Chalcid Forum

A Forum to Promote Communication Among Chalcid Workers

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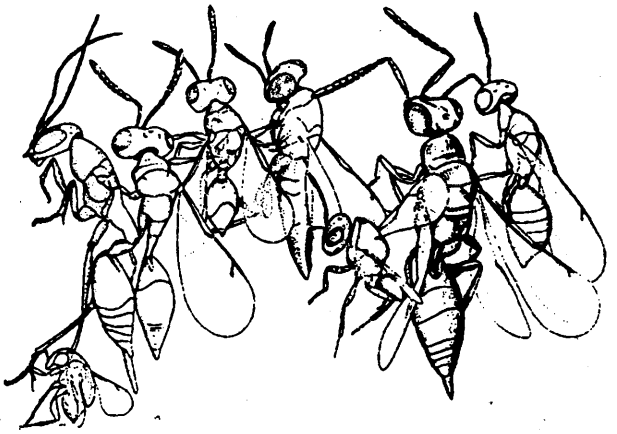

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Editor's Note

Another issue of Chalcid Forum has finally worked its way from our minds onto paper. We are a little behind our claim to produce an issue every 6 months, but then we suspect that most of you didn't believe us when we said that anyway. Our thanks, once again, to John Huber who has helped immensely by compiling most of the literature. A large part of this issue is devoted to a piece on eurytomids by M. D. Zerova. We hope it provides some food for thought. We have also appended an updated mailing list of those who receive Chalcid Forum (minus the libraries) to this issue. Let us know if there are any changes to your address. Note also the application form for membership in the International Society of Hymenopterists. The masthead for this issue is a drawing by Anthony Watsham that was sent to us by Zdenek Boucek with a note that it reminded him of dancing African pteromalids!

FORUM

PROBLEMS OF PHYLOGENY AND DEVELOPMENTAL TRENDS IN THE FAMILY EURYTOMIDAE

by **M. D. Zerova**
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Abstract. The family Eurytomidae is regarded herein as a monophyletic branch of the Chalcidoidea close to the ancestral line of the group. A suggestion is made of this family differentiation in the Lower Cretaceous Period. The relationships in 7 subfamilies of the Eurytomidae are considered. It is shown that all subfamilies share some characteristic features of the morphological and biological development, indicating the long paralleled evolution of these lines which have diverged at the relatively early stage of family evolution.

The family Eurytomidae includes over one thousand species refered to 79 genera. Based on comparative morphological studies on the type species of 72 genera of the world fauna, I have already expressed my viewpoint (Zerova, 1988) that the family Eurytomidae belongs to the chalcidoid complex of Chalcidoidea. It seems to me that this complex includes, in addition to Chalcididae and Leucospidae, the family Torymidae and other families close to it (e.g. Ormyridae). It was Nikol'syaya (1960) who pointed out the morphological resemblance between the Eurytomidae and Chalcididae. However, representatives of the Eurytomidae primitive subfamilies, firstly those of subfamily Rileyinae, also demonstrate deep similarity with torymids and with species of subfamily Monodontomerinae in particular. This similarity manifests itself by the morphology of such structures as antennae in both sexes (formula of antennae, special features of sexual dimorphism), thorax (long pronotum), venation (long postmarginal vein), abdomen (cylindrical shape), and surface sculpture. It shows a deep genetic relationship between these groups, and it can not be explained by the phenomenon of convergence. In fact, the same scheme of antennal structure is shared by the most primitive species in all three key-groups of the chalcidoid complex: Chalcididae, Eurytomidae and Torymidae, and represents probably the most generalized type of antennal structure in the superfamily Chalcidoidea. In this connection, it may be remembered that the links of relationship between the Eurytomidae and Torymidae were pointed out by Yoshimoto (1975), who considered the Eurytomid-Torymid line to be close to the ancestral stem of this superfamily. However, Noyes (1990), while bringing together the

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phylogenetic branches of the Eurytomidae and Chalcididae, separates the latter substantially from the Torymidae in his scheme of phylogenetic relations for the Chalcidoidea families. Within the ranges of chalcidoid complex, eurytomids are closest to representatives of the families Chalcididae and Torymidae. The habitus characterized by rather convex thorax with long pronotum, pitted thoracic sculpture as well as antennal structure, which is similar in chalcids and some representatives of eurytomids from subfamily Rileyinae, brings eurytomids close to chalcids.

