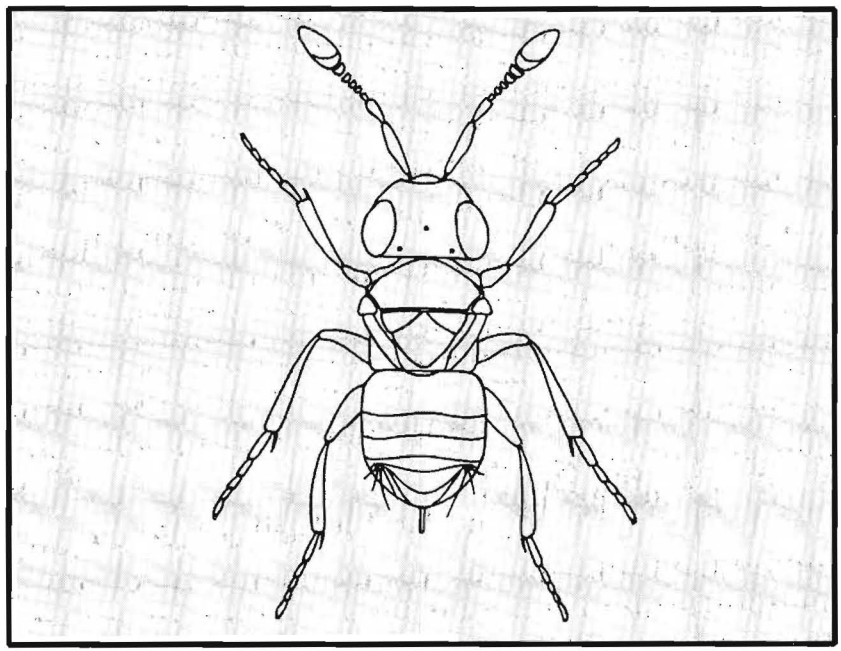
A review of encyrtids (HYMENOPTERA: CHALCIDOIDEA:ENCYRTIDAE) of the world fauna with reduced number of funicle segments of antennae

Vladimir A. Trjapitzin
Enrique Ruíz Cancino



Serie Publicaciones Científicas
CIDAFF - UAT

Universidad Autónoma de Tamaulipas
Unidad Académica Multidisciplinaria Agronomía y Ciencias
Centro de Investigación y Desarrollo Agropecuario, Forestal y de la Fauna
Serie Publicaciones Científicas No. 3
Cd. Victoria, Tamaulipas. México

A review of encyrtids (Hymenoptera:Chaicidoidea:Encyrtidae) of the world fauna with reduced number of funicle segments of antennae

Vladimir Alexandrovich Trjapitzin[1,2]
Enrique Ruíz Cancino[1]

[1] Centro de Investigación
UAM Agronomía y Ciencias
Universidad Autónoma de Tamaulipas
87149 Cd. Victoria, Tamaulipas. México

[2] Zoological Institute
Russian Academy of Sciences,
199034 St. Petersburg, Russia

First edition 2002
Printed in México

Editors of the series
Dr. Enrique Ruíz-Cancino
Dr. Juana María Coronado-Blanco

DEPARTAMENTO DE FOMENTO EDITORIAL
UNIVERSIDAD AUTONOMA DE TAMAULIPAS

An edition of the Departamento de Fomento Editorial of the Universidad Autónoma de Tamaulipas

Abstract

This book contains general information concerning antennae of encyrtids, a key to 62 genera of Encyrtidae of the world fauna with reduced number (less than 6) of funicle segments, a synopsis of 64 such genera with indication of their type species, synonyms, relevant literature, characteristics of antennae, a list of 393 species of the world fauna for most of the genera (with data on their geographical distribution, hosts and the use in classical biological control of insect pests) and notes on systematic position of these genera; a host - parasitoid index; discussion of the data from the point of view of the theory of oligomerization of homologous organs (Dogiel, 1954), and the cited literature (241 references). The genera with reduced number of funicular segments of antennae belong to different subfamilies, tribes and subtribes of the family Encyrtidae, thus the processes of oligomerization have been developed independently from the systematic position of the genera.

Resumen

Este libro contiene información general sobre las antenas de los encírtidos, una clave para la identificación de hembras y machos de 62 géneros de Encyrtidae de la fauna mundial con número reducido de artejos funiculares en las antenas (menos de 6), una sinopsis de 64 géneros con sus sinónimos, literatura relevante, características de las antenas, una lista de 393 especies de la fauna mundial de la mayoría de los géneros (con datos sobre su distribución geográfica, hospederos y uso en control biológico clásico) y notas sobre la posición sistemática de estos géneros; un índice huésped - parasitoide; discusión de los datos desde el punto de vista de la teoría de oligomerización de órganos homólogos (Dogiel, 1954) y la literatura citada (241 citas). Los géneros con el número reducido de artejos funiculares en las antenas pertenecen a diferentes subfamilias, tribus y subtribus de la familia Encyrtidae, por lo que los procesos de oligomerización se han desarrollado independientemente de la posición sistemática de los géneros.

Preface

The species of Hymenoptera Parasitica play an important role in the natural control of other arthropod populations, mainly insects. Moreover, the parasitic wasps have been the most successful group in biological control programs in the world.

Encyrtidae, together with Aphelinidae, are the most important chalcidoid families in applied biocontrol. The encyrtids are parasitoids of different groups of Insecta, and some species attack ticks. Homoptera is the preferred order by encyrtids, mainly species of the families Pseudococcidae, Coccidae and Diaspididae. More than 3,824 species of Encyrtidae are known in the world fauna (information on July 2001).

In this book, we proposed a key to determine the genera of Encyrtidae with reduced number of antennal funicle segments (less than 6), including 62 genera. The species of many of these genera are used with biological control purposes. So, this key will help to separate more easily these genera.

We also provide information on synonymy, important literature, a list of 393 species of the world fauna with data on geographical distribution, hosts, use in classical biological control, and a host-parasitoid index.

In 2000, we published the book 'Encyrtids (Hymenoptera:Encyrtidae) of agricultural importance in Mexico' (in Spanish) in order to impulse the study of Encyrtidae in Latin America. Now, this book, as a part of the same Series, can be used in a broad level.

We wish to thank the following persons and institutions: Mrs. Elisaveta Ya. Chouvakhina (Russian Entomological Society, St. Petersburg) for her help and valuable consultations, Dr. Evelina M. Danzig (Zoological Institute, Russian Academy of Sciences, St. Petersburg) for her valuable consultations on taxonomy of Coccoidea, Dr. David G. Furth (Department of Entomology, National Museum of Natural History, Smithsonian Institute, Washington, D.C., USA) for possibility to work with collections of this Department, Dr. Alejandro González Hernández (Universidad Autónoma de Nuevo León, San Nicolás de los Garza, N. L., México) for his help and permission to study his collection of Encyrtidae), Prof. Gordon Gordh (Director, Center for Plant Health Science and Technology USDA, Nort Carolina State University, Raleigh, North Carolina, U.S.A.) for his help with scientific literature and for encouragement, Dr. S. Greenberg (Southern Plains Area & Kika de la Garza Subtropical Agricultural Research Center, Weslaco, Texas, USA) for his many-sided help, Dr. John Heraty (Department of Entomology, University of California, Riverside, California, USA) for possibility to study entomological collections of the Department, the late Dr. Augustin Hoffer (Agricultural Institute in Prague, Czechoslovakia) for his help and possibility to study his rich personal collection of Encyrtidae, Dr. Isabel Izquierdo (Museo Nacional de Ciencias Naturales, Madrid, España) for her help in studying the collection of R. G. Mercet, Dr. Dmitri R. Kasparyan (Zoological Institute, Russian Academy of Sciences, St. Petersburg) for reading the manuscript and valuable advise, Prof. Dr. Mikhail A. Kozlov (Zoological Institute, Russian Academy of Sciences, St. Petersburg) for his valuable consultations, Prof. Dr. Izjaslav M. Kerzhner (Zoological Institute, Russian Academy of Sciences, St. Petersburg) for his valuable consultations on zoological nomenclature, the late Prof. Dr. Eberhard Königsmann (Zoological Museum, A. Humboldt University, Berlin, Germany) for the possibility to study collections of the Museum), Dr. Vicenta Llorente del Moral (Museo Nacional de Ciencias Naturales, Madrid, España) for her many-sided help, Prof. Dr. Gleb S. Medvedev (Zoological Institute, Russian Academy of Sciences) for many-sided help and support, Dr. Elvira Mingo Pérez (Museo Nacional de Ciencias Naturales, Madrid, España) for the possibility to study the collection of R. G. Mercet, Prof. Dr. Svetlana N. Myartseva (National Institute of Deserts, Flora and Fauna, Ashgabat, Turkmenistan & Laboratorio de Control Biológico, UAM Agronomía y Ciencias-UAT, Cd. Victoria, Tamaulipas, Mexico) for her friendly help, Dr. Boris V. Nekrasov (Library of Zoological Institute, Russian Academy of Sciences, St. Petersburg) for his valuable consultations, Dr. John

S. Noyes (Department of Entomology, The Natural History Museum, London, England) for the possibility to work in the Department and many-sided help and advice, Dr. Andrey D. Orlinski (European and Mediterranean Plant Protection Organization, Paris, France) for his many-sided help, Dr. Papp Jenő (Hungarian Natural History Museum, Budapest) for the possibility to work in the Museum and many-sided help, Prof. Wojciech Pulawski (Department of Entomology, Museum of Natural Sciences, California Academy of Sciences, San Francisco, USA) for the possibility to work in the Department, Dr. Thuróczy Csaba (Jurisic Miklós Múzeum Kószeg, Hungary) for the possibility of work with collections of L. Biró and J. Erdós, Ing. Juan R. Treviño Higuera (Director, Consejo Tamaulipeco de Ciencia y Tecnología, Gobierno del Estado de Tamaulipas, Cd. Victoria, México) for his many-sided support, Dr. Serguei V. Triapitsyn (Department of Entomology, University of California, Riverside, California, USA) for possibility of work in the Department, Mrs. Milena Verichová (Prague, Czechia) for her support during the work with collection of the late Dr. A. Hoffer, Dr. Claire Willemant-Aitlemkadem (Museum National d'Histoire Naturelle, Paris, France) for the possibility to work in the Museum, Prof. James B. Woolley, Department of Entomology Texas, A & M. University, College Station, Texas, USA) for the possibility to work in the Department and for generous help with scientific literature, and Dr. Robert L. Zuparko (Essig Museum, University of California, Berkeley, California, USA) for possibility to work in the Museum and his many-sided help.

Special thanks to Dr. Juana María Coronado Blanco (Laboratorio de Control Biológico, UAM Agronomía y Ciencias – UAT, Cd. Victoria, Tamaulipas, México) for her valuable help in the final format of this book, and to the Universidad Autónoma de Tamaulipas, México, for the support in the publication of the present book, especially the Research Center of UAM Agronomía y Ciencias, the General Secretary, and the Department of Editorial Development.

CONTENTS

Chapter 1

ON THE IMPORTANCE OF ENCYRTIDS

The family Encyrtidae is one of the largest in the superfamily Chalcidoidea. According to data on July 2001, 3824 valid species belonging to 461 genera were known in the world fauna. Host associations of encyrtid larvae are broad. They are parasitoids of insects from different orders, more often scale insects (Homoptera:Coccoidea), but also of ixodid ticks. The role of encyrtids in the natural control of insect pests is considerable, and many species are employed as classical biological control and integrated pest management agents.

Mexican encyrtids are poorly known in this country, and genera described from other countries and even from other continents may be found in Mexico. That is why keys of world genera are necessary for studying local faunas. The key to 62 genera of Encyrtidae presented here constitutes a part of a still not existing key to all world genera of encyrtids (about 14% of genera). Such review is undertaken for the first time in the chalcidological literature.

Earlier, the review of genera with reduced number of funicular segments of antennae was published by Hoffer (1960), including 6 European genera: *Admirencyrtus* Hoffer, 1960; *Copidosomopsis* Girault, 1915 (=*Pentalitomastix* Eady, 1960); *Helegonatopus* Perkins, 1906 (=*Masencyrtus* Hoffer, 1960); *Pseudaphycus* Timberlake, 1916 (= *Pseudaphycus* Clausen, 1915, ***nomen nudum***); *Tetracnemoidea* Howard, 1898 (= *Hungariella* Erdős, 1946); and *Trechnites* Thomson, 1876.

Senior author worked in the rich collection depository of Encyrtidae in the Zoological Institute, Russian Academy of Sciences (St. Petersburg), and also in Helsinki, Berlin, Prague, Budapest, Paris, Madrid, London, Washington, San Francisco, Riverside (California, USA), College Station (Texas, USA), Monterrey (Mexico) and Cd. Victoria (Mexico). This work and also the publication during the last 20 years of several fundamental monographs on faunas of Encyrtidae of Palaearctic (Trjapitzin, 1989), Nearctic (Noyes *et al.*, 1997), Neotropical (Noyes, 1979, 1980; Noyes & Ren, 1995; Noyes & Hanson, 1996, Noyes, 2000), and Oriental region, Australia and Oceania (Noyes & Hayat, 1984, 1994), New Zealand (Noyes, 1988) and Australia (Dahms & Gordh, 1997), permitted us to prepare this review.

It is necessary to note this book contains information on such important genera as *Acerophagus* E. A. Smith, *Adelencyrtus* Ashmead, *Aenasius* Walker, *Blastothrix* Mayr, *Blepyrus* Howard, *Copidosomopsis* Girault, *Epitetracnemus* Girault, *Habrolepis* Foerster, *Hambletonia* Compere, *Holcothorax* Mayr, *Microterys* Thomson, *Plagiomerus* Crawford, *Pseudaphycus* Timberlake, *Pseudhomalopoda* Girault and *Tetracnemoidea* Howard.

Some species included provide natural control or are used in classical biological control or in integrated pest management programs on such important cultivated plants as citrus *Citrus* spp., pineapple *Ananas comosus*, guava *Psidium guajava*, mango *Mangifera indica*, coconut palm *Cocos nucifera*, custard apples *Annona* spp., grape *Vitis vinifera*, Japanese persimmon *Diospyros kaki*, banana *Musa paradisiaca*, olive *Olea europaea*, coffee *Coffea arabica*, cacao *Theobroma cacao*, cassava *Manihot esculenta*, sugarcane *Saccharum officinarum*, yam *Dioscorea* spp., tamarind *Tamarindus indica*, apple tree *Malus domestica*, garden plum *Prunus domestica*, peach *Persica vulgaris*, pear *Pyrus domestica*, mulberries *Morus* spp., almond *Amygdalus communis*, tomato *Lycopersicon esculentum*, opuntias *Opuntia* spp., wheat *Triticum* spp., rice *Oryza sativa*, cotton *Gossypium* spp., aloe *Aloe* spp., eucalyptus *Eucalyptus* spp., roses *Rosa* spp., bamboos (Bambusoideae), New Zealand flax *Phormium tenax*, Rhodes grass *Chloris guyana*, oleander *Nerium oleander*, spruces *Picea* spp., and oaks *Quercus* spp. This knowledge permits us to give some suggestions of introduction of some encyrtid species treated here to control agricultural pests.

It would be useful to discuss the problems of introduction to the New World of *Adelencyrtus quadriguttus* (Girault) from India against the armoured scale *Aonidiella aurantii* Maskell (Hom.: Diaspididae), and *Habrolepis diaspidi* (Risbec) from the Mediterranean region or Africa to control *Chrysomphalus aonidum* Linnaeus, both cases on citrus. In the Far East of Russia and North Korea are known some parasitoids of San Jose scale *Diaspidiotus perniciosus* Comstock on apple trees, which are absent in Europe and America, for example *Coccidencyrtus steinbergi* Tshumakova *et* Trjapitzin. We suggested to introduce from America into Europe and Asia *Coccidencyrtus malloi* De Santis and *C. ochraceipes* Gahan against the palm armored scale *Diaspis boisduvalii* Signoret, however *C. malloi* already penetrated into France by ecesis, i.e. with its host (Panis & Pinet, 1999). It is necessary to undertake attempts of introduction of *Anthemus aspidioti* Nikolskaya from the Middle Asia and *Habrolepsis tergrigorianae* Trjapitzin from Middle Asia or Pakistan into America to control *Parlatoria oleae* Colvée. In Mexico, it would be reasonable to study possibilities of introduction of the armoured scale *Pinnaspis strachani* Cooley parasitoids on citrus, among them *Adelencyrtus coxalis* Hayat, Alam *et* Agarwal, and *Coccidencyrtus mandibularis* Hayat, Alam *et* Agarwal from India, and *Habrolepis apicalis* Waterston from Ghana and *H. diaspidi* (Risbec) from the Mediterranean region or Africa.

Some terms concerning the Encyrtidae have been published by Trjapitzin & Ruíz -Cancino (2000a) in three languages: Spanish, English and Latin.

Two genera of Encyrtidae wich are present in Synopsis are not included into the Key. They are *Coccidencyrtus* Ashmead, 1900 and *Eucoccidophagus* Hoffer, 1963. The Australian species of *Coccidencyrtus* which exhibit the phenomenon of fusion of funicle segments are unknown to us. In the genus *Eucoccidophagus* only one species, *E. adrianae* Guerrieri from Italy has 5-segmented funicle on one anomalous antenna, what it is not normal for the species.

Noyes *et al.* (1977) had included into their key to the Nearctic genera of Encyrtidae which may have 5-segmented funicle of antenna, *Mayridia* Mercet, 1921 and *Zaommoencyrtus* Girault, 1916. For both genera 6-segmented funicle is characteristic. Besides, *Zaommoencyrtus* sp. (*l.c.*, p. 320, fig. 174) has entire clava of female antenna, that is not typical for the genus *Zaommoencyrtus*. We have not seen corresponding materials and therefore do not include these genera into the Key and the Synopsis.

Chapter 2

ANTENNAE OF ENCYRTIDAE

Antenna of encyrtids (Fig. 1) consists usually from radicle, scape, pedicel, 6-segmented funicule and 3-segmented clava. In microscopic slides, between pedicel and the 1st funicular segment, a very thin ring may be seen, which is a rudiment of the true 1st funicular segment. The radicle and this ring are not included in the count of number of antennal segments. But in some species of the genus *Aenasius* Walker, for example, *A. advena* Compere (Fig. 2) and *A. chilecito* Trjapitzin *et* Trjapitzin (Fig. 3) on the place of this ringlet a true funicular segment is preserved, this testifies that the primary number of funicular segments of antennae of Encyrtidae was 7.

Funicle and clava of antennae constitute flagellum. Usually, antennal clava of Encyrtidae is wider than funicle (Fig. 4), but in some cases as *Mira macrocera* Schellenberg (Fig. 5), *Phasmocera kerzhneri* Trjapitzin (Fig. 6) and *Monstranusia mirabilissima* Trjapitzin (Figs. 7,8) may be considerably narrower than funicle. Funicle and clava of some Encyrtidae are sometimes not well delimited, as in females of *Thomsonisca amathus* (Walker) (Fig. 9) and *Philosindia longicornis* Noyes *et* Hayat. Antennal clava of encyrtids may be also 2-segmented (Fig. 10) or solid (Fig. 11). Sometimes, vestiges of sutures dividing segments of clava can be seen (Fig. 12).

A peculiar case represents the genus *Tetarticlava* Noyes, known only from West Indies and Mexico, where the clava is 4-segmented (Fig. 24).

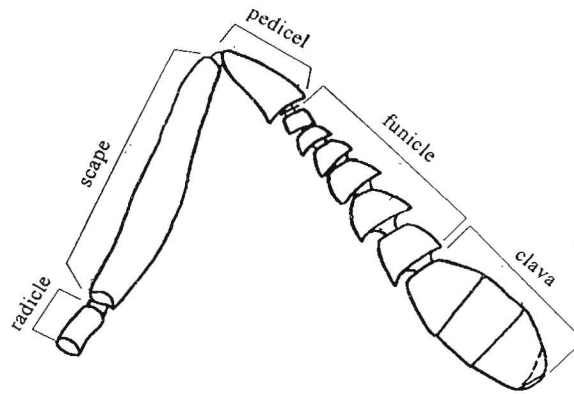


Fig. 1. *Aphycus shutovae* (Nikolskaya, 1952). Female, antenna. From Trjapitzin (1962).

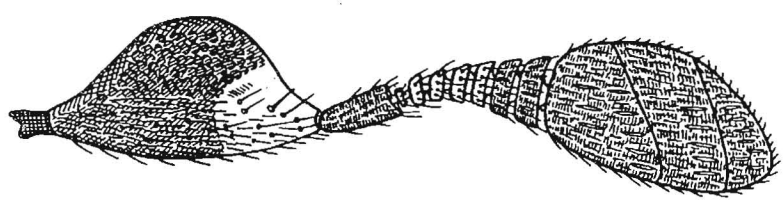


Fig. 2. *Aenasius advena* Compere, 1937. Female, antenna. From Trjapitzin (1977) after Compere (1937).

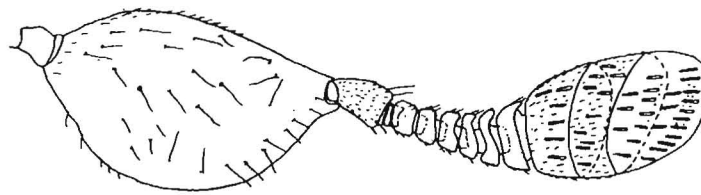


Fig. 3. *Aenasius chilecito* Trjapitzin et Trjapitzin, 1999. Female, antenna. From Trjapitzin & Trjapitzin (1999).

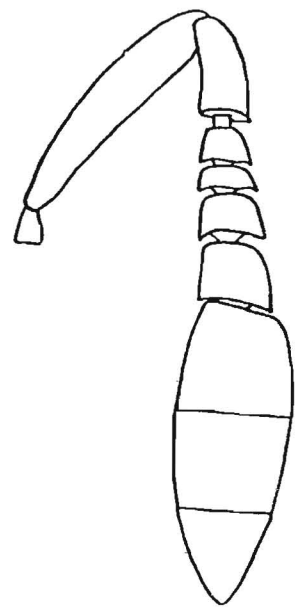


Fig. 4. *Plagiomerus diaspidis* Crawford, 1910. Female, antenna. From Trjapitzin (1989).

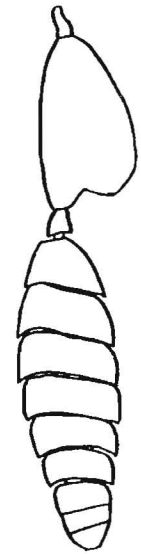


Fig. 5. *Mira macrocera* Schellenberg, 1803. Female, antenna. From Trjapitzin (1978).

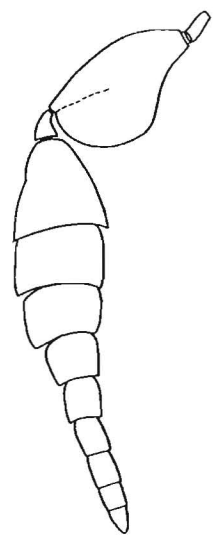


Fig. 6. *Phasmocera kerzhneri* Trjapitzin, 1971. Female, antenna. From Trjapitzin (1972).

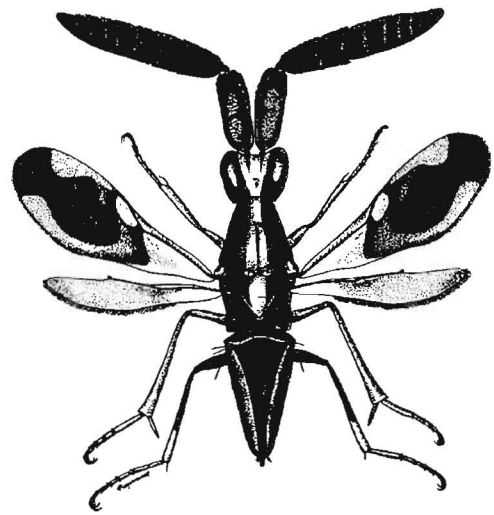


Fig. 7. *Monstranusia mirabilissima* Trjapitzin, 1964. Female, dorsal view. Orig. by N.A. Florenskaya.

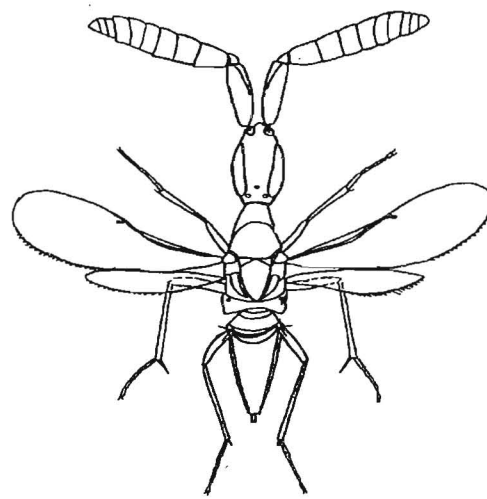


Fig. 8. *Monstranusia mirabilissima* Trjapitzin, 1964. Female, dorsal view. Orig. by A.V. Trjapitzin.

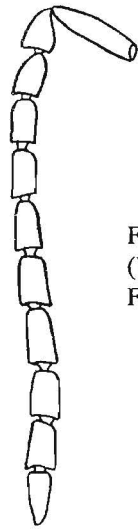


Fig. 9. *Thomsonisca amathus* (Walker, 1838). Female, antenna. From Trjapitzin (1989).

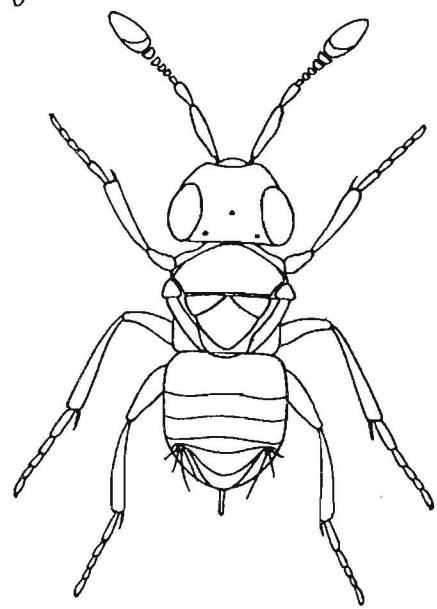


Fig. 10. *Aphyculus perparvus* Hoffer, 1954. Female, dorsal view. From Trjapitzin (1978), after Hoffer (1955a).

Fig. 11. *Copidosomopsis* sp. Female, antenna. Orig. by V.A. Trjapitzin.

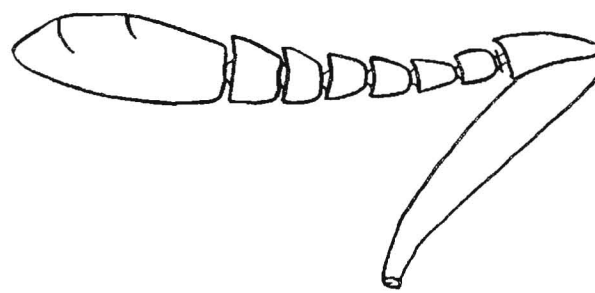


Fig. 12. *Pentacladocerus matranus* Erdős, 1963. Female, antenna. From Trjapitzin (1978).

Chapter 3

KEY TO GENERA

(*Coccidencyrtus* and *Eucoccidophagus* not included)

1. Females 2

- Males 70

2. Tarsi 4-segmented (Fig. 13) 3

- Tarsi 5-segmented (Fig. 14) 5

3. Ocelli absent. Antennal funicle 4-segmented. Wings strongly reduced ..... 61. ***Tetracyclos***

- Ocelli present. Antennal funicle composed of 1 to 3 anelliform segments or 5- segmented. Wings of normal length, reaching or exceeding apex of gaster 4

4. Antennal funicle composed of 1 to 3 anelliform segments that are adpressed with clava (Fig. 15); clava large, at least as long as remainder of antenna. Forewing broad, at most 2.25x as long as broad with marginal fringe much shorter than maximum wing width ..... 16. ***Arrhenophagus***

Fig. 13. *Arrhenophagus chionaspidis* Aurivillius, 1888. Female, apex of mid tibia with tarsus. From Trjapitzin (1977).

Fig. 14. *Pseudaphycus coccurae* Sharkov, 1995. Female, apex of mid tibia with tarsus. Orig. by V.A. Trjapitzin.

- Antennal funicle composed of 5 segments that are clearly separated from clava (Fig. 16); clava at most as long as funicle and pedicel combined. Forewing narrow, not less than 3.5 x as long as broad (Fig. 17), with marginal fringe at least as long as wing width ..... 9. ***Anthemus***

5. Antennal funicle 2-segmented 6

- Antennal funicle 3 - 5-segmented 7

6. Funicle segments anelliform and closely adpressed together; clava 3-segmented ..... 15. ***Arrhenophagoidea***

- Funicle segments subquadrate; clava 2-segmented ..... 54. ***Psyllechthrus***

7. Antennal funicle 3 - 4 segmented 8

- Antennal funicle 5-segmented 28

8. Antennal funicle 3-segmented (1st funicle segment sometimes with a suture indicating on fusion of two segments) 9

- Antennal funicle 4-segmented (1st funicle segment sometimes with a suture indicating on fusion of two segments) 12

9. Scape and pedicel of antenna strongly broadened and flattened. Antennal scrobes delimited dorsally by a carinate ridge. Stigmal vein of the forewing curved .... 63. ***Tropidophryne***

- Scape and pedicel of antenna not broadened. Antennal scrobes not delimited dorsally by a carinate ridge..... 10

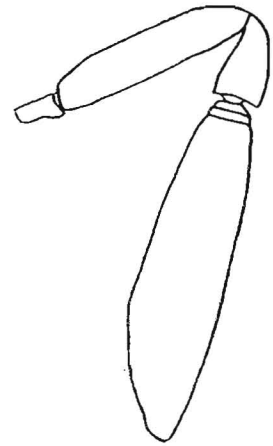


Fig. 15. *Arrhenophagus chionaspidis* Aurivillius, 1888. Female, antenna. From Trjapitzin (1971b).

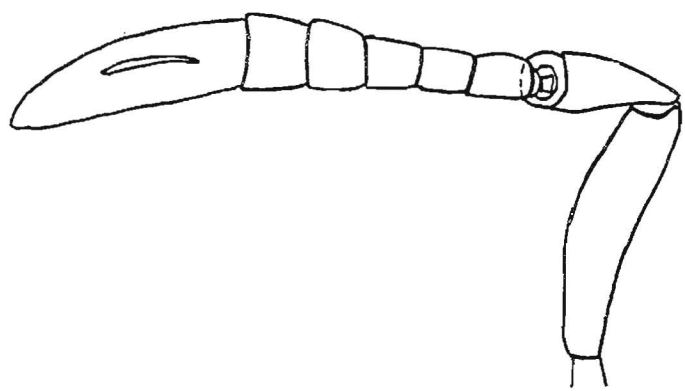


Fig. 16. *Anthemus aspidioti* Nikolskaya, 1952. Female, antenna. From Trjapitzin, (1971b).

10. Frontovertex with a transverse membranous line between anterior ocellus and antennal toruli; this line is joined to antennal toruli or nearly so, by longitudinal membranous lines. Funicle segments strongly transverse and closely adpressed together; clava solid, apically obliquely truncate and much longer than funicle and pedicel together ..... 15. ***Arrhenophagoidea***

- Frontovertex without any membranous lines. Funicle segments not transverse, clearly separated and each quadrate or longer than broad; clava 3-segmented, not truncated obliquely and shorter than funicle and pedicel together..... 11

11. Forewings hyaline. Antennal scape not flattened, but concave ventrally. Mandibles 2-dentate ..... 41. ***Marxella***

- Forewings infuscated (Fig 18), with light transverse stripe. Antennal scape flattened and convex ventrally..... 44. ***Microterys***

12. Apex of scutellum with 2 (Fig. 19) or 4 slightly to strongly broadened lamelliform setae..... 13

- Setae on apex of scutellum, if present, not broadened 16

13. Apex of scutellum with 4 lamelliform setae. Forewings hyaline ..... 49. ***Plagiomerus***

- Apex of scutellum with 2 lamelliform setae 14

14. Antennal funicle distinctly broadened, its 1st - 3rd segments transverse. Marginal vein of the forewing with several lamelliform setae ..... 52. ***Pseudhomalopoda***

- Antennal funicle not broadened or only slightly broadened. Marginal vein of the forewing with several simple setae 15

15. All funicle segments of antenna longer than broad; scape not broadened ....38. ***Homalopoda***

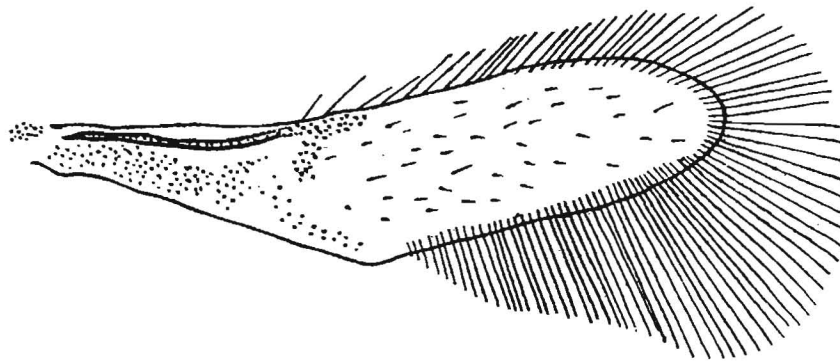


Fig. 17. *Anthemus aspidioti* Nikolskaya, 1952. Female, forewing. Orig. by V.A. Trjapitzin.

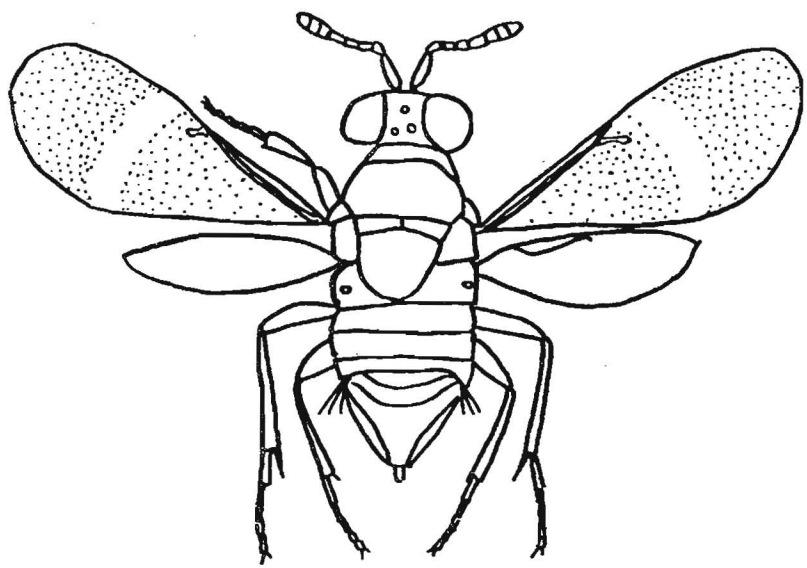


Fig. 18. *Microterys anomalus* (Erdős *et* S. Novicky), 1955). Female, dorsal view. From Erdős (1964), schematized.

