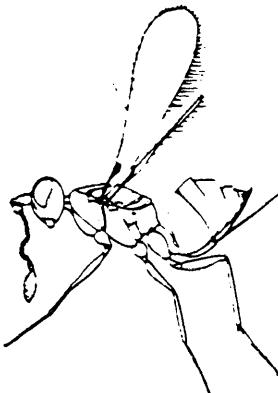


# CHALCID FORUM

A Forum to Promote Communication Among Chalcid Workers  
No. 13 August, 1990



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## EDITORS' NOTES

Time certainly does go by when you're having fun. Here it is almost a year since the last issue of CF (No. 12: October 1989). CF started out at 6 month intervals, which meant the information was current. Waiting for a year for items to accumulate means that by the time an issue is put out certain items are irrelevant. For example, the notice of the September Hym. course in Britain in this issue probably won't do many people much good. Please keep those articles, particularly the "Research News", coming in. In fact, you can inundate, flood, overwhelm and bury the CF editors with submissions because Mike Schauff and Eric Grissell have resumed responsibilities as primary editors for putting out subsequent issues of CF. Henceforth, please send all correspondence concerning CF to Mike and Eric at the address given above (literature will continue to be compiled by J. Huber).

Once again John Noyes has been incredibly imaginative and prolific, and we have him to thank for several articles in this issue. With what has been going on at The Natural History Museum (NHM) [formerly the British Museum (Natural History)] we are glad that this is a memorable issue because of John rather than a John Noyes memorial issue. Far be it for us to be flippant, but surely with the staffing cuts and changes announced by the museum it should now be called "the natural history museum (nhm)", and no, we are not going to comment on the appropriateness of the selection of a zebra's ass for their new logo. Apparently this logo (see NHM letterhead) cost £55,000 as part of a "new corporate identity". Surely at least one of the 17 senior staff the museum sent to Disneyland (at a cost of £30,000) could have shown some corporate leadership and asked to borrow Mickey Mouse. We sincerely hope that the NHM will one day overcome its "funding" (and philosophical) problems and renew what should be a world leadership role in science and systematics.

On a much happier note, congratulations are in order to Paul Hanson, who was caught in marriage by Carolina Godoy, and to Jeffrey Halstead, who married Pamela Sue Simpson on June 17. What is going on with the "H"s, they all seem to be getting married. Is there a marriage virus going around? At least the "G"s seem immune.

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## RESEARCH NEWS/HELP

**Chris Darling.** Department of Entomology, Royal Ontario Museum, 100 Queen's Park, Toronto, Ont., Canada M5S 2C6.

Much of my research time the last two years (of which there was precious little because of administrative duties and fieldwork) was spent on three projects: 1) biosystematic studies of *Nasonia* spp., 2) revision of the world species of *Spalangioptela* (Pteromalidae: Ceinae), and 3) life history and larval morphology of *Chrysolampus*. The *Nasonia* project involves both systematic and behavioural/ecological studies of these parasites of fly pupae; one taxonomic paper has been published (Darling & Werren 1990) and I am in the middle of a third season of demography and sex ratio studies. The *Spalangioptela* revision has been accepted for publication by the ROM and should be published sometime in 1991. The *Chrysolampus* project (with Terry D. Miller) is essentially complete (yes, they have "planidia") and will be submitted by the end of the summer.

Ongoing projects include : 1) the description and phylogenetic affinities of the Ceinae, 2) work on the Perilampidae chapters for both the Nearctic and Costa Rican keys (which requires a reevaluation of generic limits, esp. the validity of *Burksilampus*), and 3) preliminary studies of the Chrysolampinae of Southeast Asia and Australasia. The chrysolampine study is planned as a cooperative study with Ian Naumann and we would like to see any putative chrysolampines from these regions (my 1986 revision of the New World species provides a diagnosis of the subfamily but note that the anterior margin of the clypeus is not evenly convex in all species!). Specimens should be sent to me at the ROM (Ian has convinced me that he is even busier than me) and I will forward the Australian material to Ian. My plan is to be in Indonesia, on sabbatical leave, for 8 months starting in January of 1991. During this time I will set up a cooperative collection development program with the Bogor Zoological Museum and conduct field work in various parts of the country. Last year's field work in Sumatra and Java was very productive and I hope to solve my sorting backlog problem by having the samples processed and, for some groups, mounted and labelled at the BZN.

**William G. Eberhard.** Escuela de Biología, Universidad de Costa Rica, San Pedro, San José, Costa Rica.

Request for references: Who sleeps with whom?

I have accumulated notes on several chalcidoids as well as some scelionids which form dry season aggregations. Apparently the wasps are aestivating. I am not familiar with literature on chalcidoid biology, and would be grateful for references to descriptions of similar observations.

**G. Wilson Fernandes.** Departamento de Biologia Geral, Caixa Postal 2486, ICB/Universidade Federal de Minas

Gerais, 30161 Belo Horizonte - MG, Brazil.

I have left Northern Arizona University to take up a position at the Universidade Federal de Minas Gerais. I would enormously appreciate it if colleagues would keep my name on their mailing list because once in Brazil it will be difficult to keep up with current work because of the precarious situation of the libraries. I will keep your name on my mailing list if you like and will keep you updated on my publications.

**Gary Gibson.** Biosystematics Research Centre, K.W. Neatby Building, Ottawa, Ontario, Canada, K1A 0C6.

Life goes on as usual at BRC. I've recently completed a revision of the North American species of *Macroneura* Walker, which should be published in the July/August issue of *The Canadian Entomologist*. Seven species are recognized, of which 4 are new. Included is a key to females and males, and notes on how to distinguish males of the genus from other common North American eupelmid genera.

I've also written a paper titled, "Origin and homology of the pleuron in Hymenoptera based on a comparison of the skeletomusculature of Xyelidae (Hymenoptera) and Raphidiidae (Neuroptera)". This is to be presented and published as part of a symposium at the 1990 annual meetings of the Canadian Entomological Society, and probably is the last of my morphological work for quite some time. It is increasingly more difficult to "justify" such work when you are employed by a department of agriculture.

Work also continues on my revision of the genera of Eupelmidae. It goes without saying that genera can not be revised on a regional basis and I have been forming my concepts from an analysis of the world fauna. However, because of the super nova of eupelmid diversity in the Neotropical region I had hoped that I could limit the publication to a revision of the North American genera, with a key to the valid described world genera (i.e., avoiding a quagmire of descriptive work). Unfortunately the neotropical fauna has shown an annoying habit of sneaking into North America in Florida and the southwestern USA, and for this and other basic taxonomic reasons have now resigned myself to a full blown revisionary work. Arrrrgh! I currently recognize about 55 world genera or "subgenera" (a problem I am wrestling with at the moment is the taxonomic level to classify various "morphotaxa"), of which 25 are known from America north of Mexico (this contrasts with 8 now listed in the N. Am. hym. catalog). Most of this diversity appears to be because of influence of the neotropics. I have a provisional key to the world genera based on females and I think I can recognize most genera (at least the major genera) based on males, but have yet to try to write a key for them. With all this said, down to the requests. Now that I have basically formed my concepts I want to test them with additional material. I would be extremely grateful to any colleague who could lend me two kinds of material: 1) unidentified miscellaneous

Eupelminae, most especially from the Neotropical, Oriental, Australian or Ethiopian regions; 2) reared eupelmines that have males associated with females. Take this as a challenge - can your material stump me? Drive me to drink (please).

Paul E. Hanson. Escuela de Biología, Universidad de Costa Rica, San Pedro, San José, Costa Rica.

Some of the readers of CF have already heard about the book, Hymenoptera of Costa Rica, to be edited by Ian Gauld of The Natural History Museum and I. The format of the book will roughly follow that of the book by Gauld and Bolton (see CF #12). One big difference from the previous book, however, is that for this project we are sending specimens to most of the contributors. This is necessary because there is very little known about most Neotropical Hymenoptera. Other differences between the books include: individual family chapters more detailed, classifications updated, term "alitrunk" dropped, etc.

We have solicited individual family chapters from 30 taxonomists and are very encouraged by the nearly unanimous affirmative responses that we have received. On the one hand this is fantastic, but on the other hand yours truly has been extremely occupied with the separation and shipping of specimens. At one point we had something like 40 Malaise traps set up in various parts of Costa Rica, but there are now only about half that number. (We initially had some problems with theft of traps set up in various parts of Costa Rica, but we solved that problem by paying campesinos to look after them.) While I may sound plaintive about the work involved, the results have been worth the effort. If I may mention non-chalcids for a moment, we have turned up such oddities as Monomachidae and all 3 genera of Rhopalosomatidae. Recently Ian has been finding fewer new species of pimpline ichneumonids, which means that the curve is levelling off, at least for those groups caught in Malaise traps.

As part of the preparation for doing this book I recently spent a month in London, accompanied by my wife. (Yes, I got married after coming to Costa Rica, to Carolina Godoy, a native Nicaraguan and a budding cicadellid taxonomist.) We are extremely grateful to the hospitality of Ian Gauld, John LaSalle and John Noyes. Besides discussing the book and preparing some specimens for shipment, I spent some time banging my head against Costa Rican pteromalids. Zdenek Boucek was in France most of the time I was at the NHM but fortunately he showed up unexpectedly the last two days of my visit and helped me with some of the most problematic specimens. One series that was giving me a real headache probably represents a new subfamily and another appears to be a new genus in the Chromeurytominae. I hope to pursue these further after I've finished a couple of projects that haunt me from the past (blush) [Ed. note: perchance an *Ormyrus* study?]

Once I have sent off specimens to all the contributors

of the book I hope to dedicate more time to field research such as rearing host material. As mentioned in a previous edition of CF, I am employed by the University of Costa Rica to teach and do research in biological control. Along these lines I have been sampling parasitoids in coffee plantations where natural control seems to be functioning, and more recently I have begun collaborating in research on *Liriomyza* parasitoids. *Liriomyza* has become such a severe pest in the past year that farmers have made mass pilgrimages to the cathedral in order to ask divine intervention, and the president of the country recently visited the areas hardest hit by the "mosca minador". The most common parasitoids appear to be the euplid, *Diglyphus intermedius*, and two species of Braconidae (*Oenonogaster* sp. and *Opis dissitus*).

Finally, I would like to thank all readers of CF who have sent me reprints and would greatly appreciate remaining on the mailing lists. I would also be interested in hearing from anyone having suggestions, comments, etc. about the Hymenoptera of Costa Rica book.

Mohammad Hayat. Department of Zoology, Aligarh Muslim University, Aligarh 202001, U.P., India.

For nearly four months (18.IX.89-12.I.90) I was with John Noyes (NHM) trying to solve some problems concerned with the generic limits and specific identities of the Anagyrini (Encyrtidae). My visit to the NHM was financed by the Indian National Science Academy, the Aligarh Muslim University, and the Royal Society. The stay in London was a pleasant one mainly because the weather (for me) was not unpleasant during those four months, and I had an opportunity to meet and discuss 'chalcids' with LaSalle and Polaszek. Thanks to John's (Noyes) well-known hospitality (in Oriental sense!) I had dinner twice at his home and enjoyed the dishes prepared by Mary Noyes - she is an expert cook. I also had an opportunity to discover the difference between the 'plesiomorphic' English, of the Englishman, and one of its 'apomorphic' Yankee forms, and for the first time could see that evolution (even of a language) can really be sometimes 'retrogressive'. [Ed. note: Dr. Hayat's hypothesis requires further testing because the sample size was small and was formed from what is arguably an aberrant specimen.]

Steve Heydon. Bohart Museum, Department of Entomology, University of California, Davis, CA 95616, USA.

After getting my degree from the University of Illinois, spending a postdoc with Eric Grissell and Mike Schauff at the Smithsonian, and then working at various odd jobs at the Smithsonian, I finally landed a real job as curator of the Bohart Museum of Entomology at the University of California, Davis.

The Bohart Museum is one of the largest university insect collections in the United States with over 5 million specimens. The collection is strongest in Hymenoptera, Lepidoptera, Coccoidea, Tardigrada, Acari, and

Pseudoscorpiones. Geographically, the collection has much material from central and southern California, Panama and northern South America, Australia, South Africa, and the United Arab Emirates. The museum is housed in a single cramped room with insect cabinets piled nearly to the ceiling. We are currently looking for more suitable quarters that will allow some room for expansion.

My primary duties are to the collection, especially the improvement of the collection of parasitic Hymenoptera. We hope to get Paul Marsh (USDA) out sometime this year to help with the Braconidae. I am currently culling all the Chalcidoidea out of the unsorted Hymenoptera and sorting this material to family. I already have offers from people to look at our Eupelmidae and Mymaridae. I would be glad to send material to anyone else willing to identify material in other families.

My current research projects include completion of a revision of the Nearctic Trigonoderini (Pteromalidae) with a discussion of the world's trigonoderine genera, the pteromalid portion of the keys to the genera of the Nearctic Chalcidoidea in conjunction with Zdenek Boucek and Chris Darling, and an expert systems program for the identification of the genera and species of Nearctic Trigonoderini.

**John Huber.** FIDS, Forestry Canada, Ottawa, ON (seconded to BRC).

As co-editor with Henri Goulet (a sawfly specialist), I have been working most of this year on a manual to the families of Hymenoptera of the world to be published in 1990. My own research on Mymaridae has therefore not progressed very much though I still hope to have a paper on North America *Anaphes* ready by the end of the year.

On another topic altogether, I was saddened and dismayed to hear about the drastic cuts in taxonomic staff at The Natural History Museum [formerly British Museum (Natural History)]. I certainly hope that further cuts will not be forthcoming and that at least some of the qualified, dedicated and highly esteemed colleagues who have lost their positions there will be rehired.

An Institution such as The Natural History Museum which has world class standing and is the repository of irreplaceable collections must continue to employ sufficient numbers of qualified taxonomists to look after the collections and, above all, continue to provide high quality taxonomic research - the kind that can only be done with the backing of a large research collection built up by hundreds of people over many generations. Without taxonomists to study them, the collections would be underused, misused, or simply lost to science through neglect and inevitable destruction, to the detriment of biological science as a whole.

**David W. Johnson.** USDA/ARS, 1700 SW 23 Drive, Gainesville, FL 32604, USA.

I am still a graduate student in the Dept. of Entomology & Nematology, Univ. of Florida, but have had to suspend my studies on chalcidoid taxonomy to

concentrate on molecular biological work. I have been developing methods based on DNA hybridization for the identification of insect species, and for the estimation of incidence of pathogens in mosquitoes. I'm also working on non-radioactive detection methods for application to the hybridization assays. These methods certainly have potential for application to chalcidoid taxonomy, and I am still very much interested in their taxonomy and biology.

**Gabriela Pérez-Lachaud.** Université Paul Sabatier, Centre de Recherche en Biologie du Comportement, 118 route de Narbonne, 31062 Toulouse cédex, France.

I moved from Paris last December and am now working on courtship behaviour of *Chryseida bennetti* Burks (Eurytomidae) at the Université Paul Sabatier, with Dr. Mireille Campan as my thesis director.

**S. P. Singh.** School of Entomology, St. John's College, Agra-282002, India.

I submitted my Ph.D. thesis on January 30, 1990, under the supervision of Dr. Santokh Singh, Principal Investigator, P.L. 480 Research Project, St. John's College, Agra. The English title of the thesis is, "Bioecology of *Ormyrus orientalis* (Hym.: Chalcidoidea: Ormyridae), a serious pest of tur-pod fly, *Melanagromyza obtusa*, a serious pest of *Cajanus cajan* spring in India" [sic]. The thesis is divided into 5 chapters. Chapter I contains the introduction and materials and methods section, as well as a detailed review of literature pertaining to hymenopteran parasites of Agromyzidae in India, and in particular those of *Melanagromyza obtusa* (Malloch). Chapter II contains information on the systematic position and taxonomic description of *Ormyrus orientalis*, host selection and oviposition behaviour, description and durations of the immature stages of the parasite, emergence pattern of the adult from host-pupa, male and female longevity and copulation behaviour of the parasites. Chapter III contains the experimental data on duration of the immature stages and adult longevity under various constant temperatures and relative humidity, and the effect of various artificial foods given to adults. Chapter IV is devoted to the estimation of incidence of parasitism by *O. orientalis* under field conditions, interspecific relationships, and their impact on the parasite population. Also incorporated into this chapter is information on the parasites of *M. obtusa* other than *O. orientalis*, their status relative to the latter, and distribution of the parasites in India. Chapter V gives a detailed discussion on the topic and a brief summary, references, etc. Apart from this I recorded detailed observations on the bioecology of *Euderus lividus* (Eulophidae), *Eurytoma* sp. (Eurytomidae) and *Sengalella* sp. (Torymidae), all parasites of *M. obtusa*.

At present I am continuing my studies on the bioecology of important eulophid and pteromalid parasitoids, mainly parasites of *Chromatomyia horticola* (Agromyzidae). The PI 480 Research Project on "Bioecology of hymenopteran parasites of Agromyzidae, pest species in India" is still continuing. By the end of

October, 1990, all the results of this project are planned to be presented under a single cover in the form of a Memoir. I would very much appreciate receiving any information on bioecology of hymenopteran parasites of Agromyzidae.

**Andrey Sharkov.** Apt. B1, 2471 84th Street, Brooklyn, New York, NY 11214, USA.

I am currently working at the American Museum of Natural History as a curatorial assistant with Dr. Jerome Rozen (bee specialist). Working with chalcidooids (mainly identifications) constitutes only a small part of my duties. Therefore I will keep trying to find a position that will allow me to continue my research on the Chalcidoidea.

**Robert S. Stauffer (Steve).** Dept. of Entomology, Texas A&M Univ., College Station, TX 77843, USA.

I've recently begun a masters degree program and am working under the guidance of Mike Rose and James Woolley to develop an augmentative biological control program for *Coccus hesperidum* L. (Homoptera, Coccoidea) in interiorscapes and greenhouses. Recent compilation of pest identification reports in Texas show this scale to be a key pest of these intensely maintained tropical plantscapes. The project includes raising a suitable host plant (*Ficus* sp.), several biotypes of *C. hesperidum*, *Metaphycus luteolus* (Timberlake) and *Microterys flavus* (Howard), and the evaluation of their effectiveness under laboratory and field conditions.

**Marcelo Teixeira Tavares.** Departamento de Ciências Biológicas, Universidade Federal de São Carlos, Via Washington Luiz, km 235 - Caixa Postal 676, 13560 - São Carlos - SP - Brasil.

I am working on my M.Sc., studying aphid parasitoids around São Carlos City -SP- Brazil. Moreover, I am studying the taxonomy and biology of other Chalcidoidea of this region, mainly Encyrtidae associated with Homoptera. I have one paper in press about one new species of the genus *Psyllaephagus*. I would greatly appreciate receiving reprints on New World Chalcidoidea.

**Csaba Thuróczy.** Dept. Natural History, H-9730 Kőzeg, Jurisics Vár, Hungary.

I continue the chalcidological work of J. Erdős and G. Szélényi in Hungary. I mainly study the Pteromalidae and after identifying 100,000 chalcidooids to family and 30,000 pteromalids to genus I worked on a revision of the Palaearctic Ormocerini. Last year I was at the Natural History Museum in London to study their pteromalid collection and next January and February I hope to return to study type material, if I can obtain funding. Dr. Trjapitzin also visited me for two weeks last year and asked me to prepare a Soviet collection of Pteromalidae in Leningrad, which I will start in 1991. After Dr. Bouček has completed his studies in France and I have examined the NHM types I would like to complete a pictorial key to the genera of Palaearctic Pteromalidae.

Besides pteromalids I study the Hungarian Mymaridae and am nearing completion of a species list for Hungary.

As part of my work at the Hungarian Natural History Museum I have been compiling a list of Erdős and Szélényi types. Erdős described 376 species on the basis of 4472 specimens (specimen numbers were not given for 2 species) and Szélényi described 150 species from 760 specimens (numbers not given for 4 species). Unfortunately there are unlabelled types and paratypes in the collection, and more syntypic material of Erdős that is not in the collection. I would ask colleagues to inform me if their collections have any Erdős or Szélényi syntypic material through exchanges or gifts. I want to publish the collection data of these specimens along with the data of the types that we have.

