TEAM NEWSLETTER

TEPHRITID WORKERS OF EUROPE AFRICA AND THE MIDDLE EAST

No. 3 December 2006

TO OUR READERS

In this newsletter there are several interesting news to be reported. An important development is that the web page of our group is ready and may be visited at http://www.tephritid.org/twd.team/srv/en/home Though the page looks quite good there is certainly room for improvement. Towards this direction the list of TEAM members will be soon posted on the site. Please check your personal information to see if everything is correct. Another important thing is a change decided by our Steering Committee regarding the date of the first Scientific Meeting of our group in Majorca Spain. The Meeting will be held at the beginning of April 2008 (rather than in 2007), so please mark your calendars with this new date! The Organizing and Scientific Committees were announced in the previous newsletter.

In September 2006 most of us met in Salvador Bahia Brazil to attend the 7th International Symposium of Fruit Flies of Economic Importance and the 6th Meeting of the Working Group on Fruit Flies of the Western Hemisphere. Everything was perfectly organized and the atmosphere warm and friendly. I would like to congratulate Aldo Malavasi and the organizing committee for this superb job. There were more than 250 research papers presented and around 350 participants from 60 countries. Significant new knowledge on basic and applied aspects of fruit fly research was reported. Besides, there were several satellite meetings organized mainly by the International Atomic Energy Agency that focused on specific topics of fruit fly management.

In Salvador one of the founders of the International Fruit Fly Symposia, Professor Aris Economopoulos, retired from the International Fruit Fly Steering Committee (IFFST). Through his active participation in the IFFSC for a period of nearly 30 years Aris Economopoulos contributed immensely to the successful organization of many Fruit Fly Symposia and to the advancement of knowledge on fruit flies. On behalf of the Steering Committee I would like to thank Aris sincerely and also ask him to keep contributing his experience to the fruit fly community.

Other members who retired from the IFFSC are Pat Gomes, who successfully chaired the Committee for a period, and Daniel Frias and Hiro Kuba who made valuable contributions through their active membership. We thank them all. Four new members joined the committee. These are Sunday Ekesi (ICIPE, Kenya), Nikos Kouloussis (University of Thessaloniki, Greece), Cathy Smallridge (South Australian Research and Development Institute) and Mike Stefan (USDA). We wish them good success in their new duties.

In Salvador Aris Economopoulos gave a talk on the development of the International Fruit Fly Symposia. He started from 1982 when the first meeting was organized in Athens, and went on describing in a most passionate way the second meeting that was held in Crete and was attended by all prominent fruit fly workers at the time, including the late Ronald Prokopy. In this newsletter we present part of this talk and also photographs from the meeting in Crete. We also present a few photos from a special celebration in Salvador where Aldo Malavasi and Jorge Hendrichs thanked Aris for his contribution to the fruit fly community.

In the current newsletter Marc De Meyer contributes the main article on the Taxonomy of African Fruit Infesting Tephritidae. In his article Marc deals with the importance of Taxonomy and the need for new “blood” in this field. Fruit trading and human mobility increases the risk of introduction of exotic Tephritids that devastate local fruit production. This calls for fast an unambiguous identification. Both classical taxonomy and modern molecular technologies should be combined to this end as Marc proposes. The paper briefly and comprehensively describes the major African groups of fruit infesting Tephritids. At the end there is an introduction to “the barcoding of life”, an exciting new project that has included fruit flies as a subject group. DNA barcoding uses a short portion of the genome (usually the mitochondrial cytochrome-c oxidase I; COI gene in insects) for identifying species. Barcoding does not compete with traditional taxonomy but rather comes to supplement it.

This newsletter and all that follow will be distributed by e-mail and will be also posted on our TEAM web site. Please send us your news to be included in the next newsletter.

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TAXONOMY OF AFRICAN FRUIT INFESTING TEPHRITIDAE: ROOM FOR OPTIMISM?