- Not all funicle segments of antenna longer than broad, at least first two segments transverse; scape somewhat broadened (Fig. 20) ..... 23. ***Caenohomalopoda***

16. Antennae strongly broadened and flattened. Clava solid 17

- Antennae not broadened or only slightly broadened 18

17. Antennal clava hardly longer than funicle; all funicle segments subequal in breadth, the 1st without a suture indicating fusion of two segments. Forewing with a tuft of setae under submarginal vein and with 2 narrow, connected infuscate transverse bands formed by lamelliform setae ..... 57. ***Spaniopterus***

- Antennal clava more than 2x as long as funicle; funicle segments unequal in breadth, the 1st with a suture indicating fusion of two segments. Forewing more or less uniformly infuscate, without bands ..... 63. ***Tropidophryne***

18. Antennal clava solid.....19

- Antennal clava 2-or 3-segmented.....21

19. Funicle segments subquadrate, Marginal vein of the forewing punctiform, postmarginal vein almost absent. Mid tibial spur clearly shorter than basal mid tarsal segment. Ovipositor exserted, its exserted part about 1/3 as long as gaster. Mandible tridentate.....4. ***Admirencyrtus***

- Funicle segments transverse.....20

20. Scutellum with a distinct, thin apical flange which overhangs the propodeum and base of gaster medially. Scrobes not sharply margined laterally. Eyes bordered along temples by a sharp ridge.....32. ***Gavria***

- Scutellum with at most a small apical flange which overhangs only the anterior part of the propodeum medially. Scrobes sharply margined laterally by a downwards continuation of the fronto-facial ridge. Eyes not bordered along temples by a sharp ridge.....35. ***Hambletonia***

21. Antennal clava 2-segmented. Frontovertex with a transverse membranous line between anterior ocellus and antennal toruli, this line is joined to antennal toruli, or nearly so, by longitudinal membranous lines. Funicle segments strongly transverse and closely adpressed together ..... 15. ***Arrhenophagoidea***

- Antennal clava 3-segmented 22

22. Marginal vein of the forewing 2 - 3x as long as broad 23

- Marginal vein of the forewing more or less punctiform 25

23. Marginal vein of the forewing 3x as long as broad. Mandible 4 dentate .... 49. ***Plagiomerus***

- Marginal vein of the forewing 2x as long as broad. Mandible 3 dentate or with 2 teeth and one truncation 24

24. Submarginal vein of the forewing with a triangular expansion in its apical third. Formula of palpi 2 - 2 .....1. ***Acerophagoides***

- Submarginal vein of the forewing without a triangular expansion in its apical third. Formula of palpi 4 - 3 ..... 64. ***Xylencyrtus***

25. Antennal scape strongly broadened, considerably less than 3x as long as broad. Funicle segments not longer than broad; 1st-2nd small, anelliform. Anterior border of frontovertex sharply margined above antennal scrobes. Stigmal vein of the forewing sessile, forewings more or less strongly infuscate. Hypopygium reaching apex of gaster ..... 22. ***Brachyplatycerus***

- Antennal scape not broadened, more than 3x as long as broad 26

26. Antennal clava transversely truncate (Fig. 21). Gaster shorter than mesosoma. Stigmal vein of the forewing straight ..... 40. ***Koenigsmannia***

Fig. 19. *Habrolepis dalmanni* (Westwood, 1837). Female, head and mesosoma, lateral view. From Mercet (1921), schematized.

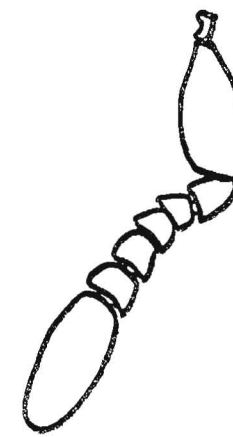


Fig. 20. *Caenohomalopoda darevskyi* Trjapitzin *et* Sharkov, 1922. Female, antenna. From Trjapitzin & Sharkov (1992).

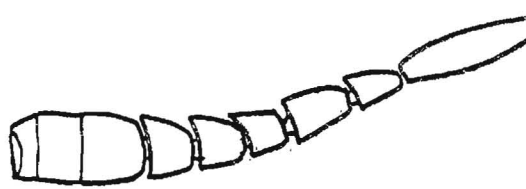


Fig. 21. *Koenigsmannia atra* Trjapitzin, 1982. Female, antenna. From Trjapitzin (1982).

- Antennal clava not truncate (Fig. 22)..... 27

27. Body dark. Mandible 4-dentate. Gaster not shorter than mesosoma and head together, conically pointed; hypopygium reaching apex of gaster or beyond; ovipositorial apparatus very short, occupying only apical part of gaster .....24. ***Cercobelus***

- Body yellow. Mandible 3-dentate ..... 46. ***Nassauia***

28. Mandible 2-dentate 29

- Mandible tridentate, 4-dentate, with 1 tooth and a broad truncation, with 2 teeth and a truncation, with 1 tooth without truncation, or truncate without teeth 34

29. Wings reduced: the forewings at most hardly exceed hind margin of propodeum. Mesosoma flattened. Antennal clava 3-segmented. Toruli near mouth margin. Ocelli sometimes absent ..... 60. ***Tetracnemoidea***

- Wings of normal length: the forewings reaching or exceeding apex of gaster 30

30. Pronotum divided longitudinally. Body flattened dorsoventrally..... 47. ***Neorhopus***

- Pronotum not divided longitudinally 31

31. Antennal clava 2-segmented; antenna not broadened ..... 15. ***Arrhenophagoidea***

- Antennal clava solid or 3-segmented 32

32. Antennal clava 3-segmented; antenna not broadened; funicle segments longer than broad, or some of them quadrate or transverse.....60. ***Tetracnemoidea***

- Antennal clava solid; antenna broadened; all funicle segments strongly broader than long (Fig. 23).....33

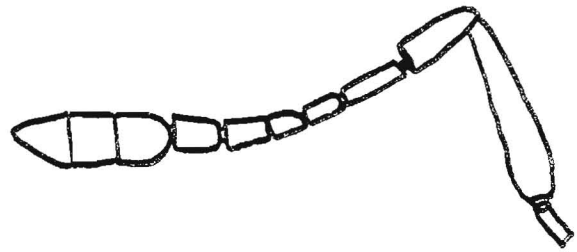


Fig. 22. *Tetracnemoidea australiensis* Howard, 1898. Female, antenna. From Trjapitzin & Gordh (1980).

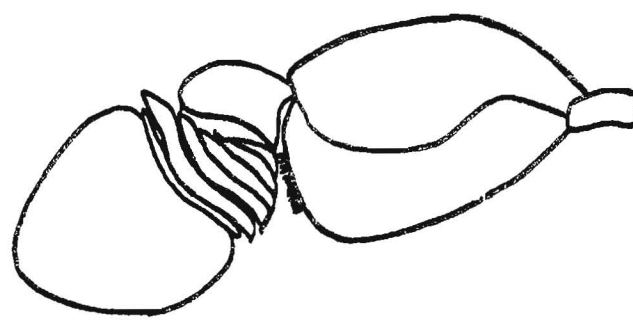


Fig. 23. *Tropidophryne africana* Compere, 1931. Female, antenna. From Compere (1931).

39. Antennal clava longer than funicle and somewhat more than 6 x longer than broad ..... 43. ***Mesorhopella***

- Antennal clava more than 2 x shorter than funicle and about 2 x longer than broad (Fig. 26)..... 19. ***Blastothrix***

40. Mesoscutum with notaular lines present. Mandible 3-dentate ..... 62. ***Trechnites***

- Mesoscutum with notaular lines absent 41

41. Antennal clava 1- or 2-segmented (Fig. 11) ..... 27. ***Copidosomopsis***

- Antennal clava 3-segmented 42

42. Antennal clava shorter than funicle..... 27. ***Copidosomopsis***

- Antennal clava longer than funicle ..... 55. ***Raffaellia***

43. Antennal clava solid 44

- Antennal clava 2- or 3-segmented 48

44. Basal midtarsal segment short, hardly longer than 2nd tarsal segment. Mandible pointed, with a rudiment of 2nd tooth. Antennal toruli near mouth margin. Malar space longer than eye ..... 53. ***Pseudorhopus***

- Basal midtarsal segment not short, but equal or distinctly longer than 2nd tarsal segment. Mandible 3-dentate or with a broad truncation on apex 45

45. Body flattened dorsoventrally. Head prognathous. Pronotum more than ½ as long as mesoscutum ..... 39. ***Indaphycus***

- Body not flattened dorsoventrally. Head hypognathous or subhypognathous ... 46

46. Antennal clava not truncate; scape 3x longer than broad, convex dorsally. Mandible 3 –dentate ..... 2. ***Acerophagus***

- Antennal clava truncate.....47

47. Pronotum long. Midtibial spur usually broadened distad, with apex more or less rounded. Mandible with one tooth and a broad truncation or with 3 equal-sized teeth.....42. ***Meromyzobia***

- Pronotum very short. Midtibial spur not broadened distad, with apex pointed. Mandible broadly truncate at apex.....7. ***Americencyrtus***

48. Antennal clava 2-segmented.....49

- Antennal clava 3-segmented.....52

49. Pronotum elongate, only 2-3 times shorter than mesoscutum (Fig. 27).....50

- Pronotum very shorth (Fig. 10).....51

50. All funicle segments broader than long. Midtibial spur not broadened distad, with apex pointed.....51. ***Pseudectroma***

- First funicle segment ring-like, the rest usually longer than broad. Midtibial spur usually broadened distad, with apex more or less rounded.....42. ***Meromyzobia***

51. Body flattened. Malar space shorter than eye. Ovipositor exserted, its exserted part about 0.17-0.2 of the length of gaster ..... 12. ***Aphyculus***

- Body not flattened. Malar space 1.5x longer than eye. Ovipositor hardly exserted ..... 10. ***Aphycinus***

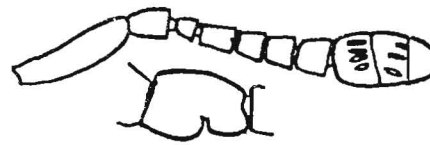


Fig. 26. *Blastothrix britannica* Imms, 1918. Female, anomalous antenna and its 2nd funicle segment. From Sugonjaev (1960).

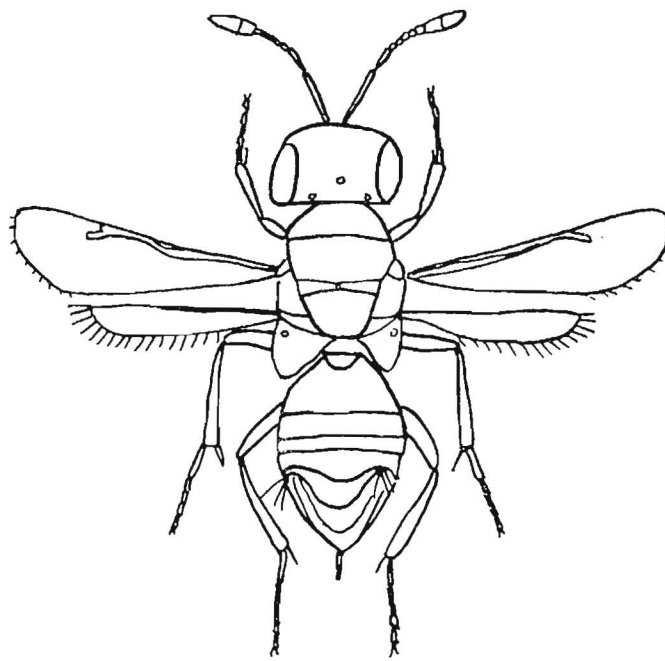


Fig. 27. *Pseudectroma europaeum* (Mercet, 1921). Female, dorsal view. From Trjapitzin (1978), after Mercet (1921), schematized.

52. Mesoscutum with complete or subcomplete notaular lines 53

- Notaular lines of mesoscutum not developed (if developed, reaching not more than 1/3 length of the visible part of mesoscutum) 55

53. Submarginal vein of the forewing with parastigma considerably swollen. Mandibular teeth not equal in length: the middle one being the longest ..... 56. ***Solenaphycus***

- Submarginal vein of the forewing with parastigma not swollen. Mandibular teeth subequal..... 54

54. Marginal vein of the forewing 2x longer than broad; costal cell broad. Midtibial spur short, notably shorter than mid tarsal segment. Eyes with hairs ..... 25. ***Coccidaphycus***

- Marginal vein of the forewing punctiform; costal cell narrow. Midtibial spur moderately long. Eyes asetose ..... 17. ***Beethovena***

55. Ovipositor sheaths with enlarged apices (ovipositor distinctly exserted). 1st and 2nd funicular segments of antenna (Fig. 28) anelliform, contrasting greatly with the 3rd to 5th segments which are subquadrate or longer than broad ... 8. ***Ameromyzobia***

- Apices of ovipositor sheaths not enlarged 56

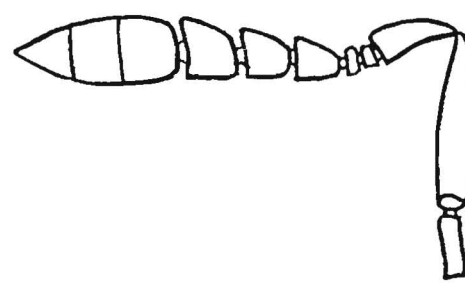


Fig. 28. *Ameromyzobia bulyginskayae* Trjapitzin, 1971. Female, antenna. From Trjapitzin (1971a).

56. Mandible with 1 tooth and a broad truncation 57

- Mandible 3-dentate or with 2 teeth and a truncation 59

57. Scape of antenna a little more than 2x longer than broad, enlarged ventrally. Apex of gaster acute; pygostiles at the level of basal 1/3 of gaster. Exserted part of the ovipositor about 1/4 the length of gaster ..... 45. ***Mozartella***

- Scape of antenna not less than 3x longer than broad, and almost not enlarged ventrally.

58. Pygostiles situated at the apex of gaster, which is rounded. All funicle segments transverse (Fig. 29). Midtibial spur not enlarged distad, its apex more or less acute.....48. ***Oriencyrtus***

- Pygostiles situated far from the apex of gaster, which is more or less accute. 1st funicle segment ring-like, other usually longer than broad. Midtibial spur enlarged distad, its apex more or less rounded.....42. ***Meromyzobia***

59. Submarginal vein of the forewing with parastigma triangularly swollen 60

- Submarginal vein of the forewing with parastigma not swollen, if somewhat swollen it is not triangular. If wings are shortened, the frontovertex without rows of punctures..... 62

60. Malar space 2x as long as eye. Funicular segments of antenna transverse. Marginal vein of the forewing longer than broad. Ovipositor somewhat exserted, thin ..... 1. ***Acerophagoides***

- Malar space shorter than eye 61

61. Scutellum long, with apical tongue-like extension which overhangs propodeum (Fig. 30). Antennal clava very large and as broad as long, much broader than funicle. 1st-3rd funicular segments very small, anelliform, 4th-5th large, transverse. Marginal vein of the forewing longer than broad. Ovipositor not exserted. Mandible with 2 teeth and a truncation. Labial palpi 1-segmented ..... 18. ***Blanchardiscus***

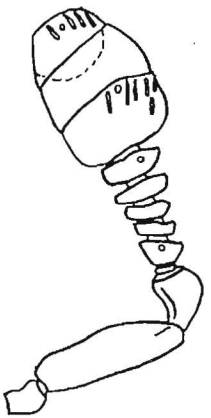


Fig. 29.*Oriencyrtus beybienkoi* Sugonjaev *et* Trjapitzin, 1974. Female, antenna. From Sugonjaev & Trjapitzin (1974).

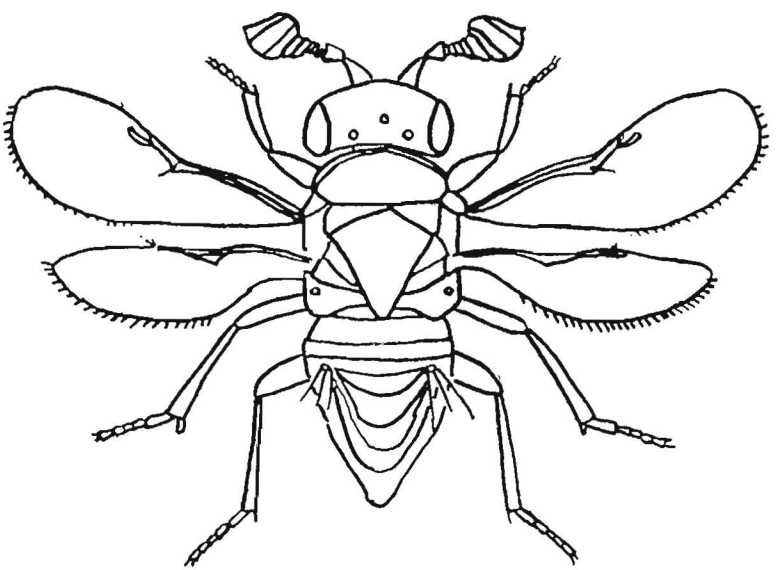


Fig. 30. *Blanchardiscus scutellatus* De Santis, 1964. Female, dorsal view. From De Santis (1964), schematized.

- Scutellum reaching only anterior margin of propodeum. Antennal clava not broader than funicle; 1st funicular segment small, anelliform, 2nd-5th segments large, somewhat longer than broad. Marginal vein of the forewing punctiform. Ovipositor exserted, its exserted part more or less equal to the length of gaster. Mandible 3-dentate with the middle tooth the longest. Labial palpi 2-segmented ..... 11. ***Aphycomastix***

62. Frontovertex with several rows of minute punctures. Middle tooth of mandible is the longest ..... 21. ***Bothriocraera***

- Frontovertex without rows of minute punctures, at most with scattered punctures, and sometimes more or less densely punctate giving a granulate appearance 63

63. Posterior margin of the forewing truncate (Fig. 31), wings shortened, the forewings reaching only the middle of the gaster. Palpal formula 2-1.....34. ***Hadzhibeylia***

- Posterior margin of the forewing not truncate 64

64. Antennal clava not broader or only slightly broader than funicle 65

- Antennal clava distinctly broader than funicle 67

65. All funicle segments longer than broad. Scape long, linear. Marginal vein of the forewing about 2x as long as broad. Hypopygium not reaching apex of gaster. Palpal formula 3-3 ..... 14. ***Arhopoidiella***

- First funicle segment very small, anelliform, so that funicle appears to be 4 segmented.....66

66. Pronotum very short. Mesoscutum without traces of notauli even anteriorly. Mesotibial spur not enlarged distad and its apex pointed. Antennal club rounded at apex. Middle tooth of mandible the longest. Palpi formula 3-2.....11. ***Aphycomastix***

- Pronotum rather long. Mesoscutum with traces of notauli anteriorly. Mesotibial spur more or less enlarged distad and its apex more or less rounded. Middle tooth of mandible not the longest. Palpi formula 4-3.....42. ***Meromyzobia***

67. Mandible with the middle tooth the longest 68

- Mandible with the middle tooth not the longest 69

68 Antennae yellow or orange, unicolorous. Palpal formula 4–2 or 3-2 ..... 2. ***Acerophagus***

- Antennal clava usually with at least 2 apical segments white contrasting sharply with more or less dark segments of funicle. Palpal formula 4-3 .....50. ***Pseudaphycus***

69. Antennal clava truncate obliquely; scape not broadened at base. Outer tooth of mandible great, clearly separated from small middle and inner teeth ... 64. ***Xylencyrtus***

- Antennal clava not truncate obliquely; scape broadened at base. Mandibular teeth subequal..... 13. ***Archinus***

70. Antennal funicle with 3-4 long branches on 1st-4 th segments, 5 segmented (Fig. 32); sometimes a short branch on the 5th segment present ..... 60. ***Tetracnemoidea***

- Antennal funicle without branches 71

71. Tarsi 4 segmented. Body length less than 1 mm. Antennal funicle 4-segmented. Forewing broad, at most 2.25x as long as broad, with the marginal fringe shorter than the maximum wing breadth ..... 16. ***Arrhenophagus***

- Tarsi 5 segmented 72

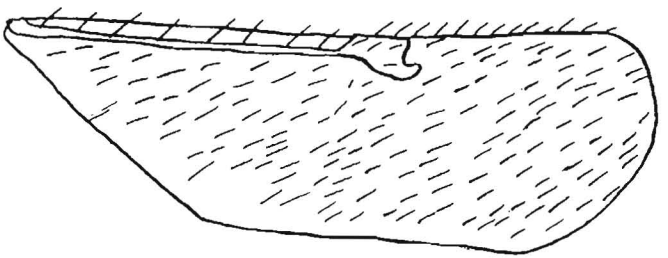


Fig. 31. *Hadzhibeylia physococci* Myartseva *et* Trjapitzin, 1981. Female, forewing. From Myartseva & Trjapitzin (1981).

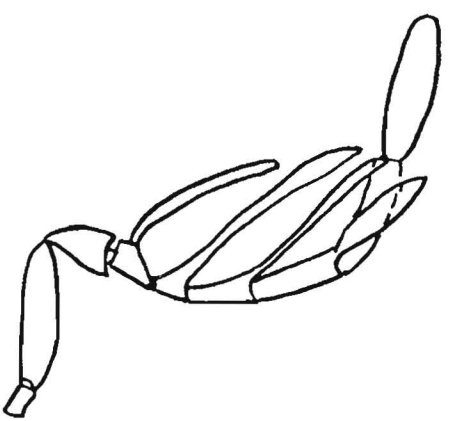


Fig. 32. *Tetracnemoidea westwoodi* (Cockerell, 1898). Male, antenna. From Trjapitzin & Gordh (1980).

72. Mandible 2-dentate 73

- Mandible 3-4-dentate, or rounded without teeth (sometimes this rounded part of mandible with very small denticles), or with 2 teeth and a truncation 75

73. Antennal clava very long, not less than 6x as long as funicle; funicle consists of 2-5 anelliform segments, some of them being concealed in ventro-basal excavation of clava (Fig. 33) ..... 5. ***Aenasius***

- Antennal clava shorter than funicle; funicle 5 segmented 74

74. Antennal clava solid, less than 2x as long as broad; scape broadened in its middle part; all segments of funicle transverse (Fig. 34) ..... 35. ***Hambletonia***

- Antennal clava 3-segmented, about 3x as long as broad; scape broadened in its basal part; not all segments of funicle transverse ..... 41. ***Marxella***

75. Antennal funicle 2- segmented 76

- Antennal funicle 3-5-segmented 83

76. First funicle segment of antenna very long, not less than 3x as long as broad.....77

- First funicle segment of antenna subquadrate, or a little longer than broad, or transverse, anelliform, in all cases it is shorter, often many times, than clava 79

77. Second funicle segment of antenna very long, 8x as long as broad; clava not less than 8x as long as broad ..... 23. ***Caenohomalopoda***

- Second funicle segment of antenna subquadrate or 1.5 x as long as broad; clava 3-4 x as long as broad.....78

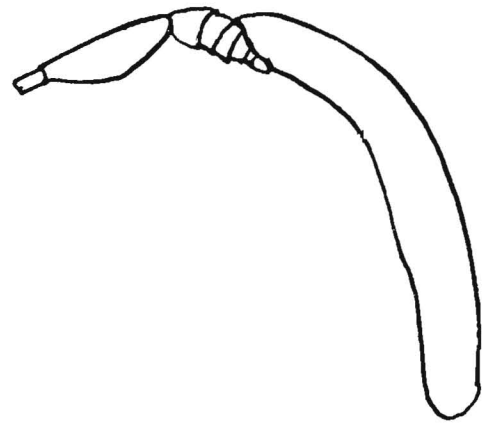


Fig. 33. *Aenasius advena* Compere, 1937. Male, antenna. From Compere (1937), schematized.

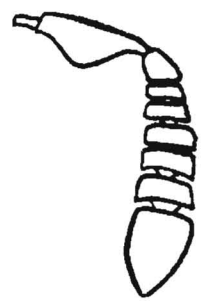


Fig. 34. *Hambletonia pseudococcina* Compere, 1936. Male, antenna. From Compere (1936).

78. Second funicle segment of antenna 1.5x as long as broad; clava 3x as long as broad ..... 3. ***Adelencyrtus***

- Second funicle segment of antenna subquadrate or 1.5 x as long as broad; clava 3-4 x as long as broad.....33. ***Habrolepis***

79. Antennal funicle segments subquadrate or a little longer than broad; clava 2-segmented, a little more than 2x as long as funicle. Postmarginal vein of the forewing absent; marginal fringe about as long as 1/3 wing breadth. Mandible with rounded apex, without teeth..... 54. ***Psyllechthrus***

- Antennal funicle segments transverse, anelliform; clava solid, many times longer than funicle (Fig. 35). Postmarginal vein of the forewing present, but usually short; marginal fringe short. Mandible 4 dentate (sometimes with some teeth weakly developed), 3-dentate, with 2 teeth and a truncation or with 1 tooth and a broad truncation..... 80

80. Mandible with 1 tooth and a broad truncation ..... 29. ***Epitetralophidea***

- Mandible 4-dentate (sometimes with some teeth weakly developed), 3-dentate or with 2 teeth and a truncation 81

81. Mesosoma partially yellow (in an Indo-Malayan species) or dark brown or black (in Afrotropical species). Mandible 3-dentate. Parasitoids of lac-insects (Homoptera: Kerriidae) ..... 30. ***Erencyrtus***

- Mesosoma obscure, without orange-yellow patches. Parasitoids of armoured scale insects (Homoptera: Diaspididae) or asterolecaniids (Homoptera: Asterolecaniidae)..... 82

82. Mandible 3-dentate or with 2 teeth and a truncation ..... 3. ***Adelencyrtus***

- Mandible 4-dentate (sometimes with some teeth weakly developed) ..... 3. ***Adelencyrtus***, 28. ***Epitetracnemus***, 33. ***Habrolepis*** and 49. ***Plagiomerus***

83. Antennal funicle 3-segmented (Fig. 36). All funicle segments anelliform; clava more than 4x as long as funicle; scape somewhat broadened and flattened, 3x as long as broad . Mandible 3-dentate, with the middle tooth the longest .....20. ***Blepyrus***

- Antennal funicle 4 - 5-segmented 84

84. Antennal funicle 4-segmented 85

- Antennal funicle 5-segmented 88

85. Antennal clava strongly obliquely truncate, this truncation almost reaching the base of clava. Marginal vein of the forewing absent. Mandible without teeth, at most its apical rounded edge with many small denticles.....6. ***Aethognathus***

- Antennal clava not truncate obliquely. Marginal of the forewing present. Mandible 3-4 dentate.....86

86. 4th funicle segment of antenna strongly transverse, funicle and clava with short hairs. Mandible 3-dentate.....32. ***Gavria***

- 4th funicle segment of antenna longer than broad.....87

87. Funicle and clava with long hairs. Mandible 4-dentate.....24. ***Cercobelus***

- Funicle and clava with very short hairs. Mandible 3-dentate.....42. ***Meromyzobia***

88. Ocelli absent. Pronotum distinctly longer than mesoscutum. Scutellum with transverse apical margin. Antennal clava more than 2x as long as funicle; all funicle segments transverse. Wings rudimentary (almost absent). Mandible 3-dentate ..... 58. ***Stemmatosteres***

- Ocelli present, although sometimes very small, almost rudimentary. Pronotum not longer than mesoscutum. Scutellum usually with more or less angular apex 89

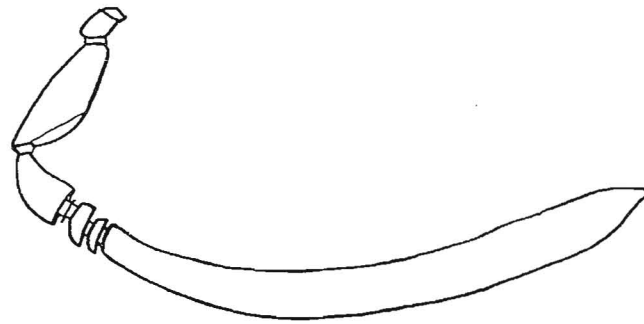


Fig. 35. *Epitetracnemus intersectus* (Fonscolombe, 1832). Male, antenna. From Trjapitzin (1971b).

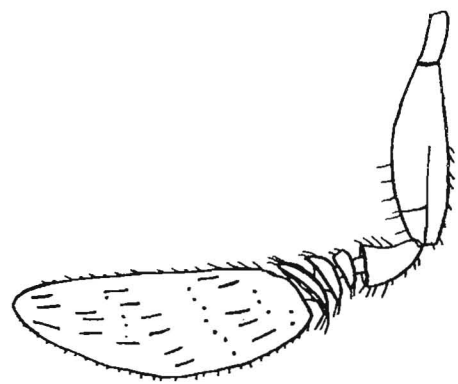


Fig. 36. *Blepyrus insularis* (Cameron, 1886). Male, antenna. From Timberlake (1922b).

89. Body with metallic lustre 90

- Body without metallic lustre or only with very weak metallic reflections 92

90. Mesoscutum with notaular lines present. Funicle segments of antenna short. Mandible 4 dentate ..... 62. ***Trechnites***

- Mesoscutum with notaular lines absent 91

91. Funicle segments of antenna longer than broad; 5th segment not broader than the 1st; clava not broader than funicle, with elongate pointed apex..... 36. ***Helegonatopus***

- Funicle segments of antenna broader than long; 5 th segment distintly broader than the 1st; clava distinctly broader than funicle, oval, with rounded apex ..... 20. ***Blepyrus***

92. Basal midtarsal segment not considerably longer than the 2nd segment. Body flattened ..... 53. ***Pseudorhopus***

- Basal midtarsal segment considerably longer than the 2nd 93

93. Mandible with a very broad truncate margin at apex. Thorax convex ..... 7. ***Americencyrtus***

- Mandible tridentate 94

94. Mesoscutum with notaular lines present, almost complete. Antenna clavate; all funicle segments somewhat broader than long ..... 25. ***Coccidaphycus***

- Mesoscutum with notaular lines absent or short, reaching at most 1/3 of mesoscutum length 95

95. Pronotum rather long (see also key couplets 49 and 50)..... 96

- Pronotum very short 97

96. All funicle segments broader than long. Midtibial spur not broadened distad, with apex pointed ..... 51. ***Pseudectroma***

- First funicle segment very short, ring-like, other funicle segments longer than broad. Midtibial spur broadened distad, with apex more or less rounded..... ..... 42. ***Meromyzobia***

97. Submarginal vein of the forewing with parastigma triangularly swollen. Antenna clavate; 1st funicle segment a little longer than broad, 2nd - 5th transverse ..... 1. ***Acerophagoides***

- Submarginal vein of the forewing with parastigma, if swollen, then not triangularly 98

98. All funicle segments of antenna longer than broad. Marginal vein of the forewing about 2x as long as broad. Mandible with 3 acute teeth, the middle tooth slightly longer. Palpal formula 3 - 3 ..... 14. ***Arhopoidiella***

- Most of funicle segments of antenna broader than long 99

99. Frontovertex with several longitudinal rows of minute punctures. Palpal formula 3 - 2 ..... 21. ***Bothriocraera***

- Frontovertex without longitudinal rows of punctures, at most with minute scattered punctures 100

100. Body flattened ..... 12. ***Aphyculus***

- Body not flattened or only slightly flattened 101

101. Mandible with the middle tooth not the longest. Palpal formula 4-3. Parasitoids of solitary bees (Hymenoptera: Apoidea) ..... 64. ***Xylencyrtus***

- Mandible with the middle tooth the longest. Parasitoids of mealybugs (Homoptera: Pseudococcidae) 102

102. Palpal formula 4 - 3 ..... 50. ***Pseudaphycus***

- Palpal formula 4 - 2, 3 - 2, 2 - 1 or 1 - 1.....103

103. Palpal formula 4 -2 or 3 - 2 ..... 2. ***Acerophagus***

- Palpal formula 2 - 1 or 1 - 1 104

104. Palpal formula 2 - 1 ..... 10. ***Aphycinus***

- Palpal formula 1 - 1 (in only 1 species from India) ..... 2. ***Acerophagus***

Chapter 4

SYNOPSIS OF GENERA AND SPECIES

1. *Acerophagoides* Ev. Blanchard, 1940

Type species: *Acerophagoides triangularis* Ev. Blanchard, 1940, by original designation.

References: Blanchard, 1940: 106-107; De Santis, 1964: 103-106; Noyes, 1980: 169; 2000: 162-168.

Characters of antenna. Funicle of both sexes 5-segmented in the type species. In one specimen of an undescribed species from Trinidad there are only 4 funicle segments (Noyes, 1980). Sexual dimorphism not developed, except that clava of male is solid.

Systematic position. The genus belongs to the subfamily Tetracneminae, tribe Pauridiini.

Described species:

1) *Acerophagoides almon* Noyes, 2000. Costa Rica, St. Vincent, Trinidad, Peru.
2) *A. cypris* Noyes, 2000, Costa Rica.
3) *A. pycnos* Noyes, 2000. Costa Rica.
4) *A. triangularis* Ev. Blanchard, 1940. Argentina, *ex* Coccoidea (probably *Eriococcus* - fam. Eriococcidae).
5) *A.varro* Noyes, 2000. Costa Rica.

2. *Acerophagus* E.A. Smith, 1880.

Type species: *Acerophagus coccois* E.A. Smith, 1880, by monotypy.

Synonym: *Rhopoideus* Howard, 1898. Type species: *Rhopoideus citrinus* Howard, 1898, by monotypy.

References: Smith, 1880: 83; Howard, 1898: 235-236 (*Rhopoideus*); Timberlake, 1916: 574-579; 1918: 347-351; Peck, 1963: 401-403; Rosen, 1969: 41-72; Gordh, 1979: 921; Fatima & Shafee, 1993: 114-116; Noyes *et al.*, 1997: 178, 190, 251.

Characters of antenna. Funicle of both sexes 5-segmented. Sexual dimorphism not developed, except that clava of male is solid. In *Acerophagus solidus* Hayat from India, the female clava is undivided.