**Z. Yefremova.** Division of Zoology, Ulyanovsk Pedagogical Institute, Ulyanovsk, 432600, USSR.

I am a Candidate of Biology and lecturer at the Ulyanovsk Teachers Training Institute. I lecture on zoology and entomology. The theme of my dissertation was *Bombus* (Apidae) of the European part of the USSR, and I have published several articles on *Bombus*. My interests were systematics, faunistics, nesting biology, and influence of antropogenic factors on the fauna and numbers of *Bombus* of the Middle and Lower Volga, Kazakhstan and Altai, and the Crimea. My monograph of bumble bees of the Volga area will be published in 1991.

My scientific interests are now connected with parasitic wasps of the subfamily Elachertinae (Eulophidae). My supervisor is Dr. Trjapitzin. At present I am studying the genus *Cirrospilus* Westwood, namely its systematics, geographical variability of species, and host specializations. I have just studied the far-eastern species of *Cirrospilus* and I will write a key to the species. My plans for the future include studying Elachertinae of the USSR.

## FORUM

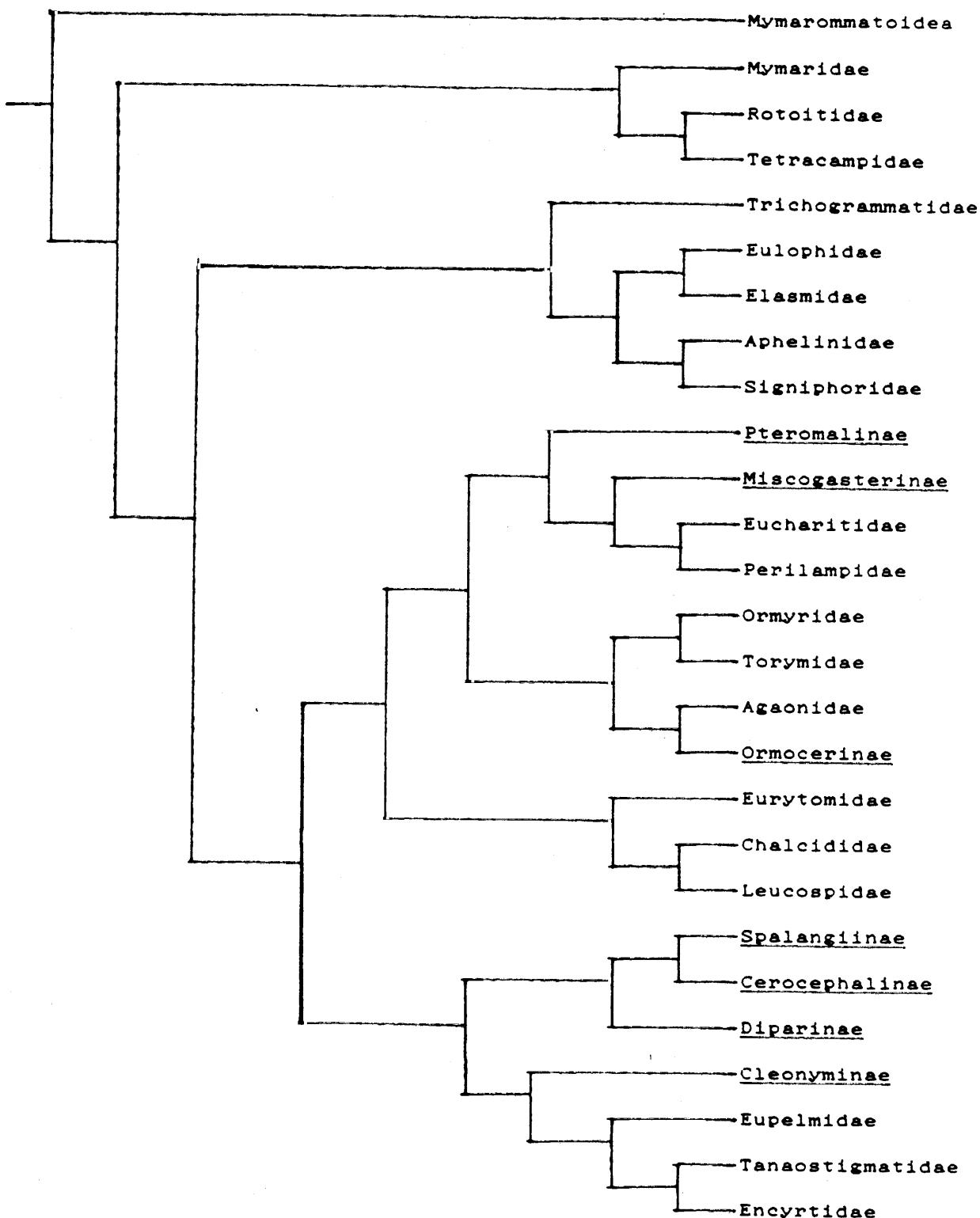
**ANELLUS, SEGMENT, ETC. RE-REVISITED.**  
Mohammad Hayat.

A response to Menke's mirth on catching hold of my "erroneous" spelling of anellus etc. is due. I too had before me a Latin dictionary (Collins Latin Gem Dictionary, 1964 edition) when I wrote that letter (CF #11:9), though my dictionary is not a "large" one. On page 20 of that dictionary is the following entry: "anell/us - i, m. little ring". The Spanish and Italian dictionaries (again, Collins Gem) have similar spellings for "ring" (anillo; anello). So it seems that "anellus" is not an incorrect spelling, unless, of course, Menke should prove that Collins is wrong. In any case, people who consistently misspell English words and biological terms (catalog for catalogue; esophagus for oesophagus) should be the last one to complain of incorrect spellings.

## A WORD ON CHALCIDOID CLASSIFICATION.

John S. Noyes. See article opposite, p. 7.

Fig. 1. Phylogeny of Chalcidoidea.



Without entering into a discussion regarding the various and variable definitions of the word "segment" given by several authors (for example, Snodgrass, Butt, Manton, Boudreux) I would like to say that the word as used by me (and others) for the parts of an antenna is a non-committal, but etymologically correct, word (segment = piece or part marked or cutoff, division). Should I refer to the dictionary from which these meanings of the word "segment" were noted? That morphologists and embryologists (fashionably called "developmental biologists") have introduced more restrictive criteria in defining this word, does not in any way make the etymologically correct usage erroneous.

I would, however, like to know if it is logical/scientific to say that an antenna, which is an appendage of a doubtfully distinct body segment, consists of 3 "true" segments (*sensu* Snodgrass)? The presence of an appendage is one of the criteria used for defining a "true" segment. If so, then there are no "true" segments either in the cephalic or thoracic appendages. The appendages are divided into parts, some of which are provided with muscles. Therefore, the use of the word "segment" for the parts of the flagellum is as much correct as the use of that word for "scape" (actually consisting of a radicle = scapomere 1, and "scape" = scapomere 2!), pedicel and flagellum.

A WORD ON CHALCIDOID CLASSIFICATION. John S. Noyes, Dept. of Entomology, The Natural History Museum (NHM), Cromwell Road, London, SW7 5BD, England.

Arnold Menke's jibe at us chalcidologists for not getting our house in order (see CF #12) has spurred me into action. I feel more than a little responsible because it was the classification used by me in The Hymenoptera that initiated his comments.

Firstly, it would seem that the problem with the Chalcidoidea is not really with the number of families generally regarded as valid but with what we understand of the phylogeny of the group. Even if we decided on some arbitrary number (from 1 to 30) of families, we would still have the problem of what to do with lower ranked taxa. We really need to get some good character evidence to enable us to decide on the phylogenetic relationships of the group as a whole before we can even start to sort out the validity of higher taxa. To my way of thinking this is a very long way off, and may in fact be impossible given the undoubtedly complexity of the group.

However, just to throw my oar in I thought it would be interesting if we could come up with some sort of phylogeny which reflects all our views of the possible relationship of the higher taxa regarded as monophyletic entities in the Chalcidoidea. My current thinking is shown opposite. This phylogeny is almost entirely intuitive and is not based on any good evidence. If I was asked to do another tomorrow it would certainly look entirely different. Perhaps readers of CF have their own ideas or would like to comment on this phylogeny. Perhaps eventually we

could arrive at some sort of intuitive "concensus" tree. Any takers?

Although the phylogeny given opposite is basically intuitive it may be worth commenting on some of the groupings. My "eulophid" lineage (Trichogrammatidae, Eulophidae, Elasmidae, Aphelinidae, Signiphoridae) is based on reductional characters which are not regarded as good ones, eg. reduction in antennal segments, tarsal segments (what about the mesofurca?). The "pteromalid" lineage consists of all other taxa, except of course the Mymaridae, Rotoitidae and Tetracampidae, which I think are basic. Could the "pteromalid" lineage have started with parasitoids of the eggs or larvae of xylophagous or other beetles? Within this lineage I think that the Pteromalidae, as it is presently considered must be polyphyletic and this I have indicated by listing some of the major subfamilies (underlined). The monophyletic relationship of the Eucharitidae and Perilampidae is generally accepted without question, but I am not sure what to do with the Echithrodapinae (are they disguised Torymidae?), Chrysolampinae (which seems to link the Miscogasterinae and Perilampidae), and Philomidinae (any comment Chris/John?). I am pretty sure that the Ormyridae-Ornocerinae group is a good one although I cannot come up with any good synapomorphies except for a possible phytophagous relationship. The Spalangiinae-Diparinae group seems to be a good one although I base it mainly on similarity of general habitus and wing venation and the association with the immature stages on non-xylophagous Coleoptera and synanthropic Diptera. I have no doubt that the Cleonyminae-Encyrtidae lineage is good and reflects the development from an ancestral group which was probably parasitic in the immature stages of xylophagous beetles through to a group of secondary phytophagous habit (Tanaostigmatidae) or parasitic on the immature stages of holometabolous insects and achenorrhynchos Homoptera (Encyrtidae).

A WORD ON CHALCIDOID CLASSIFICATION. Gary Gibson.

I am glad that John has raised the issue of chalcidoid classification because it gives us all the chance to exchange gut feelings and personal opinions which we would never dare put into print for fear of being ridiculed, as well as exchanging bits and pieces of information or questions that may, with discussion, help form the 'big picture'. It is about time that we stopped crying about the chaos in classification and started a rapid exchange of ideas and information to help solve problems, which is why CF was started in the first place. I hope that chalcidoid taxonomists throughout the world will take part in this discussion. My own initial two cents worth is given below. You will note that there are generalizations and unfounded statements and opinions, but this is the place for them.

I agree totally with John that the problem in chalcidoid familial classification is not in the number of families, but in our understanding (or the lack thereof) of

the monophyly and relationships of the morphotaxa we variously classify as families, subfamilies, tribes, etc. As he indicated, what we really need is some "good character evidence" to enable us to decide on relationships. For the most part I think that we lack accurate knowledge of structure, and particularly accurate knowledge of character state distribution throughout the superfamily. This is a severe problem for cladistic analyses and determining relationships, but it is not unique to the Chalcidoidea. Many workers decry the amount of homoplasy found in their groups because it results in 32 billion equally parsimonious trees. I suspect that much of this homoplasy is 'false' homoplasy resulting from incorrect information on structure and its distribution and leading to incorrect hypotheses of homology or polarity. If I have found anything from my morphological work it is that the literature on Hymenoptera is replete with inaccuracies. At times I've wondered if this has resulted partly from a different way of 'looking at things' by pre-cladistic and post-cladistic systematists. To generalize, pre-cladistic taxonomy emphasized differences between taxa for classification whereas post-cladistic taxonomy emphasizes 'sameness' (synapomorphies). The concept of homology is of critical importance to post-cladistic taxonomy and because of this 'sameness' is examined rigorously (at least in theory if not always in practice). In the pre-cladistic era, was 'sameness' (either superficial similarity, or superficial 'non-sameness' resulting from character state transformation) examined less critically because one was looking for differences? Because of this philosophical difference, do we now have a greater knowledge of what apparently differs among taxa (and a hodgepodge of higher level taxa and classifications) rather than what is truly shared among taxa? Regardless, the advent of cladistics should have resulted in a renaissance in morphology because of character state analysis. For the most part I do not think that this has happened. Most institutions have always seemed to be quite excited about supporting studies that use computers to massage data, but much less willing to fund the basic morphological studies that discover the data to be massaged (including the National Science Foundation judging by some proposals that I have been asked to review and were not funded [I hope that there is no correlation]). Even more insidious at present is an apparently universal institutional concept that "molecular techniques" and "science" are synonymous (the only True science is Molecular Science - praise be Its name). It has been said that there are only two sure things in life - death and taxes. A third may be the universal addiction of funding agencies, and thus managers of organizations, for supporting the latest, new and improved, 'cutting edge' of science.

Whether the above opinions are valid or not, I do not think we are going to get very far in resolving higher level chalcidoid relationships until we have a much more accurate understanding of structure and its distribution. Much of this work will have to be done during M.Sc. and Ph.D. degrees because most graduates will find employment with organizations that, at best, are willing

to tolerate morphological studies. Any professorial type turning out chalcid taxonomists should demand as part of the degree program that the candidate study, and publish on, one character system throughout at least the Chalcidoidea and preferably the Hymenoptera (see Darling's paper on the labrum as an example of such a study). Is this too much to ask?

Some of you may be beginning to wonder if I am ever going to say anything about chalcidoid classification and John's phylogeny, but first a few more general comments. One of the questions that has always intrigued me is why are chalcidoids structurally so diverse compared with other groups of parasitic Hymenoptera (if you've seen one ichneumonid you've seen them all), and why do there always seem to be intermediates. This pattern would indicate that Chalcidoidea is a relatively young (terminal) and radiating lineage that has not had time for extinctions to parcel out nice distinct groupings. However, some features seem to indicate Chalcidoidea as a very old (basal) lineage in Apocrita. For example, chalcidoids are one of the very few parasitic Hymenoptera to retain a free prepectus (retained also in Mymaromatidae (?), Stephanidae, Monomachidae, Austroniidae and Roproniidae) and a tergo-trochanteral muscle (retained in Mymaromatidae, Stephanidae, Diapriidae, Megalyridae and Ceraphronoidea). Consequently, both (plesiomorphic) features are otherwise known only in Stephanidae, and possibly Mymaromatidae. If Mymaromatidae is the sister group of Chalcidoidea (by no means definitively established), then we know that the common ancestor of Chalcidoidea is at least 100my old (early Cretaceous) because mymaromatids are known from Lebanese amber. Yet several groups of Proctotruopoidea s. l. that appear to be more derived in structure than are Chalcidoidea are known from the Jurassic. I would think that the common ancestor of Mymaromatidae + Chalcidoidea, if not the Chalcidoidea itself, must have been present during the Jurassic. Could the pattern of diversity we see in extant Chalcidoidea be a consequence of diversification over an extremely long time period combined with a more recent (middle to late Cretaceous) secondary explosive radiation of the group? Does anyone want to comment on this?

To finally get to John's comments about relationships within the Chalcidoidea, not surprisingly there are parts I agree with and parts I don't. I certainly agree with the Eurytomidae + (Chalcidae + Leucospidae) branch. There does not seem to be much of a problem with the monophyly of Leucospidae, but does anyone know of characters that indicate the monophyly of Chalcidae exclusive of Leucospidae, i.e., is Chalcidae paraphyletic relative to Leucospidae? The same question for Eurytomidae re: the Chalcidae.

I have slightly different views on the "eulophid" and "tetracampid" lineages. Some reductions do not seem to be relevant. For example, Zdenek showed in his Australasian work that the groundplan number of antennal segments in Eulophidae probably was 12. Based on non-chalcidoid parasitic Hymenoptera I think that the common

ancestor of chalcidoids must have had 5-segmented tarsi and most probably a curved, bifurcate fore tibial spur. I restrict the "eulophid" lineage to Eulophidae, Elasmidae and Trichogrammatidae, because they share 4-segmented tarsi (secondarily reduced to 3 segments in Trichos.) and a short, simple fore tibial spur. Other groups that have four segmented tarsi, such as some aphelinids, encyrtids and mymarids retain the primitive structure of the fore tibial spur, and these I think probably are independent reductions in number of tarsal segments. Consequently, I would put aphelinids and signiphorids into the "pteromalid" lineage. On the other hand, rotoitids (4-segmented tarsi) and tetracampids (4-segmented in tetracampine males) have a short and relatively straight, but still bifurcate fore tibial spur [for tetracampid structure see Figures 5-7 in Boucek (1958): Revision der europäischen Tetracampidae (Hym. Chalcidoidea) mit einem Katalog der Arten der Welt. *Acta Ent. Mus. Natl. Pragae* 32: 41-90]. Could this be an intermediate structure, which would indicate that Rotoitidae and/or Tetracampidae are the sister group of the Eulophidae + Elasmidae + Trichogrammatidae? As always there is a fly in the ointment with this character system. Although only one extant genus of Mymaromatidae is considered valid at present, there actually are two good genera, one of which has a simple fore tibial spur and the other a conspicuously bifurcate spur (both types of spurs relatively long). So even here we have a problem with (outgroup?) comparison. I would really like to see someone make a comprehensive, detailed SEM study of the fore tibial spur and fore tarsal structure throughout Chalcidoidea so that we had some 'facts' to base hypotheses on.

I also have many more doubts about a strong "Cleonyminae-Encyrtidae" lineage than John because I don't buy the monophyly of Eupelmidae. All the characters by which the family has been defined, or associated with encyrtids and tanaostigmatids, either are primitive features or apparently were derived independently several times [see Gibson (1989): Phylogeny and classification of the Eupelmidae, ... *Mem. Ent. Soc. Canada*, No. 149]. I am convinced that there is a close (possibly sister group) relationship between Cleonyminae (Cleonymini) and Calosotinae, but Eupelminae may be more closely related to some other cleonymine group (perhaps the sister group of Chalcedectini), and I have no idea of the true relationships of the Metapeltininae. Interestingly, *Eusandalum* Ratzeburg (Calosotinae) and *Metapelta* Westwood (Metapeltininae) have 9 metasomal (10 abdominal) terga, i.e. abdominal terga 9 and 10 are not fused into a composite tergum. Cleonymines often have a very distinct suture between the two presumptive terga, but I do not know of any that have the terga separate (primitive condition for Hymenoptera). The epipygium of torymids and some agaonids certainly is not homologous with the 10th tergum of the eupelmids, but can anyone tell me of any pteromalid that has 10 abdominal (9 metasomal) terga? Could this be the groundplan structure for Chalcidoidea, or must I assume

that the apical tergum in the above two eupelmid genera is secondarily divided?

I certainly agree with the Tanaostigmatidae + Encyrtidae lineage, with *Cynipencyrtus* Ishii probably the sister group of the Encyrtidae (based on transverse axillae), but possibly of the tanaos. + encyrtids (second choice), or of the tanaos. alone (third choice). How about that for taking a stand. The metapeltinines may also be involved in this grouping, and for some reason I feel that the aphelinids somehow are related to tanaos. + encyrtids, but I have no hard characters to base this on. I should note that Mike Sharkey recently caught a specimen of *Cynipencyrtus* in Japan, which I was able to CPD and mount. This specimen shows that I was incorrect in stating in my 1989 paper that a completely enlarged acropleuron is a synapomorphy for Tanaostigmatidae + Encyrtidae (p. 21, and Table 1 character 3). The specimen clearly shows that the acropleuron in *Cynipencyrtus* is not quite completely enlarged ventrally to the mesocoxa so that a slender, but distinct, lower mesepimeron remains (the ventral part of the mesopleural suture is distinct). This structure is more primitive than that known for tanaos. and encyrtids (is this statement correct for encyrtids?), but I don't know how much significance to place on it. Certainly, the pronotal-prepectal structure of *Cynipencyrtus* appears primitive relative to both the tanaos. and encyrtid structure, both of which can be derived from a *Cynipencyrtus-like* structure. Could choice 2 be correct? If so, could *Cynipencyrtus* be some sort of intermediate clade between aphelinids and tanaos. + encyrtids? [The specimen does have fore tibial apical pegs, which I did not know for the 1989 paper.]

