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The Tachinid Times began in 1988 when personal computers were gaining in popularity, yet before the advent of e-mail and the World Wide Web. A newsletter distributed through the mail seemed like a useful endeavour to foster greater awareness about the work of others among researchers interested in the Tachinidae. Now, eleven years later, despite the speed and convenience of e-mail and other advanced modes of communication, this newsletter still seems to hold a place in the distribution of news about the Tachinidae. If there is sufficient interest - and submissions - over the course of the next year, then another issue will appear in February of the new millennium. As always, please send me your news for inclusion in the newsletter before the end of next January. The newsletter appears first in hardcopy and then on the WWW some weeks later (http://res.agr.ca/brd/tachinid/times/index.html).

Abstracts from the Fourth International Congress of Dipterology (by J.E. O'Hara)

The Fourth International Congress of Dipterology was held in Oxford, England during 6-13 September 1998. A section on the Tachinidae (chaired by myself) was held during the first morning of the Congress, during which five oral presentations were given by four speakers. There were additionally a couple of posters presented at the Congress on the topic of Tachinidae. Abstracts of the oral and poster presentations are provided below. The abstract by Serge Gaponov is included although Serge was unfortunately unable to attend the Congress and consequently did not present his scheduled talk. All of the following abstracts were published in the Abstracts Volume of the Congress, edited by J.W. Ismay.

Evolution of Egg Structure in Tachinidae (by S.P. Gaponov)

Using a scanning electron microscope I investigated the egg structure of 114 species of Tachinidae. The research was focused on the peculiarities of the egg surface and the structure of the aeropylar area. Data on the method of egg-laying, the structure of the female reproductive system and the host range were also taken into consideration. Since any kind of adaptation is a result of evolution and every stage of ontogenesis, including the egg stage, is adapted to some specific environmental conditions, each stage of ontogenesis evolved more or less independently. The development of provisionary devices (coenogenetic adaptations) and their elaboration was one evolutionary route of ontogenesis in the egg stage of Tachinidae (some groups of macro-oviparous and microoviparous species). Another was the shortening and simplification of the stage, leading to the elimination of this phase of ontogenesis (Tachininae, Voriinae, Dexiinae, some groups of Exoristinae). Thus, development of embryonic egg shells as a manifestation of specialised embryo adaptations provides protection and, as a result, stability for the early stages of ontogenesis. Embryonization in the evolution of macro-oviparous and microoviparous Tachinidae allows further evolutionary improvement and simplification of those processes of individual development which eventually lead to maturity. Evolution of the egg stage in Tachinidae is caused by phylembryogenesis of which I have observed three modes: anaboly, deviation and reduction through rudimentation. Anaboly consists of the addition of new stages to those which existed in the ancestors; it is conducive to further development of the organs already possessed by the ancestors. Thus, more primitive Diptera have a three-layer chorion - in

Tachinidae it undergoes the following changes: oligomerization of plastron elements and acropylar cripts, development of different kinds of plastron surface, modification of interior cavities, appearance of the aeropylar zone. Due to anaboly the previous stage in the development of organs, the chorion in particular, becomes a palingenetic recapitulation, which results in specialization of development. In my opinion, the development of microtype eggs in Tachinidae (tribe Goniini) is connected with deviation as a restructuring of the stage which existed in their ancestors (macro-oviparous Exoristini). Reduction takes place in the evolution of eggs in Tachinidae through rudimentation, i.e. a slow disappearance of structures. As ovolarvipary develops, eggs lose plastron structures; rudimentation of the aeropylar cripts is manifest. Shortening and simplification of the metamorphosis in the egg of ovolarviparous Tachinidae account for the reduction of provisionary devices resulting in partial embryonization. The latter serves as a prerequisite of subsequent lengthening of the postembryonic stage and development of new devices. The variety of adult and immature-stages features in Tachinidae and the similarity of some of these features in tachinids from different groups can be explained by evolutionary parallelism (homoplasy). In the egg structure of different groups of tachinids morphological parallelisms are widespread.

Systematics and the World Wide Web: an information system on the Tachinidae for the 21st Century (Oral presentation by J.E. O'Hara)

Systematists in the agricultural sector are increasingly encouraged to deliver the products of their labour in a form comprehensible to applied entomologists. This is the essence of technology transfer. Two of the major impediments to the delivery of systematic information to applied entomologists have been format and access. For many potential users of systematic information, systematic revisions in specialised journals have not satisfied their needs in terms of format and access. The World Wide Web now provides access to an unprecedented degree and the challenge remaining for systematics is to deliver appropriate products. A suite of such products is being developed for the North American Tachinidae. A Tachinidae homepage is located on the website of the study "Identification Systems for Biocontrol Insects" at http://res.agr.ca/ecorc/isbi/dipt/tachhom.htm. This homepage links the user to a brief overview of the Tachinidae, the newsletter "Tachinid Times", a tachinid bibliography, tachinid primary types of the Canadian National Collection of Insects, and a series of web pages on the Tachinidae of selected insect pests. Most developed of the latter are web pages on the tachinids of bertha armyworm, *Mamestra configurata* Walker (Noctuidae); these pages include a list of tachinid species recorded from bertha armyworm, an HTML illustrated key to the species, and a review of the biology of each species.

On a remarkable distribution of two pairs of related species in Palaearctic tachinids (Tachinidae) (Oral presentation by V.A. Richter)

The Turkestanian-Himalayan distribution, previously known in certain related species in plants, birds and tenebrionid beetles was revealed and studied in tachinids.

Plesina asiatica Richter from the Hissar range (1,100 m) in Tajikistan and *P. nepalensis* Kugler from a locality east of Katmandu in Nepal (1,800-2,000 m) form a pair of closely related species in the easternmost part of the distributional area of the genus *Plesina.* They have a similar wing pattern and an additional apical bristle on the scutellum, and inhabit relatively similar altitudes. The separation of these species from the ancestral form may be attributed to the increase of continentality and aridity of climate in Middle Asia no later than the Upper Pliocene.

The second pair of related species is distributed in the upper vegetation belt of the mountains. *Haracca parnassima* Richter from the Chanach Pass in Chatkal range (3,300 m) and an undescribed species of the same genus from Nepal (5,200 m) (H.-P. Tschorsnig, pers. comm.) are dwellers of the subnival belt. The host of *H. parnassima, Parnassius delphius* Eversm., feeds on *Corydalis,* in the type locality solely on *C. fedtschenkoana,* which grows on screes together with other cryophytes. The second species of *Haracca* also inhabits the subnival belt and may also parasitise larvae of *Parnassius,* several species of which are known from the Himalaya. The age of the ancestral form of this pair of species may be Upper Pliocene - Lower Pleistocene, the time of closing of the subnival belts of Middle Asian mountains and the Himalaya. The separation of extant species of *Haracca* should be attributed to their geographic isolation beginning in the Middle or Upper Pleistocene.

The two variants of distribution of related species in tachinids differing in their age and elevational distribution illuminate certain significant events in the history of the faunas of Middle Asian mountains and the Himalaya and show evidence of their affinity.

Problems of the systematic treatment of Carcelia *Robineau-Desvoidy and related genera (Tachinidae) (Oral presentation by H. Shima)*

The genus *Carcelia* Robineau-Desvoidy and related genera as here defined are characterised by the very large and hairy eyes in comparison to other genera of the tribe Carceliini sensu Crosskey (1976). They are named as follows, and some of them are sometimes treated as subgenera or synonyms of *Carcelia* s. lat.: *Argyrothelaira* Townsend, *Asiocarcelia* Baranov, *Calocarcelia* Townsend, *Carceliella* Baranov, *Carcelina* Mesnil, *Carceliopsis* Townsend, *Catacarcelia* Townsend, *Euryclea* Robineau-Desvoidy, *Myxocarcelia* Baranov, *Senometopia* Macquart and *Thelymyiops* Mesnil. In the structure of the male genitalia they may be separated into three groups: those having the epiphallus on the basiphallus and a median expansion on the distiphallus; those having an epiphallus and lacking median expansion; and those lacking an epiphallus and having a median expansion. The first group is usually treated as a subgenus of the third group which corresponds to *Carcelia* sensu Herting (1983). The genital structure of the second group is common with that of many genera of the tribe Eryciini sensu Herting (1983) and members of this group are placed separately in *Carcelina* and *Senometopia* probably based on the chaetotaxy of the legs by Herting. However, ovipositing habits of members of these groups are variable: macrotype oviparous, ovolarviparous with petiolate chorion, ovolarviparous with thin membraneous chorion and "micro-ovo-larviparous" without hard chorion. The problem is how to incorporate consistently the morphological features, ovipositing habits and host preference in the systematics of these species.

Revision of the genus Peribaea *Robineau-Desvoidy of Japan (Tachinidae) (Poster presentation by T. Tachi and H. Shima)*

The genus *Peribaea* Robineau-Desvoidy is considered a distinct monophyletic taxon, known from 47 Old World species. Currently there are four species reported from Japan, *P. insularis* Shima, *P. orbata* Wiedemann, *P. tibialis* Robineau-Desvoidy and *P. ussuriensis* Mesnil. We have examined some 300 Japanese specimens of *Peribaea,* and found there are an additional seven undescribed and one newly recorded species and four new host records, from three species of Nymphalidae and one of Drepanidae.

In this presentation we report on 12 species of the genus *Peribaea* from Japan, including seven undescribed species. The following characters supporting the monophlyly of this genus are re-examined: antennal pedicel with two large opposed or crossed setulae; slit-like opening posteroapically of distiphallus semi-sclerotised; female sternum 8 bare; first instar larvae with narrowed labrum.

On the difference in the period of flight between males and females of Tachinidae (Oral presentation by T. Zeegers)

It is generally believed that in many families of Diptera (for instance Syrphidae and Tachinidae) the males appear, on the average, somewhat earlier than the females. This hypothesis has been tested systematically on the Dutch Tachinidae, using a non-parametrical test (Wilcoxon) for the difference in the median applied on a data-base containing all Dutch tachinid records (mostly field records). The difference in the median of the period of flight proved to be significant only in 41 out of 103 investigated species. In 14 of remaining 62 cases a significance result might have been missed due to the low number of records. In the other 48 cases a (significant) difference in the period of flight between males and females seemed genuinely absent. Therefore, the supposed difference in the period of flight is neither the rule nor an exception.

The results show that it is very difficult to predict whether a species will or will not have a difference in period of flight. In some cases in one species *(Gonia ornata* Meigen) the difference is obvious, whereas in a closely allied species *(Gonia picea* Matsumura) it is completely absent. However, as a general rule all species of the subfamily Phasiinae lack the difference in period of flight. Moreover, two tendencies may be observed. Firstly, species with only one clearcut generation each year are more likely to have a difference in period of flight than species with more generations annually. Secondly, species with a strong sexual dimorphism are likely to have a clear difference in period of flight of the sexes. The reverse does not hold true: species lacking all sexual dimorphism may show a strong difference in period of flight.

On the Tachinidae of The Netherlands (Oral presentation by T. Zeegers)

A new check list for the Tachinidae of The Netherlands is presented. This check list is based on a complete review of all available material, both old and new (altogether about 25,000 specimens). At this moment, 318 tachinid species have been found in The Netherlands, of which 113 are recorded for the first time.