Species identification is considered the first prerequisite for any fundamental or applied research topic. Biologists or agronomists can neither report empirical results nor access published information on a study organism until it is correctly identified (De Meier *et al.*, 2006). The role and importance of taxonomic knowledge and identification service can, therefore, not be overestimated. The problem poses itself less for well known pest species such as the Mediterranean fruit fly (*Ceratitis capitata*). However, several important fruit fly pests belong to complexes of sibling species which are not easy to differentiate one from another. In addition, tropical faunas such as those of Africa, Asia and South America, are relatively poorly known and harbour a magnitude of undescribed species that may confuse proper identification of the economic important ones. Finally, the increasing risk of exotic introductions and invasive species requires a profound taxonomic knowledge of the faunas of different geographic regions, in order to provide a fast and unambiguous identification. Nevertheless, there is a serious crisis in the field of taxonomy with an ever declining number of taxonomic specialists. For example, Drew & Romig (2000) listed only 11 major contributors to tephritid taxonomy worldwide at that time. That number has currently been reduced to 9. In tropical regions, the situation is even more critical since it is hard to obtain funding for classical taxonomic studies which are often considered as merely descriptive and without significant scientific impact. Motivating and training scientists from tropical regions in classical taxonomy is not an easy matter.

Mango fruit fly (*Ceratitis cosyra*). Photograph by R.S. Copeland.

This and related facts were amply demonstrated in the last years with the detection of invasive Asian *Bactrocera* species in Africa. First there was the detection of an undescribed species, belonging to the *Bactrocera dorsalis* complex (Lux *et al*., 2003). The latter complex is a group of more than 70 closely related species that are often difficult to distinguish one from another (Drew & Hancock, 1994). The species was later described as new to science (Drew *et al*., 2005) under the appropriate name *Bactrocera invadens*. More recently (October 2006), there was the finding of the solanum fruit fly, *Bactrocera latifrons* in Tanzania. In both cases, only two taxonomic specialists could provide an authoritative identity. Only one of them has a profound knowledge of both the African and Oriental fauna of this group but recently retired. No new generation is currently being trained, not for lack of interest in the current generation to pass on the acquired knowledge but because of a lack of means and general interest in the field of taxonomy. Although this problem has been addressed for more than 20 years, within the framework of the biodiversity crisis (Wilson, 1985) as well as specifically for Tephritidae (White, 1989), little or no improvement has been noticed over the last decades. On the contrary, revisionary taxonomy, which lays at the basis of proper identification tools, is more and more under pressure because of more attractive or novel disciplines (Wheeler, 2004).

Despite all the gloom and doom, has there been no progress made in the field of fruit fly taxonomy and systematics? As far as our knowledge on the taxonomy of the major fruit infesting tephritid genera in Africa is concerned, we can be slightly more optimistic. Over the last 10 years, taxonomists have tried hard to revise the major groups and to provide means and tools for the larger scientific community to enable unambiguous recognition and identification. Also, researchers are looking at other ID tools than the traditional morphological characters and dichotomous keys. In addition, current attempts are being made to place the taxonomic knowledge in a larger phylogenetic and evolutionary framework. Financial support and assistance has been provided, as a by-product of larger research activities, to alleviate the current problems. In particular several of the endeavours listed below were supported through two subsequent grants of USAID and USDA, obtained by R. Wharton (Texas A&M University) during 1999-2005.

The point of reference is the state-of-the-art publication by Aluja & Norrbom (1999), produced after the Xalapa meeting in 1998. At this successful meeting, 35 tephritid workers active in the field of taxonomy and ecology/behaviour came together in Mexico for a review of the then current status of knowledge on fruit fly phylogeny and behaviour. Regarding the major groups in Africa, the dacines, the general lack of taxonomic identification tools was highlighted as a drawback in the study of these groups (Drew & Hancock, 1999), a feat already remarked upon by I. White ten years earlier (White, 1989). Luckily, thanks to the projects mentioned above, both holding a taxonomic component, several of the shortcomings could be addressed.

The intention of this paper is to give a review of the existing taxonomic literature and tools currently available, which can assist in unambiguous species identification of representatives of the major fruit fly pest genera found in Africa. These are mainly African representatives of the dacines (Tephritidae, Dacini), including the genera *Bactrocera*, *Ceratitis*, and *Dacus* and to a lesser extent *Capparimyia* and *Trirhithrum*. They are grouped in two subtribes: Ceratitidina and

Dacina. White & Elson-Harris (1994) list about 50 species of major or minor economic importance in these five genera from Africa. Recent developments are highlighted for each of these groups. The taxonomic treatise is followed by a chapter on a novel initiative where the use of molecular tools is being investigated as an aid to identification.