My knowledge of pteromalids is limited, to say the least, so I can't comment on the other lineages John proposed. However, to me, one of the most interesting questions in Chalcidoidea is the relationships between torymids and agaonids (*sensu* whatever). I can't wait for some resolution on this.

What I would at least like to see from other chalcidoid specialists are submissions that discuss the monophyly of their group of expertise. If you believe your group is monophyletic, what are the characters that indicate this, and do you know of any derived features that link your group with other chalcidoids? I also can't wait for the next issue of CF.

#### THE NUMBER OF DESCRIBED CHALCIDOID TAXA IN THE WORLD THAT ARE CURRENTLY REGARDED AS VALID. John S. Noyes.

Several recent works, notably Boucek's Australasian Chalcidoidea, have had a fairly profound effect on the systematic placement of many chalcid taxa. They have also resulted in many changes to the number of previously described taxa that are now generally considered valid. Together with the taxa described in recent years this has resulted in a fairly dramatic change in the "shape" and relative size of each of the different families of chalcidoids compared with the table I published in 1978. Therefore

I thought readers of CF would be interested in a comparison of the figures presented then and the numbers of genera and species currently regarded as valid for each family (Table 1 - 1978 figures in parentheses).

|                   | valid<br>species    | valid<br>genera   | nominal<br>species  | nominal<br>genera |
|-------------------|---------------------|-------------------|---------------------|-------------------|
| Agaonidae         | 608 (362)           | 69 (37)           | 647 (374)           | 117 (57)          |
| Aphelinidae       | 975 (805)           | 38 (42)           | 1122 (905)          | 101 (76)          |
| Chalcididae       | 1466(1410)          | 91(114)           | 1874(1636)          | 194 (183)         |
| Elasmidae         | 203 (221)           | 1 (8)             | 260 (281)           | 2 (11)            |
| Encyrtidae        | 3277(2761)          | 451(513)          | 3823(3091)          | 745 (640)         |
| Eucharitidae      | 348 (330)           | 50 (55)           | 382 (349)           | 72 (60)           |
| Eulophidae        | 3346(2966)          | 279(323)          | 3938(3350)          | 536 (464)         |
| Eupelmidae        | 715 (704)           | 45 (57)           | 902 (861)           | 89 (84)           |
| Eurytomidae       | 1201(1063)          | 79 (73)           | 1423(1243)          | 134 (94)          |
| Leucospidae       | 134 (132)           | 4 (4)             | 241 (238)           | 11 (11)           |
| Mymaridae         | 1303(1161)          | 100 (95)          | 1412(1232)          | 155 (142)         |
| Ormyridae         | 66 (53)             | 2 (3)             | 87 (71)             | 9 (7)             |
| Perilampidae      | 229 (209)           | 19 (24)           | 258 (237)           | 28 (33)           |
| Pteromalidae      | 3003(2811)          | 551(565)          | 4114(3803)          | 846 (730)         |
| Rotoitidae        | 1 (0)               | 1 (0)             | 1 (0)               | 1 (0)             |
| Signiphoridae     | 75 (74)             | 4 (6)             | 80 (78)             | 13 (13)           |
| Tanaostigmatidae  | 88 (33)             | 9 (14)            | 92 (33)             | 16 (14)           |
| Tetracampidae     | 44 (33)             | 14 (13)           | 51 (35)             | 17 (13)           |
| Torymidae         | 889 (975)           | 74(103)           | 1153(1238)          | 121 (142)         |
| Trichogrammatidae | 630 (438)           | 76 (70)           | 673 (461)           | 123 (115)         |
| <b>TOTALS</b>     | <b>18601(16541)</b> | <b>1957(2119)</b> | <b>22533(19516)</b> | <b>3330(2889)</b> |

There may be a small error in the updated figures because they are not the result of actual recount but of a continuous update as taxonomic changes were noted in the world catalogue kept at The Natural History Museum in London.

It may be worth drawing CF reader's attention to the catalogue from which these figures are drawn, because to my knowledge it is the only complete and totally up-to-date taxonomic catalogue of world Chalcidoidea available anywhere. The catalogue is updated on a daily basis. It may be of value especially to students of chalcidoid taxonomy who are just commencing a study of a specific group and who wish to have the use of an up-to-date catalogue without having to plough through back numbers of Zoological Record and other relevant literature. The information contained in the catalogue is basically taxonomic and includes references to original descriptions, combinations under which any species has been known and where these have been published as well as references to identification aids such as keys, revisions, etc. There are also some data on hosts, but this is relatively limited. If any readers of CF are interested in obtaining information from this catalogue, even complete taxonomic references for any single family (or even superfamily as a whole) they should contact me. At present information is contained on 5"x3" record cards. However, we are

currently looking into the possibility of computerizing the whole catalogue.

#### ENCYRTIDS ARE MOST DIVERSE IN WESTERN AUSTRALIA, BUT WHAT ABOUT OTHER GROUPS OF CHALCIDOIDS? John S. Noyes.

I wonder if readers of CF would be interested in attempting to map the diversity of the different chalcidoid families in different parts of the world? In recent years I have become interested in the argument that has been raging since the early 1970's concerning the diversity of parasitic Hymenoptera in relation to latitude. A couple of short notes by me and others relating to this subject have appeared in past issues of CF. The discussion all started when Owen & Owen (1974: Species diversity in temperate and tropical Ichneumonidae. *Nature* 249: 583-584) published some figures which appeared to show that ichneumonids are no more diverse in Uganda and Sierra Leone than they are in England or Sweden. This is contrary to the general belief that animals tend to become more diverse nearer to the equator. Several other authors later joined the discussion and in general seemed to equate all the parasitic Hymenoptera with the Ichneumonidae. In an effort to correct this bias I published a short paper (Noyes, 1889a: The diversity of Hymenoptera in the tropics with special reference to

Parasitica in Sulawesi. *Ecological Entomology* 14: 197-207), which to my way of thinking showed conclusively that this is not necessarily the case for chalcidoids. In other words, chalcidoids definitely seem to be more diverse at lower latitudes.

Since publishing the 1989a paper I have been sorting out catches of Encyrtidae from collecting trips in various parts of the world in an effort to show conclusively that Encyrtidae, at least, are much more diverse at lower latitudes than at higher ones. To these ends I have been using Williams' index of diversity as a means of estimating the diversity of sweep net catches. This index takes into account the relative abundance of each of the species present in the sample and is not just a simple means of estimating species richness, i.e. the total number of species present, which can vary greatly depending on the size of the sample. In my view, and that of many ecologists, Williams' diversity index is the best index of diversity because it is the one most independent of sample size.

Williams' index of diversity ( $\alpha$ ) can be estimated using:

$S = \log_{\alpha}(1 + N/\alpha)$ , where S is the number of species present in the sample. Unfortunately it is not possible to simplify the equation, but  $\alpha$  can be estimated by substituting different values for  $\alpha$  in the equation until the whole equation balances. With a little practice this can be done fairly quickly with a hand calculator provided that it has a log. function. If readers of CF can obtain values of S and N for different samples of chalcidoids but, for one reason or another, are unable to calculate  $\alpha$  values then I could certainly be of help if they send these figures to me.

In my 1989a paper I published a short table of values that I obtained with the Encyrtidae. This is reproduced here along with some results obtained from other samples that I have analyzed more recently.

| Country :         | habitat                        | Lat. | N/S     | $\alpha$ |
|-------------------|--------------------------------|------|---------|----------|
| Indonesia:        | lowland rainforest             | 1°N  | 243/75  | 37.1     |
| Ivory Coast:      | riverine forest                | 6°N  | 305/53  | 19       |
| Ivory Coast:      | riverine forest                | 6°N  | 211/62  | 30       |
| Ivory Coast:      | riverine forest                | 6°N  | 211/52  | 22       |
| Nigeria:          | lowland rainforest             | 7°N  | 527/100 | 36.6     |
| Togo:             | lowland rainforest             | 7°N  | 405/74  | 27       |
| Togo:             | lowland rainforest             | 7°N  | 249/59  | 24       |
| Nigeria:          | Guinea savannah                | 10°N | 497/70  | 22.2     |
| USA (TX, 1989):   | mesquite forest/grassland      | 26°N | 330/47  | 15       |
| USA (TX, 1989):   | mesquite forest/grassland      | 26°N | 173/41  | 17       |
| Australia (WA):   | heath/scrub                    | 27°S | 354/72  | 27.3     |
| USA (TX, 1989):   | semi desert scrub/grass        | 29°N | 384/37  | 10       |
| USA (FL, 1989):   | coastal grassland/pines        | 29°N | 431/46  | 13       |
| USA (TX, 1989):   | deciduous/forest/pines/grass   | 30°N | 807/39  | 9        |
| USA (FL, 1987):   | woodland/grass                 | 30°N | 226/54  | 22.5     |
| USA (FL, 1989):   | woodland/grass                 | 30°N | 474/54  | 16       |
| USA (FL, 1989):   | rosemary woodland/grass        | 30°N | 701/43  | 10       |
| USA (TX, 1987):   | woodland/grass                 | 31°N | 283/45  | 15.1     |
| USA (TX, 1989):   | deciduous forest/grass         | 31°N | 252/39  | 13       |
| Australia (WA):   | heath/ <i>Eucalyptus</i>       | 34°S | 414/99  | 41       |
| Australia (WA):   | scrub                          | 35°S | 218/46  | 17.8     |
| Australia (WA):   | "wet" <i>Eucalyptus</i> forest | 35°S | 581/67  | 20       |
| Spain (Ibiza):    | scrub/grass                    | 39°N | 355/46  | 14.1     |
| Italy:            | woodland/grass                 | 39°N | 561/58  | 16.2     |
| Greece (Corfu):   | scrub/grass                    | 40°N | 497/63  | 19.1     |
| France (Corsica): | dry scrub                      | 42°N | 285/49  | 17       |
| France (Corsica): | dry scrub                      | 42°N | 636/64  | 18       |
| Canada (Ont):     | woodland/grass                 | 46°N | 253/35  | 10.8     |
| Gt. Britain:      | coastal sand dunes/grass       | 52°N | 391/38  | 10.4     |

A few of the above diversity values are worthy of comment. Firstly it can be seen that, with a few exceptions, there is a general decline in diversity in areas

of higher latitudes. The most notable exception to this is a diversity value of 41 that is for a sample taken at Fitzgerald River National Park in Western Australia at a

latitude of 34°S. This diversity value is exceptional and probably represents the highest diversity value for encyrtids anywhere in the world (unless someone else knows differently ....). I have also included several figures for the same locality, but for samples collected on different days (Ivory Coast, Togo, Texas and Corsica) or in different years (Florida, woodland/grass site at 30°N). In these samples the diversity values can vary considerably. This probably results from varying weather conditions when the samples were taken. The samples from Texas and Florida in 1989 had a lower than expected diversity because they were collected in April and may have been affected by the colder than normal spring that year in these areas.

I have included only larger samples in the above analysis. It is very likely that a sample size of less than 200 would be too small to obtain a reasonably accurate estimate of diversity. Further to this, all above diversity estimates were made from samples collected by a single day's sweeping. I have shown (Noyes, 1989b: A study of five methods of sampling Hymenoptera (Insecta) in a tropical forest with special reference to the Parasitica. *Journal of Natural History* 23: 285-298) that the diversity of samples collected using different sampling techniques can vary greatly. This means that direct comparison of samples collected by using different techniques is impossible. However, this does not mean that samples collected with Malaise traps should be ignored. For instance, Malaise traps are one of the best ways of collecting Mymaridae and therefore samples of this group collected by this method would give a very good indication of diversity in different areas of the world. However, it would be important to know what sort of design of Malaise trap is used, the colour of the material and the mesh size of the netting used in construction of the trap.

Any takers.

[Ed. note: I wonder if Malaise traps might be the best method for making comparisons using data derived by different individuals, as long as the Malaise traps are of the same construction. Even with complete sweep samples, how does one factor in differences between collectors when sweeping [speed of swing, height of swing, efficiency of the net (triangle vs. circle, mesh size), "effort" put into it, site selection, etc.]?

#### BRAZIL CHALCIDOIDEA COLLECTED BY FOGGING. Gary Gibson.

As many readers of CF are aware, Terry Erwin of the Smithsonian Institution has been sampling the insect fauna of Neotropical canopies by pyrethrum fogging. The pyrethrum stuns the insects and they fall into large trays placed below the fogged trees [see: Erwin, T.L. (1983), Tropical forest canopies: the last biotic frontier. *Bulletin of the ESA* 1983(1): 14-19]. John's article on diversity and Gerard's article (below) on canopy collecting in French Guiana spurred me into this submission about a sample of Terry's material that I sorted to family in 1986. The material was from several sites in Brazil, Amazonas, but all from between 02°30'S and 03°25'S. I saw 906

chalcidoids of the following families:

|                   |     |               |    |
|-------------------|-----|---------------|----|
| Eulophidae        | 208 | Aphelinidae   | 15 |
| Eupelmidae        | 179 | Signiphoridae | 10 |
| Pteromalidae      | 138 | Mymaridae     | 8  |
| Encyrtidae        | 114 | Eucharitidae  | 5  |
| Chalcididae       | 98  | Perilampidae  | 4  |
| Eurytomidae       | 45  | Elasmidae     | 4  |
| Torymidae         | 39  | Agaonidae     | 4  |
| Tanacostigmatidae | 35  |               |    |

There obviously is an artifact that the minute chalcidoids are under represented, probably because when they fall they never make it through the leaves to the collecting trays, or they drift away in any breeze. However, if just large-bodied chalcidoids are examined something stands out like a sore thumb - 179 eupelmids, beaten only by the Eulophidae! Now, I did not collect this material myself, there is at least a size artifact, and I can't be certain I saw the entire sample. Even with this said, whoever heard of eupelmids being more common than pteromalids? A greater diversity of eupelmids toward the equator is not something that I question, it is something that I am painfully aware of and accept with trepidation. It is also perfectly obvious that I should be collecting in the canopy. Readers will understand why Gerard's statement about the broken Malaise trap head was like a knife through my heart.

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## NOTICES

**A PARASITIC HYMENOPTERA COURSE IN EUROPE John S. Noyes.**

Hymenopterists in England have long contemplated following the example of their New World cousins in organizing a course on the systematics and biology of parasitic Hymenoptera. Well, last year (1989) we finally got down to it and the first course was held in Sheffield in September (students even got their own copy of The Hymenoptera). It was a success and just to prove we can do it again we have decided to run another this year at the same venue. The course will be organized jointly by the NHM and Sheffield University and will be held from September 2-9.

The course will include lectures on the biology and systematics of the various groups of hymenopteran parasitoids, and practicals on the preparation of specimens and their identification as well as demonstrations of techniques. It is intended to cater for the needs of workers in pest management, PhD students and other workers who are commencing studies on the Hymenoptera or who wish to become more widely acquainted with this diverse and biologically important group of insects.

The cost of the course will be £550 including accommodation, breakfast and evening meal, and a copy of the course manual which will be The Hymenoptera (Eds. Gauld & Bolton). U.K. postgraduate research students may apply to their research councils for support. Delegates from outside the U.K. are advised to investigate the possibility of grants from their local British Council office. Privately funded individuals and those only interested in particular groups are advised to write for details of bursaries and special rates.

Anyone interested in attending should contact Donald Quicke, Department of Animal and Plant Sciences, Sheffield University, Sheffield S10 2TN, England. Telephone: (0742) 768555 ext. 4628.

We are hoping to organize the course annually and so if anyone is unable to attend this year but may be interested in attending in the future they should contact Donald now so that we can keep him informed of developments.

**THE NORTH AMERICAN KEY PROJECT Jim Woolley.**

The cooperative project to produce keys to genera of North American chalcidooids continues its inexorable march forward. Following the June, 1989 meeting of 13 of the 17 participants (see "Chalcid Commingle", Chalcid Forum No. 12, guidelines for chapter format and content were distributed to all participants. Responsibility for chapter authorship and proposed content and structure of the manual are essentially unchanged from that described in the aforementioned article, but some changes have been made relating to project organization. Jim Woolley has assumed the role of Project Manager and will be responsible for overall administration and coordination. Gary Gibson and John Huber will continue as Editors and

are responsible for negotiations with the publisher, circulation of ms. for peer review, quality control and copy editing, and all of the other myriad of details associated with publication. John Pinto, Eric Grissell and John LaSalle have agreed to form an Editorial Board that will serve in an advisory capacity if disputes arise between participants or reviews, changes in authorship are required, etc. John Huber obtained partial funding on a proposal to Forestry Canada for support of the project that will provide state-of-the-art computer equipment for desk-top publishing, and additional resources for illustrations may be also become available. A proposal has been submitted to the Systematic Biology Program, National Science Foundation, for funding of the project with Jim Woolley as the Principal Investigator. All of the project participants are included in the proposal and most are requesting funding to cover some or all of their expenses. Based on the great success of the Chalcid Commingle, we believe another workshop is essential for project review and coordination. A tentative time frame of June 1991 has been set for said affair, and Eric Grissell, Mike Schauff, and the Systematic Entomology Laboratory, USDA, Washington D.C. have agreed to serve as hosts. This will also provide an opportunity for participants to work further with USNM collections. Depending on the outcome of the pending NSF proposal, we have agreed that contributors should be expected to have preliminary manuscripts ready for the June 1991 workshop, ms. will be submitted to the editors for peer review in Fall of 1991, and the deadline for final manuscripts and art will be January 1992.

|                          |                             |
|--------------------------|-----------------------------|
| Introduction             | Huber, Gibson               |
| Morphology & Terminology | Gibson                      |
| Superfamily Chalcidoidea | Grissell, Schauff           |
| Agaonidae                | Boucek                      |
| Aphelinidae              | Woolley                     |
| Chalcididae              | Halstead, Boucek            |
| Elasmidae                | Coote                       |
| Encyrtidae               | Noyes, Woolley, Zolnerowich |
| Eucharitidae             | Heyraty                     |
| Eulophidae               | Schauff, LaSalle, Coote     |
| Eupelmidae               | Gibson                      |
| Eurytomidae              | Grissell, DiGiulio          |
| Leucospidae              | Boucek                      |
| Mymaridae                | Huber                       |
| Mymaromatidae            | Huber, Gibson               |
| Ormyridae                | Hanson                      |
| Perilampidae             | Darling                     |
| Pteromalidae             | Boucek, Heydon, Darling     |
| Signiphoridae            | Woolley                     |
| Tanaostigmatidae         | LaSalle                     |
| Tetracampidae            | Boucek                      |
| Torymidae                | Grissell                    |
| Trichogrammatidae        | Pinto                       |

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## RESEARCH INSTITUTES/COLLECTIONS

**ROCKY MOUNTAIN SYSTEMATIC ENTOMOLOGY LABORATORY.** Scott R. Shaw, Curator SMSEL, P.O. Box 3354, University of Wyoming, Laramie, WY 82071-3354, USA.

The Rocky Mountain Systematic Entomology Laboratory (RMSEL) serves as a repository for insects collected throughout the Rocky Mountain region, elsewhere in the United States and from many foreign countries, including Canada, Costa Rica, Mexico, Puerto Rico, Somalia, and Australia. It is the only research collection devoted to representing the large and diverse state of Wyoming. Since 1982, the collection is housed in all new, environmentally controlled rooms, on the fourth floor of the new Agriculture Addition. The insects are housed in ca. 2200 Cornell drawers in all new steel cabinets, and eight alcohol vial cabinets. The collection strives to represent all hexapod orders; however, the Coleoptera, Diptera, Hemiptera, Hymenoptera, Orthoptera, and Trichoptera are best represented at present. Ample work space and microscopes are available for visitor use. Graduate students and researchers working on taxonomic studies of insect groups are encouraged to visit or write for study loans. For further information or loan requests please contact me at the above address.

**THE BRETHES TYPES OF CHALCIDOIDEA AND CYNIPHOIDEA IN THE MACN COLLECTION.** Jorge F. Genise. Departamento de Ciencias Biológicas, Facultad de Ciencias Exactas y Naturales, Ciudad Universitaria (1428), Buenos Aires, ARGENTINA.