The Dutch tachinid fauna is surprisingly rich compared with the neighbouring regions of comparable area (Niedersachsen and Nordrhein-Westfalen in

Germany, Belgium, southern and central England). The number of recorded Dutch tachinids exceeds those of the neighbouring regions by at least fifty, although it must be stressed that the Belgian fauna is poorly studied. Regions of interest in The Netherlands are the southern part of Limburg (many central-European species), the dune area (with *Neophryxe vallina* Rondani, *Germaria angustata* Zetterstedt, *Phorocera grandis* Brauer & Bergenstamm, *Chaetogena acuminata* Rondani and *Bothria frontosa* Meigen) and the Veluwe (with *Hemimacquartia paradoxa* Brauer & Bergenstamm, *Bothria subalpina* Villeneuve, *Cyzenis jucunda* Meigen and *Myxexoristops bonsdorffi* Zetterstedt). The Dutch tachinid fauna has not always been the same over the last century and half. On the one hand, at least seven previously indigenous species must now be considered extinct: *Estheria cristata* Meigen, *Peteina erinaceus* Fabricius, *Nemorilla maculosa* Meigen, *Thelymorpha marmorata* Fabricius, *Fausta nemorum* Meigen, *Nemoraea pellucida* Meigen and *Nowickia atripalpis* Robineau-Desvoidy. On the other hand, at least nine species seem to have established themselves in The Netherlands during the past thirty years. Some of them *(Phyrno vetula* Meigen, *Appendicia truncata* Zetterstedt) are now quite common.

Larval cephalo-pharyngeal skeletons and puparia of tachinid flies (Tachinidae) - two morphological complexes of phylogenetic significance (Poster presentation by J. Ziegler)

The Tachinidae are the most species-rich family of the Diptera. Larvae develop as endoparasites within arthropod hosts, which are consumed and killed. Many species parasitise harmful insects, and the family is of considerable importance in agriculture and forestry. Nevertheless, the systematic subdivision of the family is still at an unsatisfactory level. Most of the major subgroups are defined only on the basis of adult characters. For this reason a study has been made of the puparia and the cephalo-pharyngeal skeletons of mature larvae, to search for possible constitutive characters and to confirm the family-group taxa of the existing traditional classification on the basis of synapomorphies. In addition to the Tachinidae, further representatives of the Oestroidea (sensu McAlpine 1989) were included. This study is illustrated by SEM photographs and drawings, and so it also provides a basic introduction to the external morphology of tachinid puparia and of the cephalo-pharyngeal skeleton with reference to their origin and function. The hypothetical ground-plan condition for the Tachinidae is postulated, both for puparia and for the cephalo-pharyngeal skeleton. Finally, plesiomorphous and apomorphous characters within the Oestroidea are interpreted and their suitability as constitutive characters for higher taxa is discussed.

The following taxa of the Tachinidae are most likely monophyletic on the basis of established autapomorphies: Acemyini, Cylindromyini, Bigonichetini, Graphogastrini, Gynandromyini, Ormiini s.l., Proscissionini and Voriini s.l. The Glaurocarini and Ormiini share synapomorphies and are placed together in the tribe Ormiini s.l. For the same reason, *Dufouria* Robineau-Desvoidy and *Rondania* Robineau-Desvoidy are assigned to the Voriini s.l.

Massive parasitization of *Romalea guttata* by the tachinid parasitoid *Anisia serotina* (by D. Otto, M. Lamb and D. Whitman)

In 1997, we found eastern lubber grasshoppers, *Romalea guttata* (Houttuyn), in SW Florida to be heavily parasitized with maggots of the tachinid parasitoid *Anisia serotina* (Reinhard) (Goniinae: Blondeliini). Evidence of parasitization was first noted when tachinid maggots literally dropped from field-collected grasshoppers. These grasshoppers suffered a high mortality rate: within one month, 51.7% of 950 grasshoppers collected from Copeland and Oochopee, FL in May and June 1997 died. Dissections of 45 of the dead grasshoppers (20 males, 20 females, and 5 juveniles) on June 11, 1997 revealed that 62.2% were parasitized with from 1 to 30 maggots (Mean=9.18 maggots/parasitized grasshopper).

To determine parasitization levels in living grasshoppers, we isolated 50 adult males and 50 adult females and recorded all emerging maggots. At the end of the isolation period, we dissected and examined all surviving grasshoppers for maggots (grasshoppers that died during the experiment were immediately dissected). Significantly more females were parasitized (92%; 46/50) than males (72%; 36/50, X^2=6.78, df=1, p<0.05). The number of maggots per grasshopper ranged from 0 to 63 and averaged 7.02±3.3 (SE) (n=100). There was a strong trend, but no significant difference in the mean number of maggots in adult males (Mean=5.1±1.4 (SE), n=50) vs. adult females (Mean=8.9±1.5 (SE), n=50, t=1.81, df=98, p>0.05). Similarly, when only parasitized grasshoppers were compared, there was no significant difference in the mean number of maggots in males (Mean=7.1±1.8 (SE), n=36) versus females (Mean=9.7 + 1.6 (SE), n=46, t=1.04, df=80, p>0.05).

In 1998, we returned twice to south Florida to survey lubber populations for tachinids. In May, we collected and dissected 52 lubbers from an area stretching from Everglades City to Immokalee to Shark Valley, and found only one maggot in a single adult male collected 15 miles N of Copeland, FL. In early August, we conducted a second survey and dissected 114 adult lubbers from an area stretching from Copeland to the Anhinga Trail, to Flamingo Key. Seven lubbers (4 females & 3 males) were parasitized with *A. serotina* maggots. Three females contained 7, 22, and 35 maggots, whereas each of the four males contained a single maggot. Five of the parasitized lubbers were collected 10-14 miles N of Copeland, one male from 7 miles E of Copeland, and one male from the Anhinga Trail in the Everglades National Park. Summing all 1998 dissections across south Florida reveals that 8/166 (4.8%) of dissected lubbers were parasitized with *A. serotina* maggots. The 1998 parasitization level for just the Copeland-Ochopee area was 7.6%.

The high level of parasitization we observed in 1997 (82%) was remarkable. Equally remarkable was the enormous decrease in the lubber population and parasitization level during 1998. Estimated maximum lubber densities fell from a 1994 high of >1100/100m^2, to 7/100m^2 in 1997, to 0.4/100^2 in 1998 (a 99.9% reduction in 4 years). Likewise, the *Anisia* parasitization level fell from 82% in 1997 to 4.8% in 1998.

Little is known about *A. serotina*; however, Reinhard originally described the species in the genus *Stenoneura* in 1945. D. M. Wood then moved it to the genus *Anisia* in 1985 as part of his Blondeliini revision. As far as we know, this is the only literature on this species. We also believe that our study is the first host record for *A. serotina*, and the first record of its occurrence in Florida. However, N. Woodley informed us that the USNM in Washington, D.C. contains *A. serotina* specimens reared by R. Silberglied from *R. guttata* in June 1966 from Hendley Co., FL and Lake Placid, FL.

Please see full article submitted to Florida Entomologist (1999).

Classical biological control of the gypsy moth (by C. Thireau)

For the second year of a joint project (Canadian Forestry Service; Ministry of Natural Resources and Energy of New Brunswick) aimed at combatting the gypsy moth (*Lymantria dispar*) using classical biological control, we released 18-20 mated females of *Ceranthia samarensis* (Villeneuve) [also known as *Aphantorhaphopsis samarensis* (Villeneuve), pers. comm. of Jim O'Hara] in three cages at the end of May 1998. In each cage ca. 600 gypsy moth larvae were placed on a small oak tree. The larvae were collected after one week of exposition and reared in the laboratory.

Successful parasitism was indicated by the emergence of 58 puparia from the 1500 larvae reared in the laboratory. Those puparia were placed at the New Brunswick site in mid August. They will be monitored in the spring of 1999 to determine successful overwintering and to liberate the females in the site after their mating.

Update on Catalogue of the Tachinidae of America north of Mexico (by J.E. O'Hara)

A revised catalogue of the Tachinidae of America north of Mexico is currently in preparation by myself and Monty Wood. The catalogue will include valid names, synonyms, primary type data, distributions, and citations to taxonomic and nomenclatural information on nominal genera and species published subsequent to the original descriptions. The catalogue is being prepared using the software program Platypus developed by CSIRO in Australia. I anticipate that the catalogue will be completed in 2000 and offered as a hardcopy publication at that time. A WWW version may follow sometime thereafter.

For those wishing to verify the current status of names in the Tachinidae of America north of Mexico, we have developed an online checklist to the genera and species of the region. This document incorporates all the nomenclatural changes published since the catalogue of Sabrosky and Arnaud (1965), most significantly those proposed by Wood (1985, 1987) in his Blondeliini revision and his Tachinidae chapter in the Manual of Nearctic Diptera. The nomenclatural changes of Wood (1987) were republished in summary form, with additional changes, by O'Hara and Wood (1998). The checklist more accurately represents the current classification of tachinid genera and species in America north of Mexico than the recent checklist by Poole and Lewis (1996). It does not contain suprageneric categories because we do not want to publish such information on the WWW prior to hardcopy publication of our catalogue. Furthermore, we expect the higher classification to undergo more significant changes than the generic classification as the catalogue progresses. The checklist can be viewed at http://res.agr.ca/ecorc/isbi/cat/cathom.htm.

<u>References</u>

O'Hara, J.E. and D. M. Wood. 1998. Tachinidae (Diptera): nomenclatural review and changes, primarily for America north of Mexico. The Canadian Entomologist **130**: 751-774.

Poole, R.W. and R.E. Lewis. 1996. Nomina Insecta Nearctica. A checklist of the insects of North America. Volume **3**: Diptera, Lepidoptera, Siphonaptera. Entomological Information Services, Rockville, Maryland. 1143 pp.

Sabrosky, C.W. and P.H. Arnaud, Jr. 1965. Family

Tachinidae (Larvaevoridae). Pp. 961-1108 *in* Stone, A., et al. (eds.), A catalog of the Diptera of America north of Mexico. United States Department of Agriculture, Agriculture Handbook **276**: 1-1696.

Wood, D.M. 1985. A taxonomic conspectus of the Blondeliini of North and Central America and the West Indies (Diptera: Tachinidae). Memoirs of the Entomological Society of Canada **132**: 130 pp.

Wood, D.M. 1987. [Chapter] 110. Tachinidae. Pp. 1193-1269 *in* McAlpine, J.F., et al. (eds.), Manual of Nearctic Diptera. Volume 2. Agriculture Canada Monograph **28**: vi + 675-1332 pp.

An interactive key to the Palearctic genera of Tachinidae (by H.-P. Tschorsnig)

An interactive key to the Palearctic genera of Tachinidae is available for everyone who wants to try it and who sends me a floppy-disc. The key should work with any personal computer because no graphics are used. However, dBase is needed to start the program.

A few years ago I studied material of all Palearctic genera for a key in the handbook of Palearctic Diptera, which is now in press. A preliminary result of this study was a character matrix of nearly 100 characteristics for every genus. I have now used this character matrix for a digitalized key to the genera.

The program is a helpful instrument to key out a genus (or at least a restricted number of genera) when parts of the tachinid body (antennae, head, wings, legs, etc.) are broken off or when features are not easily visible (material in bad condition). It comprises much more information than normal keys. For the program I used 70 easily visible features out of the 100 that I studied.
When running the program, the number of genera which fulfill the conditions will be more and more restricted, and their names are available when asked for. If a clear decision between two or more alternatives is not possible, then it will not be necessary for the run of the program. As not every possible characteristic is used, the key will unfortunately not allow in any case the separation of a few nearly related genera. These may key out together.

Summarized additional information, such as number of species, distribution, and most important references, is provided to a certain extent.

Additional notes on the hilltopping of Graphogastrini (by H.-P. Tschorsnig)

I read with great interest the contribution on hilltopping Graphogastrini by Stig Andersen in the last issue of *Tachinid Times* (**11**: 6).

The only place where I observed *Ancistrophora mikii* regularly in numbers is the mountain "La Gardiole" in the French Alps (NW of Briançon). During 1992-1998 I collected on several occasions altogether 50 specimens, but much more would have been available. La Gardiole is a treeless mountain of 2753m elevation, not at all extraordinary and not significantly different from many other mountains in the southern Alps. I have visited comparable places in the Alps but never found *Ancistrophora* in numbers, and I have no idea at present why this species is more common on this mountain.

Males and females of *Ancistrophora* sit or run on rock debris. When disturbed they would quickly fly to another stone and were not easy to collect. Most of the activity took place in an area of rock debris about 50m below the mountain top. I found only 6 males and 3 females on stones on the very summit of this mountain in the typical waiting position of hilltopping species.

