CHIRONOMUS

NEWSLETTER OF CHIRONOMID RESEARCH

Editor: **Ulrike Nolte**

Production editor: **Richard K. Johnson**
University of Agricultural Sciences, Sweden

Treasurer: **Trond Andersen**
University of Bergen, Norway

No. 7 **April, 1995**

Report on the Third International Congress of Dipterology

by J.H. Epler

From Sunday night, 14 August 1994, until Friday, 19 August, fly workers from around the world swarmed around the University of Guelph in Guelph, Ontario, Canada, for the Third International Congress of Dipterology. Over 260 scientists made up this assemblage, with more than 10% consisting of workers who have published on or are working with Chironomidae. Chironomid people came from Australia, Austria, Belgium, Brazil, Canada, Denmark, Israel, Italy, Japan, Russia, Sweden and the United States to enjoy the beautiful weather and hospitality that Canada had to offer (much better than Florida in August!!). For some of us who have missed one or two of the last chironomid symposia, it was a welcome chance to talk with colleagues we haven't seen for a while.

The Congress was divided into several concurrent sections; the largest section (lasting the whole day on Thursday) was the Chironomidae section! A total of 26 papers and poster-papers directly concerning Chironomidae were presented during the Congress (listed at the end of this report). **Ian Walker** has arranged to have the Chironomidae papers from the Congress published as a special issue of HYDROBIOLOGIA.

Believe it or not, there actually were several interesting papers on Diptera other than Chironomidae. Especially interesting were two papers in the "Advances in Systematics of the Nematocera" section in which the current phylogenetic position of the Tipulidae was considered in a different light based on previously unused characters. A "spirited" discussion followed these two papers!

continued on page 4

about *CHIRONOMUS*

Editorial

I'm about to leave Brazil because my time as a guest lecturer at the Federal University of Mato Grosso is over. Joining again the group of "independent biologists", to adopt this euphemistic term, I have started to look for an appropriate address for the editorial office of the *CHIRONOMUS* newsletter.

Dr. Peter Cranston spontaneously agreed with the idea that his office may host *CHIRONOMUS* for a while. Colleagues who know Pete's office will appreciate this kind offer as well as I do: It is full with piles of manuscripts and figures, mounts of slides, books, reprints, news, and any information a chironomid worker can imagine, and, certainly has an e-mail address - so *CHIRONOMUS* finally gets hooked up to the Internet!! I already know by now that the newsletter will profit a lot from this centre of worldwide information interchange. Beyond this, I am happy to be able to join CSIRO's Division of Entomology in Canberra as a guest scientist for a few months and work together with Peter Cranston.

Please, send all correspondence and contributions for the next issue of *CHIRONOMUS* to this address:

Dr. Ulrike Nolte
c/o Dr. Peter S. Cranston
Division of Entomology, CSIRO
P.O.Box 1700
Canberra, ACT 2601 (Australia)
Fax +61 6 246 4000
e-mail petercr@ento.csiro.au

Ulrike Nolte

CONTENTS

The new Regional Representative for **Brazil** is:

Mirian A. da Silva Serrano
Laboratório de Entomologia - IB
Universidade Federal de Mato Grosso
Avenida Fernando Correa s/n
78060-900 Cuiabá - MT
phone: (065) 315 8872

