The Tachinid Times

ISSUE 6
February 1993

Jim O'Hara, editor
Agriculture Canada, Biological Resources Division
Centre for Land & Biological Resources Research
C.E.F., Ottawa, Ontario, Canada, K1A 0C6

Once again I assemble here the contributions I have received during the past year, and provide a bibliography to tachinid literature. There has been a significant number of publications on the Tachinidae during the past year indicating a healthy interest in tachinid research, despite the ever dwindling resources that are being spent on biological research during these difficult economic times.

Our Centre is faced each year with less operating funds and a smaller scientific staff, but by world standards we still enjoy a privileged position. One of the benefits of this situation is that I am permitted to produce and distribute this newsletter at no cost to the readership. Another is that a large number of entomological and abstracting journals are subscribed to by our Entomology library, allowing me to assemble a fairly good tachinid bibliography with relatively little effort. As long as these circumstances continue I am content to produce **The Tachinid Times**, provided also there is support for it. This support must be more than a desire to receive the newsletter each year, for such support does not generate any news. News means contributions, so please think about this in the fall when I write to ask if you have anything to include in issue 7. I extend my thanks to all of you who have helped with this issue.

British Tachinidae Handbook (by J. O'Hara)

Robert Belshaw was commissioned several years ago by the Royal Entomological Society to write a tachinid handbook in the series "Handbook for the Identification of British Insects". The handbook, in manuscript form, was submitted to the editors of the RES in February 1991. The following information about the handbook was supplied by Peter Barnard of the Natural History Museum (in letter dated 11 January 1993): "As far as I understand the situation, the manuscript was finished some time ago and has been in the hands of the editors ever since. It has never formally been submitted to the Museum for publication. However, I now hear that editorial work on the manuscript has been completed and that it should be submitted for publication very shortly. At this stage I cannot give you a definite date for publication, because this will obviously depend on the exact timing of its handover by the editors and on other handbooks in various stages of production."

We can unfortunately conclude from Barnard's letter that publication of Belshaw's handbook is not close at hand, even though two years have elapsed since its submission to the RES. Persons interested in seeing Belshaw's handbook appear as soon as possible may wish to indicate this desire in letters to the RES.

Third International Congress of Dipterology (by J. O'Hara)

Plans are progressing for the Congress, which will be held in Guelph, Ontario, Canada, August 15-19, 1994. Members of the Organizing Committee met in Baltimore, Maryland during the Annual Meeting of the Entomological Society of America in December 1992 to review progress to date, assign duties, and discuss other Congress-related business. The Second Announcement will be mailed this summer or fall, and will include registration and abstract forms. Persons wishing to receive the Second Announcement who did not receive, or respond to, the First Announcement should write the Congress Chair, Steve Marshall

(address in mailing list). Persons wishing to arrange visits to the Canadian National Collection in Ottawa before or after the Congress should contract Jeff Cumming (same address as Jim O'Hara).

Collecting in Greenland (by Stig Andersen)

I travelled to southeastern Greenland last summer (15.vii.-18.viii.1992) as part of a mainly geological and archaeological expedition to island-bound Skjoldungen and the famous valley Dronning Maries Dal near the inland ice (an area abandoned for twenty years and visited today only rarely by seal hunters). The insects of these areas are virtually unknown but are of interest because of the southern (subarctic) position of these areas on the east coast of Greenland. Due to the very steep and high mountains (2000m in altitude) arising immediately after the seashore and the presence of many glaciers, the climate and vegetation is arctic. The vegetation is restricted to patches of coppices (dominated by willow or birch) intermingled with patches of meadow, grassland and heath and beautiful herbslows extending up to an altitude of 500m.

When we arrived in Skjoldungen on July 18th most of the snow in the lowlands had melted and the beautiful alpine flora of the herbslows had just begun to flower. Everywhere could be smelled the characteristic scent of flowering orchids. Large numbers of flies were already present, representing many species of (most notably) muscids, anthomyiids and scatophagids. We were not attacked by many mosquitoes. Only one tachinid was found at this locality: *Petinarctia stylata* (B. & B.) [Ed.: also known as *Periscepsia stylata*] a circumpolar species and a very widely distributed species in Greenland. This fly turned out to be the most abundant, or at least the most spectacular, insect on heaths at this and other localities. Its host is unknown.

Later in our trip, from July 27th to August 5th, we collected at Dronning Maries Dal. There we were almost eaten alive by numerous mosquitoes, black flies and biting midges. One further tachinid was found: *Peleteria aenea* (Staeger), also known from Canada. It is a rather common and widespread species in Greenland. Females were found singly at altitudes of 300-400m, where they were apparently visiting flowers of thyme. Males were found in the lowland on small sandy patches where individuals were observed to "take stations" and "fight" for each sandy patch.

A total of 8 species of tachinids are known from Greenland, based on the large collection of insects from Greenland in the Zoologisk Museum (Copenhagen). Not all the species have been identified yet because specimens need to be compared with those of Canadian species. Though most of these species are believed rare, our collection of only two species from SE Greenland was fewer than we expected, even if one excludes from consideration the exclusively high-arctic species. The number of species of calliphorids (4) and butterflies (15) that we collected was also lower than expected. However, we found as many as 10 of a possible 13 species of syrphids. The factors limiting species numbers at the two localities we visited were apparently the high humidity (caused by the large amount of melting water) and the absence of ice-free high-alpine areas. The humid conditions were perhaps better tolerated by Syrphidae.

An extraordinary case of multiparasitism in tachinid flies (by R. Cortés)

While collecting all sorts of insects in the mesquite (*Prosopis* spp.) forest (22,000 Hás.) in the Pampa above Iquique (1,200 meters) close to the border with Perú, entomologist D. Bobadilla (Universidad de Tarapacá, Arica) was able to secure two fully grown larvae of the noctuid *Melipotis* sp., one with 25 macrotype eggs of *Euphorocera peruviana* Townsend (Exoristini) on its dorsum and the other with no less than 148 eggs of the parasitoid. The first host larva yielded two perfect adult tachinids of normal size, where as the second understandably yielded none at all. Both host larvae were protected, for pupation, in crevices under bark of mesquite (*Prosopis tamarugo* Philippi). Both examples were collected in the forest in January 1992.

This extraordinary case of multiparasitism does not seem to have been reported before, at least not in the texts and literature available here. It evidently reveals the inability of an ovipositing female of *E. peruviana* to detect that a prospective host larva is already parasitized and cannot possibly provide enough food for such an overwhelming number of parasitic eggs, ignoring the autocidal competition to survive that 148 eggs of the fly unavoidably would create.

An illustrated paper with photographs by D. Bobadilla will be published soon, describing in detail this unusual and aberrant case of multiparasitism in the Tachinidae. *Euphorocera* Townsend (1912) is a common genus in the Nearctic and Neotropical Regions. [Ed.: Bobadilla's paper was published in 1992; see bibliography.]

Studies on tachinids attacking the European earwig in central Europe (by Ulrich Kuhlmann)

At the request of the Kentville Research Station [Nova Scotia, Canada], the European Station of the IIBC [International Institute of Biological Control] started a survey of natural enemies of the European earwig (*Forficula auricularia*) in central Europe in 1989. This was the continuation of a programme in the 1960s, when the tachinid *Triarthria setipennis* was introduced and became established in Newfoundland, where it gave limited success according to G.M. Weaver. Weaver observed that no parasitoids were reared from the European earwig in Nova Scotia, where the earwig assumes economic importance because it infests cracks and crevices in leafy vegetables and fruit.

A total of 72,000 earwigs were collected from 10 regions in Germany, Austria, France and Switzerland from May to October, 1989-1991. These were reared for the presence of tachinid parasitoids, whose biology and ecology were studied. Two species of tachinids were found, and represent the only known parasitoids of the earwig in central Europe. The dominant earwig parasitoid, *Triarthria* (=*Digonochaeta*, *Bigonichaeta*) *setipennis* (Fallén) is an ovolarviparous species with relatively few eggs whose maggots emerge immediately after oviposition. The other tachinid, *Ocytata* (=*Rhacodineura*) *pallipes* (Fallén), is less abundant. It is oviparous and has a large number of microtype eggs that are deposited on host food plants. Both species have been successfully used in biological control programmes.

Females of *Triarthria setipennis* lay their eggs near the host. The maggot penetrates into the haemocoel through the intersegmental membranes of the abdomen. On average 235 eggs are laid by each female. Larval development is very variable, taking from 2 weeks to 2 months in summer. The puparia overwinter. In Europe there is one full and a partial second generation per year. Emergence of the spring generation of *T. setipennis* is distinctly bimodal, with colour dimorphism between the first and second peak. This observation and cross mating experiments cast doubt on a previous conclusion that these colour differences are seasonal dimorphisms and lends support to the existence of two species, *T. setipennis* (the dark form) and *T. spinipennis* (Meigen) (the light form). The release of both forms in Canada would have no adverse effect, as probably only the better-adapted species would survive.

The daily number and total number of eggs laid by *Ocytata pallipes* females varies widely. More than a thousand eggs are produced during a period of about 10 days. The average daily egg number was 110, the maximum was 573. The second instar larvae hibernate in the host. *Ocytata pallipes* has two generations per year over a wide range in Europe.

Methods to parasitize hosts experimentally were developed to obtain data on larval development and competition in super- and multiparasitized hosts, with the goal of improving mass rearing techniques for introduction of both parasitoids into Canada. Greater than 84% parasitism was obtained in experiments using larvae of *T. setipennis*, and 61% using microtype eggs of *O. pallipes*. There is still a problem with successful hibernation of parasitized earwigs; if this cannot be overcome, then the summer generation of tachinids must be used for shipment to and release in Canada.

Tachinid parasitoids of the green stink bug (by Gerardo Liljesthröm)

It is well known that correct identifications of parasitoids used in biological control programs is of great importance. Somatic characters used to identify species do not vary much in most tachinid groups, but tachinids of the tribe Trichopodini show significant amounts of variation.

When I began field work on tachinid parasitoids of the green stink bug *Nezara viridula* (a pest of soybean in Argentina), I had some difficulty with the taxonomic status of the parasitoids. I was not sure if I was dealing with one polymorphic species or a complex of different species, mainly because of different colour patterns of individuals as well as differences in the number of some bristles and the shape of a wing cell. The literature suggested a complex of different species, but the behaviour in the field suggested the first hypothesis was true.

Parasitoids of successive generations obtained in the laboratory from a couple of tachinids collected in the field, allowed me to compare the variability of character states used in taxonomic keys. I found variation in the size of individuals, colour patterns, number and size of bristles, shape of a wing cell and other important taxonomic characters, that deviated widely from the "mean". In contrast, male and female external genital structures did not vary.

After dissection and study of the genital structures of holotypes and other type specimens described as different species in Argentina, I concluded that I was working with one polymorphic species, properly named *Trichopoda giacomellii*.

Further study of many argentine specimens of 13

nominal species led me to conclude that they belonged to only 2 species: *T. giacomellii* and *Trichopoda arentinensis*, a supposed parasitoid of a coreid bug.

My current project concerns the population dynamics of *T. giacomellii* and a simulation model for the host - parasitoid system *N. viridula* - *T. giacomellii*.