This year I observed, 10m below the summit, both males and females for the first time visiting flowers. Despite its long proboscis, most of the body of the small species was deeply sunken in the flowers of *Cerastium* (Caryophyllaceae), *Doronicum* (Compositae), and a small species of yellow flowering *Senecio* (Compositae).

All other records of *Ancistrophora* known to me are from elevations between 1700 and 3000m, usually distinctly above timberline. Two of them are from summits (Piz d'Aint, 2970m in Switzerland, Grand Aréa, 2870m in the French Alps). Stig's observation of *Ancistrophora* at such a low elevation of 1000m is extraordinary indeed.

Concerning *Graphogaster vestita*, I have found many specimens of this species on many occasions in Spain (usually swept from flowers), but only once on a hilltop. On 29 April 1980 I observed an aggregation of more than 50 males and females on a low mountain (limestone, elevation about 100m) near the coast north of Santa Pola (Alicante). As all specimens were visiting flowers of a yellow flowering shrub, it seems to me till today that it was not the typical hilltopping behaviour.

A note on the eggs of *Macroprosopa atrata* (Fallén) (by H.-P. Tschorsnig and S. Gaponov)

In Tachinid Times **4**: 3 (1991) and Ent. Rev. **73**(3): 73 (1994)*, Serge Gaponov reported on the egg structure of *Macroprosopa atrata* being "similar to typical exoristine macrotype eggs" with "a dorsal (convex) and ventral (concave) surface". Recently H.-P. Tschorsnig dissected a dry female of *Macroprosopa atrata* (from Switzerland, collected June 25 1965). Only water and - for a very short time - cold KOH was used for the dissection. The uterus contained about 80 eggs, most of them with an entirely developed larva. The chorion of the egg turned out to be thin and transparent, as was to be expected within the Macquartiini. No egg shell could be found for those larvae which were most developed.

As the egg structure is very different, it is obvious that the species studied by Serge was not *Macroprosopa atrata*. Unfortunately, the tachinid specimen which Serge used for his egg study is lost. He will try to find more material for the redetermination of his species.

*English translation of: Gaponov, S.P. 1993. Exochorion morphology in some species of the subfamily Tachininae (Diptera, Tachinidae). [In Russian.] Zoologicheskii Zhurnal **72**: 125-129.

Systematic studies on the Exoristinae and Phasiinae of Tokat Province, Turkey (by K. Kara)

I successfully defended my Ph.D. thesis entitled "Systematic studies on the Exoristinae and Phasiinae flies (Diptera:Tachinidae) of Tokat (Turkey) Province" at the University of Gazi Osman Pasa in spring 1998.

In this study, I tried to determine the Exoristinae and Phasiinae fauna in the Tokat district. For this purpose, the caterpillars of Lepidoptera and nymphs and adults of Heteroptera were reared under laboratory conditions and from these a number of tachinid species were obtained. Also some adult tachinid specimens were collected by sweeping various herbaceous plants.

Lepidoptera species from which parasitoids were obtained under laboratory conditions: *Aglais urticae* L., *Euproctis chrysorrhoea* (L.), *Hyponomeuta malinellus* Zell., *Leucoma salicis* (L.), *Lymantria dispar* L., *Malacosoma neustria* (L.), *Nycteola* sp., *Parocneria terebinthi* Frr., *Pieris brassicae* (L.) and *Pleuroptya ruralis* Scop. Lepidoptera species from which no tachinids were reared: *Clostera anastomosis* L., *Eriogaster lanestris* L., *Hedya nubiferana* Haw., *Heliothis armigera* (Hübn.), *Hyphantria cunea* Dry., *Mamestra brassicae* L., *M. oleraceae* L., *Nymphalis polychloros* L., *Phragmatobia fuliginosa* L., *Pieris rapae* (L.), *Plutella maculipennis* (L.), *Rhyacionia buoliana* (Den-Schiff.), *Syntomus* sp., *Thaumetopoea soliteria* Frr., *Vanessa atalanta* L. and *Vanessa cardui* L.

Heteroptera species from which parasitoids were obtained: *Aelia acuminata* L., *Cerapleptus gracilicornis* (H..S.), *Halcostethus vernalis* (W.), *Lygaeus equestris* (L.). Heteroptera species from which no tachinids were reared: *Aelia rostrata* Boch., *Carpocoris* sp., *Coreus marginatus* (L.), *Dicronocephalus putoni* (Hv.), *Dolycoris baccarum* (L.), *Enoplops disciger* (K.H.), *Eurydema oleraceum* (L.), *E. ornatum* (L.), *Graphosoma lineatum* (L.) and *Palomena prasina* (L.).

As a result of this study, 22 genera and 27 species belonging to the subfamily Exoristinae and 11 genera and 23 species belonging to the subfamily Phasiinae were found. It was concluded that 24 species among them were recorded for the first time in Turkey. These are *Aplomya confinis* (Fallén), *Carcelia gnava* (Meigen), *Ceromasia rubrifrons* (Macquart), *Chetogena acuminata* Rondani, *Clairvillia biguttata* (Meigen), *Clemelis pullata* (Meigen), *Clytomyia continua* (Panzer), *C. dupuisi* Kugler, *Cylindromyia auriceps* (Meigen), *C.brevicornis* (Loew), *Epicampocera succincta* (Meigen), *Eulabidogaster setifacies* (Rondani), *Exorista mimula* (Meigen), *E. rustica* (Fallén)., *Labigaster pauciseta* Rondani, *Leucostoma abbrevatium* Hert., *L. anthracina* Meigen, *L. simplex* Fallén, *Lydella grisescens* Robineau-Desvoidy, *Nemorilla floralis* Fallén, *Phasia mesnili* Draber-Monko, *P. obesa* (Fabricius), *P. pusilla* Meigen and *Pseudoperichaeta palesoidea* (R.-D.).

Additionally, 7 new hosts species for the world were determined. These are *Parocneria terebinthi* Frr. for *Chetogena acuminata* Rondani; *Malacosoma neustria* L. and *Parocneria terebinthi* for *Exorista segregata* (Rondani); *Euproctis chrysorrhoea* L. for *Exorista rossica* Mesnil; *Parocneria terebinthi* for *Compsilura concinnata* (Meigen); *Parocneria terebinthi* for *Drino imberbis* Wiedemann; *Lygaeus equestris* L. for *Leucostoma anthracinum* (Meigen); *Cerapleptus gracilicornis* (H.S.) for *Elomya lateralis* (Meigen).

Fifty species obtained in the research area were identified and identification keys including genera and species belonging to the 2 subfamilies were prepared and important distinctive morphological features of body parts of the specimens were illustrated. Some biological aspects were also given.

In addition to the above study, I collected tachinid species from Amasya in 1998. I hope to cover the Middle Black Region in the coming years.

Finally, my sincere thanks to Drs. Benno Herting and Hans-Peter Tschorsnig for identifying the tachinid species.

An interesting catch of Sarcophagidae, Rhinophoridae and Tachinidae in northern Italy (by B. Merz)

Introduction

The recently published Checklist of the Italian Diptera (Minelli et al., 1995) gives a very good idea of the actual faunistic knowledge of this country and allows a comparison with new data. For instance, the Sarcophagidae contain 158 species, the Rhinophoridae 22 species and the Tachinidae 474 species (Pape et al., 1995). Compared with other European countries, the fauna of Italy is moderately well known, with additions to be expected especially in the Sarcophagidae and Tachinidae and only to a lesser extent in the Rhinophoridae.

Luckily enough I had the opportunity from 25-28 September 1997 to visit the region of the Cinque Terre, more precisely the picturesque village of Monterosso al Mare. This village is situated in Liguria some 60km SE of Genova along the coast on $9^0$40'E/$44^0$10'N. The weather conditions were excellent with temperatures around 25^0C during the day and almost no wind. Over 90% of the specimens and all species (except *Peribaea tibialis*) were collected in a small valley of about 1km length just outside of Monterosso. The small creek at the bottom of the valley contained both flowing water and ponds. Despite the late season the vegetation was still remarkably green, probably because of the high ground water level and the rather short amount of time that the sun shines at the bottom of the valley. Few specimens were taken on hills near Monterosso from 0-400m and along the footpath from Vernazza to Monterosso.

The flies were collected between 0915 and 1600, but the very best time (with over 75% of the specimens caught) was from 0915-1100, just when the first rays of sun reached down to the bottom of the valley. Four different types of places proved best for collecting:
a) the stony walls of the vineyard terraces (70% of the Sarcophagidae and 20% of the Tachinidae specimens)
b) on the sandy pathway (15% of the Sarcophagidae and 15% of the Tachinidae)
c) on stones on the ground along the creek (15% of the Sarcophagidae and only few Tachinidae)
d) on green vegetation or flowers (mostly grass and sedges, Umbelliferes and *Mentha*) along the creek and the ponds (50% of the Tachinidae, very few Sarcophagidae)

The nomenclature and arrangement of the species corresponds with Pape (1996) for the Sarcophagidae, with Herting (1993) for the Rhinophoridae and with Herting & Dely-Draskovits (1993) for the Tachinidae.

Results

A total of around 190 specimens of Sarcophagidae, Rhinophoridae and Tachinidae were found during the 3 days of collecting. The Sarcophagids were represented by 22 species (Table 1), the Rhinophoridae by 2 species (Table 2) and the Tachinidae by 42 species (Table 3); an undescribed male of the tachinid genus *Meigenia* was also collected, which will be described elsewhere (Tschorsnig, in litt.) and is not further treated here. Two species are reported here for the first time from Italy: The sarcophagid *Sarcophaga jacobsoni* and the tachinid *Vibrissina debilitata*. The following species are new for the Northern part of Italy (as defined by Minelli et al., 1995): *Sarcophaga portschinskyi*, *S. subvicina*, *Dolichocolon paradoxum*, *Tachina grossa* and *Thelaira solivaga*.

At first glance it may seem surprising that such a high proportion as 14% of the total Sarcophagidae and 9% of the Tachinidae recorded from Italy were found in just 3 days of collecting. This result highlights the still moderate knowledge of these families for Italy, but it can also be explained by the rather late date of collecting. Usually spring and early summer are the best seasons for studying Mediterranean insects, and only few excursions take place later in the year. Furthermore it is noteworthy that 65 of the 66 species (and specimens) mentioned here were collected at the very same place, whereas only few species and specimens could be found elsewhere in the region. This may be explained by the high diversity of microhabitats, the presence of standing and flooding water in the riverbed and the favourable microclimatic conditions with rather high humidity and low temperatures compared with the surrounding area. Only few flowers (Umbelliferae and *Mentha*) were still present, but they harboured a rich fauna of Phasiinae and also *Peleteria rubescens* was numerous.

Another point of interest is that most species are represented only by few specimens, although I collected every specimen I could get into my net (except for the extremely numerous *Paykullia partenopea*). In fact, half of the species (33) were found only in single individuals, and only *Sarcophaga teretirostris*, *Rhacodinella apicata* and *Nemoraea pellucida* in 10 or more specimens.

The most abundant species of the families treated here was *Paykullia partenopea*. This species could be observed mainly on green leaves and on the branches of trees. The flies exhibited movements with the wings, apparently aimed at presenting the dark wing pattern. These movements were executed more rapidly while they were walking than while resting. They are similar to those observed in Ulidiidae and Sepsidae, and they may be a behaviour related to courtship. This hypothesis is supported by the fact that several pairs were seen *in copula*. However, the direct link between this behaviour and the onset of copulation was not observed. Later in the afternoon single females of *P. partenopea* were seen walking and flying around stony walls. From time to time they entered the cavities between the stones, apparently searching for suitable oviposition sites.

Acknowledgements

I would like to express my best thanks to Th. Pape (Stockholm) for the confirmations of the identifications of the Sarcophagidae and to H.P. Tschorsnig (Stuttgart) for his help in identifying the Tachinidae and Rhinophoridae. Furthermore I thank A. Heitzer for his company and assistance in the field and K. Tschudi-Rein for her

linguistic help.