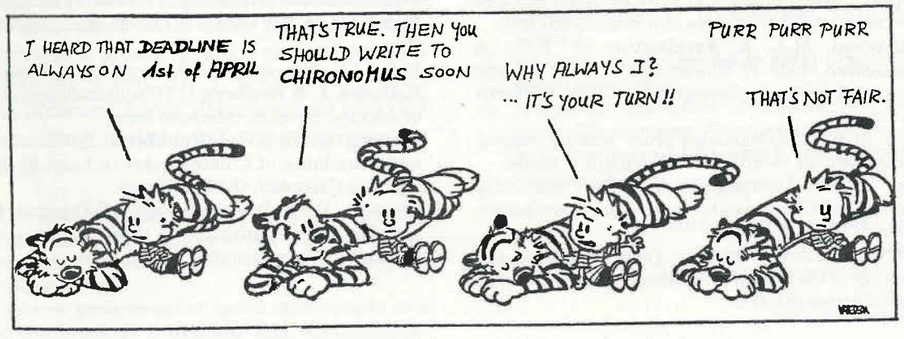
Financial report 1994

The 31 December 1994 the newsletter account showed a balance of NOK 20,158 (i.e. approximately USD 3,278). About NOK 10,545 was money transferred from 1993. At the 12th chironomid symposium in Canberra, contributions paid to the treasurer amounted to NOK 4,275. In addition, a few contributions from subscribers have arrived. In 1994 we also got a contribution of NOK 7,778 from Dr. Kees Davids and Dr. Wouter van de Bund, Dept. of Pure and Applied Ecology, University of Amsterdam, which was the surplus from the 11th chironomid symposium in Amsterdam 1991, a contribution which we appreciate highly. The cost of issuing *CHIRONOMUS* No.6 amounted to NOK 3,846.

All *CHIRONOMUS* readers who have yet to pay for the forthcoming subscription period (1995, 96, 97) are asked to send the equivalent of USD $20 either to their regional representative or directly to the newsletter account.

Trond Andersen
treasurer

CHIRONOMUS
Bank Account No. 8225.40.82518
Union Bank
Lars Hilles gt. 15
5008 Bergen (Norway)



Reports from chironomid meetings

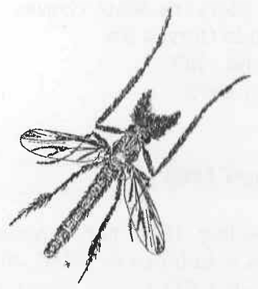
(continued from page 1)

Also interesting was Tuesday night's section, "Diptera Databases, Nomenclature, and Biodiversity Inventory". Copies of the *Resource Directory for Diptera Systematics. Part I - Workers*, by F. Christian Thompson & Neal L. Evenhuis, was distributed to attendees of this section. This first part of the Directory is a database of workers and their specialties. The second part, not yet completed, will list the holdings of the Diptera collections of the world. The directory is free to all working Diptera systematists in exchange for reprints of their publications, or can be purchased for a USD $25.00 contribution to the S.W. Williston Diptera Research Fund of the Smithsonian Institution. Write Dr. F. Christian Thompson, Systematic Entomology Laboratory, USDA, NHB-168 Smithsonian Institution, Washington, D.C. 20560, U.S.A. for more details. A questionnaire is provided in this issue of *CHIRONOMUS* for workers who would like to be listed in future updates (see page 46).

Sorry, but since I'm basically a hermit and rarely drink alcohol, I can't report on any wild parties that may have taken place. Contact your favorite party animal(s) for such details!

Dr. Willis W. Wirth was awarded the C. P. Alexander Award during the Congress. It is with heavy heart that I must report that Bill passed away on 3 September. He was a prolific worker and kind man who always had time to help. He will be greatly missed.

John H. Epler
Rt.3, Box 5485
Crawfordville, FL 32327 (USA)



Chironomidae papers presented at Third International Congress of Dipterology

Ali A. & **Lobinske** R.: Spatial and temporal changes of larval Chironomidae and selected sediment and water chemistry parameters in a subtropical lake.
Blackwood M.A. & **Ferrington** Jr. L.C.: A phenological study of Chironomidae from a large spring in the Ozark physiographic region of North America.
Colbo M.H.: Chironomidae from marine coastal habitats near St. John's, Newfoundland, Canada.
Coler B.G. & **Ferrington** Jr. L.C.: Community responses of Chironomidae to organic enrichment in a small Kansas stream.
Contreras-Lichtenberg R.: Contribution to the knowledge of the females of species of west Palaearctic *Glyptotendipes* (Kieff.).
Cranston P.S.: Chironominae phylogeny: total evidence and the partitioning of life-history information.
Epler J.H.: A new species of *Dicrotendipes* from Costa Rica.
Epler J.H.: New species of *Oukuriella* from Costa Rica.
Eriksson L. & **Renberg** I.: Paleolimnological studies of selected Swedish reference lakes.
Ferrington Jr. L.C. & **Pehofer** H.E.: Distribution and abundance of Chironomidae in Lake El Junco, Isla San Cristobal, the Galapagos.
Francis D.R.: Paleolimnology of Douglas Lake, Michigan: comparison of three basins using remains of Chironomidae.