New tachinid records (by Jaromír Vaňhara)

In previous years I collected tachinids in a floodplain forest area in southern Moravia (Czechoslovakia). During the summer of 1992, I visited some floodplain areas in western Europe. I collected tachinids in the area of Rhein (FRG-Rastatt) and in the area of Loire (Fr-Nevers). In the latter area, I worked for two weeks with syrphidologist Martin Speight of Dublin; we used Malaise traps for fly collecting, especially for tachinids for me. At the end of August 1992, while taking part in the conference of SOVE in Bologna, I visited Appenins too, where I collected tachinids during a one day trip.

From Czechoslovakian 1991 material I have the following interesting findings (with thanks for help with identifications to Prof. Rozkošný of Brno and Dr. Tschorsnig of Stuttgart). Unless otherwise indicated, all specimens were collected by myself in 1991.

Genera and species new to the fauna of former Czechoslovakia: *Chaetoptilia puella* (Rond.) - Pavlov Hills, Hostýn Hills, Brno-Soběšice; *Eloceria delecta* (Meig.) - Brno-Soběšice; *Ceranthia siphonoides* (Strobl) - Hostýn Hills; *Gymnosoma costata* (Panz.) - Lanžhot-floodplain forest; *Medina separata* (Meig.) - Hostýn Hills; *Nilea rufiscutellaris* (Zett.) - Lednice-floodplain forest, Brno-Útěchov.

Species new for the fauna of Czech Republic: *Catagonia aberrans* (Rond.) - Pavlov Hills; *Ceranthia abdominalis* (R.-D.) - Lednice and Lanžhot-floodplain forests; *Solieria vacua* (Rond.) - Lanžhot-floodplain forest; *Senometopia susurrans* (Rond.) - Mohelno steppe (leg. M. Černý, 1985).

Species new for Moravia: *Lithophasia hyalipennis* (Fall.) - Pavlov Hills; *Peribaea fissicornis* (Strobl) - Moravian Karst; *Phasia barbifrons* (Girsch.) - Hostýn Hills, Lanžhot-floodplain forest; *Thecocarcelia acutangulata* (Macq.) - Pavlov Hills.

Tachinid egg morphology (by Serge Gaponov)

I offer the descriptions of eggs of *Senometopia excisa* (Fallén) and *Phryxe nemea* (Meigen).

1. Egg of *Senometopia excisa* (Fallén): The tachinid *S. excisa* has macrotype eggs, length 0.72 mm, width 0.19 mm, height 0.29 mm. Eggs are oval and white. The dorsal surface of the chorion is slightly convex and has a clear polygonal network. The ridges of the polygons are thin, and elongated on the longitudinal axis. The aeropylar structure is situated approximately in the central part of the egg and is represented by a belt of 2-3 rows of crypts. Micropylar structure is conical and situated ventrally. This egg probably has full incubation in the uterus.

2. Egg of *Phryxe nemea* (Meigen): Egg is membranous, length 0.83 mm, width 0.56 mm. The chorion is thin, without a clear dividing line between dorsal and ventral parts, and has a polygonal structure with little multiple perforations of the plastron surface. The ridges of the polygons are rectilinear, and the polygonal cells are 3.5 times longer than wide. The aeropylar structure is situated on the anterior egg pole, slightly laterally. This zone contains 45-56 little respirative crypts. Due to the presence of the polygonal network, and structure of the plastron surface and aeropylar zone, this egg is similar to that of macrotype exoristine eggs.

Tachinid reprints available (by J. O'Hara)

Our Diptera Unit has multiple copies of the following systematic publications on the Tachinidae. The following are available free of charge to interested persons. Please request only those publications that are expected to be useful. With respect to "The tachinids of Trinidad", we have many copies of volumes III, IV, V, VI, VII, a few copies of volume II, very few copies of volume VIII, and no copies of volume I.

Curran, C.H. 1925. The American species of the tachinid genus *Peleteria* Desv. (Diptera). Trans. Roy. Soc. Canada **19** (Ser. 3): 225-257 + 2 pl.

Tothill, J.D. 1913. Tachinidae and some Canadian hosts. Can. Ent. **45**: 69-75.

Thompson, W.R. 1963. The tachinids of Trinidad. II. Echinomyiines, dexiines, and allies. Can. J. Zool. **41**: 335-576.

Thompson, W.R. 1963. The tachinids of Trinidad. III. The goniines with microtype eggs (Dipt. Tachinidae). Studia Entomologica **6**: 257-404.

Thompson, W.R. 1963. The tachinids of Trinidad. IV. Winthemiines. Can. Ent. **95**: 953-995.

Thompson, W.R. 1963. The tachinids of Trinidad. V. Siphosturmiines and masiphyiines. Can. Ent. **95**: 1292-1320.

Thompson, W.R. 1964. The tachinids of Trinidad.

VI. The larviparous goniines of the carceliine type (Diptera, Tachinidae). Studia Entomologica **7**: 97-151.

Thompson, W.R. 1965. The tachinids of Trinidad. VII. The larviparous goniines with broad cheeks (Dipt. Tachinidae). Studia Entomologica **8**: 353-434.

Thompson, W.R. 1968. The tachinids of Trinidad. VIII. Phorocerines. Mem. Ent. Soc. Canada **56**, 207 pp.

Tothill, J.D. 1921. A revision of the Nearctic species of the tachinid genus *Ernestia* R.D. (Diptera). Can. Ent. **53**: 199-205, 226-230, 247-252, 270-274.

Catalog of the Diptera of the Australasian and Oceanian Regions (by J. O'Hara)

This catalog, edited by Neal Evenhuis, was published in 1989 by Bishop Museum Press and E.J. Brill. Changes to the catalog, including updates based on recent publications, are published periodically in the newsletter **Pacific Basin Diptera News** (Neal Evenhuis, editor). Changes to Cantrell and Crosskey's Tachinidae chapter appeared in issue **5**, dated 1 April 1991 (pp. 5-6). These changes reflect the work of Cantrell (1989, *J. Aust. Entomol. Soc.* **28**: 93-104), O'Hara (1989, *Quaest. Ent.* **25**: 1-229), Shima (1988, *Bull. Kitakyushu Mus. Nat. Hist.* **8**: 1-37) and Shinonaga (1978, *Mem. Natl. Sci. Mus. Tokyo* **11**: 163-168). The catalog was reviewed recently by Jim O'Hara (1992, *The American Entomologist* **38**: 182-183).

PERSONAL NOTES

David Barraclough writes: I do not have much to report for 1992, although I co-authored a paper on the Afrotropical genus *Schizolinnaea* van Emden. *Schizolinnaea* was previously suspected to have bifid antennae in males (the species was described from females only) and the form and possible function of these antennae are discussed in this paper. The greater part of my doctoral thesis on the Australasian Dexiini was published on November 13, 1992, in the Australian journal *Invertebrate Taxonomy*, more than two years after the monograph was submitted for publication. I have attempted to include reference to recent literature to ensure that the work is up-to-date.

Brian Cantrell writes: My career continues to take me away from tachinids in a restructured Queensland Department of Primary Industries. I now hold the position of Chief, Plant Protection Systems, in the Division of Plant Protection. The Division is the result of the amalgamation of the previous Branches of Plant Pathology and Entomology. My brief is to facilitate the development of plant protection systems for different crops/commodities incorporating management techniques for both diseases and insects. It is an administrative post which leaves no room for research, although I am still called upon to identify tachinids for colleagues all over Australia.

Chao Chien-ming writes that his current tachinid projects are as follows: (1) Study of the biological control of *Crypotothelea variegata* Snellen using the tachinid *Nealsomyia rufella* Bezzi in the Shandong Province of China (1990-1993). This work will be finished in the first season of 1993. (2) Compilation of "Chinese Flies", including 30 families with more than 4000 species, among them the Tachinidae with 750 species. This book will be published within the next year. (3) Study of the action mechanism of tachinid flies in the natural control to the pine caterpillars *Dendrolimus punctatus* Walker and *D. tabulaeformis* Tsai et Liu (1993-1997). (4) Compilation of "Insect Fauna of China" (Tachinidae), Volume 1, Subfamily Exoristiinae containing 450 species. This work will be finished before July 1993.

Serge Gaponov writes: I have been investigating the egg morphology of tachinids during the past year. I have prepared papers on eggs of the Blondeliini and Winthemiini. I examined the eggs of *Oswaldia spectabilis* (Mg.), *Elomyia lateralis* (Mg.), *Gymnosoma (Stylogymnomyia) nitens* Mg. and *Strongygaster globula* (Mg.). One paper on the eggs of phasiines was published in 1992 [see bibliography].

Giuliana Giangiuliani writes: In 1992 I defended my Ph.D. thesis on "The Diptera Tachinidae adult parasitoid complex parasitizing *Nezara viridula* in Central Italy: biology, ecology, behavior and laboratory experiences of the two species *Trichopoda pennipes* and *Ectophasia crassipennis*." After that, I obtained a post-doctoral fellowship from the O.E.C.D. (Organization for Economic Co-operation and Development) to conduct research on the following topic: "Assessment of benefits and risks of introducing new organisms in agricultural practise." The specific topic of my research is "Evaluation and assessment of the host-parasitoid association *Nezara viridula* - *Trichopoda pennipes* in the Nearctic and Palearctic

zones." This research is coordinated by Prof. Heikki Hokkanen of Helsinki University. I have a large parasitoid colony in the laboratory and I can use the adults also for behavioral bioassays in a wind-tunnel.

I stayed a month in Gainesville, Florida, to collect the parasitoid and I would like to thank Dr. Heather McAuslane for her precious help.

Simon Grenier writes: I have completed, with Gérard Plantevin and Olivier Perru, a study about the polyploidy levels in *Pseudoperichaeta nigrolineata* (a parasitoid of the European corn borer, *Ostrinia nubilalis*). Modifications of the level were studied in salivary glands and Malphigian tubules during larval development, especially in relation to the arrest of development in diapausing hosts.

Bernard Pintureau and I are studying the genetic variability of *Lixophaga diaraeae* (a parasitoid of sugar cane borers) in relation to long term rearing in the laboratory, using the substitution host *Galleria mellonella*. Two papers are in press on this topic.

Benno Herting continues his work on the Dexiinae for Lindner's "Die Fliegen der palaearktischen Region". *Estheria* is substantially finished except for the descriptions of subgenera and the genus as a whole. The genera *Billaea* and *Dinera* must still be done. The Dexiinae will take at least another year to complete, after which work on the Phasiinae will resume.

Silvia Acosta Izquierdo: The tachinid fly *Lixophaga diatraeae* (Towns) has been used in Cuba for reducing the damage caused by the sugar cane borer, *Diatraea saccharalis* (Fab.). The larval parasitoid *Cotesia flavipes* (Cam.) (Braconidae) was introduced recently into Cuba from Brazil for the same purpose. Silvia has been studying the effects of competition between these two species in their host.

Ulrich Kuhlmann has been working on the biology and ecology of two tachinid flies parasitizing the European earwig, *Forficula auricularia*, for the past three years. Some of Ulrich's findings are mentioned above in a note about his work.

Gerardo Liljesthröm writes: I am interested in biological control and the dynamics of parasitoids (in particular, tachinids), and their host populations. I am still working with *Trichopoda giacomellii*.