References

Andersen, S. 1996. The Siphonini (Diptera: Tachinidae) of Europe. *Fauna Entomologica Scandinavica* **33**: 1-146.
Herting, B. 1993. Family Rhinophoridae. *In* Soós, A. & Papp, L., eds., *Catalogue of Palaearctic Diptera* **13**: 102-117.
Herting, B. & Dely-Draskovits, A. 1993. Family Tachinidae. *In* Soós, A. & Papp, L., eds., *Catalogue of Palaearctic Diptera* **13**: 118-458.
Minelli, A., Ruffo, S. & La Posta, S., eds. 1995. Checklist delle species della fauna italiana. Fasc. **66-78**. Calderini, Bologna.
Pape, T. 1996. Catalogue of the Sarcophagidae of the World (Insecta: Diptera). *Memoirs on Entomology, International* **8**. 558 pp.
Pape, T., Richter, V., Rivosecchi, L. & Rognes, K. 1995. Diptera Hippoboscoidea, Oestroidae. *In* Minelli, A., Ruffo, S. & La Posta, S., eds., Checklist delle species della fauna italiana, **78**. Calderini, Bologna.

Table 1. List of Sarcophagidae collected near Monterosso a. M. (Liguria, Italy)
Amobia signata (Mg., 1824) 1♂
Miltogramma taeniata Mg., 1824 1♂, 1♀
Sarcophaga (Bercaea) africa (Wied., 1824) 7♂♂
Sarcophaga (Helicophagella) agnata Rond., 1860 5♂♂
Sarcophaga (Helicophagella) hirticrus Pand., 1896 1♂
Sarcophaga (Helicophagella) melanura Mg., 1826 6♂♂
Sarcophaga (Heteronychia) haemorrhoa Mg., 1826 7♂♂
Sarcophaga (Heteronychia) pandellei (Rohd., 1937) 3♂♂
Sarcophaga (Liopygia) argyrostoma (R.-D., 1830) 1♂
Sarcophaga (Liopygia) crassipalpis Macq., 1839 7♂♂
Sarcophaga (Liosarcophaga) jacobsoni (Rohd., 1937) 2♂♂
Sarcophaga (Liosarcophaga) portschinskyi (Rohd., 1937) 3♂♂
Sarcophaga (Liosarcophaga) teretirostris Pand., 1896 17♂♂
Sarcophaga (Liosarcophaga) tibialis Macq., 1851 4♂♂
Sarcophaga (Myorhina) socrus Rond., 1860 1♂
Sarcophaga (Parasarcophaga) albiceps Mg., 1826 3♂♂
Sarcophaga (Robineauella) caerulescens Rohd., 1838 1♂
Sarcophaga (Rosellea) aratrix Pand., 1896 5♂♂
Sarcophaga s.str. lehmanni Mueller, 1922 1♂
Sarcophaga s.str. subvicina Rohd., 1937 1♂
Sarcophaga s.str. variegata (Scopoli, 1763) 1♂
Sarcophaga (Thyrsocnema) incisilobata Pand., 1896 4♂♂

Table 2. List of Rhinophoridae collected near Monterosso a. M. (Liguria, Italy)
Oplisa tergestina (Schiner, 1862) 7♂♂
Paykullia partenopea (Rond., 1861) 3♂♂, 3♀♀

Table 3. List of Tachinidae collected near Monterosso a. M. (Liguria, Italy)
Exoristinae
Exorista sp. (*rustica*-group) 1♀
Phorinia aurifrons R.-D., 1830 1♂
Gastrolepta anthracina (Mg., 1826) 1♀
Medina separata (Mg., 1824) 2♂♂
Compsilura concinnata (Mg., 1824) 2♂♂, 3♀♀
Vibrissina debilitata (Pand., 1896) 1♀
Paratryphera barbatula (Rond., 1859) 1♀
Paratryphera bisetosa (B. & B., 1891) 1♂
Nemorilla maculosa (Mg., 1824) 1♂
Epicampocera succincta (Mg., 1824) 1♀
Buquetia musca R.-D., 1847 1♂
Pseudoperichaeta nigrolineata (Walker, 1853) 2♂♂
Catagonia aberrans (Rond., 1859) 1♀
Senometopia sp. (*excisa*-group) 1♀
Platymya fimbriata (Mg., 1824) 1♀
Clemelis pullata (Mg., 1824) 2♀♀
Pales pavida (Mg., 1824) 1♂, 4♀♀
Erycilla rutila (Mg., 1824) 1♀
Rhacodinella apicata (Pand., 1896) 3♂♂, 7♀♀
Sturmia bella (Mg., 1824) 1♂, 1♀
Dolichocolon paradoxum B. & B., 1889 3♀♀
Prosopea nigricans (Egger, 1861) 1♀
Gaedia connexa (Mg., 1824) 2♀♀
Spallanzania multisetosa (Rond., 1859) 1♂
Tachininae
Tachina grossa (Linnaeus, 1758) 1♂
Peleteria rubescens (R.-D., 1830) 5♂♂
Nemoraea pellucida (Mg., 1824) 1♂, 9♀♀
Linnaemya lithosiophaga (Rond., 1859) 1♂
Linnaemya media Zimin, 1954 1♀
Linnaemya picta (Mg., 1824) 1♀
Chrysosomopsis aurata (Fallén, 1820) 4♀♀
Actia infantula (Rohd., 1844) 1♀
Peribaea minuta R.-D., 1830 1♂, 1♀
= *P. apicalis* auct. nec R.-D., 1863 (synonymy after Andersen, 1996)
Peribaea tibialis (R.-D., 1851) 1♂
Fischeria bicolor R.-D., 1830 1♀
Clausicella suturata Rond., 1859 2♀♀
Dexiinae
Billaea adelpha (Loew, 1873) 1♂
Thelaira solivaga (Harris, 1780) 1♂
Phasiinae
Ectophasia crassipennis (Fabricius, 1794) 1♂, 5♀♀
Phasia pusilla Mg., 1824 1♂, 3♀♀
Phasia obesa (Fabricius, 1798) 1♀
Cylindromyia intermedia (Mg., 1824) 3♂♂

PERSONAL NOTES

Jim O'Hara writes: I would like to point out several errors in a recent paper by myself and Monty Wood (1998, Can. Ent. **130**: 751-774; see Bibliography for full citation):

Page 754, "*Ateloglossa* Coquillett 1899, syn. of *Arctophyto* Townsend 1915". *Ateloglossa* is the older, and hence the valid, name for this genus.

Page 758, change "*Arctophyto* Townsend 1915" to "*Ateloglossa* Coquillett 1899".

Page 771, change "*Eumasicera coccidella* Townsend ... valid species of *Eumasicera* Townsend" to "*Eumasicera coccidella* Townsend ... valid species of *Houghia* Coquillett". *Eumasicera* is correctly cited as a synonym of *Houghia* on pages 761 and 762.

Page 771, change "*Exopalpus pompale* Reinhard" to "*Exopalpus pompalis* Reinhard".

Mehrdad Parchami-Araghi writes: In 1998 I started a Ph.D. program at the University of Guelph (Ontario, Canada) to study the "Systematics of *Chetogena* Rondani (Diptera: Tachinidae)" under the supervision of S. Marshall (Guelph) and J.E. O'Hara (Ottawa). The genus as currently recognized (including *Euphorocera*, *Diplostichus*, *Spoggosia* and *Stomatomyia*) comprises over 60 described species distributed throughout the world. The goal of my thesis is to review the monophyly of the genus, revise the Holarctic fauna (over 30 described species), and analyze the phylogenetic and zoogeographic relationships of the Holarctic species.

Please contact me at my address given in the Mailing List if you have *Chetogena* specimens available for loan from your institution or personal collection. All specimens will be returned with individual determination labels. It may be necessary to dissect the terminalia of certain specimens, in which case the abdomen will be removed and later re-attached to the specimen and the terminalia stored in glycerin in a microvial pinned below the specimen. I would like to thank Dr. O'Hara (CNC), Dr. Evenhuis (BPBM), Dr. Brooks (SNOW), Dr. Perkins (MCZ), and Dr. Woodley (USNM) for their loans of *Chetogena* specimens.

Penny Smith writes: We of the Biological Control research group of the Canadian Forestry Service in Sault Ste. Marie (Ontario) are studying interactions amongst gypsy moth natural enemies. Some of the interactions involve gypsy moth pathogens and the tachinid parasitoid, *Compsilura concinnata* (Meigen).

Theo Zeegers writes: The checklist of Dutch Tachinidae was published in the September issue of *Entomologische Berichten* (see Bibliography below). Since preparation of the checklist, two new species have been found in The Netherlands and can be added to the checklist: *Siphona collini* and *Carcelia kowarzi*.

In September - October I visited the Nepalese Himalaya's and collected some interesting Tachinidae. Some of them well known, some of them apparently belonging to yet undescribed genera. I hope to make some time to publish on this subject.

TACHINID BIBLIOGRAPHY

Each year I include here tachinid references I have found during the past year for the period 1980 to the present which have not appeared in previous issues of this newsletter. The complete bibliography is available on the WWW at http://res.agr.ca/ecorc/isbi/biocont/biblio.htm. I would be grateful if omissions or errors could be brought to my attention.

This year I take special pleasure in thanking Jaromír Vaňhara for providing me with a copy of his book entitled *Czech and Slovak dipterological literature 1986-1995*, in which are listed numerous references on the Tachinidae which I would not otherwise have found. I am also indebted to Rob Fairchild, a talented student assistant, who reorganized and checked my entire reference database such that all lists, whether in hardcopy or in HTML format on the WWW, are now generated through the software program ProCite©. I am grateful as well to research technician Doug Kritsch, who assisted in various ways with the compilation of the following list of references.

Aldrich, J.R., Leal, W.S., Nishida, R., Khrimian, A.P., Lee, C.J. and Sakuratani, Y. 1997. Semiochemistry of aposematic seed bugs. Entomologia Experimentalis et Applicata **84**: 127-135.

Aldrich, J.R., Zanuncio, J.C., Vilela, E.F., Torres, J.B. and Cave, R.D. 1997. Field tests of predaceous pentatomid pheromones and semiochemistry of *Podisus* and *Supputius* species (Heteroptera: Pentatomidae: Asopinae). Anais da Sociedade Entomológica do Brasil **26**: 1-14.

Ansari, M.M. and Jacob, T.K. 1997. Tachinid parasite - a potential bio-parasite to control rice ear bug. Journal of the Andaman Science Association **13**: 56-58.

Arretz, P., Lamborot, L., Guerrero, M.A. and Araya, J.E. 1994. Parasitism of eggs and larva of *Rachiplusia nu* (Guenee) (Lepidoptera: Noctuidae) on cultivated beans in the Metropolitan Region, Chile. [In Spanish.] Boletin de Sanidad Vegetal Plagas **20**: 909-917.

Barraclough, D.A. 1997. *Melanesomyia*, a tribally unplaced new genus of Dexiinae (Diptera: Tachinidae) from Indonesia

(Maluku) and Papua New Guinea, with description of two new species. Australian Journal of Entomology **36**: 345-350.

Barraclough, D.A. 1998. Type-species designation for "*Melanesomyia* Barraclough" (Diptera: Tachinidae). Australian Journal of Entomology **37**: 22.

Barraclough, D.A. and O'Hara, J.E. 1998. *Obscuromyia*, a remarkable new genus of the endemic Australian tribe Myiotrixini (Diptera: Tachinidae: Tachininae). Invertebrate Taxonomy **12**: 825-832.

Barták, M. 1995. Diptera communities of "Oseká" dump near Duchcov and its environment. Dipterologica Bohemoslovaca **7**: 5-16.

Barták, M. and Cepelák, J. 1991. Faunistic records from Czechoslovakia. Diptera, Tachinidae. Acta Ent. Bohemoslov. **88**: 40-42.