3rd International Congress of Dipterology, Canada 1994

Grubbs S.A., **Jacobsen** R.E. & **Cummins** K.W.: Colonization by Chironomidae on three leaf species differing in substrate quality.
Hamburger K., **Lindegaard** C. & **Dall** P.C.: The role of glycogen during ontogenesis of *Chironomus anthracinus*.
Hayford B., **Hagen** B., **Smith** D.R. & **Ferrington** Jr. L.C.: Mitochondrial DNA sequences from two populations of *Chironomus riparius* Meigen.
Herold I., **Freidburg** A., **Porat** R. & **Telsch** B.: Chironomidae in the potable water system in Israel.
Int Panis L., **Goddeeris** B. & **Verheyen** R.: On the relationship between the vertical distribution of littoral Chironomidae in the sediment and some adaptations to oxygen stress.
Jacobsen R.E.: The symbiotic relationship of a chironomid with its ephemeropteran host in an Arizona mountain stream.
Kondo S.: Life cycle of *Hydrobaenus kondoi* Sæther at the middle reaches of the Kiso River, Japan.
Levesque A., **Cwyner** L.C. & **Walker** I.R. The use of chironomids to infer summer surface-water temperatures of four New Brunswick lakes between 12,000 and 10,000 years before present.
Lobinske R. & **Ali** A.: Long-term (1980-1993) population trends of pestiferous Chironomidae along a lakefront in central Florida.
Makarchenko E.A.: Diamesinae of the Holarctic: systematics and distribution.
Sherk T.E. & **Rau** G.H.: Early emergence of *Procladius*, *Orthocladius* and *Microtendipes* from Findlay Lake in the Cascade Mountains.
Takeda A.M., **Higuti** J. & **Lima** M.A.: Spatial and temporal variation of benthic Chironomidae larvae of floodplain of Paraná River, Brazil.
Walker I.R., **Heinrichs** M., **Wilson** S. & **Smol** J.P.: Chironomidae as palaeosalinity indicators for lakes of south-central British Columbia, Canada.
Wolfram G.: Impact of sediment structure and water chemistry on chironomids of a shallow alkaline lake (Lake Neusiedl, Austria).
Wright C.A., **Crisp** N.H. & **Ferrington** Jr. L.C.: Analysis of chlordane-impacted streams using chironomid pupal exuviae.

Chironomidae papers from the congress will be published as a special issue of HYDROBIOLOGIA.

Österreichisches Chironomiden-Treffen

The first Austrian Workshop on Chironomidae was held on 6 July 1994 at the Naturhistorisches Museum Wien on the occasion of the visit of Prof. Dr. P. Michailova (Sofia) to the Museum. About 10 participants attended the meeting, and the following five lectures were given:

1. The role of polytene chromosomes in the systematics of the genus *Glyptotendipes*; by P. **Michailova**, Zoological Institute, Bulgarian Academy of Sciences, Sofia.
2. Habitat preferences of larval chironomids in a gravel brook; by P. **Schmid**, Biol. Station Lunz.
3. Investigation of the benthic community of the Neusiedler-See; by G. **Wolfram**, Biol. Station Ilmitz.
4. Epiphytic Chironomidae in flood plains; by W. **Lechthaler**, Wien.
5. Diagnostic characters of females of Chironomidae (*Dicrotendipes, Demeijerea, Glyptotendipes*); by R. **Contreras-Lichtenberg**, Naturhistorisches Museum Wien.