Systematic position. The genus belongs to the subfamiliy Encyrtinae, tribe Aphycini, subtribe Aphycina. It is very close to *Pseudaphycus* Timberlake, so that the latter might occur to be finally a synonym of *Acerophagus*.

Hosts: mealybugs (Homoptera: Pseudococcidae).

Described species:

1) *Acerophagus antennalis* D. Rosen, 1969. USA (California), *ex Dysmicoccus ryani* Coquillet.
2) *A. californicus* D. Rosen, 1969. USA (California), *ex Spilococcus pressus* Ferris.
3) *A. citrinus* (Howard, 1898). USA (California).
4) *A. coccois* E.A. Smith, 1880. USA (Massachusetts, New York, Pennsylvania, Illinois), *ex Phenacoccus acericola* King and *Oracellia acuta* Lobdell. The species was found in Hawaii as an accidental immigrant parasitizing *Ph. manihoti* Matile-Ferrero. In 1988, *A. coccois* have been imported from USA to China (Guandong Province) to control the pine mealybug *Oracellia acuta.*
5) *A. debilis* Timberlake, 1924. México (Veracruz), *ex Dysmicoccus brevipes* Cockerell on pineapple.
6) *A. erii* Timberlake, 1916. USA (Utah), *ex Amonostherium lichtensioides* Cockerell.
7) *A. fasciatipennis* Timberlake, 1918. USA (California), *ex Antonina crawii* Cockerell.
8) *A. flavidulus* (Brèthes, 1916). Argentina.
9) *A. flavus* D. Rosen, 1969. Jamaica, *ex* Pseudococcidae on *Acalypha* sp.
10) *A. gutierreziae* Timberlake, 1916. USA (New Mexico), *ex Spilococcus gutierreziae* Cockerell.
11) *A. luteolus* D. Rosen, 1969. Trinidad, *ex Ferrisia virgata* Cockerell.
12) *A. notativentris* (Girault, 1917), USA (California), *ex* grape mealybug *Pseudococcus maritimus* Ehrhorn. Introduced into Chile and South Africa.
13) *A. nubilipennis* Dozier, 1926. Puerto Rico, *ex Pseudococcus longispinus* Targioni Tozzetti and *Planococcus citri* Risso.
14) *A. pallidus* Timberlake, 1918. USA (California), as hosts were indicated mealybugs *Phenacoccus gossypii*, *P. solani* Ferris, *Pseudococcus maritimus* Ehrhorn and *Spilococcus eriogoni* Ehrhorn. The species was purposely introduced into Hawaii and Bermuda, in the latter case against *Phenacoccus madeirensis* Green, and established. Results of introduction of *A. pallidus* from California to Ghana in 1951 to control *Planococcoides njalensis* Laing on cacao are unknown.
15) *A. serpentinus* Fatima *et* Shafee, 1988. India, *ex Naiacoccus serpentinus* Green.
16) *A. solidus* Hayat, 1981. India.

17) *A. texanus* (Howard, 1898). USA (Texas), *ex Ferrisia virgata*; México (Nuevo León, Durango), *ex F. virgata*. The parasitoid has been successfully introduced from México into California. An accidental immigrant in Hawaii.

3. *Adelencyrtus* Ashmead, 1900

Type species: *Encyrtus chionaspidis* Howard, 1898, by original designation.

Synonyms: *Epiencyrtoides* Girault, 1915. Type species: *Epiencyrtoides quadridentatus* Girault, 1915, by original designation.

Rotrencyrtus Risbec, 1958. Type species: *Rotrencyrtus depressus* Risbec, 1958, by monotypy.

References: Ashmead, 1900: 401-402; Girault, 1915a: 108-109 (*Epiencyrtoides*); Mercet, 1921: 292-297 (*Epiencyrtoides*), 698; Ferrière, 1949: 371; Doutt, 1951: 501-504 (as *Anabrolepis*); Nikolskaya, 1952: 390-391; Tachikawa, 1956: 93; Risbec, 1958: 39-41 (*Rotrencyrtus*); Compere & Annecke, 1961:47-58, Nikolskaya, 1963: 400; Tachikawa, 1963: 239-240; De Santis, 1964: 239-242; Hayat et al., 1975: 76-87; Trjapitzin, 1978: 307; Noyes, 1980: 170; Myartseva, 1984: 161, 249; Noyes & Hayat, 1984: 223-224; Trjapitzin, 1987: 554; Noyes, 1988: 54-55; Mani, 1989: 981-990; Trjapitzin, 1989: 290-292; Noyes, 1990: 153-154; Fatima & Shafee, 1993: 68-72; Dahms & Gordh, 1997: 22-25; Noyes *et al.*, 1997: 247, 249.

Characters of antenna. Females have 6-segmented funicle and 3-segmented clava. Males are characterized by funicle consisting from 2 ring-segments and very long undivided clava of antenna. In *A. oceanicus* (Doutt) funicle 2-segmented and clava rather short.

Systematic position. The genus belongs to the subfamily Encyrtinae, tribe Habrolepidini, subtribe Habrolepidina.

Hosts: armoured scale insects (Homoptera: Diaspididae).

Described species:

1) *Adelencyrtus antennatus* Compere *et* Annecke, 1961. South Africa, *ex Aspidiotus* sp. on *Chaetachme aristata.*
2) *A. aulacaspidis* (Brèthes, 1914). England, Spain, France, Czechoslovakia (former), Switzerland, Hungary, Italy, Croatia, Bulgaria, Russia (Leningrad Province, Stavropolye Territory, Kabardino-Balkaria, Black Sea Coast of Krasnodar Territory, Daghestan, Sakhalin), Moldavia, Ukraine, Turkey, Georgia, Azerbaijan, Kazakhstan, Japan, USA (Illinois, California), Chile, Argentina, New Zealand. Usual host - *Aulacaspis rosae* Bouché on *Rosa* spp., in Caucasus the parasitoid was reared also from *Chionaspis salicis* Linnaeus on willows *Salix* spp. In Japan parasitizes *A. difficilis* Cockerell and *Pseudaulacaspis pentagona* Targioni Tozzetti.
3) *A. axillaris* (Girault, 1915). Australia.
4) *A. bifasciatus* (Ishii, 1923). Japan, China, Taiwan, India, Bangladesh. Reared from various Diaspididae. An accidental immigrant into Hawaii.
5) *A. bimaculatus* Alam, 1972. India, *ex Aonidiella orientalis* Newstead.
6) *A. chionaspidis* (Howard, 1898). Sri Lanka, *ex Duplachionaspis graminis* Green.
7) *A. clavatus* Hayat, Alam *et* Agarwal, 1975. India, *ex* Diaspididae.
8) *A. coxalis* Hayat, Alam *et* Agarwal, 1975. India, *ex Pinnaspis strachani* Cooley.
9) *A. depressus* (Risbec, 1957). Madagascar.
10) *A. flagellatus* Compere *et* Annecke, 1961. South Africa.
11) *A. funicularis* Hayat, Alam *et* Agarwal, 1975. India, *ex* Diaspididae.
12) *A. inglisiae* Compere *et* Annecke, 1961. Ethiopia, South Africa. Reared from various Diaspididae.
13) *A. kerrrichi* Fatima *et* Shafee, 1993. India.
14) *A. longiclavatus* Hayat, Alam *et* Agarwal, 1975. India.
15) *A. longiscapus* Fatima *et* Shafee, 1993. India.
16) *A. magniclavus* Fatima *et* Shafee, 1993. India.
17) *A. mangiphila* (Risbec, 1952). Madagascar, *ex Phenacaspis dilatata* Green on mango.

Neodiscodes Compere, 1931. Type species: *Neodiscodes martinii* Compere, 1931, by original designation.

Pseudanasius Hayat, Alam *et* Agarwal, 1975. Type species: (*Pseudanasius clavus* Hayat, Alam *et* Agarwal, 1975) = *Aenasius advena* Compere, 1937, by original designation.

References: Walker, 1846: 181; Howard, 1895: 606-607 (*Chalcaspis*); Compere, 1931: 272-274 (*Neodiscodes*); 1937: 383-388; 1939a: 24 (*Neodiscodes*); Kerrich, 1953: 793-796 (*Neodiscodes*), 796-797; Peck, 1963: 372 (*Aenasius*), 372-373 (*Chalcaspis*); De Santis, 1964: 253-260; Agarwal, 1965: 69-70; Kerrich, 1967: 191-195 (*Chalcaspis*), 195-225 (*Aenasius*), 228-235 (*Neodiscodes*); Hayat *et al.*, 1975: 21-24 (*Pseudanasius*); Noyes, 1980. 170-171; Noyes & Hayat, 1984: 225 (*Aenasius*), 306 (*Neodiscodes*); Kaul & Agarwal, 1985: 44-48 (*Aenasius*), 57-62 (*Neodiscodes*); Prinsloo, 1988: 1468-1471; Mani, 1989: 906-909 (*Neodiscodes*); Trjapitzin, 1989: 122-123 (*Neodiscodes*); Noyes & Ren, 1995: 117-163; Noyes *et al.*, 1997: 199, 206, 239, 248; Trjapitzin & Trjapitzin, 1999: 174-179; Noyes, 2000: 170-192.

Characters of antenna. Antennal funicle of female usually 6-segmented, sometimes 7-segmented. Antennae of males variable; either with 6 distinct funicle segments and a small, entire clava, or with 2-5 anelliform segments and a very long clava.

Systematic position. The genus belongs to the subfamily Tetracneminae, tribe Aenasiini, subtribe Aenasiina.

Hosts: mealybugs (Homoptera: Pseudococcidae).

Described species:

1) *Aenasius abengouroui* (Risbec, 1949). Ivory Coast, Ghana and Senegal, *ex Planococcoides njalensis* Laing on cacao; Kenya.
2) *A. advena* Compere, 1937. India, Pakistan, Bangladesh, Thailand, Malaysia, Philippines, Hawaii (introduced from México), Fiji, New Caledonia, Samoa, Loyalty Islands, Solomon Islands, Congo, USA (Florida), México (Baja California Sur,

Nuevo León, Tamaulipas), Costa Rica, Panama, Puerto Rico, St. Thomas, Trinidad, Venezuela, Brazil, Bolivia, Argentina. Usual host *Ferrisia virgata* Cockerell, reared also from *Phenacoccus manihoti* Matile-Ferrero, *Planococcus citri* Risso and *Pseudococcus longispinus* Targioni Tozzetti.

3) *A. arizonensis* (Girault, 1915). USA (Arizona).
4) *A. bolowi* Mercet, 1947. Belize, Guatemala, Costa Rica, Panama, Grenada, Trinidad, Venezuela, Ecuador, Peru, Brazil.
5) *A. brethesi* De Santis, 1964. Argentina.
6) *A. caeruleus* Brues, 1910. USA (Texas, Florida), México (Nuevo León, Veracruz), Belize, Costa Rica, Panama, Puerto Rico, Trinidad, Venezuela, Ecuador, Peru, Brazil, Uruguay. The species was reared in Trinidad from *Ferrisia virgata* Cockerell on cacao.
7) *A. chapadae* Ashmead, 1900. Brazil.
8) *A. chilecito* Trjapitzin *et* Trjapitzin, 1999. Argentina, *ex Ferrisia virgata.*
9) *A. cirrha* Noyes *et* Ren, 1995. Costa Rica.
10) *A. comperei* (Kerrich, 1967). South Africa, *ex Delottococcus questius* Brain on *Citrus*; Namibia, Zimbabwe, Kenya.
11) *A.connectens* Kerrich, 1967. Uruguay.
12) *A. dives* Noyes *et* Ren, 1995. Costa Rica.
13) *A. flandersi* Kerrich, 1967. USA (California), México (Tamaulipas), Costa Rica, Cayman Islands, St. Vincent, Trinidad, Colombia, Guyana, French Guiana, Ecuador, Peru, Uruguay. Reared from various Pseudococcidae, for example *Ferrisia virgata* Cockerell and *Planococcus madeirensis* (Green).
14) *A. frontalis* Compere, 1937. USA (Texas), México (Sinaloa, Tamaulipas), Costa Rica, Panama, Trinidad, Peru, Brazil. In Trinidad, the species was reared from *Ferrisia virgata* Cockerell on cacao and the coconut palm *Cocos nucifera.*
15) *A. hyettus* Walker, 1846. Panama, St. Vincent, Grenada, Trinidad, Uruguay. In Trinidad, the species was reared from *Ferrisia virgata* Cockerell on cacao, the palm *Cocos nucifera*, and also on guava *Psidium guajava.*
16) *A. indicus* (Narayanan *et* Subba Rao, 1960). India, *ex Nipaecoccus viridis* Newstead on *Citrus* spp. and *ex Planococcoides robustus* Ezzat *et* Mc Connell.
17) *A. insularis* Compere, 1937. Mexico (Nayarit), Costa Rica, Puerto Rico, Trinidad, Peru, Brazil.

18) *A. kerrichi* Noyes *et* Ren, 1955. Costa Rica.
19) *A. lepelleyi* (Kerrich, 1953). Sri Lanka, *ex Planococcus lilacinus* Cockerell; India.
20) *A. longiscapus* Compere, 1937. México (Nayarit), Costa Rica, Puerto Rico, Trinidad, Ecuador, Peru, Brazil. In Trinidad, the species was reared from *Dysmicoccus brevipes* Cockerell on cacao, in Brazil - from *Ferrisia virgata* Cockerell on the coconut palm.
21) *A. lua* Noyes *et* Ren, 1995. Costa Rica.
22) *A. lucidus* (Kerrich, 1967). Cuba, *ex Phenacoccus solani* Ferris.
23) *A. maplei* Compere, 1937. USA (California), *ex Puto yuccae* Coquillett.
24) *A. martinii* (Compere, 1931). Eritrea, *ex Planococcus citri* Risso on *Olea africana*; Kenya.
25) *A. masii* Domenichini, 1951. Peru, ex *Planococus citri* Risso, *Phenacoccus gossypii* Townsend *et* Cockerell and *Pseudococcus neomaritimus* Beardsley.
26) *A. mitchellae* Noyes *et* Ren, 1995. Costa Rica.
27). *A. nitens* Kerrich, 1967. USA (Nebraska).
28) *A. parvus* (Kerrich, 1967). China (Hunan Province).
29) *A. paulistus* Compere, 1937. Costa Rica, Brazil. Parasitoid of various Pseudococcidae, for example *Pseudococcus calceolariae* Maskell, *P. maritimus* Ehrhorn and *P. sociabilis* Hambleton.
30) *A. pelops* Noyes *et* Ren, 1995. Costa Rica.
31) *A. pergandei* (Howard, 1895). USA (Massachusetts, D.C., South Dakota).
32) *A. phenacocci* (Ashmead, 1902), USA (Maryland, Montana, Idaho, Iowa, Utah, California, New Mexico, Florida). The species was reared from *Phenacoccus solani* Ferris and *P. solenopsis* Tinsley.
33) *A. philo* Noyes, 2000. Costa Rica.
34) *A. punctatus* Compere, 1937. Brazil, Uruguay. Reared from *Phenacoccus* sp.
35) *A. quezadai* Noyes, 2000. Costa Rica.
36) *A. regularis* Kerrich, 1967. El Salvador; Trinidad, *ex Ferrisia virgata* Cockerell on cacao.
37). *A. simlaensis* (Kaul *et* Agarwal, 1986). India.

38) *A. subbaraoi* (Kerrich, 1967). Hong Kong, *ex* Pseudococcidae; Indonesia (Java), *ex Planococcus lilacinus* Cockerell.
39) *A. tachigaliae* (Brues, 1922). Mexico (Veracruz), Costa Rica, Panama, Trinidad, Colombia, Guyana, Ecuador, Peru, Brazil, Bolivia. Parasitoid of *Dysmicoccus brevipes* Cockerell and *Cataenococcus* sp. (in Costa Rica).
40) *A. vexans* Kerrich, 1967. México (Nayarit), Costa Rica, Trinidad and Tobago, Colombia, Venezuela, Guyana, French Guiana, Ecuador, Peru, Brazil. The main host is *Phenacoccus herreni* Cox *et* Williams on cassava *Manihot esculenta.*
41) *A. zeuxis* Noyes, 2000. Costa Rica.

6. *Aethognathus* Silvestri, 1915

Type species: *Aethognathus afer* Silvestri, 1915, by original designation.

References: Silvestri, 1915: 352-355; Ghesquière, 1960: 45-52; Subba Rao, 1973: 443-444; Trjapitzin, 1984: 294-295.

Characters of antenna. Funicle of female 6-segmented, funicle of male 4-segmented.

Systematic position. The genus belongs to the subfamily Encyrtinae, tribe Aethognathini.

Hosts: Stictococcidae and Coccidae (Homoptera).

Described species:
1) *Aethognathus afer* Silvestri, 1915. Ghana and Benin; *ex Stictococcus diversiseta* Silvestri on custard-apple (*Annona*).
2) *A. bicolor* Subba Rao, 1973. Uganda, *ex Stictococcus multispinosus* Newstead on guava *Psidium guajava.*
3) *A. cavilabris* Waterston, 1917. Zaire, *ex Saissetia oleae* Olivier (Coccidae) and *Stictococcus* sp.; Nigeria; Ruanda; Uganda, *ex S. dimorphus* Newstead.
4) *A. kryzhanovskyi* Trjapitzin, 1984. Equatorial Guinea.

5) *A. unicolor* Subba Rao, 1973. Nigeria, *ex Stictococcus gowdeyi* Newstead on cacao; Uganda, *ex S. multispinosus* on guava.

7. *Americencyrtus* Sugonjaev, 1989

Type species: *Pseudorhopus hartmani* Timberlake, 1926, by original designation.

References: Timberlake, 1926: 11-12 (as *Pseudorhopus*); Sugonjaev, 1989: 100; Noyes & Woolley, 1994: 1329-1330 (as *Pseudorhopus)*; Noyes *et al.*, 1997: 179 (as *Pseudorhopus*).

Characters of antenna. Funicle of female and male 5-segmented.

Systematic position. The genus belongs to the subfamily Encyrtidae, where its placement is uncertain. According to Noyes & Woolley (1994) and Noyes *et al.* (1997) - a synonym of *Pseudorhopus* Timberlake, 1926.

Described species:

1) *Americencyrtus hartmani* (Timberlake, 1926). USA (Texas), *ex* "*Eulecanium* sp." (Homoptera: Coccidae).

8. *Ameromyzobia* Girault, 1916

Type species: *Ameromyzobia aphelinoides* Girault, 1916, by original designation.

References: Girault, 1916: 232; Trjapitzin, 1971a: 289-291; Noyes, 1980: 172; 1990: 158; Noyes *et al.*, 1997: 180, 251.

Characters of antenna. Funicle of female 5-segmented. Male unknown.

Systematic position. The genus belongs to the subfamiliy Encyrtidae, where its position is uncertain.

Described species:

1) *Ameromyzobia aphelinoides* Girault, 1916. St. Vincent; Trinidad, *ex Odonaspis* sp. (Homoptera: Diaspididae).
2) *A. bulyginskayae* Trjapitzin, 1971. Cuba. According to Noyes (1980) might be synonymous with *A. aphelinoides.*

9. *Anthemus* Howard, 1896

Type species: *Anthemus chionaspidis* Howard, 1896, by monotypy.

Synonym: *Hexalis* Bakkendorf, 1939. Type species: *Hexalis funicularis* Bakkendorf, 1939, by monotypy.

References: Howard, 1896: 649; Mercet, 1922b: 363-370; Bakkendorf, 1939: 84-86 (*Hexalis*), Ghesquière, 1950: 130-137; Nikolskaya, 1952: 338-339: 1963: 345; Erdős, 1964: 40-41; Ferrière, 1965: 123-126; Subba Rao, 1976: 685-687; Trjapitzin, 1978: 325; Sharipov, 1980: 381-384; Myartseva, 1984:186, 272-273; Noyes & Hayat, 1984: 233; Trjapitzin, 1987: 589-590; Mani, 1989: 1064-1067; Prinsloo & Neser, 1989: 51-72; Trjapitzin, 1989: 378-379; Noyes, 1990: 157.

Characters of antenna. Funicle of females 5-6-segmented, of males - 6-segmented.

Systematic position. The genus belongs to the subfamily Encyrtinae, tribe Anthemini.

Hosts: armoured scales (Homoptera: Diaspididae).

Described species:

1) *Anthemus affinis* Prinsloo *et* Neser, 1989. South Africa, *ex Diaspidiotus perniciosus* Comstock on pear; Namibia.
2) *A. africaspidis* Ghesquière, 1950. Zaire, *ex Africaspis chionaspiformis* Newstead on coffee.
3) *A. aiaisanus* Prinsloo *et* Neser, 1989. Namibia.
4) *A. aloinis* Prinsloo *et* Neser, 1989. South Africa, *ex Nelaspis exalbida* Cockerell on *Aloe* spp.
5) *A. aspidioti* Nikolskaya, 1952. Kazakhstan, Turkmenistan, Uzbekistan, Tadzhikistan. Reared from *Diaspidiotus slavonicus* Green, *D. transcaspiensis* Marlatt, *D. prunorum* Laing and *Parlatoria oleae* Colvée.
6) *A. borealis* Prinsloo *et* Neser, 1989. South Africa.
7) *A. chionaspidis* Howard, 1896. Sri Lanka, *ex Duplachionaspis graminis* Green.
8) *A. critinus* Prinsloo *et* Neser, 1989. Eritrea, *ex Duplachionaspis eritreana* Williams *on Aloe* sp.
9) *A. evallaspidis* Ferrière, 1965. Italia, Algeria, Tunisia. In Africa, the species was reared from *Evallaspis ampelodesmae* Newstead on the gramineous plant *Ampelodesmus tenax.*
10) *A. exertus* Prinsloo *et* Neser, 1989. South Africa.
11) *A. funicularis* (Bakkendort, 1939). Sweden, Hungary, Russia (Leningrad Province), Latvia. In Sweden and Russia, the species was reared from *Anamaspis loewi* Colvée on the pine *Pinus silvestris.*
12) *A. hilli* Dodd, 1917. Australia.
13) *A. inconspicuus* Doutt, 1966. Pakistan, ex *Parlatoria oleae* Colvée. Introduced into USA (California). Recorded by Jasnosh (1971) from Tadzhikistan (Pamirs) as parasitoid of *P. oleae.*
14) *A. ledaspidis* Prinsloo *et* Neser, 1989. South Africa, *ex Ledaspis distincta* Leonardi on *Protea caffra.*
15) *A. leucaspidis* Mercet, 1922 (Fig. 38). Hungary, Rumania, France (including Corsica), Italy, Spain. Parasitoid of *Leucaspis* spp. on pines *Pinus* spp.
16) *A. lobus* Prinsloo *et* Neser, 1989. South Africa.
17) *A. maculatus* Subba Rao, 1976. Pakistan, ex *Diaspidiotus prunorum* Laing.

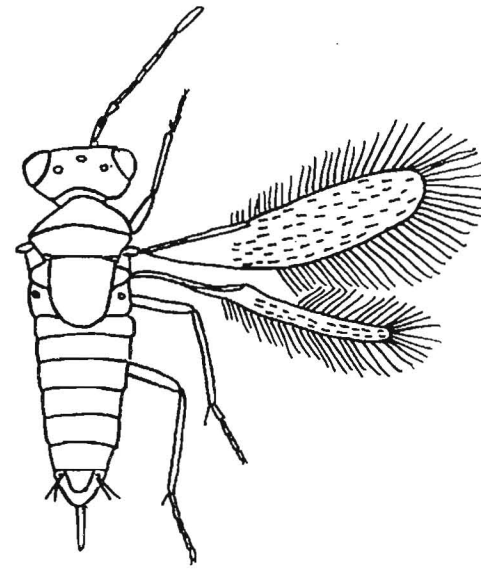


Fig. 38. *Anthemus leucaspidis* Mercet, 1922. Female, dorsal view. From Nikolskaya (1952), after Mercet (1922b).

18) *A. maurus* Prinsloo *et* Neser, 1989. South Africa, *ex Entaspidiotus lounsburyi* Marlatt on *Carpobrotus* sp., probably *edulis*.
19) *A. montanus* Prinsloo *et* Neser, 1989. South Africa, *ex* Diaspididae.
20) *A. pini* Ferrière, 1927. Switzerland, *ex Leucaspis pini* Hartig; Georgia, *ex L. pusilla* Loew.

10. *Aphycinus* Trjapitzin, 1962

Type species: *Aphycinus magdalinae* Trjapitzin, 1962, by original designation.

References: Trjapitzin, 1962: 278-280; 1989: 223.

Characters of antenna. Funicle in both sexes 5-segmented.

Systematic position. The genus belongs to the subfamily Encyrtinae, tribe Aphycini, subtribe Aphycina.

Described species:

1) *Aphycinus magdalinae* Trjapitzin, 1962. Armenia, *ex Phenacoccus affinis* Ter-Grigorian (Homoptera: Pseudococcidae) on wheat roots (*Triticum*).

11. *Aphycomastix* De Santis, 1972

Type species: *Aphycomastix annulata* De Santis, 1972, by original designation.

References: De Santis, 1972: 50-51; Noyes, 1980: 175.

Characters of antenna. Funicle of female 5-segmented, with the 1st segment anelliform. Male unknown.

Systematic position. The genus belongs to the subfamily Encyrtinae, possibly to the tribe Aphycini. Noyes (1980) suggests affinity to the genus *Cyderius* Noyes, 1980.

Described species:

1) *Aphycomastix annulata* De Santis, 1972. Brazil, Argentina, Uruguay.

12. *Aphyculus* Hoffer, 1954

Type species: *Aphyculus zavadili* Hoffer, 1954, by original designation.

References: Hoffer, 1954: 169; 1955a: 105-109; Erdős, 1964: 93-94; Myartseva & Trjapitzin, 1976: 34-38; Trjapitzin, 1978: 295; Myartseva, 1983b: 33-39; 1984: 138-139, 226; Trjapitzin, 1987: 532; 1989: 221-222; Sharkov & Trjapitzin, 1995: 225.

Characters of antenna. Funicle in both sexes 5-segmented.

Systematic position. The genus belongs to the subfamily Encyrtinae, tribe Aphycini, subtribe Aphycina.

Hosts: mealybugs (Homoptera: Pseudococcidae).

Described species:

1) *Aphyculus antoninae* Pilipjuk *et* Trjapitzin, 1974. Russia (Kunashir), *ex Antonina crawii* Cockerell on bamboo *Sasa* sp.
2) *A. astanovi* Myartseva, 1983. Turkmenistan, *ex Spilococcus flavus* Borchsenius on *Phragmites australis* and *Erianthus ravennae*.
3) *A. perparvus* Hoffer, 1954 (Fig. 10). Austria, Czechia, Slovakia, Hungary.
4) *A. sasae* Sharkov, 1995. Russia (Sakhalin), *ex Dysmicoccus kaiensis* Kanda on bamboo *Sasa* sp.
5) *A. tamaricicola* Myartseva *et* Trjapitzin, 1976. Turkmenistan, *ex Naiacoccus serpentinus* Green and *Trabutina crassispinosa* Borchsenius on *Tamarix*.
6) *A. trabutinae* Myartseva, 1983. Turkmenistan, *ex Trabutina crassispinosa* Borchsenius and *T. mannipara* Hemprich *et* Ehrenberg on *Tamarix*; Uzbekistan (Karakalpakia), *ex T. crassispinosa*.
7) *A. zavadili* Hoffer, 1954. Finland, Austria, Czechia, Slovakia, Hungary, Bulgaria, Moldavia.

13. *Archinus* Howard, 1897

Type species: *Archinus occupatus* Howard, 1897, by monotypy.

References: Howard, 1897: 154-155; Noyes, 1979: 148-150; 1980: 176; Noyes *et al.*, 1997: 180.

Characters of antenna. Funicle of both sexes 5-segmented.

Systematic position. According to Noyes (1979), the genus belongs to the subtribe Paraphycina, tribe Aphycini, subfamily Encyrtinae.

Described species:
1) *Archinus occupatus* Howard, 1897. Grenada, Trinidad.

14. *Arhopoidiella* Noyes, 1980

Type species: *Arhopoidiella carinata* Noyes, 1980, by original designation.

References: Noyes, 1980: 177-178; Noyes *et al.*, 1997: 181.

Characters of antenna. Funicle of both sexes 5-segmented.

Systematic position. The genus belongs to the subfamily Encyrtinae where its position is uncertain.

Described species:
1) *Arhopoidiella carinata* Noyes, 1980. Trinidad, Brazil.

15. *Arrhenophagoidea* Girault, 1915

Type species: *Arrhenophagoidea coloripes* Girault, 1915, by original designation.

References: Girault, 1915a: 73; Annecke & Prinsloo, 1974: 40-46; Prinsloo, 1974: 257-260; Noyes, 1980: 178; Noyes & Hayat, 1984: 235; Noyes, 1988: 56-57; 1990: 157; Dahms & Gordh, 1997: 59-60; Noyes *et al.*, 1997: 176.

Characters of antenna. Funicle of female with 3-6 transverse segments, of male -6 segmented.

Systematic position. The genus belongs to the subfamily Encyrtinae, tribe Arrhenophagini.

Hosts: armoured scales (Homoptera: Diaspididae).

Described species:

1) *Arrhenophagoidea coloripes* Girault, 1915. USA (Florida), Australia, New Zealand, *ex* Diaspididae.
2) *A. neseri* Prinsloo, 1974. South Africa.
3) *A. rolaspidis* Annecke *et* Prinsloo, 1974. South Africa, *ex Rolaspis* spp.
4) *A. sierra* Annecke *et* Prinsloo, 1974. South Africa, *ex Versiculaspis* sp.

16. *Arrhenophagus* Aurivillius, 1888

Type species: *Arrhenophagus chionaspidis* Aurivillius, 1888, by monotypy.

Synonym: *Mymariella* Risbec, 1951. Type species: *Mymariella parlatoriae* Risbec, 1951, by monotypy.

References: Aurivillius, 1888: 144-146; Mercet, 1921: 51-54 (*Arrenophagus* !); Risbec, 1951: 402-403 (*Mymariella*); Nikolskaya, 1952: 337-338 (*Arrenophagus* !); 1963: 344-345 (*Arrenophagus* !); Tachikawa, 1963: 240-243; De Santis, 1964: 36-41; Erdős, 1964: 39-40; Hoffer, 1964: 118-122; Annecke & Prinsloo, 1974: 35-40; Noyes, 1980: 178-179; Noyes & Hayat, 1984: 235; Noyes, 1988: 57-58; Mani, 1989: 1059-1064; Trjapitzin, 1989: 377-378; Noyes, 1990: 157; Noyes *et al.*, 1997: 175, 248; Trjapitzin & Ruíz Cancino, 2000a:73-78.

Characters of antenna. Funicle of females with 2-4 ring segments, males with 4 funicular segments.

Systematic position. The genus belongs to the subfamily Encyrtinae, tribu Arrhenophagini.

Hosts: armoured scales (Homoptera: Diaspididae).

Described species:

1) *Arrhenophagus albitibiae* Girault, 1915. Russia (Primorye Territory), *ex Phenacaspis cockerelli* Cooley; Japan, *ex Aulacaspis yabunikkei* Kuwana, *Fiorinia externa* Ferris and *Nuculaspis tsugae* Marlatt; China, *ex Canceraspis brasiliensis* Hempel; Hong Kong, *ex Chionaspis eugeniae* Maskell; Sri Lanka, *ex Fiorinia saprosmae* Green; USA (Florida), *ex Pseudaulacaspis pentagona* Targioni Tozzetti; Hawaii, *ex P. cockerelli* (an accidental immigrant); Samoa, *ex Pseudaulacaspis pentagona.*
2) *A. chionaspidis* Aurivillius, 1888. England, Sweden, Poland, Czechia, Switzerland, Hungary, France, Spain (Balearic Islands), Russia (Leningrad Province, Black Sea Coast of Krasnodar Territory, Kabardino-Balkaria), Georgia, China (Guandong Province), India, Sri Lanka, New Zealand, USA (New York, Pennsylvania, Ohio, Illinois, Montana), Mexico (Tamaulipas), Jamaica, Puerto Rico, Tortola, Barbados, Guyana, Peru, Brazil, Argentina, Bermuda, Madeira, Canary Islands, Cabo Verde, Senegal, Uganda, Réunion, Madagascar. Usual hosts: *Aulacaspis rosae* Bouché and *Chionaspis salicis* Linnaeus, this parasitoid attacks also *Pseudaulacaspis pentagona* Targioni Tozzetti, *Unaspis citri* Comstock, *Pinnaspis strachani* Cooley, *Diaspidiotus perniciosus* Comstock and other Diaspididae.

17. *Beethovena* Girault, 1932

Type species: *Beethovena longifasciata* Girault, 1932, by monotypy.

References: Girault, 1932: 2-3; Noyes & Hayat, 1984:244; Dahms & Gordh, 1997: 85-87.

Characters of antenna. Funicle of female 5-segmented. Male exists in the collection of the Queenland Museum (Brisbane), but was not redescribed by Dahms & Gordh (1997).

Systematic position: the genus belongs to the subfamily Encyrtinae, tribe Aphycini, subtribe Paraphycina.

Described species:

1) *Beethovena longifasciata* Girault, 1932. Australia, *ex Eriococcus* sp. (Hom.: Eriococcidae) on *Eucalyptus* sp.

18. *Blanchardiscus* De Santis, 1964

Type species: *Blanchardiscus scutellaris* De Santis, 1964, by original designation.

References: De Santis, 1964: 268-270; Noyes, 1980: 182.

Characters of antenna. Funicle of both sexes 5-segmented; clava of male 3-segmented as in female.

Systematic position. The genus belongs to the subfamily Encyrtinae, tribe Blanchardiscini.

Described species:

1) *Blanchardiscus scutellaris* De Santis, 1964 (Fig. 30). Brazil, Argentina.

19. *Blastothrix* Mayr, 1876

Type species: *Encyrtus sericeus* Dalman, 1820, by subsequent designation (Ashmead, 1900: 389).

References: Mayr, 1876: 687, 688. 697-699; Mercet, 1921: 242-251; Sugonjaev, 1964: 368-390 (only subgenus *Blastothrix*); 1965: 395-410 (only subgenus *Blastothrix)*; Graham, 1969: 242-243; Sugonjaev, 1983: 601-608; Myartseva, 1984: 134-135,

222-224; Noyes & Hayat, 1984: 242; Sugonjaev, 1984: 211-213; Herthevtzian, 1986: 49-51; Trjapitzin, 1989: 223-230; Fatima & Shafee, 1993: 57, 59; Sharkov & Trjapitzin, 1995: 225-227; Shi *et al.*, 1995: 363-366; Noyes *et al.*, 1997: 203, 223, 237, 269, 271; Voinovich & Sugonjaev, 1999: 545-554.