Bhanu Nandi writes: I submitted two projects to the Government of West Bengal, India, one on calliphorid flies and another on tachinid flies. The short project on calliphorid flies has been sanctioned by the Government of West Bengal, Department of Science and Technology. There is a lot of work to be done on Indian tachinid flies especially on their taxonomy and biology. At present I am doing some collections from this area.

Jim O'Hara writes: I was busy most of 1992 writing a couple of revisions: one on the goniine genus *Frontiniella* Townsend (with new synonym Eufrontina Brooks) and the other on the Nearctic species of the siphonine genus *Ceromya* Robineau-Desvoidy. The *Ceromya* revision will likely appear in a special issue of *The Canadian Entomologist* being planned to honor the illustrious career of George E. Ball, recently retired from a professorship in the Department of Entomology at the University of Alberta. Myself and many other ex-students and friends of George Ball congregated in Edmonton last November for a systematics symposium arranged in George's honor. In December, I travelled to Washington to study specimens of the *Lypha*-group at the United States National Museum. From Washington I travelled to nearby Baltimore to attend the annual meeting of the Entomological Society of America, where I presented a talk on the life and scientific contributions of the 19th century naturalist, Henry Walter Bates, in a Bates Symposium. My systematic focus for the next few years will likely be the *Lypha*-group.

Thomas Pape writes: After two years in applied entomology, I am now back at the Zoological Museum as a research associate. I finally managed to finish a long overdue project on the family-level phylogeny of the Tachinidae family-group (Oestroidea) [see the Tachinid Bibliography]. Although the results are not at all definitive, I find it interesting that none of the characters used by previous authors for the corroboration of sister-group relationships between families came out as clearcut synapomorphies. Especially interesting is the suggestion of a sister-group relationship between the Tachinidae and the Sarcophagidae, and I should like to see this challenged by new characters and/or new interpretations of the characters and character states I have used.

At the moment, I am busy finishing several projects within the Sarcophagidae. My planned work on *Bezzimyia* is slowly taking shape, with several new specimens recently being sorted out by Norm Woodley

from highland Malaise trap samples in Costa Rica.

Stuart Reitz writes: I am continuing to study the behavior of *Eucelatoria* and its interactions with the host, *Helicoverpa zea*. One current project is examining how *E. bryani* alters the behavior of host larvae, where parasitized larvae begin their wandering/ burrowing behavior sooner than unparasitized larvae. Also, I am working on a comparison of the development of *E. bryani* and *E. rubentis* and interactions between the larvae of these two gregarious species in the same host. This work developed from an interest in how *Eucelatoria* females adjust clutch size in response to host quality and from Keisuke Iwao's note about larval competition in the **Tachinid Times** a couple of years ago.

Knut Rognes writes: I have not done any work on tachinids for a long time, except for occasional collecting (e.g. the summer of 1992 in Denmark). At present I am working on several projects concerning Calliphoridae: (1) Revision of the world *Pollenia* Robineau-Desvoidy and related genera, (2) Revision of *Melanodexia* Williston, a peculiar genus from the western United States, (3) The phylogeny of the Calliphoridae, where I am preparing the groundwork for a chapter on this family in a collective work on "Phylogenetic relationships of the Diptera" (editor Dr. Art Borkent), (4) Preparing a chapter on Calliphoridae in the recent project "Manual of European/Palearctic Diptera" (editors Pont, Papp, Darvas & Wood), and (5) Helping Thomas Pape with his newsletter OISTROS covering non-tachinid oestroid Diptera families. Sometimes I wonder how I shall be able to do all this difficult work besides my teaching duties. I find that many hours go into preparing drawings, and I have almost developed an obsession for the ovipositor, which gives much more taxonomic and phylogenetic information than has been realised in the past.

Claire Rutledge writes: Habitat location is an important step in the location of a host. Volatile chemicals from the host's host plant are often used to locate the habitat. Once the parasitoid has located the habitat of her host, she then searches either randomly for the host, or uses visual and contact chemical cues. By increasing the efficiency with which a parasitoid can find a host, we can increase the rate of parasitism. In my study I am attempting to increase the efficiency of host habitat location in *Eucelatoria bryani* by artificial selection.

Eucelatoria bryani is a tachinid parasitoid of the polyphagous and economically important genera *Heliothis* and *Helicoverpa*. It is attracted by the volatile chemicals of many of *Heliothis'* host plants. I am hoping to identify some of the chemicals important in this attraction. I have also hypothesized that individual females may have genetically based preferences for volatiles in certain host plants, and that I can increase the magnitude of these preferences by artificial selection. This would breed crop-specific and more efficient parasitoids. In my study I will breed *E. bryani* specific for tomato and bush beans. This study would be the first to artificially select for traits important to parasitism in a dipteran parasitoid.

Xuekui Sun writes: After having temporarily finished my research work on tachinids at the Institute of Zoology, Academia Sinica, Beijing, I began in fall of 1992 a Ph.D. program at the University of Guelph, Canada, under Steve Marshall. My Ph.D. thesis is entitled "Zoogeography and systematics of the genus *Phasia* Latreille (Diptera: Tachinidae, Phasiinae)". This genus is the largest in the subfamily Phasiinae, with about 86 valid species in the world. I would be very grateful for the loan of *Phasia* specimens for study.

Claude Thireau writes: We have greatly improved the laboratory rearing of *Actia interrupta* (Diptera: Tachinidae), a tachinid parasitoid of the spruce budworm *Choristoneura fumiferana*. We now have a method that provides a continuous supply of flies for experimental work, and the capability for large-scale rearing. We are accumulating a stock of 10,000 flies to introduce into western Québec in the spring of 1993, where the densities of overwintering spruce budworm have increased during the last five years (Insectes et maladies des arbres, published by Le Ministère des Forêts du Québec et Forêts Canada). This research is a part of J. Régnière's project at Forestry Canada. Our research focuses on the effect of parasitoid-budworm interactions on the population dynamics of the spruce budworm.

Peter Tschorsnig is nearing completion of his new key to the Central European Tachinidae. He and Joachim Ziegler found several interesting species of tachinids during a collecting trip last summer in the Spanish Pyrenees and French Alps.

Joachim Ziegler writes: During my holidays I collected in southwestern Turkey and, together with Peter Tschorsnig, in the Spanish Pyrenees and French

Alps. I continue my works on puparia, larval mouthparts, and the PARADOX databases.

TACHINID BIBLIOGRAPHY

Here, as usual, I list all the references I have been able to find during the past year that have some mention of tachinids in them. In addition to papers appearing in 1992 are other post-1980 publications that were not listed in previous issues of this newsletter.

The combined bibliography from all issues of **The Tachinid Times** is now approximately 1000 titles. Anyone wishing to have a copy of this bibliography in the form of a WordPerfect 5.1 file (283K) has only to send me a request for it and a 3.5" computer disk to copy the file to. I have available also a ProCite 2.01 file (1422K) with the tachinid bibliography from issues 1-5 of this newsletter, which includes tachinid and host names entered into a searchable field.

I would like to thank Thomas Pape for sharing his sarcophagid bibliography with me, which led to the inclusion of some references below that I would not have been aware of otherwise. If you notice titles missing from this bibliography, please bring them to my attention so I can include them next time.

Anonymous. 1988. Entomology. List of insects and mites. [In Dutch.] Verslagen en Mededelingen, Plantenziektenkundige Dienst, Wageningen, No. **166**: 56-97.

Acosta, S. and J. Rodriguez. 1987. Toxic effect of certain herbicides on *Lixophaga diatraeae* Towns (Diptera: Tachinidae). [In Spanish.] Revista INICA, No. **3**: 22-28.

Aldrich, J.R., Hoffmann, M.P., Kochansky, J.P., Lusby, W.R., Eger, J.E. and J.A. Payne. 1991. Identification and attractiveness of a major pheromone component for Nearctic *Euschistus* spp. stink bugs (Heteroptera, Pentatomidae). Environ. Entomol. **20**: 477-483.

Allen, A.A. 1992. *Mintho rufiventris* (Fall.) (Dipt.: Tachinidae) at Charlton, S.E. London. Entomologist's Record **104**: 23-24.

Allen, A.A. 1992. Some notable Diptera from Oxleas Wood SSSI, Shooters Hill, N.W. Kent. Entomologist's Record **104**: 265-271, 297-302.

Andersson, H. 1991. Modern classification of Swedish Diptera, with common names in Swedish for the native families. [In Swedish.] Entomologisk Tidskrift 112: 49-52. [Family name only.]

Atienne, J. 1981. Indirect action of the larval food of an alternative host *Galleria mellonella* (L.) (Lepidoptera, Galleriidae) on the reproductive possibilities of an entomophagous insect *Lixophaga diatraeae* (Towns) (Dipt. Tachinidae). [In French?] Karachi, Saad Publications, Translations Division, 8 leaves. [DNAL TRANSL 29613.]

Ballard, J.W.O., Olsen, G.J., Faith, D.P., Odgers, W.A., Rowell, D.M. and P.W. Atkinson. 1992. Evidence from 12S ribosomal RNA sequences that onychophorans are modified arthropods. Science **258**: 1345-1348.

Baltazar, C.R. 1990. An inventory of Philippine insects. I. Orders Neuroptera, Strepsiptera, Siphonaptera, Trichoptera and Diptera. College of Agriculture, University of the Philippines, Los Baños and National Academy of Science and Technology. xi + 730 pp.

Battu, G.S. and N. Ramakrishnan. 1989. Comparative role of various mortality factors in the natural control of *Spilosoma obliqua* (Walker) in northern India. J. Entomol. Res. **13**: 38-42.

Bayram, S. and N. Kilincer. 1987. Some changes in the blood cells of larvae of *Agrotis segetum* (Den.-Schiff.) (Lepidoptera: Noctuidae) parasitized by *Periscepsia carbonaria* (Panz.) (Diptera: Tachinidae). [In Turkish.] Turkiye I. Entomoloji Kongresi Bildirileri, 13-16 Ekim 1987, Ege Universitesi, Bornova, Izmir: 437-446.

Bayram, S. and N. Kilincer. 1987. Investigations on the development of *Periscepsia carbonaria* (Panz.) (Diptera: Tachinidae) in the larvae of *Agrotis segetum* (Den-Schiff.) (Lepidoptera: Noctuidae). [In Turkish.] Turkiye I. Entomoloji Kongresi Bildirileri, 13-16 Ekim 1987, Ege Universitesi, Bornova, Izmir: 521-530.

Belshaw, R. 1992. Tachinid (Diptera) assemblages in habitats of a secondary succession in southern Britain. The Entomologist **111**: 151-161.

Betbeder-Matibet, M. 1990. Rearing of some species of the genus *Chilo* and of some of their parasites for biological control of borers of the Gramineae in Africa. [In French.] Insect Science and its Application **11**: 617-623.

Bidlack, D.S., Grant, J.F. and C.D. Pless. 1991. Seasonal incidence of larvae of the tobacco budworm and corn earworm, and their parasitoids, on tobacco in eastern Tennessee. Jour. Agric. Ent. **8**: 155-162.

Biever, K.D., Chauvin, R.L., Reed, G.L. and R.C. Wilson. 1992. Seasonal occurrence and abundance of lepidopterous pests and associated parasitoids on collards in the northwestern United States. J. Entomol. Sci. **27**: 5-18.