Ruth Contreras-Lichtenberg
II. Zoologische Abteilung
Naturhistorisches Museum Wien
Burgring 7
1014 Wien (Austria)

Chironomids at the 12th Workshop of Czech and Slovak Dipterologists

Eleven workshops have been held between 1969 and 1994. An increasing interest and participation in the workshops is undoubtedly due to both interest in the study of Diptera, but also the friendly atmosphere and cordiality of every meeting. The 12th workshop has been expected with anticipation because it was the first one after the split of Czecho-Slovakia. Fortunately, this meeting has demonstrated that the borderline between the two newly created republics cannot interrupt the long meeting tradition (only the name of the workshop had to be changed).

The 12th workshop was held in the Slovak mountain village Donovaly, where 38 active Dipterologists came together at pension "Limba" (20 from Bohemia and 18 from Slovakia). Chironomid workers are still rare both in the Czech and Slovak Republic, but in spite of this, three lectures concerning chironomids were given among the total of 37 presentations.

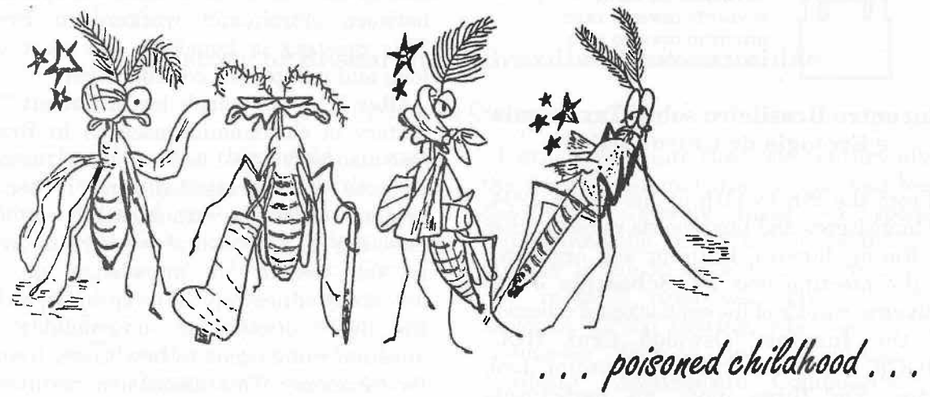
Papers from the workshop will be published in the traditional volume of DIPTEROLOGICA BOHEMOSLOVACA, that should appear in the end of 1995. The abstracts of the lectures related to Chironomidae are given below:

1. Food preference of two species of terrestrial Chironomidae; by J. **Frouz** and A. **Lukesova**.
   The larval gut content of two species of terrestrial chironomids *Bryophaenocladius virgo* and *Smittia* sp. was studied. Mineral particles formed the highest proportion of the gut content in both species (on average 25.4% in *B.virgo* and 38.6% in *Smittia* sp.). Organic particles represented 22.4 and 28.6 % of the gut content, respectively. Fungi (21.0 and 18.5%), mosses (15.8 and 7.8%) and algae (14.2 and 6.2%) belonged to the important parts of the gut content, as well. Results indicate a selective feeding of the terrestrial chironomid larvae.

2. The effect of peat meadow drainage on soil dwelling dipteran communities - a preliminary report; by J. **Frouz** and O. **Syrovatka**.
   The effect of underground pipe drainage on the soil dwelling larval and adult dipteran communities was studied in a peat meadow in south Bohemia. A distinctly lower species diversity of larval communities and lower adult emergence was apparent in the drained plots. Possible explanations for these differences are presented.