Ceratitidine fruit flies

The Ceratitidina comprises three genera of major or minor economic importance: *Ceratitis*, *Trirhithrum* and *Capparimyia*. *Ceratitis* is a predominantly Afrotropical genus, comprising 94 described species divided into six subgenera (*Ceratitis* s.s., *Ceratalaspis*, *Pterandrus*, *Pardalaspis* and the monotypic genera *Hoplolophomyia* and *Acropteromma*). Only the infamous medfly (*Ceratitis capitata*) is now spread worldwide due to human activities, although other species might have the same potential at least as far as ecological requirements are concerned. The different subgenera were taxonomically revised over the last 10 years resulting in a number of separate publications (De Meyer, 1996, 1998, 2000; De Meyer & Copeland, 2001; De Meyer & Freidberg, 2006). These publications provide detailed descriptions and illustrations of the major diagnostic characters, clarify the status of synonymous names, list distributional data and host plants and recognize species groups within the larger subgenera such as *Ceratalaspis* and *Pterandrus*. They also provide classical dichotomous keys for both sexes.

The Afrotropical genus *Trirhithrum* is closely related to *Ceratitis* and might even be a subgeneric part of the latter. The larvae develop in soft fruits, particularly of the coffee-plant family Rubiaceae (White *et al.*, 2003). They have also been studied in the search of parasitoids that can be used in the biological control of *Ceratitis* fruit flies. White *et al.* (2003) revised the group comprising 40 recognized species, and provided descriptions, host plant data, and a dichotomous key. The genus *Capparimyia* is much smaller than the preceding two. Representatives of this group develop in plants of the caper family (Capparidaceae). They have an Afrotropical distribution, except for *C. savastani* which is found in the Mediterranean region, the Arabian Peninsula and Pakistan. It is considered a pest of cultivated capers that are grown to be pickled as a relish. All eight species were also revised recently (De Meyer & Freidberg, 2005) and a key provided, as well as a cladistic analysis outlining the relationships among the species and evolutionary trends regarding host use within the Capparidaceae.

Most of this published information is also available in electronic format through two different media. De Meyer and White developed a website within the framework of an EU funded project, 'European Network for Biodiversity Information' (ENBI), and with the assistance of the Belgian Biodiversity Platform (http://projects.bebif.be/fruitfly/index.html). This website lists both the taxon information such as description, illustrations and distribution map, as well as the individual specimen information. It furthermore provides digital images of all major diagnostic structures to aid in the identification. The same authors also developed electronic multi-entry keys (based on the CABIKEY software) for *Ceratitis* and *Trirhithrum*, as a tool within the scope of an USAID funded project. These keys use illustrations to differentiate the diagnostic character states and allow the user to choose characters to assist in identification. An annotated list of host plants for *Ceratitis* was furthermore published separately by De Meyer *et al.* (2002).

Besides the purely taxonomic revisions, morphological and molecular studies have also investigated the relationships between the extant species of *Ceratitis* (Barr & McPheron, 2005; De Meyer, 2005). Although conflicting in some aspects, there is also some common ground. For example, the subgenus *Pardalaspis* is clearly a monophyletic group in both studies. Also the subgenus *Ceratitis* s.s. is largely monophyletic with possible exception of the most basal taxon (*C. cornuta*). The subgenus *Pterandrus* might, as a whole, not be monophyletic but two distinct subgroups are recognized within. Both studies also indicate the subgenus *Ceratalaspis* as not being monophyletic but comprising some distinct species groups. The genus has an interesting evolutionary relationship towards host plants in the sense that some representatives are polyphagous, attacking a wide variety of unrelated hosts belonging to several plant families. Other groups are stenophagous, being specialized on a particular host plant genus. Both molecular and morphological evidence show that the stenophagous specialists belong to individual monophyletic clades, hence current taxa attacking a particular host plant genus seem to have a common ancestry. Such clades are found for species attacking the plant genera *Solanum*, *Strychnos*, *Podocarpus*, and *Cola* and probably also *Vepris*. The evolutionary process behind these specialisations is unclear. One hypothesis currently under investigation is that this can be the result of an innovative trait in the larval development. Key innovations are traits which, once evolved, increase the rate of cladogenesis within a lineage. Fruits of genera such as *Solanum* and *Strychnos* are known to harbour toxins that have strong detrimental effects on the larvae of many tephritids (Prokopy & Papaj, 1999). By overcoming this toxicity, it could provide a novel food resource for the larval development. Other evolutionary trends, however, may also have played a major role in the exploration of novel fruit hosts.