Between 1901 and 1927, Juan Brethes published 77 papers in which he described 893 new species of Hymenoptera. Most of the types were deposited in the Museo Argentino de Ciencias Naturales (MACN) where he worked, building up one of the most important collections of Hymenoptera from South America.

When Brethes died, nobody paid attention to his collection for about fifty years, until M.A. Fritz began to arrange it and made the first alphabetical files.

Brethes used to put a small label with a number on each insect in his collection. He registered each number in a notebook with a determination and a copy of this notebook is kept at MACN. The number label is critical for determining the "type" status of Brethes material because he rarely identified specimens with name labels, and his locality labels were usually less complete than information in the original descriptions. Definitive decisions on all "types" will have to be made by specialists after comparisons with the original descriptions.

In the following list species names are given in their original combination without considering subsequent nomenclatorial changes and synonyms. A plus sign (+) at the end of an entry indicates that there is typical material in the MACN collection. The absence of a plus sign means that the type has not been found. In some cases such material may simply repose in our collection

undetected, or it may have been borrowed without a record. Brethes deposited some types in other collections and these are cited in parentheses at the end of an entry.

A complete list of Brethes papers on Hymenoptera will be given in SPHECOS #20.

## Superfamily CHALCIDOIDEA:

## Family Aphelinidae:

- Aphelinus argentinus* Brethes, 1916 (+)
- Aphelinus signiphorooides* Brethes, 1916 (+)
- Coccophagus nubeculus* Brethes, 1913 (+)
- Diaspidophilus pallidus* Brethes, 1914 (+)
- Dimacrocerus platensis* Brethes, 1914 (+)
- Onophitus caridei* Brethes, 1918 (+)
- Parachariopus lecanii* Brethes, 1913 (+)
- Perissopterus caridei* Brethes, 1920 (+)
- Prospaltoides howardi* Brethes, 1914 (+)
- Pseudaphelinus caridei* Brethes, 1918
- Pteroptrix australis* Brethes, 1916 (+)
- Trichogrammatoides signiphorooides* Brethes, 1913 (+)

## Family Chalcididae:

- Heptasmicra brasiliensis* Brethes, 1918 (+)
- Pseudochalcis paraguayensis* Brethes, 1916 (+)
- Spilochalcis bertonii* Brethes, 1909 (+)
- Spilochalcis fischeri* Brethes, 1927 (Col. Inst. Ent. Alemán)
- Spilochalcis porteri* Brethes, 1923 (+)
- Spilochalcis t-nigrum* Brethes, 1927 (Col. Inst. Ent. Alemán)
- Spilochalcis 20-dentata* Brethes, 1922

## Family Encyrtidae:

- Ageniaspis chilensis* Brethes, 1921 (+) *Allorhopoideus mirabilis* Brethes, 1916 (+)
- Aphytus flavidulus caridei* Brethes, 1918 (+)
- Aphytus flavidulus nigra* Brethes, 1918 (+)
- Bothriothorax silvai* Brethes, 1921 (+)
- Brethesia selvatica* Brethes, 1920
- Cerapterocerus bonariensis* Brethes, 1922 (+)
- Gyranusia porteri* Brethes, 1920 (+)
- Leptomastidea pseudococci* Brethes, 1924 (+)
- Litomasita argentinus* Brethes, 1913 (+)
- Mendozaniella mirabilis* Brethes, 1913 (+)
- Paranusia bifasciata* Brethes, 1913 (+)
- Phaenodiscus bertonii* Brethes, 1924 (+)
- Philoponectroma pectinatum* Brethes, 1913 (+)
- Prionomitus aulacaspidis* Brethes, 1914 (+)
- Prionomitus brasiliensis* Brethes, 1920 (+)
- Prothopoeus baezi* Brethes, 1921 (+)
- Psilomirinus flavidulus* Brethes, 1916

## Family Eucharitidae:

- Eucharomorpha brasiliensis* Brethes, 1927 (Col. Inst. Ent. Alemán)
- Psilogasteroides formicarius* Brethes, 1910 (+)
- Tetramelia chilensis* Brethes, 1916

## Family Eulophidae:

- Cirrospilopsis verticillata* Brethes, 1913 (+)  
*Cirrospilus melleus* Brethes, 1920 (+)  
*Mesiocharis maculipennis* Brethes 1922 (+)  
*Paracrasis phytomyzae* Brethes, 1923 (+)  
*Perthymenes schrottkyi* Brethes, 1916 (+)  
*Phytomyzophaga albipes* Brethes, 1923 (+)  
*Sphencophagus sceliphronidis* Brethes, 1910 (+)  
*Sympotomus porteri* Brethes, 1921 (+)  
*Tetrastichodes claudii* Brethes, 1927 (+)  
*Tetrastichodes imitator* Brethes, 1916 (+)  
*Tetrastichus arachnophagus* Brethes, 1913 (+)  
*Tetrastichus apanteleicida* Brethes, 1921  
*Tetrastichus caridei* Brethes, 1918 (+)  
*Tetrastichus ceroplastidis* Brethes, 1913 (+)  
*Tetrastichus isis* Brethes, 1918 (+)  
*Tetrastichus luridiceps* Brethes, 1918 (+)  
*Tetrastichus oeceticola* Brethes, 1920 (+)  
*Tetrastichus platensis* Brethes, 1904 (+)  
*Tetrastichus porteri* Brethes, 1918 (+)  
*Tetrastichus rivalis* Brethes, 1918 (+)  
*Tetrastichus riverai* Brethes, 1926 (+)  
*Tetrastichus zemani* Brethes, 1920 (+)

## Family Eupelmidae:

- Brasemopsis halysidota* Brethes, 1913 (+)  
*Calosoter olierae* Brethes, 1916 (+)  
*Calosoter silvai* Brethes, 1917 (+)  
*Eupelmus halysidota* Brethes, 1916 (+)  
*Lindesonius caridei* Brethes, 1917 (+)  
*Lindesonius cecidiopae* Brethes, 1916 (+)  
*Pseudooderella catamarcensis* Brethes, 1922 (+)

## Family Eurytomidae:

- Decatoma cecidosiphaga* Brethes, 1916 (+)  
*Eudecatoma opposita* Brethes, 1916 (+)  
*Eudecatoma paranensis* Brethes, 1922 (+)  
*Eurytoma caridei* Brethes, 1917 (+)  
*Eurytoma geniculata* Brethes, 1913 (+)  
*Eurytoma vulgaris* Brethes, 1916 (+)  
*Eurytoma ridiaschiae* Brethes, 1916  
*Prodecatoma parodii* Brethes, 1922 (+)  
*Tragocola haumani* Brethes, 1918  
*Xanthosomodes albiangulus* Brethes, 1913 (+)

## Family Mymaridae:

- Anagrus chilensis* Brethes, 1916  
*Anagrus porteri* Brethes, 1917 (+)  
*Anaphoidea atomaria* Brethes, 1913 (+)  
*Forsterella bonariensis* Brethes, 1922 (+)  
*Stichotrix platensis* Brethes, 1913 (+)

## Family Pteromalidae:

- Carolaccus espinosai* Brethes, 1927 (+)  
*Epistenia cupreoviridis* Brethes, 1906 (+)  
*Epistenia conica* Brethes, 1909 (+)  
*Epistenia scutellata* Brethes, 1909 (+)  
*Epistenia lignensis* Brethes, 1916 (+)  
*Epistenia chilensis* Brethes, 1916 (+)

- Eucherchius scolyti* Brethes, 1913 (+)  
*Habritus bimaculatus* Brethes, 1916 (+)  
*Habrocytus platensis* Brethes, 1920 (+)  
*Miscogaster bonariensis* Brethes, 1913 (+)  
*Pachycrepoides bonariensis* Brethes, 1916 (+)  
*Pachyneuron syrphiphagum* Brethes, 1913 (+)  
*Parapteromatus chilensis* Brethes, 1927 (+)  
*Platymesopus eurasquini* Brethes, 1913 (+)  
*Platymesopus porteri* Brethes, 1916 (+)  
*Prospalangia platensis* Brethes, 1915 (+)  
*Pieromatus caridei* Brethes, 1913 (+)  
*Pieromatus chacoensis* Brethes, 1913 (+)  
*Serinus argentinus* Brethes, 1913 (+)  
*Serinus porteri* Brethes, 1917 (+)  
*Spalangia tarsalis* Brethes, 1913  
*Trichomalus hesperocharidis* Brethes, 1920 (+)  
*Trichomalus politiventris* Brethes, 1909 (+)

## Family Signiphoridae:

- Signiphora argentina* Brethes, 1913 (+)  
*Signiphora caridei* Brethes, 1914 (+)  
*Signiphora platensis* Brethes, 1913 (+)

## Family Tanaostigmatidae:

- Eutetracera ringueleti* Brethes, 1924 (+)  
*Minapis nigra* Brethes, 1916 (+)  
*Rafa albiarctis* Brethes, 1916 (+)  
*Rafa ridiaschiae* Brethes, 1916 (+)

## Family Torymidae:

- Callimorus chilensis* Brethes, 1916 (+)  
*Megastigmus porteri* Brethes, 1916 (l agree) - type not found  
*Monodonomerus argentinus* Brethes, 1913 (+) not seen  
*Monodonomerus schrottkyi* Brethes, 1916 (+)  
*Perissocentrus argentinae caridei* Brethes, 1917 (+) - neotype - my  
*Syntomaspis alegrensis* Brethes, 1927 (+) unpubl.!

## INCERTAE SEDIS:

- Aprostocerus thomasi* Brethes, 1921 (+)  
*Archinus chilensis* Brethes, 1918 (+)  
*Blennocampa chilensis* Brethes, 1914  
*Bruchobius brasiliensis* Brethes, 1927 (+)  
*Dicylus porteri* Brethes, 1927 (+)  
*Heterobelyta chilensis* Brethes, 1916  
*Idiobia schmidti* Brethes, 1927 (Col. Inst. Ent. Alemán)  
*Parasympiesis cecidicola* Brethes, 1927 (+)  
*Perecromia hubrichi* Brethes, 1913 (+)  
*Tanava rospigliosi* Brethes, 1918 (+)  
*Tropinius willei* Brethes, 1927 (Col. Inst. Ent. Alemán)

## Superfamily CYNIPOIDEA:

- Aegilips chilensis* Brethes, 1918 (+)  
*Charipsella laevigata* Brethes, 1913  
*Eucoila (Psichacra) pelleranoi* Brethes, 1924 (+)  
*Euperilampus cerasinus* Brethes, 1909 (+)  
*Hypolectria bonariensis* Brethes, 1913 (+)  
*Pegasynips barahonai* Brethes, 1927 (+)

THE CHALCIDOID COLLECTION AT TEXAS A&M UNIVERSITY. Jim Woolley, Department of Entomology, College of Agriculture and Life Sciences, Texas A&M University, College Station, TX 77843-2475, U.S.A.

The insect collection at Texas A&M University was initiated sometime during the period between 1902 and 1904, but there was no serious effort to build the collection until the arrival of H.J. Reinhard in 1916. Over the years, the collection has grown to over one million specimens, and is now especially strong in material from Texas, the southwestern U.S., and Mexico. Many individuals contributed to the growth of the collection during the early years, including Reinhard (many groups), J.C. Gaines (Coccinellidae), S.E. Jones (general), R.K. Fletcher (Homoptera), H.B. Parks (Apoidea), V.A. Little (Acrididae), and H.G. Johnson (Miridae). Horace R. Burke, a Curculionidae systematist, assumed curatorship of the collection in 1959 and remains in this post today. Joseph Schaffner, a Miridae systematist, joined the faculty in 1963. Burke and Schaffner have pursued active field programs and much of the growth of the collection is due to their efforts and those of their students and other associates. Schaffner in particular has collected most of Texas and Mexico intensively over the years, for both Miridae and general insects. Ed Riley (Chrysomelidae, Scarabaeidae), our Collections Manager, joined us in June of 1988.

The collection moved to its present spacious quarters (in the Minnie Bell Heep Building, no kidding) in 1977. The main collection resides in a large room of about 1500 sq. ft. and there are about another 3000 sq. ft. of associated labs, preparatory rooms and offices. Virtually all of the pinned material is housed in foam-bottom unit trays in Cornell drawers in 48-drawer, steel cabinets, 76 of which form the main collection. We can probably accommodate at least twenty more cabinets on the current floor space, which at the current rate of collection growth is sufficient for perhaps 3-5 years. In addition, substantial material is stored in individual research laboratories, perhaps another 20 cabinets total. One large room is devoted to storage of wet specimens. Although we don't have facilities to store the entire wet collection in cold, dark conditions, all recent acquisitions in alcohol (and all parasitic Hymenoptera in alcohol) are stored in freezers. We are midway through a three year grant from NSF for improvement of the collection, and this is providing much-needed resources for additional cabinets, supplies and technical help.

However, the interesting part of the collection (the parasitic Hymenoptera) remained relatively stagnant with a few major exceptions. Eric Grissell worked in the collection for three months in 1972, primarily collecting and curating chalcidoids, many of which were (needless to say) reared from galls and other hosts of Torymidae. Charles Porter has contributed many specimens from south Texas over the years including many Chalcididae. As biological control became an increasingly important

research emphasis in the department in the late 1970's, more and more chalcidoids associated with specific projects found their way into the collection. Real growth of parasitic Hymenoptera was, however, to wait until the arrival of Bob Wharton in 1981 and Jim Woolley in 1983. Although Wharton's primary interests are in Ichneumonoidea (blech!) he is an avid collector of all Hymenoptera and has not yet found a way to exclude chalcidoids from his collections. When Woolley arrived in 1983 he found most families of chalcidoids represented in a relatively small collection: about 6,700 specimens representing approximately 190 species. Mike Rose joined the department in 1984, bringing his interests and expertise in Aphelinidae and other parasites of Homoptera. With the arrival of two students in Woolley's lab, Greg Zolnerowich and John Heraty, the current chalcidoid team was formed and began the current period of explosive growth in the chalcidoid collection.

Over the past few years, we have collected extensively in south and central Texas and central and southern Mexico, particularly the states of Michoacan, Guerrero, Oaxaca and Puebla. Currently we are working intensively in the Big Bend region and south and central Texas. Therefore, our holdings are exceptionally strong, probably uniquely so, in material from these under-collected and biogeographically interesting areas. Increasingly, we are managing to find funding for foreign fieldwork, and recently the collection has benefitted from trips by Wharton (Australia, New Guinea, Malaysia), Woolley (Venezuela), and Heraty (Australia, Taiwan, Malaysia and India).

The collection has also benefitted greatly from the efforts of many colleagues. John LaSalle visited the collection for two weeks in 1988, spending most of his time sorting (and no doubt helping himself to) Tetrastichinae and other Eulophidae. Zdenek and Tanya Boucek spent two weeks with us in 1989, working almost entirely on Pteromalidae for the North American key project. John Noyes has visited twice, for a total of about four weeks, and contributed mightily to the encyrtid collection. Luis De Santis, Carl Yoshimoto and Andrey Sharkov all visited us in 1989. Other colleagues have sorted or determined material for us: Steve Heydon, John Huber, Chris Darling, Mike Schauff, Eric Grissell, Paul Hanson, Jeff Halstead, and Fred Moitoza, to name just a few.

Overall, the collection now consists of approximately 50,000 point-mounted specimens and probably 3000 slides. Virtually all of our material was collected in alcohol and critical-point dried, therefore, the collection is composed almost entirely of very high quality specimens. Table 1 is a summary of our holdings by family. The totals shown for Eucharitidae include Heraty's extensive working collection, much of which is borrowed (John was out of the country when this was composed). The totals shown for Encyrtidae do not include Zolnerowich's working collection of Copidosomatini, some 30 drawers at present, much of which is borrowed. The totals shown for Signiphoridae include some borrowed material. We also

maintain an extensive slide collection, primarily of Signiphoridae, Aphelinidae, Signiphoridae and Eucharitidae.

The reader will note the large backlog of undetermined specimens in Eulophidae and Pteromalidae. Most of this is sorted to subfamily or tribe, and can therefore be readily loaned to interested specialists. There are also some 10 drawers or so of material awaiting sorting to family. Following the example of our colleagues in Ottawa (it pains us to admit that, once again), we have instituted weekly sorting sessions, and over the past two years we managed to sort to family or subfamily a backlog of approximately 40 Cornell drawers packed with chalcidoid specimens.

We should also note that our somewhat fanatical collecting program in combination with the limited resources available for sorting and curation have created a rather substantial backlog of material in alcohol. In particular, our penchant for collecting screen-sweep samples in not yet matched by our ability to sort them, and we are now a few years behind with those. There are also probably 300 vials of unsorted chalcidoids (encyrtids, aphelinids, eucharitids etc. have been removed) awaiting our attention or those of future visitors (so far, John LaSalle has been the only visitor brave enough to

explore the contents of the freezer - but many delights await the intrepid).

In short, recent years have seen an ever increasing rate of growth of the TAMU collection, and this is particularly true of chalcidoids. The growing usefulness of the collection to systematists is reflected in a steadily increasing number of loans and visitors. Anyone contemplating revisionary work on Nearctic or Neotropical chalcidoids should contact us for loans of material. In addition, we are eager to negotiate exchanges, particularly with collections with holdings from different parts of the world, or those with very active collecting programs. Inquiries concerning loans or exchanges should be addressed to Dr. James B. Woolley, Associate Professor, or Dr. Horace Burke, Professor and Curator, Department of Entomology, Texas A&M University, College Station, Texas, U.S.A. 77843, telephone: (409) 845-9349. Hymenopterists should also consider visiting the collection - we are well equipped for guests and we can arrange for very reasonable local accommodations. And, of course, if you come at the right time of year (April through October), we will be pleased to introduce you to chalcidoid-collection, Texas style.

Table 1. Chalcidoidea in the Insect Collection, Texas A&M University

| Family            | Genera    | Cornell Drawers | Drawers of Unsorted Material |
|-------------------|-----------|-----------------|------------------------------|
| Mymaridae         | 13        | 4               | 1                            |
| Myrmecommataidae  | 1         | -               | 0                            |
| Chalcididae       | 12        | 8               | 3                            |
| Leucospidae       | 1         | 1               | 0                            |
| Eurytomidae       | 9         | 6               | 4                            |
| Torymidae         | 12        | 7               | 3                            |
| Ormyridae         | 1         | 2               | 0                            |
| Agaonidae         | 5         | 1               | 0                            |
| Pteromalidae      | 94        | 20              | 5                            |
| Perilampidae      | 3         | 2               | (on loan)                    |
| Eucharitidae      | ??        | 36              | -                            |
| Eupelmidae        | 5         | 2               | (on loan)                    |
| Tanaostigmatidae  | 3         | 2               | 1                            |
| Encyrtidae        | 190       | 69              | 6                            |
| Signiphoridae     | 4         | 8               | 1                            |
| Aphelinidae       | 23        | 8               | 3                            |
| Tetracampidae     | 2         | 1               | 0                            |
| Elasmidae         | 1         | 1               | (on loan)                    |
| Eulophidae        | 48        | 29              | 15                           |
| Trichogrammatidae | (on loan) | -               | (on loan)                    |

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## TRIP REPORTS

ENTOMOLOGISTS ON A TROPICAL CANOPY.  
Gerard Delvare, CIRAD, Avenue du Val de Montferrand,  
B.P. 5035-34032 Montpellier, Cedex 1, France.

In October-November 1989, I took part in an expedition exploring the amazonian canopy in French Guiana with H.-P. Aberlenc, another colleague of the CIRAD-Montpellier. The novelty of this expedition was the use of a machine built especially for this purpose and called "raft of tops" (*radeau des cimes* in French). This raft is in fact composed of two separate parts: a hexagonal platform of 600 square metres (700 kilos weight) composed of 6 nets stretched by pneumatics, and a dirigible 47 metres in length (the largest one of this type in the world) inflated with heated air. The dirigible is used to place the platform on top of the trees. When laid, the raft perfectly fits their shape. Four or five scientists can work in security at the same time on the raft. We access it from the ground by means of a rope and the use of speleology equipment.