Among torymids, the most close to eurytomids are representatives of the subfamily Monodontomerinae, which are similar to some eurytomids (*Archirileya*) by the structure of antennae, thorax, legs (widened hind femora). Eurytomids differ from the above-indicated two families by the structure of head having non-fringed occiput and relatively highly articulated antennae, by the venation of forewings with the radial vein being noticeably longer than that in representatives of the related families, by the structure of thorax with distinct compartments of pro-, meso- and metathorax which have not undergone any complex modifications and, as a rule, by the short ovipositor. Eurytomids also differ from torymids by the structures of last abdominal tergites, since the dorsal shift of pygostyles and the associated modifications of tergites are observed only in torymids.

Unfortunately, there are practically no paleontological findings which one could use in judging the morphology of initial forms of eurytomids as well as on the time and site of their origin. Yoshimoto (1975), having summed up all available information on fossil Chalcidoidea, names only three finds of fossil species of the Eurytomidae. Two of them are refered to Neogene (Miocene), from where two species of *Eurytoma* are known, one is reffered to Palaegene (Oligocene), from where one species of *Eudecatoma* is known. All of the above-listed finds were made in North America. The works by Statz (1938), devoted to fossil chalcids of the Tertiary Period on the territory of Western Europe, lacks any data on eurytomids. No finds of eurytomids are mentioned in the works by Rasnitsyn (1975) devoted to fossil Apocrita.

The above mentioned fossil forms of eurytomids belong to recent genera and do not differ in essence from common existing forms.

In this connection, the findings indicating primitiveness or evolutionary advancedness of different species and genera become of special importance when solving problems of the family's phylogeny. These include the data on geographic distribution and nature of areas inhabited by the most archaic genera of eurytomids as well as on phylogenetic age and geographic distribution of the major groups of eurytomid hosts. The working out of general ideas on an origin of the Apocrita and Chalcidoidea is also of great importance for understanding the phylogeny of eurytomids. The works by Malyshev (1966), Nikol'skaya (1952, 1960), Konigsmann (1976), Rasnitsyn (1975), Yoshimoto (1975) are worthy of note in this respect.

At present, the criteria are well established which determine the trends in morphologic evolution common for chalcids: the reduction in body sizes, the smoothing of initially rough pitted sculpture of the thorax and the oligomerization of homonomous structures. In application to eurytomids, the primitiveness of a number of characters was noted by Bugbee (1936). These are an elongated abddomen, without lateral compression ane with a short petiole, the straight position of ovipositor elements in the abdomen, the homonomous segmentation of abdomen, the relatively homonomous segmentation of flagellum. According to Bugbee, the specialization of morphological structures proceeds, similarly to that in other families of chalcids, by means of the oligomerization of homonomously segmenated structures, the reduction in length of thorax and abdomen, and the deeper sexual dimorphism.

A number of authors, when dealing with the problems of phylogeny in eurytomids, have paid special attention to such factors as the rising and evolution of phytophagy (Bugbee, 1936; Telenga, 1952; Nikol'skaya, 1956).

Bugbee (1936) believed that phytophagy in the family Eurytomidae was primary in relation to entomophagy, and harmolitines represented by phytophages were, therefore, closest to an ancestral root of the family. Telenga (1952) was of the similar opinion concerning eurytomids. On the other hand, Nikol'skaya considered phytophagy to be secondary in the family Eurytomidae, which is supported by our own investigations on the foodstuff links in eurytomids. We also consider that phytophagy in the family Eurytomidae is secondary in the relation to entomophagy and that it has already appeared repeatedly and independently at different stages of the family development.

According to our viewpoints, the ancestral branch which gave rise to the family Eurytomidae could be represented by forms with the following principal features: I) 13-segmented antennae with an equally segmented, shortly pubescent flagellum, and without a well differentiated club and rings; antennal structure lacks sexual dimorphism; 2) elongated thorax with a well developed, long, rectangular pronotum and a wide prepectus; 3) elongated, cylindrical, relatively equally segmented abdomen; 4) elongated venation of forewings; 5) weakly pronounced sexual dimorphism; 6) male genitals with a large number (no less than 4) of hooks on digital sclerites. At that, the ecologically primary forms of eurytomids were, possibly, connected with larvae or egg-layings of insects developing inside of the stems of angiospermous plants. The

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larvae of eurytomids have developed as ectoparasites on larvae or egg layings of their hosts.