Characters of antenna. All 27 species of *Blastothrix* described in the world fauna, have 6 segmented funicle of females (Fig. 39) and males, and only one female specimen of *B. britannica* (Imms, 1918), discovered by Sugonjaev (1960) in the Leningrad Province of Russia has-5 segmented funicle (Fig. 26). It was described as *B. anomala* Sugonjaev, 1960. The comparison of this specimen with big materials of *B. britannica* had shown that in *B. anomala* the 2nd funicle segment is enlarged, as if being fused from two segments (Fig. 26). Later Sugonjaev (1965) suggested that *B. anomala* might be, probably a spring seasonal form of *B. britannica* or a variety which arose as result of superinfestation of the host *Eulecanium tiliae* Linnaeus (Homoptera: Coccidae). The first suggestion is incredible, but the second one is quite possible. Finally, Sugonjaev & Babaev (1978) formally sinonimized *B. anomala* Sugonjaev, 1960 with *B. britannica* Girault, 1920 (correctly, *B. britannica* Imms, 1918). In our opinion, this case is misshapenness of antenna of *B. britannica*.

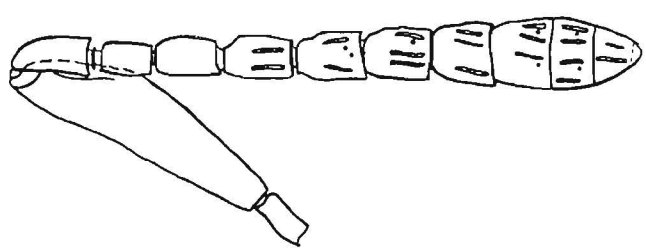


Fig. 39. *Blastothrix britannica* Imms, 1918. Female, normal antenna. From Sugonjaev (1964).

Systematic position. The genus belongs to subfamily Encyrtidae, tribe Aphycini, subtribe Blastothrichina.

Hosts: Coccidae and Kermesidae.

Described species - 27. We give here data only on one species where a specimen with 5 segmented antennal funicle of female was found:

1) *Blastothrix britannica* Imms, 1918. England, Sweden, Denmark, Germany, Poland, Czechoslovakia (former), Hungary, Spain, Italy, Greece, Russia (Karelia, Kaliningrad, Leningrad, Moscow, Kaluga, Irkutsk Provinces, Yakutia, Primorye Territory, Sakhalin), Estonia, Bielorussia, Moldavia, Armenia, Kazakhstan, Mongolia, Canada (introduced), USA (introduced). Parasitoid of *Eulecanium douglasi* Šulc, *E. tiliae* Linnaeus and *E. ciliatum* Douglas.

20. *Blepyrus* Howard, 1898

Type species: *Blepyrus mexicanus* Howard, 1898 = *B. insularis* (Cameron. 1886), by subsequent designation (Ashmead, 1900: 233).

Synonyms: *Euryrhopalus* Howard, 1898. Type species: *Euryrhopalus schwarzi* Howard, 1898, by monotypy.

Coccophoctonus Ashmead, 1900. Type species: *Coccophoctonus dactylopii* Ashmead, 1900, by original designation.

Synaspidia Timberlake, 1924. Type species: *Synaspidia pretiosa* Timberlake, 1924, by original designation.

References: Howard, 1898: 233-235; 237 (*Euryrhopalus*); Ashmead, 1900: 375-376 (*Coccophoctonus*); Timberlake, 1922b: 168-170; 1924: 397-402 (*Synaspidia*); Peck, 1963: 376-377; 379 (*Euryrhopalus*); De Santis, 1964: 260-261 (*Euryrhopalus*); Kerrich, 1967: 225-228; 235-246 (*Euryrhopalus*); Noyes, 1979; 157; 1980: 182; 196 (*Euryrhopalus*); Noyes & Hayat, 1984: 242; 277 (*Euryrhopalus*); Kaul & Agarwal, 1985: 48-52; Noyes & Woolley, 1994: 1328; Noyes *et al.*, 1997: 239, 249, 256; Noyes, 2000: 192-209.

Characters of antenna. Funicle of female 6-segmented, that of male - 3-5 segmented (segments more or less anelliform).

Systematic position. The genus belongs to the subfamily Tetracneminae, tribe Aenasiini, subtribe Aenasiina.

Hosts: mealybugs (Homoptera: Pseudococcidae).

Described species:

1) *Blepyrus carolinensis* (Kerrich, 1967). USA (North Carolina).
2) *B. clavicornis* (Compere, 1939). Costa Rica, Trinidad; Brazil, *ex Pseudococcus* sp.
3) *B. decimus* (Kerrich, 1982). Mexico (Morelos), *ex Pseudococcus* sp.
4) *B. deiopea* Noyes, 2000. Costa Rica.
5) *B. fabius* Noyes, 2000. Costa Rica.
6) *B. hansoni* Noyes, 2000. México (San Luis Potosí, ex Pseudococcidae on *Larrea tridentata*); Costa Rica.
7) *B. insularis* (Cameron, 1886). Egypt; Cabo Verde, *ex Phenacoccus madeirensis* Green on cotton;Sudan;Nigeria; South Africa; Madagascar; India, Sri Lanka, China, Malaysia, Thailand, Philippines, Indonesia (Java), Papua New Guinea, Mariana Islands, New Caledonia, Hawaii, USA (Texas), México (Baja California, Sonora, Nuevo León), Bahamas, Trinidad, Guyana. Usual host - *Ferrisia virgata* Cockerell. In Guyana, the species was reported as *Phenacoccus herreni* Cox *et* Williams parasitoid; in Bolivia - *ex P. manihoti* Matile-Ferrero.
8) *B. integer* Noyes, 2000. Costa Rica.
9) *B. larymna* Noyes, 2000. Costa Rica.
10) *B. lunae* Noyes, 2000. Costa Rica.
11) *B. pretiosus* (Timberlake, 1924). USA (Florida), México (Veracruz), Guatemala, Argentina. A *Dysmicoccus brevipes* Cockerell parasitoid.
12) *B. pulchrior* (Kerrich, 1967). Jamaica.
13) *B. rhopoideus* (Kerrich, 1967), USA (Texas).

14) *B. saccharicola* Gahan, 1942. USA (Louisiana, Florida - *ex Pseudococcus* sp. on sugarcane; California, *ex Phenacoccus solani* Ferris).
15) *B. sappho* Noyes, 2000. Costa Rica.
16) *B. schwarzi* (Howard, 1898). USA (Florida, Texas); Costa Rica; Trinidad; Guyana; Bolivia; Hawaii (introduced). Parasitoid of *Dysmicoccus brevipes* Cockerell.
17) *B. tenuiscapus* (Kerrich, 1967). USA (California), *ex Phenacoccus* sp.
18) *B. zenonis* Noyes, 2000. Costa Rica.

21. *Bothriocraera* Timberlake, 1916

Type species: *Bothriocraera flavipes* Timberlake, 1916, by original designation.

References: Timberlake, 1916: 567-569; Compere & Zinna, 1955: 101-105; Compere & Annecke, 1960: 378-379; Noyes, 1980: 182; Noyes *et al.*, 1997: 181, 250.

Characters of antenna. Funicle of both sexes 5 segmented.

Systematic position. The genus belongs to the subfamily Encyrtinae, tribe Aphycini, subtribe Aphycina.

Hosts: mealybugs (Homoptera: Pseudococcidae).

Described species:
1) *Bothriocraera bicolor* Compere *et* Zinna, 1955. Trinidad, *ex Ferrisia virgata* Cockerell.
2) *B. flavipes* Timberlake, 1916. USA (Utah), *ex* Pseudococcidae on *Elymus* sp.

22. *Brachyplatycerus* De Santis, 1972

Type species: *Brachyplatycerus minutus* De Santis, 1972, by original designation.

References: De Santis, 1972: 49-50; Noyes, 1980: 183; Noyes & Hayat, 1984: 243; Noyes *et al.*, 1997: 176.

Characters of antenna. Funicle of female 4-segmented, that of male 5-segmented.

Systematic position. Uncertain in the subfamily Encyrtinae.

Described species:
1) *Brachyplatycerus minutus* De Santis, 1972. Brazil, Argentina.

23. *Caenohomalopoda* Tachikawa, 1979

Type species: *Pseudhomalopoda shikokuensis* Tachikawa, 1956, by original designation.

References: Tachikawa, 1956: 90-93, 96 (as *Pseudhomalopoda*); 1963: 101-102 (as *Pseudhomalopoda*); 1966: 654-655 (as *Pseudhomalopoda*); 1978: 65-67 (as *Pseudhomalopoda*); 1979: 163-170; Tachikawa *et al.*, 1981: 183-186; Noyes & Hayat, 1984: 243-244; Trjapitzin, 1989: 295; Noyes, 1990: 154; Trjapitzin & Sharkov, 1992: 174-178; Noyes *et al.*, 1997: 177.

Characters of antenna. Funicle of female 4-segmented (Fig. 20), that of male consisting of 2 very long segments.

Systematic position. The genus belongs to the subfamily Encyrtinae, tribe Habrolepidini, subtribe Habrolepidina.

Hosts: armoured scales (Homoptera: Diaspididae) on bamboos.

Described species:

1) *Caenohomalopoda darevskyi* Trjapitzin *et* Sharkov, 1992. Vietnam.
2) *C. guamensis* (Fullaway, 1946). Mariana Islands (Guam); Hawaii (adventive). In Hawaii, the species was reared from *Odonaspis greeni* Cockerell.
3) *C. koreana* Tachikawa, Paik *et* Paik, 1981. South Korea, *ex Odonaspis secreta* Cockerell.
4) *C. nagaii* (Tachikawa, 1978). Indonesia (Sumatra).
5) *C. shikokuensis* (Tachikawa, 1956). Japan, South Korea, South Africa, USA (Florida), West Indies (Cayman Islands, Puerto Rico). In Japan, South Africa and Florida, the species was reared from *Frogatiella penicillata* Green, in South Korea - from *Odonaspis secreta*.

24. *Cercobelus* Haliday, 1842

Type species: *Encyrtus jugaeus* Walker, 1837, by monotypy.

References: Haliday, 1841-1842: VI; Thomson, 1876: 170-171; Kryger, 1951: 99-103; Erdős, 1964: 319-320; Graham, 1969: 292; Trjapitzin, 1978: 301; Noyes & Hayat, 1984: 247-248; Herthevtzian, 1986: 65-66; Trjapitzin, 1987: 577; 1989: 265-266; Noyes & Hanson, 1996: 107-118; Noyes *et al.*, 1997: 176, 250.

Characters of antenna. Funicle of both sexes 4-segmented (Fig. 40).

Systematic position. The genus belongs to the subfamily Encyrtinae, tribe Cercobelini.

Hosts: Psylloidea (Homoptera).

Described species:

1) *Cercobelus daphne* Noyes *et* Hanson, 1996. Costa Rica.
2) *C. godoyae* Noyes *et* Hanson, 1996. Costa Rica, *ex Katacephala* sp. on *Eugenia carthagensis*.
3) *C. isara* Noyes *et* Hanson, 1996. Costa Rica.
4) *C. jugaeus* (Walker, 1837) (Fig. 40). Northern Irland, Scotland, England, Denmark, Sweden, Finland, Czechia, Hungary, France, Montenegro, Russia (Stavropolye and Khabarovsk Territories), Lithuania, Moldavia, Armenia. Parasitoid of Psylloidea of the genus *Psyllopsis* on *Fraxinus* spp.
5) *C. sithon* Noyes *et* Hanson, 1996. Costa Rica.
6) *C. ulixes* Noyes *et* Hanson, 1996. Costa Rica.

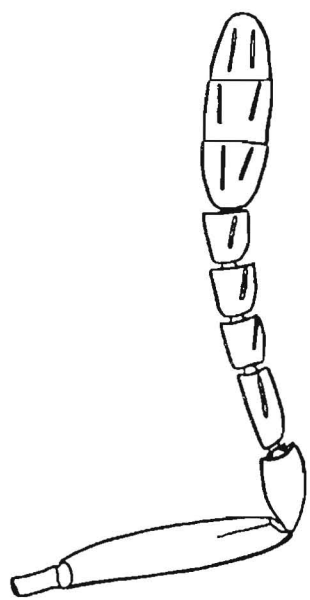


Fig. 40. *Cercobelus jugaeus* (Walker, 1837). Female, antenna. From Trjapitzin (1989).

25. *Coccidaphycus* Ev. Blanchard, 1940

Type species: *Coccidaphycus nigricans* Ev. Blanchard, 1940, by original designation.

References: Blanchard, 1940: 110-112; De Santis, 1964: 243-246; Noyes, 1980: 187-188; Noyes & Hayat, 1984: 253.

Characters of antenna. Funicle of both sexes 5-segmented.

Systematic position. Noyes (1980) placed this genus in subfamily Encyrtinae, tribe Trechnitini, subtribe Trechnitina, what might be doubtful.

Described species:

1) *Coccidaphycus nigricans* Ev. Blanchard, 1940. Argentina. The species was recorded as reared from coccids *Neocoelostoma xerophila* Hempel (Homoptera: Margarodidae), *Tachardiella argentina* Domínguez (Homoptera: Kerriidae) and *Mesolecanium deltae* Lizer *et* Trelles (Homoptera: Coccidae).

26. *Coccidencyrtus* Ashmead, 1900

Type species: *Encyrtus ensifer* Howard, 1885, by original designation.

Synonyms: *Encyrtomyia* Girault, 1915. Type species: *Encyrtomyia albiflagellum* Girault, 1915, by original designation.

Omphalencyrtus Girault, 1915. Type species: *Omphalencyrtus wallacei* Girault, 1915, by original designation.

Coccidencyrtoides Ev. Blanchard, 1940. Type species: *Coccidencyrtoides maculicornis* Ev. Blanchard, 1940, by monotypy.

Neoadelencyrtus Hayat, Alam *et* Agarwal, 1975. Type species: *Neoadelencyrtus mandibularis* Hayat, Alam *et* Agarwal, 1975, by original designation.

References: Ashmead, 1900: 383; Girault, 1915a: 131-133 (*Encyrtomyia*), 169 (*Omphalencyrtus*); Compere, 1928: 212; Blanchard, 1940: 107 (*Coccidencyrtoides*); Compere *et* Annecke, 1961: 49, 53-65; Peck, 1963: 396-397; De Santis, 1964: 218-231; Agarwal, 1965: 75-77; Hayat *et al.*, 1975: 72-76 (*Neoadelencyrtus*); Myartseva, 1978: 1735-1740; Noyes, 1980: 188; Myartseva, 1981: 72-73; 1984: 162, 250; Noyes & Hayat, 1984: 253-254; Noyes & Ren, 1987: 167-170; Trjapitzin, 1989: 297-298; Noyes, 1990: 1550; Fatima & Shafee, 1993: 55-56; Sharkov & Trjapitzin, 1995: 239-240; Dahms & Gordh, 1997: 122-125; Noyes *et al.*, 1997: 187, 213, 224, 242, 246, 268.

Characters of antenna. The poorly studied genus *Coccidencyrtus* is not included in the key because its Australian species are not known to the authors. Some of them have antennal funicle 4-segmented with traces of fusion of the first three segments. This fact was commented by Noyes & Hayat (1984). According to them, *Coccidencyrtus* is characterized by 6-segmented antennal funicle. *C. albiflagellum* (Girault) has the 1st funicular segment with two partial sutures so that in slide mounted material it could be taken as 1-segmented (this results in a 4-segmented funicle) and in dry mounted material it apears to be 3-segmented (this results in a 6-segmented funicle). *C. secundus* (Girault) also shows this situation, whilst in *C. australis* (Girault) funicle is definitely 4-segmented. Several other specimens of *Coccidencyrtus* were examined by Noyes & Hayat (*op. cit.*) with partial segmentation of the 1st funicle segment. These authors conclude that the occurence of an apparent partial fusion of the first three funicular segments in some specimens or species, is therefore not uncommon in the genus *Coccidencyrtus*. They note that the 1st funicle segment of both *C. australis* (Girault) and *C. wallacei* (Girault) is longer than those following and is about as long as that it might be expected if the first three segments become fused. All these species belong to the Australian fauna.

Systematic position. The genus belongs to subfamily Encyrtinae, tribe Habrolepidini.

Hosts: armoured scales (Homoptera: Diaspididae).

Described species:

1) *Coccidencyrtus albiflagellum* (Girault, 1915). Australia.
2) *C. albitarsus* (Girault, 1915). Australia.
3) *C. annulipes* De Santis, 1964. Argentina.
4) *C. artemisiae* Myartseva, 1981. Turkmenistan, *ex Diaspididae* on *Artemisia* sp.
5) *C. auricornis* (Girault, 1924). Australia.
6) *C. australis* (Girault, 1915). Australia.
7) *C. bicolor* (Girault, 1915). Australia.
8) *C. blanchardi* (De Santis, 1956). Argentina, *ex Paradiaspis lizeriana* Lahille.
9) *C. denieri* De Santis, 1964. Argentina.
10) *C. dupeachionaspidis* Myartseva, 1978. Turkmenistan, *ex Duplachionaspis noaeae* Hall on *Noaea mucronata.*
11) *C. dynaspidioti* Battaglia, 1988. Italy, *ex Dynaspidiotus britannicus* Newstead.
12) *C. ensifer* (Howard. 1885). USA (Maine; Massachusetts, *ex Targionia dearnessi* Cockerell; Michigan, *ex Diaspidiotus juglansregiae* Comstock and *D. perniciosus* Comstock; Florida, *ex* Diaspididae).
13) *C. exiguus* Noyes & Ren, 1987. China (Guandong Province), *ex Insulaspis* sp. on *Michelia longifolia* and *ex Parainsulaspis laterochitinosa* Green.
14) *C. grioti* De Santis, 1964. Argentina.
15) *C. infuscatus* Compere *et* Annecke, 1961. USA (California), *ex Diaspidiotus juglansregiae* Comstock.
16) *C. lepidosaphidis* Sharkov, 1995. Russia (Primorye Territory), *ex Lepidosaphes salicina* Borchsenius and *L. ussuriensis* Borchsenius.
17) *C. maculicornis* (Ev. Blanchard, 1940). Argentina.
18) *C. malloi* De Santis, 1964. Argentina, *ex Diaspis boisduvalii* Signoret on Orchidaceae.
19) *C. mandibularis* (Hayat, Alam *et* Agarwal, 1975). India, *ex Phenacaspis* sp. on mango and *ex Pinnaspis strachani* Cooley.
20) *C. maritimus* Sharkov, 1995. Russia (Primorye Territory).
21) *C. obesus* De Santis, 1964. Argentina.

22) *C. ochraceipes* Gahan, 1927. USA (New York, *ex Diaspis boisduvalii* Signoret in greenhouse; California, from the same host); Brazil, *ex D. boisduvalii*; Bermuda, *ex D. boisduvalii* (adventive); Hawaii, *ex D. boisduvalii* (adventive); South Africa, *ex D. bromeliae* Kerner.
23) *C. punctatus* Compere *et* Annecke, 1961. South Africa.
24) *C. schizotargioniae* Myartseva, 1978. Turkmenistan, *ex Schizotargionia arthrophyti* Archangelskaya on *Haloxylon persicum*.
25) *C. secundus* (Girault, 1915). Australia.
26) *C. steinbergi* Tshumakova *et* Trjapitzin, 1964. Russia (Primorye Territory) and North Korea. Parasitoid of *Diaspidiotus perniciosus* Comstock.
27) *C. wallacei* (Girault, 1915). Australia.

27. *Copidosomopsis* Girault, 1915

Type species: *Copidosomopsis perminutus* Girault, 1915, by monotypy.

Synonyms: *Pseudolitomastix* Eady, 1960 non Risbec, 1954, type species: *Pseudolitomastix nacoleiae* Eady, 1960, by monotypy.

Pentalitomastix Eady, 1960 (replacement name *pro Pseudolitomastix* Eady, 1960), by original designation.

References: Girault, 1915a: 94; Eady, 1960a: 667-668 (*Pseudolitomastix* Eady); 1960b: 173 (*Pentalitomastix*); Hoffer, 1960: 105-108 (*Pentalitomastix*); Caltagirone, 1966: 145-151 (*Pentalitomastix*); Trjapitzin, 1967: 207-208 (*Pentalitomastix*); 1978: 320 (*Pentalitomastix*); Noyes, 1980: 222 (*Pentalitomastix*); Noyes & Hayat, 1984: 258-259; Caltagirone, 1985: 705-708; Trjapitzin, 1987: 580 (*Pentalitomastix*); Trjapitzin *et al.*, 1987: 172-176; Mani, 1989: 880-881 (*Pentalitomastix*); Trjapitzin, 1989: 353-354; Fatima & Shafee, 1993: 63-64; Dahms & Gordh, 1997: 143-145; Noyes *et al.*, 1997: 182, 257; Kazmi & Hayat, 1998: 326-331.

Characters of antenna. Funicle of female 5-segmented, that of male - 6-segmented.

Systematic position. The genus belongs to the subfamily Encyrtinae, tribe Copidosomatini, subtribe Copidosomatina.

Hosts. Lepidoptera larvae.

Described species:

1) *Copidosomopsis arenicola* (Trjapitzin, 1967). Russia (Primorye Territory), India.
2) *C. bohemica* (Hoffer, 1960). Czechia.
3) *C. coni* Trjapitzin, Voinovich *et* Sharkov, 1987. Vietnam, ex *Cnaphalocrocis medinalis* Guenée (Pyralidae) on rice.
4) *C. indica* Kazmi *et* Hayat, 1998. India.
5) *C. meridionalis* Kazmi *et* Hayat, 1998. India.
6) *C. nacoleiae* (Eady, 1960). India, *ex Parotis vertumnalis* Guenée (Pyraustidae); Singapore, Malaysia, Indonesia; Papua New Guinea, *ex* banana scab moth *Lamprosema octasema* Meyrick (Pyralidae).
7) *C. nepalensis* Kazmi, 1997. Nepal.
8) *C. perminuta* Girault, 1915. Australia, *ex* Pyralidae larvae.
9) *C. plethorica* (Caltagirone, 1966). USA (California), introduced from Mexico and Texas to control *Paramyelois transitella* Walker (Phycitidae), a pest of *Amygdalus;* México (Nuevo León, *ex Cydia caryana* Fitch (Tortricidae) on peach; Tamaulipas, *ex P. transitella* larvae in *Pithecellobium flexicaule* pods; San Luis Potosí, *ex P. transitella* in *Tamarindus indica* ripe fruits); Oaxaca, ex *P. transitella* in *Sapindus saponaria* ripe fruits); Israel [introduced to control *Ectomyelois ceratoniae* Zeller (Phycitidae)].
10) *C. tanytmemus* Caltagirone, 1985. USA (California), *ex Anagasta kuehniella* Zeller (Phycitidae).

28. *Epitetracnemus* Girault, 1915

Type species: *Epitetracnemus sexguttatipennis* Girault, 1915, by original designation.

Synonym: *Anabrolepis* Timberlake, 1920. Type species: *Anabrolepis extranea* Timberlake, 1920 = *E. intersectus* (Fonscolombe, 1832), by original designation.

References: Girault, 1915a: 164-165; Timberlake, 1920: 431-434 (*Anabrolepis*), Mercet, 1921: 678-682 (only as *Habrolepis zetterstedti*); Tachikawa, 1955: 9-14 (*Anabrolepis*); 1956: 94 (*Anabrolepis*); 1963: 161-168 (*Anabrolepis*); Erdős, 1964: 317-318 (only as *A. zetterstedti)*; Beardsley, 1976: 197-198 (*Anabrolepis*); Trjapitzin, 1978: 307 (*Anabrolepis*); Noyes, 1980: 172 (*Anabrolepis*); Noyes & Hayat, 1984: 273; Noyes & Ren, 1987: 172-173; Trjapitzin, 1987: 554-555 (*Anabrolepis*); Noyes, 1988: 76-78; Mani, 1989: 1056-1058; Trjapitzin, 1989: 292-294; Noyes, 1990: 153-154; Dahms & Gordh, 1997: 173-175; Noyes et al., 1997: 200, 231, 246, 249.

Characters of antenna. Funicle of female 6-segmented, male funicle consisting only of 2 ring segments (clava very long).

Systematic position. The genus belongs to the subfamily Encyrtinae, tribe Habrolepidini, subtribe Habrolepidina.

Hosts: armoured scales (Homoptera: Diaspididae).

Described species:

1) *Epitetracnemus comis* Noyes *et* Ren, 1987. China (Guangong Province), *ex Pseudaulacaspis pentagona* Targioni Tozzetti.
2) *E. intersectus* (Fonscolombe, 1832) (forewing , Fig. 41). England, the Netherlands, Denmark, Sweden, Finland, Poland, Germany, Czechia, Slovakia, Hungary, France, Italy, Spain, Croatia, Russia (Leningrad, Moscow and Kaluga Provinces, Stavropolye and Krasnodar Territories, Kabardino-Balkaria, Chechenia, Daghestan, Primorye Territory, Sakhalin), Bielorussia, Moldavia, Ukraine, Georgia, Armenia, Azerbaijan,

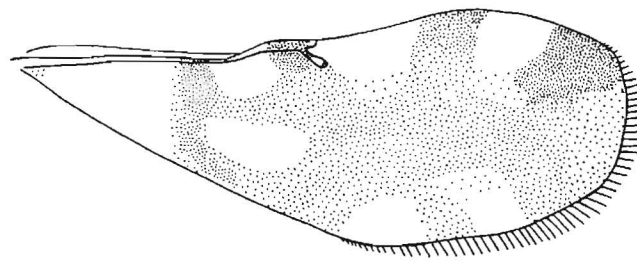


Fig. 41. *Epitetracnemus intersectus* (Fonscolombe, 1832). Female, forewing. From Trjapitzin (1971b).

China, Japan, Canary Islands (Tenerife), Tunisia, Canada, USA (Maine, New York, Michigan, Ohio, Wisconsin), Hawaii (immigrant), New Zealand (probably immigrant). Parasitoid of *Lepidosaphes ulmi* Linnaeus, *Diaspidiotus ostreaeformis* Curtis, *D. perniciosus* Comstock, *D. prunorum* Laing and *D. pyri* Lichtenstein.

3) *E. japonicus* (Ishii, 1923). Japan, *ex Odonaspis bambusarum* Cockerell.
4) *E. lindingaspidis* (Tachikawa, 1963). Japan, *ex Lindingaspis setiger* Maskell, *Pseudaulacaspis pentagona* Targioni Tozzetti and *Pseudaonidia duplex* Cockerell.
5) *E. sexguttatipennis* Girault, 1915. Australia.

29. *Epitetralophidea* Girault, 1915

Type species: *Epitetralophidea bicinctipes* Girault, 1915, by original designation.

Synonym: *Ectromomyiella* Girault, 1915. Type species: *Ectromomyiella articulus* Girault, 1915, by original designation.

References: Girault, 1915a: 176-177; 160-161 (*Ectromomyiella*); Noyes & Hayat, 1984: 273-274; Dahms & Gordh, 1997: 175-180.

Characters of antenna. Funicle of female is 6-segmented, male 2-segmented.

Systematic position. The genus belongs to the subfamily Encyrtinae, tribe Habrolepidini.

Described species:
1) *Epitetralophidea articulus* (Girault, 1915). Australia.
2) *E. bicinctipes* Girault, 1915. Australia.
3) *E. magnithorax* (Girault, 1923). Australia.

30. *Erencyrtus* Mahdihassan, 1923

Type species: *Erencyrtus dewitzi* Mahdihassan, 1923, by monotypy.

References: Mahdihassan, 1923: 70-71; Ferrière, 1935: 396-398; Mahdihassan, 1956: 288-293; Annecke & Mynhardt, 1970b: 105-110; Prinsloo & Mynhardt, 1982: 38-41; Noyes & Hayat, 1984: 274; Mani, 1989: 999-1000; Fatima & Shafee, 1993: 97; Dahms & Gordh, 1997: 180.

Characters of antenna. Funicle of female 6-segmented, that of male consisting of 2 ring segments; male clava very long.

Systematic position. The genus belongs to the subfamily Encyrtinae, tribe Microteryini, subtribe Microteryina.

Hosts: lac-insects (Homoptera: Kerriidae).

Described species:

1) *Erencyrtus ater* Annecke *et* Mynhardt, 1970. South Africa, *ex Tachardina* sp.
2) *E. contrarius* Prinsloo *et* Mynhardt, 1982. South Africa, *ex Tachardina* sp. on *Lycium* sp.
3) *E. dewitzi* Mahdihassan, 1923. India, Pakistan,Sri Lanka, Indonesia. Parasitoid of *Kerria lacca* Kerr and other Kerriidae.
4) *E. keatsi* (Girault, 1939). Australia, *ex Austrotachardia melaleucae* Maskell.
5) *E. notialis* Prinsloo *et* Mynhardt, 1982. South Africa, *ex Tachardina* sp. on *Erica* sp.

31. *Eucoccidophagus* Hoffer, 1963

Type species: *Ixodiphagus biroi* Erdős, 1956, by original designation.

References: Hoffer, 1959: 15-23 (as *Ixodiphagus*); 1963: 591-592; Erdős, 1964: 260-261 (only as *I. biroi*); Trjapitzin, 1978: 327-328; 1987: 593-594; Sharkov, 1988: 1251-1252; Trjapitzin, 1989: 111-113; Guerrieri, 1994: 161-168; Noyes *et al.*, 1997: 238.

Characters of antenna. 6 species of *Eucoccidophagus* described in Palaearctic have 6-segmented funicle in both sexes. However, Guerrieri (1994) described *E. adrianae* Guerrieri from Italy, where it was reared from *Eriococcus agropyri* Borchsenius (Homoptera: Eriococcidae) on the gramineous plant *Elytrigia repens*. Funicle of one of the males of the series of specimens of *Eucoccidophagus adrianae* has 5 segments (Fig. 42). The 1st funicle segment of this anomalous antenna is as long the 1st and the 2nd funicle segments taken together of the normal 6 segmented male funicle of *E. adrianae* (Fig. 43), what shows according to Guerrieri on the fusion of the first two funicular segments (Guerrieri, 1994: 164).

Systematic position. Trjapitzin (1973) referred *Eucoccidophagus* to subfamily Encyrtinae, but treated it as the genus with uncertain position inside this subfamily. Sharkov (1988), studying abdominal sternites of some species of *Eucoccidophagus*, discovered in *E. karelianus* Sharkov, 1988 and *E. breviventris* (Kurdjmov, 1912) very large paratergites, which are typical characters of subfamily Tetracneminae. As a result, he transferred the genus *Eucoccidophagus* to the subfamily Tetracneminae, the tribe Oriencyrtini, what was followed by Trjapitzin (1989). Mandibles of *Eucoccidophagus*, which are 4-dentate, are unique in the subfamily Tetracneminae.

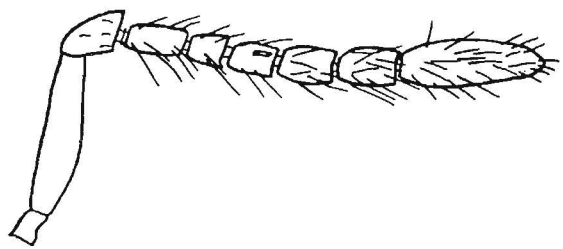


Fig. 42. *Eucoccidophagus adrianae* Guerrieri, 1994. Male, abnormal antenna. From Guerrieri (1994).

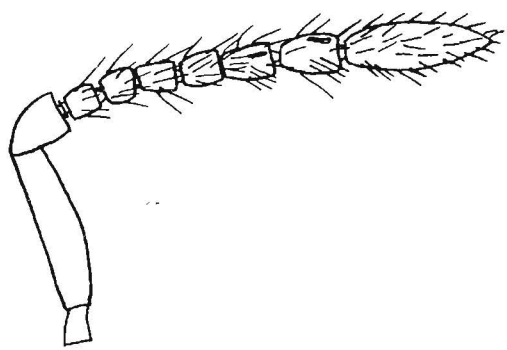


Fig. 43. *Eucoccidophagus adrianae* Guerrieri, 1994. Male, normal antenna. From.Guerrieri (1994).

Hosts: Eriococcidae and Pseudococcidae (Homoptera: Coccoidea).

Described species - 6. We give here data only on the species discussed above:
1) *Eucoccidophagus adrianae* Guerrieri, 1994. Italy, *ex Eriococcus agropyri* Borchsenius on *Elytrigia repens*.

32. *Gavria* Noyes, 2000

Type species: *Gavria haplos* Noyes, 2000, by original designation.

References: Noyes, 2000: 233-234.

Characters of antenna. Funicle 4-segmented in both sexes.

Systematic position. Noyes (2000) placed *Gavria* into the tribe Aenasiini of the subfamily Tetracneminae.

Hosts: unknown.

Described species:
1) *Gavria haplos* Noyes, 2000. Costa Rica.

33. *Habrolepis* Foerster, 1856

Type species: *Encyrtus nubilipennis* Walker, 1837 = *Habrolepis dalmanni* (Westwood, 1837), by original designation.

Synonym: *Gymnoneura* Risbec, 1951. Type species: *Gymnoneura bambeyi* Risbec, 1951, by monotypy.

References: Foerster, 1856: 34, 38; Mercet, 1921: 673-677 (only *Habrolepis dalmanni* and *H. pascuorum*); Risbec, 1951: 157-158 (*Gymnoneura*); Tachikawa, 1956: 95; Peck, 1963: 445-446; Erdős, 1964: 316-317; Delucchi, 1965: 295-304; Annecke & Mynhardt, 1970a: 127-146; Annecke & Insley, 1971: 13-14, 38; Trjapitzin, 1978: 281; Noyes, 1980: 199; Myartseva, 1984: 161-162, 249; Noyes & Hayat, 1984: 281; Trjapitzin, 1987: 555; Noyes, 1988: 80-82; Trjapitzin, 1989: 293-294; Noyes, 1990: 154; Podsiadlo, 1993: 65-73; Noyes *et al.*, 1997: 193, 249.

Characters of antenna. Funicle of female 6-segmented, that of male consisting of 2 ring segments; male clava very long.

Systematic position. The genus belongs to the subfamily Encyrtinae, tribe Habrolepidini, subtribe Habrolepidina.

Hosts: Coccids of the families Diaspididae and Asterolecaniidae (Homoptera).