3. A biological assessment of the Turiec river and selected tributaries using chironomid pupal exuviae; by P. **Bitusik**.
   Samples of chironomid pupal exuviae were taken from 19 station at the Turiec river and selected tributaries. More than 14,000 exuviae were collected and 122 taxa identified, and were used as a tool for stream zonation and water quality assessment. The community composition in the mountain zone (epirhithral) and submontane zone (metarhithral + hyporhithral) were distinct. Pupal exuviae analysis reflected the major trends in water quality, and results matched well with the saprobian system classification.

Peter Bitusik
Faculty of Ecology
Technical University
Masarykova 24
960 53 Zvolen (Slovakia)



Nederlandse Chironomidendag

Last year, on the 19th of October, the 'Dutch Chironomid Day 1994' was held at Brussels. Brussels is not part of The Netherlands ... for the moment, but our Dutch colleagues always invited their Belgian colleagues to their Chironomid Day so they were kindly invited, in return, to come to Brussels. We have very strong common roots!

The 36 participants followed and discussed eight very interesting lectures. It is amazing that nearly all lectures were directly or indirectly linked to pollution problems, especially heavy metals and deformities in the larvae. For those who are interested in these topics, the addresses of the speakers with the titles of the lectures are listed below:

1. The vertical distribution of littoral Chironomidae in the sediment and adaptations to low oxygen concentrations; by L. **Int Panis**, Universiteit van Antwerpen, Dept. Biologie, Universiteitsplein 1, B-2610 Antwerpen, Fax +32 3 8202271.
2. The use of chironomids pupal exuviae for characterizing water quality in the Ourthe basin; by M. **Evrard**, Fac. Univ. Notre-Dame de la Paix, UNECED, rue de Bruxelles 61, B-5000 Namur, Fax +32 81 724420.
3. Changes in the chironomid community of Lake Volkerak-Zoom after damming of the Eastern Scheldt estuary and the progressive decrease in the salinity of the waters; by J. **van der Velden**, E. **van Dam** and S. **Wiersma**, RIZA, Van Leeuwenhoekweg 20, NL-3316 AV Dordrecht, Fax +31 78 315003.
4. Effect of salinity on the uptake of cadmium and zinc by the midge larva *Chironomus riparius*; by L. **Bervoets**, Universiteit van Antwerpen, Dept. Biologie, Universiteitsplein 1, B-2610 Antwerpen, Fax +32 3 8202271.
5. Adaptation to cadmium in populations of the midge *Chironomus riparius*; by J. **Postma**, Universiteit van Amsterdam, Aquatische Ecotoxicologie, Kruislaan 320, NL-1098 SM Amsterdam, Fax +31 20 5257709.
6. Deformities in the head capsule of *Chironomus riparius* in field-bioassays, intermediate between lab and field; by C. **van de Guchte**, E. **Grootelaar** and A. **Naber**, RIZA, Postbus 17, NL-8200 AA Leylystad, Fax +31 32 0049218.
7. Deformities in chironomid larvae as bioindicators: insights in a dynamical process; by L. **Janssens de Bisthoven**, Lund University, Ecology Building, Ecochemistry-Ecotoxicology, Sölvegaten 39, S-22362 Lund, Fax +46 46 103790.
8. Pollutant-specific deformities in the head capsule of *Chironomus* gr. *thummi* larvae in three Danish watercourses; by A. **Vermeulen**, Koninklijk Belgisch Instituut voor Natuurwetenschappen, Zoetwaterbiologie, Vautierstraat 29, 1040 Brussels, Fax +32 2 6464433.