Subfamilies Buresiinae and Rileyinae are closest to this hypothetic ancestral group of eurytomids by a number of characters (13-segmented antennae of both sexes, weakly pronounced sexual dimorphism, homonomous segmentation of abdomen, elongated thorax). By their antennal structure and weak sexual dimorphism, the Heimbrinae approach these subfamilies. However, the development of numerous secondary modifications in the structure of abdominal segments and surface sculptures is characteristic of representatives of this subfamily. The genera which constitute subfamilies Rileyinae, Buresiinae and Heimbrinae are small in the number and mainly found in the tropic regions.

In contrast to the above-indicated three subfamilies, subfamilies Eurytominae, Harmolitinae, Aximinae and Eudecatominae represent the second, rapidly developing branch of the family. Within this group, representatives of the archaic monotypical or not numerous tropic genera can be also found. However, the percentage of evolutionarily young, numerous and widely distributed genera, such as *Eurytoma, Bruchophagus, Tetramesa, Systole, Pseudosystole, Eudecatoma* and a number of others, is high. The development of this group of subfamilies and its differentiation into various ecological and morphological types was proceeding evidently at a very high speed. As a result, several trends formed in the ecological and morphological specialization, which are illustrated by eurytomids of four subfamilies (Aximinae, Eudecatominae, Eurytominae and Harmolitinae). These four subfamilies of eurytomids are characterized by similarity in a number of the plesiomorphic characters and, at the same time, display the morphological evolution trends developing in parallel. This indicates the prolonged independent development of these groups. It should be noted that, among the indicated four subfamilies, Eurytominae, Harmolitinae and Aximinae are closer to each other by all morphological characters and may be opposed to Eudecatominae by such characters as venation of fore wings, pubescence of antennae in both sexes and the nature of sexual dimorphism. Thus, only eudecatomines are characterized by the short diffuse pubescence of antennal flagellum in both sexes, by a peculiar tendency to thickening the marginal vein and by relatively weak sexual dimorphism.

Figure 1 illustrates our understanding of the relationships between subfamilies of eurytomids.

At present, the progressively developing two branches of the family Eurytomidae represented by subfamilies Eurytominae and Harmolitinae are markedly stand out. These two subfamilies are characterized by immensity in number, distribution all over the world and intense generation of forms, which is typical of progressively developing groups of organisms.

Decidedly of great interest is the problem of geologic time when the differentiation took place in the family Eurytomidae and in major evolutionary branches within the family. It seems that the appearance of eurytomids should be dated no later than by the Cretaceous Period of the Mesozoic era, since a lot of recent genera of chalcids, eurytomids inclusive, are known from Paleogene (Yoshimoto, 1975), while before that (the Jurassic Period) the hymenopteran large groups were not differentiated. This interpretation conforms to Rasnitsyn's viewpoints (1975) concerning the origin of Apocrita, which were based on an analysis of fossil material. According to Rasnitsyn, the Apocrita history took its beginning at the Middle Jurassic Period where still very primitive forms are known. The Upper Jurassic Period (Karatau) is characterized by the differentiation of Apocrita into separate groups, most of which turned out to be perspective evolutionary. Rasnitsyn considers the parasitic Apocrita to be raised from two groups, Ephialtitidae and Mesoserphidae, which were abundant at the Upper Jurassic Period. At that, the Chalcidoidea are connected in their origin with the latter of groups. It is of interest that the Apocrita of the late Jurassic Period were, from the ecological point of view, parasites of secretly developing (in shelters) insects.

By Rasnitsyn, the differentiation of parasitic Apocrita into separate groups, consistent with the modern classification for Hymenoptera, took place at the Lower Cretaceous Period, where representatives of the recent families (ichneumonids, braconids, chalcids) are known from. However, these forms are still difficult to compare with recent forms because of their undoubted primitiveness. On the other hand, fauna of the parasitic Apocrita close to the modern one was revealed from the late Cretaceous Period. In particular, the Chalcidoidea were already differentiated into families in their current understanding at the late Cretaceous Period. Representatives of Eulophidae, Tetracampidae, Mymaridae, Ormyridae, etc. are known from the late Cretaceous Period. Therefore, the formation of major groups of the parasitic hymenopterans should have taken place at the lower Cretaceous Period.