Described species:

1) *Habrolepis aeruginosa* Masi, 1917. Seychelles.
2) *H. algoensis* Annecke *et* Mynhardt, 1970. South Africa, *ex Aspidiotus capensis* Newstead.
3) *H. apicalis* Waterston, 1916. Ghana, *ex Pinnaspis strachani* Cooley.
4) *H. dalmanni* (Westwood, 1837) (Figs. 19, 44). England, the Netherlands, Denmark, Poland, Germany, Austria, Czechia, Slovakia, Hungary, Italy, France (including Corsica), Spain, Croatia, Montenegro, Rumania, Bulgaria, Russia (Kaliningrad, Leningrad and Kursk Provinces, Stavropolye Territory, Black Sea Coast of Krasnodar Territory, Kabardino-Balkaria), Moldavia, Ukraine, Georgia, Armenia, Israel, Algeria, South Africa (accidental immigrant), USA (Massachusetts, Connecticut, Ohio), Chile (introduced), Australia with Tasmania (introduced), New Zealand (introduced). Parasitoid of *Asterodiaspis quercicola* Bouché and *A. variolosum* Ratzeburg on oaks (*Quercus*); in Algeria reared from *A. ilicicola* Targioni Tozzetti.
5) *H. diaspidi* (Risbec, 1951). Lebanon, Israel, Egypt, Algeria, Cabo Verde, Senegal, Eritrea, Nigeria, Zimbabwe, Mozambique, South Africa. In Mediterranean countries parasitizes *Chrysomphalus aonidum* Linnaeus, *Aonidiella orientalis* Newstead,

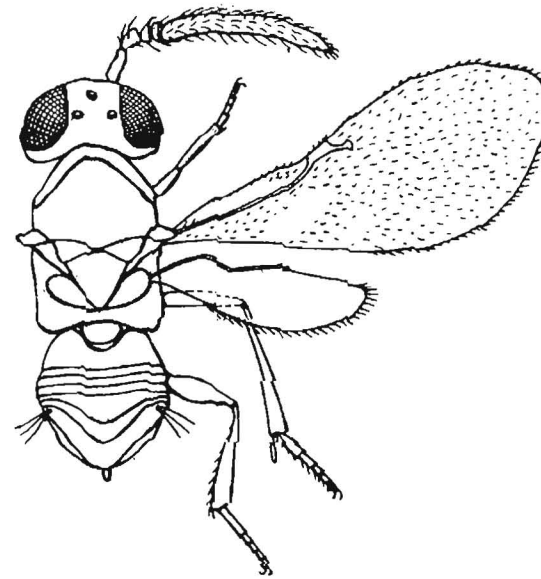


Fig. 44. *Habrolepis dalmanni* (Westwood, 1837). Male,dorsal view. From Nikolskaya (1952), after Mercet (1921).

Parlatoria ziziphi Lucas, *Chrysomphalus distyospermi* Morgan and *Diaspidiotus perniciosus* Comstock; in Cabo Verde, the species was reared from *Hemiberlesia lataniae* Signoret, *Pinnaspis strachani* Cooley and *Aspidiotus nerii* Bouché, in Senegal from *Diaspis senegalensis* Vayssière. In South Africa, is a parasitoid of *C. aonidum*, *Tecaspis visci* Brain, *Selenaspidus pertusus* Brain, *S. celastri* Maskell, *Pudaspis newsteadi* Leonardi.

6) *H. guineensis* Ferrière, 1953. Guinea, *ex Chionaspis pavettae* Balachowsky.
7) *H. montenegrina* Hoffer, 1975. Montenegro.
8) *H. namibiensis* Prinsloo *et* Annecke, 1976. Namibia, *ex Namaquea simplex* Munting.
9) *H. neocaledonensis* Fabres, 1974. New Caledonia, *ex Pseudaonidia trilobitiformis* Green on *Citrus*.

10) *H. obscura* Compere *et* Annecke, 1961. South Africa, *ex Melanaspis corticosa* Brain, *Africaspis chionaspiformis* Newstead, *Separaspis capensis* Walker, *Diaspidiotus perniciosus* Comstock, *Ledaspis distincta* Leonardi, *Lindingaspis rossi* Maskell and *Aonidiella orientalis* Newstead; Namibia, *ex* Diaspididae.
11) *H. occidua* Annecke *et* Mynhardt, 1970. South Africa, *ex Melanaspis phenax* Cockerell and *Pseudotargionia glandulosa* Newstead; Namibia, *ex Pseudotargionia* sp.
12) *H. oppugnati* Silvestri, 1915. Eritrea, *ex Aspidiotus elaeidis* Marchal.
13) *H. pascuorum* Mercet, 1921. Czechoslovakia (former), Hungary, Croatia, Serbia, Montenegro, Macedonia, Bulgaria, Italy, Spain, Canary Islands (Tenerife), Algeria, Egypt, Lebanon, Israel. In Hungary, the species was reared from *Targionia vitis* Signoret, in Italy from *Chrysomphalus dictyospermi* Morgan and *Diaspidiotus ostreaeformis* Curtis, in Serbia from *Diaspidiotus perniciosus* Comstock, in Algeria, Egypt, Lebanon and Israel from *C. aonidum* Linnaeus.
14) *H. rouxi* Compere, 1936. Saudi Arabia, *ex Aonidiella orientalis* Newstead; Kenya; Mozambique, *ex A. aurantii* Maskell; South Africa, *ex A. aurantii* and *Chrysomphalus aonidum* Linnaeus (the original host in Africa is probably *Aspidiotus sylvaticus* Brain); Swaziland, ex *Aonidiella aurantii;* Madagascar; the species was introduced from South Africa and Saudi Arabia into USA (California), where has been established on *A. aurantii* on *Citrus* and on *Parlatoria oleae* Colvée; Hawaii (an accidental immigrant); introduced from California into Bermuda against Bermuda cedar scales *Carulaspis minima* Targioni Tozzetti and *Lepidosaphes newsteadi* Šulc and established.
15) *H. setigera* Annecke *et* Mynhardt, 1970. South Africa, *ex Lindingaspis greeni* Brain *et* Kelly.
16) *H. tergrigorianae* Trjapitzin, 1962. Armenia, *ex Diaspidiotus prunorum* Laing; Uzbekistan, *ex D. prunorum* and *Parlatoria oleae* Colvée; Pakistan, *ex P. oleae.*

34. *Hadzhibeylia* Myartseva *et* Trjapitzin, 1981

Type species: *Hadzhibeylia physococci* Myartseva *et* Trjapitzin, 1981, by original designation.

References: Myartseva & Trjapitzin, 1981: 621-623; Trjapitzin, 1989: 223.

Characters of antenna. Funicle of both sexes 5-segmented.

Systematic position. The genus belongs to the subfamily Encyrtinae, tribe Aphycini, subtribe Aphycina.

Described species:

1) *Hadzhibeylia physococci* Myartseva *et* Trjapitzin, 1981. Georgia, ex *Ritsemia pupifera* Lichtenstein (Homoptera: Pseudococcidae) on *Ulmus foliacea*.

35. *Hambletonia* Compere, 1936

Type species: *Hambletonia pseudococcina* Compere, 1936, by original designation.

References: Compere, 1936: 171-174; Peck, 1963: 343; Kerrich, 1967: 146; Noyes, 1980: 200; Noyes & Hayat, 1984: 282-283; Trjapitzin, 1989: 125; Noyes *et al.* 1997: 198, 202, 249; Sharkov & Woolley, 1997: 191-218; Noyes, 2000: 224-232.

Characters of funicle. Funicle of female is 4-6-segmented, that of male 5-segmented. According to Sharkov & Woolley (1997), the number of funicular segments of females of *Hambletonia* can be different in different species (from 4 to 6), and also can vary within a single species, for example in *H. marticephala* Sharkov *et* Woolley (6 or 4). In the Fig. 26 (p. 206, *l.c.*), it is clearly seen that the 1st funicle segment is unusually great, and without any doult is a product of fusion of two segments, as shows arrangement of hairs on its dorsal side. In *H. maticephala* even left and right antennae of the same specimen can have different number of funicular segments.

Systematic position. According to Trjapitzin & Gordh (1978) and Gordh & Trjapitzin (1979), the genus belongs to the subtribe Chrysoplatycerina, tribe Chrysoplatycerini, subfamily Tetracneminae, but Noyes & Hayat (1984) had the opinion it would be more correct to refer this genus to the subtribe Taftiina in the tribe Chrysoplatycerini. Trjapitzin

(1989) accepted the placement of *Hambletonia* in Taftiina. Noyes & Hayat (1994) included all the genera previously placed in Chrysoplatycerini into the tribe Aenasiini, although they did not formally synonymize the two tribes. Sharkov & Woolley (1997) in their splendid revision of the genus *Hambletonia*, had the opinion that the genus *Hambletonia* placement within the subfamily Tetracneminae remains "subjective and unstable" (*l.c.*, p. 196).

Described species:

1) *Hambletonia calvifrons* Sharkov *et* Woolley, 1997. Costa Rica.
2) *H. marticephala* Sharkov *et* Woolley, 1997. USA (Georgia, Florida).
3) *H. pilosifrons* Sharkov *et* Woolley, 1997. Guatemala, Costa Rica.
4) *H. pseudococcina* Compere, 1936. USA (California, Florida), introduced; Mexico, Costa Rica, Jamaica (introduced), Dominican Republic, Dominica, Puerto Rico (introduced), Trinidad, Venezuela, Ecuador, Columbia, Brazil, Argentina, Hawaii (introduced), Taiwan (probably introduced). A *Dysmicoccus brevipes* Cockerell (Homoptera: Pseudococcidae) parasitoid.
5) *H. punctifrons* Sharkov *et* Woolley, 1997. Costa Rica.
6) *H. roseni* Sharkov *et* Woolley, 1997. Costa Rica, Panama.
7) *H. setosifrons* Sharkov *et* Woolley, 1997. Costa Rica.
8) *H. squalicephala* Sharkov *et* Woolley, 1997. Costa Rica.
9) *H. undulitibiae* Sharkov *et* Woolley, 1997. Costa Rica.

36. *Helegonatopus* Perkins, 1906

Type species: *Helegonatopus pseudophanes* Perkins, 1906, by monotypy.

Synonyms: *Chalcerinys* Perkins, 1906. Type species: *Chalcerinys eximia* Perkins, 1906, by monotypy.

Schedioides Mercet, 1919. Type species: *Schedioides formosus* Mercet, 1919, by monotypy.

9) *H. nikolskajae* Hoffer, 1965. Finland, Czechoslovakia (former), Hungary, Russia (Leningrad Province), Moldavia.
10) *H. ponomarenkoi* (Trjapitzin, 1964). Kyrghyzstan, *ex* Dryinidae on Cicadellidae; India.
11) *H. pseudophanes* Perkins, 1906 (Fig. 46). USA (Ohio), *ex* cocoon of *Gonatopus* sp. or allied form on Cicadellidae; Jamaica, St. Vincent, Trinidad, Ecuador, Brazil, Uruguay, Argentina; Hawaii, *ex Haplogonatopus vitiensis* Perkins and *Pseudogonatopus hospes* Perkins (introduced from USA or an accidental immigrant).
12) *H. pulchricornis* Hayat *et* Verma, 1978. India.
13) *H. rasnitzyni* (Trjapitzin, 1964). Finland; Hungary; Russia (Kaluga Province; Buryatia, *ex Dicondylus sibiricus* N. Ponomarenko); Ukraine (Crimea), *ex* cocoons of *Pseudogonatopus distinctus* Kieffer; Kazakhstan, Turkmenistan, Mongolia.
14) *H. saotomensis* Prinsloo, 1979. São Tome, *ex* Dryinidae on *Ricania insularis* Lallemant (Homoptera: Ricaniidae).

37. *Holcothorax* Mayr, 1876

Type species: *Encyrtus testaceipes* Ratzeburg, 1848, by subsequent designation (Gahan & Fagan, 1923: 72).

References: Mayr, 1876: 691-693; Mercet, 1921: 339-341 (as *Ageniaspis*); Askew, 1983: 131-136; Myartseva, 1984: 182,267; Noyes & Hayat, 1984: 287; Herthevtzian, 1986: 97-99; Trjapitzin, 1989: 357-358; Noyes *et al.*, 1997: 178, 265.

Characters of antenna. Funicle of female 5-segmented, that of male 6- segmented.

Systematic position: The genus belongs to the subfamily Encyrtinae, tribe Copidosomatini, subtribe Ageniaspidina.

Hosts: Leaf mining larvae of Lepidoptera.

Described species:

1) *Holcothorax fulvicornis* (Kazmi *et* Hayat, 1998). India.
2) *H. kopetdagicus* Myartseva, 1988. Turkmenistan, *ex Parornix persicella* Danilevsky (Gracillariidae) on peach and *Amygdalus,* and *ex Phyllonorycter milierella* Staudinger (Lithocolletidae) on *Celtis caucasica.*
3) *H. testaceipes* (Ratzeburg, 1848) (Fig. 25). England, the Netherlands, Denmark, Poland, Germany, Switzerland, Spain (including Majorca), Czechoslovakia (former), Hungary, Montenegro, Rumania, Bulgaria, Russia (Pskov, Voronezh and Rostov Provinces, Kabardino- Balkaria, Khabarovsk and Primorye Territories), Lithuania, Moldavia, Ukraine (including Crimea), Georgia, Armenia, Iran, Kyrghyzstan, China, South Korea, Canada (Ontario) (introduced against *Phyllonorycter blancardella* Fabricius), USA (introduced into Massachusetts to control *P. crataegella* Clemens). Polyembryonic parasitoid of *Phyllonorycter* spp. (Lithocolletidae) larvae.

38. *Homalopoda* Howard, 1894

Type species: *Homalopoda cristata* Howard, 1894, by monotypy.

References: Howard, 1894: 90-92; Noyes, 1979: 157-159; 1980: 203; Noyes & Hayat, 1984: 287; Mani, 1989: 869-870; Noyes, 1990: 154; Noyes *et al.*, 1997: 177.

Characters of antenna. Funicle of female 4- segmented.

Systematic position. The genus belongs to the subfamily Encyrtinae, tribe Habrolepidini, subtribe Habrolepidina.

Described species:

1) *Homalopoda cristata* Howard, 1894. India; Sri Lanka, *ex Odonaspis secreta* Cockerell (Homoptera: Diaspididae); Panama, Cuba, Haiti, Puerto Rico; St. Vincent, *ex O. secreta;* Trinidad; Hawaii [(an accidental immigrant, infesting *Duplachionaspis claviger* Cockerell (Homoptera: Diaspididae)].

39. *Indaphycus* Hayat, 1981

Type species: *Indaphycus planus* Hayat, 1981, by original designation.

References: Hayat, 1981: 20-21; Noyes & Hayat, 1984: 289; Fatima & Shafee, 1993: 114; Dahms & Gordh, 1997: 186-187.

Characters of antenna. Funicle of female 5- segmented. Male unknown.

Systematic position. The genus belongs to the subfamily Encyrtidae, tribe Aphycini, subtribe Aphycina.

Described species:
1) *Indaphycus bryanti* (Girault, 1922). Australia.
2) *I. planus* Hayat, 1981. India.

40. *Koenigsmannia* Trjapitzin, 1982

Type species: *Koenigsmannia atra* Trjapitzin, 1982, by original designation.

References: Trjapitzin, 1982: 1439-1440.

Characters of antenna. Funicle of female 4- segmented. Male unknown.

Systematic position. The genus belongs to the subfamily Encyrtinae, where its position is unknown.

Described species:
1) *Koenigsmannia atra* Trjapitzin, 1982 (Fig. 21). Chile.

Systematic position. According to Noyes & Hayat (1984: 297), the genus belongs, probably to the tribe Trechnitini of Encyrtinae.

Described species:

1) *Mesorhopella emersoni* Girault, 1923. Australia.
2) *M. longfellowi* (Girault, 1915). Australia.
3) *M. maculatipes* (Girault, 1923). Australia.

44. *Microterys* Thomson, 1876

Type species: *Encyrtus sylvius* Dalman, 1820, by subsequent designation (Ashmead, 1900: 390).

Synonyms: *Sceptrophorus* Foerster, 1856. Type species: *Sceptrophorus sceptriger* Foerster, 1856, by subsequent designation (Ashmead, 1900: 381). The name *Sceptrophorus* was rejected in favour of *Microterys*: Opinion 1110, 1978, Opin. Decl. Int. Comm. Zool. Nomencl. 35: 99-100.

Apentelicus Fullaway, 1913. Type species: *Apentelicus kotinskyi* Fullaway, 1913, by original designation.

Paraphaenodiscoides Mercet, 1921. Type species: *Paraphaenodiscoides dimorphus* Mercet, 1921, by original designation.

Birous Erdős *et* S. Novicky, 1955. Type species: *Birous anomalus* Erdős *et* S. Novicky, 1955, by original designation.

References: Foerster, 1856: 34, 38 (*Sceptrophorus*); Thomson, 1876: 155, 157-162; Ashmead, 1900: 390-394; Fullaway, 1913: 26 (*Apentelicus*); Girault, 1915a: 90-93 (as *Encyrtus,* except *E. wundti* and *E. parus*); Mercet, 1921: 378-383 (*Paraphaenodiscoides*), 389-425, 705-710 (as *Encyrtus*); 1922a: 296-299 (*Sceptrophorus*); Compere, 1926: 34-44; Ishii, 1928: 130-139; Compere, 1939a: 16-20; Nikolskaya, 1952: 400-401 (*Paraphaenodiscoides*), 402-403 (*Sceptrophorus*), 403-408 (as *Encyrtus*); Erdős & Novicky, 1955: 196 (*Birous*); Annecke, 1962: 170-

175; Nikolskaya, 1963: 410-411 (*Paraphaenodiscoides*), 412-413 (*Sceptrophorus*), 413-419 (as *Encyrtus*); Peck, 1963: 386-393; Tachikawa, 1963: 225-235; De Santis, 1964: 181-186 (*Sceptrophorus*); Bakkendorf, 1965: 144-152; Trjapitzin, 1968: 101-108; Graham, 1969: 259-267; Prinsloo, 1975a: 19-37; 1975b: 409-423; Shafee *et al.*, 1975: 65-71; Rosen, 1976: 479-485; Sugonjaev, 1976: 912-927; Hoffer, 1977: 185-201; Trjapitzin, 1978: 280-284; 284 (*Birous*); Gordh, 1979: 951-953; Myartseva, 1980: 43-50; Noyes, 1980: 213; Prinsloo & Mynhardt, 1981a: 152-153; Myartseva, 1984: 213-218; Herthevtzian, 1986: 36-41; Liao *et al.*, 1987: 170-172; Trjapitzin, 1987: 503-509; 509 (*Birous*); Noyes, 1988: 91-92; Trjapitzin, 1989: 162-182; Sharkov & Trjapitzin, 1995: 209-214; Noyes *et al.*, 1997: 185, 200, 232, 253, 264.

Characters of antenna. All 121 species of *Microterys*, described in the world fauna (except one - *M. anomalus*) have 6-segmented funicle in both sexes (Fig. 47). *Microterys anomalus* was described for the first time from one female collected in

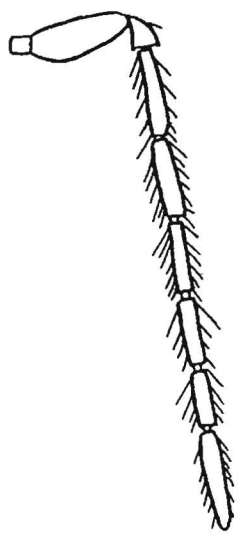


Fig. 46 *Helegonatopus pseudophanes* Perkins, 1906. Male, antenna. From De Santis (1964).

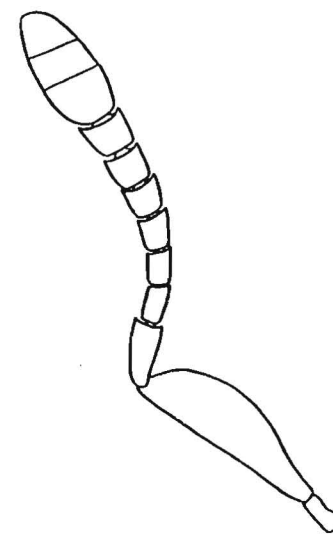


Fig. 47. *Microterys chalcostomus* (Dalman, 1820). Female antenna. Orig. by V.A. Trjapitzin.

47. *Neorhopus* Girault, 1917

Type species: *Neorhopus australicus* Girault, 1917, by original designation.

References: Girault, 1917: 139-140; Noyes & Hayat, 1984: 307; Dahms & Gordh, 1997: 235-236.

Characters of antenna. Funicle of female 5-segmented. Male unknown.

Systematic position. The genus belongs to the subfamily Tetracneminae, tribe Anagyrini, subtribe Rhopina.

Described species:

1) *Neorhopus australicus* Girault, 1917. Australia, ex *Sphaerococcus obscuratus* Maskell (Homoptera: Pseudococcidae) on *Eucalyptus* sp.

48. *Oriencyrtus* Sugonjaev *et* Trjapitzin, 1974

Type species: *Oriencyrtus beybienkoi* Sugonjaev *et* Trjapitzin, 1974, by original designation.

References: Sugonjaev & Trjapitzin, 1974: 296-298; Sugonjaev, 1984: 104, 117, 119, 133, 142, 143, 208; Sharkov, 1988: 1252-1254; Trjapitzin, 1989: 113; Sharkov & Trjapitzin, 1995: 201.

Characters of antenna. Funicle of female 5-segmented. Male unknown.

Systematic position. The genus belongs to the tribe Oriencyrtini. The placement of this tribe among subfamilies of Encyrtidae is unclear.

Described species:

1) *Oriencyrtus beybienkoi* Sugonjaev *et* Trjapitzin, 1974 (Fig. 29). Russia (Primorye Territory), *ex Eulecanium diminutum* Borchsenius (Homoptera: Coccidae) on *Maackia amurensis*; Mongolia, *ex E. kostylevi* Borchsenius on *Ulmus propinqua*.

49. *Plagiomerus* Crawford, 1910

Type species: *Plagiomerus diaspidis* Crawford, 1910, by original designation.

Synonym: *Parahomalopoda* Girault, 1915. Type species: *Parahomalopoda peruviensis* Girault, 1915, by original designation.

References: Crawford, 1910: 89-90; Girault, 1915b: 170-171 (*Parahomalopoda*); Gahan, 1924: 1; Peck, 1963: 457; Trjapitzin, 1969: 1252-1254 (*Parahomalopoda*); Schafee *et al.*, 1975: 101-103; Beardsley, 1976: 223-224; Gordh & Lacey, 1976: 132-134; Noyes, 1980: 222; Noyes & Hayat, 1984: 325; Mani, 1989: 1017-1020; Trjapitzin, 1989: 294 (*Parahomalopoda*), 295; Noyes, 1990: 154; Fatima *et* Shafee, 1993: 20-21; Noyes *et al.*, 1997: 176, 249.

Characters of antenna. Funicle of female 4-segmented, that of male with 2 ring segments and very long clava.

Systematic position. The genus belongs to the subfamily Encyrtinae, tribe Habrolepidini, subtribe Habrolepidina.

Hosts: armoured scales (Homoptera: Diaspididae).

Described species:

1) *Plagiomerus bangaloriensis* Shafee, Alam *et* Agarwal, 1975. India.
2) *P. cyaneus* (Ashmead, 1898). India, *ex Aonidiella orientalis* Newstead; USA (Florida); Mexico (Morelos), *ex Hemiberlesia diffinis* Newstead; Cuba, Puerto Rico, Trinidad; Brazil, *ex Diaspis echinocacti* Bouché.

3) *P. derceto* (Trjapitzin, 1969). China (Sichuan Province).
4) *P. diaspidis* Crawford, 1910 (Fig. 4). Italy (immigrant), Azerbaijan (immigrant, in greenhouse), USA (Maryland, Virginia, New Mexico, Texas; in District of Columbia and in California found in greenhouses); Mexico (Tamaulipas); Colombia; Hawaii (an accidental immigrant). Introduced into France from Tenerife (Canarian Islands). The usual host is *Diaspis echinocacti* Bouché.
5) *P. hospes* Timberlake, 1920. Trinidad, Bermuda; Hawaii (adventive).
6) *P. peruviensis* (Girault, 1915). Peru.

50. *Pseudaphycus* Timberlake, 1916*

Type specie: *Aphycus angelicus* Howard, 1898, by original designation.

Synonym: *Psilomirinus* Brèthes, 1916. Type species: *Psilomirinus flavidulus* Brèthes, by original designation.

References: Timberlake, 1916: 569-574; Brèthes, 1916: 424 (*Psilomirinus*); Mercet, 1925: 10-14; Gahan, 1946: 311-327; Nikolskaya, 1952: 362-365; Bennett, 1955: 413-416; Hoffer, 1955a: 102-103; 1960: 94-97; Sugonjaev, 1960: 365-366; Nikolskaya. 1963: 371-373; Peck, 1963: 397-400; De Santis, 1964: 150-161; Erdõs, 1964: 94-97; Beardsley, 1976: 224; Trjapitzin, 1978: 295; Gordh, 1979: 927-928; Noyes, 1980: 225; Rosen, 1981: 251-263; Prinsloo, 1982: 221-222, Myartseva; 1984: 138, 225-226; Noyes & Hayat, 1984: 328; Herthevtzian, 1986: 54-55; Trjapitzin, 1987: 530-532; 1989: 219-221; Sharkov & Trjapitzin, 1995: 224; Noyes *et al.*, 1997: 178, 190.

Characters of antenna. Funicle in both sexes 5- segmented.

* The authorship of the genus is attributed usually to Clausen (1915), but in his article description is absent.

Systematic position. The genus belongs to the subfamily Encyrtinae, tribe Aphycini, subtribe Aphycina.

Hosts: mealybugs (Homoptera: Pseudococcidae).

Described species:

1) *Pseudaphycus abstrusus* Gahan, 1946. USA (Virginia, *ex Pseudococcus comstocki* Kuwana; California, *ex Spilococcus pressus* Ferris on *Nerium oleander*); Chile, *ex Pseudococcus* sp. on Japanese persimmon *Diospyros kaki*; Argentina.
2) *P. alveolatifrons* Gahan, 1946. USA (New Jersey), *ex Pseudococcus comstocki* Kuwana.
3) *P. angelicus* (Howard, 1898). Canada, *ex Pseudococcus maritimus* Ehrhorn and *Spilococcus implicatus* Ferris in greenhouses; USA (Washington, *ex P. maritimus*; California, *ex P. maritimus*, *P. longispinus* Targioni Tozzetti, *P. calceolariae* Maskell, *Planococcus citri* Risso, *Spilococcus implicatus* Ferris, *Phenacoccus gossypii* Townsend *et* Cockerell and *Dysmicoccus ryani* Coquillett. According to Noyes (1980), also found in Neotropical Region.
4) *P. angustifrons* Gahan, 1946. Cuba, *ex Dysmicoccus brevipes* Cockerell.
5) *P. austriacus* Mercet, 1925. Finland, Germany, Austria, Czechia, Hungary, Italy, Russia (Leningrad and Kaluga Provinces, Komi Republic, Primorye Territory), Ukraine (Crimea). The species was reared in Germany from *Phenacoccus piceae* Loew on spruce *Picea abies*. Hoffer (1960) reported it have been reared from a cluster of eggs of a tabanid (Diptera), attached to a leaf of reed *Phragmites australis* (in Czechia).
6) *P. clavatus* Pilipjuk, 1981. Russia (Sakhalin), *ex Phenacoccus aceris* Signoret on *Malus* sp.
7) *P. coccurae* Sharkov, 1995. Russia (Amur Province; Primorye Territory, *ex Coccura suwakoensis* Kuwana *et* Toyoda on *Spiraea* sp.).
8) *P. debachi* D. Rosen. 1981. Mexico (Sonora), *ex Ferrisia virgata* Cockerell.
9) *P. dysmicocci* Bennett, 1955. Trinidad, *ex Dysmicoccus brevipes* Cockerell on pineapple.
10) *P. ferrisianae* Bennett, 1955. Trinidad, *ex Ferrisia virgata* Cockerell on cacao.

11) *P. flavidulus* (Brèthes, 1916). USA (California), *ex Pseudococcus affinis* Maskell on tomatoes in greenhouses; Chile, *ex P. affinis* on grapes; Argentina.
12) *P. graminicola* Timberlake, 1916. USA (Utah, New México), *ex Trionymus utahensis* Cockerell on *Stipa* sp. and *ex* Pseudococcidae on *Elymus condensatus*.
13) *P. griseus* De Santis, 1947. Argentina.
14) *P. hungaricus* Erdős, 1956. Hungary, Georgia. *Ex Polystomophora ostiaplurima* Kiritshenko.
15) *P. limatulus* Gahan, 1946. USA (Maryland), *ex Pseudococcus* sp. on *Andropogon* sp.
16) *P. maculipennis* Mercet, 1923. Spain, France, Italy, Canary Islands (Tenerife). The species was introduced from France into Georgia and established; also it was introduced into Azerbaijan, USA (California) and Chile, and was employed in greenhouses of Moscow, Russia. Parasitoid of *Pseudococcus affinis* Maskell.
17) *P. malinus* Gahan, 1946 (Fig. 48). The species is an effective parasitoid of the Comstock mealybug, *Pseudococcus comstocki* Kuwana, a dangerous pest of

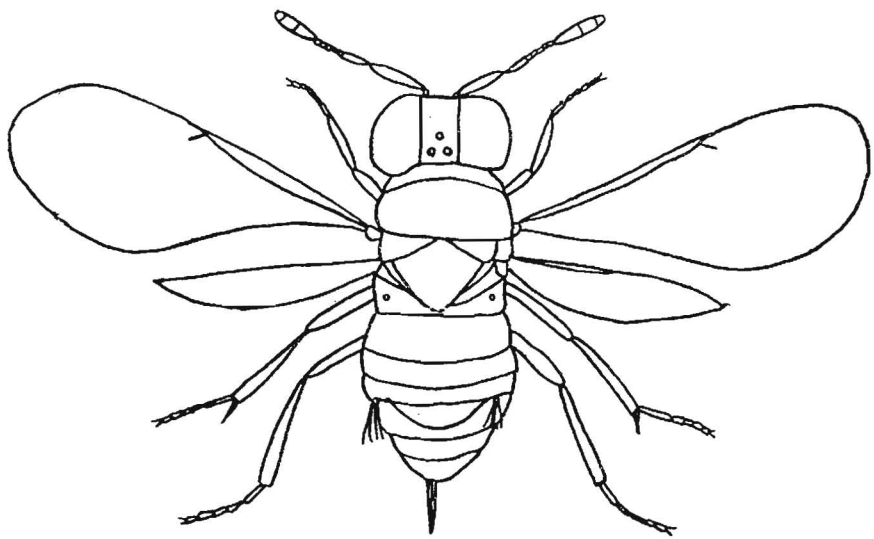


Fig. 48. *Pseudaphycus malinus* Gahan, 1946. Female, dorsal view. From Myartseva (1984), schematized.

mulberry (*Morus* spp.) and many other plants. Its native range of distribution comprises Japan and the Korean Peninsula (except, probably, the extreme northern regions), it was reported also from China. In Japan, *P. malinus* was propagated in insectaries and used as a "living insecticide". In 1939, it was introduced from Japan into USA (to Connecticut, and later to New York, Virginia, West Virginia, Ohio, New Jersey, Delaware, Georgia, Michigan), and from Japan and USA into Ontario, Canada. As a result it was biological suppression of *P. comstocki* in USA and Canada as a pest. The parasitoid was introduced and acclimatized also in California, where complete biological suppression of the pest was achieved. In 1945, the parasitoid was introduced from USA into Uzbekistan. It has been established in Uzbekistan, Tadzhikistan, Turkmenistan, Kyrghyzstan and southern Kazakhstan, and later in Transcaucasus (Georgia, Armenia, Azerbaijan), in some parts of Russia (Krasnodar and Stavropolye Territories of the North Caucasus), in Moldavia and in southern Ukraine. The problem of the Comstock mealybug was solved everywhere.

18) *P. meracus* Gahan, 1946. USA (Virginia), *ex Ferrisia virgata* Cockerell.
19) *P. meritorius* Gahan, 1946. USA (Maryland, Virginia), *ex Ferrisia virgata* Cockerell.
20) *P. mundus* Gahan, 1946. Hawaii; USA (introduced into Louisiana, Georgia, Florida and Texas against *Dysmicoccus boninsis* Kuwana); México; Puerto Rico (successfully introduced from Louisiana against *D. boninsis*), Bahamas; Jamaica; Nevis; in St. Kitts, Puerto Rico and Barbados attacks *Saccharicoccus sacchari* Cockerell on sugarcane.
21) *P. orientalis* Ferrière, 1937. Philippines, *ex Planococcus lilacinus* Cockerell.
22) *P. perdignus* Compere *et* Zinna, 1955. Eritrea; introduced into USA (California) and Chile against *Planococcus citri* Risso.
23) *P. phenacocci* Jasnosh, 1957. Georgia, Armenia, Azerbaijan. Parasitoid of *Phenacoccus mespili* Signoret.
24) *P. prosopidis* Timberlake, 1916. USA (New México), *ex Spilococcus prosopidis* Cockerell. According to Noyes (1980), the species is found also in the Neotropical Region.

25) *P. utilis* Timberlake, 1923. México (Tamaulipas, *ex Nipaecoccus* sp. near *filicornis* Williams *et* Granara de Willink; Veracruz, *ex N. nipae* Maskell); Puerto Rico (introduced from Hawaii); Trinidad, *ex N. nipae* on cacao; Dominican Republic; Hawaii (introduced from México).
26) *P. websteri* Timberlake, 1916. USA (Washington, *ex Pseudococcus maritimus* Ehrhorn, a serious pest of apple and pear; Indiana and Illinois, *ex* Pseudococcidae).

51. *Pseudectroma* Girault, 1915

Type species: *Pseudectroma auricorpus* Girault, 1915, by original designation.

Synonym: *Timberlakia* Mercet, 1925. Type species: *Acerophagus europaeus* Mercet, 1921, by original designation.

References: Girault, 1915a: 161; Mercet, 1921: 191-193 (as *Acerophagus*); 1925: 9-10 (*Timberlakia*); Nikolskaya, 1952: 362 (*Timberlakia*); Hoffer, 1955a: 103-105 (*Timberlakia*); Compere & Annecke, 1960: 377-378 (*Timberlakia*); Nikolskaya, 1963: 371 (*Timberlakia*); Erdős, 1964: 92-93 (*Timberlakia*); Trjapitzin, 1978: 295 (*Timberlakia*); Noyes, 1980: 233-234 (*Timberlakia*); Prinsloo, 1982: 221-225 (*Timberlakia*); Myartseva, 1983a: 64-66 (*Timberlakia*); Noyes & Hayat, 1984: 389; Trjapitzin, 1987: 532 (*Timberlakia*); 1989: 222; Dahms & Gordh, 1997: 300-303; Noyes et al., 1997: 179, 251.