Dacine fruit flies

The African Dacina fauna consists of two main groups. Firstly the genus *Dacus*, with 177 species recognized in Africa, versus about 70 Indo-Australian species. Secondly a small contingent of 11 native *Bactrocera* species, out of more than 500 described species mainly from the Indo-Australian region. In addition, some Asian *Bactrocera* species were introduced to Africa, like *B. cucurbitae*, *B. zonata*, *B. invadens*, and recently *B. latifrons*. While the representatives of *Bactrocera* attack soft fruits from a wide variety of plant families, the hosts of *Dacus* species belong to only three plant families: Cucurbitaceae, Passifloraceae and Apocynaceae. For years the only comprehensive reference work to the African fauna was the treatise by H.K. Munro (1984). However, this work was considered largely inaccessible to the non-specialist. It did not provide an identification key to species level but proposed a system of coded

characters in stead. Recently, however, the dacine fauna of Africa and the Middle East was reviewed by White (2006). This monograph presents us with species descriptions, an easy to use identification key, and distributional, lure and host plant information. The book is accompanied by a CD-Rom holding additional information such as all basic data related to the individual specimens that were studied within the course of the revision, as well as a database of digital images illustrating the main diagnostic features used in identification. In addition, the work presents a working template of species groups formation, and their association with named subgeneric divisions, all of which will hopefully serve as the basis for more detailed research in the years to come. In this regard, it can already be considered a major reference work for the group.

The invasive fruit fly *Bactrocera invadens*. Photograph by R.S. Copeland.

A first cladistic analysis, based on a set of 21 characters and a subset of 30 species groups is also presented for the African representatives of *Dacus*. Because of the staggering homoplasy observed throughout the genus, any cladistic analysis is hampered by low compatibility found among the observed character states. The proposed subgeneric relationships and phylogeny are considered by White (2006) as a mere working hypothesis that should be tested in detail. Simultaneously to the work by White, the subgeneric classification within the genus *Dacus* worldwide was also studied by Hancock & Drew (2006). Although they did provide a character state matrix of 34 characters, coded for 241 species (partly based on literature, partly on examination of 150 species), the delimitation of subgenera and species groups as well as the phylogenetic relationships were not based upon a cladistic analysis but on a visual interpretation of the distribution of the character states throughout the matrix. Both systems are compared in White (2006).

The origin of the African versus Indo-Australian fauna both for *Bactrocera* and *Dacus*, has been speculated upon in different articles (Drew & Hancock, 1999; Drew, 2004; White, 2006), largely producing two opposing views. Drew & Hancock (1999) and Drew (2004) propose an Indo-Madagascan origin for *Dacus* while White (2006) proposes an alternative hypothesis with an African origin, in view of known chronology for the evolution of flowering plant families. The evolutionary traits that have lead to the diversification and current biogeographical distribution of the Dacina, is certainly an interesting research element that needs further investigation.

Molecular barcoding, tool of the future?

Given the problems encountered during identification, other approaches besides the purely morphological identification, have been explored over the years. Especially because of the declining number of taxonomists, and their ever increasing overload with requests for their services, the need is felt for alternative systems providing reliable identification by non-specialists. For non-adult stages, even the specialists are stymied because eggs, larvae, or pupae are difficult or impossible to identify using morphological features. Over the past three years, "DNA barcoding" has been proposed as a system for identifying species using a very short gene sequence from a standardized portion of the genome (Herbert *et al*., 2003). Once a validated diagnostic system has been developed, the DNA barcode sequence can be obtained from a tiny tissue sample (such as an insect egg or larva) and assigned to a species using an on-line reference database of DNA barcodes. The mitochondrial cytochrome-c oxidase I ("COI") gene has proven to be an effective barcode gene region in almost all higher animal groups, especially among insects. DNA barcodes will likely provide the base upon which new diagnostic technologies of the future will be built. A number of agricultural agencies have begun to explore DNA barcoding as a tool for pest identification. The Consortium for the Barcode of Life (CBOL; www.barcoding.si.edu), an international initiative hosted by the Smithsonian Institution in Washington, is partnering with these agencies to promote barcoding as a practical tool. CBOL and its partners have set the ambitious goal of creating the first practical DNA Barcoding Demonstrator System that will be able to identify any specimen from an agricultural pest group from anywhere in the world. Fruit flies (Tephritidae) have been selected as one of the possible subject groups.