Barták, M., Tschorsnig, H.P. and Vanhara, J. 1997. [Faunistic records from the Czech and Slovak Republics: Diptera.] Tachinidae: Part 2. Folia Facultatis Scientiarium Naturalium Universitatis Masarykianae Brunensis, Biologia 95. Dipterologica bohemoslovaca **8**: 235-236.

Baumgarten, H.T. and Fiedler, K. 1998. Parasitoids of lycaenid butterfly caterpillars: different patterns in resource use and their impact on the hosts' symbiosis with ants. Zoologischer Anzeiger **236**: 167-180.

Beckage, N.E. 1985. Endocrine interactions between endoparasitic insects and their hosts. Ann. Rev. Entomol. **30**: 371-413.

Bergström, C. 1998. A tachinid fly, *Phytomyptera minutissima* (Zett.) (Diptera: Tachinidae), feeding directly from aphid honeydew. [In Swedish.] Ent. Tidskr. **119**: 101-103.

Bethke, J.A. and Redak, R.A. 1996. Seasonal occurrence of the herbivore *Trirhabda geminata* (Coleoptera: Chrysomelidae) on *Encelia farinosa* in southern California. Ann. Ent. Soc. Amer. **89**: 843-848.

Bloxham, M. 1997. Entomology report. Sandnats **19**: 13-15.

Bochev, N. and Georgiev, G.T. 1996. New parasitoids on the pine sawfly (*Diprion pini* L., Hymenoptera: Diprionidae) in Bulgaria. [In Bulgarian.] Nauka za Gorata **33**: 80-82.

Brushwein, J.R. and Childers, C.C. 1990. Parasitoids associated with the immature stages of *Selenisa sueroides* (Lepidoptera; Noctuidae). Florida Entomologist **73**: 337-339.

Burrows, D.W. and Balciunas, J.K. 1997. Biology, distribution and host-range of the sawfly, *Lophyrotoma zonalis* (Hym., Pergidae), a potential biological control agent for the paperbark tree, *Meleleuca quinquenervia*. Entomophaga **42**: 299-313.

Bystrowski, C. 1997. *Atylostoma tricolor* (Mik, 1883), a species new to the fauna of tachinid flies (Diptera: Tachinidae) of Poland. Fragmenta Faunistica **40**: 199-203.

Camillo, E., Garófalo, C.A. and Serrano, J.C. 1997. Biology of *Monobia angulosa* Saussure in trap nests (Hymenoptera: Vespidae: Eumeninae). [In Portuguese.] Anais da Sociedade Entomológica do Brasil **26**: 169-175.

Campadelli, G. 1997. Notes on the biology of *Vibrissina turrita* Meigen (Dipt. Tachinidae) on its host *Arge ochropus* Gmel. (Hym.: Argidae). [In Italian.] Boll. Ist. Entomol. "Guido Grandi", Univ. Bologna **51**: 161-170.

Cañas, L.A. and O'Neil, R.J. 1998. Applications of sugar solutions to maize, and the impact of natural enemies on fall armyworm. International Journal of Pest Management **44**: 59-64.

Capek, M., Kudler, J. and Martinek, V. 1989. Parasitoids of *Lymantria monacha* and *Rhyacionia buoliana* recorded on the territory of the CSSR. [In Russian.] Pp. 175-179. *In* International Organization for Biological Control of Noxious Animals and Plants, East Palaearctic Section, Moskva.

Cappuccino, N., Lavertu, D., Bergeron, Y. and Regniere, J. 1998. Spruce budworm impact, abundance and parasitism rate in a patchy landscape. Oecologia **114**: 236-242.

Cepelák, J. 1986. Höhere Zweiflügler (Diptera, Cyclorrhapha, Schizophora) der Hraškova Lúka und ihrer Umgebung. I. [In Slovak.] Rosalia, Nitra **3**: 193-209. [Publ. date 1987.]

Cepelák, J. 1986. Syrphidae, Eginiidae, Rhinophoridae, Tachinidae. Pp. 36-87, 251, 277-332, 342-356, 405, 411-424. *In* Cepelák J., ed., Diptera Slovenska **2**. Veda, Bratislava.

Cepelák, J. 1988. Weiterer Beitrag zur Kenntnis der höheren Zweiflüglern (Dipt., Brachycera) der Staatlichen Naturschutzreservation Hrdovickáim Naturschutzgebiete Ponitrie. [In Slovak.] Rosalia, Nitra **5**: 153-164.

Cepelák, J. 1989. Die Vertretung höherer Zweiflügler (Diptera, Brachycera) der Umgebung von Kurort Nimnica in der Frühlingsperiode. [In Slovak.] Entom. Probl., Bratislava **19**: 101-110.

Cepelák, J. 1990. Ergebnisse der Forschung des Vorkommens der Zweiflüglern an den östlichen Abhängen des Berges Vtácnik (Diptera, Brachycera) I. [In Slovak.] Rosalia, Nitra **6**: 273-282.

Cepelák, J. 1991. Diptera on the hill of Sitno. [In Slovak.] Biológia, Bratislava **46**: 535-543.

Cepelák, J. 1991. Ergebnisse der Forschung des Vorkommens der Zweiflüglern an den östlichen Abhängen des Berges Vtácnik (Diptera, Brachycera) II. [In Slovak.] Rosalia, Nitra **7**: 203-211.

Cepelák, J. 1992. Evaluation of the Diptera Brachycera material from the Protected Site Suchý vrch and the environs in the Vel'ká Fatra Mts. [In Slovak]. Ochrana prirody **1**: 339-344.

Cepelák, J. 1992. Höhere Zweiflügler (Diptera, Cyclorrhapha) aus dem Gebiete Vel'ký Lysec. [In Slovak.] Rosalia, Nitra **8**: 191-198.

Cepelák, J. 1992. The results of Šrámková nature reserve investigation and new knowledge from the territory of Malá Fatra National park. [In Slovak.] Entom. Probl., Bratislava **22**: 53-74.

Cepelák, J. 1992. Strecek jeleni (*Hypoderma actaeon*), kuklice (*Hyalurgus tomostethi*), kuklice (*Germaria angustata*), kuklice (*Gonia foersteri*). Pp. 126-127. *In* Škapec, L., ed., Red Data Book of Endangered and Rare Species of Plants and Animals of the CSFR. Invertebrates **3**.

Cepelák, J. 1997. [Faunistic records from the Czech and Slovak Republics: Diptera.] Tachinidae: Part 1. Folia Facultatis Scientiarium Naturalium Universitatis Masarykianae Brunensis, Biologia 95. Dipterologica bohemoslovaca **8**: 235.

Cepelák, J. and Cepelák, S. 1986. Bietrag zur Kenntnis der

Zweiflügler (Diptera) rumänischer Gebirge Retezat und Paring. [In Slovak.] Dipterologica Bohemoslovaca **4**: 53-56.

Cepelák, J. and Cepelák, S. 1986. Summarized results of surveys of two-winged flies (Diptera) from the region of the High Tatras. [In Slovak.] Zbor. prác o Tatr. nár. parku **27**: 59-81.

Cepelák, J. and Cepelák, S. 1987. Ergebnisse der Forschung der höheren Zweiflüglern (Diptera, Brachycera) im Gebirge Biele Karpaty I. Vel'ká Javorina. Biológia, Bratislava **42**: 1011-1019.

Cepelák, J. and Cepelák, S. 1991. Certain families of Diptera in Zobor. [In Slovak.] Zobor, Nitra **2**: 245-278.

Cepelák, J. and Cepelák, S. 1995. Erkenntnisse höheren Zweiflüglern aus dem Gebiete Donovaly (Diptera, Brachycera). Dipterologica Bohemoslovaca **7**: 33-36.

Cepelák, J. and Vanhara, J. 1997. Tachinidae. Pp. 100-106. *In* Chvála, M., ed., Check list of Diptera (Insecta) of the Czech and Slovak Republics. Karolinum - Charles University Press, Prague. 130 pp.

Cepelák, S. 1993. Ergebnisse der Orientations-Abfänge der Zweiflüglern (Diptera) an den ausgewählten Lokalitäten im Tríbec Gebirge. [In Slovak.] Rosalia, Nitra **9**: 173-179.

Chakraborty, N., Suresh, R., Bhattacharya, S.S., Sahakundu, A.K. and Das, N.K. 1996. Study of seasonal life tables for *Exorista bombycis* (Louis) (Diptera: Tachinidae), a parasitoid of the mulberry silkworm, *Bombyx mori*. Uttar Pradesh Journal of Zoology **16**: 123-128.

Chao, C.m. and Zhou, S. 1997. Diptera: Tachinidae. Pp. 1529-1552. *In* Yang, X., ed., Insects of the Three Gorge Reservoir area of Yangtze river. Part 2. [In Chinese.] Chongqing Publishing House, Chongqing, pp. i-x + 975-1847.

Chen, H., Zhao, R., Jin, G., Lu, X. and Li, C. 1997. Studies on the bionomics of *Cephalcia tianmua* Maa. [In Chinese.] Scientia Silvae Sinicae **33**: 279-282.

Chiriac, I. and Poiras, A. 1995. Notes on parasites of *Sitona* weevils (Coleoptera, Curculionidae) in the Republic of Moldova. Buletinul Academiei de Stiinte a Republicii Moldova Stiinte Biologice si Chimice 2 **275**: 38-45, 88.

Clark, T.L., Foster, J.E., Witkowski, J.F., Siegfried, B.D. and Spencer, T.A. 1997. Parasitoids recovered from European corn borer, *Ostrinia nubilalis* Hubner, (Lepidoptera: Pyralidae) larvae in Nebraska. Journal of the Kansas Entomological Society **70**: 365-367.

Corrales, J.F. and Epstein, M.E. 1997. Review of Costa Rican *Venadicodia*, with descriptions of two new species and localities for *V. ruthea* [*ruthaea*] (Lepidoptera: Limacodidae). Revista de Biologia Tropical **45**: 1093-1105.

Das, B.C. 1993. A new species of *Turanogonia* Rohdendorf (Diptera: Tachinidae) from Darjeeling Dist., West Bengal. Records of the Zoological Survey of India **91**: 49-51.

Denton, J. 1998. Two uncommon Tachinidae (Diptera) from Greater London. Dipterists Digest **5**: 94.

Deryugin, V.A. 1997. Abundance of the beneficial entomofauna. [In Russian.] Sakharnaya Svekla **4**: 20.

Dippel, C. and Hilker, M. 1998. Effects of physical and chemical signals on host foraging behavior of *Drino inconspicua* (Diptera: Tachinidae), a generalist parasitoid. Environmental Entomology **27**: 682-687.

Dirlbek, K. 1986. Fauna of Diptera on refuse depositions of communal waste in Prague. [In Czech.] Cas. Nár. Muz. **155**: 160-172.

Dirlbek, K. 1986. Species, daily frequency and succession of Diptera on refuse depositions of communal waste in Prague. [In Czech.] Dipterologica Bohemoslovaca **4**: 109-111.

Dirlbek, K. 1987. Solid communal waste dumps as breeding places of Diptera in the Prague agglomeration. Environmentalica **1**: 66-79.

Dirlbek, K. 1988. Conspicuous flies from the Zehunská obora State Nature Reserve. [In Czech.] Zprávy Cs. spol. entomol. CSAV, Praha **24**: 87-91.

Drees, M. 1997. Reports on heat loving Phasiinae from south Westphalia (Diptera: Tachinidae). [In German.] Entomologische Zeitschrift **107**: 64-68.

Dunk, K. von der and Tschorsnig, H.P. 1998. Zweiflügler aus Bayern XIII (Diptera, Tachinidae). Entomofauna **19**: 145-172.

Fain, A. and Baugnee, J.Y. 1996. Acariens phoretiques ou parasites recoltes sur des insectes du sud de la Belgique. Deuxieme note. Bulletin and Annales de la Societe Royale Belge d'Entomologie **132**: 19-33.