When characterizing the fauna changes at the Mesozoic Period, Rasnitsyn notes extreme irregularities in its development rates. At the first stage, from the middle Jurassic up to the beginning of the Cretaceous Period, evolutionary changes proceeded rather slowly. A fast restructuring of the Apocrita fauna was characteristic of the Lower Cretaceous Period, which differed substantially that period from both the previous period and the subsequent, third one. The Third, last period of the Mesozoic Apocrita fauna development, according to Rasnitsyn, falls on the end of the Cretaceous Period. The Apocrita fauna of the late Cretaceous Period

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does not practically differ from that of Paleogene. This last period of the Apocrita development is characterized by an unusual duration and goes on till now.

We have analysed herein Rasnitsyn's viewpoints in detail so as they, in our opinion, are of crucial importance for understanding the Eurytomidae phylogeny.

The analysis of morphological features of the imago and preimaginal stages in eurytomids as well as the analysis of ecological features of their species indicates that the family Eurytomidae is close to the ancestral root of the Chalcidoidea.

This allows us to suppose that a period of rapid form-generation in the family Eurytomidae fell also on the Lower Cretaceous Period. In fact, if representatives of modern genera of the Eurytomidae are known from Paleogene, it is evident that the family primary differentiation into separate genera has taken place before, in the Cretaceous Period. At that, taking into consideration a trend pointed out by Rasnitsyn for all the Apocrita to have their development at the Cretaceous Period, the most stormy differentiation in the family was likely to take place just at the Lower Cretaceous Period.

Simpson (1948), based on numerous paleontologic findings concerning vertebrates, pointed out a possibility of such a fast evolutionary restructuring in various groups of animals. He stated that many animal groups passed through the states of form-variety which happened relatively suddenly. These periods were called by Simpson the explosive generation of forms.

If one turns to the Cretaceous Period's history it can be seen that just during this time the processes took place which greatly promoted the fast development of many forms of insects, the Apocrita inclusive. The origin and unusual fast distribution of angiospermous plants are connected just with this time (Takhtajan, 1970). In their turn, the fast development and distribution of angiospermae have determined the particular trend and fast evolution in many insect groups (Rodendorf, 1964). Concerning the development of Angiospermae during the Mesozoic era, Vakhrameev (1970) singled out three stages of development, as it was done later by Rasnitsyn (1975) in relation to Hymenoptera, Apocrita. These stages also differ in the rate of evolution, a period of the fastest restructuring of angiospermous flora falling on the Lower Cretaceuos Period. Late Cretaceous flora of Angiospermae is close to that of Paleogene, its development goes on at present.

Therefore, there are all reasons to suppose that the evolution of Angiospermae had served as a background against which the evolution of Apocrita, the Chalcidoidea inclusive, took place.

It was already noted herein that the trophic links of eurytomids involve the hosts connected with an angiospermous plants. It is true for both the evolutionarily young genera and the most archaic representatives of the family.

The time and site of the differentiation of ancient eurytomidous forms can only be established supposedly. The data on the distribution of archaic eurytomidous genera in the tropics as well as the common nature of ecological specialization in the entire family evidence in favour of the suggestion that the group formation must have proceeded in the monotypic ecological conditions and, perhaps, on the territory where angiospermous plants were already distributed, at least during the Cretaceous Period. Eurytomids, the most archaic genera inclusive, are associated just with angiospermous plants as their major hosts. This territory could be located in the tropic belt of the Earth where, according to the findings of paleobotanists and paleogeographers (Kryshtofovich,1946, 1950; Sinitsyn, 1962; Vakhrameev, et al., 1970; Takhtaaan, 1970), fast distribution of angiospermous plants occurred already in the Lower Cretaceous Period. Further to the North (for example, in the Siberian paleofloristic region of Eurasia), the major type of vegetation was represented at the same time by the coniferous and ginkgous foxests.

The connection of archaic eurytomidous genera with hosts developing exclusively on angiospermous plants and the substantial predominance of these genera in the tropics allows us to suppose that the group formation took place in a region of the propagation and primary differentiation of ancient tropical formations of angiospermae.

The centre of Eurytomidae origin was likely those terrains where the ecological differentiation of angiospermous flora had already occurred at the Cretaceous Period in connection with the formation of arid regions with their cycles of xerophytes out of angiospermous plants. The following findings evidence in favour of such a suggestion.

