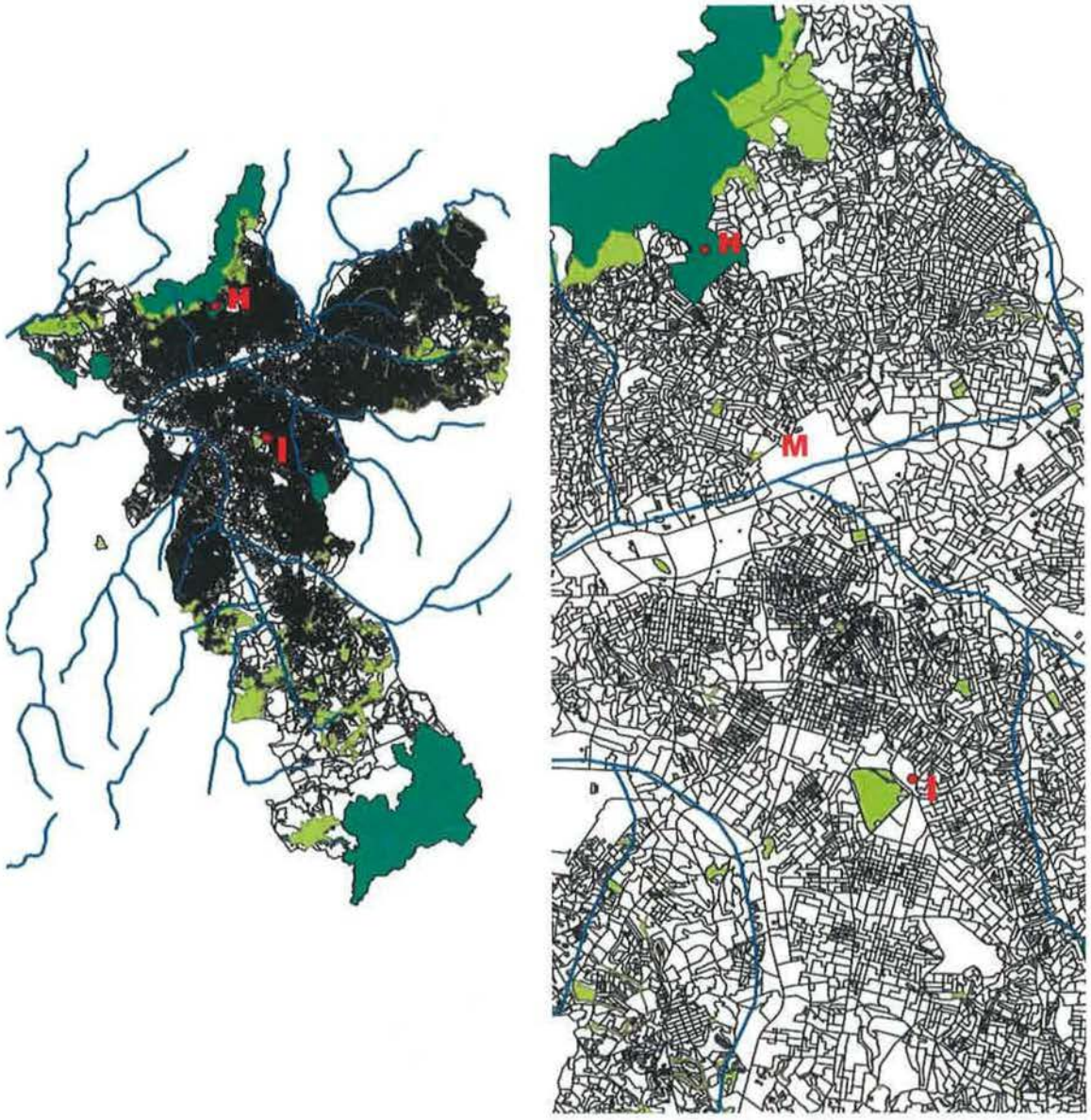


Figure 17: São Paulo city, Brazil. Places of capture: I and H, weather station: M.

Catching technique

The winged ants were captured using light traps equipped with 15 watts "black blue" ultraviolet lamps. This capture technique has been little used in myrmecology, both because the interest has always been addressed to the worker caste, and because of the difficulty of identifying taxonomically the winged caste, especially males.

The winged ants were captured with the use of four light traps (two for each place of capture) hanging on a branch of a tree at a height of three and seven meters. These traps have been active every day from 01/08/2012 to 01/09/2014 using a photocell to activate the lamps at night time.