Blackith, R.M. and R.E. Blackith. 1991. *Napomyza lateralis*, *Phytomyza anemones, Calamancosis aprica*, *Rhegmoclema coxendix, Blondelia nigripes*, *Macquartia grisea*, *Medina luctuosa* and *Voria ruralis*, flies (Diptera) new to Ireland. The Irish Naturalists' Journal **23**: 504-505.

Bobadilla, D. 1992. Insolito caso de superparasitismo en taquínidos (Diptera: Tachinidae). Acta Ent. Chilena **17**: 241-245.

Bonnot, G., Grenier, S., Delobel, B. and J. Guillaud. 1991. Comparison of body composition of 3 tachinids (*Phryxe caudata*, *Lixophaga diatraeae* and *Pseudoperichaeta nigrolineata*) growing on the same host: *Galleria mellonella*: comparative study of nutritional needs. Redia **74**: 453-455. [Insect Parasitoids, 4th European Workshop, Perugia April 3-5, 1991.]

Braman, S.K. and K.V. Yeargan. 1990. Phenology and abundance of *Nabis americoferus*, *N. roseipennis*, and *N. rufusculus* (Hemiptera: Nabidae) and their parasitoids in alfalfa and soybean. Jour. Econ. Ent. **83**: 823-830.

Braman, S.K. and K.V. Yeargan. 1991. Reproductive strategies of primary parasitoids of the green cloverworm (Lepidoptera: Noctuidae). Environ. Entomol. **20**: 349-353.

Bratti, A. and W. Costantini. 1991. Effects of new artificial host diets on the host-parasitoid system *Galleria mellonella* L. (Lepidoptera Galleriidae) — *Archytas marmoratus* Town. (Diptera Tachinidae). Redia **74**: 445-448. [Insect Parasitoids, 4th European Workshop, Perugia April 3-5, 1991.]

Bratti, A. and W.C. Nettles, Jr. 1992. *In vitro* rearing of *Eucelatoria bryani*: improvements and evaluation of factors affecting efficiency. Entomol. exp. appl. **63**: 213-219.

Bratti, A., Nettles, W.C., Jr. and P. Fanti. 1992. Influence of *Helicoverpa zea* (Lepidoptera: Noctuidae) age during the last instar on rates of parasitization by the larval-pupal parasitoid, *Archytas marmoratus* (Diptera: Tachinidae). Environ. Entomol. **21**: 1196-1201.

Bueno, V.H.P. and A.I.A. Fraga. 1988. Parasitoids associated with *Eueides isabella dianasa* (Cramer, 1782) (Lepidoptera: Heliconiini) in passion fruit and aspects of the biology of *Tetrastichus* sp. (Hymenoptera, Eulophidae). [In Portuguese.] Turrialba **38**: 83-86.

Campadelli, G. and G. Gardenghi. 1990. Biological notes on *Billaea triangulifera* Zett. (Dipt. Tachinidae), a parasitoid of *Saperda scalaris* L. (Col. Cerambycidae). [In Italian.] Boll. Ist. Entomol. "Guido Grandi", Univ. Bologna **45**: 182-189.

Campadelli, G. and M. Zanotti. 1990. Effects of collective and individual parasitization techniques in the system *Galleria mellonella* L. — *Pseudogonia rufifrons* Wied. [In Italian.] Boll. Ist. Entomol. "Guido Grandi", Univ. Bologna **45**: 101-108.

Chandra, J. and P.N. Avasthy. 1988. Biological behaviour of *Sturmiopsis inferens* Towns., an indigenous parasite of moth borers of sugarcane. Indian Journal of Agricultural Research **22**: 85-91.

Chandra, J. and P.N. Avasthy. 1988. Effect of temperature variations on survival and development of *Sturmiopsis inferens* Tns. during winter months. Indian Journal of Agricultural Research **22**: 159-163.

Charlet, L.D. 1992. Seasonal abundance and parasitism of the sunflower beetle (Coleoptera: Chrysomelidae) on cultivated sunflower in the Northern Great Plains. Jour. Econ. Ent. **85**: 766-771.

Clemons, L. 1992. *Litophasia hyalipennis* (Fallen) (Dip.: Tachinidae) in Kent. Entomol. Rec. J. Var. **104**: 201-202.

Colless, D.H. and D.K. McAlpine. 1991. Diptera (flies). Pp. 717-786. *In* The insects of Australia. A textbook for students and research workers. Second edition. Melbourne University Press, Carlton, Victoria. Volume 2, pp. 543-1137.

Cortés, R. 1992. Nuevas sinonimias de taquínidos chilenos (Diptera: Tachinidae). Acta Ent. Chilena **17**: 235-236.

Culin, J.D. 1992. Pupal cell construction by *Helicoverpa zea* (Boddie) (Lepidoptera: Noctuidae) parasitized by *Archytas marmoratus* (Townsend) or *Eucelatoria bryani* Sabrosky (Diptera: Tachinidae). J. Agric. Entomol. **9**: 65-72.

David, H., Easwaramoorthy, S., Kurup, N.K., Shanmugasundaram, M. and G. Santhalakshmi. 1989. A simplified mass culturing technique for *Sturmiopsis inferens* Tns. J. Biol. Control **3**: 1-3.

Draber-Mońko, A. 1991. Scathophagidae - Nycteribiidae. Pp. 231-268. *In* Razowski, J., ed., Checklist of animals of Poland. Volume II. 342 pp. Wroclaw, Poland.

Easwaramoorthy, S., David, H., Shanmugasundaram, M. and S. Santhalakshmi. 1991. Seasonal occurrence of the tachinid parasite *Sturmiopsis inferens* Tns. in the sugarcane agroecosystem. J. Biol. Control **5**: 1-3.

Eggleton, P. and K.J. Gaston. 1992. Tachinid host ranges: a reappraisal (Diptera: Tachinidae). Entomologist's Gazette **43**: 139-143.

Elkinton, J.S., Gould, J.R., Ferguson, C.S., Liebhold, A.M. and W.E. Wallner. 1990. Experimental manipulation of gypsy moth density to assess impact of natural enemies. Pp. 275-287. *In* Watt, A.D., Leather, S.R., Hunter, M.D. and N.A.C. Kidd, eds., Population dynamics of forest insects. Intercept, Andover, UK. 408 pp.

Engelmark, R. and T.-B. Engelmark. 1989. The calyptrate fly fauna (Diptera, Calyptratae) of three fens near Jokkmokk in Swedish Lapland. [In Swedish.] Ent. Tidskr. **110**: 81-95.

Fanti, P. 1990. Hormonal factors triggering the first larval molt of the parasitoid *Pseudogonia rufifrons* Wied. (Diptera Tachinidae) reared *in vivo* and *in vitro*. [In Italian.] Boll. Ist. Entomol. "Guido Grandi", Univ. Bologna **45**: 47-59.

Fanti, P. and A. Bratti. 1991. *In vitro* rearing of the larval stages of the parasitoid *Pseudogonia rufifrons* Wied. (Diptera Tachinidae): preliminary results. Redia **74**: 449-452. [Insect Parasitoids, 4th European Workshop, Perugia April 3-5, 1991.]

Farinets, S.I. and M.N. Mat'kovskiy. 1992. Tachinidae (Diptera) as parasites of leaf-beetles (Coleoptera, Chrysomelidae) of Transcarpathia. Ent. Rev. **71**(3): 72-73.

Farrar, R.R., Jr., Kennedy, G.G. and R.K. Kashyap. 1992. Influence of life history differences of two tachinid parasitoids of *Helicoverpa zea* (Boddie) (Lepidoptera: Noctuidae) on their interactions with glandular trichome/ methyl ketone-based insect resistance in tomato. J. Chem. Ecol. **18**: 499-515.

Finch, S. 1990. The effectiveness of traps used currently for monitoring populations of the cabbage root fly (*Delia radicum*). Annals of Applied Biology **116**: 447-454.

Gallo, D. 1981. Rearing of *Paratheresia claripalpis* van der wulp, 1896 (Diptera, techinidae) on larvae of *Galleria mellonella* (Linnaeus, 1758) (Lep., Galleriidae). [In Portuguese?] Karachi, Saad Publications, Translations Division, 6 leaves. [DNAL TRANSL 29692.]

Ganchev, G. 1981. Species composition and distribution of parasites of gypsy moth from family Tachinidae (Dipt.) and their hyperparasites. [In Bulgarian?] Cairo, ESDUCK, 8 leaves. [DNAL TRANSL 30743.]

Gaponov, S.P. 1992. Macrotype eggs of phasiins [sic] of the genera *Gymnosoma*, *Heliozeta*, *Clytiomyia*, *Subclytia*, *Cistogaster* and *Ectophasia*. [In Russian.] Zoologichesky Zhurnal **71**(7): 23-28.

Gerding, M. and A. Figueroa. 1989. *Hyalomyodes triangulifera* Loew (Diptera: Tachinidae), parasitoid of *Bruchus pisorum* L. [In Spanish.] Agricultura Tecnica Santiago **49**: 69-70.

Goicoechea, J.L. and J. Aleman. 1988. Relationship between pupal colouration and morphological characters of *Lixophaga diatraeae*. [In Spanish.] Revista de Proteccion Vegetal **3**: 132-136.

González, C.R. 1992. Generos Cuphocerinos de taquínidos chilenos (Diptera: Tachinidae: Cuphocerini). Acta Ent. Chilena **17**: 53-68.

González, C.R. 1992. Taquínidos de la Reserva National de Río Clarillo (Diptera: Tachinidae). Acta Ent. Chilena **17**: 175-185.

González, C.R. and A. Henry. 1992. El genero Neotropical *Incamyia* Townsend, 1912 en Chile, con una clave para sus especies (Diptera: Tachinidae: Blondeliini). An. Mus. Hist. Nat. Valparaíso **20**: 35-39.

Gould, J.R., Elkinton, J.S. and T.M. Odell. 1992. Superparasitism of gypsy moth, *Lymantria dispar* (L.) (Lepidoptera: Lymantriidae), larvae by *Parasetigena silvestris* (Robineau-Desvoidy) (Diptera: Tachinidae). Can. Ent. **124**: 425-436.

Gould, J.R., Elkinton, J.S. and R.G. Van Driesche. 1992. Suitability of approaches for measuring parasitoid impact on *Lymantria dispar* (Lepidoptera: Lymantriidae) populations. Environ. Entomol. **21**: 1035-1045.

Gould, J.R., Elkinton, J.S. and W.E. Wallner. 1990. Density-dependent suppression of experimentally created gypsy moth, *Lymantria dispar* (Lepidoptera: Lymantriidae), populations by natural enemies. J. Anim. Ecol. **59**: 213-234.

Grenier, S. and G. Plantevin. 1991. Action of an insect growth regulator, fenoxycarb, on the parasitoid *Pseudoperichaeta nigrolineata* (Diptera, Tachinidae). Redia **74**: 425-431. [Insect Parasitoids, 4th European Workshop, Perugia April 3-5, 1991.]

Guerra-Sobrevilla, L. 1991. Parasitoids of the grapeleaf skeletonizer, *Harrisina brillians* Barnes and McDunnough (Lepidoptera: Zygaenidae) in northwestern Mexico. Crop Protection **10**: 501-503.