This 2 year project is managed by the Steering Committee for the Tephritid Barcoding Initiative (TBI). Results of a pilot study conducted by the Steering Committee indicate that this project can rely almost entirely on tissue samples from identified specimens currently housed in major insect collections worldwide. Specimens collected as early as 1929 have repeatedly produced DNA from which reference barcodes can be obtained. The work will be distributed among coordinated regional centres, each focusing on regional pests and museums/collections and should produce a COI database consisting of 10,000 specimens and 2,000 species, including all species of economic importance, the majority of their congeners, and representatives of genera and tribes that have no economically important species.

However, the people involved in TBI realize that such a molecular database will raise as many questions as it will resolve. There are bound to be new species complexes to be discovered; while other recognized sibling species might not be differentiable using standard marker such as COI. There remains, therefore, an even greater need for a new generation

of traditional taxonomists who will have to try and resolve questions raised by this work. Barcoding is thus not seen as a replacement for traditional systematics but rather an extra tool in identification procedures. In order to stress the importance of morphological taxonomy, the project proposal includes a strong training element specifically in this field in order to ensure the transfer of knowledge from the declining group of fruit fly specialists to the next generation.

Looking at the work carried out in the last decade on African fruit flies, and the planned activities, I think there is room for some optimism, without indulging in outright euphoria. With revisions of the major taxa finalized and reference works available, the foundations are laid for a robust taxonomy. Novel tools are being explored, and the taxonomic ground work is currently leading to more in depth research. It is my hope that young scientists can be motivated to continue the basic descriptive alpha-taxonomy work, as well as to further unravel the evolutionary tendencies that have lead to these spectacular speciation and diversification events.

Acknowledgements
The above listed research activities where I was personally involved in, were performed in collaboration with several individuals and institutions. The results and ideas put forward here are, in large, the result of this collaborative work. In particular, I would like to mention, in alphabetical order, Norman Barr (USDA-APHIS, Texas, USA), Bob Copeland (International Centre for Insect Physiology and Ecology, Nairobi, Kenya), Nathalie Erbout (University Ghent, Belgium), Amnon Freidberg (Tel Aviv University, Israel), Bruce McPheron (PennState University, USA), Massimiliano Virgilio (Royal Museum for Central Africa, Tervuren, Belgium), Bob Wharton (Texas A&M University, USA), and Ian White (Natural History Museum, London UK). The chapter on Tephritid Barcoding Initiative was largely taken from an earlier draft on the initiative for a CBOL demonstrating leaflet.

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THE FOUNDATION OF FRUIT FLIES SYMPOSIA SERIES

Main parts of a talk given by Aristidis Economopoulos during the 7th INTERNATIONAL FRUIT FLY SYMPOSIUM, Brazil

As fruit flies infestation problems in tropical and subtropical regions grew bigger and bigger, among others because of extensive invasions caused by expanded international travel and trade, the community of fruit flies workers grew larger and larger. The fruit industry grew also bigger because of expansion of fruit trade across the world, e.g. grapes to Europe from South America in winter.