Falk, S. 1998. *Catharosia pygmaea* (Fallén) (Diptera: Tachinidae) new to Britain. Br. J. Nat. Hist. **11**: 1-5.

Farneti, R., Dindo, M.L. and Cristiani, G. 1997. *In vitro* rearing of the larval-pupal parasitoid *Archytas marmoratus* (Townsend) (Diptera: Tachinidae) on oligidic diets: preliminary results. Boll. Ist. Entomol. "Guido Grandi", Univ. Stud. Bologna **51**: 53-61.

Franz, H. 1989. Die Nordostalpen im Spiegel ihrer Landtierwelt. Eine Gebietsmonographie. Universitätsverlag Wagner, Innsbruck. Vol. VI (1) Diptera Orthorapha [sic], 413 pp. & Vol. VI (2) Diptera Cyclorapha [sic], 445 pp.

Fuester, R.W., Sandridge, P.T., Dill, N.H., McLaughlin, J.M., Peiffer, R.A., Taylor, P.B., Sigmon, J.O.D. and Newlon, C.J. 1997. Parasitism of gypsy moth (Lepidoptera: Lymantriidae) pupae on the Delmarva Peninsula with emphasis on *Coccygomimus disparis* (Hymenoptera: Ichneumonidae). Journal of Economic Entomology **90**: 1551-1559.

Gajdoš, P., Kalivodová, E. and Králiková, A. 1992. A survey of endangered, rare and protected animal species. Pp. 132-144. *In* Ruzicková, H., Halada, L. and Jedlicka, L., eds., Biotopy Slovenska. Príručka k mapovaniu a katalóg biotopov. [In Slovak.] Ústav kraj. ekol. SAV, Bratislava.

Ganeshan, S. and Rajabalee, A. 1996. The *Mythimna* spp. (Lepidoptera: Noctuidae) complex on sugarcane in Mauritius. Proceedings of the Annual Congress - South African Sugar Technologists' Association **70**: 15-17.

Gaponov, S. 1998. Evolution of egg structure in Tachinidae. Pp. 61-62. *In* Ismay, J.W., ed., Abstracts Volume, Fourth International Congress of Dipterology, Oxford. [Presentation not given at Congress.]

Gaponov, S.P. 1997. Tachinid-flies (Diptera, Tachinidae): the egg stage. [In Russian.] VINITI, No. 3694-B97. Moscow. 116 pp.

Gaponov, S.P. 1998. Morphology of egg surface in tachinid-flies from the tribes Eryciini and Blondeliini (Diptera, Tachinidae). [In Russian.] Russian Journal of Zoology **77**:

202-208.
Gorska, J. 1997. The structure and function of the tympanal organ of parasitic flies (Diptera: Tachinidae). [In Polish.] Wszechswiat **98**: 119-122.
Gramajo, M.C. 1997. Species of the tribe Ormiini (Diptera: Tachinidae) in the Miguel Lillo Institute. [In Spanish.] Revista Sociedad Entomologica Argentina **56**: 96.
Gross, H.R. Jr., Rogers, C.E. and Carpenter, J.E. 1996. Development of *Archytas marmoratus* (Diptera: Tachinidae) reared in *Galleria mellonella* larvae (Lepidoptera: Pyralidae) feeding on selected diets. Biological Control **6**: 158-163.
Hastings, A., Harrison, S. and McCann, K. 1997. Unexpected spatial patterns in an insect outbreak match a predator diffusion model. Proceedings of the Royal Society of London Series B Biological Sciences **264**: 1837-1840.
Hawkins, R. 1998. *Medina separata* (Meigen) (Diptera, Tachinidae) reared from *Calvia quattuordecimguttata* (Linnaeus) (Coleoptera, Coccinellidae). Dipterists Digest **5**: 94.
Heineck-Leonel, M.A. and Salles, L.A.B. 1997. Incidence of parasitoids and pathogens in adults of *Diabrotica speciosa* (Germ.) (Coleoptera: Chysomelidae) in Pelotas, RS. [In Portuguese.] Anais da Sociedade Entomológica do Brasil **26**: 81-85.
Hradetzky, R. and Kromp, B. 1997. Spatial distribution of flying insects in an organic rye field and an adjacent hedge and forest edge. Entomological research in organic agriculture. Selected papers from the European Workshop, Austrian Federal Ministry of Science and Research, Vienna, Austria, 14-16 March, 1995. Biological Agriculture and Horticulture **15**: 353-357.
Hunter, M.D., Malcolm, S.B. and Hartley, S.E. 1996. Population-level variation in plant secondary chemistry, and the population biology of herbivores. Chemoecology **7**: 45-56.
Ismay, J.W. 1998. *Ceromya flaviseta* (Villeneuve) (Diptera, Tachinidae) new to Britain. Dipterists Digest **5**: 28-29.
Jamil, K., Jyothi, K.N., Prasuna, A.L., Murty, U.S.N. and Persoons, C.J. 1997. *Trichopria khandalus* (Hym., Diapridae [Diapriidae]): a new biocontrol agent of the uzifly *Exorista bombycis* (Dipt., Tachinidae). Journal of Applied Entomology **121**: 99-102.
Jüngling, H. and Tschorsnig, H.P. 1998. Neue oder interessante Wirtsbefunde von Raupenfliegen (Dipt., Tachinidae) aus dem Wallis (Schweiz). Mitt. ent. V. Stuttgart **33**: 46.
Karban, R. and English-Loeb, G. 1997. Tachinid parasitoids affect host plant choice by caterpillars to increase caterpillar survival. Ecology **78**: 603-611.
Katsoyannos, P. and Aliniazee, M.T. 1998. First record of *Strongygaster triangulifera* (Loew) (Diptera: Tachinidae) as a parasitoid of *Harmonia axyridis* (Pallas) (Coleoptera: Coccinellidae) in western North America. Can. Ent. **130**: 905-906.
Keeping, M.G. 1997. Hyperparasitism and interspecific trophallaxis in a social wasp *Belonogaster juncea colonialis* Kohl (Hymenoptera: Vespidae). African Entomology **5**: 362-364.
Keese, M.C. 1997. Does escape to enemy-free space explain host specialization in two closely related leaf-feeding beetles (Coleoptera: Chrysomelidae)? Oecologia **112**: 81-86.
Kfir, R. 1997. Parasitoids of *Plutella xylostella* (Lep.: Plutellidae) in South Africa: an annotated list. Entomophaga **42**: 517-523. [Publ. date 1998.]
Kfir, R. 1998. Origin of the diamondback moth (Lepidoptera: Plutellidae). Ann. Ent. Soc. Amer. **91**: 164-167.
Kienzle, J., Zebitz, C.P.W. and Athanassov, Z.A. 1997. Parasitoids of leafroller species in apple orchards in southern Germany. [In German.] Mitteilungen der Deutschen Gesellschaft fuer Allgemeine und Angewandte Entomologie **11**: 247-249.
Kilic, N. and Alaoglu, O. 1996. Biology and parasitoids of the satin moth *Leucoma salicis* (L.) (Lepidoptera, Lymantriidae) a pest of poplar trees in Erzurum Province. [In Turkish.] Türkiye Entomoloji Dergisi **20**: 269-279.
Komonen, A. 1997. The parasitoid complexes attacking Finnish populations of two threatened butterflies, *Euphydryas maturna* and *E. aurinia*. [In Finnish.] Baptria (Helsinki) **22**: 105-109.
Kuhlmann, U., Carl, K.P. and Mills, N.J. 1998. Quantifying the impact of insect predators and parasitoids on populations of the apple ermine moth, *Yponomeuta malinellus* (Lepidoptera: Yponomeutidae), in Europe. Bull. Entomol. Res. **88**: 165-175.
Lanfranco, D., Ide, S., Rojas, E., Ruiz, C., Carrillo, R., Martinez, C., Jofre, P., Simeone, A., Schlater, R., Valencia, J.C. and Calderon, R. 1998. Biological control agents in the management of pine shoot moth: studies, findings and expectations. Biocontrol News and Information **19**: 33N-34N.
Liljesthröm, G. 1997. Persistence of *Trichopoda giacomellii* (Diptera: Tachinidae) during the hibernating period of the host, *Nezara viridula* (Hemiptera: Pentatomidae) in the northeast of Buenos Aires province. [In Spanish.] Revista Sociedad Entomologica Argentina **56**: 133-136.
Litt, R. 1997. Observations on some parasitic insects of butterflies (Lepidoptera/Rhopalocera). [In French.] Revue Vervietoise d'Histoire Naturelle **1997**: 33-36.
Liu, Y.h. and Chao, C.m. et al. 1998. Fauna of Tachinidae from Shanxi Province, China. [In Chinese.] Science Press, Beijing. 378 pp. + pls. I-XI.
Lopez, R., Ferro, D.N. and Elkinton, J.S. 1997. Temperature-dependent development rate of *Myiopharus doryphorae* (Diptera: Tachinidae) within its host, the Colorado potato beetle (Coleoptera: Chrysomelidae). Environ. Ent. **26**: 655-660.
Manjunatha, H.B. and Puttaraju, H.P. 1992. Preliminary studies on the cytology of spermatogenesis in the uzifly, *Exorista sorbillans* (India). Perspectives in Cytology and Genetics **7**: 911-916.
Manjunatha, H.B. and Puttaraju, H.P. 1996. Stages of oogenesis correlated with the age of the uzi fly, *Exorista sorbillans* (Diptera: Tachinidae). Sericologia **36**: 107-118.
Manjunatha, H.B. and Puttaraju, H.P. 1997. Association of chromosomes during spermatogenesis in the uzi fly, *Exorista sorbillans* (Diptera: Tachinidae). Cytobios **89**: 81-88.
Marchesini, E., Tosi, L. and Galbero, G. 1998. Natural enemies

of *Hyphantria cunea* in Veneto. [In Italian.] Informatore Agrario **54**: 115-11 [?page error].

Mariau, D. 1997. Rôle des parasitoïdes dans le contrôle des défoliateurs du palmier à huile. Plantations, Recherche, Développement **4**: 297-303.

Maron, J.L. and Harrison, S. 1997. Spatial pattern formation in an insect host-parasitoid system. Science **278**: 1619-1621.

Martinek, V. 1988. Outbreak of a new pest, *Cephalcia falleni*, as a consequence of ecosystem deterioration in mountain spruce forests by immissions. [In Czech.] Aktuálne problémy ochrany biosféry CSSR, zborník referátov z celoštátnej konferencie, Brno 1988. VŠLD Zvolen, pp. 105-110.

Martinek, V. 1990. Parasites of web-spinning sawflies of the *Cephalcia* Pz. genus (Hym., Pamphilidae) in the CR. Part V- Represention of larval parasites in the spectrum of natural enemies. [In Czech.] Lesnictví **36**: 201-220.

Martinek, V. 1991. An outbreak of the web-spinning sawfly *Cephalcia arvensis* Panz. (Hym., Pamphilidae) in eastern Bohemia. [In Czech.] Lesnictví **37**: 543-570.

Martinek, V. 1994. Study of forest fauna of Diptera (Diptera-Brachycera) in the valley of the Metuje river near Nové Mesto and Metují. [In Czech.] Lesnictví **40**: 29-37.

Mason, P.G., Arthur, A.P., Olfert, O.O. and Erlandson, M.A. 1998. The bertha armyworm (*Mamestra configurata*) (Lepidoptera: Noctuidae) in western Canada. Can. Ent. **130**: 321-336.

McFadyen, R.E. 1997. Parasitoids of the arctiid moth *Pareuchaetes pseudoinsulata* (Lep.: Arctiidae), an introduced biocontrol agent against the weed *Chromolaena odorata* (Asteraceae), in Asia and Africa. Entomophaga **42**: 467-470.

Mellini, E. and Campadelli, G. 1997. A study of the superparasitoidism of *Exorista larvarum* (L.) in the factitious host *Galleria mellonella* L. [In Italian.] Boll. Ist. Entomol. "Guido Grandi", Univ. Bologna **51**: 1-11.