Gupta, M., Murthy, K.R.K. and A.D. Pawar. 1988. Response of egg and larval parasites of *Heliothis armigera* (Hb) to pyrethroids. Plant Protection Bulletin Faridabad **40**: 37-39.

Hackman, W. and R. Väisänen. 1986. Viewpoints on the classification of the calyptrate flies based on the costal chaetotaxy. [In Swedish.] Ent. Tidskr. **107**: 7-9.

Hagley, E.A.C. and D.R. Barber. 1991. Foliage-feeding Lepidoptera and their parasites recovered from unmanaged apple orchards in southern Ontario. Proc. Ent. Soc. Ont. **122**: 1-7.

Häussler, D. 1990. Der Kiefernknospentriebwickler (*Rhyacionia buoliana* Den. & Schiff.). Merkblatt - Institut für Fortswissenschaften Eberswalde **48**, 13 pp.

Hepburn, H.R. 1991. Incidence of the tachinid bee fly, *Rondaniooestrus apivorus*, in southern Africa. J. ent. Soc. sth. Afr. **54**: 84-85.

Hébert, C. and C. Cloutier. 1990. Host instar as a determinant of preference and suitability for two parasitoids attacking late instars of the spruce budworm (Lepidoptera: Tortricidae). Ann. Ent. Soc. Amer. **83**: 734-741.

Hokkanen, H. 1986. Polymorphism, parasites, and the native area of *Nezara viridula* (Hemiptera, Pentatomidae). Annales Entomologici Fennici **52**: 28-31.

Hubenov, Z.K. 1992. Artenbestand, Höhenverbreitung und zoogeographische Charakteristik der Familie Tachinidae (Diptera) aus dem Piringebirge. Acta Zoologica Bulgarica **44**: 3-17.

Hubenov, Z.K. 1992. Systematische Liste der bulgarischen Raupenfliegen (Diptera, Tachinidae). Acta Zoologica Bulgarica **45**: 63-71.

Humble, L.M., Shepherd, R.F. and T.F. Maher. 1989. Biology, outbreak characteristics and damage caused by the black army cutworm (Lepidoptera: Noctuidae). Pp. 82-88. *In* Alfaro, R.I. and S.G. Glover, eds., Insects affecting reforestation: biology and damage. Forestry Canada, Victoria.

Hsu, Y.-f. and J.A. Powell. 1992. *Hemihyalea edwardsii* (Parkard) (Lepidoptera: Arctiidae) is the host of *Paradejeania rutilioides* (Jaennicke) (Diptera: Tachinidae) in central coastal California. Pan-Pacific Entomologist **68**: 64-65.

Inque, T., Kato, M., Kakutani, T., Suka, T. and T. Itino. 1990. Insect-flower relationship in the temperate deciduous forest of Kibune, Kyoto: an overview of the flowering phenology and the seasonal pattern of insect visits. Contr. biol. Lab. Kyoto Univ. **27**: 377-463.

Jacobson, N.L. 1991. Parasitoid and larval food plant records for three Peruvian moths (Arctiidae, Saturniidae). Jour. Lep. Soc. **45**: 173-175.

Jalali, S.K. Singh, S.P., Kumar, P. and C.R. Ballal. 1989. New record of hyperparasitoids on *Campoletis chloridae* Uchida and *Eucelatoria bryani* Sabrosky parasitizing *Heliothis armigera* (Hubner) on tomato. Current Science **58**: 326-327.

Janzen, D.H. 1988. Ecological characterisation of a Costa Rica dry forest caterpillar fauna. Biotropica **20**: 120-135.

Jones, W.A. 1988. World review of the parasitoids of the southern green stink bug, *Nezara viridula* (L.) (Heteroptera: Pentatomidae). Ann. Ent. Soc. Amer. **81**: 262-273.

Joshi, K.C., Gurung, D. and P.C. Sarma. 1988. Some observations on the bionomics of *Trabala vishnou* Lef. (Lepidoptera Lasiocampidae) - a pest of *Eucalyptus* spp. in Assam. Jour. Trop. Forestry **4**: 285-289.

Kakutani, T., Inque, T., Kato, M. and H. Ichihashi. 1990. Insect-flower relationship at the campus of Kyoto University, Kyoto: an overview of the flowering phenology and the seasonal pattern of insect visits. Contr. biol. Lab. Kyoto Univ. **27**: 465-521.

Kanmiya, K. 1987. New records of endoparasitic Nemestrinidae and Tachinidae (Diptera) on Tettigoniidae. [In Chinese.] Makunagi/Acta Dipterologia **15**: 1-4.

Kato, M., Kakutani, T., Inque, T. and T. Itino. 1990. Insect-flower relationship in the primary beech forest of Ashu, Kyoto: an overview of the flowering phenology and the seasonal pattern of insect visits. Contr. biol. Lab. Kyoto Univ. **27**: 309-375.

Kearns, C.A. 1992. Anthophilous fly distribution across an elevation gradient. Amer. Midl. Nat. **127**: 172-182.

Kfir, R. 1991. Selecting parasites for biological control of lepidopterous stalk borers in summer grain crops in South Africa. Redia **74**: 231-236. [Insect Parasitoids, 4th European Workshop, Perugia April 3-5, 1991.]

Kfir, R., Graham, D.Y. and R. van Vuuren. 1989. An improved method for mass rearing *Paratheresia claripalpis* for biological control of lepidopteran stalk borers. Entomol. Exp. Appl. **51**: 37-40.

Krieg, A. and A.M. Huger. 1987. The causative agent of a bacteriosis in the parasite-host system *Ernestia consobrina*/*Mamestra brassicae*: *Serratia liquefaciens*. [In German.] Nachrichtenblatt des Deutschen Pflanzenschutzdienstes **39**: 132-134.

Kulikova, N.A. 1987. Evolutionary trends of the oral disc in Calyptrates. Pp. 64-65. *In* Skarlato, O.A., ed., Two-wingled [sic!] insects: systematics, morphology and ecology. [In Russian.] Zoological Institute, AN SSSR. 156 pp.

Kumar, P., Kishore, R., Jayaprakas, C.A. and K. Sengupta. 1991. Parasitoids of uzi fly, *Exorista sorbillans* Wiedemann (Diptera: Tachinidae): XIII. Studies on the efficiency of *Nesolynx thymus* (Girault) at the field level. Indian J. Seric. **30**: 161-164.

Kumar, P., Kishore, R. and K. Sengupta. 1991. Parasitoids of uzi fly, *Exorista sorbillans* Wiedemann (Diptera: Tachinidae): XV. Comparative efficiency of three hymenopteran parasitoids. Indian J. Seric. **30**: 165-166.

Kusigemati, K. 1991. Parasites of the alfalfa weevil, *Hypera postica*, in Japan, with description of a new ichneumonid species (Hymenoptera: Ichneumonidae, Chalcididae and Pteromalidae; Diptera: Tachinidae). AKITU, New Series **125**: 1-13.

Laub, C.A. and J.M. Luna. 1992. Winter cover crop suppression practices and natural enemies of armyworm (Lepidoptera: Noctuidae) in no-till corn. Environ. Entomol. **21**: 41-49.

Lavrukh, O.V. and L.G. Rogochaya. 1992. Abundance and species composition of tachinid flies (Diptera, Tachinidae) in plantings in and around Kiev. Ent. Rev. **71**(3): 11.

Liang, E.-y. and C.-m. Chao. 1992. On the genus *Exorista* Meigen from China (Diptera: Tachinidae). [In Chinese.] Acta zootax. sin. **17**: 206-223.

Liang, E.-y. and C.-m. Chao. 1992. On the genus *Neophryxe* Townsend from China (Diptera: Tachinidae). [In Chinese.] Acta zootax. sin. **17**: 224-226.

Liljesthröm, G. 1985. Respuestas de *Trichopoda giacomellii* (Blanchard, 1966) (Diptera, Tachinidae) a variaciones de densidad de *Nezara viridula* (L.) (Hemiptera, Pentatomidae). Revista Soc. ent. argent. **44**: 161-167. [Published in 1987.]

Liljesthröm, G. 1991. Selectividad del parasitoide *Trichopoda giacomellii* (Blanchard) (Diptera: Tachinidae) hacia individuos de *Nezara viridula* (L) (Hemiptera: Pentatomidae) que difieren en el estado de desarrollo, sexo, edad y patrones de coloración. Ecología Austral **1**: 41-49.

Lopez, R., Ferro, D.N. and R.G. van Driesche. 1992. Overwintering biology of *Myiopharus aberrans* and *Myiopharus doryphorae* (Dipt.: Tachinidae) larval parasitoids of the Colorado potato beetle. Entomophaga **37**: 311-315.

Losey, J.E., Song, P.Z., Schmidt, D.M., Calvin, D.D. and D.J. Liewehr. 1992. Larval parasitoids collected from overwintering European corn borer (Lepidoptera: Pyralidae) in Pennsylvania. Jour. Kans. Ent. Soc. **65**: 87-90.

Lucchi, A., Giangiuliani, G. and S.B. Vinson. 1991. Feather legged fly (FLF) *Trichopoda pennipes* F. (Diptera: Tachinidae): a S.E.M. preliminary study on antennal sensilla possibly involved in detection of host and plant volatiles. Redia **74**: 373-374. [Insect Parasitoids, 4th European Workshop, Perugia April 3-5, 1991.] [Ed. note: No SEM's in publication!]

Luciano, P. and R. Prota. 1982. Investigations on the parasitism of forest areas of high density of *Lymantria dispar* L. (Tachinidae, Quercus, Sardinia). [In Italian.]

Studi Sassar Sez III, Sassari, Facolta di agraria dell'Universita di Sassari 1980/1981, **28**: 153-167.

Lukasheva, N.V. 1992. On xylophilic flies (Diptera Cyclorrhapha) of Teberda Reserve. Ent. Rev. **71**(3): 14-16.

Madrigal, C.A. 1989. A critical view of forest pest management in Colombia. [In Spanish.] Crónica Forestal y del Medio Ambiente **7**: 43-57.

Maier, K. 1990. Beitrag zur Biologie primärer und sekundärer Parasitoide von *Lymantria dispar* L. (Lep., Lymantriidae). J. Appl. Ent. **110**: 167-182.

Maini, S. and G. Burgio. 1990. The parasitoids of *Ostrinia nubilalis* (Hb.) in Emilia Romagna. [In Italian.] Informatore Fitopatologico **40**: 19-28.

Mamedov, Z.M. 1988. Parasitoids of the brown-tail moth (*Euproctis chrysorrhoea* L.) and the gypsy moth (*Lymantria dispar* L.) in orchards of Azerbaidzhan. [In Russian.] Izvestiya Akademii Nauk Azerbaidzhanskoi SSR, Biologicheskikh Nauk **4**: 75-77.

Martin, W.R., Jr., Nordlund, D.A. and W.C. Nettles, Jr. 1992. Parasitization of *Helicoverpa zea* (Lepidoptera: Noctuidae) by *Palexorista laxa* (Diptera: Tachinidae): influence of host developmental stage on host suitability and progeny production. J. Entomol. Sci. **27**: 164-171.

McCutcheon, G.S. 1991. Late-season parasitoids of the fall armyworm in South Carolina. J. Agric. Entomol. **8**: 219-221.