Since the presence of winged individuals of ants in entomological collections is poor, a part of the captured species was deposited in the Zoological Museum of University of São Paulo, SP, Brazil and all species are in my personal collection available to the entire scientific community.

Urban microclimate

Climatic data, relative to the average temperatures and average rainfall, were consulted at the Meteorological Station Mirante Santana, of the Institute of Meteorology of the Ministry of Agriculture, located between the two places of capture (Fig. 17).

Trophic categories

The ants community was analyzed based on the trophic function, dividing the identified genera into three trophic categories: a) predators: consisting of the genera of subfamily Dorylinae, Ectatomminae, Heteroponerinae, Ponerinae and Pseudomyrmecinae; b) generalists: it consists of the genera belonging to the subfamily Myrmicinae and c) generalists/opportunists: consisting of the genera of subfamily Dolichoderinae and Formicinae, where various species are known to present a trophic behavior that varies according to food availability.

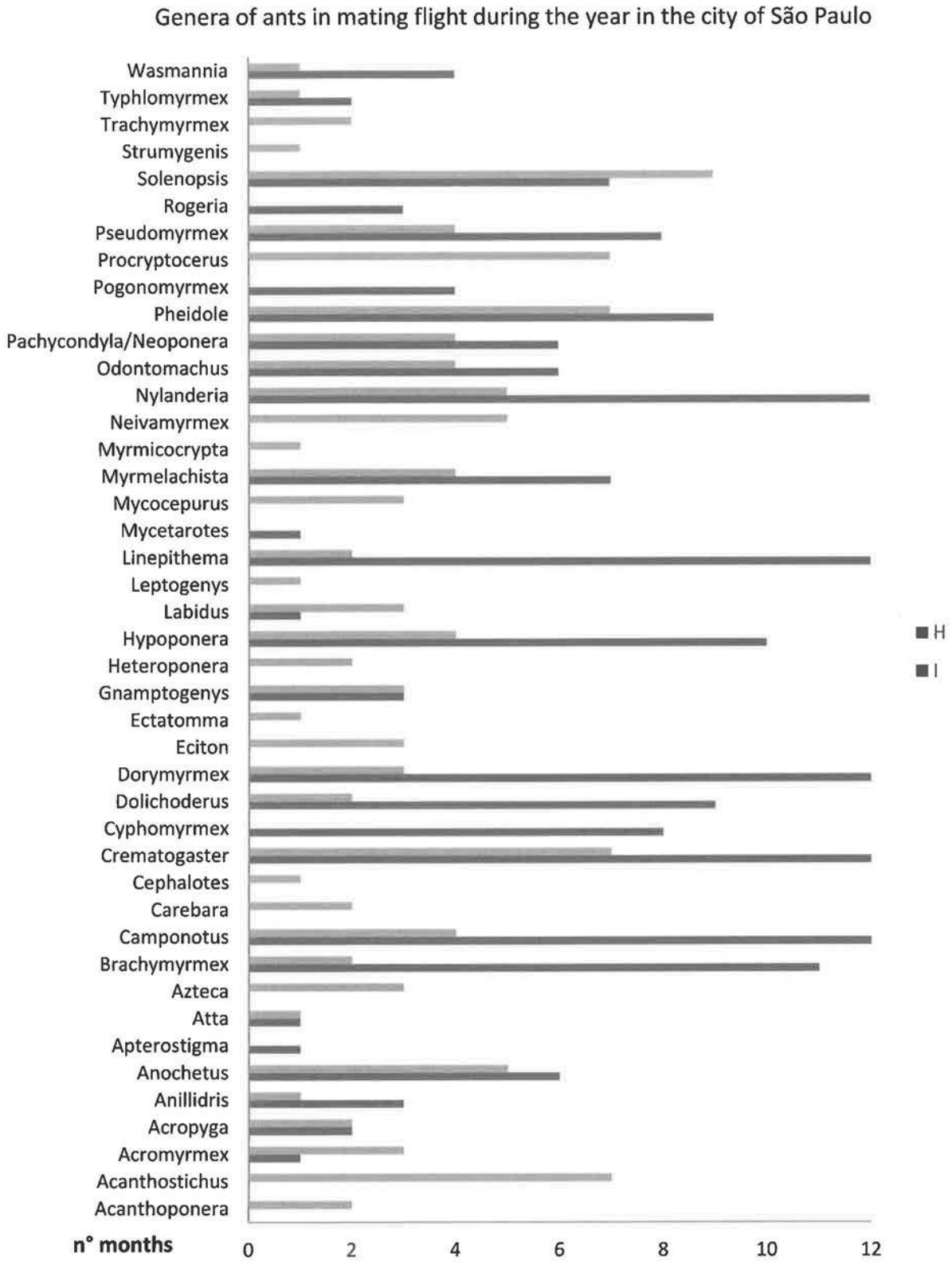
4.6.3 The diversity of ants at São Paulo city, Brazil