The idea of exploring the canopy from the top, instead of from the ground, came from the meeting of three people: Prof. F. Hallé of the Botanical Institute of Montpellier (responsible for the expedition), Dany Cleyat-Marrel (the pilot of the dirigible and one of the best in France), and Gilles Ebersolt (architect and specialist in pneumatic machines).

The first expedition took place in 1986, also in French Guiana. They used a balloon, which was not easy to manage and could not be directed, thus depending on the wind. Actually, the laying of the raft needs, even with the dirigible, a location flight in order to choose the right places according to the topography of the forest, their botanical interest, and their accessibility from the ground.

The site of the 1989 expedition was Petit Saut on Sinnamary River, 60 km SW of Kourou, the place where Ariane rockets are fired. Approximately 50 scientists took part in the expedition. Most of them were botanists, but there was also a botanico-entomologist studying pollination and seed dispersion, two herpetologists, one ornithologist, two arachnologists and also a television crew and photographers. About 25 to 30 people were present at the same time. We stayed 4 weeks, from October 11 to November 8.

We were supposed to collect all kinds of insects, not only parasitic Hymenoptera. On the canopy, we swept the trees, put up Malaise traps and made a light trap.

The first impression when you climb to the raft is that you are actually living in a new environment. This is a bit distressing because it is at first unknown. After climbing so many metres on the rope you must keep climbing up because it is now impossible to go down. You become hot and wet and, after 10 to 15 minutes, you reach the raft. There, you receive the violence of the light right in your face and realize immediately that there is an evident contrast between the canopy and the undergrowth. But there is another thing which you can appreciate when "sleeping" on the raft. During the night

the humidity is so high that it feels like rain. It is the dew which falls from leaf to leaf. Hence, your sleeping bag is like a floorcloth. But as soon as the air is heated, during the sunny days, it becomes very dry (40% humidity) and hot. So the maximum activity of insects is from 8:30 a.m. to 11:00 a.m. After that time, it is even very difficult for people to stay on the raft.

I did not collect many insects by sweeping as they moved the platform only once a week. The space which can be explored is thus rather limited. The Malaise trap seemed much more promising as small insects can fly through the meshes of the net which constitute the platform. We first thought of simply putting the traps on the raft. However, it soon became evident that they could not stand upright because their base was not rigid. Actually they fell the day after they were installed. We then tried to make a frame with local means. The traps stood for a longer period of time but they finally fell down also. After two weeks a better system was found. Gilles Ebersolt built a tetrahedron with pneumatics in order to stretch the trap, which was included in it. The whole system was then deposited directly on a tree by the dirigible. The operation of placing the tetrahedron and recovering it proved not to be too difficult. However, we had another problem when, after 10 days of trapping, the pilot wanted to change the jar (which was black because it was full of insects) and used a small balloon. He let the jar fall during the operation and no insect survived this disaster!!!

Of course, we also collected in the undergrowth. I looked for parasites of xylophagous beetles on dead trunks and we put a Malaise trap in a clearing. I also went to another place for two days, 20 km S of Sinnamary, where I collected Chalcididae on an attractive plant (*Solanum* sp.). Finally, we collected several thousands of insects but I shall speak only of the parasitic Hymenoptera.

Despite the relatively small samples collected on the canopy, it is evident that chalcidoids occur mostly there and much less in the undergrowth. In a few minutes, I collected more on the top than in two hours in the undergrowth. Only Diparinae (most probably *Lelaps* sp.) have been found there, where they were relatively numerous. Representatives of Diapriidae, Eucoliiidae, Scionidae were exclusively found on or near the ground. Within the braconids, *Heteropilus* spp. proved to be especially abundant in the same habitat.

On dead trunks I found a few interesting Cleonyminae. By rearing eggs of a dictyopharid, we also got some very interesting Pteromalinae (new genus ?). And lastly, I collected 40 species of Chalcidini, 25 identified as new, 10 previously described and 5 doubtful.

It is possible that another expedition will be planned for 1990 in French Guiana. If we take part in it we shall use many more Malaise traps (at least 10) and mainly special, larger ones, adapted to this particular use. We are, of course, interested in any suggestions from readers of Chalcid Forum.

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## BOOK NOTICES

**ORIENTAL CHALCIDIDAE (HYMENOPTERA)**, a monograph on the Oriental genera and species of Chalcididae by Prof. T.C. Narendran, Dept. of Zoology, University of Calicut, Calicut University P.O. 673635, India (440 pp.).

An illustrated monograph providing the latest revision of the family Chalcididae from the Oriental region, including 41 genera and 330 species. Included are taxonomy, brief accounts of biology, morphology and distribution, illustrated dichotomous keys to genera and species along with detailed diagnoses of taxa, several new synonyms and new combinations, and a host parasite catalogue.

Not priced; postage, packing and forwarding charges by way of "Coupon Response International" worth \$8.00 (US) should be sent to the author.

## MISCELLANY

**A U S T R A L A S I A N C H A L C I D O I D E A (HYMENOPTERA): FURTHER ERRORS AND OMISSIONS.** Z. Boucek. 1990. [Reproduced from] Ent. Mon. Mag. 126(1508-1511): 87-88.

The majority of the following corrections are results of a meticulous checking by Dr J.S. Noyes.

P160 second part of couplet 22 should run to . . . 24 (not '25')

P171 L11 ... gaster with ... (not 'wich')

P173 L5 ... close to *dubia* ... (not 'dubius')

P173 L25 ... *W. kurandensis* from ... (not 'wiebesi')

P173 L4 from bottom ... in which *kurandensis* ... (not 'wiebesi')

P192 [*Pleistodones*] 'liszti' (2x) should be corrected to: *listzi*. Although apparently named after the composer Liszt, Girault's *listzi* is the valid original spelling. Correct it also in the Index, P813 (2x).

P234, P425 and P487 correct '*Buloloa*' to *Bulolosa* (nom. novum). Dr H. Roberts of Bulolo kindly informed me that the pteromalid name *Buloloa* is preoccupied by *Buloloa* Hardy, 1986, proposed in his publication 'Fruit Flies of the Subtribe Acanthonevrina of Indonesia, New Guinea and the Bismarck and Solomon Islands', *Pacif. Insects Monogr.* 42:32.

P312 [*Systasis*] insert as last: *viridis* (Girault) comb. n. - *Paruriella viridis* Girault, 1916[274]: 226. NSW: Boggabri. The single female mentioned by Girault (apart from 2 males) is here designated Lectotype; in USNM (see also Dahms, 1986: 642).

P341 L3 ... mandibles 4-toothed ... (not '4-segmented')

P391 correct (597) 'monteithrum' to *monteithorum*

P552 delete last line concerning *worcesteri*; it is right on P545

P583 *Nitcampe 'noyesi'* correct to *Nitcampe metallica*; and *Epiclerus 'petiolatus'* correct to *Epiclerus longicornis*

P607 *Ophelimus 'liszti'* (2x) should be corrected to *listzi* (as P192 above)

P611 bottom line delete 2 lines concerning *Pseudochrysocharis*; it is correct on P721 (bottom)

P615 [*Cirrospilus*] insert after *nigriscutum*: *nigrivariegatus* (Girault) comb. n. - *Cirrospilopsis nigrivariegatus* Girault, 1915[250]: 264. QLD: Gordonvale. Transferred to *Giraultia* by Gahan & Fagan, 1923: 66.

P615 [*Cirrospilus*] insert after *quadrifasciatus*: *quinquefasciatus* (Girault) comb. n. - *Cirrospilopsis quinquefasciatus* Girault, 1915[230]: 264. NSW: Chinderah.

P615 delete 2 lines beginning 'specialis ...' and the line with 'speciosus (*Pseudochrysocharis*) ...'. The species is correctly placed on P724.

P644 correct 'cicuta' (2x) to: *specimenipennis*

P649 correct 'speciminipennis' (2x) to *specimenipennis*

P675 [*Neotrichoporooides*] replace line concerning 'bicolor' by: *bicolor* (*Tetrastichomorpha*) see 76. *Aprostocetus mahometi*

P675 replace 2 lines concerning 'margiventris' by: *margiventris* (*Aprostoceroloides*) see 76. *Aprostocetus margiventrosus*

P675 replace line concerning *Neotrichoporooides purpureithorax* by: *purpureithorax* (*Paraprostocetus*) see 76. *Aprostocetus*

P682 [*Aprostocetus*] replace 2 lines concerning 'kochi' by: *kochi* (*Epomphalooides*) see *variegatus*

P684 delete line beginning 'purpureithorax (*Paraprostocetus*) ...'

P684 insert at end of text about *purpureus*: The name became a junior secondary homonym of *A. purpureus* (Cameron) published in January 1913 and transferred to *Aprostocetus* by Graham, 1987: 353. Girault's *purpureus* was published in December 1913. The latter name is not being replaced because of the uncertain identity of the species.

P684 [*Aprostocetus*] insert before *queenslandensis*: *quadrimaculatus* (Girault) comb. n. - *Syniomyphrella quadrimaculata* Girault, 1913[167]: 245. QLD: Gordonvale (Nelson).

P684 [*Aprostocetus*] insert after *quinqnigromaculae*: *rieiki* (DeSantis) comb. n. - *Neotetrasichodes flavus* Girault, 1913[167]: 228 and [172]: 44-45. QLD: Gordonvale (Nelson). Comment by Girault, 1915[250]: 234. Transferred to *Tetrasichus* and renamed *rieiki* by DeSantis, 1979: 296, because in *Tetrasichus* the name *flavus* was preoccupied by *T. flavus* (Howard, 1897). Probably the same species as *Aprostocetus gala* (Walker).

P686 [Aprostocetus] replace line with 'variegatus (*Epomphalooides*) ...' by the following: *variegatus* (Girault) comb. n. - *Epomphalooides variegatum*(!) Girault, 1915[230]: 252. QLD: Gordonvale. Thought to be preoccupied by *Selitrichodes variegatus* Girault, 1913[167]: 226, when both species were transferred to *Tetrastichodes* by Girault, 1935[445]: 4, and 'Tetrastichodes Kochi' was proposed to replace *variegatus* of 1915. However, the correct original spelling of the 1913 name is *varigatus*, which leaves the 1915 *variegatus* as available name (ICZN Art. 32), and *kochi*, as unnecessary replacement, is its junior synonym.

P686 L8 correct 'variegatus' (2x) to: *varigatus*. This name was quoted by Girault, 1935[445]: 4 as "Tetras. *variegatus* gir. 1915 preocc. name ..." but the original spelling is *varigatus*.

P688 L9 [*Sigmophora*] correct as follows: = *Neomphaloideella parkmani* Girault, 1929[431]: 327 ... P693 under [*Tetrastichus*] *arnoldi*, and P694 under *longiscapus* and under *ruskini* correct references to the original genus as: *Ceratoneuronomyia* not '*Ceratoneuromyia*'

P711 under *Apleurotropis* correct *Propleurotropis* 'minii' to: *mini*

P723 [*Chrysotomyia*] insert before *aenella*: *aeneicoxa* (Dodd) comb. n. - *Rhincopeltomyia aeneicoxa* Dodd, 1917: 365-366. QLD: Cairns district; ex mid rib of sugarcane leaf.

P733 L21 (in 'Distribution') correct 'P.' *kaulbarsi* to *E. kaulbarsi*  
L29 correct: ... NZ: Central Otago area, ... (not 'Coromandel')

P763 add: BOUCEK, Z. & NARENDRAJAN, T.C. (1981). Indian chalcid wasps (Hymenoptera) of the genus *Dirhinus* parasitic on synanthropic and other Diptera. - *Syst. Ent.* 6, 229-251.

P765 add: DAHIMS, E.C. (1986). A checklist of the types of Australian Hymenoptera described by Alexandre Arsene Girault: IV. Chalcidoidea species N-Z and genera with advisory notes plus Addenda and Corrigenda. - *Mem. Qd Mus.* 23, 319-739.

P798 insert: *bellus* (*Encyrtacephalus*) 300 [Errors 1]

P800 insert: *Bulolosa* 425, 234 [Errors 2]

P812 insert: *kochi* (*Aprostocetus*) 686 [Errors 2]

P814 insert: *mediosulcata* (*Sigmophora*) 688 [Errors 1]

P817 insert: *nigrivariegatus* (*Cirrospilus*) 615 [Errors 2]

P824 insert: *quinquefasciatus* (*Cirrospilus*) 615, and: *rieki* (*Aprostocetus*) 684 [Errors 2]

P831 insert: *varicincta* (*Coelocyba*) 316, and: *varigatus* (*Aprostocetus*) 686 [Errors 2]

P832 insert: *viridis* (*Systasis*) 312 [Errors 2]

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### RECENT LITERATURE

All titles and journal abbreviations should be checked by the reader for accuracy if they are to be quoted in scientific papers. Strictly taxonomic references are marked with an asterisk (\*).

The references by De Santis and Fidalgo with dates and journals marked as "xx's were sent to John Huber as unpublished papers with their status as current or future publications not indicated.

- Abdullah, M., H.A. Dawah, & M.A. Jervis. 1989. New rearing records for the parasitoids *Homoporus subniger* Walker, *Homoporus febriculosus* Girault and *Merisus splendidus* Walker (Hymenoptera: Pteromalidae). *Ent. Gaz.* 40: 325-327.
- Aeschlimann, J.P., & J. Vitou. 1989. Observations on the lucerne seed chalcid, *Bruchophagus rodii* (Hymenoptera, Eurytomidae), and its parasitoids in Mediterranean France: a promising candidate for classical biological control in Australia. *Oecol. Applic.* 10: 129-133.
- Agricola, U., D. Agounke, H.U. Fischer, & D. Moore. 1989. The control of *Rastrococcus invadens* Williams (Hemiptera: Pseudococcidae) in Togo by the introduction of *Gyranusoidea tebygi* Noyes (Hymenoptera: Encyrtidae). *Bull. ent. Res.* 79: 671-678.
- Ardellano, C.G., & I. Redolfi de Huiza. 1988. Biology of *Halticoptera ardune* (Hym. Pteromalidae), parasitoid of *Liriomyza huidobrensis* (Diptera: Agromyzidae). *Rev. Peru. Ent.* 31: 95-101.
- Arretz, P., L. De Santis, M. Angelica Guerrero, & L. Lamborot. 1989. Presence in Chile of *Aprostocetus daira* Walker (Hymenoptera: Eulophidae). *Acta ent. Chil.* 15: 275-276.
- Askew, R.R. 1990. *Palaeomyrm anomatum* Blood and Kryger (Hymenoptera: Mymaromatidae) in Cheshire, England. *Ent. mon. Mag.* 126: 73.
- van den Assem, J. 1988. Proximal causal factors and parasitization behavior, pp. 37-38, in Parasitoid Insects, Lyon, September 7-10, 1987. Ed. INRA, Paris, 1988 (Les Colloques de l'INRA no. 48). [*Lariophagus*].
- \*van den Assem, J. & M.J. Gijswijt. 1989. The taxonomic position of the Pachyneurini (Chalcidoidea, Pteromalidae) as judged by the characteristics of courtship behavior. *Tijdschr. Ent.* 132: 149-154.
- van den Assem, J., J.A. van Iersel, & R.L. los-den Hartogh. 1989. Is being large more important for female than for male parasitic wasps? *Behavior* 108: 160-195. [*Lariophagus*].
- Bai, B., & M. Mackauer. 1990. Oviposition and host-feeding patterns in *Aphelinus asychis* (Hymenoptera: Aphelinidae) at different aphid densities. *Ecol. Ent.* 15: 9-16.
- Barrett, B.A., & J.F. Brunner. 1990. Temporal distribution of *Phyllonorycter elmaella* (Lepidoptera: Gracillariidae) and its major parasitoid *Pnigalio flavipes* (Hymenoptera: Eulophidae) in Washington apple orchards. *Environ. Ent.* 19: 362-369.
- Bastian, R.A., & E.R. Hart. 1990. First generation parasitism of the mimosa webworm (Lepidoptera: Plutellidae) by *Elasmus albizziae* (Hymenoptera: Eulophidae) in an urban forest. *Environ. Ent.* 19: 409-414.
- Battaglia, D. 1989. A note on the male of *Comperiella lemniscata* Compere and Annecke (Hymenoptera: Encyrtidae). *Boll. Lab. Ent. agrar. Filippo Silvestri* 45: 77-80.
- \*Becker, M. 1989. Um nova espécie do gênero *Spi洛chalcis* Thomson 1876 (Hymenoptera: Chalcididae). *Rev. Bras. Ent.* 33: 337-340.

- Bethke, J.A., & M.P. Parrella. 1989. Compatibility of the aphid fungus *Cephalosporium lecanii* with the leafminer parasite *Diglyphus beginii* (Hymenoptera: Eulophidae). *Pan-Pac. Ent.* 65: 385-390.
- Biassangama, A., B. Le Ru, Y. Izquierdo, A. Kiyindou, & A.S. Bimangou. 1989. The insects associated with the cassava mealybug *Phenacoccus manihoti* (Homoptera: Pseudococcidae) in Congo five years after the introduction of *Epidinocarsis lopezi* (Hymenoptera: Encyrtidae). *Ann. Soc. ent. Fr.* 25: 315-320.
- Bin, F., & S. Colazza. 1988. Egg parasitoids (Hymenoptera: Scelionidae and Encyrtidae) associated with Hemiptera, Plataspidae, pp. 33-34 in Voegele, J., J. Waage, & J. van Lenteren (Eds.). Colloques de l'INRA no. 43. Les trichogrammes et autres parasitoïdes oophages. Second International Symposium, Guangzhou, China, November 10-15, 1986. Institut National de la Recherche Agronomique, Paris. 644 pp.
- Bin, F., & S. Colazza. 1988. Introduction in Italy, laboratory culture and field release of *Edovum putnieri* Griss. (Hymenoptera: Eulophidae) egg predator and parasitoid of the Colorado potato beetle, pp. 459-460 in Voegele, J., J. Waage, & J. van Lenteren (Eds.). Colloques de l'INRA no. 43. Les trichogrammes et autres parasitoïdes oophages. Second International Symposium, Guangzhou, China, November 10-15, 1986. Institut National de la Recherche Agronomique, Paris. 644 pp.
- Blahutiaik, A. 1988. Natural enemies of *globulae* scale in Czechoslovakia. *Entomol. Probl.* 0(18): 9-98. [Encyrtidae, Aphelinidae, Eulophidae, Pteromalidae, Eupelmidae].
- Bronstein, J.L., & D. McKey. 1989. The fig-pollinator mutualism, a model for comparative biology. *Experientia (Basel)* 45: 601-604.
- Cabello, T., & P. Vargas. 1988. The effect of temperature on the bionomics of *Trichogramma cordubensis* (Hymenoptera: Trichogrammatidae), pp. 155-164 in Voegele, J., J. Waage, & J. van Lenteren (Eds.). Colloques de l'INRA no. 43. Les trichogrammes et autres parasitoïdes oophages. Second International Symposium, Guangzhou, China, November 10-15, 1986. Institut National de la Recherche Agronomique, Paris. 644 pp.
- Carde, R.T., & H.-P. Lee. 1989. Effect of experience on the responses of the parasitoid *Brachymeria intermedia* (Hymenoptera: Chalcididae) to its host *Lymantria dispar* (Lepidoptera: Lymantriidae) and to kairomone. *Ann. ent. Soc. Amer.* 117: 653-657.
- Chapman, G.B., & M.E. Hooker. 1990. Ultrastructural features of the musculo-epidermal and epidermo-cuticular junctions in the abdomen of *Pediobius foveolatus* (Hymenoptera: Eulophidae). *Ann. ent. Soc. Am.* 83: 215-219.
- Clark, S.R., G.L. Debarr, & C.W. Berisford. 1990. Life history of *Oracella acuia* (Homoptera: Pseudococcidae) in loblolly pine seed orchards in Georgia, USA. *Environ. Ent.* 19: 99-103. [*Acerophagus*].
- Clouâtre, A., D. Coderre, & D. Gagnon. 1989. Habitat of a new Mymaromatidae found in southern Quebec, Canada (Hymenoptera: Terebrantes). *Can. Ent.* 121: 825-826.
- Compton, S.G. 1989. The fig wasp *Odontofroggattia galili* (Hymenoptera: Pteromalidae) in the Greek isles. *Ent. Gaz.* 40: 183-184.
- Coudron, T.A. 1989. Further studies on the mode of action of the venom from the ectoparasitoid *Euplectrus*-spp. (Hymenoptera: Eulophidae). *Abstr. Pap. Am. Chem. Soc. V. 198 (0) P: Agro.* 62.
- Darling, D.C., and J.H. Werren. 1990. Biosystematics of *Nasonia* (Hymenoptera: Pteromalidae): two new species reared from birds' nests in North America. *Ann. Ent. Soc. Am.* 83(3): 352-370.
- Delobel, A. 1989. Effectiveness of *Uscana carydoni* (Hymenoptera: Trichogrammatidae) as a biological control agent of the groundnut bruchid *Caryedon serratus* (Coleoptera: Bruchidae). *Entomophaga* 34: 351-364.
- Dennill, G.B., & A.J. Gordon. 1990. Climate-related differences in the efficacy of the Australian gall wasp (Hymenoptera: Pteromalidae) released for the control of *Acacia longifolia* in South Africa. *Environ. Ent.* 19: 130-136.
- Devasahayam, S. 1989. *Erythmelus helopeltidis* Gahan (Hymenoptera: Mymaridae), a new egg parasite of *Helopeltis antonii* Signoret on cashew. *J. Bombay nat. Hist. Soc.* 86: 113.
- De Santis, L. 1989. Catalogue of the Chalcidoidea (Hymenoptera) of America south of the United States. Second Supplement. *Acta Ent. Chil.* 15: 9-90.
- De Santis, L. 1989. Parasitoide e hiperparasitoide de un insecto polinizador de Argentina, Bolivia, Paraguay, Uruguay y sur de Brasil. *Acad. nac. Agron. Veterin.* 42 (2): 5-8.
- De Santis, L., L. Lamborot, M.A. Guerrero, A. Sureda, & P. Arretz. 1989. *Systole albipennis* new record Walker, a new eurytomid wasp for Chile (Hymenoptera: Eurytomidae). *Acta ent. Chil.* 15: 281-282.
- \*De Santis, L. P. Fidalgo, & S. Ovruski. 19xx. Himenópteros parasitoídes (Insecta: Hymenoptera) asociados a agallas en *Nothofagus* (Fagaceae) del sur de Argentina y Chile. I. Pteromalidae: género *Aditrochus* Ruebsaamen. xx.
- \*De Santis, L. P. Fidalgo, & S. Ovruski. 19xx. Himenópteros parasitoídes (Insecta: Hymenoptera) asociados a agallas en *Nothofagus* (Fagaceae) del sur de Argentina y Chile. II. Pteromalidae: género *Espinosa* Gahan. xx.
- Doane, J.F., R. Declerck-Floate, A.P. Arthur, & F. Affolter. 1989. Description of the life stages of