The most archaic species and genera of eurytomids are known from the arid terrains of all zoogeographical regions characterized by an abundance of xerophilous plant types. In regions of hot climate, these are representatives of subfamilies Aximinae, Heimbrinae, and Buresiinae, almost all representatives of Rileyinae (*Rileya, Macrorileya, Archirileya*), the archaic ethiopian monotypic genus *Paradecatoma* (Eudecatominae), many species of Harmolitinae and Eurytominae (connected with the desert, semidesert and steppen xerophytes). It is rather significant that such ancient groups of eurytomids, as Rileyinae and Buresiinae, are characterized by the specialization to hosts - inhabitants of the arid conditions.

Since we refer the differentiation of Eurytomidae to the Lower Cretaceous Period, the problem of ecological conditions determining the vegetation types at that time is of undoubted interest.

In the opinion of many investigators (Popov, 1958, 1963; Sukhachev, 1938; Lavrenko, 1938,

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1950; Sinitsyn, 1962, 1965), the differentiation of angiospermous flora began in the Southern Hemisphere, on dry land of Gondwana, where the desert and semidesert regions with the characteristic xerophytic flora had already formed in the Cretaceous Period. Popov (1958:238) notes that "the primary desert flora out of Angiospermae and some Gymnospermae (*Ephedra, Welwitschia*) had developed, most probably, in Cretaceous or may be Jurassic time. The beginning of its history was associated with the history of Gondwana (Holonotis), a large equatorial continent which must be deserted in its central part due to its construction."

Therefore, the primary differentiation of xerophilous flora was synchronized with the end of Gondwana's history (the Cretaceous Period). During this period, there took place the propagation of desert and other forms of plants on the territories corresponding to modern Southern Africa and Southern America, on the one hand, and Southern Africa and Australia, from the other. An indubitable relationship between the ancient angiospermous florae, ancient xerophytic inclusive, separated now by the oceans has been already demonstrated by various methods.

In connection with the formation of xerophilous plant cycles, there appears to be specialization to them of phytophagous insect groups with which, also at the Cretaceous Period, a link could be established by one of the forming branches of chalcids which originated the family Eurytomidae.

If one assumes the suggestion that the family Eurytomidae was originated and had its primary differentiation at the Cretaceous Period on the territory of an ancient land which had lost its integrity subsequently, the disjunction of genus *Desantisca's* area, of which separate species are known from tropic areas of the Neotropical, Ethiopian, Indo-Malaysian and Australian regions, will become clear, as will the characteristic type of disruptured area peculiar of genera *Phylloxeroxenus* (Nearctic, Australian region), *Prodecatoma* (the south of Nearctic, the Neotropical, Indo-Malaysian and Ethiopian regions), *Aximopsis* (the Neotropical, Indo-Maalaysian regions). However, the propagation of genera of subfamily Rileyinae, whose some species have been revealed in fauna of Old and New World under the arid or semiarid conditions, is the most spectacular in this respect. In all above-listed cases, eurytomids are connected with the hosts developing on the plants useless economically, which prevents their wide distribution in an association with human cultural activity.

Telenga (1952) showed in the parasitic hymenopterans that the development on hosts living secretly is regular for the groups forming under the arid conditions. This evidences in favour of the opinion that eurytomids have differentiated under the arid conditions. The entomophage dependence upon the secretly developing hosts gives them, under the arid conditions, a stable biotope thereby contributing to their survival under the conditions of rised temperature and lowered humidity. Thus, the formation is elucidated for the entire family Eurytomidae of the common nature of ecological specialization to insects developing secretly. Although, in the course of their evolution, individual species of eurytomids have also spread to the hosts associated with the mesophilous vegetation and, together with them, advanced up to the moderate zone of Northern Hemisphere, the arid regions of low latitudes are undoubtedly the centre of the deepest taxonomic differentiation and variety of eurytomidous forms.