Characters of antenna. Funicle of both sexes 5 - segmented.

Systematic position. The genus belongs to the subfamily Encyrtinae, tribe Aphycini, subtribe Aphycina.

Hosts: mealybugs (Homoptera: Pseudococcidae).

Described species:

1) *Pseudectroma auricorpus* Girault, 1915. Australia, *ex Antonina* sp. on Rhodes grass *Chloris guyana*.
2) *P. ciliatum* (Myartseva, 1983). Turkmenistan, *ex Neotrionymus monstatus* Borchsenius.
3) *P. cussoniae* (Risbec, 1959). Madagascar.
4) *P. europaeum* (Mercet, 1921) (Fig. 27). France, *ex Antonina purpurea* Signoret on *Brachypodium ramosum*; Spain.
5) *P. gilvum* (Prinsloo, 1982). South Africa, *ex Paracoccus burnerae* Brain, *Nipaecoccus viridis* Maskell and *Planococcus citri* Risso on citrus plants.
6) *P. nocturnum* (Hoffer, 1954). Czechia.
7) *P. obscurum* Girault, 1923. Australia.
8) *P. signatum* (Prinsloo, 1982). South Africa, *ex Nipaecoccus viridis* Newstead and *Paracoccus burnerae* Brain.

52. *Pseudhomalopoda* Girault, 1915

Type species: *Pseudhomalopoda prima* Girault, 1915, by original designation.

References: Girault, 1915b: 171-172; Peck, 1963: 453; Tachikawa, 1979: 166-168; Noyes, 1980: 225; 1990: 155; Noyes *et al.*, 1997: 177; Trjapitzin & Ruíz Cancino, 1998: 1-6.

Characters of antenna. Funicle of female 4 - segmented.

Systematic position. The genus belongs to the subfamily Encyrtinae, tribe Habrolepidini, subtribe Habrolepidina.

TRJAPITZIN V. A. Y RUÍZ C. E.

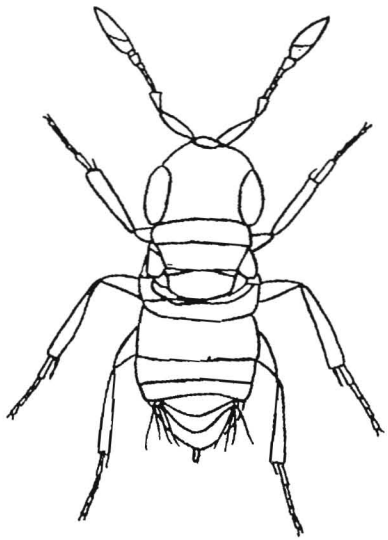


Fig. 49. *Stemmatosteres bohemicus* Hoffer, 1954. Female, dorsal view. From Hoffer (1955a).

59. *Tetarticlava* Noyes, 1980

Type species: *Tetarticlava yoshimotoi* Noyes, 1980, by original designation.

References: Noyes, 1980: 232-233; Trjapitzin & Ruíz Cancino, 2000b:267-268.

Characters of antenna. Funicle of female 5 - segmented, clava 4 - segmented (Fig. 24). Male unknown.

Systematic position. The genus belongs to the subfamily Encyrtinae, where its placement is unknown.

Described species:

1) *Tetarticlava larai* Trjapitzin *et* Ruíz Cancino,.2000. Mexico (Tamaulipas).
2) *T. yoshimotoi* Noyes, 1980: St. Vincent, Trinidad.

60. *Tetracnemoidea* Howard, 1898

Type species: *Tetracnemoidea australiensis* Howard, 1898, by monotypy.

Synonyms: *Tetracnemopsis* Ashmead, 1900. Type species: *Tetracnemus westwoodi* Cockerell, 1898, by original designation.

Ectromella Girault, 1915. Type species: *Ectromella bicolor* Girault, 1915, by original designation.

Arhopoideus Girault, 1915. Type species: *Arhopoideus brevicornis* Girault, 1915, by original designation.

Anarhopus Timberlake, 1929. Type species: *Anarhopus sydneyensis* Timberlake, 1929, by original designation.

Hungariella Erdõs, 1946. Type species: *Hungariella piceae* Erdős, 1946, by original designation.

Antipodencyrtus Kerrich, 1964. Type species: *Antipodencyrtus procellosus* Kerrich, 1964, by monotypy.

Zealandencyrtus Tachikawa *et* Valentine, 1971. Type species: *Zealandencyrtus yasumatsui* Tachikawa *et* Valentine, 1971, by original designation.

References: Howard, 1898: 232; Ashmead, 1900: 358 (*Tetracnemopsis*); Girault, 1915a: 142-143 (*Ectromella*), 174-175 (*Arhopoideus*); Timberlake, 1929: 5-11 (as *Tetracnemus*), 15-18 (*Anarhopus*); Compere & Smith, 1932: 585, 601-605, 609-617 (as *Tetracnemus*); Clancy, 1934: 231-248 (as *Tetracnemus*); Compere & Flanders, 1934: 966-973 (*Anarhopus*); Compere, 1939b: 59-61 (as *Tetracnemus*); Erdős, 1946: 144-147 (*Hungariella*); Kryger, 1951: 119-121 (as *Tetracnemus*); Nikolskaya, 1952: 433-434 (as *Tetracnemus*); Erdős, 1955: 217-218 (*Hungariella*); Ferrière, 1955: 133-135 (as *Tetracnemus*); Hoffer, 1959: 13-14 (*Hungariella*); 1960: 101-102 (*Hungariella*); Nikolskaya, 1963: 445 (as *Tetracnemus*); Peck, 1963: 344-346 (*Hungariella*), 467 (*Anarhopus*); De Santis, 1964: 109-113 (*Hungariella*); Erdős, 1964: 283-285 (*Hungariella*); Kerrich, 1964: 504-506 (*Antipodencyrtus*); 1967: 154-166 (*Hungariella*); Tachikawa & Valentine, 1971: 26 (*Arhopoideus*, *Anarhopus*), 26-27 (*Antipodencyrtus*), 28-30 (*Zealandencyrtus*); Tachikawa, 1974a: 23-31(*Arhopoideus*); 1974b: 33-44 (*Arhopoideus*); Trjapitzin, 1978: 280; Noyes, 1980:

233; Trjapitzin & Gordh, 1980: 169-175; Noyes & Hayat, 1984: 341-342; Trjapitzin, 1987: 502; Noyes, 1988: 113-123; Mani, 1989: 735-739 (*Arhopoideus*); Trjapitzin, 1989: 158-159; Dahms & Gordh, 1997: 358-363; Noyes *et al.*, 1997: 181, 247.

Characters of antenna. Funicle of both sexes 5 - segmented, male with long branches.

Systematic position. The genus belongs to the subfamily Tetracneminae, tribe Tetracnemini, subtribe Arhopoideina.

Hosts: mealybugs (Homoptera: Pseudococcidae).

Described species:

1) *Tetracnemoidea australiensis* Howard, 1898 (Fig. 23). Australia, *ex* Pseudococcidae.
2) *T. bicolor* (Girault, 1915). Australia, New Zealand, Antipodes Islands, Auckland Islands, Campbell Island. The species was reared from *Trionymus* sp. on *Juncus* sp. and from Pseudococcidae on *Phormium tenax* and *Olearia furfuracea*.
3) *T. brevicornis* (Girault, 1915). Australia, *ex Pseudoccus calceolariae* Maskell and *P. longispinus* Targioni Tozzetti; New Zealand, *ex Phenacoccus graminicola* Leonardi (introduced from Australia); USA (California), *ex Pseudococcus calceolariae* and *P. longispinus* (introduced from Australia); France and Italy, *ex P. calceolariae* (introduced from California). The parasitoid was indicated also as introduced into Chile as parasitoid of *P. calceolariae* and established [Vaughan, 1992 - as *Hungariella pretiosa* (Timberlake, 1929)].
4) *T. brownii* (Timberlake, 1929). New Zealand, islands of Auckland, Chatham and The Snares. The species was reared from *Nipaecoccus aurilanatus* Maskell, *Pseudococcus calceolariae* Maskell and *Dysmicoccus ambiguus* Morrison.
5) *T. coffeicola* (Kerrich, 1967). Uganda, *ex Planococcus kenyae* Le Pelley and *P. citri* Risso on *Coffea arabica*.
6) *T. heterocornis* (Mani *et* Saraswat, 1974). India.
7) *T. indica* (Ramakrishna Ayyar). India, *ex Planococcus citri* Risso and also *ex P. lilacinus* Cockerell on acid lime *Citrus aurantifolia*.
8) *T. ipswichiå* (Girault, 1922). Australia.

9) *T. mediterranea* (Kerrich, 1967). France, *ex Pseudococcus calceolariae* Maskell.
10) *T. mozarti* (Girault, 1932). Australia.
11) *T. peregrina* (Compere, 1939). The species is native in Brazil and Argentina, where it attacks *Pseudococcus longispinus* Targioni Tozzetti and some other Pseudococcidae; USA (California), introduced from Brazil and Argentina and established on *P. longispinus* and some other Pseudococcidae; Hawaii (introduced from Brazil to control *Dysmicoccus brevipes* Cockerell); Bermuda (introduced from California against *P. longispinus*; estabished); St. Helena; France, *ex P. longispinus* and *P. calceolariae* Maskell in greenhouses (introduced); Israel, *ex P. longispinus* (introduced); South Africa, *ex* Pseudococcidae (introduced from Brazil); New Zealand, *ex P. longispinus*.
12) *T. piceae* (Erdős, 1946). Sweden, Finland, Poland, Germany, Czechia, Slovakia, Hungary, Rumania, Russia (Komi Republic; Leningrad, Moscow and Kaluga Provinces). Parasitoid of *Phenacoccus piceae* Loew on spruce *Picea abies*.
13) *T. secunda* (Girault, 1915). Australia.
14) *T. spilococci* (Ferrière, 1957). Finland, Germany, Russia (Karelia, Sakhalin). In Germany, the species was reared from *Spilococcus nanae* Schmutterer on *Betula nana*, in Sakhalin from *Peliococcus multispinus* Siraiwa.
15) *T. sydneyensis* (Timberlake, 1929). The species is native in Australia where parasitizes *Pseudococcus calceolariae* Maskell; from Australia it was introduced into USA (California) where keeps *P. longispinus* Targioni Tozzetti under control; against the same pest the parasitoid was introduced into Trinidad; by ecesis it penetrated into New Zealand and Hawaii as parasitoid of *P. longispinus*.
16) *T. westwoodi* (Cockerell, 1898) (Fig. 32). Canada (Quebec), *ex* Pseudococcidae; USA (Colorado, *ex Phenacoccus minimus* Tinsley on *Picea*; Maine).
17) *T. zealandica* Noyes, 1988. New Zealand, *ex Planococcus mali* Ezzat *et* McConnell on black currant.

61. *Tetracyclos* Kryger, 1942

Type species: *Tetracyclos boreios* Kryger, 1942, by monotypy.

References: Kryger, 1942: 260-263; Gibson & Yoshimoto, 1981: 873-881; Darling, 1991: 622,628; Noyes *et al.*, 1997: 175.

Characters of antenna. Funicle of female 4 - segmented. Male unknown.

Systematic position. The genus belongs to the subfamily Encyrtinae, tribe Aphycini, subtribe Aphycina.

Described species:

1) *Tetracyclos boreios* Kryger, 1942. Greenland, *ex Pseudococcus* sp. on *Dryas integrifolia*; Canada (Elsmir Island).

62. *Trechnites* Thomson, 1876

Type species: *Metallon fuscitarsis* Thomson, 1876, by monotypy.

Synonyms: *Psylledontus* Crawford, 1910. Type species: *Psylledontus insidiosus* Crawford, 1910, by original designation.

Metallonella Girault, 1915. Type species: *Metallonella australiensis* Girault, by original designation.

Paratrechnites Hoffer, 1960 (as subgenus of the genus *Trechnites*). Type species: *Metallon flavipes* Mercet, by original designation.

References: Thomson, 1876: 118; Crawford, 1910: 88-89 (*Psylledontus*); Girault, 1915a: 77 (*Metallonella*); Mercet, 1921: 436-438 (as *Metallon*); Nikolskaya, 1952: 410-411 (as *Metallon*), 411 (*Psylledontus*); Hoffer, 1960: 109-114; 112 (*Trechnites* subgen. *Paratrechnites*); Ferrière, 1961: 39-41; Nikolskaya, 1963: 420-421 (as

Metallon), 421-422 (*Psylledontus*); Erdõs, 1964: 192-195; Graham, 1969: 243-245; Trjapitzin, 1978: 300; Prinsloo, 1981: 234-240; Myartseva, 1984: 142-143, 232-233; Noyes & Hayat, 1984: 345; Herthevtzian, 1986: 61-62; Trjapitzin, 1987: 541-542; Mani, 1989: 858-861; Trjapitzin, 1989: 249-251; Fatima & Shafee, 1993: 13; Kazmi & Hayat, 1995: 87-94; Sharkov & Trjapitzin, 1995: 230; Noyes & Hanson, 1996: 112-113; Dahms & Gordh, 1997: 365-367; Noyes *et al.*, 1997: 180, 250.

Characters of antenna. Funicle of both sexes 5 - segmented.

Systematic position. The genus belongs to the subfamily Encyrtinae, tribe Trechnitini, subtribe Trechnitina.

Hosts: reared from Psylloidea (Homoptera).

Described species:

1) *Trechnites albipodus* Kazmi *et* Hayat, 1995. India.
2) *T. aligarhensis* Hayat, Alam *et* Agarwal, 1975. India, *ex* Psylloidea.
3) *T. alni* Erdős, 1957. Ireland, England, the Netherlands, Denmark, Finland, Czechia, Hungary, Russia (Leningrad Province, Primorye Territory), Mongolia.
4) *T. angolensis* Prinsloo, 1981. Angola, *ex* Psylloidea on *Isoberlinia* sp.
5) *T. australiensis* (Girault, 1915). Australia.
6) *T. brevicornis* Erdõs, 1957. Hungary.
7) *T. concinnus* Kazmi *et* Hayat, 1995. India.
8) *T. dubiosus* Sharkov, 1995. Russia (Sakhalin).
9) *T. flavipes* (Mercet, 1921). Denmark, Poland, Czechia, Hungary, France, Spain, Russia (Kaluga Province, Daghestan), Armenia, Azerbaijan, Kazakhstan, Turkmenistan, Uzbekistan, Kyrghyzstan, Mongolia. In Czechia, the species was recorded to be reared from Aphidoidea (Homoptera) on the roots of *Calluna vulgaris*, in Kazakhstan from *Eurotica distincta* Loginova on *Eurotia ceratoides*. According to Myartseva (1984), in the Middle Asia the species was reared from the psyllids *Cyanophila* sp. on *Halimodendron halodendron* and *Caillardia* sp. on *Hammada leptoclada*. Myartseva (*op. cit.*) supposes *T. flavipes* is an hyperparasitoid of psyllids via *Psyllaephagus* sp. (Hymenoptera: Encyrtidae).

10) *T. fuscitarsis* (Thomson, 1876). England, Denmark, Sweden, Czechia, Slovakia, Hungary, Russia (Leningrad, Moscow and Kaluga Provinces, Yamalo-Nenetsky Autonomous District, Altai Territory, Tshita Province, Primorye Territory), Moldavia, Ukraine, Turkmenistan, Mongolia.
11) *T. insidiosus* (Crawford, 1910). USA (New York and Connecticut, *ex Psylla pyricola* Foerster and *P. pyri* Linnaeus; Oregon and California, *ex P. pyricola*).
12) *T. manaliensis* Hayat, Alam *et* Agarwal, 1975. India, *ex Psylla hyalina* Mathur on *Albizzia lebbek* and *ex Euphyllura eastorpi* Mathur; South Africa, *ex E. longiciliata* Silvestri on *Olea africana* and *ex E. longicauda* Silvestri.
13) *T. merops* Noyes *et* Hanson, 1996. Costa Rica, *ex Trioza* sp. on *Clethra* sp.
14) *T. morulus* Prinsloo, 1981. South Africa.
15) *T. pernicialis* Robinson, 1970. Uganda, ex *Phytolyma* sp.
16) *T. psyllae* (Ruschka, 1923). England, Germany, Austria, Czechia, Slovakia, Hungary, France, Italy, Russia (Lipetsk Province, Black Sea Coast of Krasnodar Territory, Primorye Territory), Bielorussia, Moldavia, Ukraine, Georgia, Armenia, Turkmenistan, Uzbekistan, Kyrghyzstan, Iran, Afghanistan, Mongolia, Canada (Ontario), USA (introduced from Iran, Afghanistan and various European countries). Reared from *Psylla pyri* Linnaeus, *P. pyricola* Foerster, *P. vasiljevi* Šulc, *P. pyrisuga* Foerster and from some other Psylloidea on pear.
17) *T. secundus* (Girault, 1915). Sri Lanka, from gall-making psyllids.
18) *T. trjapitzini* Sugonjaev, 1968. Kazakhstan, Turkmenistan, Uzbekistan, Mongolia. The species was reared from *Caillardia robusta* Loginova and *C. azurea* Loginova on *Haloxylon persicum* and *H. aphyllum*. According to Myartseva, it might be an hyperparasitoid of Psylloidea via *Psyllaephagus* spp. (Hymenoptera: Encyrtidae).
19) *T. versicolor* Prinsloo, 1981. South Africa, *ex Ciriacremum capense* Enderlein on *Schotia brachypetalia*.
20) *T. viridiscutellatus* (Ishii, 1928). Japan, *ex* Psylloidea on *Elaeagnus umbellata*.
21) *T. viridiscutellum* (Girault, 1915). Australia.

63. *Tropidophryne* Compere, 1931

Type species: *Tropidophryne africana* Compere, 1931, by original designation.

References: Compere, 1931: 269-272; 1939a: 13-15; Doutt & Smith, 1950: 165-170; Peck, 1963: 342; Kerrich, 1978: 145-150; Prinsloo & Annecke, 1978: 313-315; Noyes & Hayat, 1984: 346; Noyes *et al.*, 1997: 178.

Characters of antenna. Funicle of female 3-4-segmented, male 6-segmented. The genus *Tropidophryne* was revised by Kerrich (1978). He noted (p. 145): "From a series of reared specimens here attributed to the species *natalensis* Compere, the left antennae of three female specimens have been mounted; two of these have four separate funicle segments, the basal segment to a differing degree divided, and the third appears to have five fully separate segments... Unexpected as it may seem, I believe that the female funicle is unstable in this genus, and that Compere's drawing, which I can confirm as accurate, was made from an abnormal specimen. Indeed Compere (1939a, p. 14) wrote "funicle with four distinct joints, sometimes with vestigial fifth joint at base". [See also Sharkov & Woolley (1997)].

Systematic position. The genus belongs to the subfamily Tetracneminae, tribe Chrysoplatycerini, subtribe Chrysoplatycerina.

Hosts: mealybugs (Homoptera: Pseudococcidae).

Described species:

1) *Tropidophryne africana* Compere, 1931 (Fig. 23). Eritrea, *ex Planococcus* sp., probably *P. citri* Risso, on *Olea chrysophylla*; Uganda and Nigeria, *ex P. kenyae* Le Pelley; Ghana, *ex Dysmicoccus brevipes* Cockerell and *Planococcoides njalensis* Laing; South Africa, *ex P. citri*; Mauritius.
2) *T. comperei* Prinsloo *et* Annecke, 1978. South Africa, *ex Erium* sp. on *Bobartia macrospatha.*

3) *T. melvillei* Compere, 1931. Ghana, *ex Planococcoides njalensis* Laing on cacao and *ex Dysmicoccus brevipes* Cockerell; Kenya, *ex Pseudococcus* sp. on *Alberia* sp.; Uganda, *ex Saccharicoccus sacchari* Cockerell. The species was introduced from Kenya into USA (California) where developed in *Planococcus citri* Risso and *Pseudococcus longispinus* Targioni Tozzetti in greenhouses but not established.
4) *T. natalensis* Compere, 1939. Nigeria and South Africa, *ex Planococcus citri* Risso.

64. *Xylencyrtus* Annecke, 1968

Type species: *Xylencyrtus tridens* Annecke, 1968, by original designation.

References: Annecke, 1968: 258-264.

Characters of antenna. Funicle of both sexes 5 - segmented.

Systematic position. The genus belongs to the subfamily Encyrtinae where its placement is unknown.

Hosts. The species were reared from bees larvae and prepupae of the family Apidae (Hymenoptera: Apoidea).

Described species:
1) *Xylencyrtus mumifex* Annecke, 1968. South Africa, *ex* nest of *Allodapula melanopus* Cameron.
2) *X. tridens* Annecke, 1968. Cameroun, *ex* prepupa of *Allodape* sp.; Kenya, *ex* prepupa of *Allodapula* sp.; Uganda, *ex* prepupa of *Allodapula* sp.; South Africa: 1) *ex* mature larva of *Allodape mucronata* Smith; 2) *ex* nest (and prepupa?) of *A. panurgoides* Smith; 3) *ex* prepupa of *A. rufogastra* Lepeletier *et* Serville; 4) *ex A. exoloma* Strand; 5) *ex* nest of *Allodapula grandiceps* Friese.

Chapter 5

HOST - PARASITOID INDEX

The encyrtid species included in Table 1 are parasitoids of different species of 1 families in the order Orthoptera, at least 14 in Homoptera, 6 in Lepidoptera, 2 in Diptera and 3 in Hymenoptera; some of them are secondary parasitoids.

Table 1. Host – parasitoid list of encyrtid species with less than 6 funicular segments.

Hosts	Parasitoids
Insecta	
Orthoptera gen. sp. (eggs)	*Meromyzobia pedicellata* Gordh
Homoptera	
Auchenorrhyncha	
Ricaniidae	
Ricania insularis Lallemant	*Helegonatopus saotomensis* Prinsloo*
Tettigometridae	
Hilda patruelis Stål	*Psyllechthrus oophagus* Ghesquière
Cicadellidae	
Turrutus socialis Flor	*Helegonatopus dimorphus* (Hoffer)*
Cicadellidae gen. sp.	*H. dimorphus* *
	H. ponomarenkoi (Trjapitzin)*
	H. pseudophanes Perkins*

* Hyperparasitoid

Hosts	Parasitoids
	Aenasius advena Compere
	A. martinii (Compere)
	A. masii Domenichini
	Pseudaphycus angelicus (Howard)
	P. perdignus Compere *et* Zinna
	Pseudectroma gilvum (Prinsloo)
	Tetracnemoidea coffeicola (Kerrich)
	T. indica (Ramakrishna Ayyar)
	Tropidophryne africana Compere
	T. melvillei Compere
	T. natalensis Compere
P. kenyae Le Pelley	*Tetracnemoidea coffeicola* (Kerrich)
	Tropidophryne africana Compere
P. lilacinus Cockerell	*Aenasius lepelleyi* (Kerrich)
	A. subbaraoi (Kerrich)
	Pseudaphycus orientalis Ferrière
	Tetracnemoidea indica (Ramakrishna Ayyar)
P. mali Ezzat *et* Mc Connell	*T. zealandica* Noyes
Planococcus sp. aff. *citri* Risso	*Tropidophryne africana* Compere
Polystomophora ostiaplurima Kiritshenko	*Pseudaphycus hungaricus* Erdős
Pseudococcus affinis Maskell	*P. flavidulus* (Brèthes)
	P. maculipennis Mercet
P. calceolariae Maskell	*Aenasius paulistus* Compere
	P. angelicus (Howard)
	Tetracnemoidea brevicornis (Girault)
	T. brownii (Timberlake)
	T. mediterranea (Kerrich)
	T. peregrina (Compere)
	T. sydneyensis (Timberlake)

Hosts	Parasitoids
P. comstocki Kuwana	*Pseudaphycus abstrusus* Gahan
	P. alveolatifrons Gahan
	P. malinus Gahan
P. longispinus Targioni Tozzetti	*Acerophagus nubilipennis* Dozier
	Aenasius advena Compere
	Pseudaphycus angelicus (Howard)
	Tetracnemoidea brevicornis (Girault)
	T. peregrina (Compere)
	T. sydneyensis (Timberlake)
	Tropidophryne melvillei Compere
P. maritimus Ehrhorn	*Acerophagus notativentris* (Girault)
	A. pallidus Timberlake
	Aenasius paulistus Compere
	Pseudaphycus angelicus (Howard)
	P. websteri Timberlake
P. neomaritimus Beardsley	*Aenasius masii* Domenichini
P. sociabilis Hambleton	*A. paulistus* Compere
Pseudococcus spp.	*Blepyrus clavicornis* (Compere)
	B. decimus (Kerrich)
	B. saccharicola Gahan
	Pseudaphycus abstrusus Gahan
	P. limatulus Gahan
	Tetracyclos boreios Kryger
	Tropidophryne melvillei Compere
Puto yuccae Coquillett	*Aenasius maplei* Compere
Ritsemia pupifera Lichtenstein	*Hadzhibeylia physococci* Myartseva *et* Trjapitzin
Saccharicoccus sacchari Cockerell	*Pseudaphycus mundus* Compere
	Tropidophryne melvillei Compere
Sphaerococcus obscuratus Maskell	*Neorhopus australicus* Girault
Spilococcus eriogoni Ehrhorn	*Acerophagus pallidus* Timberlake
S. flavus Borchsenius	*Aphyculus astanovi* Myartseva

Hosts	Parasitoids
S. gutierreziae Cockerell	*Acerophagus gutierreziae* Timberlake
S. implicatus Ferris	*Pseudaphycus angelicus* (Howard)
S. nanae Schmutterer	*Tetracnemoidea spilococci* (Ferrière)
S. pressus Ferris	*Acerophagus californicus* D. Rosen
	Pseudaphycus abstrusus Gahan
S. prosopidis Cockerell	*P. prosopidis* Timberlake
Trabutina crassispinosa Borchsenius	*Aphyculus tamaricicola* Myartseva *et* Trjapitzin
	A. trabutinae Myartseva
T. mannipara Hemprich *et* Ehrenberg	*Aphyculus trabutinae* Myartseva
Trionymus utahensis Cockerell	*Pseudaphycus graminicola* Timberlake
Trionymus sp.	*Tetracnemoidea bicolor* (Girault)
Pseudococcidae gen. sp.	*Acerophagus flavus* D. Rosen
	Aenasius flandersi Kerrich
	A. paulistus Compere
	A. subbaraoi (Kerrich)
	Blepyrus hansoni Noyes
	B. schwarzi (Howard)
	Bothriocraera flavipes Timberlake
	Pseudaphycus graminicola Timberlake
	P. websteri Timberlake
	Tetracnemoidea australiensis Howard
	T. bicolor (Girault)
	T. peregrina Compere
	T. westwoodi (Cockerell)
Eriococcidae	
Eriococcus agropyri Borchsenius	*Eucoccidophagus adrianae* Guerrieri
Eriococcus spp.	*Acerophagoides triangularis* Ev. Blanchard
	Beethovena longifasciata Girault
Coccidae	
Eulecanium ciliatum Douglas	*Blastothrix britannica* Imms
E. diminutum Borchsenius	*Oriencyrtus beybienkoi* Sugonjaev *et* Trjapitzin

Hosts	Parasitoids
E. douglasi Šulc	*Blastothrix britannica* Imms
E. kostylevi Borchsenius	*Oriencyrtus beybienkoi* Sugonjaev et Trjapitzin
E. tiliae Linnaeus	*Blastothrix britannica*
"*Eulecanium* sp."	*Americencyrtus hartmani* (Timberlake)
Mesolecanium deltae Lizer *et* Trelles	*Coccidaphycus nigricans* Ev. Blanchard
Physokermes hemicriphus Dalman	*Pseudorhopus testaceus* (Ratzeburg)
Saissetia oleae Olivier	*Aethognathus cavilabris* Waterston
Kermesidae	
Kermes spp.	*Microterys chalcostomus* (Dalman)
Stictococcidae	
Stictococcus dimorphus Newstead	*Aethognathus cavilabris* Waterston
S. diversiseta Silvestri	*A. afer* Silvestri
S. gowdeyi Newstead	*A. unicolor* Subba Rao
S. multispinosus Newstead	*A. bicolor* Subba Rao
	A. unicolor
Stictococcus sp.	*A. cavilabris*
Kerriidae	
Austrotachardia melaleucae Maskell	*Erencyrtus keatsi* (Girault)
Kerria lacca Kerr	*E. dewitzi* Mahdihassan
Tachardiella argentina Domínguez	*Coccidaphycus nigricans* Ev. Blanchard
Tachardina spp.	*E. ater* Annecke *et* Mynhardt
	E. contrarius Prinsloo *et* Mynhardt
	E. notialis Prinsloo *et* Mynhardt
Kerriidae gen. sp.	*E. dewitzi*
Asterolecaniidae	
Asterodiaspis ilicicola Targioni Tozzetti	*Habrolepis dalmanni* (Westwood)
A. quercicola Bouché	*H. dalmanni*
A. variolosum Ratzeburg	*H. dalmanni*
Diaspididae	
Africaspis chionaspiformis Newstead	*Anthemus africaspidis* Ghesquière
	Habrolepis obscura Compere *et* Annecke

Hosts	Parasitoids
Anamaspis loewi Colvée	*Anthemus funicularis* (Bakkendorf)
Aonidiella aurantii Maskell	*Adelencyrtus quadriguttus* (Girault)
	A. sarawaki Trjapitzin *et* Myartseva
	Habrolepis rouxi Compere
A. orientalis Newstead	*Adelencyrtus bimaculatus* Alam
	Habrolepis diaspidi (Risbec)
	H. obscura Compere *et* Annecke
	H. rouxi Compere
	Plagiomerus cyaneus (Ashmead)
Aonidiella sp.	*Adelencyrtus shafeei* Hayat, Alam *et* Agarwal
Aspidiella hartii Cockerell	*A. moderatus* (Howard)
Aspidiotus capensis Newstead	*Habrolepis algoensis* Annecke *et* Mynhardt
A. destructor Signoret	*Spaniopterus crucifer* Gahan
A. elaeidis Marchal	*H. oppugnati* Silvestri
A. nerii Bouché	*H. diaspidi* (Risbec)
A. sylvaticus Brain	*H. rouxi* Compere
Aspidiotus sp.	*Adelencyrtus antennatus* Compere *et* Annecke
Aulacaspis difficilis Cockerell	*A. aulacaspidis* (Brèthes)
A. rosae Bouché	*A. aulacaspidis*
	Arrhenophagus chionaspidis Aurivillius
A. tegalensis Zehntner	*Adelencyrtus moderatus* (Howard)
A. yabunikkei Kuwana	*Arrhenophagus albitibiae* Girault
Canceraspis brasiliensis Hempel	*A. albitibiae*
Carulaspis minima Targioni Tozzetti	*Habrolepis rouxi* Compere
Chionaspis eugeniae Maskell	*A. albitibiae*
C. salicis Linnaeus	*Adelencyrtus aulacaspidis* (Brèthes)
	Arrhenophagus chionaspidis Aurivillius
Chrysomphalus aonidum Linnaeus	*Habrolepis diaspidi* (Risbec)
	H. pascuorum Mercet

Hosts	Parasitoids
	H. rouxi Compere
	Pseudhomalopoda prima Girault
C. dictyospermi Morgan	*H. diaspidi* (Risbec)
	H. pascuorum Mercet
Diaspidiotus juglansregiae Comstock	*Coccidencyrtus ensifer* (Howard)
	C. infuscatus Compere *et* Annecke
D. ostreaeformis Curtis	*Epitetracnemus intersectus* (Fonscolombe)
	Habrolepis pascuorum Mercet
D. perniciosus Comstock	*Anthemus affinis* Prinsloo *et* Neser
	Arrhenophagus chionaspidis Aurivillius
	Coccidencyrtus ensifer (Howard)
	C. steinbergi Tshumakova *et* Trjapitzin
	Epitetracnemus intersectus (Fonscolombe)
	Habrolepis diaspidi (Risbec)
	H. obscura Compere *et* Annecke
	H. pascuorum Mercet
D. prunorum Laing	*Anthemus aspidioti* Nikolskaya
	A. maculatus Subba Rao
	Epitetracnemus intersectus (Fonscolombe)
	Habrolepis tergrigorianae Trjapitzin
D. pyri Lichtenstein	*E. intersectus*
D. slavonicus Green	*Anthemus aspidioti* Nikolskaya
D. transcaspiensis Marlatt	*A. aspidioti*
Diaspis boisduvalii Signoret	*Coccidencyrtus malloi* De Santis
	C. ochraceipes Gahan
D. bromeliae Kerner	*C. ochraceipes*
D. echinocacti Bouché	*Plagiomerus cyaneus* (Ashmead)
	P. diaspidis Crawford
D. senegalensis Vayssière	*Habrolepis diaspidi* (Risbec)

Hosts	Parasitoids
Duplachionaspis claviger Cockerell	*Homalopoda cristata* Howard
D. eritreana Williams	*Anthemus critinus* Prinsloo *et* Neser
D. graminis Green	*Adelencyrtus chionaspidis* (Howard)
	Anthemus chionaspidis (Howard)
D. noaeae Hall	*Coccidencyrtus duplachionaspidis* Myartseva
D. pavettae Balachowsky	*Habrolepis guineensis* Ferrière
D. phragmitis Borchsenius	*Adelencyrtus moderatus* (Howard)
D. sansevieriae Williams	*A. odonaspidis* Fullaway
Dynaspidiotus britannicus Newstead	*Coccidencyrtus dynaspidioti* Battaglia
Entaspidiotus lounsburyi Marlatt	*Anthemus maurus* Prinsloo *et* Neser
Evallaspis ampelodesmae Newstead	*A. evallaspidis* Ferrière
Fiorinia externa Ferris	*Arrhenophagus albitibiae* Girault
F. saprosmae Green	*A. albitibiae*
Frogatiella penicillata Green	*Caenohomalopoda shikokuensis* (Tachikawa)
Furcaspis oceanica Lindinger	*Adelencyrtus oceanicus* (Doutt)
Hemiberlesia diffinis Newstead	*Plagiomerus cyaneus* (Ashmead)
H. lataniae Signoret	*Habrolepis diaspidi* (Risbec)
Hemichionaspis minor Maskell	*Adelencyrtus minutus* (Girault)
Insulaspis sp.	*Coccidencyrtus exiguus* Noyes *et* Ren
Ledaspis distincta Leonardi	*Anthemus ledaspidis* Prinsloo *et* Neser
	Habrolepis obscura Compere *et* Annecke
Lepidosaphes salicina Borchsenius	*Coccidencyrtus lepidosaphidis* Sharkov
L. newsteadi Šulc	*Habrolepis rouxi* Compere
L. ulmi Linnaeus	*Epitetracnemus intersectus* (Fonscolombe)
L. ussuriensis Borchsenius	*Coccidencyrtus lepidosaphidis* Sharkov
Leucaspis pini Hartig	*Anthemus pini* Ferriére
L. pusilla Loew	*A. pini*
Leucaspis spp.	*A. leucaspidis* Mercet