Mellini, E., Campadelli, G. and Gardenghi, G. 1997. Pabulum inoculation techniques for the *in vitro* rearing of the parasitoid *Exorista larvarum* (L.). [In Italian.] Boll. Ist. Entomol. "Guido Grandi", Univ. Bologna **51**: 37-51.

Molinari, A.M. and Delia, S.A. 1997. Contribution to the knowledge of the tachinid (Diptera) parasitoids of leaf cutters (Lepidoptera) on soybean crop. [In Spanish.] Revista Sociedad Entomologica Argentina **56**: 131-136.

Mondor, E.B. and Roland, J. 1997. Host locating behaviour of *Leschenaultia exul* and *Patelloa pachypyga*: two tachinid parasitoids of the forest tent caterpillar, *Malacosoma disstria*. Entomologia Experimentalis et Applicata **85**: 161-168.

Moura, J.I.L., Mariau, D. and Delabie, J.H.C. 1994. Control strategy against *Amerrhinus ynca* Sahlb. 1823 (Coleoptera: Curculionidae), coconut (*Cocos nucifera* L.) leaf rachis borer in Brazil. [In Spanish.] Oléagineux (Paris) **49**: 222-226.

Munro, V.M.W. 1997. *Eutorna phaulocosma* Meyrick (Lepidoptera: Oecophoridae), a new host for the introduced Australian parasitoid *Trigonospila brevifacies* Hardy (Diptera: Tachinidae). New Zealand Entomologist **20**: 71-72.

Nakai, M., Takeda, M. and Kunimi, Y. 1997. Seasonal changes in prevalence of viral disease and parasitism by parasitic insects in a larval population of the smaller tea tortix, *Adoxophyes* sp. (Lepidoptera: Tortricidae) in a tea field. Applied Entomology and Zoology **32**: 609-615.

Narayanaswamy, K.C., Devaiah, M.C. and Govindan, R. 1994. Mating behavior of uzi fly, *Exorista bombycis* (Louis) (Diptera: Tachinidae), a parasitoid of silkworm *Bombyx mori* L. Annals of Entomology (Dehra Dun) **12**: 37-43.

Negi, B.K., Barah, A., Siddiqui, A.A. and Sengupta, A.K. 1993. *Cricula trifenestrata* - a new alternate host of *Blepharipa zebina* Walker (Diptera: Tachinidae). Annals of Entomology (Dehra Dun) **11**: 71-72.

Negi, B.K., Sengupta, A.K. and Srivastava, A.K. 1994. Observations on the seasonal incidence of uzi fly (Tachinidae: Diptera) infestation in various muga crops. Annals of Entomology (Dehra Dun) **12**: 89-90.

Negm, F.H., Salem, M.M. and El-Bassiouny, M.M. 1997. Abundance and fluctuations of insect population of order Diptera at Al-Arish region, north of Sinai. Annals of Agricultural Science, Moshtohor **35**: 1005-1011.

Nirmala, M.R. and Veeranna, G. 1997. Studies on the age specific fecundity and intrinsic rate of natural increase in gregarious parasitoids of uzi fly *Exorista bombycis* (Louis). Proceedings of the Indian National Science Academy Part B Biological Sciences **63**: 41-44.

O'Hara, J.E. 1996. The tachinid taxa of Louis P. Mesnil, with notes on nomenclature (Insecta: Diptera). Can. Ent. **128**: 115-165.

O'Hara, J.E. 1998. Systematics and the World Wide Web: an information system on the Tachinidae for the 21st Century. Pp. 161-162. *In* Ismay, J.W., ed., Abstracts Volume, Fourth International Congress of Dipterology, Oxford.

O'Hara, J.E. and Wood, D.M. 1998. Tachinidae (Diptera): nomenclatural review and changes, primarily for America north of Mexico. Can. Ent. **130**: 751-774.

Papp, L. and Adam, L. 1996. High insect diversity in a poor habitat (dry sheep-runs in Hungary). Folia Entomologica Hungarica **57**: 171-196.

Parchami-Araghi, M. and Malkeshi, H. 1997. Introduction of *Drino inconspicua* (Mg.), (Dip: Tachinidae), as parasitoid of *Theretra alecto* L. larva in Iran. Applied Entomology and Phytopathology **64**: Ar73.

Parry, D., Spence, J.R. and Volney, W.J.A. 1997. Responses of natural enemies to experimentally increased populations of the forest tent caterpillar, *Malacosoma disstria*. Ecological Entomology **22**: 97-108.

Piekarska-Boniecka, H. 1996. The leaf-rollers (Lepidoptera, Tortricidae) and their parasitoids (Hymenoptera, Ichneumonidae) occuring in plantations of black currant (*Ribes nigrum* L.) in the environs of Poznan. [In Polish.] Wiadomosci Entomologiczne **15**: 241-247. [Publ. date 1997.]

Pillai, G.B. and Nair, K.R. 1995. Superiority of the solitary parasitoids over gregarious species in the biological suppression of the coconut caterpillar, *Opisina arenosella* Walker. Journal of Plantation Crops **23**: 19-27.

Plana, L., Alemán, J., Fernández, M., Vidal, M., Llanes, G. and

Miranda, I. 1997. Control of birth in mass rearing of *Lixophaga diatraeae* (Town.) (Diptera: Tachinidae). Revista de Protección Vegetal **12**: 151-154.

Plant, C.W. and Smith, D. 1997. *Clytiomyia continua* (Diptera, Tachinidae) confirmed as a British species. Dipterists Digest (2nd Series) **4**: 22-23.

Poong, L.H., Kim, O.S. and Kim, J.T. 1981. Studies on natural enemies parasiting [sic] overwintering fall webworm pupae, *Hyphantria cunea* Drury and way of protection for parasitoids. [In Korean.] Korean Journal of Entomology **11(2)**: 11-16.

Proshold, F.I., Gross, H.R. Jr. and Carpenter, J.E. 1998. Inundative release of *Archytas marmoratus* (Diptera: Tachinidae) against the corn earworm and fall armyworm (Lepidoptera: Noctuidae) in whorl-stage corn. J. Entomol. Sci. **33**: 241-255.

Puttaraju, H.P. and Manjunatha, H.B. 1994. Differentiation of cystocytes in *Exorista sorbillans*. Asia Pacific Journal of Molecular and Biotechnology **2**: 247.

Puttaraju, H.P. and Manjunatha, H.B. 1996. Spermatogenesis in *E. sorbillans* as revealed by light and EM. Molecular Biology of the Cell **7, No. SS**: 731.

Puttaraju, H.P. and Shivashakarappa, L.H. 1995. Application of the diflubenzuron to control the uzi fly, *Exorista bombycis* Louis (= *Exorista sorbillans*) (Diptera: Tachinidae). Sericologia **35**: 755-758.

Puttaraju, H.P. and Venkatachalapathy, K.N. 1996. C heterochromatin distribution in the somatic chromosomes of the uzi fly *E. sorbillans*. Proc. 10th Int. Cong. of Histochemistry and Cytochemistry (Kyoto, Japan): 255-258.

Quednau, F.W. and Lamontagne, K. 1998. Principles of mass culture of the gypsy moth parasitoid *Ceranthia samarensis* (Villeneuve) Canadian Forest Service, Laurention Forestry Centre, Information Report LAU-X-121, 24 pp.

Reitz, S.R. and Trumble, J.T. 1997. Effects of linear furanocoumarins on the herbivore *Spodoptera exigua* and the parasitoid *Archytas marmoratus*: host quality and parasitoid success. Entomologia Experimentalis et Applicata **84**: 9-16.

Richmond, J.A., Werner, R.A. and Drooz, A.T. 1995. Larch sawfly, *Pristiphora erichsonii* (Hymenoptera: Tenthredinidae) and its parasitoids from Alaska. Journal of the Entomological Society of British Columbia **92**: 25-27.

Richter, V.A. 1998. *Chetogena filipalpis* Rondani from the vicinity of the Karadag Nature Reserve, Crimea (Diptera: Tachinidae). Zoosystematica Rossica **7**: 152.

Richter, V.A. 1998. New and little known species of tachinids (Diptera, Tachinidae) of the fauna of Russia and neighbouring countries. [In Russian.] Entomol. Obozr. **77**: 704-712.

Richter, V.A. 1998. On a remarkable distribution of two pairs of related species in Palearctic tachinids (Tachinidae). Pp. 183-184. *In* Ismay, J.W., ed., Abstracts Volume, Fourth International Congress of Dipterology, Oxford.

Richter, V.A. 1998. The tachinid genus *Hasmica* new to the fauna of Pakistan (Diptera: Tachinidae). Zoosystematica Rossica **7**: 162.

Risco-Briceno, S.H. 1996. Historical successes of tachinid flies and braconid wasps in biological control of *Diatraea* borers of sugarcane in America. [In Spanish.] Revista Peruana de Entomologia **39**: 85-90. [Publ. date 1997.]

Rodriguez, S. and Rafael, L. 1997. Notes on the natural history of two *Ozophora* bugs (Heteroptera: Lygaeidae) in Costa Rica. Journal of the Kansas Entomological Society **70**: 203-206.

Rognes, K. 1997. The Calliphoridae (blowflies) (Diptera: Oestroidea) are not a monophyletic group. Cladistics **13**: 27-66.

Rohácek, J. and Vanhara, J. 1995. Tachinidae. Pp. 197-204. *In* Rohácek, J., Starý, J., Martinovský, J. and Vála, M., eds., Diptera of the Bukovské Hills. [In Slovak.] Správa CHKO a BR Východné Karpaty, Humenné.

Rozkošný, R. 1988. Interesting dipterological records from Hády Mt. at Brno. [In Czech.] Práce z oboru botaniky a zoologie (1984-1988), Brno 19-21.

Rozkošný, R., Gaisler, J. and Trnka, P. 1987. The importance of animals in the agricultural landscape. [In Czech.] Acta Univ. Agric. Brno (B) **2**: 53-66.

Rozkošný, R. and Vanhara, J. 1993. Diptera Brachycera of agricultural landscape in southern Moravia. (Preliminary report). Dipterologica Bohemoslovaca **5**: 87-91.

Rozkošný, R. and Vanhara, J. 1994. Diptera Brachycera of the agricultural landscape in southern Moravia: faunistic and biogeographical aspects Scripta Fac. Sci. Nat. Univ. Masar. Brun., **22-23** (1992-1993) (Biol.): 85-97.

Rozkošný, R. and Vanhara, J. 1995. Monitoring Diptera in southern Moravia by pitfall traps. Dipterologica Bohemoslovaca **7**: 143-157.

Sajap, A.S., Wahab, Y.A. and Murshidi, A. 1997. An outbreak of *Ericeia ? subcinerea* Snellen (Lepidoptera: Noctuidae), new pest of *Acacia mangium.* MAPPS Newsletter **20**: 5.

Sannino, L. and Espinosa, B. 1998. Biological cycle of *Mamestra brassicae* and damage to horticultural crops in Campania. [In Italian.] Informatore Fitopatologico **48**: 59-67.

Santos, C.H. and Panizzi, A.R. 1997. Tachinid parasites of adult *Megalotomus parvus* West. (Hemiptera: Alydidae). Anais da Sociedade Entomologica do Brasil **26**: 577-578.

Sehnal, P. 1998. A new species of *Borgmeiermyia* Townsend, 1935, from Paraguay (Insecta: Diptera: Tachinidae). Ann. Naturhist. Mus. Wien **100**: 349-354.

Shepard, B.M. and Barrion, A.T. 1998. Parasitoids of insects associated with soybean and vegetable crops in Indonesia. J. Agric. Entomol. **15**: 239-272.

Shilenkov, V.G. and Richter, V.A. 1998. Notes on biology of some Siberian tiger-moths (Lepidoptera: Arctiidae) and their parasitoids (Diptera: Tachinidae). Zoosystematica Rossica **7**: 192.