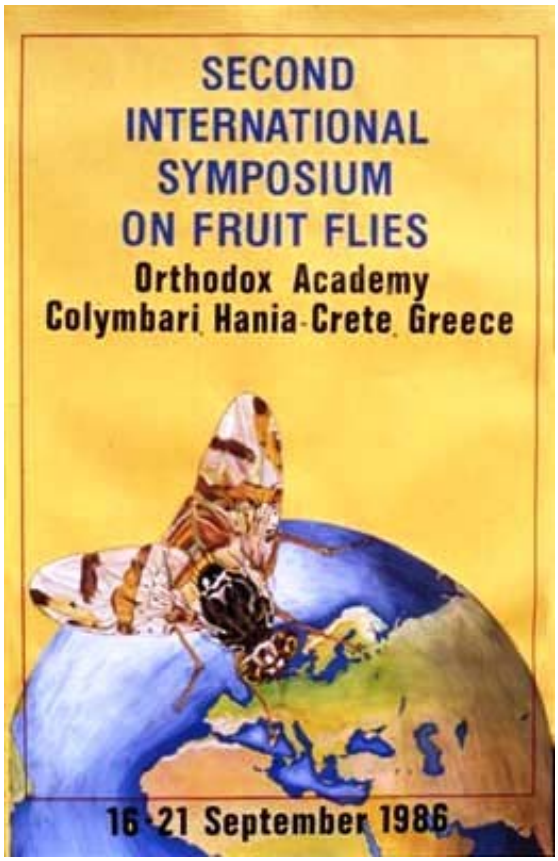
Back in the early 70s, coordinated fruit fly international projects became common. In Greece, a big project on olive tree protection financed by FAO was initiated in 1970. It included 5 research centers and lasted 12 years in total. One of the research centers was "Democritos" in Athens, in which an entomology group emphasized on SIT olive fly control and related research. Under this project several fruit fly experts have been invited for short duration joint research and exchange of thoughts. Among the invited experts, B. Fletcher, K. Hagen, R. Prokopy, L. Steiner, N. Tanaka, J. Tumlinson and several others. The need to meet and exchange ideas with fruit fly research people, dispersed from the Mediterranean to the Pacific and the Americas and from Europe to South Africa, appeared more and more important to us, junior fruit fly researchers at that time, for the advancement of basic and applied knowledge and the development of alternative control methodologies.

In 1978-79 we realized that an international symposium on fruit flies, in-between international congresses of entomology, would secure more frequent meetings and exchange of useful information among fruit fly "fans" (term recently introduced by McInnis, if I am correct). Until then smaller fruit fly meetings within working groups or RCMs of coordinated programs were the case. By nature, all these small meetings were of restricted subject and usually did not involve people from basic science located mostly in universities.

The 1st International Fruit Fly Symposium was organized in Athens in 1982. Following proposal by this speaker, the IOBC Working Group on Fruit Flies also participated in the organization of the 1st IFFS and contributed financially to this end. The late R. Cavalloro, also a member of the WG at that time, supported the idea and secured that the European Union (of which he was an employee) will cover some travel costs and publish the proceedings. The Greek organizing committee established, secured funding from several Greek authorities, among others the Ministry of Agriculture and the Ministry of Research and Technology. The symposium was organized in November 1982 with 85 original research oral presentations and about 120 participants from 35 countries. Nine major fruit fly species were research subjects of the above presentations: A. suspensa, C. capitata, D. dorsalis, frontalis, oleae and tryoni, R. cerasi, conversa and pomonella. Behavior, pheromones, artificial rearing and control dominated the symposium. The Mediterranean fruit fly and olive fly were the species in over 50% of presentations.

Photo of 1st IFFS Logo

Although in the closing plenary session and the symposium recommendation of the 1st IFFS the importance to continue the fruit fly quadrennial symposia had been underlined, no organization to secure continuation (e.g. steering committee) had been established. Furthermore, some fruit fly colleagues were not very enthusiastic with the idea of an international symposium on fruit flies. Thus, almost 3 years following the 1st IFFS no activities for the organization of the second symposium had been initiated. A very small group of fruit fly people realized that if the decision for quadrennial symposia was not observed timely, no guarantee for continuation was possible. At emergency procedures, an international organizing committee with strong Greek participation was set up, while the IAEA was asked to approve that all mail concerning the organization of the 2nd IFFS be handled through its services. Thanks to the strong support by Don Lindquist, the Agency allowed the present speaker to manage the organization of the symposium from the Seibersdorf Lab and the Insect and Pest Control Section of IAEA. Finally, the 2nd IFFS was organized in Colymbari, Crete in September 1986 in a unique location. The basic research component was very strong with prominent scientists from Harvard, Berkeley, Riverside, Davis, Amherst, Cambridge, Sienna, CSIRO presenting important topics and results. To all participants this was an extraordinary scientific meeting. For some participants this was the best meeting they had ever attended both in science and friendly and inspiring atmosphere and events. For some junior fruit fly colleagues it was the decision moment for their subsequent research career.