- Magroglenes penetrans* Kirby (Hymenoptera: Chalcidoidea: Pteromalidae), a parasitoid of the wheat midge *Sitodiplosis mosellana* Gehin (Diptera: Cecidomyiidae). *Can. Ent.* 121: 1041-1048.
- \*Doganlar, M. 1989. A new parasitic species of *Megastigmus* Dalman (Hymenoptera: Torymidae) from Tokat. *Turk ent. derg.* 13: 197-203.
- \*Doganlar, M. 1989. Two new species of *Amerinicus* Nikolskaja (Hymenoptera: Torymidae) from Adana district, Turkey. *Turk ent. derg.* 13: 141-146.
- Dolgin, M.M. 1989. Biology of parasites of larch gall gnats *Dasyneura rozkhovi*. *Zool. Zh.* 68: 131-134.
- \*Donev, A. 1989. A new species of *Anagrus* Haliday from Bulgaria (Insecta: Hymenoptera: Chalcidoidea: Mymaridae). *Reichenbachia* 26: 153-156.
- Donev, A. 1987. Untersuchungen der Parasiten auf den Eiern von *Oulema melanopus* (Linn.) (Col. Chrysomelidae). *Univ. Plovdiv "Paissi Hilendarski", Trav. Scient. (Biol.)* 25: 69-72. [Anaphes, Alaphus].
- Donev, A. 1987. *Erythmetus goochi* (Hym. Mym.) parasit auf eieren von *Pilophorus perplexus* Dougl. & Scott. (Het. Miridae). *Univ. Plovdiv "Paissi Hilendarski", Trav. Scient. (Biol.)* 25: 77-78.
- \*Dzhanokmen, K.A. 1989. New species of pteromalids (Hymenoptera, Chalcidoidea, Pteromalidae) from Kazakhstan, pp. 42-49, in Sugonyaev, E.S. (Ed.). A taxonomy and biology of parasitic Hymenoptera - chalcidoid and proctotrupoid wasps. USSR Academy of Sciences, Proc. Zool. Inst., Leningrad 191. 130pp.
- Ehler, L.E. 1989. Observations on *Scutellista cyanea* Motsch. (Hymenoptera: Pteromalidae). *Pan-Pac. Ent.* 65: 151-155.
- Espelie, K.E., & J.J. Brown. 1990. Cuticular hydrocarbons of species which interact on four trophic levels: apple (*Malus pumila* Mill.), codling moth *Cydia pomonella* L., a hymenopteran parasitoid *Ascogaster quadridentata* Wesmael and a hyperparasite *Perilampus fulvicornis* Ashmead. *Comp. Biochem. Physiol. B. Comp. Biochem.* 95: 131-136.
- Feland, C.M. 1990. Habitat specific parasitism of the stalk borer (Lepidoptera: Noctuidae) in northern Ohio. *Environ. Ent.* 19: 162-166.
- Ferguson, A.M. 1989. *Pieris rapae* (L.) small white butterfly (Lepidoptera: Pieridae), pp. 129-134, in: Cameron, P.J., R.L. Hill, J. Bain, & W.P. Thomas (Eds.). A review of biological control of invertebrate pests and weeds in New Zealand, 1874-1987. Technical Communication, Commonwealth Institute of Biological Control. CAB, Wallingford, Oxford. [Pteromalus].
- \*Fidalgo, P. 19xx. Sobre la presencia del género *Stephanodes* Enock, 1909, en la Argentina con comentarios sobre sus especies (Hymenoptera: Mymaridae). xx.
- \*Fidalgo, P. 19xx. Sobre *Erdoesiella* Soyka, 1956, género neotropical poco conocido de Mymarini (Hymenoptera: Mymaridae). xx.
- \*Fidalgo, P. 19xx. Nuevos aportes a la distribución y a la sistematica del género *Bruchomyrmec* Ogloblin (Hymenoptera: Mymaridae). xx.
- \*Fidalgo, P. 19xx. Sobre *Tetrapolyneuma* Ogl. con descripción de una nueva especies y de la hembra de género (Hymenoptera: Mymaridae). xx.
- \*Fidalgo, P. 19xx. Nuevos aportes al genero *Parapolyneuma* Fidalgo, 1982. Hymenoptera: Mymaridae). xx.
- Filippov, N.A. 1989. The present state and future outlook of biological control in the USSR. II Finnish-Soviet symposium on biological pest control, Kishinev, Moldavian SSR, October 12-17, 1987. *Acta Ent. Fennica* 53: 11-18.
- \*Fidalgo, P. 1988. Sobre *Agalmopolyneuma* Ogl. nov. status, género peculiar de los bosques australes argentinos de *Nothofagus* (Hymenoptera: Mymaridae). *An. Mus. Nat. Valparaíso* 19: 43-64.
- Force, D.C. 1989. Observations on the parasitoids of *Mesepiola speccea* Davis (Lepidoptera: Incurvariidae). *Pan-Pac. Ent.* 65: 436-439. [Eurytoma, Mesopolobus, Tetrastichus].
- Fried, C.S., D.A. Rutz, & D. Pimentel. Host parasitism and progeny production of two geographic strains of the parasitoid *Nasonia vitripennis* (Hymenoptera: Pteromalidae) on house fly (Diptera : Muscidae) hosts. *Environ. Ent.* 19: 322-326.
- Gagnepain, C., & J.Y. Rasplus. 1989. *Caryedon serratus* and its parasitoids in the savanna around Lamto, Ivory Coast. *Entomophaga* 34: 559-568. [Pteromalidae, Trichogrammatidae, Chalcididae, Eurytomidae].
- Gerard, P.J. 1989. Influence of egg depth in host plants on parasitism of *Scolypopa australis* (Homoptera: Ricaniidae) by *Centrodora scolypopae* (Hymenoptera: Aphelinidae). *N.Z. Ent.* 12: 30-34.
- Gerard, P.J. 1989. Biology and morphology of immature stages of *Centrodora scolypopae* (Hymenoptera: Aphelinidae). *N.Z. Ent.* 12: 24-29.
- \*Gibson, G.A.P. 1989. Phylogeny and classification of Eupelmidae with a revision of the world genera of Calosotinae and Metapelmatinae (Hymenoptera: Eupelmidae). *Mem. ent. Soc. Can.* 149. 121 pp.
- \*Gijswijt, M.J. 1990. Two new species of Chalcidoidea from Spain associated with Spanish juniper (Hymenoptera). *Ent. Ber. (Amsterdam)* 50: 42-45. [Pteromalidae, Torymus].
- Głogowski, S. 1989. Chalcidoidea (Hymenoptera) of moist meadows on the Mazovian lowland. *Memorabilia Zool.* 43: 233-247.
- Goeden, R.D. Life history of *Eutreta diana* Wsten Sacken on *Artemisia tridentata* Nuttall in southern California (Diptera: Tephritidae). *Pan-Pac. Ent.* 66: 24-32. [Eurytoma, Pteromalus, Tetrastichus, Torymus].
- Gosh, S.M., & U.C. Abdurahiman. 1988. Some hyperparasitoids of *Opisina arenosella* Walker, the

- black-headed caterpillar pest of coconut. *Philipp. J. coconuts Stud.* 13: 11-17. [Pediobius, Eurytoma, Brachymeria, Elasmus].
- Graham, de V. M.W.R. 1989. A remarkable secondary seal character in the legs of male *Nesolytus glossinae* Waterson (Hymenoptera: Chalcidoidea; Eulophidae). *Ent. mon. Mag.* 125: 231-232.
- Grissell, E.E. 1989. *Megastigmus floridanus* (Hymenoptera: Torymidae), newly discovered in *Ilex* seed (Aquifoliaceae). *Proc. ent. Soc. Wash.* 91: 604-610.
- \*Grissell, E.E., & M.E. Schauff. 1990. A synopsis of the seed-feeding genus *Bephratelloides* (Chalcidoidea: Eurytomidae). *Proc. ent. Soc. Wash.* 92: 177-187.
- Guppy, J.C., & F. Meloche. 1989. Note on *Cyrtogaster vulgaris* Walker (Hymenoptera: Pteromalidae), a secondary parasite of the alfalfa blotch leafminer (Diptera: Agromyzidae) with descriptions of the immature stages. *Can. Ent.* 121: 929-932.
- Habibian, A., & H.B. Assadi. 1989. Some complementary studies of biological control with *Pseudaulacaspis pentagona* Targ.-Tozz. in Guilan Province, Iran, pp. 249-250, in McFarlane, N.R. (Ed.). British Crop Protection Council Monograph no. 43. Progress and prospects in insect control. International Conference, Reading, England, Sept. 18-20, 1989. British Crop Protection Council, Surrey. 273 pp. [Aphelinidae].
- \*Halstead, J.A. 1990. Review of *Haltichella* Spinola in the Nearctic Region (Hymenoptera: Chalcididae). *Proc. ent. Soc. Wash.* 92: 153-159.
- \*Halstead, J.A. 1990. Redescription of males, biological notes, and identification of American *Acanthochalcis* (Hymenoptera: Chalcididae). *Ent. News* 101: 75-80.
- Halstead, J.A. 1989. Hymenoptera associated with a California population of the Russian thistle biological control agent *Coleophora klimeschiella* Toll (Lepidoptera: Coleophoridae). *Proc. ent. Soc. Wash.* 91: 635-636. [Catolaccus, Macroneura, Spilochalcis].
- Hamerski, M.R., & R.W. Hall. 1989. Adult emergence, courtship, mating, and ovipositional behavior of *Tetrastichus gallerucae* (Hymenoptera: Eulophidae), a parasitoid of the elm leaf beetle (Coleoptera: Chrysomelidae). *Environ. Ent.* 18: 791-794.
- \*Hansson, C. 1990. A taxonomic study on the Palearctic species of *Chrysonotomyia* Ashmead and *Neochrysocharis* Kurdjumov (Hymenoptera: Eulophidae). *Ent. Scand.* 21: 29-52.
- \*Hayat, M. 1990. Taxonomic studies on *Aphelinus* (Hymenoptera: Aphelinidae) 2. A new subgenus from India with comments on *Mesidia* and *Mesidiopsis*. *Orient. Insects* 24: 253-257.
- \*Hayat, M., & K. Fatima. 1990. Taxonomic studies on *Aphelinus* (Hymenoptera: Aphelinidae). 1. The Australian species described by A.A. Girault. *Orient. Insects* 24: 247-252.
- \*Hayat, M., & S. Singh. 1989. Description of a new *Coccophagus* of the *lycimnia*-group (Hymenoptera: Aphelinidae) from the Khasi hills, with some other species records from India. *Colemania* 5: 29-34.
- Headrick, D., & R.D. Goeden. 1989. Life history of *Pteromalus coloradensis* Ashmead (Hymenoptera: Pteromalidae), a parasite of *Paracantha gentilis* Hering (Diptera: Tephritidae) in *Cirsium* thistle capitula. *Proc. ent. Soc. Wash.* 91: 594-603.
- Heraty, J.M., & K.N. Barber. 1990. Biology of *Obesa floridana* Ashmead and *Pseudochalcura gibbosa* Provancher (Hymenoptera: Eucharitidae). *Proc. ent. Soc. Wash.* 92: 248-258.
- Herre, E.A. 1989. Coevolution of reproductive characteristics in 12 species of New World figs and their pollinator wasps. *Experientia (Basel)* 637-647.
- \*Heydon, S.L. 1989. Review of Nearctic *Rhincocoelia* and *Callimerismus* with a discussion of their phylogenetic relationships (Hymenoptera: Pteromalidae). *Jl. N.Y. ent. Soc.* 97: 347-357.
- Hohmann, C.L., S.M.T. Silva, & W.J. Santos. 1989. Preliminary list of Trichogrammatidae found in Paraná, Brazil. *An. Soc. ent. Bras.* 18: 203-206.
- Hohmann, C.L., R.F. Luck, E.R. Oatman, & G.R. Platner. 1989. Effects of different biological factors on longevity and fecundity of *Trichogramma platneri* Nagarkatti (Hymenoptera: Trichogrammatidae). *An. Soc. ent. Bras.* 18 (suppl.): 61-70.
- Hohmann, C.L., & W.J. Santos. 1989. Parasitization of *Heliothis* spp. and *Alabama argillacea* Hubner (Lepidoptera: Noctuidae) eggs on cotton by *Trichogramma prestiosum* Riley (Hymenoptera: Trichogrammatidae) in northern Parana, Brazil. *An. Soc. ent. Bras.* 18 (suppl.): 161-168.
- Huang, J. 1989. Notes on *Aphytis holoxanthus* DeBach (Hymenoptera, Aphelinidae), a parasite of the Florida red scale, *Chrysomphalus aonidum* L. (Homoptera, Diaspididae). *J. Fujian Agr. Coll.* 18 (Supplement): 403-408.
- Hulspas-Jordaan, P.M., & J.C. van Lenteren. 1989. The parasite-host relationship between *Encarsia formosa* Gahan (Hymenoptera: Aphelinidae) and *Trialeurododes vaporariorum* (Homoptera: Aleyrodidae). XXX. Modelling population growth of greenhouse whitefly on tomato. *Agric. Univ. Wageningen Pap.* 89: 1-54.
- Hung, A.C.F., & P.W. Schaefer. 1990. Isozyme analysis on six populations of *Pediobius foveolatus* Crawford (Hymenoptera: Eulophidae). *Proc. ent. Soc. Wash.* 92: 160-165.
- Hunter, M.S. 1989. Suitability of stages of female *Encarsia pergandiella* (Hymenoptera: Aphelinidae) for development of conspecific male hyperparasites. *Entomophaga* 34: 265-274.

- \*Hussain, T., & P.P. Kudeshia. 1989. Two new species of *Elasmus* Westwood 1833 from India (Insecta: Hymenoptera: Chalcidoidea: Elasmidae). *Reichenbachia* 26: 149-152.
- Hutchinson, W.D., M. Moratorio, & J.M. Martin. 1990. Morphology and biology of *Trichogrammatoidea bactrae* (Hymenoptera: Trichogrammatidae), imported from Australia as a parasitoid of pink bollworm (Lepidoptera: Gelechiidae) eggs. *Ann. ent. Soc. Am.* 83: 46-54.
- Idoine, K., & D.N. Ferro. 1990. Diurnal timing of ovipositional activities of *Edovum pusilli* (Hymenoptera: Eulophidae), an egg parasitoid of *Leptinotarsa decemlineata* (Coleoptera: Chrysomelidae). *Environ. Ent.* 19: 104-107.
- Iheagwam, E.U., & J. Wojtusiak. 1989. Observations on insects associated with the water yam *Vioscorea alata* L. during storage with particular reference to lepidopteran pests. *Entomon* 14 (1-2): 117-120. [Chalcididae].
- Izquierdo, Y., & B. Le Ru. 1989. Influence of hyperparasitism on populations of the encyrtid *Epidinocarsis lopezi* parasitoid of *Phenacoccus manihoti* introduced in Congo. *Ent. Exp. Appl.* 52: 239-248.
- \*Jensen, P.B., & A.V. Sharkov. 1989. Revision of the genus *Trichomasthus* (Hymenoptera: Encyrtidae) in Europe and Soviet Asia. *Ent. scand.* 20: 23-54.
- Jesudasan, R.W.A., & B.V. David. 1989. Record of parasitoids of *Asphondylia riveae* Mani (Cecidomyiidae: Diptera). *J. Bombay nat. Hist. Soc.* 85: 645. [Eurytoma, Tetrastichus].
- Kajita, H. 1989. Mating activity of the aphelinid wasp *Encarsia* sp. in the field (Hymenoptera: Aphelinidae). *Appl. Ent. Zool.* 24: 313-315.
- Kato, M. 1989. Host-handling behavior of the parasitoid *Diglyphus minoeus* (Hymenoptera: Eulophidae) parasitizing the honeysuckle leaf-miner *Phytomyza lonicerae* (Diptera: Agromyzidae). *Entomophaga* 34: 503-510.
- Kauffman, W.C., & G.G. Kennedy. 1989. Relationship between trichome density in tomato and parasitism of *Heliothis* spp. (Lepidoptera: Noctuidae) eggs by *Trichogramma* spp. (Hymenoptera: Trichogrammatidae). *Environ. Ent.* 18: 698-704.
- Kay, I.R. 1989. Seasonal incidence of *Heliothis* spp. (Lepidoptera: Noctuidae) on tomatoes in north Queensland. *J. Aust. ent. Soc.* 28: 193-194. [Trichogrammatidae].
- Kfir, R. 1989. Effect of pesticides on *Copidosoma koehleri* Blanchard (Hymenoptera: Encyrtidae), a parasite introduced into South Africa for biological control of the potato tuber moth. *J. ent. Soc. S. Afr.* 52: 180-181.
- \*Kostjukov, V.V. 1989. New species of the genus *Tetrastichus* (Hymenoptera, Eulophidae) from Algeria, pp. 60-64, in Sugonyaev, E.S. (Ed.). A taxonomy and biology of parasitic Hymenoptera - chalcidoid and proctotrupoid wasps. USSR Academy of Sciences, Proc. Zool. Inst., Leningrad 191. 130pp.
- Kumar, P., A. Kumar, B.D. Singh, & K. Sengupta. 1989. Parasites of Uzi fly, *Exorista sorbillans* Wiedemann (Diptera: Tachinidae) I. Morphology of immature stages of *Nesolyra thymus* Girault (Hymenoptera: Eulophidae). *Indian J. Seric.* 28: 233-237.
- LaSalle, J., & J.A. McMurtry. 1989. First record of *Thripobius semilutus* (Hymenoptera: Eulophidae) from the New World. *Proc. ent. Soc. Wash.* 91: 634.
- Laudonia, S. 1989. Morphological observations on *Encarsia dichroa* Mercet (Hymenoptera: Aphelinidae). *Boll. Lab. Ent. agrar. Filippo Silvestri* 45: 103-112.
- Lee, H.-P., J.-H. Lee, & K.-S. Ko. 1989. Effect of kairomones on host acceptance by the parasitoid *Brachymeria lasus* Walker (Hymenoptera: Chalcididae). *Korean K Ent.* 19: 247-254.
- Lee, H.-P., J.-H. Lee, K.-S. Ko, & S.-H. Kim. 1989. Effect of host species and their kairomone on the host acceptance behavior of *Brachymeria lasus* Walker (Hymenoptera: Chalcididae). *Korean K Ent.* 19: 267-272.
- Legner, E.F. 1989. Paternal influences in males of *Muscidifurax raptorrellus* (Hymenoptera: Pteromalidae). *Entomophaga* 34: 307-320.
- Legner, E.F. 1989. Phenotypic expressions of polygenes in *Muscidifurax raptorrellus* (Hymenoptera: Pteromalidae), a synanthropic fly parasitoid. *Entomophaga* 34: 523-530.
- Legner, E.F. 1989. Fly parasitic wasp *Muscidifurax raptorrellus* Kogan and Legner (Hymenoptera: Pteromalidae) invigorated through insemination by males of different races. *Bull. Soc. vector Ecol.* 14: 291-300.
- van Lenteren, J.C., A. van Vianen, I. Hatala-Zseller, & C. Budai. 1989. The parasite-host relationship between *Encarsia formosa* Gahan (Hymenoptera: Aphelinidae) and *Trialeurodes vaporariorum* Westwood (Homoptera: Aleyrodidae). XXIX. Suitability of two different cultivars of sweep pepper *Capsicum annuum* L. for two different strains of whiteflies. *J. appl. Ent.* 108: 113-130.
- \*Lin, N.Q. 1988. A preliminary report on the classification of Trichogrammatidae and Mymaridae from South China (Hymenoptera: Chalcidoidea), pp 69-74 in Voegele, J., J. Waage, & J. van Lenteren (Eds.). Colloques de l'INRA no. 43. Les trichogrammes et autres parasitoides oophages. Second International Symposium, Guangzhou, China, November 10-15, 1986. Institut National de la Recherche Agronomique, Paris. 644 pp.
- van der Linden, A., & C. van Achterberg. 1989. Recognition of eggs and larvae of the parasitoids of *Liriomyza* spp. (Diptera: Agromyzidae,