Approximately 113,000 individuals were captured, belonging to eight subfamilies and 44 genera (Table 12). 30 genera were identified in place I and 38 genera in place H, totalizing 288 morphospecies.

The representativeness of diversity at the genus level shows to be highly significant, given that the diversity known to the latitude of Capricorn, in the South American continent, is about 60 genera. The diversity of genera encountered, at the two capture sites, and the presence of winged individuals throughout the year, represented in number of months, is shown in Graphic 8.

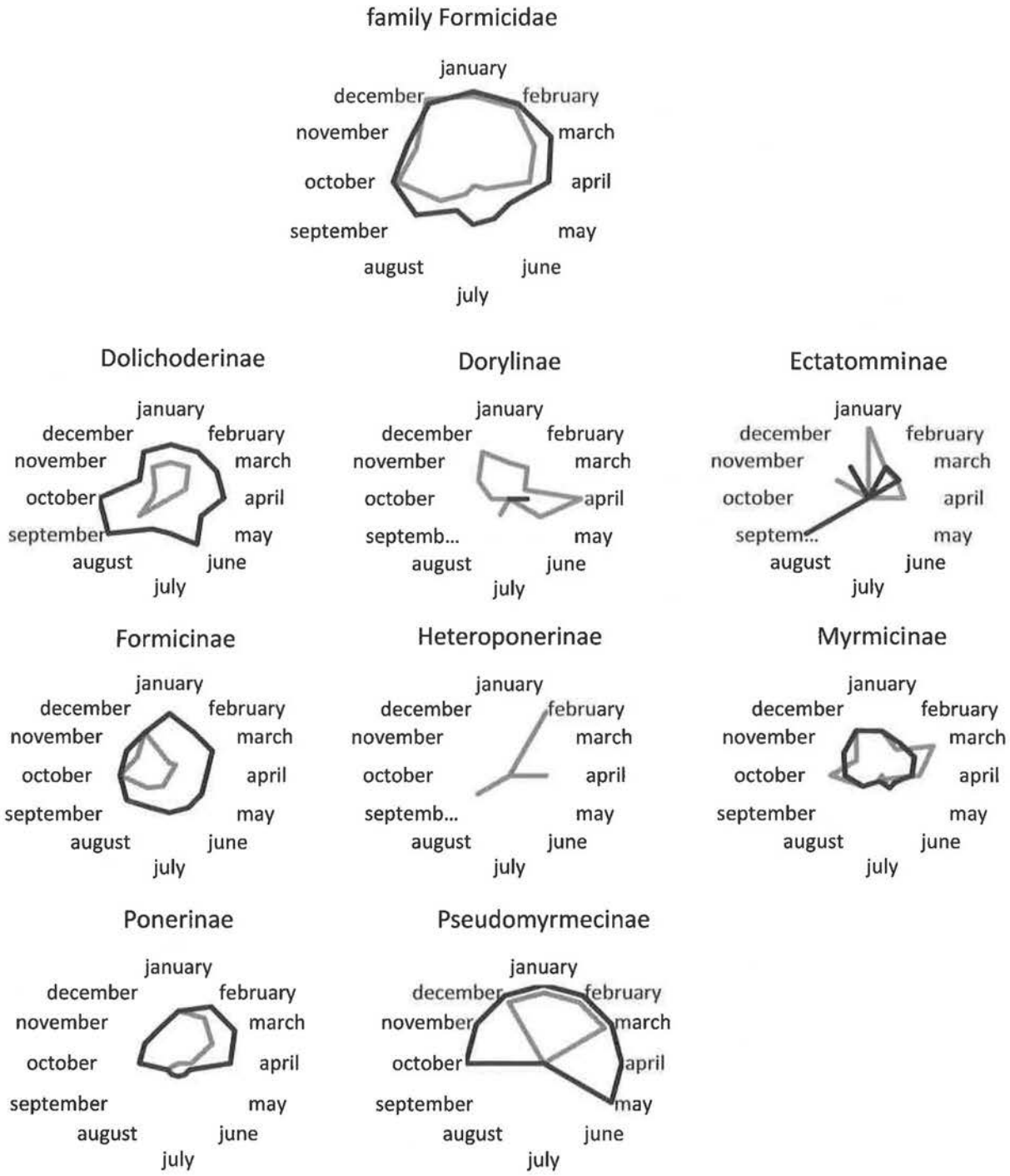
Subfamily	**Genera**
Dolichoderinae	5
Dolyrinae	4
Ectatomminae	3
Formicinae	5
Heteroponerinae	2
Myrmicinae	18
Ponerinae	6
Pseudomyrmecinae	1
8	**44**