Boudewijn Goddeeris
Koninklijk Belgisch Instituut
voor Natuurwetenschappen
Vautierstraat 29, B-1040 Brussels (Belgium)

MINISTÉRIO DA SAÚDE
FUNDAÇÃO OSWALDO CRUZ
INSTITUTO OSWALDO CRUZ
COLEÇÃO ENTOMOLÓGICA

Encontro Brasileiro sobre Taxonomia e Ecologia de Chironomidae

From the 9th to 11th of November 1994, 20 limnologists and taxonomists came together in Rio de Janeiro. Initiator and organizer of the meeting was Dr. **Sebastião J. de Oliveira**, curator of the entomological collection of the Instituto Oswaldo Cruz (IOC-FIOCRUZ), where the symposium took place. For three days, all participants enjoyed the generous hospitality offered by this institution, including shuttle-service, exquisite lunches and refreshments, and a guided tour through the remarkable IOC-FIOCRUZ, the foundation of which was laid in 1900, and where brilliant personalities such as Oswaldo Cruz and Carlos Chagas have worked. Most interesting was the visit of the "Castelo" (shown in the logo of the IOC-FIOCRUZ), an impressive neo-Moorish building erected 90 years ago, which houses the entomological collection and the famous library "Biblioteca de Manguinhos" where precious books and foliovolumes can be consulted. One finds here original editions of works by Linné, Fabricius, de Geer, Humboldt, Lamarck, Meigen, Wiedemann, Haeckel, Darwin, Goeldi and many others.

Guest of honour was Prof. Dr. **Ernst Josef Fittkau**, who gave a colorful talk about his studies and expeditions to the Brazilian Amazon region he had undertaken during the 60-ies. The rich chironomid material collected at that time resulted in many publications and academic theses until well into the 90-ies. A highlight of the symposium was the award of the IOC-FIOCRUZ medal to Dr. Fittkau in appreciation of his research done in Brazil.

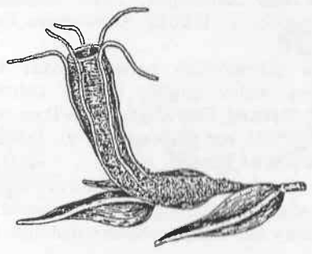
A further highlight was a present given to Sebastião de Oliveira by his students to celebrate his 76th birthday. All colleagues relished the big, delicious cake, and the cheerful group drank to S. de Oliveira's health as well as to a future cooperation between chironomid workers in Brazil. This meeting is hopefully the start of a long and prosperous collaboration.

After S. de Oliveira's lecture about "The history of chironomid research in Brazil" (see also next page), a diversity of research projects were presented, and it became evident that one troublesome problem affecting all chironomid workers in Brazil is the dearth of knowledge on the taxonomy of neotropical midges. So, during the lively discussions, unavoidably, the question came up as to how to get funding for taxonomy. This discussion resulted in the decision to establish a central voucher collection for Brazilian chironomids at the entomological collection of the IOC-FIOCRUZ. This collection will be supplemented by a central data base in order to pool the sparse and widely scattered information, thus facilitating access to these data. The data base will be linked to the Federal University of Rio de Janeiro (UFRJ) and Dr. **Jorge L. Nessimian** kindly offered to file publications on Brazilian Chironomidae.

The next Brazilian symposium on Chironomidae will be held in Belo Horizonte at the Federal University of Minas Gerais (UFMG) in 1996.

Marcos Callisto d.F.P.
Lab. Limnologia, IB
UFRJ - Box c.p. 68044
21944-970 Rio de Janeiro - RJ (Brazil)

Ulrike Nolte
Lab. Entomologia, IB
UFMT - Box. c.p. 3091
78060-200 Cuiabá - MT (Brazil)



CHIRONOMUS special

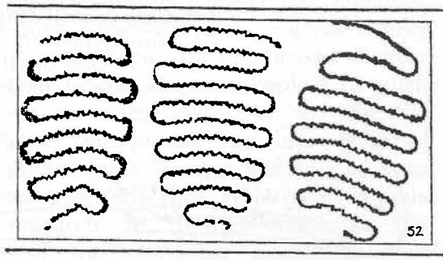
The History of Research on Brazilian Chironomidae

by S. J. de Oliveira

Research on Brazilian chironomids started 163 years ago and, thus, has a fairly long tradition. When I gave a lecture on its history at the first Brazilian chironomid meeting in November last year, Ulrike Nolte asked me to write it down for *CHIRONOMUS* in order that this chapter of our natural history is accessible to a wider circle of chironomid workers. So, in the following, I recount the order of events, or better, of chironomid workers who contributed to our present knowledge on the Brazilian chironomid fauna. Taxonomical comments won't be included here, but will appear in the "Catálogo das espécies Brasileiras de Chironomidae", which I am about to complete and which will provide an extensive bibliography.