Hosts	Parasitoids
Lindingaspis greeni Brain *et* Kelly	*Habrolepis setigera* Annecke *et* Mynhardt
L. rossi Maskell	*H. obscura* Compere *et* Annecke
L. setiger Maskell	*Epitetracnemus lindingaspidis* (Tachikawa)
Melanaspis corticosa Brain	*H. obscura*
M. glomerata Green	*Adelencyrtus mayurai* (Subba Rao)
M. phenax Cockerell	*H. occidua* Annecke *et* Myrhardt
Namaquea simplex Munting	*H. namibiensis* Prinsloo *et* Annecke
Nelaspis exalbida Cockerell	*Anthemus aloinis* Prinsloo *et* Neser
Nuculaspis tsugae Marlatt	*Arrhenophagus albitibiae* Girault
Odonaspis bambusarum Cockerell	*Epitetracnemus japonicus* (Ishii)
O. greeni Cockerell	*Caenohomalopoda guamensis* (Fullaway)
O. janeirensis Hempel	*Adelencyrtus odonaspidis* Fullaway
O. ruthae Kotinsky	*A. odonaspidis*
O. secreta Cockerell	*Caenohomalopoda koreana* Tachikawa, Paik *et* Paik
	C. shikokuensis (Tachikawa)
	Homalopoda cristata Howard
Odonaspis sp.	*Ameromyzobia aphelinoides* Girault
Paradiaspis lizeriana Lahille	*Coccidencyrtus blanchardi* (De Santis)
Parainsulaspis laterochitinosa Green	*C. exiguus* Noyes *et* Ren
Parlatoria oleae Colvée	*Anthemus aspidioti* Nikolskaya
	A. inconspicuus Doutt
	Habrolepis rouxi Compere
	H. tergrigorianae Trjapitzin
P. ziziphi Lucas	*H. diaspidi* (Risbec)
Phenacaspis cockerelli Cooley	*Arrhenophagus albitibiae* Girault
P. dilatata Green	*Adelencyrtus mangiphila* (Risbec)
Phenacaspis sp.	*Coccidencyrtus mandibularis* Hayat, Alam *et* Agarwal

Hosts	Parasitoids
Pinnaspis strachani Cooley	*Adelencyrtus coxalis* Hayat, Alam *et* Agarwal
	Arrhenophagus chionaspidis Aurivillius
	Coccidencyrtus mandibularis Hayat, Alam *et* Agarwal
	Habrolepis apicalis Waterston
	H. diaspidi (Risbec)
Pseudaonidia duplex Cockerell	*Epitetracnemus lindingaspidis* (Tachikawa)
P. trilobitiformis Green	*H. neocaledonensis* Fabres
Pseudaulacaspis pentagona Targioni Tozzetti	*Adelencyrtus aulacaspidis* (Brèthes)
	Arrhenophagus albitibiae Girault
	A. chionaspidis Aurivillius
	Epitetracnemus comis Noyes *et* Ren
	E. lindingaspidis (Tachikawa)
Pseudotargionia glandulosa Newstead	*Habrolepis occidua* Annecke *et* Mynhardt
Pseudotargionia sp.	*H. occidua*
Pudaspis newsteadi Leonardi	*H. diaspidi* (Risbec)
Rolaspis sp.	*Arrhenophagoidea rolaspidis* Annecke *et* Prinsloo
Schizotargionia arthrophyti Archangelskaya	*Coccidencyrtus schizotargioniae* Myartseva
Selenaspidus celastri Maskell	*H. diaspidi*
S. pertusus Brain	*H. diaspidi*
Separaspis capensis Walker	*H. obscura* Compere *et* Annecke
Targionia dearnessi Cockerell	*Coccidencyrtus ensifer* (Howard)
T. vitis Signoret	*H. pascuorum* Mercet
Tecaspis visci Brain	*H. diaspidi* (Risbec)
Unaspis citri Comstock	*Arrhenophagus chionaspidis* Aurivillius
Versiculaspis sp.	*Arrhenophagoidea sierra* Annecke *et* Prinsloo

Hosts	Parasitoids
Diaspididae gen. sp.	*Adelencyrtus bifasciatus* (Ishii) *A. clavatus* Hayat, Alam *et* Agarwal *A. funicularis* Hayat, Alam *et* Agarwal *A. inglisiae* Compere *et* Annecke *Anthemus montanus* Prinsloo *et* Neser *Arrhenophagoidea coloripes* Girault *Arrhenophagus chionaspidis* Aurivillius *Coccidencyrtus artemisiae* Myartseva *C. ensifer* (Howard) *Habrolepis obscura* Compere *et* Annecke
Coccoidea gen. sp.	*Acerophagoides triangularis* Ev. Blanchard *Nassauia secunda* Girault *Solenaphycus vianai* De Santis
Lepidoptera	
Pyralidae	
Cnaphalocrocis medinalis Guenée	*Copidosomopsis coni* Trjapitzin, Voinovich *et* Sharkov
Lamprosema octasema Meyrick	*C. nacoleiae* (Eady)
Pyralidae gen. sp.	*C. perminuta* Girault
Pyraustidae	
Parotis vertumnalis Guenée	*C. nacoleiae*
Phycitidae	
Anagasta kuehniella Zeller	*C. tanytmemus* Caltagirone
Ectomyelois ceratoniae Zeller	*C. plethorica* (Caltagirone)
Paramyelois transitella Walker	*C. plethorica*
Tortricidae	
Cydia cariana Fitch	*C. plethorica*
Gracillariidae	
Parornix persicella Danilevsky	*Holcothorax kopetdagicus* Myartseva
Lithocolletidae	
Phyllonorycter blancardella Fabricius	*H. testaceipes* (Ratzeburg)

Hosts	Parasitoids
P. crataegella Clemens	*H. testaceipes*
P. milierella Staundinger	*H. kopetdagicus*
Phyllonorycter spp.	*H. testaceipes*
Diptera	
Chloropidae	
Chlorops ingratus Williston	*Meromyzobia maculipennis* (Ashmead)
Tabanidae gen. sp.	*Pseudaphycus austriacus* Mercet
Hymenoptera	
Apidae	
Allodape exoloma Strand	*Xylencyrtus tridens* Annecke
A. grandiceps Friese	*X. tridens*
A. mucronata Smith	*X. tridens*
A. panurgoides Smith	*X. tridens*
A. rufogaster Lepeletier *et* Serville	*X. tridens*
Allodape sp.	*X. tridens*
Allodapula melanopus Cameron	*X. mumifex* Annecke
Allodapula sp.	*X. tridens*
Dryinidae	
Dicondylus sibiricus N. Ponomarenko	*Helegonatopus rasnitzyni* (Trjapitzin)
Gonatopus rossicus N. Ponomarenko	*H. dimorphus* (Hoffer)
Gonatopus sp.	*H. eximia* (Perkins)
Gonatopus sp. (?)	*H. pseudophanes* Perkins
Haplogonatopus vitiensis Perkins	*H. pseudophanes*
Pseudogonatopus distinctus Kieffer	*H. rasnitzyni*
P. hospes Perkins	*H. pseudophanes*
Dryinidae gen. sp.	*H. dimorphus*
	H. ponomarenkoi (Trjapitzin)
	H. saotomensis Prinsloo
Encyrtidae	
Psyllaephagus spp.	*Trechnites flavipes* (Mercet)
	T. trjapitzini Sugonjaev

Chapter 6

DISCUSSION

All cases of reduction of number of funicular segments can be divided in five categories.

1. Equal reduction of number of funicle segments in both sexes of all species of the genus.

The following 22 genera belong to this category: *Acerophagoides* (funicle of female 5-segmented, male 5-segmented), *Acerophagus* (5-5), *Americencyrtus* (5-5), *Ameromyzobia* (5-5), *Aphyculus* (5-5), *Aphycinus* (5-5), *Archinus* (5-5), *Arhopoidiella* (5-5), *Blanchardiscus* (5-5), *Bothriocraera* (5-5), *Cercobelus* (4-4), *Coccidaphycus* (5-5), *Gavria* (4-4), *Pseudaphycus* (5-5), *Pseudectroma* (5-5), *Pseudorhopus* (5-5), *Psyllechthrus* (2-2), *Solenaphycus* (5-5), *Stemmatosteres* (5-5), *Tetracnemoidea* (5-5), *Trechnites* (5-5) and *Xylencyrtus* (5-5). So, about 1/3 from all 64 genera of Encyrtidae which have reduced number of funicle segments.

These genera represent various tribes of the subfamily Encyrtinae, and two of them, *Gavria* and *Tetracnemoidea*, are members of the subfamily Tetracneminae. So, this character cannot be used by elaboration of higher classification of Encyrtidae. For example, Hoffer (1955b) committed a serious mistake combining in his tribe Cercobelini the genera *Cercobelus* and *Plagiomerus,* only based on the 4-segmented funicle of both genera. According to Mayr *et al.* (1953), it is a case of convergence.

2. Reduction of number of funicle segments only in females, whereas it remains to be the generalized number 6 in males.

To this category belong the genera *Anthemus* (funicle of female 5-segmented, male 6-segmented, but 6-6 is possible as well), *Brachyplatycerus* (4-6), *Copidosomopsis* (5-6), and *Holcothorax* (5-6).

3. The number of funicle segments in female less than in males, but the latter is also reduced.

Here belongs the genus *Marxella* (funicle of female 3-segmented, in male 5-segmented).

4. The number of funicle segments more in females than in males.

In this category belong the genera *Adelencyrtus* (funicle of females is 6-segmented, male 2-segmented), *Aethognathus* (6-4), *Aenasius* (6-5, but often 6-6), *Blepyrus* (6-5), *Caenohomalopoda* (4-2), *Epitetracnemus* (6-2), *Epitetralophidea* (6-2), *Erencyrtus* (6-2), *Habrolepis* (6-2), *Hambletonia* (6-5), *Helegonatopus* (6-5, but in one case, *H. nikolskajae* Hoffer, 6-6) and *Plagiomerus* (4-2). Among these genera, *Adelencyrtus*, *Epitetracnemus*, *Epitetralophidea*, *Habrolepis* and *Plagiomerus* are characterized by 2-segmented funicle of males formed by ring-segments and a very long undivided clava. They constitute a monophyletic group, the subtribe Habrolepidina of the tribe Habrolepidini. Similar construction of male antenna has the genus *Erencyrtus*, but it belongs to the subtribe Microteryina of the tribe Microteryini. In the other subfamily, Tetracneminae, such type of male antenna may be found in the genus *Aenasius*.

5. A peculiar category constitute the genera *Arrhenophagus* and *Arrhenophagoidea*, referred to the tribe Arrhenophagini. In *Arrhenophagus* 2-3 ring-segment are adpressed to a giant clava (2-5 ring-segments in *Arrhenophagoidea*).

All these phenomena are in accordance with the rule of oligomerization of homologous organs as one of the main ways of evolution of animals, developed by Dogiel (1954), and treated by Gorodkov (1983, 1984, 1985). According to this rule, a number of homologous organs possessed by nonspecialized ancestors decreases when they evolve into their more specialized descendants. Usually, the oligomerization is caused by miniaturization of organisms, such is the case also in the family Encyrtidae: among them, extremely miniaturized species belonging to the genus *Arrhenophagus* (length of body 0.5-0.6 mm) have most reduced number of funicular segments, which are ring-like and adpressed to giant clava. The development of a giant clava has compensatory significance, necessary for normal function of antenna, thus the oligomerization is connected with morfological differenciation of organs. In this genus, the number of tarsi segments is also reduced up to 4.

In the monophyletic subtribe Aphycina, the most archaic genus is *Aphycus*, having a 6-segmented funicle in both sexes and the length of female body in Palaearctic species is in average not less than 1 mm and may attain 1.4 mm, whereas nearly all members of the genera *Acerophagus*, *Aphyculus*, *Aphycinus*, *Bothriocraera*, *Pseudaphycus*, *Pseudectroma* and *Stemmatosteres*, characterized by 5-segmented funicles, have female body length in average not more than 0.7 mm, and only rarely attain 1 mm. The minimum length of *Aphycus* female body is 0.67 mm, in the rest of genera in the subtribe is 0.25 mm (in the genus *Aphyculus*).

But there are cases when oligomerization of funicle segments of Encyrtidae is not connected with species body size (for example, in males of the genera *Aenasius*, *Blepyrus*, *Aethognathus*, *Erencyrtus*). This is a phenomenon of morphological specialization on male antenna, when maximum of sensorial workload is transferred to clava.

Compere, H. & D. P. Annecke. 1960. A reappraisal of *Aphycus* Mayr, *Metaphycus* Mercet, and allied genera (Hymenoptera: Encyrtidae), *Journal of the Entomological Society of Southern Africa* 23 (2): 375-389.

Compere, H. & D. P. Annecke. 1961. Descriptions of parasitic Hymenoptera and comments (Hymenoptera: Aphelinidae, Encyrtidae, Eulophidae). *Journal of the Entomological Society of Southern Africa* 24 (1): 17-71.

Compere, H. & S. E. Flanders. 1934. *Anarhopus sydneyensis* Timberlake, an encyrtid parasite of *Pseudococcus longispinus* (Targ.), recently introduced into California from Australia. *Journal of Economic Entomology* 27 (5): 966-973.

Compere, H. & H. S. Smith. 1932. The control of Citrophilous Mealybug, *Pseudococcus gahani*, by Australian parasites. *Hilgardia* 6 (17): 585-618.

Compere, H. & G. Zinna. 1955. Tre nuovi generi e cinque nuove specie di Encyrtidae. *Bollettino del Laboratorio di Entomologia Agraria "Filippo Silvestri", Portici* 14: 94-116.

Crawford, J. C. 1910. Three new genera and species of parasitic Hymenoptera. *Proceedings of the United States National Museum* 38 (1730): 87-90.

Dahms, E. & G. Gordh. 1997. A review of the genera of Australian Encyrtidae (Hymenoptera: Chalcidoidea) described from Australia by A. A. Girault with a Checklist of included species. *Memoirs on Entomology, International* (Gainesville, Florida, USA) 9: i-v + 1-518.

Darling, C. D. 1991. *Bohpa maculata*, a new genus and species of Ceinae from South Africa (Hymenoptera: Chalcidoidea: Pteromalidae). *Proceedings of the Entomological Society of Washington.* 93 (3): 622-629.

Delucchi, V. 1965. Les *Habrolepis* Foerster, 1856 (Hymenoptera: Chalcidoidea, Encyrtidae). *Entomophaga* 10 (3): 295-304.

De Santis, L. 1964 (1963). Encírtidos de la República Argentina (Hymenoptera: Chalcidoidea). *Anales de la Comisión de Investigación Científica, Provincia de Buenos Aires, Gobernación* 4: 9-422.

De Santis, L. 1972. Adiciones a la fauna argentina de encírtidos. III (Hymenoptera: Chalcidoidea). *Revista Peruana de Entomología Agrícola* 15 (1): 44-60.

REFERENCES

Agarwal, M.M. 1965. Taxonomy of encyrtid parasites (Hymenoptera, Chalcidoidea) of Indian Coccoidea. *Acta Hymenopterologica* (Fukuoka, Japan) 2 (2): 37-97.

Alam, M. S. 1957. The taxonomy of some British encyrtid parasites (Hymenoptera) of scale insects (Coccoidea). *Transactions of the Royal Entomological Society of London* 109 (15): 421-466.

Annecke, D. P. 1962. Records and descriptions of African Encyrtidae -1 (Hymenoptera: Chalcidoidea). *Journal of the Entomological Society of Southern Africa* 25 (2): 170-191.

Annecke, D. P. 1968. Records and descriptions of African Encyrtidae -4 (Hymenoptera: Chalcidoidea). *Journal of the Entomological Society of Southern Africa* 31 (2): 249-264.

Annecke, D. P. & H. P. Insley. 1971. Catalogue of Ethiopian Encyrtidae and Aphelinidae (Hymenoptera: Chalcidoidea). *Entomology Memoir, Department of Agricultural Technical Services, Republic of South Africa* 23: 1-53.

Annecke, D. P. & M. J. Mynhardt, 1970a. On some species of *Habrolepis* Foerster and *Adelencyrtus* Ashmead (Hymenoptera: Encyrtidae) in Southern Africa and Mauritius. *Entomophaga* 15 (2): 127-148.

Annecke, D.P. & M. J. Mynhardt, 1970b. On the genera *Allocerellus* Silvestri, 1915 and *Erencyrtus* Mahdihassan, 1923 in South Africa (Hymenoptera: Encyrtidae). *Revue de Zoologie et de Botanique Africaines* (Bruxelles) 82 (1-2): 85-110.

Annecke, D. P. & G. L. Prinsloo. 1974. On some new and described species of arrhenophagine Encyrtidae (Hymenoptera). *Journal of the Entomological Society of Southern Africa* 37 (1): 35-47.

Ashmead, W.H. 1900. On the genera of chalcid-flies belonging to the subfamily Encyrtinae. *"Proceedings of the United States National Museum* 22 (1202): 323-412.

Askew, R. R. 1983. A revision of the encyrtid genus *Holcothorax* (Hymenoptera). *Systematic Entomology* 8 (2): 131-136.

Aurivillius, C. 1888. *Arrhenophagus,* ett nytt slägte bland Encyrtiderna. *Entomologisk Tidskrift* 9: 142-147.

Bakkendorf, O. 1939. Verzeichnis der Trichogrammatiden und Mymariden aus dem Kanjer-Moor nebst Beschreibung einer neuen Art der Aphelinidae (Hym.). *Korespbl. Naturforsch. Verein Riga* 63: 83-86 [*Latvijas Biologijas Biedribas Raksti* 11: 83-86].

Bakkendorf, O. 1965. Perilampidae, Eupelmidae, Encyrtidae (Hym., Chalcidoidea) from the Hansted Reservation with description of new species. *Entomologiske Meddelelser* 30 (2): 105-187.

Beardsley, J. W. 1976. A synopsis of the Encyrtidae of the Hawaiian Islands with keys to genera and species (Hymenoptera: Chalcidoidea). *Proceedings of the Hawaiian Entomological Society* 22 (2): 181-228.

Bennett, F. D. 1955. Encyrtidae from Trinidad, B. W. I. Three species of *Pseudaphycus* reared from mealybugs. *Canadian Entomologist* 87 (9): 413-416.

Blanchard, E. E. 1940. Apuntes sobre Encírtidos argentinos. *Anales de la Sociedad Científica Argentina* 130 (3): 106-128.

Bouček, Z. & M. W. R. de V. Graham. 1978a. Chalcidoidea. *In*: Fitton, M. G., M. W. R. de V. Graham & Z. Bouček (Eds.). A check list of British Insects. *Handbook for Identification of British Insects* 11 (4) (Hymenoptera): 67-110.

Bouček, Z. & M. W. R. de V. Graham. 1978b. British check-list of Chalcidoidea (Hymenoptera): taxonomic notes and additions. *Entomological Gazette* 29 (4): 225-235.

Brèthes, J. 1916. Hyménoptères parasites de l'Amérique meridional. *Anales del Museo Nacional de Historia Natural de Buenos Aires* 27: 401-430.

Caltagirone, L. E. 1966. A new *Pentalitomastix* from México (Hymenoptera: Encyrtidae). *Pan-Pacific Entomologist* 42 (2): 145-151.

Caltagirone, L. E. 1985. New *Copidosomopsis* (Hymenoptera: Encyrtidae) from California, with comments on the genus. *Annals of the Entomological Society of America* 78 (6): 705-708.

Clancy, D. W. 1934. The biology of *Tetracnemus pretiosus* Timberlake. *University of California Publications in Entomology* 6 (8): 231-248.

Clausen, C. P. 1915. Mealy bugs of citrus trees. *Bulletin of the California University Agricultural College, Berkeley* (California, USA) 258: 19-48.

Compere, H.1926. New coccid-inhabiting parasites (Encyrtidae, Hymenoptera) from Japan and California. *University of California Publications in Entomology* 4 (2): 33-50.

Compere, H. 1928. New coccid-inhabiting parasites from Africa and California. *University of California Publications in Entomology* 4 (8): 209-230.

Compere, H. 1931. New encyrtid (hymenopterous) parasites of *Pseudococcus* species from Eritrea. *University of California Publications in Entomology* 5 (14): 265-274.

Compere, H.1936. A new genus and species of Encyrtidae parasitic in the Pineapple Mealybug, *Pseudococcus brevipes* (Cockerell). *Proceedings of the Hawaiian Entomological Society* 9 (2): 171-174.

Compere, H. 1937. The species of *Aenasius*, encyrtid parasites of mealybugs. *Proceedings of the Hawaiian Entomological Society* 9 (3): 383-404.

Compere, H. 1939a. A second report on some miscellaneous African Encyrtidae in the British Museum. *Bulletin of Entomological Research* 30 (1): 1-26.

Compere, H. 1939b. Mealybugs and their enemies in South America. *University of California Publications in Entomology* 7 (4): 57-74.

Compere, H. & D. P. Annecke. 1960. A reappraisal of *Aphycus* Mayr, *Metaphycus* Mercet, and allied genera (Hymenoptera: Encyrtidae), *Journal of the Entomological Society of Southern Africa* 23 (2): 375-389.

Compere, H. & D. P. Annecke. 1961. Descriptions of parasitic Hymenoptera and comments (Hymenoptera: Aphelinidae, Encyrtidae, Eulophidae). *Journal of the Entomological Society of Southern Africa* 24 (1): 17-71.

Compere, H. & S. E. Flanders. 1934. *Anarhopus sydneyensis* Timberlake, an encyrtid parasite of *Pseudococcus longispinus* (Targ.), recently introduced into California from Australia. *Journal of Economic Entomology* 27 (5): 966-973.

Compere, H. & H. S. Smith. 1932. The control of Citrophilous Mealybug, *Pseudococcus gahani*, by Australian parasites. *Hilgardia* 6 (17): 585-618.

Compere, H. & G. Zinna. 1955. Tre nuovi generi e cinque nuove specie di Encyrtidae. *Bollettino del Laboratorio di Entomologia Agraria "Filippo Silvestri", Portici* 14: 94-116.

Crawford, J. C. 1910. Three new genera and species of parasitic Hymenoptera. *Proceedings of the United States National Museum* 38 (1730): 87-90.

Dahms, E. & G. Gordh. 1997. A review of the genera of Australian Encyrtidae (Hymenoptera: Chalcidoidea) described from Australia by A. A. Girault with a Checklist of included species. *Memoirs on Entomology, International* (Gainesville, Florida, USA) 9: i-v + 1-518.

Darling, C. D. 1991. *Bohpa maculata*, a new genus and species of Ceinae from South Africa (Hymenoptera: Chalcidoidea: Pteromalidae). *Proceedings of the Entomological Society of Washington.* 93 (3): 622-629.

Delucchi, V. 1965. Les *Habrolepis* Foerster, 1856 (Hymenoptera: Chalcidoidea, Encyrtidae). *Entomophaga* 10 (3): 295-304.

De Santis, L. 1964 (1963). Encírtidos de la República Argentina (Hymenoptera: Chalcidoidea). *Anales de la Comisión de Investigación Científica, Provincia de Buenos Aires, Gobernación* 4: 9-422.

De Santis, L. 1972. Adiciones a la fauna argentina de encírtidos. III (Hymenoptera: Chalcidoidea). *Revista Peruana de Entomología Agrícola* 15 (1): 44-60.

De Santis, L. & E. G. Virla. 1991. Sobre dos encírtidos parasitoides de driinidos en la República Argentina (Insecta, Hymenoptera). *Sesión Ordinaria de la Academia Nacional de Agronomía y Veterinaria, Rep. Argentina* 45 (3): 5-19.

Dogiel, V. A. 1954. *Oligomerization of homologous organs as one of the main ways of evolution of animals*. Leningrad, Leningrad University. 368 pp. (In Russian).

Doutt, R. L. 1951. The parasite complex of *Furcaspis oceanica* Lindinger. *Annals of the Entomological Society of America*. 43: 501-507.

Doutt, R. L. & R. A. Smith. 1950. Males and intersexes in a normally thelyotokous insect, *Tropidophryne melvillei* Compere (Hymenoptera, Encyrtidae). *Canadian Entomologist* 82 (8): 165-170.

Eady, R. D. 1960a. A new genus and two new species of Encyrtidae (Hymenoptera, Chalcidoidea) from the Banana Scab Moth, *Nacoleia octasema* (Meyr.). *Bulletin of Entomological Research* 50 (4): 667-670.

Eady, R. D. 1960b. *Pentalitomastix*, a new name for *Pseudolitomastix* Eady (Hymenoptera, Chalcidoidea). *Bulletin of Entomological Research* 51 (1): 173.

Erdős, J. 1946. Genera nova et species novae Chalcidoidarum (Hym.). *Annales Historico-Naturales Musei Nationalis Hungarici* 39 (9): 131-165.

Erdős, J. 1955. Encyrtidae novae Hungariae et regionum finitimarum. *Acta Zoologica Academiae Scientiarum Hungaricae* 1 (3/4): 187-229.

Erdős, J. 1957. Series Encyrtidarum novarum hungaricarum. *Acta Zoologica Academiae Scientiarum Hungaricae* 3 (1-2): 5-87.

Erdős, J. 1964. 10 család: Encyrtidae-szivárványfürkészek. Fémfürkészek: Magyarország Állatvilága. XII. Köt. Hymenoptera II. 4 Füz. Fémfürkészek - Chalcidoidea III. Budapest. 320 pp. (Fauna hung: N 73). (In Hungarian).

Érdős, J. & S. Novicky. 1955. Genera Encyrtidarum regionis palaearcticae. *Beiträge zur Entomologie* 5 (1/2): 165-202.

Fatima, A. & S. A. Shafee. 1993. Studies on the taxonomy of the Indian encyrtids (Hymenoptera: Encyrtidae). *Aligarh Muslim University Publication, Zoological Series on Indian Insect Types* 25: I-VIII + 1-141.

Ferrière, C. 1935. The chalcidoid parasites of lac-insects. *Bulletin of Entomological Research* 26 (3): 391-406.

Ferrière, C.1949. Notes sur quelques Encyrtidae de la Suisse (Hym., Chalcidoidea). *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* 22 (4): 369-384.

Ferrière, C. 1955. Encyrtides nouveaux ou peu connus (Hym., Chalcidoidea). *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* 28 (1): 115-136.

Ferrière, C. 1961. Encyrtides paléarctiques parasites de psylles. *Entomophaga* 6 (1): 39-51.

Ferrière, C.1965. Une nouvelle espéce d'*Anthemus* de l'Afrique du Nord (Hym., Encyrtidae). *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* 37 (3): 123-126.

Foerster, A. 1856. *Hymenopterologishe Studien. II. Heft. Chalcidiae and Proctotrupii.* Aachen. 152 S.

Fullaway, D. T. 1913. Report of the entomologist: scale insects parasites. *Report of the Hawaii Agricultural Experiment Station 1912*: 26-31.

Gahan, A. B. 1924. Some new parasitic Hymenoptera with notes on several described forms. *Proceedings of the United States National Museum* 65 (2517): 1-23.

Gahan, A. B. 1927. On some chalcidoid scale parasites from Java. *Bulletin of Entomological Research* 18 (2): 149-153.

Gahan, A. B. 1946. Eight new species of chalcid-flies of the genus *Pseudaphycus* Clausen, with a key to the species. *Proceedings of the United States National Museum* 96 (3200): 311-327.

Gahan, A. B. & M. M. Fagan. 1923. The type species of the genera of Chalcidoidea or chalcid-flies. *Bulletin of the United States National Museum* 124: I - III + 1-173.

Ghesquière J. 1946. Contribution à l'ètude des Microhyménoptères du Congo Belge. X-XI. *Revue de Zoologie et de Botanique Africaines* 39: 367-373.

Ghesquière J. 1950. Le genre *Anthemus* Howard nouveau pour la faune éthiopienne (Hym. Chalcidoidea, Encyrtidae). *Proceedings 8 th International Entomological Congress.* Stockholm 1948 1: 130-137.

Ghesquière J. 1958. Le premier oviparasite de psylle et son hôte *Trioza erythreae* (Del Guercio) au Congo Belge (Hymenoptera: Chalcidoidea, Encyrtidae; Homoptera: Psyllidae). *Proceedings 10 th International Entomological Congress* 1: 275-280.

Ghesquiére J. 1960. *Aethognathus cavilabris* (Waterston) status nov. et son parasite au Congo (Hymenoptera, Chalcidoidea, Encyrtidae et Eulophidae). *Revue de Zoologie et de Botanique Africaines* 62 (1-2): 45-52.

Ghesquière, J. 1968. Ethologie, biogeographie et brachyptérisme de *Psyllechthrus oophagus* Ghesquière (Hymenoptera: Chalcidoidea, Encyrtidae, Arrhenophaginae). *Revue de Zoologie et de Botanique Africaines* 78 (1-2): 46-52.

Gibson, G. A. P. & C. M. Yoshimoto. 1981. Redescription of *Tetracyclos boreios* (Hymenoptera: Encyrtidae), with a discussion of its placement and structure. *Canadian Entomologist* 113 (10): 873-881.

Girault, A. A. 1915a. Australian Hymenoptera Chalcidoidea - VII. The family Encyrtidae with descriptions of new genera and species. *Memoirs of the Queensland Museum* 4: 1-184.

Girault, A. A. 1915b. New genera of chalcidoid Hymenoptera. *Journal of the New York Entomological Society* 23 (3): 165-173.

Girault, A. A. 1916. A remarkable new genus of Encyrtidae from the West Indies, bearing two ring-joints. *Journal of the New York Entomological Society* 24 (3): 232-233.

Girault, A. A. 1917. New Australian Chalcid-flies (Hymenoptera, Chalcididae). *Insecutor Inscitiae Menstruus* 5: 133-155.

Girault, A. A. 1922. New chalcid flies from Australia. *Entomologist* 55 (712): 205-208.

Girault, A. A. 1923. New Encyrtidae from Australia - II (Hymenoptera). *Insecutor Inscitiae Menstruus* 11 (7-9): 141-148.

Girault, A. A. 1926. *Hymenoptera minutae nova Australiensis*. Brisbane, priv. publ.1p.

Girault, A. A. 1932. *New pests from Australia*, X. Brisbane, priv. publ. 6 pp.

Gordh, G. 1979. Family Encyrtidae. *In*: Krombein K. V., P. D. Hurd, D. R. Smith (Eds.). *Catalog of Hymenoptera in America North of Mexico.* Washington 1: 890-967.

Gordh, G. 1987. A taxonomic study of Nearctic *Meromyzobia* Ashmead, 1900 (Hymenoptera: Encyrtidae). *Pan-Pacific. Entomologist* 63 (1): 16-36.

Gordh, G. & L. Lacey. 1976. Biological studies of *Plagiomerus diaspidis* Crawford, a primary internal parasite of diaspidid scale insects (Hymenoptera: Encyrtidae; Homoptera: Diaspididae). *Proceedings of the Entomological Society of Washington* 78 (2): 132-144.

Gordh, G. & V. A. Trjapitzin. 1979. Review of genera of parasitic Hymenoptera of the tribe Chrysoplatycerini (Encyrtidae) with description of a new myrmecophilous genus from Tasmania. *Proceedings of the Zoological Institute, Academy of Sciences of the USSR* 82: 103-112. (In Russian).

Gorodkov, K. B. 1983. Oligomerization and evolution of systems of morphological structures. 1. Oligomerization and stabilization of number of the structures. *Zoologicheskiy Zhurnal* 62 (5): 661-674. (In Russian).

Gorodkov, K. B. 1984. Oligomerization and evolution of systems of morphological structures. 2. Oligomerization and body size decrease. *Zoologicheskiy Zhurnal* 63 (12): 1765-1778. (In Russian).

Gorodkov, K. B. 1985. Oligomerization and evolution of systems of morphological structures. 3. Prerequisites and consequences of oligomerization. *Zoologicheskiy Zhurnal* 64 (3): 325-335. (In Russian).

Graham, M. W. R. de V. 1969. Synonymic and descriptive notes on European Encyrtidae (Hym., Chalcidoidea). *Polskie Pismo Entomologiczne* 39 (2): 211-319.

Guerrieri, E. 1994 (1992). Description of *Eucoccidophagus adrianae* sp. n. with redescription of *Eucoccidophagus biroi* (Erdős) (Hymenoptera: Encyrtidae). *Bollettino del Laboratorio di Entomologia Agraria, Filippo Silvestri, Portici* 49: 161-168.

Haliday, A. H. 1840-1842. Plates A-P illustrating the genera of Chalcidoidea. *Entomologist* 1: V-VI (explanations of the plates).

Hayat, M. 1981. Taxonomic notes on Indian Encyrtidae (Hymenoptera: Chalcidoidea). II. *Colemania* 1: 17-29.

Hayat, M. & M. Verma. 1978. Species of *Helegonatopus* and *Parasyrpophagus* from India, with description of a new genus (Hymenoptera: Encyrtidae). *Oriental Insects* 12 (3): 355-364.

Hayat, M., S. M. Alam & M. M. Agarwal. 1975. Taxonomic survey of encyrtid parasites (Hymenoptera: Encyrtidae) in India. *Aligarh Muslim University Publications (Zoological Series) on Indian Insect Types* 9: i-iii + 1-112.

Herthevtzian, E. K. 1986. *Encyrtids (Encyrtidae) of Armenian SSR*. Erevan. 161 pp. (In Russian).

Hoffer, A. 1954. Encyrtidae našich státních přirodních reservací. II. Encyrtidae (Hymenoptera-Chalcidoidea), que in reservationibus naturae in Čechoslovakia occurunt. Pars II. *Ochrana Přírody* (Praha) 9: 169-173.

Hoffer, A. 1955a. Monografie československých druhù tribu Aphycini Hffr. Cast I. Šesta predbežná prace k monografickému zpracování čs. Encyrtidù. *Acta Societatis Entomologicae Čechosloveniae* 51: 71-114.

Hoffer, A. 1955b. Fylogenese a taxonomie čeledi Encyrtidae (Hym. Chalcidoidea). The phylogeny and taxonomy of the family Encyrtidae (Hym. Chalcidoidea). *Sborník Národního Musea v Praze (Acta Musei Nationalis Pragae)* 11 (B), 1: 1-21.

Hoffer, A. 1959. Miscellanea encyrtidologica III (Hym. Chalcidoidea). *Acta Entomologica Musei Nationalis Pragae* 33 (530): 5-36.