Table 23 – The diversity of genera of the ants per subfamily at São Paulo city.



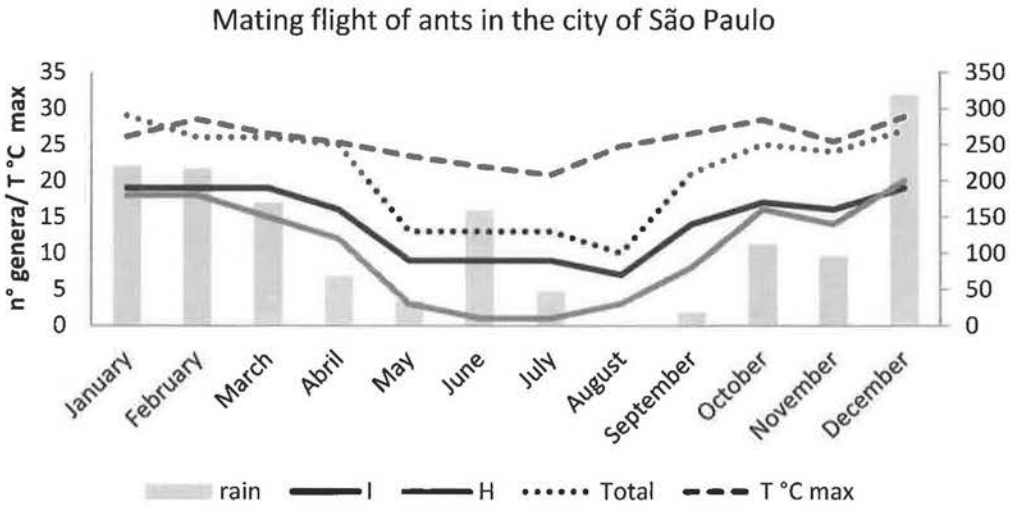
Graphic 8 – The diversity of genera and the respective number of months of mating flight during the year at the places of capture at São Paulo city, Brazil.

4.6.4 Mating flight analysis



Graphic 9 - The mating flight analysis at the family and subfamily level of ants at São Paulo city, Brazil. Each graph has a different proportion depending on the number of genera in each subfamily. Places of capture I ——, H ——

At São Paulo city, in January, I recorded the largest number of ants genera in mating flight, probably associated with the maximum mean temperature values and the rainfall. The maximum mean temperature and the rainfall are the abiotic variables that appear to be associated with the mating flight and for this reason, winged ants could be used as bioindicators of climate change. (Graphic 10).

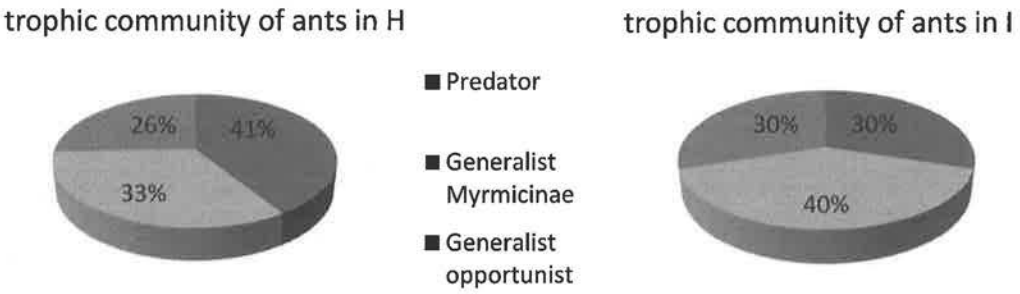


Graphic 10 - Comparison between the genera presence in mating flight, the maximum temperature and the rainfall of the year São Paulo city, Brazil (dates of years 08/2012 to 09/2014. places of capture genera in I ——, genera in H ——