Photos of 2nd IFFS, Logo and Participants

At the conclusion of the 2nd symposium an international steering committee was established with J. Hendrichs, F. Kafatos, D. Lindquist and R. Prokopy as first members. Interested fruit fly groups, organizations and symposium participants were asked to nominate another 4 members. B. Fletcher, at that time convenor of the IOBC global group on fruit flies, was asked to administer the completion of the steering committee synthesis and election of chairman. In the 2nd IFFS it was suggested that the 3rd one be organized in Latin America, given the large area-wide control programs operated in the area. Also it was decided that following payment of all symposium obligations, left over funds (mainly from subscription fees and proceedings sales) should be contributed to the organization of the 3rd IFFS.

The continuation is well known, a series of quadrennial symposia of extraordinary success in Guatemala, Florida, Malaysia, South Africa and now in Brazil. The latter with 250 research presentations and 350 participants from 58 countries. What an evolutionary success!

Photo of a sketch by R. Prokopy

Concluding this short review I would like to project a hand sketch by the late R. Prokopy, a pioneer in the study of fruit fly foraging behavior and its use in developing environmentally safe control methodologies. It was made on a hot summer day of 1973, returning from field experimentation on wild olive fly colour response and host tree/fruit orientation near Athens. It was an outlet and relief scenario for results not quite predictable or anticipated.

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Scetch of a medfly couple
(By David Nestel)

A FEW PHOTOS FROM A SPECIAL OCCASION

In Salvador one of the founders of the International Fruit Fly Symposia, Professor Aris Economopoulos, retired from the International Fruit Fly Steering Committee. Below are some photos from a special event, where Aldo Malavasi and Jorge Hendrichs thank Aris for his immence contribution to the successful organization of many Fruit Fly Symposia as well as his general contribution to the fruit fly research.

BOOK REVIEW

Merz, B. (ed.) 2006. Phylogeny, taxonomy and biology of tephritoid flies (Diptera, Tephritoidea) – Proceedings of the 3rd Tephritoid taxonomist's Meeting. Instrumenta Biodiversitatis 7: 274pp. Published by the Muséum d'Histoire Natural, Geneva. ISBN 2-88139-012-9.

In July 2004, 29 scientists from 18 different countries came together in Switzerland for a meeting on tephritoid taxonomy, phylogeny and biology. This was the third meeting of this kind. The idea started in 1998 when tephritid systematists and behavioural ecologists came together in Xalapa, Mexico to review the current state of knowledge on fruit fly behaviour, phylogeny and related subjects. During that meeting it was suggested to gather at regular intervals to provide updates on tephritid research and related families. It was also conceived from the beginning that these meetings would be a combination of presentation sessions with field excursions. The first meeting of this nature was organised by Amnon Freidberg (Tel Aviv University, Israel) in 2000, while Bernhard Merz (Muséum d' Histoire Naturelle, Geneva Switzerland) organized the next one in 2004. During the latter meeting, 23 oral communications and 4 posters were presented. The proceedings were published in the summer of this year, comprising 11 scientific papers based on some of the communications presented during the meeting. The majority of the 11 papers deal with taxonomy (8 articles). Furthermore there are various contributions on faunistics, morphology and biology (1 article each). One paper deals with several families within the Tephritoidea. All others deal with Tephritidae s.s., except for some contributions on Ulidiidae and Platystomatidae. This diversity in topics is a good reflection of the actual presentations during the meeting.

Elena Kameneva (Schmalhausen Institute of Zoology, Kiev, Ukraine) presents a review of the East Asian and Papuan species of the ulidiid genus *Herina*. The genus *Herina* is mainly distributed in the Palaearctic and Oriental regions, and seems to be associated with plants among the Poaceae and Caricaceae. She reviews, redescribes and illustrates the 8 known species and describes a further 10 new ones.

Unusual head ornamentations are a morphological feature observed in several dipteran families. The most conspicuous are the stalk eyed-flies (Diopsidae) or the antlered fruit flies of the genus *Phytalmia*. Less well known is the unusual head morphology in Platystomatidae, another tephritoid group. Andy Whittington (Dunbar, U.K.) explores the variety of head modifications in the subfamily Plastotephritinae. He furthermore proposes a system of classification of head modifications within the dipterous families.