Mills, N.J. 1990. Are parasitoids of significance in endemic populations of forest defoliators? Some experimental observations from gypsy moth, *Lymantria dispar* (Lepidoptera: Lymantriidae). Pp. 265-274. *In* Watt, A.D., Leather, S.R., Hunter, M.D. and N.A.C. Kidd, eds., Population dynamics of forest insects. Intercept, Andover, UK. 408 pp.

Mills, N.J., Fischer, P. and W.D. Glanz. 1986. Host exposure: a technique for the study of gypsy moth larval parasitoids under non-oubreak conditions. Proc. 18th IUFRO World Congr., Vol. II, Div. 2, pp. 777-785.

Mills, N.J. and V.G. Nealis. 1992. European field collections and Canadian releases of *Ceranthia samarensis* (Dipt.: Tachinidae), a parasitoid of the gypsy moth. Entomophaga **37**: 181-191.

Milward-de-Azevedo, E.M.V., Guimarães, J.H. and J.R.P. Parra. 1991. Biological aspects of *Archytas incertus* (Diptera, Tachinidae) and their interrelations with *Spodoptera frugiperda* (Lepidoptera, Noctuidae). 2. Parasitary rate and inoculation site in the host's body. [In Portuguese.] Rev. Bras. Entomol. **35**: 499-507.

Milward-de-Azevedo, E.M.V. and J.R.P. Parra. 1991. Biological aspects of *Archytas incertus* (Diptera, Tachinidae) and their interrelations with *Spodoptera frugiperda* (Lepidoptera, Noctuidae). 3. Temperature influence in the parasitoids ontogeny. [In Portuguese.] Rev. Bras. Entomol. **35**: 509-516.

Milward-de-Azevedo, E.M.V., Parra, J.R.P. and J.H. Guimarães. 1991. Biological aspects of *Archytas incertus* (Diptera, Tachinidae) and their interrelations with *Spodoptera frugiperda* (Lepidoptera, Noctuidae). 4. Synchronism. [In Portuguese.] Rev. Bras. Entomol. **35**: 517-520.

Milward-de-Azevedo, E.M.V., Parra, J.R.P. and J.H. Guimarães. 1991. Biological aspects of *Archytas incertus* (Diptera, Tachinidae) and their interrelations with *Spodoptera frugiperda* (Lepidoptera, Noctuidae). 5. Reproductive stage and longevity. [In Portuguese.] Rev. Bras. Entomol. **35**: 521-530.

Milward-de-Azevedo, E.M.V., Parra, J.R.P., Guimarães, J.H. and R.D.P. Almeida. 1991. Biological aspects of *Archytas incertus* (Diptera, Tachinidae) and their interrelations with *Spodoptera frugiperda* (Lepidoptera, Noctuidae). 1. Rearings methodology and the determination of the most adequate instar for the parasitoid production. [In Portuguese.] Rev. Bras. Entomol. **35**: 485-497.

Newton, A.F., Thayer, M.K. and C.W. Sabrosky. 1992. Case 2786. Tachinidae Fleming, 1821 (Insecta, Coleoptera) and Tachinidae Robineau-Desvoidy, 1830 (Insecta: Diptera): proposed removal of homonymy, and Tachyporidae MacLeay, 1825 (Insecta, Coleoptera): proposed precedence over Tachinusidae Fleming, 1821. Bull. zool. Nom. **49**: 122-126.

Nishida, G.M., editor. 1992. Hawaiian terrestrial arthropod checklist. Bishop Museum Press, Honolulu. viii + 262 pp.

O'Hara, J.E. and B.E. Cooper. 1992. Revision of the Nearctic species of *Cyzenis* Robineau-Desvoidy (Diptera: Tachinidae). Can. Ent. **124**: 785-813.

Panizzi, A.R. 1988. Parasitism by *Eutrichopodopsis nitens* (Diptera: Tachinidae) of *Nezara viridula* (Hemiptera: Pentatomidae) on different host plants. [In Portuguese.] Documentos, Centro Nacional de Pesquisa de Soja, EMBRAPA **1988**: 82-83.

Panizzi, A.R. and F. Slansky, Jr. 1985. *Piezodorus guildinii* (Hemiptera: Pentatomidae): an unusual host of the tachinid *Trichopoda pennipes*. Florida Entomologist **68**: 485-486.

Pape, T. 1992. Phylogeny of the Tachinidae family-group. Tijdschrift voor Entomologie **135**: 43-86.

Parra, J.R.P., Aguilar, J.A.D. and P.S.M. Botelho. 1989. Effect of high temperatures on *Diatraea saccharalis* (Fabr., 1794) and its natural enemies. [In Portuguese.] Revista de Agricultura Piracicaba **64**: 147-162.

Peigler, R. 1989. A revision of the Indo-Australian genus *Attacus*. The Lepidoptera Research Foundation, Inc., Beverly Hills, California. xi + 167 pp.

Peng, R.K., Sutton, S.L. and C.R. Fletcher. 1992. Spatial and temporal distribution patterns of flying Diptera. Journal of Zoology, London **228**: 329-340.

Peter, C., Nagarkatti, S. and K.P. Jayanth. 1987. Parasites of *Bessa remota* Aldrich. FAO Plant Protection Bulletin **35**: 63.

Poinar, G.O., Jr. 1992. Life in amber. Stanford

University Press, Stanford, California. 350 pp.

Quezada, J.R. and A. Rodriguez. See Rutilio-Quezada, J. and A. Rodriguez.

Rao, R.S.N. and S.V.V. Satyanarayana. 1989. Studies on *Peribaea orbata* Wied. (Diptera-Tachinidae), a larval parasite of tobacco caterpillar *Spodoptera litura* F. Tobacco Research **15**: 1-4.

Richter, V.A. 1987. New host of the Arctic tachinid *Chaetogena gelida* Coq. (Diptera, Tachinidae). [In Russian.] Vestnik Zoologii **1987**(5): 86.

Richter, V.A. 1988. New Palearctic genera and species of tachinids (Diptera, Tachinidae). [In Russian.] Systematika Nasekomikh i Kleshchei **70**: 202-212.

Richter, V.A. 1991. A new tribe, new and little known species of the tachinid flies (Diptera, Tachinidae) of the fauna of the USSR. [In Russian.] Entomol. Obozr. **70**: 229-246. [English translation in Ent. Rev. **70**(8): 133-150, 1992.]

Riggin, T.M., Wiseman, B.R., Isenhour, D.J. and K.E. Espelie. 1992. Incidence of fall armyworm (Lepidoptera: Noctuidae) parasitoids on resistant and susceptible corn genotypes. Environ. Entomol. **21**: 888-895.

Robert, D., Amoroso, J. and R.R. Hoy. 1992. The evolutionary convergence of hearing in a parasitoid fly and its cricket host. Science **258**: 1135-1137.

Robertson, J.A. 1988. Descriptions of the immatures of *Typocerus serraticornis* (Coleoptera: Cerambycidae), and new observations on biology, including 'varnish' production and usage by the larva. Pan-Pacific Ent. **64**: 228-242.

Roland, J. and K.E. Denford. 1991. Identification and use of volatile plant compounds for the enchancement of biological control by *Cyzenis albicans* (Tachinidae). Redia **74**: 135-141. [Insect Parasitoids, 4th European Workshop, Perugia April 3-5, 1991.]

Rozkošný, R. and J. Vaňhara. 1992. Diptera (Brachycera) of the agricultural landscape in southern Moravia. Acta Sc. Nat. Brno **26**(4): 1-62.

Rutilio-Quezada, J. and A. Rodriguez. 1988. Larvae of *Rothschildia orizaba* (Lepidoptera: Saturniidae) on coffee, an experiment in integrated pest control. [In Spanish.] Actividades en Turrialba **16**: 9-13.

Rutilio-Quezada, J. and A. Rodriguez. 1989. Outbreak of larvae of *Rothschildia orizaba* (Lepidoptera: Saturniidae) in coffee, an experiment in integrated pest control. [In Spanish.] Manejo Integrado de Plagas **12**: 21-32.

Salles, L.A.B. 1991. Aspects of *Trichopoda pennipes* (Fabricius) (Diptera: Tachinidae) oviposition and its relation to parasitization on the adults of *Nezara viridula* (Linnaeus) (Heteroptera: Pentatomidae). Pesq. agropec. bras., Brasília **26**: 39-44.

Salles, L.A.B. 1992. Effect of *Trichopoda pennipes* parasitization on *Nezara viridula*. Pesq. agropec. bras., Brasília **27**: 981-986.

Salles, L.A.B. 1992. Relation between body size of host and the parasitoid developed, a case study: *Nezara viridula* (Linnaeus, 1758) (Hemiptera: Pentatomidae), and *Trichopoda pennipes* Fabricius, 1794 (Diptera: Tachinidae). [In Portuguese.] An. Soc. Entomol. Bras. **21**: 175-185.

Samoedi, D. 1989. The impacts of mass liberation of *Diatraeophaga striatalis* Towns. on population and intensity of infestation of sugar cane moth-borer, *Chilo auricilius* Dudg. in central Java. Gula Indonesia **15**: 46-48.

Santos, G.P., Anjos, N. and J.C. Zanúncio. 1989. Biology of *Eustema sericea* Schaus, 1922 (Lepidoptera: Notodontidae), a defoliator of sobrasil *Colubrina rufa* (Rhamnaceae). [In Portuguese.] Anais de Sociedade Entomológico do Brasil **18**: 247-256.

Shanthamurthy, K.D. and S.K. Aswath. 1982. Preliminary investigations on the cytology of the uzifly (*Tricholyga bombycis* Beck), a tachinid parasite of silk worm (*Bombyx mori*, L.). Cell Chromosome Res. Calcutta, India **5**: 33-34.

Shima, H. 1992. Tachinidae (Diptera) collected in Ussuri by Prof. T. Saigusa. Makunagi/ Acta Dipterologica **17**: 15-20.

Shima, H. and C.-m. Chao. 1992. New species of Tachinidae (Diptera) from Yunnan Province, China. Jpn. J. Ent. **60**: 633-645.

Shima, H., Chao, C.-m. and W.-x. Zhang. 1992. The genus *Winthemia* (Diptera, Tachinidae) from Yunnan Province, China. Jpn. J. Ent. **60**: 207-228.

Siddappaji, C. and Y.K. Kotikal. 1988. Effect of 'uzicide' against the Indian uji fly on mulberry silkworm. Current Research **17**: 165-167.

Silveira, J.C.F. da, Sasaki, E.T., Forner, M.A., Honda, M.S. and M.H. Calafiori. 1987. Occurrence of parasitoids of *Spodoptera frugiperda* (J.E. Smith, 1797) on maize in Espirito Santo do Pinhal, SP. [In Portuguese.] Ecossistema **1987**: 41-44.

Smith, K.G.V. 1989. An introduction to the immature stages of British flies. Diptera larvae, with notes on eggs, puparia and pupae. Handbooks for the identification of British Insects, Vol. **10**, Pt. 14. 280 pp. (Published by the Royal Entomological Society of London.)

Spahr, U. 1985. Ergänzungen und Berichtigungen zu R. Keilbachs Bibliographie und Liste der Bernsteinfossilien - Ordnung Diptera. Stutt. Beitr. Naturk. (B) **111**, 146 pp.