The periodicity analysis of mating flight at subfamily level shows different patterns between them. In particular, there is the presence, only in place I, of many genera of Dolichoderinae and Formicinae subfamilies in mating flight in the dryest months and with the lowest average maximum temperature (Graphic 9). Site I is characterized by a higher demographic density than site H. This data shows that it is not enough to explain the periodicity of mating flight only in relation to temperature and rainfall values, showing that mating flight behavior is more complex and subject to other variables.

The trophic community of ants in the two areas shows a different diversity of genera, evidencing how the trophic community of predator is higher (41%) in H, instead of in I where the generalist Myrmicinae's trophic community is greater (40%) (Graphic 11).

This is about the relationschip to a different availability of trophic resources between the two study sites. Indeed, at the site I, with a higher density of the human population, the presence of food, waste of human activity is much greater, favoring the greater presence of generalist and generalist/opportunistic genera than at the site H.



Graphic 11 - The trophic community of ants, in two places of capture, shows a different composition of genera in percentage.

In fact, this does not explain the difference reproductive phenology of genera found in the two places of capture, of the subfamily Dolichoderinae and Formicinae, which I included in the trophic generalist/opportunist category.

The hypothesis is that the trophic structure of ant communities reflects the dynamics of the trophic availability in different urban microhabitats showing, as a result, a change in the mating flight strategy. The availability of trophic resource is an important variable in the study of mating flight intervals in tropical ants due to the large expenditure of colony energy in the breeding of the winged caste.

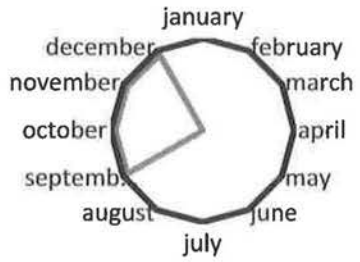
The place I, much more urbanized and with a demographic density almost twice than place H, has a lot of restaurants and the neighboring park is attended by 13 million people during the year. The availability of food resources is therefore abundant, continues throughout the year and probably influences the mating flight periodicity of the generalist / opportunist trophic category, which one recorded winged ants, all year long, only in place I, showing large plasticity of mating flight. This plasticity of mating flight is not found in the trophic category generalist Myrmicinae and its predators (Graphic 12). This plasticity in genera was analyzed by dividing genera with high or low mating flight plasticity (Graphics 13, 14 and 15)

Mating flight in trophic community of ants in São Paulo city

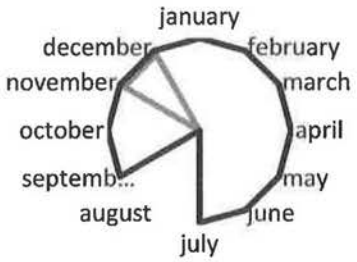
Graphic 12 – Mating flight in trophic community of ants in São Paulo city. Each graph has different proportions depending on the number of genera. Place of capture: I ▬ , H ▬

Genera with "high plasticity mating flight period"
(Mating flight with an interval longer than three months between places of capture)