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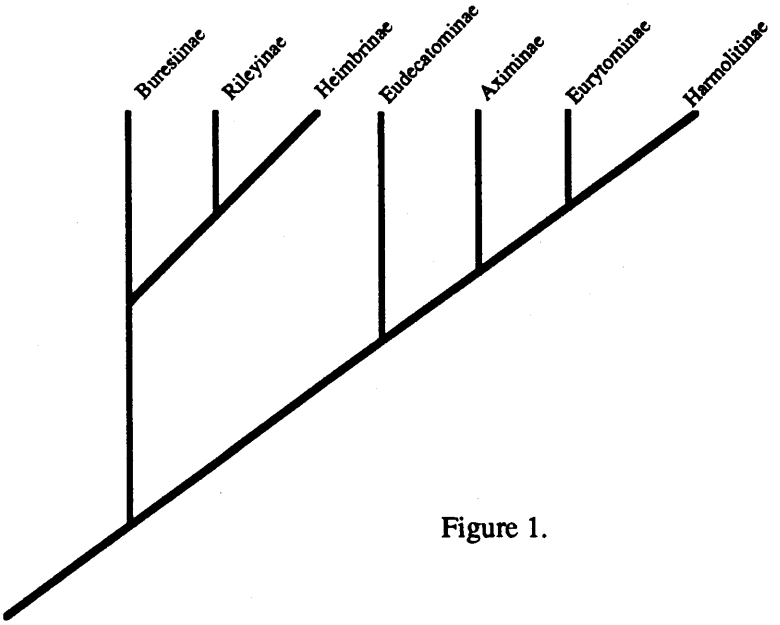

Figure 1.

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Research News

Fig News

A new newsletter devoted to information on fig biology has made it appearance with the August 1991, no. 1. edition. Edited by Steve Compton and Tony Ware, the newsletter follows "the format of the highly successful newsletter Chalcid Forum" [our thanks for the nice compliment, eds.]. The first issue includes notices of meetings, research news/profiles, abstracts, a bibliography of J. T. Wiebes, a mailing list, and recent publications. Trip reports and other items are being sought.

To contribute or get on the mailing list write: Steve Compton and Tony Ware, Dept. of Zoology and Entomology, Rhodes University, Grahamstown 6140, Republic of South Africa. Telephone 0461 22023 ext. 527.

Oriental Chalcididae (Hymenoptera: Chalcidoidea) Errors and Omissions

by T. C. Narendran, Kerala, India

After publishing my monograph in July 1989, I found several errors (mostly printing errors) and omissions. I regret very much the errors and mistakes.

Page 9. Change couplet no. 9 to as follows: "pronotum with two median tubercles; apex of scutellum not unusually emarginate (at most slightly emarginate) posteriorly; hind femur with a distinct inner basal tooth 10

Page 14: Couplet no. 30, second paragraph, last sentence: "postmarginal vein usually present" change to "postmarginal vein absent or present"..... 31

Page 16: First two lines: "postmarginal not longer than stigmal at the most subequal to stigmal" change to "frontogenal sulcus (malar groove) indistinct; postmarginal often not longer than stigmal. Phasgonophorini 38

Page 87: Couplet 21: first paragraph; "maximum length of vertex (Fig. 102) a trifle over 1.6X POL" change to "maximum length of vertex (Fig. 102) a trifle over 1.4X POL."

Page 94: line 24; "Forewing with postmarginal absent" change to "forewing with postmarginal present".

Page 113: After the account of *Hockeria sativa* add; "31. *Stomatocerus esterhazy* W. Fernando 1957: 16, M. Sri Lanka (UC)."

Page 185: After line 4 add "Host: *Chilo parteles* Zell. (Lepidoptera: Pyralidae)."

Page 235: Key couplet 1: "upper margin of clypeus pubescent on postclypeus (Figs. 297, 299, 304)" change to " upper margin of clypeus partly or completely fused with frons, densely

pubescent on post-clypeus (Figs. 297, 299, 304)."

Page 246: Couplet 63, second line "Postorbital carina absent" change to "Preorbital carina absent."

Page 255: Last line add "Hyperparasitic in pupa of *Hylaea puera* Cr. (Hybaleaeidae: Lepidoptera) and primarily parasitic on *Exorista sorbilans* Wide (Tachinidae: Diptera)."

Page 263: After Line 8 add "The known synonym of *jayaraji* is *B. lymantiae* Joseph, Narendran, and Joy (1972)."

Page 275: Under *Brachymeria criculae* add "*Brachymeria argentifrons* (Ashmead) is a known synonym of this species."

Page 441: Under Addendum add "3. Genuc *Chalcidiopsis* Masi, *Chalcidiopsis* Masi 1933: 4. Type-species: *Chalcidiopsis odontomera* Masi (MCSG). This may be *Psilochalcis* Kieffer."

Apart from the above corrections there are several other minor printing mistakes wich I have corrected using rotring pen before sending out copies.