Giuseppe Gentilini (Emilia Romagna, Italy) and co-authors present a review of the fossil tephritoid flies. Part of the article is based on Upper Miocene compression fossils from Central Italy. Furthermore the taxonomic position of all known European fossil Tephritoidea is reviewed. This is an endeavour that cannot be underestimated because of its importance in studies of larger phylogeny and interrelationships between tephritoid families.

The next six chapters deal with specific taxonomic problems within the family Tephritidae. The genera of the basal lineage of Tachiniscinae are reviewed by Valery Korneyev (Schmalhausen Institute of Zoology, Kiev, Ukraine) and Allen Norrbom (National Museum of Natural History, Washington DC, USA). Tachiniscinae are not phytophagous but are believed to be parasitoids of other insects. This way they take an unusual place within the family. The paper proposes an intergeneric classification within this subfamily. It also presents a generic key. Phylogeny and classification is also the topic of the next two chapters. First a cladistic analysis of the subtribe Pelmatopina by Xiao-lin Chen and Xing-jian Wang (Institute of Zoology, Beijing, China). Representatives of Pelmatopina also have tremendous long eye-stalks (similar as in diopsids) but their life history is unknown. The next chapter, by David Hancock (Cairns, Australia) and Richard Drew (Griffith University, Brisbane, Australia) proposes a revised classification for groups within the genus *Dacus*, a genus with many representatives in Africa, including several pest species. Severin and Valery Korneyev (Schmalhausen Institute) report on the biology and immature stage of *Malica caraganae*, one of the more aenigmatic Palaearctic Tephritidae. It is a species that attacks beans of *Caragana turkestanica* and that seems to be distantly related to African tephritids. The two succeeding chapters deal with flowerhead infesting fruitflies. The first is an account on the sunflower infesting genus *Gymnocarena* by Allen Norrbom in North America. He presents descriptions of three new species within this genus as well as several new host plant and distribution records. This is followed by a paper on a new Afrotropical genus, and three new species, infesting flowerheads of *Vernonia*. Irina Zonstein and Amnon Freidberg (Tel Aviv University, Israel) describe the schistopterine genus *Setoides*, based on material from eastern and equatorial Africa.

The last two concluding chapters look at particular island faunas. The first, by John Smit (Utrecht, the Netherlands) looks at the fauna of the Madeiran archipelago, in the Atlantic Ocean. He presents a checklist of the 16 tephritid species recorded (including occurrence of olive fruit fly) and provides several new fly-host plant relations. Jonathan Brown (Grinnell College, Iowa USA) and his colleagues look at the phylogeny, host association and wing pattern in the endemic Hawaiian fruit flies. These fruit flies belong to three different genera and all attack the endemic Hawaiian silverswords, and other endemic Asteraceae. Among their initial findings is the indication of a single colonizing ancestor for the endemic taxa, and the lack of evidence for co-speciation between plants and herbivores.

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FP7 EU-FUNDED RESEARCH

The Seventh Framework Programme for Research and Technological Development (FP7) is the European Union's main instrument for funding research in Europe and it will run from 2007 to 2013. The EC budget for the next seven years is € 50.5 billion. The Programme supports research in selected priority areas including Food, Agriculture and Biotechnology. The aim is to make, or keep, the EU as a world leader in those sectors and also respond to Europe's employment needs and competitiveness. FP7 is made up of 4 main blocks of activities forming 4 specific programmes plus a fifth specific programme on nuclear research:

More Information

European Research Portal:
www.ec.europa.eu/research

General information on the **Seventh EU Research Framework Programmes**:
www.ec.europa.eu/research/fp7

Specific information on research programmes, projects and FP7 Call documents:
www.cordis.europa.eu/fp7

General **information** requests:
www.ec.europa.eu/research/enquiries

FORTHCOMING MEETINGS

First Meeting of Tephritid Workers of Europe Africa and the Middle East, Spring 2008, Majorca, Spain.

THIS NEWSLETTER

This newsletter is intended for the publication of subjects of interest to the members of TEAM. All content is solicited from the membership and should be addressed to:

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