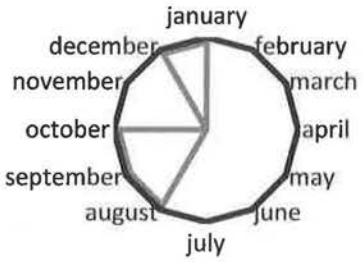
Genus *Camponotus*



Genus *Brachymyrmex*

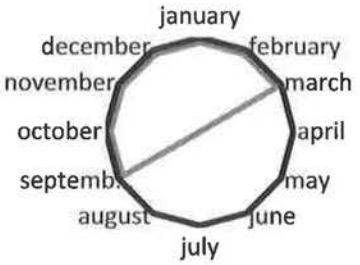


Genus *Nylanderia*

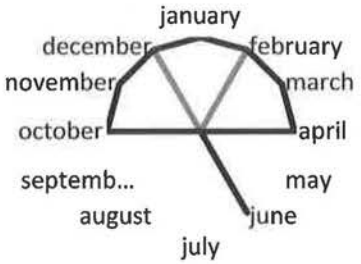


Genus *Hypoponera*

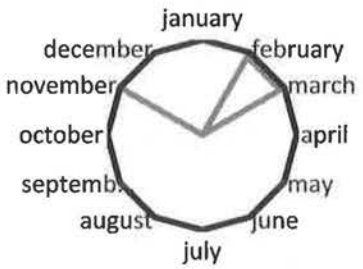
Genus *Crematogaster*



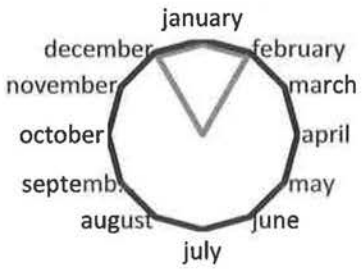
Genus *Dolichoderus*



Genus *Dorymyrmex*



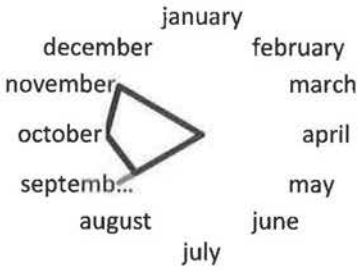
Genus *Linepithema*



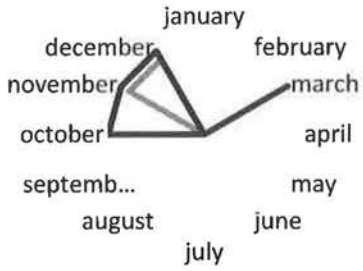
Graphic 13 – Genera with high plasticity mating flight in São Paulo city.
Place of capture: I ▬ , H ▬

Genera with "low plasticity mating flight period"
(Mating flight with an interval shorter than three months between places of capture)

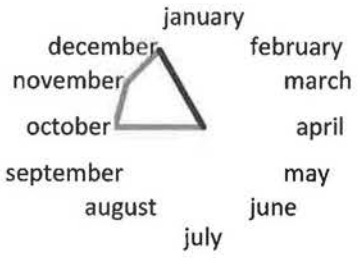
Genus *Anillidris*



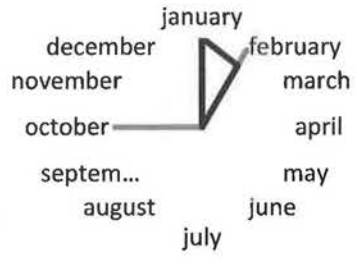
Genus *Wasmannia*



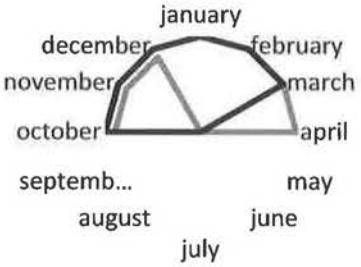
Genus *Acromyrmex*



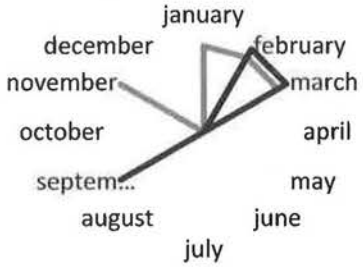
Genus *Acropyga*



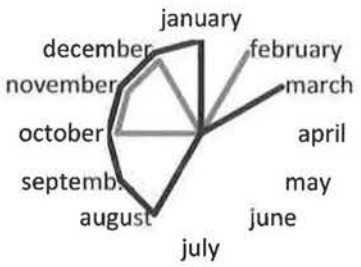
Genus *Anochetus*



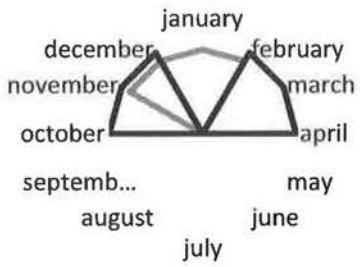
Genus *Gnamptogenys*



Genus *Myrmelachista*



Genus *Odontomachus*



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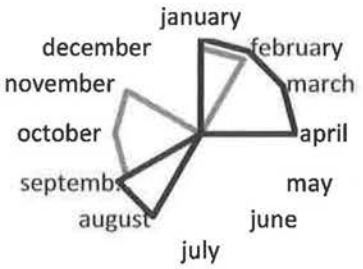
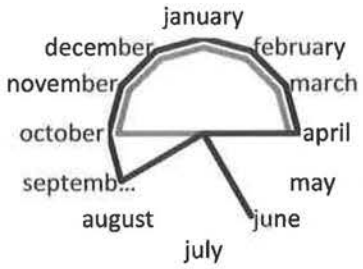
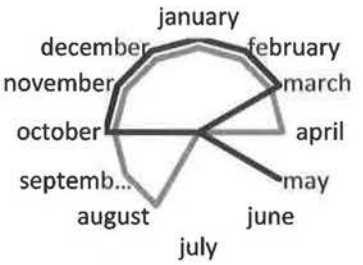
Genus *Pachycondyla/Neoponera*