Anthony Watsham, Harare, Zimbabwe

During the next three years I am hoping to make sketches of all the genera that have been collected here, at least where I have reasonable specimens. Theses are copied and colored in. One hopes someone may find them useful and want to publish them sometime in the future.

S.P. Singh, St. John's College, Agra, India

I have been awarded Ph.D. Degree in August 1990 from Agra Univesity Agra on bioecology of hymenopteran parasites of Agromyzidae (Diptera) belonging superfamily chalcidoidea. All the details of Ph.D. thesis and information about research project has been published in CHALCID FORUM *No.13 August* 1990 issue. Thereafter I continued my work in same project (PL 480) which was also completed in same year. It was possible for us to release memoir No.ll from school of Entomology, St. John's College, Agra containing all the results of PL 480 research project.

Reference to this memoir is -

Santokh Singh, S.P. Singh, S.Suresh Babu and Sebastian P.C. 1990. Bioecology of hymenoptera parasites of Agromyzidae Diptera) Pest species in India. Mem. Sch. Ent. 11 : 232 pp.

This memoir contains bioecology of three important key parasites viz. *Ormyrus orientalis* (parasite of *M. obtusa*), *Opius phaseoli* parasite *Lixiomvza brassicae, Gronotoma sp.* parasite of *Melanagromyza sojae*) and notes on some other important parasites.

Apart from this I also published some important research papers on bioecology of hymenopteran parasites (few are in press).

Now I am interested to continue my work on mass rearinq of these important parasites to achieve its benefit. Therefore I will keep trying to find a position that will allow me to continue my research on bioecology of chalcids and their mass breeding.

If any scientific or agricultural institution needs a specialist please contact me at S.P. Singh, E-723, Kamla Nagar, Agra 282005. U.P., India

Patricio Fidalgo, Tucuman, Argentina

I am planning to go to Australia for a year beginning 1 Nov. 1991. I will be working with Girault's Australian mymarids at the Queensland Museum. If I have enough time, I will try to work with insects associated with galls on Nothofagus.

Luis De Santis, Sergio Ovruski and I have finished the study of *Aditrochus* (5 species) and *Espinosa* (2 spp.) and we are sending the manuscripts to press. Fabiani Cuezzo (a yound myrmecologist that is under my direction) and I are sending to press a paper on a new species of *Ptilomymar* from Argentina. At present I am finishing a paper with S. Ovruski on the parasitoid complex of *Nematus desantisi* Smith (Symphyta: Tenthredinidae), a pest of willow in Agrentina. Together with S. Ovruski and F. Cuezzo I am preparing a paper on the taxonomy and biology of *Eschatocerus niger*, a cynipid gall maker on *Prosopis nigra* (Leguminosae) in Argentina.

Huang Jian, Fujian Agric. College, Fujian, China.

I received my Ph.D. in Aug. of 1991 and finished my thesis entitled "Systematic studies of Aphelinidae of China (Hym., Chalcidoidea).

Based upon studies of about 10,000 aphelinid speicmens collected mainly in Fujian Province, the thesis describes 93 species and 17 genera of Aphelinidae, including 42 new species, 1 new combination, and 4 genera and 14 species which are recorded for the first time from China. The materials on which this study is based are housed in Fujian Agricultural College, Fujian.

In the paper, a historical review, taxonomic notes, morphology, and biology of Aphelinidae are dealt with. Keys are given to Chinese genera of Aphelinidae and to species of some genera treated in the taxonomic part. Under each genus, generic synonymy, diagnostic characters, phylogenetic relationship, systematic history, and present systematic status are reviewed and discussed. All the treated species are illustrated in detail.

Necrology

Paul DeBach

We were saddened to learn recently that Paul DeBach, for many years a leader in the field of biological control and author of signficant works on chalcid taxonomy, passed away recently. Few details are available at this time. We hope to publish an obituary in a forthcoming issue.

M. G. Ramdas Menon

(1 January 1913 - 28 February 1990)

Oriental Insects (1991; vol. 25:viii-xv) published an obituary and bibliography of Dr. Ramdas Menon who passed away in Trichur, Kerala, India at the age of 77. Dr. Ramdas Menon published over 80 papers on taxonomy, parasitology, toxicology, ecology, and economic entomology. He wrote upon a wide diversity of insects and mites including nearly half-a-dozen papers on Pteromalidae and Chalcididae. He served for many years at the Indian Agricultural Research Institute, where he was instrumental in developing the National Pusa Collection and the Insect Identification Service. He also trained many students. He studied at several international museums from 1947-49, including some time with A. B. Gahan (T.C. Narendran, personal communication) at the U. S. National Museum in Washington, D.C.