Hoffer, A. 1960. A revision of the Czechoslovak genera of the subfamily Encyrtinae with a reduced number of funicle segments (Hymenoptera, Chalcidoidea). *Acta Faunistica Entomologica Musei Nationalis Pragae* 6 (49): 93-119.

Hoffer, A. 1963. Descriptions of new species of the family Encyrtidae from Czechoslovakia (Hym., Chalcidoidea). I. *Acta Entomologica Musei Nationalis Pragae* 35: 549-592.

Hoffer, A. 1964. Notes on Arrhenophaginae (Hym., Chalcidoidea, Encyrtidae). *Acta Societatis Entomologicae Čechosloveniae* 61 (2): 118-122.

Hoffer, A. 1965. Předběžná správa o chalcidkách, parasitujících na druzich čeledi Dryinidae (Hym.) na území našeho státu. *Zprávy Československé Společnosti Entomologické při CSAV* 1 (3): 12-17.

Hoffer, A. 1969. Beschreibungen der neuen Arten der Familie Encyrtidae (Hym., Chalcidoidea) aus der Tschechoslowakei. IV. *Acta Entomologica Bohemoslovaca* 66 (3): 165-180.

Hoffer, A. 1977. Übersicht der tschechoslowakischen Arten der Gattung *Microterys* Thomson, 1876 (Hym., Chalc., Encyrtidae). *Studia Entomologica Forestalia* (Praha) 2 (11): 185-201.

Howard, L. O. 1894. Report on the Chalcididae of the subfamilies Chalcidinae, Eucharitinae, Perilampinae, Encyrtinae, Aphelininae, Pireninae, Elasminae, and Elachertinae (pp. 79-108). *In*: Riley, C. V., W. H. Ashmead & L. O. Howard. Report upon the parasitic Hymenoptera of the Island of St. Vincent. *Journal of the Linnean Society of London, Zoology* 25 (159-160): 56-254.

Howard, L. O. 1895. On the Bothriothoracinae insects of the United States. *Proceedings of the United States National Museum* 17 (1025): 605-613.

Howard, L. O. 1896. On some new parasitic insects of the subfamily Encyrtinae. *In:* Howard, L. O. & W. H. Ashmead. 1896. On some reared parasitic hymenopterous insects from Ceylon. *Proceedings of the United States National Museum* 18 (1035): 633-648.

Howard, L. O. 1897. On the Chalcididae of the Island of Grenada, B. W. I. *Journal of the Linnaean Society of London, Zoology* 26: 129-178.

Howard, L.O. 1898. On some new parasitic insects of the subfamily Encyrtidae. *Proceedings of the United States National Museum* 21 (1142): 231-248.

Ishii, T. 1928. The Encyrtinae of Japan. I. *Bulletin of the Imperial Agricultural Experiment Station of Japan* 3 (2): 79-160.

Jasnosh, V. A. 1971. Problems of control of *Parlatoria oleae*. *In*: Biological control methods against pests of fruit and vegetable cultures: 121-123. (In Russian).

Kaul, K. & M. M. Agarwal. 1985. Taxonomic studies on encyrtid parasitoids (Hymenoptera: Chalcidoidea) of India (with XVII plates). *Aligarh Muslim University Publications* [*Zoological Series*] *on Indian Insect Types* 13: i-viii + 1-89.

Kazmi, S. I. & M. Hayat. 1995. The species of *Trechnites* (Hymenoptera: Encyrtidae) from India and Sri Lanka. *Shushpa* (India) 2 (2): 87-94.

Kazmi, S.I. & M. Hayat. 1998. Revision of the Indian Copidosomatini (Hymenoptera: Chalcidoidea: Encyrtidae). *Oriental Insects* 32: 287-362.

Kerrich, G. J. 1953. Report on Encyrtidae associated with mealybugs on cacao in Trinidad, and on some other species related thereto. *Bulletin of Entomological Research* 44 (4): 789-810.

Kerrich, G. J. 1964. Insects of Campbell Island. Hymenoptera: Encyrtidae. *Pacific Insects Monograph* 7: 504-506.

Kerrich, G. J. 1967. On the classification of the anagyrine Encyrtidae, with a revision of some of the genera (Hymenoptera: Chalcidoidea). *Bulletin of the British Museum* (*Natural History*), *Entomology* 20 (5): 143-250.

Kerrich, G. J. 1978. A revision of the dinocarsiinae Encyrtidae with a study of the genus *Pelmatencyrtus* De Santis (Hymenoptera: Chalcidoidea). *Zoological Journal of the Linnaean Society* 62 (2): 109-159.

Kryger, J. P. 1942. *Tetracyclos boreios* n.g. et sp. (Hym., Chalcididae, Aphelinini) *Entomologiske Meddelelser* 22 (4): 260-263.

Kryger, J. P. 1951. Notes on chalcids. II. *Entomologiske Meddelelser* 26 (2): 98-121.

Liao Dingxi, Li Xuelin, Pang Xiongfei & Chien Tailu. 1987. Hymenoptera: Chalcidoidea (1). *Economic Insect Fauna of China* 34: I-X + 1-234. (In Chinese).

Mahdihassan, S. 1923. Classification of lac insects from physiological standpoint. *Journal of the Science Association of the Maharaja's College, Vizianagaram*, India 1: 47-99.

Mahdihassan, S. 1956. On *Erencyrtus dewitzii. Zoologischer Anzeiger* 156 (11/12): 288-293.

Mani, M. S. 1989. Chalcidoidea (Hymenoptera). Part 1 (Introduction, Agaontidae, Torymidae, Leucospididae, Chalcididae, Eurytomidae, Perilampidae, Eucharidae, Cleonymidae, Miscogasteridae, Pteromalidae, Eupelmidae and Encyrtidae). Fauna of India and the adjacent countries. *Zoological Survey of India* (Calcutta). Madras: i-XIV + 1-1067.

Mayr, E., E. G. Linsley & R. L. Usinger. 1953. *Methods and principles of Systematic Zoology*. New York. McGraw-Hill Book. 328 pp.

Mayr, G. 1876. Die europäischen Encyrtiden. *Verhandlungen der Zoologisch-Botanischen Gesellschaft in Wien* 25: 675-778.

Mercet, R. G. 1919. Encírtinos de España. *Boletín de la Real Sociedad Española de Historia Natural* 19: 96-102.

Mercet, R. G. 1921. *Himenópteros fam. Encírtidos. Fauna Ibérica*. Madrid: XI + 732 pp.

Mercet, R. G. 1922a. Encírtidos de Europa Central nuevos o poco conocidos. *Boletin de la Real Sociedad Española de Historia Natural* 22: 294-299.

Mercet, R. G. 1922b. Una subfamilia nueva de himenópteros calcidoideos. *Boletín de la Real Sociedad Española de Historia Natural* 22: 363-370.

Mercet, R. G. 1925. El género *Aphycus* y sus afines (Hym., Chalc.). *Eos* 1 (1): 7-31.

Myartseva, S. N. 1978. Two new species of the genus *Coccidencyrtus* (Hymenoptera, Encyrtidae) from Turkmenia. *Zoological Journal* 57 (11): 1735-1740. (In Russian).

Myartseva, S. N. 1980. Species of the genus *Microterys* Thomson (Hymenoptera, Encyrtidae) in the fauna of Turkmenia. *Izvestiya Akademii Nauk Turkmenskoy SSR, Ser. Biol. Nauk* 4: 43-53. (In Russian).

Myartseva, S. N. 1981. New species of encyrtids (Hymenoptera, Chalcidoidea) from Turkmenia, parasites of coccids (Homoptera, Coccoidea). *Izvestiya Akademii Nauk Turkmenskoy SSR, Ser. Biol. Nauk* 5: 70-77. (In Russian).

Myartseva, S. N. 1983a. New species of parasitic Hymenoptera (Hymenoptera, Encyrtidae). *Izvestiya Akademii Nauk Turkmenskoy SSR, Ser. Biol. Nauk* 1: 64-68 (In Russian).

Myartseva, S. N. 1983b. A review of encyrtids of the genus *Aphyculus* Hoffer (Hymenoptera, Chalcidoidea) of Palaearctic. *Izvestiya Akademii Nauk Turkmenskoy SSR, Ser. Biol. Nauk* 2: 33-39. (In Russian).

Myartseva, S. N. 1984. *Parasitic Hymenoptera of the family Encyrtidae (Hymenoptera, Chalcidoidea) of Turkmenistan and adjacent regions of the Middle Asia*, Ashkhabad, Ylym. 304 pp. (In Russian).

Myartseva, S. N. & V. A. Trjapitzin. 1976. A new species of encyrtids *Aphyculus tamaricicola* Myartseva *et* Trjapitzin, sp. n. (Hymenoptera, Encyrtidae) - a parasite from coccids on *Tamarix* in the southeast Turkmenistan. *Izvestiya Akademii Nauk Turkmenskoy SSR, Ser. Biol. Nauk* 2: 34-38. (In Russian).

Myartseva, S. N. & V. A. Trjapitzin. 1981. A new genus of Encyrtidae (Hymenoptera) from Georgia. *Zoologicheskiy Zhurnal* 60 (4): 621-628. (In Russian).

Nikolskaya, M. N. 1952. *Chalcids of the fauna of the USSR (Chalcidoidea)*. Moscow-Leningrad, Academy of Sciences of the USSR. 574 pp.(In Russian).

Nikolskaya, M. N. 1963. *The chalcid fauna of the U.S.S.R. (Chalcidoidea)*. Israel Program for Scientific Translations. Jerusalem. 593 pp.

Noyes, J. S. 1979. The West Indian species of Encyrtidae described by L. O. Howard, 1894 and 1897 (Hymenoptera, Chalcidoidea). *Systematic Entomology* 4 (2): 143-169.

Noyes, J. S. 1980. A review of the genera of Neotropical Encyrtidae (Hymenoptera: Chalcidoidea). *Bulletin of British Museum (Natural History), Entomology series* 41 (3): 107-253.

Noyes, J. S. 1988. Encyrtidae (Insecta: Hymenoptera). *Fauna of New Zealand* 13: 1-188.

Noyes, J. S. 1990. Chalcidoid parasitoids, pp. 247-262. *In*: Rosen, D. (Ed.). Armoured scale insects, their biology, natural enemies and control. Vol. 4B. Amsterdam. Elsevier Science Publishers. 688 pp.

Noyes, J. S. 2000. Encyrtidae of Costa Rica (Hymenoptera: Chalcidoidea) 1. The subfamily Tetracneminae, parasitoids of mealybugs (Homoptera: Pseudococcidae). *Memoirs of the American Entomological Institute* 62: 1-355.

Noyes, J. S. & P. Hanson. 1996. Encyrtidae (Hymenoptera: Chalcidoidea) of Costa Rica: the genera and species associated with jumping plant-lice (Homoptera: Psylloidea). *Bulletin of Natural History Museum. Entomology series* 65 (2): 105-164.

Noyes, J. S. & M. Hayat. 1984. A review of the genera of Indo-Pacific Encyrtidae (Hymenoptera: Chalcidoidea). *Bulletin of the British Museum (Natural History). Entomology series* 42 (3): 131-395.

Noyes, J. S. & M. Hayat. 1994. *Oriental mealybug parasitoids of the Anagyrini (Hymenoptera: Encyrtidae)*. CAB International. The Natural History Museum, London. 554 pp.

Noyes, J. S. & H. Ren. 1987. Two new species of Encyrtidae (Hymenoptera) reared from diaspidid scale insects (Homoptera: Diaspididae) in China. *Entomotaxonomia* 9 (3): 167-174.

Noyes, J. S. & H. Ren. 1995. Encyrtidae of Costa Rica (Hymenoptera: Chalcidoidea): the genus *Aenasius* Walker, parasitoids of mealybugs (Homoptera: Pseudococcidae). *Bulletin of the Natural History Museum London (Entomology series)* 64 (2): 117-163.

Noyes, J. S. & J. B. Woolley. 1994. North American encyrtid fauna (Hymenoptera: Encyrtidae): taxonomic changes and new taxa. *Journal of Natural History* 28 (6): 1327-1401.

Noyes, J. S., J. B. Wooley & G. Zolnerowich. 1997. Chapter 8. Encyrtidae, pp. 170-320. *In*: Gibson, G. A. P., J. T. Huber & J. B. Woolley (Eds.). 1997. Annotated keys to the genera of Nearctic Chalcidoidea (Hymenoptera). NRC Research Press, Ottawa, Canada. 794 pp.

Panis, A.&C. Pinet 1999. A discussion on some ecological factors affecting *Coccidencyrtus malloi* Blanchard (Hymenoptera:Encyrtidae) under glass in France. *Entomologica* (Bari) 33:419-422.

Peck, O. 1963. A catalogue of the Nearctic Chalcidoidea (Insecta: Hymenoptera). *Canadian Entomologist. Supplement* 30: 1-1092.

Perkins, R. C. L. 1906. Leaf-hoppers and their natural enemies (VIII). *Bulletin, Hawaiian Sugar Planters' Association Experiment Station (Entomology Series)* 1 (8): 239-267.

Podsiadlo, E. 1993. Variation in the taxonomic characters of the fore wings and antennae in females of *Habrolepis dalmani* (Westwood, 1837) (Hymenoptera, Chalcidoidea, Encyrtidae). *Annales Zoologici* (Warszawa) 44 (6): 65-73.

Prinsloo, G. L. 1974. A new species of *Arrhenophagoidea* Girault, 1915 (Hymenoptera: Encyrtidae) from South Africa. *Journal of the Entomological Society of Southern Africa* 37 (2): 257-260.

Prinsloo, G. L. 1975a. On some species of *Microterys* Thomson, 1876 (Hymenoptera: Encyrtidae) from Africa. *Journal of the Entomological Society of Southern Africa* 38 (1): 19-37.

Prinsloo, G. L. 1975b. The Australian species of *Microterys* Thomson (Hymenoptera: Encyrtidae). *Journal of the Australian Entomological Society* 14: 409-423.

Prinsloo, G. L. 1979. On some little-known African Encyrtidae (Hymenoptera: Chalcidoidea), with new records and descriptions of genera and species. *Journal of the Entomological Society of Southern Africa* 42 (1): 17-34.

Prinsloo, G. L. 1981. On the encyrtid parasites (Hymenoptera: Chalcidoidea) associated with psyllids (Hemiptera: Psylloidea) in southern Africa. *Journal of the Entomological Society of Southern Africa* 44 (2): 199-244.

Prinsloo, G. L. 1982. Two new South African species of *Timberlakia* Mercet (Hymenoptera: Encyrtidae), parasitic in mealybugs on citrus. *Journal of the Entomological Society of Southern Africa* 45 (2): 221-225.

Prinsloo, G. L. 1985. Afrotropical Encyrtidae (Hymenoptera: Chalcidoidea). *Journal of Natural History* 19: 277-284.

Prinsloo, G. L. 1988. A review of the encyrtid wasp tribe Aenasiini, with descriptions of new Afrotropical taxa (Hymenoptera: Chalcidoidea). *Journal of Natural History* 22 (6): 1465-1482.

Prinsloo, G. L. & D. P. Annecke. 1978. On some new and described Encyrtidae (Hymenoptera: Chalcidoidea) from the Ethiopian region. *Journal of the Entomological Society of Southern Africa* 41 (2): 311-331.

Prinsloo, G. L. & M. J. Mynhardt. 1981a. New species of coccoid-inhabiting Encyrtidae (Hymenoptera: Chalcidoidea) from South Africa. I. *Phytophylactica* 13: 149-154.

Prinsloo, G. L. & M. J. Mynhardt. 1981b. On two Encyrtidae parasites (Hymenoptera: Chalcidoidea) of the Rhodes-grass scale, *Antonina graminis* (Maskell) (Hemiptera: Pseudococcidae) in South Africa. *Journal of the Entomological Society of Southern Africa* 44 (2): 325-330.

Prinsloo, G. L. & M. J. Mynhardt. 1982. New species of coccoid-inhabiting Encyrtidae (Hymenoptera: Chalcidoidea) from South Africa. II. *Phytophylactica* 14: 35-41.

Prinsloo, G. L. & O. C. Neser. 1989. A revision of the genus *Anthemus* Howard Hymenoptera: Encyrtidae) in the Afrotropical region. *Revue Zool. Afr.* 103: 51-72.

Risbec, J. 1951. Les Chalcidoïdes d' A. O. F. *Mémoires de l' Institute Français d' Afrique Noire* 13: 7-409.

Risbec, J. 1958. Encyrtidae de Madagascar (Hym., Chalcid.). *Bulletin de l' Académie Malgache* 35: 17-44.

Rosen, D. 1969. A systematic study of the genus *Acerophagus* E. Smith, with descriptions of new species (Hym., Encyrtidae). *Hilgardia* 40 (2): 41-72.

Rosen, D. 1976. The species of *Microterys* (Hymenoptera: Encyrtidae). An annotated world list. *Annals of the Entomological Society of America* 69: 479-485.

Rosen, D. 1981. A new species of *Pseudaphycus* (Hym. Encyrtidae), with notes on the *angelicus* group. *Entomophaga* 26 (3): 251-263.

Shafee, S. A., S. M. Alam & M. M. Agarwal. 1975. Taxonomic survey of encyrtid parasites (Hymenoptera: Encyrtidae) in India. *Aligarh Muslim University Publications* (*Zoological Series*) *on Indian Insect Types* 10: i-iii + 1-125.

Sharipov, M. 1980. *Anthemus aspidioti* Nikolskaya, 1952 (Hymenoptera, Encyrtidae) - a parasite of armoured scales (Homoptera, Diaspididae) in the Middle Asia and Kazakhstan. *Entomologicheskoye Obozreniye* 59 (2): 381-384. (In Russian).

Sharkov, A. V. 1988. On systematic position of encyrtids from the genera *Eucoccidophagus, Quadrencyrtus, Oriencyrtus* and *Mira* (Hymenoptera, Encyrtidae). *Zoologicheskiy Zhurnal* 67 (8): 1251-1254. (In Russian).

Sharkov, A. V. & V. A. Trjapitzin. 1995. 41. Fam. Encyrtidae-encyrtids, pp. 178-256. *In:* Kupyanskaya A. N.(Ed.). Keys to insects of the Far East of Russia. Vol. 4. Neuropteroidea, Mecoptera, Hymenoptera. Part 2. Hymenoptera. Vladivostok, Dalnauka. 598 pp. (In Russian).

Sharkov, A. V. & J. B. Woolley. 1997. A revision of the genus *Hambletonia* Compere (Hymenoptera: Encyrtidae). *Journal of Hymenoptera Research* 6 (2): 191-218.

Shi Zenya, Si Shengli & Wang Hezhong. 1995. Two new species of the genus *Blastothrix* Mayr from China (Hymenoptera: Encyrtidae). *Acta Entomologica Sinica* 38 (3): 363-366.

Silvestri, F. 1915. Descrizione di nuovi Imenotteri Calcididi africani. *Bollettino del Laboratorio della R. Scuola d' Agricoltura* (Portici, Italia) 9: 337-377.

Smith, E. A. 1880. Biological and other notes on *Pseudococcus aceris. North American Entomologist* 1: 73-87.

Subba Rao, B. R. 1971. New genera and species of encyrtids (Hymenoptera: Encyrtidae). *Journal of Natural History* 5: 209-224.

Subba Rao, B. R. 1973. Descriptions of two new species of *Aethognathus* Silvestri (Hym., Encyrtidae). *Bulletin of Entomological Research* 62 (3): 443-447.

Subba Rao, B. R. 1976. Description of a new species of *Anthemus* Howard (Hymenoptera: Encyrtidae) parasitic on *Diaspidiotus prunorum* Laing (Coccoidea: Diaspididae) with some new combinations and synonyms. *Journal of Natural History* 10 (6): 685-689.

Sugonjaev, E. S. 1960. To the knowledge of genera of the *Aphycus* Mayr group (Hymenoptera, Chalcidoidea) of the European part of the USSR. *Entomologicheskoye Obozreniye* 39 (2): 364-383. (In Russian).

Sugonjaev, E. S. 1964. Palaearctic species of the genus *Blastothrix* Mayr (Hymenoptera, Chalcidoidea), their biology and useful role. Part I. *Entomologicheskoye Obozreniye* 43 (2): 368-390. (In Russian).

Sugonjaev, E. S. 1965. Palaearctic species of the genus *Blastothrix* Mayr (Hymenoptera, Chalcidoidea), their biology and useful role. Part II. *Entomologicheskoye Obozreniye* 44 (2): 395-410. (In Russian).

Sugonjaev, E. S. 1976. Chalcids of the genus *Microterys* Thomson (Hymenoptera, Chalcidoidea, Encyrtidae) - parasites of Coccidae in the USSR. *Entomologicheskoye Obozreniye* 55 (4): 912-927. (In Russian).

Sugonjaev, E. S. 1983. A review of chalcids of the genus *Blastothrix* Mayr (Hymenoptera, Encyrtidae) of North America. *Entomologicheskoye Obozreniye* 62 (3): 601-608. (In Russian).

Sugonjaev, E. S. 1984. Chalcids (Hymenoptera, Chalcidoidea) - parasites of Coccoidea (Homoptera) in the fauna of the USSR. A complex investigation of host-parasite systems in insects. Leningrad, Nauka, Leningrad division. 234 pp. *Trudy Zoologicheskogo Instituta AN SSSR* T.117. (In Russian).

Sugonjaev, E. S. 1989. Notes on taxonomy of encyrtid-wasps (Hymenoptera, Chalcidoidea, Encyrtidae), mainly parasites of soft scales (Homoptera, Coccoidea, Coccidae) in North America and West Indies. *Trudy Zoologicheskogo Instituta AN SSSR* 191: 90-102. (In Russian).

Sugonjaev, E. S. & T. Babaev. 1978. On chalcids (Hymenoptera, Chalcidoidea) - parasites of Coccidae (Homoptera, Coccoidea) in Tadzhikistan. *Entomologicheskoye Obozreniye* 57 (1): 48-67. (In Russian).

Sugonjaev, E. S. & V. A Trjapitzin. 1974. A new remarkable genus of the family Encyrtidae (Hymenoptera, Chalcidoidea) from the Primorye Territory of the USSR and from Mongolia. *Zoologicheskiy Zhurnal* 53 (2): 296-298. (In Russian).

Szelényi, G. 1972. Neue Encyrtiden aus Ungarn (Hymenoptera, Chalcidoidea). *Annales Historico-Naturales Musei Nationalis Hungarici* 64: 347-353.

Tachikawa, T. 1955. Notes on the genus *Anabrolepis* Timberlake, 1920 (Hymenoptera: Encyrtidae). *Memoirs of Ehime University*. Sect. 6 (Agr.). 1 (1): 9-14.

Tachikawa, T. 1956. Description of a new species of the genus *Pseudhomalopoda* Girault from Japan, with a list of the known species and their hosts of the *Habrolepis*-like genera (Hymenoptera: Encyrtidae). *Insecta Matsumurana* 20 (3/4): 90-96.

Tachikawa, T. 1963. Revisional studies on the Encyrtidae of Japan (Hymenoptera: Chalcidoidea). *Memoirs of Ehime University*. Sect. 6 (Agr.). 9 (1): 1-264.

Tachikawa, T. 1966. Discovery of the male of the genus *Pseudhomalopoda* (Hymenoptera: Chalcidoidea: Encyrtidae). *Transactions of the Shikoku Entomological Society* 9 (1): 29-30.

Tachikawa, T. 1974a. Notes on *Arhopoideus brevicornis* Girault, the type species of the genus (Hymenoptera: Chalcidoidea- Encyrtidae). *Transactions of the Shikoku Entomological Society* 12 (1/2): 23-31.

Tachikawa, T. 1974b. Illustrations of some known species of the genus *Arhopoideus* Girault (Hymenoptera: Chalcidoidea- Encyrtidae). *Transactions of the Shikoku Entomological Society* 12 (1/2): 33-94.

Tachikawa, T. 1978. A new species of *Pseudhomalopoda* from Indonesia (Hymenoptera: Chalcidoidea- Encyrtidae). *Transactions of the Shikoku Entomological Society* 14 (1/2):65-67.

Tachikawa, T. 1979. A revision of the genus *Pseudhomalopoda* Girault with the description of a new genus (Hymenoptera: Chalcidoidea- Encyrtidae). *Transactions of the Shikoku Entomological Society* 14 (3/4): 163-170.

Tachikawa, T. & E. W. Valentine. 1971. Notes on *Arhopoideus*-group (Hymenoptera: Chalcidoidea - Encyrtidae). *Transactions of the Shikoku Entomological Society* 11 (1): 21-30.

Tachikawa, T., W. H. Paik & J. C. Paik. 1981. A new species of the genus *Caenohomalopoda* Tachikawa (Hymenoptera: Encyrtidae) parasitic on *Odonaspis secreta* (Homoptera: Diaspididae) from Korea. *Transactions of the Shikoku Entomological Society* 15 (3/4): 183-186.

Thomson, C. G. 1876. *Skandinaviens Hymenoptera*. Lund 4. 259 pp.

Timberlake, P. H. 1916. Revision of the parasitic hymenopterous insects of the genus *Aphycus* Mayr, with notice of some related genera. *Proceedings of the United States National Museum* 50 (2136): 561-640.

Timberlake, P. H. 1918. New genera and species of Encyrtidae from California parasitic in mealybugs (Hymenoptera). *University of California Publications in Entomology* 1 (8): 347-367.

Timberlake, P. H. 1920. Descriptions of new genera and species of Hawaiian Encyrtidae (Hymenoptera), II. *Proceedings of the Hawaiian Entomological Society* 4 (2): 197-231.

Timberlake, P. H. 1922a. Descriptions of new genera and species of Hawaiian Encyrtidae (Hymenoptera), III. *Proceedings of the Hawaiian Entomological Society* 5 (1): 135-167.

Timberlake, P. H. 1922b. Notes on the identity and habits of *Blepyrus insularis* Cameron (Hymenoptera, Chalcidoidea). *Proceedings of the Hawaiian Entomological Society* 5 (1): 167-173.

Timberlake, P. H. 1924. Descriptions of new chalcid-flies from Hawaii and Mexico (Hymenoptera). *Proceedings of the Hawaiian Entomological Society* 5 (3): 395-417.

Timberlake, P. H. 1926. Miscellaneous new chalcid-flies of the hymenopterous family Encyrtidae. *Proceedings of the United States National Museum* 69 (2629): 1-34.

Timberlake, P. H. 1929. Three new species of the hymenopterous family Encyrtidae from New South Wales. *University of California Publications in Entomology* 5 (2): 5-18.

Trjapitzin, S. V. & V. A. Trjapitzin. 1999. Parasites of mealybugs (Homoptera, Pseudococcidae) on grape in Argentina with description of a new species of the genus *Aenasius* Walker (Hymenoptera, Encyrtidae). *Entomologicheskoye Obozreniye* 78 (1): 174-179. (In Russian).

Trjapitzin, V. A. 1962. New encyrtids (Hymenoptera, Encyrtidae) from USSR and Afghanistan. *Trudy Zoologicheskogo Instituta AN SSSR* 30: 278-290. (In Russian).

Trjapitzin, V. A. 1964. Encyrtids (Hymenoptera, Encyrtidae) - parasites of dryinids in the fauna of USSR. *Zoologicheskiy Zhurnal* 43 (1): 142-145. (In Russian).

Trjapitzin, V. A. 1967. Encyrtids (Hymenoptera, Encyrtidae) of Primorye Territory. *Trudy Zoologicheskogo Instituta AN SSSR* 41: 173-221. (In Russian).

Trjapitzin, V. A. 1968. A review of the fauna of encyrtids (Hymenoptera, Encyrtidae) of Caucasus. *Trudy Vsesoyuznogo Entomologicheskogo Obshchestva* 52: 43-125. (In Russian).

Trjapitzin, V. A. 1969. A Palaearctic representative of the genus *Parahomalopoda* (Hymenoptera, Encyrtidae). *Zoologicheskiy Zhurnal* 48 (8): 1252-1254. (In Russian).

Trjapitzin, V. A. 1971a. A new species of the genus *Ameromyzobia* (Hymenoptera, Encyrtidae) from the island of Cuba. *Zoologicheskiy Zhurnal* 50 (2): 289-292. (In Russian).

Trjapitzin, V. A. 1971b. Review of genera of Palaearctic encyrtids (Hymenoptera, Encyrtidae). *Trudy Vsesoyuznogo Entomologicheskogo Obshchestva* 54: 68-155. (In Russian).

Prof. Vladimir A. Trjapitzin

Work at the Research Center of "UAM Agronomia y Ciencias" - UAT since 1995, and has been researcher of the Zoological Institute in St. Petersburg for many years. He published several books and more than 220 scientific papers, mainly on taxonomy of Encyrtidae and other chalcidoids.
Member of the National System of Researchers in México since 1997, and of the Mexican Academy of Sciences since 1998.

Dr. Enrique Ruíz-Cancino

Work at "UAM Agronomía y Ciencias" - UAT since 1980, and coordinated 21 research projects on Economic Entomology and Taxonomy of Hymenoptera.
He published 85 scientific papers and 53 articles of scientific divulgation.
Create the Insects Museum of UAT.

Member of the National System of Researchers of México since 1989.

Trjapitzin, V. A. & G. Gordh. 1980. Encyrtids of the genus *Tetracnemoidea* Howard, 1898 (Hymenoptera, Chalcidoidea, Encyrtidae). *Entomologicheskoye Obozreniye* 59 (1): 169-175. (In Russian).

Trjapitzin, V. A. & E. Ruíz Cancino. 1998 (1997). *Pseudhomalopoda prima* Girault (Hymenoptera: Chalcidoidea: Encyrtidae), un parasitoide de la escama roja de Florida *Chrysomphalus aonidum* (Linnaeus) (Homoptera: Coccoidea: Diaspididae) en el estado de Tamaulipas, México. *Biotam* (Cd. Victoria, Tam., México) 9 (1): 1-6.

Trjapitzin, V. A. & E. Ruíz Cancino, 2000a. *Encírtidos (Hymenoptera: Encyrtidae) de importancia agrícola en México.* Serie Publicaciones Científicas, CIDAFF-UAT, No. 2 (Cd. Victoria, Tamaulipas, México). 162 pp.

Trjapitzin, V.A. & E. Ruíz Cancino. 2000b. A new species of the encyrtid genus *Tetarticlava* Noyes, 1980 (Hymenoptera:Encyrtidae) from Mexico. *Russian Entomological Journal* 9(3):267-268.

Trjapitzin, V. A. & A. V. Sharkov. 1992. A new species of the genus *Caenohomalopoda* Tachikawa (Hymenoptera, Encyrtidae) from Vietnam. *Trudy Zoologicheskogo Instituta RAN* 245: 174-178. (In Russian).

Trjapitzin, V. A., N. D. Voinovich & A. V. Sharkov. 1987. A new species of encyrtids of the genus *Copidosomopsis* Girault (Hymenoptera, Encyrtidae) from Vietnam. *In*: *Entomofauna Vietnama* (*Entomofauna of Vietnam*), Moscow: 172-177. (In Russian).

Vaughan, M. A. 1992. International biocontrol cooperation within Latin America, pp. 7-38. *In*: Proceedings of the International Organization for Biological Control (IOBC). Workshop on Opportunities for Implementation of Biocontrol in Latin America. (Coulson, J. R. & M. C. Zapater, Eds.).

Voinovich, N. D. & E. S. Sugonjaev. 1993. Peculiarities of parasitism of chalcids (Hymenoptera, Chalcidoidea) on soft scales (Homoptera, Coccoidea). V. Biology and preimaginal stages of *Pseudorhopus testaceus* Ratzeburg - a parasite of the minor spruce soft scale *Physokermes hemicriphus* Dalman. *Entomologicheskoye Obozreniye* 72 (3): 549-557. (In Russian).

Voinovich, N. D. & E. S. Sugonjaev. 1999. Peculiarities of parasitism of chalcids (Hymenoptera, Chalcidoidea) on soft scales (Homoptera, Coccoidea, Coccidae). VII: *Blastothrix truncatipennis* Ferrière, a parasite of *Eulecanium douglasi* Šulc in high latitudes. *Entomologicheskoye Obozreniye* 78 (3): 545-554. (In Russian).

Walker, F. 1846. Characters of some undescribed species of Chalcidites. *Annals and Magazine of Natural History* (1) 17 (111): 177-185.

Yoshimoto, C. M. 1972. A new species of the genus *Stemmatosteres* (Encyrtidae, Chalcidoidea). *Canadian Entomologist* 104 (11): 1837-1839.

Serie Publicaciones Científicas
CIDAFF - UAT

1. Origen del Maíz. 1999. Eleno Muñoz Mares.

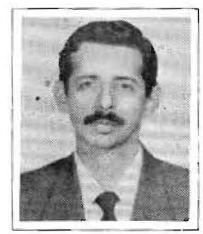
2. Encírtidos (Hymenoptera:Encyrtidae) de importancia agrícola en México. 2000. Vladimir Alexandrovich Trjapitzin y Enrique Ruíz Cancino.

3. A review of encyrtids (Hymenoptera:Chalcidoidea:Encyrtidae) of the world fauna with reduced number of funicle segments of antennae 2002. Vladimir Alexandrovich Trjapitzin and Enrique Ruíz-Cancino.

A REVIEW OF ENCYRTIDS (HYMENOPTERA:CHALCIDOIDEA:ENCYRTIDAE)
OF THE WORLD FAUNA WITH REDUCED NUMBER
OF FUNICLE SEGMENTS OF ANTENNAE
Printed in February, 2002
at the Talleres del Departamento de Fomento Editorial,
of the Universidad Autónoma de Tamaulipas.
Administrative Building
Centro Universitario "Adolfo López Mateos".
The book format was in change of the
Departamento de Fomento Editorial and
Centro de Investigación UAM Agronomía y Ciencias, UAT
This edition is 500 exemplars
plus reposition
Cd. Victoria, Tamaulipas. México

Prof. Vladimir A. Trjapitzin

Work at the Research Center of "UAM Agronomía y Ciencias" - UAT since 1995, and has been researcher of the Zoological Institute in St. Petersburg for many years. He published several books and more than 220 scientific papers, mainly on taxonomy of Encyrtidae and other chalcidoids.
Member of the National System of Researchers in México since 1997, and of the Mexican Academy of Sciences since 1998.



Dr. Enrique Ruíz-Cancino

Work at "UAM Agronomía y Ciencias" - UAT since 1980, and coordinated 21 research projects on Economic Entomology and Taxonomy of Hymenoptera.
He published 85 scientific papers and 53 articles of scientific divulgation.
Create the Insects Museum of UAT.
Member of the National System of Researchers of México since 1989.