Shima, H. 1998. Problems of the systematic treatment of *Carcelia* Robineau-Desvoidy and related genera (Tachinidae). Pp. 204. *In* Ismay, J.W., ed., Abstracts Volume, Fourth International Congress of Dipterology, Oxford.

Shima, H. 1998. Taxonomic notes on Oriental Tachinidae (Insecta: Diptera) II: genus *Thecocarcelia* Townsend. Bulletin of the Graduate School of Social and Cultural Studies, Kyushu University **3**: 147-160.

Shivashakarappa, L.H. and Puttaraju, H.P. 1994. Effect of diflubenzuron on the ovarian development of the uzi fly, *Exorista bombycis* Louis (*Exorista sorbillans*) (Diptera: Tachinidae). Mendel **11**: 101-102.

Shivashakarappa, L.H. and Puttaraju, H.P. 1995. Application of diflubenzuron in aqueous form to induce sterility in the uzi fly, *Exorista sorbillans*, a feasibility study. Perspectives in Cytology and Genetics **8**: 339-349.

Shivashakarappa, L.H. and Puttaraju, H.P. 1995. Effects of diflubenzuron on the reproduction of uzi fly, *Exorista bombycis* (= *Exorista sorbillans*) (Diptera: Tachinidae). Sericologia **35**: 763-766.

Silva, F.M.A., Fowler, H.G. and Lemos, R.N.S. 1997. Parasitism of fall armyworm, *Spodoptera frugiperda* (Smith), in the Triangulo Mineiro region, MG. [In Portuguese.] Anais da Sociedade Entomológica do Brasil **26**: 235-241.

Singh, R.N. and Sinha, S.S. 1996. Demonstration of the kairomonal activity in the pupae of uzifly to its parasitoid. Indian Journal of Sericulture **35**: 73-75.

Singh, R.N. and Thangavelu, K. 1996. Biological characteristics of *Trichomalopsis apanteloctena* Crawford - a parasitoid of *Blepharipa zebina* Walker. Indian Journal of Sericulture **35**: 62-63.

Sinha, U.S.P., Banerjee, N.D., Singh, R.N. and Sinha, S.S. 1997. Effect of uzi fly *Blepharipa zebina* (Walker) on the haemolymph free amino acids of tasar silkworm *Antheraea mylitta* Drury. Proceedings of the National Academy of Sciences India Section B (Biological Sciences) **67**: 133-136.

Sisojevic, P. and Cepelák, J. 1987. Contribution to the fauna of parasitic flies (Diptera; Tachinidae) of Jakovacki Kljuc (Srem, Northern Serbia). [In Serbian.] Proc. Fauna of SR Serbia **4**: 117-158.

Sisojevic, P., Cepelák, J. and Gorše, B. 1991. Contribution to the fauna of Tachinidae (Diptera) of Palic and Deliblato. [In Serbian.] Bull. Nat. Hist. Mus., Belgrade **46**: 151-156.

Sisojevic, P., Cepelák, J. and Slamecková, M. 1986. Contribution to the fauna of higher flies (Diptera: Sarcophagidae, Rhinophoridae, Tachinidae) of Macedonia. [In Serbian.] Biosistematika **12**: 139-154.

Sivaprakasam, N. 1997. Parasitoids of fruit-borer (*Helicoverpa armigera*) of tomato (*Lycopersicon esculentum*) in Tamil Nadu. Indian Journal of Agricultural Sciences **67**: 177.

Skrzypczynska, M. 1998. Insect pests and their parasitoids inhabiting cones of fir *Abies alba* Mill. in Poland. Anzeiger fuer Schaedlingskunde Pflanzenschutz Umweltschutz **71**: 50-52.

Slamecková, M. and Cepelák, J. 1995. The new and interesting finds of flies (Diptera, Brachycera) from the territory of the Low Tatras. [In Slovak.] Acta Zootech. Univ. Agric. **1995**: 133-139.

Smith, M.N. 1998. *Ernestia puparum* (Fabricius) (Diptera, Tachinidae) in Berkshire. Dipterists Digest **5**: 82.

Stadler, T. and Schang, M.M. 1994. Life cycle of *Acaulona brasiliana* Townsend, 1937 (Diptera: Tachinidae), parasitoid of the "cotton stainer" *Dysdercus albofasciatus* Berg, 1878 (Heteroptera: Pyrrhocoridae). [In Spanish.] Boletin de Entomologia Venezolana **9**: 193-198.

Straka, V. 1992. Diptera. Pp. 196-198. *In* Kuca, P., Májsky, J., Kopecek, F. and Jongepierová, I., eds., Biele Karpaty Mts, a landscape protected area. [In Slovak.]

Streito, J.C. and Nibouche, S. 1997. First observations on the parasitoids associated with lepidopterous pests of cotton in Burkina Faso. Entomophaga **42**: 543-557. [Publ. date 1998.]

Szeoke, K. and Szendrey, L. 1997. Damage by bright line clover moth (*Discestra trifolii* Hufnagel 1766) in sugarbeet and maize. [In Hungarian.] Novenyvedelem **33**: 395-397.

Tachi, T. and Shima, H. 1998. Revision of the genus *Peribaea* Robineau-Desvoidy of Japan (Tachinidae). Pp. 228-229. *In* Ismay, J.W., ed., Abstracts Volume, Fourth International Congress of Dipterology, Oxford.

Tachi, T. and Shima, H. 1998. A systematic study of the genus *Actia* Robineau-Desvoidy of Japan (Diptera: Tachinidae). Entomological Science **1**: 441-463.

Tanaka, C., Tainoh, Y. and Honda, H. 1999. Comparison of oviposition on host larvae and rubber tubes by *Exorista japonica* Townsend (Diptera: Tachinidae). Biological Control **14**: 7-10.

Tereshkin, A.M. and Lobodenko, Y.S. 1997. Some results on rearing entomophagous insects in Belarus. [In Russian.] Vyestsi Akademii Navuk Byelarusi Syeryya Biyalahichnykh Navuk **3**: 99-103, 127.

Terkanian, B. 1997. Cultivating a caterpillar parasitoid. Pp. 69-71. *In* Sonoran Arthropod Studies Institute. 1997 Invertebrates in Captivity Conference. July 31 - August 3, 1997. Tucson, Arizona. Sonoran Arthropod Studies Institute, Tucson, Arizona, pp. i-vi + 1-196.

Tschorsnig, H.P. 1997. Gezogene Raupenfliegen (Diptera, Tachinidae) aus der Sammlung Karl Burmann im Tiroler Landesmuseum Ferdinandeum. Veröffentlichungen des Tiroler Landesmuseums Ferdinandeum **77**: 293-296.

Tschorsnig, H.P. 1997. Raupenfliegen-Zuchtbefunde und einige bemerkenswerte faunistische Angaben aus der Sammlung Rudolf Gauss (Diptera: Tachinidae). Mitt. ent. V. Stuttgart **32**: 79-82.

Tschorsnig, H.P. 1998. Beiträge zur Tachiniden-Fauna Tirols (Insecta: Diptera). Ber. nat.-med. Verein Innsbruck **85**: 333-337.

Tschorsnig, H.P. 1998. Catálogo de los taquínidos de Aragón (Diptera: Tachinidae) Catalogus de la Entomofauna Aragonesa **17**: 9-12.

Tschorsnig, H.P. and Herting, B. 1998. A new species of the genus *Meigenia* Robineau-Desvoidy (Diptera: Tachinidae). Stutt. Beitr. Naturk. (A) **569**: 1-5.

Tschorsnig, H.P. and Herting, B. 1998. Tachinidae. Pp. 343-356. *In* Merz, B., Bächli, G., Haenni, J.P. and Gonseth, Y., eds., Diptera - Checklist. Fauna Helvetica 1. 369 pp.

Tschorsnig, H.P. and Pujade, J. 1997. Records of Tachinidae (Diptera) from Andorra with the description of a new species. Revta. aragon. ent. **7**: 213-220.

Valenti, M.A., Berryman, A.A. and Ferrell, G.T. 1997. Life history and behavior of *Synaxis cervinaria* (Geometridae), a defoliator of *Arctostaphylos patula* (Ericaceae). Journal of the Lepidopterists' Society **51**: 333-343.

Vanhara, J. and Rozkošný, R. 1997. Czech and Slovak dipterological literature 1986-1995. Folia Facultatis Scientiarium Naturalium Universitatis Masarykianae Brunensis, Biologia **96**. 170 pp.

Venkatachalapathy, K.N. and Puttaraju, H.P. 1995. Characterization of somatic chromosomes in the uzi fly, *Exorista sorbillans* by G.R. and AgNO3 staining. Perspectives in Cytology and Genetics **8**: 273-279.

Verdcourt, B. 1998. *Phasia hemiptera* (F.) (Dipt., Tachinidae) at Maidenhead, Berks. Entomologist's Monthly Magazine **134**: 43.

Woodley, N.E. 1998. A revision of the genus *Pararchytas* Brauer and Bergenstamm (Diptera: Tachinidae). Proc. Entomol. Soc. Wash. **100**: 409-420.

Yurshenko, G.I. and Turova, G.I. 1998. On biology of the tachinid-fly *Carcelia matsukarehae* Shima (Diptera, Tachinidae) in Primorye Territory. Far Eastern Entomologist **52**: 7-8.

Zaharieva-Pentcheva, A. and Georgiev, G.T. 1997. Parasitoids of the satin moth *Stilpnotia salicis* (L.) (Lepidoptera Lymantriidae) in Bulgaria. Bollettino di Zoologia Agraria e di Bachicoltura **29**: 81-89.

Zeegers, T. 1997. Book Review of "The Siphonini (Diptera: Tachinidae) of Europe" by S. Andersen (1996). Tijdschrift voor Entomologie **140**: 249.

Zeegers, T. 1998. An annotated checklist of the Dutch tachinid flies (Diptera: Tachinidae). Ent. Ber., Amst. **58**: 165-200.

Zeegers, T. 1998. On the difference in the period of flight between males and females of Tachinidae. Pp. 257-258. *In* Ismay, J.W., ed., Abstracts Volume, Fourth International Congress of Dipterology, Oxford.

Zeegers, T. 1998. On the Tachinidae of The Netherlands. Pp. 258-259. *In* Ismay, J.W., ed., Abstracts Volume, Fourth International Congress of Dipterology, Oxford.

Zhao, J.m. and Yuan, S.y. 1996. A new species of the genus *Linnaemya* from Gansu, China (Diptera: Tachinidae). Acta Zootaxonomica Sinica **21**: 229-231.

Ziegler, J. 1992. Bemerkenswerte Raupenfliegen (Diptera, Tachinidae) aus dem Tríbec-Gebirge. Rosalia, Nitra **8**: 215-221.

Ziegler, J. 1998. Die Morphologie der Puparien und der larvalen Cephalopharyngealskelette der Raupenfliegen (Diptera, Tachinidae) und ihre phylogenetische Bewertung. Studia Dipterologica. Supplement **3**, 244 pp.

Ziegler, J. 1998. Larval cephalo-pharyngeal skeletons and puparia of tachinid flies (Tachinidae) - two morphological complexes of phylogenetic significance. Pp. 259-260. *In* Ismay, J.W., ed., Abstracts Volume, Fourth International Congress of Dipterology, Oxford.

Ziegler, J. 1998. Raupenfliegen -seit RATZEBURG ein Forschungsthema in Eberswalde. Ein Bericht aus dem Deutschen Entomologischen Institut. Eberswalder Jahrbuch für Heimat-Kultur-und Naturgeschichte **1998/99**: 273-281.

Ziegler, J. 1998. Rote Liste der Raupenfliegen des Landes Sachsen-Anhalt. *In* Rote Listen Sachsen-Anhalt, Teil IV. Berichte des Landesamtes für Umweltschutz Sachsen-Anhalt **30**: 66-68.

Zuk, M., Rotenberry, J.T. and Simmons, L.W. 1998. Calling songs of field crickets (*Teleogryllus oceanicus*) with and without phonotactic parasitoid infection. Evolution **52**: 166-171.

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