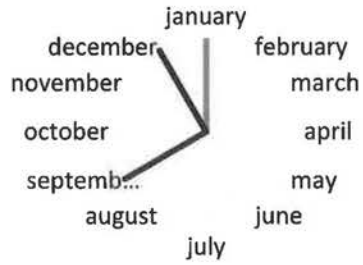
Genus *Pheidole*



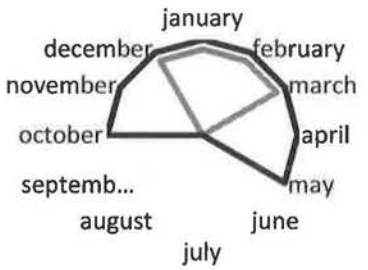
Genus *Solenopsis*



Genus *Typhlomyrmex*



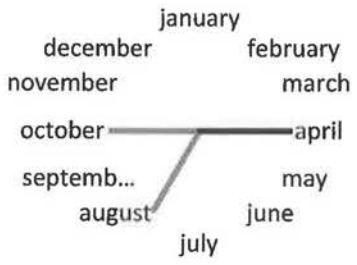
Genus *Pseudomyrmex*



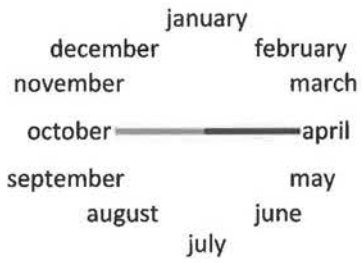
Graphic 14 – Genera with low plasticity mating fight in São Paulo city.
Place of capture I ▬, H ▬

Genera with "opposite mating flight periods"

Genus *Labidus*



Genus *Myrmicocrypta*



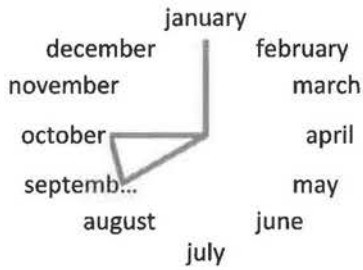
Genera recorded only in one place of capture

Genus *Acanthoponera*

Genus *Apterostigma*

Genus *Atta*

Genus *Azteca*



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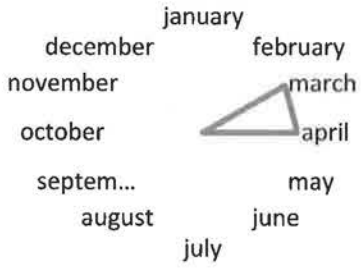
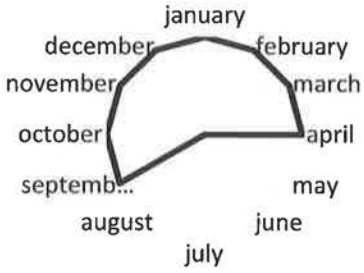
Genus *Carebara*