Sun, X. and C.-m. Chao. 1992. A new species of *Zenilliana* from China (Diptera: Tachinidae). [In Chinese.] Sinozoologia **1992**: 331-333.

Sun, X., Liang, E.-y., Qiao, Y., Chao, C.-m. and S. Zhou. 1992. Diptera, Tachinidae. [In Chinese.] Iconography of forest insects in Hunan China **1992**: 1163-1207.

Sun, X., Qiao, Y., Zhou, S. and C.-m. Chao. 1992. A preliminary study on the control of *Pieris rapae* using *Phryxe vulgaris*. [In Chinese.] Chinese J. Appl. Ecol. **3**: 96-98.

Sun, X., Qiao, Y., Zhou, S. and C.-m. Chao. 1992. Studies on the biology of *Phryxe vulgaris* Fallén (Diptera, Tachinidae) and its mass reproduction on natural host, *Pieris rapae* L. (Lepidoptera, Pieridae). Pp. 198-203. *In* Zhu, G.R., Zhang, Z.L. and C.Y. Shen, eds., Advance in IPM on main vegetables. [In Chinese.] Chinese Agricultural Science, Technology Press, Beijing.

Thompson, F.C. 1990. Biosystematic information: dipterists ride the third wave. Pp 179-201. *In* Kosztarab, M. and C.W. Schaefer, eds., Systematics of the North American insects and arachnids: status and needs. Virginia Agricultural Experiment Station Information Series 90-1. Blacksburg, Virg. Polytech. Inst. and State Univ.

Tkachev, V.M. 1992. Tachinids (Diptera, Tachinidae) as effective parasites of orchard pests. Ent. Rev. **71**(3): 67-69.

Togashi, I. 1988. Parasitic insects reared from larvae of *Ivela auripes* Butler (Lepidoptera: Lymantriidae), a defoliator of dogwood tree, *Cornus controversa* Hemsley, in Ishikawa Prefecture, Japan. Trans. Shikoku Ent. Soc. **19**: 83-86.

Torres, J.A. 1992. Lepidoptera outbreaks in response to successional changes after the passage of Hurricane Hugo in Puerto Rico. J. Trop. Ecol. **8**: 285-298.

Tremblay, E., Ragusa, S., Micieli de Biase, L., Russo, A., Russo, L.F. and S. Zagami. 1989. Report on the massive presence of a psychid moth in Calabria. [In Italian.] Informatore Agrario **45**: 113-115.

Tschorsnig, H.P. 1991. *Engeddia hispanica* sp. n., a new Tachinidae (Diptera) from Spain. Eos **67**: 67-70.

Tschorsnig, H.P. 1992. Tachinidae (Diptera) from the Iberian Peninsula and Mallorca. Stutt. Beitr. Naturk. (A) **472**, 76 pp.

Turnock, W.J. and R.J. Bilodeau. 1992. Life history and coldhardiness of *Athrycia cinerea* (Dipt.: Tachinidae) in western Canada. Entomophaga **37**: 353-362.

Uéda, S. 1991. Morphology of the female abdomen in *Aulacephala hervei* Bequaert, with special reference to the postabdominal structures (Diptera: Tachinidae). Bull. Akiyoshi-dai Mus. Nat. Hist. **26**: 45-51.

Varma, A. 1989. Record of a hyperparasitoid *Nesolynx thymus* (Girault) on *Sturmiopsis inferens* Townsend in Jagadhari area of Haryana State. Indian Journal of Plant Protection **17**: 103.

Vinson, S.B. 1991. Chemical signals used by parasitoids. Redia **74**: 15-42. [Insect Parasitoids, 4th European Workshop, Perugia April 3-5, 1991.]

Vossbrinck, C.R. and S. Friedman. 1989. A 28s ribosomal RNA phylogeny of certain cyclorrhaphous Diptera based upon a hypervariable region. Syst. Ent. **14**: 417-431.

Wen, J.-z. and C.-x. Sun. 1988. Two new species of *Nosema* (Microspora: Nosematidae). [In Chinese.] Acta Zootaxonomica Sinica **13**: 105-111.

Weseloh, R.M. 1990. Gypsy moth predators: an example of generalist and specialist natural enemies. Pp. 233-243. *In* Watt, A.D., Leather, S.R., Hunter, M.D. and N.A.C. Kidd, eds., Population dynamics of forest insects. Intercept, Andover, UK. 408 pp.

West, R.J. 1991. Notes on the biology and control of the black army cutworm, *Actebia fennica* (Lepidoptera: Noctuidae), in black spruce plantations. Proc. Ent. Soc. Ont. **122**: 53-63.

Wheeler, A.G., Jr. 1989. *Disonycha punctigera* (Coleoptera: Chrysomelidae): first host record of a little-known flea beetle. Entomol. News **100**: 67-71.

Wheeler, G.S., Ashley, T.R. and K.L. Andrews. 1989. Larval parasitoids and pathogens of the fall armyworm in Honduran maize. Entomophaga **34**: 331-340.

Yang, X.-k. and H.-g. Sun, editors. 1991. Catalogue of the insect type specimens preserved in the insect collections of the Institute of Zoology, Academia Sinica. Agriculture Press, Beijing. 164 pp.

Zhang, Y.-j. 1990. Study on the bionomics of *Amraica recusaria superaus* (Butler). [In Chinese.] Insect Knowledge **27**: 220-222.

MAILING LIST

I have included telephone numbers, FAX numbers and E-Mail addresses in the list below, to the limited extent that I know them. I will add to the list in future issues of **The Tachinid Times**.

Acquisitions Section, Department of Library Services, Natural History Museum, Cromwell Road, London, SW7 5BD, ENGLAND

Entomology Library, Peabody Museum, Yale University, New Haven, Connecticut 06511, USA

Dr. Peter Adler, Department of Entomology, Clemson University, Clemson, South Carolina 29634-0365, USA [Tele: 803-656-5044; FAX: 803-656-5065; E-Mail: PADLER@CLUST1.CLEMSON.EDU]

Dr. Jean-Paul Aeschlimann, CSIRO, Biological Control Unit, 335, Avenue Paul-Parguel, 34100 Montpellier, FRANCE [Tele: 67.63.38.81; FAX: 67.41.20.42]

Mr. John Amoroso, Entomology & Nematology Department, Building 970, Hull Road, University of Florida, Gainesville, Florida 32611-0620, USA [Tele: 904-336-0357; E-Mail: ja@gnv.ifas.ufl.edu]

Mr. Stig Andersen, Zoologisk Museum, Universitetsparken 15, DK 2100, Copenhagen, DENMARK [Tele: +45.31.35.41.11; FAX +45.31.39.81.55]

Dr. Paul H. Arnaud, Jr., Curator, Department of Entomology, California Academy of Sciences, Golden Gate Park, San Francisco, California 94118, USA [Tele: 415-750-7227; FAX: 415-750-7106]

Biol. Susana Avalos, Centro de Investigaciones Entomologicas de Córdoba, Fac. Cs. Ex. Fs. y Nat., Universidad Nacional de Córdoba, Avda V. Sársfield 299, 5000 Córdoba,

ARGENTINA

Dr. David A. Barraclough, Natal Museum, P.O. Box 9070, Pietermaritzburg 3200, SOUTH AFRICA [Tele: 0331-451404]

Mr. Robert Belshaw, c/o Diptera Section, Department of Entomology, Natural History Museum, Cromwell Road, London, SW7 5BD, ENGLAND

Dr. Michaél v.d. Berg, Department of Agriculture and Water Supply, Citrus & Subtropical Fruit Research Institute, Private Bag X11208, Nelspruit, 1200, SOUTH AFRICA [Tele: 01311-52071]

Mr. Christer Bergström, Reykjaviksgatam 126, S-75263 Uppsala, SWEDEN

Dr. John F. Burger, Department of Entomology, Nesmith Hall, University of New Hampshire, Durham, New Hampshire 03824, USA [Tele: 603-862-1707]

Dr. Bryan K. Cantrell, Division of Plant Protection, Department of Primary Industries, 80 Meiers Road, Indooroopilly, Queensland, 4068, AUSTRALIA [Tele: (07) 8779385; FAX: (07) 3710766]

Dr. Klaus P. Carl, Scientist-in-Charge, European Station, International Institute of Biological Control, 1, chemin des Grillons, CH-2800 Delémont, SWITZERLAND [Tele: 066/ 22 12 57; FAX: 066/ 22 48 24]

Dr. José A. Castellanos, Biological Control, I.I.S.V. (I.N.I.S.A.), 150 - no. 2126 Siboney, La Habana, CUBA

Dr. Ronald D. Cave, Plant Protection Department, Escuela Agricola Panamericana, El Zamorano, P.O. Box 93, Tegucigalpa, HONDURAS [Tele: 504-32-2660; FAX: 504-32-8543]

Doc. RNDr. Jirí Cepelák, 949 01 Nitra, Mostná 10, SLOVAKIA

Dr. Chao Chien-ming, Director, Institute of Zoology, Academia Sinica, 7 Zhongguancun Lu, Haitien, Beijing, CHINA

Dr. D.E. Conlong, SASA Experiment Station, Private Bag X02, Mount Edgecombe, 4300, Natal, SOUTH AFRICA [Tele: (031) 593205; FAX: (031) 595406]

Dr. Raúl Cortés, Instituto de Entomología, Universidad Metropolitana de Ciencias de la Educación, Casilla 147, Santiago, CHILE

Dr. Roger W. Crosskey, Department of Entomology, Natural History Museum, Cromwell Road, London, SW7 5BD, ENGLAND [Tele: 071-938-9123; FAX: 071-938-8937]

Dr. Eliane De Coninck, Entomology Branch, Musée Royal de l'Afrique Centrale, B-1980 Tervuren, BELGIUM

Dr. M. Doganlar, Entomoloji Anabilim Dali Başkanligi, Cumhuriyet Üniversitesi, Tokat Ziraat Fakultesi Dekanligi, Tokat, TURKEY

Dr. Agnieszka Draber-Mońko, Instytut Zoologii, Polska Akademia Nauk, 00-679 Warszawa, ul. Wilcza 64, P.O. Box 1007, POLAND [Tele: 29-32-21]

Dr. John S. Dugdale, Entomology Division, Department of Scientific & Industrial Research, Private Bag, Auckland, NEW ZEALAND [Tele: (09) 893 660; FAX: (09) 863 330]

Professeur Claude Dupuis, Entomologie générale et appliquée, Musée National d'Histoire Naturelle, 45, rue de Buffon, 75005 Paris, FRANCE [Tele: 40.79.34.05]

Dr. Neal L. Evenhuis, Bishop Museum, 1525 Bernice St., P.O. Box 19000A, Honolulu, Hawaii 96817-0916, USA [Tele: 808-847-3511; FAX: 808-841-8968; E-Mail: NEALE@BISHOP.BISHOP.HAWAII.ORG]

Dr. Sheila Fitzpatrick, Agriculture Canada Research Station, 6660 N.W. Marine Drive, Vancouver, British Columbia, V6T 1X2, CANADA [Tele: 604-224-4355; FAX: 604-666-4994]

Dr. Saul Frommer, Department of Entomology - 41, University of California, Riverside, California 92521-0314, USA [FAX: 714-787-3086]