The first chironomid species from Brazil, *Chironomus brasiliensis*, was described by Christian R. W. Wiedemann as early as 1828. Two years after, Wiedemann described *C. insignis*, the second species from Brazil, and in 1838, Justin Macquart published the two further species *C. trimaculatus* and *C. ferrugenius*. Then, studies on chironomids from Brazil ceased until the beginning of our century, precisely until 1905, when Emil A. Goeldi described *C. holoprasinus* and *C. calligraphus* in his work "Os Mosquitos no Pará". Surprisingly, Goeldi included these species into the family Culicidae.

Until 1939 - more than one century after the first chironomid from Brazil had been described - merely these six species represented the known fauna of our chironomids. In the 30-ies, a decisive impulse to our research area was given by the zoologist R. von Ihering, who headed the "Comissão Técnica de Piscicultura do Nordeste" (Pisciculture Commission of Northeastern Brazil) which was founded by the Brazilian government in 1932. Von Ihering realized the significance of chironomid larvae as fish food organisms, and emphasized this in his book "Ciências e Belezas nos Sertões do Nordeste". In this commission a young German fellow, H. Sioli, worked as a trainee, who had been appointed by F. Lenz, a disciple and colleague of A. Thienemann. Sioli's work would be of great importance for the knowledge on the Amazon region in the future. As an indirect result of the commission's work, new chironomid species were described. In 1939, J. G. Rempel published six species of *Chironomus*, one of *Polypedilum*, one of *Tanytarsus*, and one of *Coelotanypus*. Together with the other species of *Coelotanypus*, that was described somewhat earlier by F. W. Edwards (1933), a total of sixteen Brazilian chironomid species were known at that time.

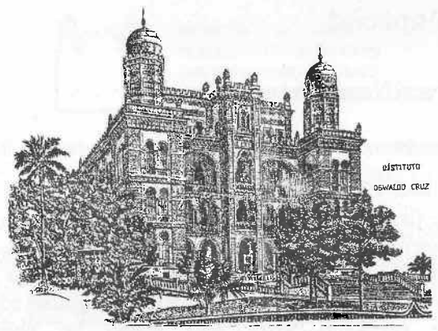


E.A. Goeldi named *C. calligraphus* after the conspicuous regular loops within the egg masses.

— Trez cordões de ovos, na liberdade frescamente postos na superficie d'agua de um tanque por *Chironomus calligraphus*, ... Vê-se o arranjo exquisito em linhas de zig-zag.

52

Memorias do Museu Gœldi 1905.



Fundação Oswaldo Cruz

From 1944 to 1967, I gave my contribution in publishing on the chironomid fauna of Brazil (see *CHIRONOMUS* No. 6: 32-33). One example, worth to be mentioned, is the redescription of *Chironomus brasiliensis*. However, I was compulsorily dismissed from my research work by the military dictatorship that ruled the country for twenty years.

In 1960, S. S. Roback described *Aedokritus sartis* from São Paulo, and in 1963 *Coelotanypus amoenis* from Amazonas.