- Hymenoptera: Braconidae and Eulophidae). *Ent. Ber (Amst.)* 49: 138-140.
- Mani, M., & T.S. Thontadarya. 1989. Development of the parasitoid *Anagrus dactylopis* How. on the grape mealybug *Maconellicoccus hirsutus* Green. *Entomon* 14: 49-52.
- Marutani, M., & R. Muniappan. 1989. Incidence of the red coconut scale *Furcaspis oceanica* (Homoptera: Diaspididae) and its parasites in Micronesia. *J. Plant Prot. Trop.* 6: 61-66. [*Adelencyrus, Ablerus, Marietta, Rozanovaella*].
- Matthews, J.R., & J.J. Petersen. 1989. Effect of temperature on parasitism, development, and diapause of the fly parasite, *Urolepis rufipes* (Hymenoptera: Pteromalidae). *Environ. Ent.* 18: 728-731.
- Mendel, M.J., P.B. Shaw, J.C. Owens, & D.B. Richman. 1989. Developmental rates, thresholds and thermal constants of the egg parasitoid *Anastatus semiflavidus* (Hymenoptera: Eupelmidae) and its host *Helicoverpa armigera* (Lepidoptera: Saturniidae). *J. Kansas ent. Soc.* 62: 300-306.
- Meyerdirk, D.E., S. Khasimuccin, & M. Bashir. 1988. Importation, colonization and establishment of *Anagrus indicus* (Hymenoptera: Encyrtidae) in Jordan. *Entomophaga* 33: 229-237.
- Mihajlovic, L., M.D. Krunic, & K.W. Richards. 1989. Hyperparasitism of *Phyocephala conopitarum* Boucek (Hymenoptera: Pteromalidae), a pest of *Megachile rotundata* F. (Hymenoptera: Megachilidae) in Yugoslavia. *J. Kansas ent. Soc.* 62: 418-420.
- Mihajlovic, L., M.D. Krunic, & K.W. Richards. 1989. Hyperparasitism of *Phyocephala vittata* (F.) (Diptera: Conopidae) by *Habrocytus conopitarum* (Boucek) (Hymenoptera: Pteromalidae), a pest of *Megachile rotundata* (F.) (Hymenoptera: Megachilidae) in Yugoslavia. *J. Kansas ent. Soc.* 62: 418-420.
- Minkenberg, O.P.J.M. 1989. Temperature effects on the life history of the eulophid wasp *Diglyphus isaea*, an ectoparasitoid of leafminers. *Ann. Appl. Biol.* 115: 381-398.
- Moratorio, M.S. 1990. Host-finding and ovipositional behavior of *Anagrus mutans* and *Anagrus siwoodensis* (Hymenoptera: Mymaridae). *Environ. Ent.* 19: 142-147.
- Morgan, P.B., H. Hoyer, & R.S. Patterson. 1989. Life history of *Spalangia cameroni* (Hymenoptera: Pteromalidae), a microhymenopteran pupal parasite of muscoid flies (Diptera: Muscidae). *J. Kansas ent. Soc.* 62: 381-386.
- Myartseva, S.N., & S.K. Durdyev. 1989. Peculiarities of biocenotic relations of parasites (Hymenoptera: Braconidae, Pteromalidae) of some Lepidoptera from orchard and cotton agroecosystems. *Izv. Akad. Nauk Turkmen SSR Ser. Biol. Nauk* 0(1): 17-23.
- \*Myartseva, S.N. 1989. New eulophid species (Hymenoptera) parasites of Lepidoptera in fruit orchards of the southern Turkmen SSR. *Izv. Akad. Nauk Turkmen SSR Ser. Biol. Nauk* 0(2): 44-51.
- \*Myartseva, S.N., & K.A. Dzhanokmen. 1989. Elasmid-wasps (Hymenoptera, Chalcidoidea, Elasmidae) from the Middle Asia, pp. 65-68, in Sugonyaev, E.S. (Ed.). A taxonomy and biology of parasitic Hymenoptera - chalcidoid and proctotrupoid wasps. USSR Academy of Sciences, Proc. Zool. Inst., Leningrad. 191: 130pp.
- Nagaraja, H. 1988. Life and fertility tables of some *Trichogrammaoidea*-spp. (Hymenoptera: Trichogrammatidae) under laboratory conditions, pp. 221-222 in Voegeli, J., J. Waage, & J. van Lenteren (Eds.). Colloques de l'INRA no. 43. Les trichogrammes et autres parasitoïdes oophages. Second International Symposium, Guangzhou, China, November 10-15, 1986. Institut National de la Recherche Agronomique, Paris. 644 pp.
- Nalepa, C.A. 1989. Distribution of the rose seed chalcid *megastigmus aculeatus* var. *nigroflavus* Hoffmeyer (Hymenoptera: Torymidae) in North Carolina. *J. ent. Sci.* 24: 413-416.
- \*Narendran, T.C. 1989. A remarkable new genus of Eurytomidae (Hymenoptera: Chalcididae) from the Philippines. *J. Ecobiol.* 9: 295-298.
- \*Narendran, T.C., & P.M. Sureshan. 1989. On some Torymidae (Hymenoptera: Chalcidoidea) from India. *Hexapoda* 1: xx-xx (no pagination on reprint received).
- \*Narendran, T.C., & P.M. Sureshan. 1989. A contribution to our knowledge of Torymidae of India (Hymenoptera: Chalcidoidea). *Boll. Lab. Ent. agrar. Filippo Silvestri* 45: 37-48.
- Nechols, J.R., J.L. Tracy, & E.A. Vogt. 1989. Comparative ecological studies of indigenous egg parasitoids (Hymenoptera: Scelionidae, Encyrtidae) of the squash bug *Anasa tristis* (Hemiptera: Coreidae). *J. Kansas ent. Soc.* 62: 177-188.
- Neuenschwander, P., & W.N.O. Hammond. 1989. Natural enemy activity following the introduction of *Epidinocarsis lopezi* (Hymenoptera: Encyrtidae) against the cassava mealybug, *Phenacoccus manihoti* (Homoptera: Pseudococcidae), in southwestern Nigeria. *Environ. Ent.* 17: 894-902.
- Neuenschwander, P., P. Gutierrez, A.R. Cudjoe, R. Adjakloe, J.U. Baumgartner, & U. Regev. 1989. Impact assessment of the biological control of the cassava mealybug *Phenacoccus manihoti* Matile-Ferrero (Hemiptera: Pseudococcidae) by the introduced parasitoid *Epidinocarsis lopezi* De Santis (Hymenoptera: Encyrtidae). *Bull. ent. Res.* 79: 579-594.
- Newton, P.J. 1989. Combinations of applications of a chitin synthesis inhibitor and inundative releases of egg parasitoids against the false codling moth *Cryptophelbia leucotreta* Meyrick (Lepidoptera:

- Tortricidae) on citrus. *Bull. ent. Res.* 79: 507-520. [Trichogrammatoidea].
- Ning, Z., R. Kuang, F. Shan, Y. Tang, & B. Yu. 1988. Effect of mean density and aggregation of the woolly apple aphid *Eriosoma lanigerum* Haussm. on parasitism percentage of *Aphelinus mali* Haldeman. *Zool. Res.* 9: 395-400.
- Noyes, J.S. 1989. *Copidosoma graminis* sp. n. (Hymenoptera: Encyrtidae), a polyembryonic parasitoid of armyworms (Lepidoptera: Noctuidae) in Australia. *Bull. ent. Res.* 79: 367-371.
- \*Noyes, J.S. 1990. A genus and species of encyrtid (Hymenoptera: Chalcidoidea), parasitoid of the eggs of the varicose borer *Agrius sexsignatus* Fisher (Coleoptera: Buprestidae), a pest of bagras, *Eucalyptus deglupta* Blume in the Philippines. *J. nat. Hist.* 24: 21-26.
- Nuttall, M.J. 1989. *Megastigmus spermotrophus* Wachl., Douglas fir seed chalcid (Hymenoptera: Torymidae), pp. 277-279 in Cameron, P.J., R.L. Hill, J. Bain, & W.P. Thomas (Eds.). A review of biological control of invertebrate pests and weeds in New Zealand, 1874-1987. Technical Communication, Commonwealth Institute of Biological Control. CAB, Wallingford, Oxford. [*Mesopolobus Agnomyces*].
- Odell, T.M., P.Y. Chang, & G.S. Walton. 1989. Effects of light on location of host egg masses by *Ooencyrtus kuvanae* (Hymenoptera: Encyrtidae), an egg parasite of gypsy moth (Lepidoptera: Lymantriidae). *Env. Ent.* 18: 1101-1104.
- Ouyang, Y.-L., T.-X. Peng, & I.-Y. Li. 1988. Studies on the intraspecific variation of *Trichogramma dendrolimi* Matsumura (Hymenoptera: Trichogrammatidae), pp. 79-90 in Voegele, J., J. Waage, & J. van Lenteren (Eds.). Colloques de l'INRA no. 43. Les trichogrammes et autres parasitoides oophages. Second International Symposium, Guangzhou, China, November 10-15, 1986. Institut National de la Recherche Agronomique, Paris. 644 pp.
- Overgaard, S.M. 1989. Parasitoid wasps reared from Danish burnets (Lepidoptera: Zygaenidae) *Zygaena Fabr.* 1775. Hymenoptera Braconidae, Ichneumonidae, Pteromalidae and Eupelmidae. *Ent. Medd.* 57: 143-149.
- Parra, J.R.P., R.A. Zucchi, & S. Silveira Neto. 1988. Perspectives of biological control using *Trichogramma* and/or *Trichogrammatoidea* in the state of Sao Paulo, Brazil, pp. 527-540 in Voegele, J., J. Waage, & J. van Lenteren (Eds.). Colloques de l'INRA no. 43. Les trichogrammes et autres parasitoides oophages. Second International Symposium, Guangzhou, China, November 10-15, 1986. Institut National de la Recherche Agronomique, Paris. 644 pp.
- Patterson, R.S., B.E. Hagenbuch, & P.G. Koehler. 1988. Efficiency of *Tetrastichus hagenowii* (Hymenoptera: Encyrtidae) to control the American cockroach (Orthoptera: Blattellidae). *Repr. U.S. Dep. agric. Res. Serv.* 106: 433-443.
- Pickett, C.H., L.T. Wilson, D.L. Flaherty, & D. Gonzalez. 1989. Measuring the host preference of parasites: an aid in evaluating the biotypes of *Anagrus epos* (Hymenoptera: Mymaridae). *Entomophaga* 34: 551-558.
- Pinheiro, J.B., V.H.P. Bueno, & D.G. Alves. 1989. Occurrence of parasitoids of *Musca domestica* L. 1758 (Diptera: Muscidae) in larvae, Minas Gerais, Brazil. *An. Soc. ent. Bras.* 18: 420-422. [Tachinaephagus, Spalangia, Eurytoma].
- \*Pintureau, B., & M. Babault. 1988. Systematics of the African species of the genera *Trichogramma* Westwood and *Trichogrammatoidea* Girault (Hymenoptera: Trichogrammatidae), pp. 97-120 in Voegele, J., J. Waage, & J. van Lenteren (Eds.). Colloques de l'INRA no. 43. Les trichogrammes et autres parasitoides oophages. Second International Symposium, Guangzhou, China, November 10-15, 1986. Institut National de la Recherche Agronomique, Paris. 644 pp.
- \*Pintureau, B., & F. Dalato Keita. 1989. Nouvelles données sur les estérases des trichogrammes (Hym. Trichogrammatidae). *Biochem. Syst. Ecol.* 17: 603-608.
- Pitcairn, M.J., & A.P. Gutierrez. 1989. Biological control of *Hypera postica* and *Hypera brunneipennis* (Coleoptera: Curculionidae) in California with reference to the introduction of *Tetrastichus incertus* (Hymenoptera: Encyrtidae). *Pan-Pac. Ent.* 65: 420-428.
- Polaszek, A., & M. Hayat. 1990. *Diprphys boswelli* new record (Hymenoptera: Aphelinidae), an egg-parasitoid of Plataspidae (Heteroptera). *J. nat. Hist.* 24: 1-6.
- Pujade, I., & J. Villar. 1989. First data of the eupelmids associated with gall in Catalonia (Hymenoptera: Chalcidoidea: Eupelmidae) with male description of *Macroneura seculata* Ferrière, 1954. *Orsis* 4: 151-160.
- Rahim, A. 1989. Abiotic factors influencing development and longevity of *Tetrastichus pyriillae* Craw (Hymenoptera: Encyrtidae), an egg parasite of *Pyrrilla perpusilla* Walk. *Pak. J. Sci. Ind. Res.* 32: 820-822.
- Rajadurai, S. 1989. Reproductive strategies and potential of a gregarious egg parasitoid *Xenoencyrtus niger* (Hymenoptera: Encyrtidae) on coreid and pentatomid hosts. *Proc. Indian natl. Sci. Acad. Part B Biol. Sci.* 55: 85-90.
- \*Ren, H. 1988. Two new species of *Aphytis* from China (Hymenoptera: Encyrtidae). *Entomotaxonomia* 10: 219-223.
- \*Rasplus, J.-Y. 1988. New Eurytomidae species, chiefly parasites of legume seed-eating beetles in the Ivory coast, Lamto (Hymenoptera: Encyrtidae).

- Chalcidoidea). *Boll. zool. Agr. Bactic.* 20: 89-114.
- \*Rasplus, J.-Y. 1989. Revision of Afrotropical species from the genus *Dinarmus* Thomson (Hymenoptera: Pteromalidae). *Ann. Soc. ent. Fr.* 25: 135-162.
- Resnik, S.I., & T.I. Umarova. 1989. Refusal from oviposition and reaction of *Trichogramma embryophagum* Htg. to host population density, pp. 69-78, in Sugonyaev, E.S. (Ed.). A taxonomy and biology of parasitic Hymenoptera - chalcidoid and proctotrupoid wasps. USSR Academy of Sciences, Proc. Zool. Inst., Leningrad 191. 130pp.
- Richards, K.W. 1989. Seasonal occurrence and biology of the sainfoin seed chalcid *Eurytoma onobrychidis* (Hymenoptera: Eurytomidae) in western Canada. *J. Kans. ent. Soc.* 62: 219-227.
- Ruberson, J.R., M.J. Tauber, & C.A. Tauber. 1989. Intraspecific variability in hymenopteran parasitoids: comparative studies of two biotypes of the egg parasitoid *Edovum puttleri* (Hymenoptera: Eulophidae). *J. Kans. ent. Soc.* 62: 189-202.
- Ruberson, J.R., M.J. Tauber, C.A. Tauber, & W.M. Tingey. 1989. Interactions at three trophic levels: *Edovum puttleri* Grissell (Hymenoptera: Eulophidae), the Colorado potato beetle, and insect-resistant potatoes. *Can. Ent.* 121: 841-851.
- \*Sands, D.P.A., R. Broe, & W.J.M.M. Liebregts. 1990. Identity of *Encarsia* spp. (Hymenoptera: Aphelinidae) for biological control of *Pseudaulacaspis pentagona* (Targioni-Tozzetti)(Hemiptera: Diaspididae). *Proc. ent. Soc. Wash.* 92: 135-138.
- Santiago-Blay, J.A. 1989. Chalcidoids (Hymenoptera) reared from *Artemesia tridentata* (Asteraceae) galls in British Columbia. *J. ent. Soc. B.C.* 86: 80-81. [Torymus, Eurytoma, Sympiesis].
- \*Schaufl, M.E. 1989. A new species of *Horismenus* (Hymenoptera: Eulophidae) parasitic on the lesser cornstalk borer *Elasmopalpus lignosellus* (Lepidoptera: Pyralidae). *Proc. ent. Soc. Wash.* 91: 534-537.
- Schlumprecht, H. 1989. Dispersal of the thistle gallfly *Urophora cardui* and its endoparasitoid *Eurytoma serratulae* (Hymenoptera: Eurytomidae). *Ecol. Ent.* 14: 341-348.
- Schroder, R.F.W., & M.M. Athanas. 1989. Use of the egg parasite *Edovum puttleri* (Hymenoptera: Eulophidae) in an IPM system developed for the Colorado potato beetle (Coleoptera: Chrysomelidae) control on potatoes in Beltsville, Maryland. *Entomophaga* 34: 193-200.
- \*Seregina, L.Y., & V.V. Kostyukov. 1989. A new eulophid species (Hymenoptera: Eulophidae) parasite of the green oak leaf roller. *Vestn. Zool.* 0(2): 80-81. [Tetrastichus].
- \*Sharkov, A.V., & N.D. Voinovich. 1990. A new genus of Encyrtidae (Hymenoptera) from northern Karelia, Russian SFSR, and Finland. *Ent. Rev.* 69: 45-49.
- \*Sheng, J. 1989. Category [catalogue and keys - ed.] of Jiangxi Chalcidoidea (Hymenoptera). *Acta Agric. Univ. Jiangxiensis* (treatise). 108pp. [in Chinese].
- Shu, S., & R.L. Jones. 1989. Kinetic effects of a kairomone in moth scales of the European corn borer on *Trichogramma rubilale* Ertile & Davis (Hymenoptera: Trichogrammatidae). *J. Insect Behav.* 2: 123-131.
- Shu, S., P.D. Swedenborg, & R.L. Jones. A kairomone for *Trichogramma rubilale* (Hymenoptera: Trichogrammatidae): isolation, identification and synthesis. *J. chem. Ecol.* 16: 521-530.
- Skalski, A.W. 1988. A new fossil trichogrammatid from the Scilia amber (Hymenoptera: Chalcidoidea: Trichogrammatidae). *Fragm. Ent.* 21: 111-116.
- Skrzypczynska, M. 1989. Studies on the occurrence and parasitization of the spruce seed pests, *Megastigmus strobilobius* Ratz. (Hym., Torymidae) and *Plemeliella abietina* Seitz. (Dipt., Cecidomyiidae) in Poland during a poor seed year. *J. appl. Ent.* 108: 138-143.
- Skrzypczynska, M. 1989. *Megastigmus suspectus* Borr. (Hym., Torymidae) and *Resseliella piceae* Seitzn. (Dipt., Cecidomyiidae) within fir (*Abies alba* Mill.) stands in Poland in 1986. *Acta Agrar. Silv. Ser. Silvestris* 28: 3-16.
- Smith, D., D.F. Papacek, & D.A.H. Murray. 1988. The use of *Leptomastix dactylopii* Howard (Hymenoptera: Encyrtidae) to control *Planococcus citri* Risso (Hemiptera: Pseudococcidae) in Queensland citrus orchards. *Queensl. J. Agric. Anim. Sci.* 45: 157-164.
- Smith, L., D.A. Rutz, & G.A. Scoles. 1989. Influence of habitat and temperature on dispersal behavior of two pteromalid parasitoids of houseflies during an inundative release at a dairy barn. *Med. Vet. ent.* 3: 169-178.
- \*Sorokina, A.P. 1989. Variability of morphologic characters of species of the genus *Trichogramma* (Hymenoptera, Trichogrammatidae) connected with parasitizing in eggs of different hosts, pp. 79-89, in Sugonyaev, E.S. (Ed.). A taxonomy and biology of parasitic Hymenoptera - chalcidoid and proctotrupoid wasps. USSR Academy of Sciences, Proc. Zool. Inst., Leningrad 191. 130pp.
- Stewart, V.B., W.C. Yergian, & T.J. Kring. 1990. Parasitism of *Heliothis zea* (Lepidoptera: Noctuidae) eggs and larvae and *Celama sorghella* (Lepidoptera: Noctuidae) eggs on grain sorghum panicles. *Environ. Ent.* 19: 154-161. [Trichogramma].
- Stilbane, F.A., & R. Abraham. 1989. Investigations on reed stands *Phragmites australis* in the Haseldorf marsh near Hamburg, West Germany, with special reference to the gall midge *Graudiella inclusa* Frauenfeld 1862 (Diptera: Cecidomyiidae). *Ent. Mitt. zool. Mus. Hamburg* 9: 136-137.
- \*Storozheva, N.A. 1989. New species of chalcids of