[Eds. Note]

In the last issue, we noted that we intended to publish an obituary of Barney Burks in this issue of CF. Some information is still outstanding and we hope to have that for the next issue.

Trip Reports

CHALCIDS OF THE GALAPAGOS ISLANDS

by John Heraty, Carleton University

In the summer of 1991, I had the opportunity to spend three months on the Galapagos Islands, Ecuador, with Stewart Peck as part of a general survey of the insects. My focus was Hymenoptera, in particular, the smaller and always more interesting parasitic groups. The Galapagos Islands are comprised of about 45 islands, islets or rocks that occur about 1000 km off the coast of Ecuador. For the most part, the low-lying areas are arid or semi-arid zones of cactus, Palo Santo (*Bersera*) trees, scrub Acacia, or barren lava flows. Higher elevations may possess open "pampas," volcanic ash fields, or occasionally, humid zones with dense forests of 8 to 10 meter high trees (*Scalesia* - Compositae that are closely related to sunflowers). Collecting was a brutal exercise. Most of our time was spent collecting on uninhabited areas of Fernandina, Isabela, Santiago, Espanola, Pinzon and Rabida, with home base at the Charles Darwin Research Station on the island of Santa Cruz. Each trip consisted of a long ocean voyage on fishing boats followed by a grueling hike with all gear to the summit of each island. Water was usually absent and had to be packed and rationed on each trip. The expeditions were eventful, and we managed to be twice lost at sea, once stranded for three days, and twice had our boat nearly crash into the rocks. Apart from the large animals, the Hymenoptera proved to be far richer and more interesting than I had expected. I increased the known fauna from the 51 species of Hymenoptera previously recorded from the islands to over 243 species. Only sixty percent of the material has been processed, but I do not expect to find many more species. Generally, the Aculeates fair rather poorly, and, excluding the 29 species of ants, account for only 12.3% (30 of 243 species) of all Hymenoptera I have been able to identify. Eleven families of Chalcidoidea presently account for 44.4% of the Hymenoptera. Encyrtids are the most abundant (16 genera, 29 species) followed by Eulophidae (15 genera, 23 species). *Zagrammasoma* (7 species) and *Brasema* (8 species) appear to form species swarms, with each island apparently having a separate species. I was rather surprised to find four genera of Eucharitidae (*Orasema, Kapala, Obeza and Pseudochalcura*), of which three are possibly endemic species. The table below gives a general summary of chalcid numbers for other islands where I understand that vigorous surveys have been attempted. The results show that oceanic islands have a very high proportion of Chalcidoidea relative to all Hymenoptera. This is not surprising. In the series of papers by Gressitt and Yoshimoto that report aerial samples of Pacific insects, Chalcidoidea represent about 62% of all Hymenoptera (either based on total numbers [63.3%, 302/477 insects] or an unweighted average of all studies [61.2%]). The low percentage of chalcids for North America could be an artifact based on dealing with only described species. Many thanks to Ian Naumann (CSIRO), Gordon Nishida (Bishop Museum), and Carl Yoshimoto (BRC) for supplying me with the data for Norfolk, Philip, and Christmas Islands, and the Hawaiian Islands. If anyone knows of any other thorough surveys of islands for microHymenoptera, please let me know.

Species of Chalcidoidea and Total Hymenoptera

	Galapagos	Norfolk1	Philip1	Christmas1	Hawaii2	Sulawesi3	England3	N.Am.4
Chalcidoidea	108	80	33	145	559	1388	1414	2223
Hymenoptera	243	189	33	303	1281	4106	6160	17429
% of total	44.4	42.3	41.2	47.8	43.6	33.8	23.0	12.8

1-Naumann, CSIRO 2-Howarth, 1990, Bishop Mus. Occ. Pap. 30: 4-26; Beardsley & Yoshimoto, in prep. 3-Noyes 1990 (Sulawesi paper) 4-Hymenoptera Catalog

RECENT LITERATURE Chalcid Forum #15
(January, 1992)
Compiled by John Huber

All titles and journal abbreviations should be checked by the reader for accuracy if they are to be quoted in scientific papers.

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