Dr. Serge Gaponov, Voronezh State University, Universitetskaya pl., I, 394000 Voronezh, RUSSIA

Dr. Eric Georgeson, Entomological Services, Nova Scotia Department of Natural Resources, P.O. Box 68, Truro, Nova Scotia, B2N 5B8, CANADA

Dr. Giuliana Giangiuliani, Istituto di Entomologia Agraria, Universitá Degli Studi di Perugia, Borgo XX Giugno, 72, 06121 Perugia, ITALY [Tele: (075) 5856027; FAX (39) (75) 5856039]

Dr. José-Luis Goicoechea, Laboratory of Insect Genetics, Department of Pest Control - Ap. 10, C.E.N.S.A., San José de Las Lajas, Habana, CUBA

Dr. Simon Grenier, Laboratoire de Biologie appliquée, Bât. 406, INRA-INSA, 20, Ave. A. Einstein, 69621 Villeurbanne, FRANCE [Tele: (33) 72438356; FAX: (33) 72438511; E-Mail: sgrenier@jouy.inra.fr]

Dr. Harry R. Gross, Jr., Insect Biol. & Pop. Manag. Res. Lab., USDA-ARS, P.O. Box 748, Tifton, Georgia 31793-0748, USA [Tele: 912-387-2343; FAX: 912-387-2321]]

Dr. Keith M. Harris, CAB International Institute of Entomology, 56 Queen's Gate, London SW7 5JR, ENGLAND [Tele: (01) 584 0067/8]

Dr. Benno Herting, Staatliches Museum für Naturkunde, Rosenstein 1, D-7000 Stuttgart 1, GERMANY [Tele: (0711) 8 93 60]

Dr. Zdravko Hubenov, Bulgarian Academy of Sciences, Institute of Zoology, boul. Rouski 1, 1000 Sofia, BULGARIA

Mr. Keisuke Iwao, Zoology Department, 243 BioSci, Duke University, Box 90325, Durham, North Carolina 27708-0325, USA [Tele: 919-684-2507; FAX: 919-684-6168; E-Mail: K1730%DUKEMVS.BITNET@NCSUVM.NCSU.EDU]

Dr. Silvia Acosta Izquierdo, Entomología, Dept. de Protección de Plantas, I.N.I.C.A., Avenida Van Troi - Ap. 17203, Boyeros, Ciudad Habana, CUBA

Dr. Newel M. Jorgensen, Department of Life Sciences, Eastern New Mexico University, Portales, New Mexico 88130, USA [Tele: 505-562-1011, ext. 2543]

Prof. Nikolai G. Kolomiets, Department of Forestry, V.N. Sukachev Inst. of Forest and Wood, Siberian Branch Russian Acad. of Sciences, P.O. Box 45, 630082, Novosibirsk 82, RUSSIA

Dr. Ulrich Kuhlmann, European Station, International Institute of Biological Control, 1, chemin des Grillons, CH-2800 Delémont, SWITZERLAND

Dr. Pradip Kumar, Pest Management Laboratory, Central Sericultural Research & Training Inst., (Central Silk Board - Govt. of India), Srirampuram, Manandavadi Road, Mysore 570 008, Karnataka State, INDIA

Mr. Jorge Rodríguez Lara, Entomología, Dept. de Protección de Plantas, I.N.I.C.A., Avenida Van Troi - Ap. 17203, Boyeros, Ciudad Habana, CUBA

Dr. Gerardo Liljesthröm, Museo de La Plata, Paseo del Bosque S/N, 1900 La Plata, ARGENTINA

Mr. Rolando E. López, Department of Entomology, University of Massachusetts, Amherst, Massachusetts 01003, USA [Tele: 413-545-2004, ext. 2844]

Dr. Steve Marshall, Department of Environmental Biology, University of Guelph, Guelph, Ontario N1G 2W1, CANADA [Tele: 519-824-4120; FAX: 519-837-0442]

Dr. Peter G. Mason, Agriculture Canada, Research Station, 107 Science Crescent, Saskatoon, Saskatchewan S7N 0X2, CANADA [Tele: 306-975-7014; FAX: 306-242-1839]

Dr. Egidio Mellini, Instituto di Entomologia, Universita Degli Studi di Bologna, I 40126 Bologna - via Filippo re, 6, ITALY [Tele: (051) 35 15 50; FAX: (051) 25 10 52]

Dr. Ferenc Mihályi, Zoological Department, Hungarian Natural History Museum, H-1088 Budapest, Baross u. 13, HUNGARY

Mr. Satoshi Nakamura, Tropical Agriculture Research Center, Ministry of Agriculture, Forestry & Fisheries, Ohwashi 1-2, Tsukuba, Ibaraki, 305, JAPAN [Tele: 0298-38-8314; FAX: 0298-38-6316]

Dr. Bhanu C. Nandi, Assistant Professor of Zoology, Presidency College, 86/1, College St., Calcutta 700073, INDIA [Tele: 311350]

Dr. Vincent Nealis, Forestry Canada, Ontario Region, P.O. Box 490, Sault Ste. Marie, Ontario, P6A 5M7, CANADA [Tele: 705-949-9461; FAX: 705-759-5700]

Dr. William C. Nettles, Jr., Biological Control of Pests Research Unit, USDA, ARS, 2413 East Highway 83, Weslaco, Texas 78596, USA [Tele: 512-968-7546; FAX: 512-565-6133]

Dr. James O'Hara, Agriculture Canada, Biological Resources Division, CLBRR, C.E.F., Ottawa, Ontario K1A 0C6, CANADA [Tele: 613-996-1665; FAX: 613-995-1823; E-Mail: AG190DIPTERA@NCCCOT2.AGR.CA]

Dr. Thomas Pape, Hulegardsvej 15, DK - 4320 Lejre, DENMARK [Tele: +45 31 62 61 68; FAX: +45 31 62 61 21]

Dr. Cristobal J.H. Pruett, CIMCA, Casilla 2731, Santa Cruz de la Sierra, BOLIVIA [Tele: 34-7707 or 34-2684]

Dr. F. Wolfgang Quednau, Laurentian Forestry Centre, P.O. Box 3800, 1055 PEPS Street, Sainte-Foy, Quebec, G1V 4C7, CANADA [Tele: 418-648-5804; FAX: 418-648-5849]

Mr. Stuart R. Reitz, Department of Entomology, Clemson University, Clemson, South Carolina 29634-0365, USA [Tele: 803-656-3111]

Dr. Vera A. Richter, Zoological Institute, Russian Academy of Sciences, St. Petersburg, 199034, RUSSIA

Dr. Knut Rognes, Havornbrautene 7a, N—4048 Hafrsfjord, NORWAY [Tele: +47 4 590696]

Dr. Jens Roland, Forestry Canada, Ontario Region, P.O. Box 490, Sault Ste. Marie, Ontario, P6A 5M7, CANADA [Tele: 705-949-9461; FAX: 705-759-5700]

Ms. Claire Rutledge, Department of Entomology, University of Illinois, Urbana, Illinois 61801, USA [Tele: 217-333-2910; FAX: 217-244-3499]

Dr. Curtis Sabrosky, 205 Medford Leas, Medford, New Jersey 08055, USA [Tele: 609-654-3205]

Dr. Vicente Sánchez, USDA, Center for Biological Control of Northeastern, Forest Insects and Diseases, Northeastern Forest Experiment Station, 51 Mill Pond Road, Hamden, CT 06514, USA [Tele: 203-773-2021; FAX: 203-773-2183]

Mr. Michael J. Sarazin, Agriculture Canada, Biological Resources Division, CLBRR, C.E.F., Ottawa, Ontario K1A 0C6, CANADA [Tele: 613-996-1665; FAX: 613-995-1823]

Dr. H. Schumann, Zoologisches Museum, Museum für Naturkunde der Humboldt-Universitèt zu Berlin, Invalidenstr. 43, Berlin, 1040, GERMANY [Tele: 28 97(0)]

Dr. Hiroshi Shima, Biological Laboratory, College of General Education, Kyushu University, Ropponmatsu, Fukuoka 810, JAPAN [Tele: 092-771-4161; FAX: 092-712-1587]

Mr. Sun Xuekui, Department of Environmental Biology, University of Guelph, Guelph, Ontario N1G 2W1, CANADA [Tele: 519-824-4120; FAX: 519-837-0442]

Dr. Claude Thireau, Forêt Canada, Région du Québec, 1055 du PEPS, C.P. 3800, Sainte-Foy, Quebec GlV 4C7, CANADA

Dr. F.C. Thompson, Systematic Entomology Laboratory, SEA, U.S. Department of Agriculture, c/o U.S. National Museum NHB 168, Washington, D.C. 20560, USA [Tele: 202-382-1800; FAX: 202-786-9422; E-Mail: CTHOMPSON@UMDARS]

Mrs. Maribel Galán Torres, Entomología, Dept. de Protección de Plantas, I.N.I.C.A., Avenida Van Troi - Ap. 17203, Boyeros, Ciudad Habana, CUBA

Dr. Hans-Peter Tschorsnig, Staatliches Museum für Naturkunde, Rosenstein 1, D-7000 Stuttgart 1, GERMANY [Tele: (0711) 8 93 60]

Dr. W. J. Turnock, Agriculture Canada Research Station, 195 Dafoe Road, Winnipeg, Manitoba R3T 2M9, CANADA [Tele: 204-269-2100; E-Mail: AG3640000@NCCCOT2.AGR.CA]

Dr. Jaromír Vaňhara, Ústav Ekologie Lesa, Lesnická Fakulta Vysoké Školy Zemědělské v Brně, 644 00 Brno - Soběšice, CZECH REPUBLIC [Tele: 05/ 751 684]

Dr. Ronald M. Weseloh, Department of Entomology, Connecticut Agricultural Experiment Station, New Haven, Connecticut 06504, USA

Dr. Robert A. Wharton, Department of Entomology, Texas A&M University, College Station, Texas 77843-2475, USA [Tele: 409-845-7972; FAX: 409-845-7977]

Dr. Ian M. White, CAB International Institute of Entomology, c/o Department of Entomology, Natural History Museum, Cromwell Road, London, SW7 5BD, ENGLAND

Ms. Susan Wineriter, Entomology & Nematology Department, Building 970, Hull Road, University of Florida, Gainesville, Florida 32611-0740, USA [Tele: 904-392-1901; FAX: 904-392-0190]

Dr. D. Monty Wood, Agriculture Canada, Biological Resources Division, CLBRR, C.E.F., Ottawa, Ontario K1A 0C6, CANADA [Tele: 613-996-1665; FAX: 613-995-1823; E-Mail: AG190DIPTERA@NCCCOT2.AGR.CA]

Dr. Norman E. Woodley, Systematic Entomology Laboratory, SEA, U.S. Department of Agriculture, c/o U.S. National Museum NHB 168, Washington, D.C. 20560, USA [Tele: 202-382-1802]

Dr. M. Wysoki, Head, Department of Entomology, Agricultural Research Organization, The Volcani Center, P.O.B. 6, Bet Dagan, 50250, ISRAEL [Tele: 972.3.9683111; FAX: 972.3.9683457]

Dr. Joachim Ziegler, Deutsches Entomologisches Institut, Biologische Zentralanstalt Berlin, Schicklerstrasse 5, D (0) - 1300 Eberswalde, GERMANY