- the Eulophinae family (Hymenoptera: Chalcidoidea) in the USSR. *Zool. Zhur.* 68: 151-154.
- Stouthammer, R., R.F. Luck, & W.D. Hamilton. 1990. Antibiotics cause parthenogenetic *Trichogramma* (Hymenoptera: Trichogrammatidae) to revert to sex. *Proc. natl. Acad. Sci. U.S., Biol. Sci.* 87: 2424-2427.
- \*Sugonyaev, E.S. 1989. A new species of the genus *Blastothrix* Mayr (Hymenoptera: Encyrtidae) from Japan. *Ent. Obozr.* 68: 178-179. [English Trans.: *Ent. Rev.* 68: 145-146].
- \*Sugonyaev, 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, pp. 90-102, in Sugonyaev, E.S. (Ed.). A taxonomy and biology of parasitic Hymenoptera - chalcidoid and proctotrupoid wasps. USSR Academy of Sciences, Proc. Zool. Inst., Leningrad 191. 130pp.
- \*Sureshan, P.M., & T.C. Narendran. 1990. Taxonomic studies on *Eurydinetomorpha* and *Netomocera* (Hymenoptera: Chalcidoidea, Pteromalidae). *Orieni. Insects* 24: 219-227.
- Takasu, K., & Y. Hirose. 1989. The number of larval instars in *Ooencyrtus* species (Hymenoptera: Encyrtidae). *Jpn. J. Ent.* 57: 398-401.
- Tepedino, V.J. 1989. Repulsion of three chalcid parasitoids of the alfalfa leafcutting bee *Megachile rotundata* F. by the fungicides captan and DPX. *Pan-Pac. Ent.* 65: 403-409. [*Pieromalus*, *Monodontomerus*, *Tetrastichus*].
- Thakur, J.N., U.S. Rawat, & A.D. Pawar. 1988. Effects of commonly used fungicides on longevity and mortality of *Encarsia perniciosi* Tower and *Aphytis proclia* group of Hymenoptera (Aphelinidae). *J. biol. Contr.* 2: 72-73.
- Thomson, M.S., & R.E. Stinner. 1990. The scale response of *Trichogramma* (Hymenoptera: Trichogrammatidae); variation among species in host specificity and the effect of conditioning. *Entomophaga* 35: 7-22.
- Tolstova Yu, S., & V.M. Kalinkin. 1989. The effect of insecticides on the encyrtid *Holcothorax testaceipes* Ratz. (Hymenoptera), a parasite of *Lithocolletes pyrifoliella* Gers. (Lepidoptera: Lithocolletidae). *Ent. Obozr.* 68: 465-468.
- Tret'yakov, N.N. 1989. Role of parasitic insects in regulating apple curculio population during pesticide application. *Isv. Timiryazev S-Kh Akad.* 0(4): 90-94.
- Tribe, G.D., A.P. Du Toit, N.J. van Rensburg, & M.F. Johannsmeier. 1989. The collection and release of *Tetrastichus* sp. (Eulophidae) as a biological control agent for *Drosophila flavohirta* Malloch (Drosophilidae) in South Africa. *J. ent. Soc. S. Afr.* 52: 181-182.
- \*Tryapitzin, V.A. 1989. A brief review of parasitic Hymenoptera of the genus *Prionomastix* Mayr, 1876 (Encyrtidae), with description of a new species from Costa Rica, pp. 103-108 in Sugonyaev, E.S. (Ed.). A taxonomy and biology of parasitic Hymenoptera - chalcidoid and proctotrupoid wasps. USSR Academy of Sciences, Proc. Zool. Inst., Leningrad 191. 130pp.
- Tryapitzin, V.A. 1989. Finding of *Ooencyrtus kuwanae* Howard (Hymenoptera: Encyrtidae), an egg parasite of the gypsy moth in the USSR. *Vestn. Zool.* 0(3): 86.
- Tryapitzin, V.A., & E.S. Sugonyaev. 1989. Maria Nikolaevna Nikolskaya (1896-1969) as the founder of the scientific school of Soviet chalcidologists (with a review of achievements of chalcidology in the USSR), pp. 3-30 in Sugonyaev, E.S. (Ed.). A taxonomy and biology of parasitic Hymenoptera - chalcidoid and proctotrupoid wasps. USSR Academy of Sciences, Proc. Zool. Inst., Leningrad.
- \*Viggiani, G. 1987. New species of *Encarsia* Foerster (Hymenoptera: Aphelinidae), parasitoids of whiteflies. *Boll. Lab. Ent. agrar. Filippo Silvestri* 44: 33-42.
- \*Viggiani, G. 1987. A new species of *Aphelinus* (*Mesidiopsis*) Dahlman (Hymenoptera: Aphelinidae) from Angola. *Boll. Lab. Ent. agrar. Filippo Silvestri* 44: 3-6.
- \*Viggiani, G. 1987. A new species of *Encarsia* Foerster *Encarsia plaumanni* sp. n. (Hymenoptera: Aphelinidae), from Brazil. *Boll. Lab. Ent. agrar. Filippo Silvestri* 44: 77-80.
- \*Viggiani, G. 1987. Le specie italiane del genere *Encarsia* Foerster (Hymenoptera: Aphelinidae). *Boll. Lab. Ent. agrar. Filippo Silvestri* 44: 121-180.
- \*Viggiani, G. 1988. Male genitalia in a few Eriaporinae (Hymenoptera: Aphelinidae). *Boll. Lab. Ent. agrar. Filippo Silvestri* 45: 99-102.
- Viggiani, G. 1989. Notizie preliminari sulla *Comperiella lemniscata* Compere & Annecke (Hymenoptera: Encyrtidae), parassitoide di *Chrysomphalus dictyospermi* (Morg.) in Italia. *Redia* 72: 523-527.
- \*Viggiani, G. 1989. Two new species of *Encarsia* Foerster (Hymenoptera: Aphelinidae) from Africa. *Redia* 72: 513-517.
- \*Viggiani, G. 1989. A preliminary classification of the Mymaridae (Hymenoptera: Chalcidoidea) based on the external male genitalic characters. *Boll. Lab. Ent. agr. Filippo Silvestri* 45: 141-148.
- \*Viggiani, G. 1989. Description of *Pintoa nearctica*, gen. nov., sp. nov. (Hymenoptera: Trichogrammatidae). *Boll. Lab. Ent. agr. Filippo Silvestri* 45: 23-29.
- \*Viggiani, G. 1989. *Ufensia minuta* sp.n. (Hymenoptera: Trichogrammatidae), ooparasitoide di *Reuteria marqueti* Puton (Hemiptera: Miridae), con note sulle specie paleartiche del genere *Ufensia* Girault. *Boll. Lab. Ent. agr. Filippo*

- Silvestri 45: 15-21.
- \*Viggiani, G., & E. Guerrieri. 1989. Italian species of the genus *Metaphycus* Mercet (Hymenoptera: Encyrtidae). *Boll. Lab. Ent. agr. Filippo Silvestri* 45: 113-140.
- \*Viggiani, G., & S. Laudonia. 1989. Su alcuni complessi delle antenne maschile di tre specie del genere *Encarsia* Förster (Hymenoptera: Aphelinidae) e il loro rapporto con le fasi dell'accoppiamento. *Boll. Lab. Ent. agr. Filippo Silvestri* 45: 67-75.
- Voegele, J. 1988. Reflections upon the last ten years of research concerning *Trichogramma* (Hymenoptera: Trichogrammatidae), pp.15-30 in Voegele, J., J. Waage, & J. van Lenteren (Eds.). Colloques de l'INRA no. 43. Les trichogrammes et autres parasitoïdes oophages. Second International Symposium, Guangzhou, China, November 10-15, 1986. Institut National de la Recherche Agronomique, Paris. 644 pp.
- Voinovich, N.D., & E.S. Sugonyaev. 1989. Peculiarities of parasitism of chalcids (Hymenoptera, Chalcidoidea) on soft scales (Homoptera, Coccoidea). IV. Biology and preimaginal stages of *Microterys lunatus* Dalman - parasite and predator of *Physokermes hemicyrphus* Dalman, pp. 31-41 in Sugonyaev, E.S. (Ed.). A taxonomy and biology of parasitic Hymenoptera - chalcidoid and proctotrupoid wasps. USSR Academy of Sciences, Proc. Zool. Inst., Leningrad 191. 130pp.
- Waage, J. 1988. Understanding progeny and sex allocation in egg parasitoids, pp. 283-294 in Voegele, J., J. Waage, & J. van Lenteren (Eds.). Colloques de l'INRA no. 43. Les trichogrammes et autres parasitoïdes oophages. Second International Symposium, Guangzhou, China, November 10-15, 1986. Institut National de la Recherche Agronomique, Paris. 644 pp.
- Walker, G.P. 1989. *Tuberculatus annulatus* (Hartig), Oak Aphid (Homoptera: Callaphididae), pp. 307-308, in Cameron, P.J., R.L. Hill, J. Bain, & W.P. Thomas (Eds.). A review of biological control of invertebrate pests and weeds in New Zealand, 1874-1987. Technical Communication, Commonwealth Institute of Biological Control. CAB, Wallingford, Oxford. [Aphelinus, Pachyneuron].
- Walton, M.P., W. Powell, H.D. Loxdate, & L. Allen-Williams. 1990. Electrophoresis as a tool for estimating levels of hymenopterous parasitism in field populations of the cereal aphid *Sitobion avenae*. *Ent. exp. appl.* 54: 271-280.
- Wang, T., & J.E. Laing. 1989. Polyembryony in *Holcothorax testaceipes* (Hymenoptera: Encyrtidae). *Proc. ent. Soc. Am.* 82: 725-729.
- Weiss, A.E., K.D. McCrea, & W.G. Abrahamson. 1989. Can there be an escalating arms race without coevolution? Implications from a host parasitoid simulation. *Evol. Ecol.* 3: 361-370. [*Eurytoma*].
- Wellenga, S., & M. Wysoki. 1989. Preliminary investigation of food source preferences of the parasitoid *Trichogramma planeri* Nagarkatti (Hymenoptera: Trichogrammatidae). *Anz Schädlingskd. Planzenschutz Unweltschutz* 62: 133-135.
- West, R.J. 1990. The biology, damage and within-tree distribution of the spruce bud midge on black spruce in Newfoundland, Canada. *Phytoprotection* 71: 31-36.
- West, A., & J.D. Shorthouse. 1989. Initiation and development of the stem gall induced by *Hemadas nubilipennis* (Hymenoptera: Pteromalidae) in lowbush blueberry, *Vaccinium angustifolium* (Ericaceae). *Can. J. Bot.* 67: 2187-2198.
- Wheeler, G.S., & J.P. McCaffrey. 1989. Egg predation by *Catolaccus* probable new species (Hymenoptera: Pteromalidae) on the spider *Dictyna coloradensis* (Dictynidae). *J. Arachnol.* 17: 371-373.
- \*Wiebes, J.T. 1989. Agaonidae (Hymenoptera: Chalcidoidea) and *Ficus* (Moraceae): fig wasps and their figs. IV. African *Ceratosolen*. *Proc. K. Ned. Akad. Wet. Ser. C Biol. Med. Sci.* 92: 251-266.
- \*Wiebes, J.T. 1989. Agaonidae (Hymenoptera: Chalcidoidea) and *Ficus* (Moraceae): fig wasps and their figs. V. *Agaon*. *Proc. K. Ned. Akad. Wet. Ser. C Biol. Med. Sci.* 92: 395-407.
- Wysoki, M., M. De Jong, & S. Rene. 1988. *Trichogramma planeri* Nagarkatti (Hymenoptera: Trichogrammatidae): its biology and ability to search for eggs of two lepidopterous avocado pests, *Boarmia selenaria* Schiffermueller (Geometridae) and *Cryptoblabes gnidiella* Millière (Phyticidae) in Israel, pp. 295-302 in Voegele, J., J. Waage, & J. van Lenteren (Eds.). Colloques de l'INRA no. 43. Les trichogrammes et autres parasitoïdes oophages. Second International Symposium, Guangzhou, China, November 10-15, 1986. Institut National de la Recherche Agronomique, Paris. 644 pp.
- Xu, R., L.P.J.J. Noldus, & J.C. van Lenteren. 1989. The parasite-host relationship between *Encarsia formosa* Gahan (Hymenoptera: Aphelinidae) and *Trialeurodes vaporariorum* Westwood (Homoptera: Aleyrodidae). XXII. Simulation models for the between plant movement of adult greenhouse whiteflies. *J. appl. Ent.* 108: 234-244.
- \*Xu, Z.-H. & He, J.-H. 1989. Description of a new species of *Megastigmus* Dalman (Hymenoptera: Torymidae). *Acta Zootaxonomica Sin.* 14: 482-485.
- Yano, E. 1989. A simulation study of population interactions between the greenhouse whitefly *Trialeurodes vaporariorum* Westwood (Homoptera: Aleyrodidae) and the parasitoid *Encarsia formosa* Gahan (Hymenoptera: Aphelinidae). I. Description of the model. *Res. popul. Ecol. (Kyoto)* 31: 73-88.

- Yano, E. 1989. A simulation study of population interactions between the greenhouse whitefly *Trialeurodes vaporariorum* Westwood (Homoptera: Aleyrodidae) and the parasitoid *Encarsia formosa* Gahan (Hymenoptera: Aphelinidae). II. Simulation analysis of population dynamics and strategy of biological control. *Res. popul. Ecol. (Kyoto)* 31: 89-104.
- Yano, E., J.C. van Lenteren, R. Rabbinge, & P.M. Hulspas-Jordaan. 1989. The parasite-host relationship between *Encarsia formosa* Gahan (Hymenoptera: Aphelinidae) and *Trialeurodes vaporariorum* (Homoptera: Aleyrodidae). XXXI. Simulation studies of population growth of greenhouse whitefly on tomato. *Agric. Univ. Wageningen Pap.* 89: 55-74.
- Yano, E., J.C. van Lenteren, R. Rabbinge, A. van Vianen, & R. Dorsman. 1989. The parasite-host relationship between *Encarsia formosa* Gahan (Hymenoptera: Aphelinidae) and *Trialeurodes vaporariorum* (Homoptera: Aleyrodidae). XXXI. Simulation studies of population growth of greenhouse whitefly on eggplant, cucumber, sweet pepper and gerbera. *Agric. Univ. Wageningen Pap.* 89: 75-99.
- \*Yasnoch, V.A. 1989. Species of the genus *Encarsia* Foerster (Hymenoptera, Aphelinidae) - parasites of aleyrodids in the USSR, pp. 109-121 in Sugonyaev, E.S. (Ed.). A taxonomy and biology of parasitic Hymenoptera - chalcidoid and proctotrupoid wasps. USSR Academy of Sciences, Proc. Zool. Inst., Leningrad 191. 130pp.
- Yoo, C.K., & M.I. Ryoo. 1989. Host preference of *Lariophagus distinguendus* Foerster (Hymenoptera: Pteromalidae) for the instars of the rice weevil *Siophilus oryzae* L. (Coleoptera: Curculionidae) and sex ratio of the parasitoid in relation to the host. *Korean J. appl. Ent.* 28: 28-31.
- \*Zehavi, A., & D. Rosen. 1988. A new species of *Aphelinus* (Hymenoptera: Aphelinidae) from Israel, with notes on the *mali* group. *Israel J. Ent.* 22: 101-108.
- Zerova, M.D. 1989. Main trends of evolution and systematics of the Eurytomidae (Hymenoptera: Chalcidoidea). *Ent. Rev.* 68: 102-128.
- \*Zerova, M.D. 1989. A review of the chalcid-flies the parasites of *Diplolepis mayri* in the USSR with description of a new species of the family Eurytomidae (Hymenoptera, Chalcidoidea), pp. 50-55 in Sugonyaev, E.S. (Ed.). A taxonomy and biology of parasitic Hymenoptera - chalcidoid and proctotrupoid wasps. USSR Academy of Sciences, Proc. Zool. Inst., Leningrad 191. 130pp.
- Zong, L., C. Zhong, & C. Lei. 1988. Studies on *Trichogramma* (Hymenoptera: Trichogrammatidae): classification and geographical distribution in Hubei Province of China, pp. 57-68 in Voegele, J., J. Waage, & J. van Lenteren (Eds.). Colloques de l'INRA no. 43. Les trichogrammes et autres parasitoïdes oophages. Second International Symposium, Guangzhou, China, November 10-15, 1986. Institut National de la Recherche Agronomique, Paris. 644 pp.
- Zucchi, R.A. 1988. New species of *Trichogramma* (Hymenoptera: Trichogrammatidae) associates with the sugar cane borer *Diatraea saccharalis* F. (Lepidoptera: Pyralidae) in Brazil, pp. 133-140 in Voegele, J., J. Waage, & J. van Lenteren (Eds.). Colloques de l'INRA no. 43. Les trichogrammes et autres parasitoïdes oophages. Second International Symposium, Guangzhou, China, November 10-15, 1986. Institut National de la Recherche Agronomique, Paris. 644 pp.