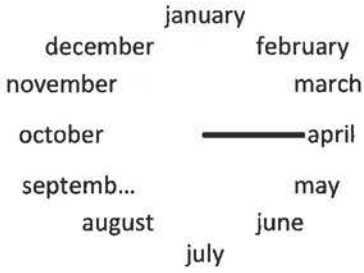


Genus *Chephalotes*

Genus *Cyphomyrmex*



Genus *Ectatomma*

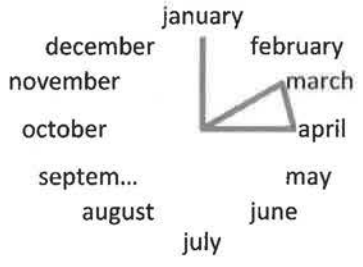


Genus *Heteroponera*

Genus *Leptogenys*

Genus *Mycetarotes*

Genus *Mycocepurus*



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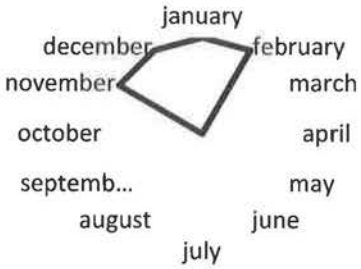
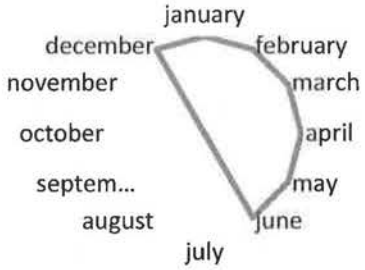
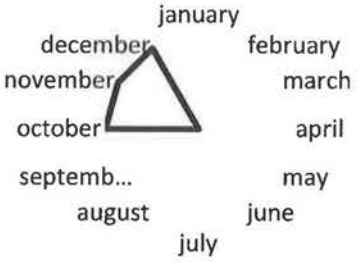
Genus *Pogonomyrmex*



Genus *Procryptocerus*

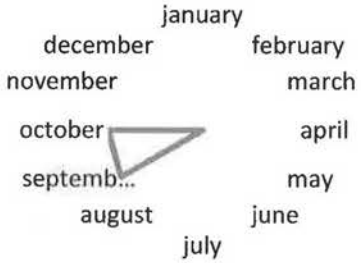


Genus *Rogeria*

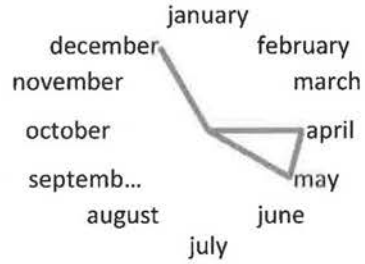


Genus *Strumygenis*

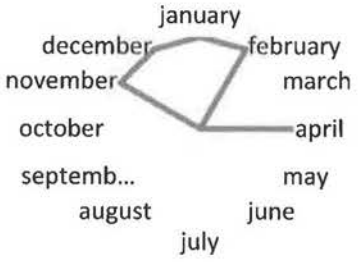
Genus *Trachymyrmex*



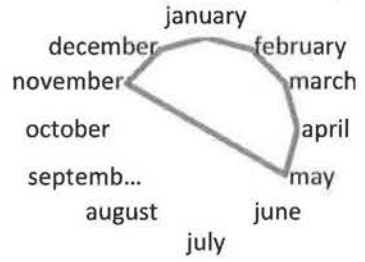
Genus *Eciton*



Genus *Neivamyrmex*



Genus *Acanthostichus*



Graphic 15 – Genera with opposite mating flight periods and recorded only in one place of capture in São Paulo city: Place of capture: I ▬ , H ▬

4.7.5 Conclusions

Therefore, I hypothesize that the plasticity of the mating flight behavior of the generalist/opportunist trophic category is influenced by the availability of food due to the human activities.

The capture technique with light trap used for the winged ants in urban ecosystem showed a high efficiency in the diversity register.

This research represents a new possibility of the urban ecosystem ecology analysis which one, with the use of winged ant caste and a periodicity analysis of mating flight, can record the effects of habitat changes in trophic and climatic equilibrium.

This research is the first study of mating flight in a community of ants in urban ecosystem, and there is no other research to make a comparison!

Acknowledgements

For the research of this last chapter, I thank the Instituto Biológico of the São Paulo, in particular the researchers Ana Eugenia de Carvalho Campos, João Justi Junior and Francisco José Zorzenon for availability of the light traps and the laboratory. I thank the development agency Capes (Brazil) for the research fellowship.

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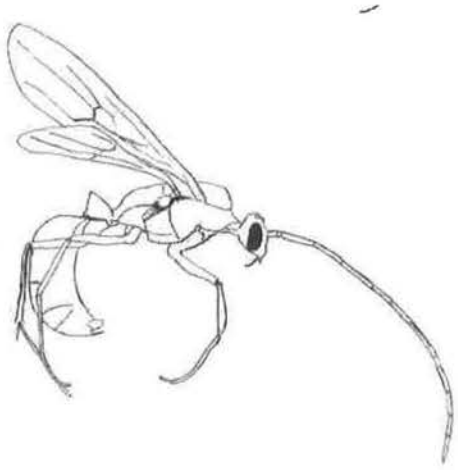

Winged Ants
Stefano Cantone