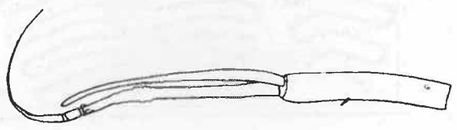
After years in the Amazon region, Sioli returned to Germany to succeed Thienemann, who had died in 1960. Sioli invited E. J. Fittkau to take his place as a limnologist at the Max-Planck-Institute for Limnology field station, a guest of the "Instituto Nacional de Pesquisas da Amazônia" (INPA, National Institute for Research of the Amazon Region) in Manaus. In 1962, Fittkau published his doctoral thesis on Tanypodinae, the epoch-making work that entirely changed the previous view on this subfamiliy. With Fittkau at work, the number of described genera and species began to increase. In 1963 he published the genus *Manoa*; in 1965 he revised the two *Chironomus* species described by Goeldi and erected the genus *Goeldichironomus* (*G. holoprasinus*); in 1968 he created the genera *Djalmabatista* and *Siolimyia* and described *Chironomus strenzkei*. In his first synopsis on Amazonian chironomids in 1971, Fittkau pointed out that, when he had started to work in Amazonia ten years before, merely the two species described by Goeldi had been known, whereas now 437 species from 58 genera could be distinguished, some of which were already described.

Fortunately, during the last 20 years, the interest of Brazilian biologists on chironomids has awakened, and now research on ecology and taxonomy has started at several places of Brazil, so in São Carlos (SP), São Paulo (SP), Botucatú (SP), Cuiabá (MT), Porto Alegre (RS), Maringá (PR) and in the state and city of Rio de Janeiro (RJ). This has resulted in the description of four chironomid species by Trivinho-Strixino and Strixino and works on ecology. After 1986, the year of my return to the IOC-FIOCRUZ, my working group has published further two genera and six species (see *CHIRONOMUS* No. 6: 32-33).

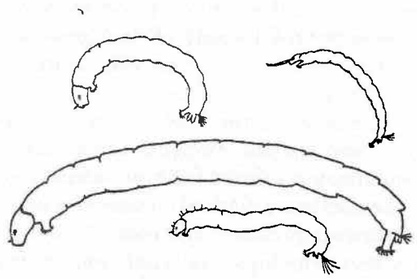
The material collected in Amazonia, in particular by Fittkau and Reiss (Zoologische Staatssammlung München, Germany), has been studied by these authors themselves as well as by Borkent, Epler, Sæther, Säwedal, Soponis, Spies and others, thus many new genera and species were described during the last years.

Altogether there are presently 125 described chironomid species from Brazil, which belong to 30 genera of the four subfamilies Telmatogetoninae, Tanypodinae, Orthocladdinae and Chironominae.

Sebastião José de Oliveira
Instituto Oswaldo Cruz
Avenida Brasil 4365
2104-900 Rio de Janeiro - RJ (Brazil)



Short Communications



Digitized Chironomids
On measurement techniques for larval dimensions - by R. Haase

Dimensions like length and head capsule width of larvae of chironomids or other aquatic insects are of interest in various studies, e.g. on size structure of benthic communities (Strayer 1986), on relating body size population densities (Strayer 1994), and on biomass estimates via regression equations (Nolte 1990).

Measuring straight lines like head capsule widths of chironomid larvae is easy. All this takes is a dissecting microscope and a graticule. When it comes to measure curved lines, such as total body length of a chironomid larva, things get more difficult. In this case, a digitizing tablet connected to a computer with the adequate software would nicely do the job. After employing a drawing tube to your dissecting microscope, you simply trace the desired feature of the larva with a pointing device and readily get the result from the computer screen.

Until quite recently, however, this equipment was quite expensive. Today's great variety of computer hard and software at sharply dropped prices, however, makes it much easier in many countries to put the adequate equipment together. Personal computers have become widespread even in countries with little resources available for research. So, in most institutes, the core of the electronic equipment, the personal computer, is already at hand and digitizing tablets and required software became affordable now.

This short notice is meant to encourage studies involving measurements of small animals. Here I will give an example of what we have done and the kind of equipment used. We measured body lengths of chironomid larvae and employed the following equipment:

- dissecting microscope with drawing tube
- personal computer
- 12x12" digitizing tablet, cross hair cursor

The following software was available and found useful for our purpose:

- ROOTS (digitizing + vector managing)
- TOSCA (digitizing + vector managing)
- EasyCAD2 (Computer Aided Design)

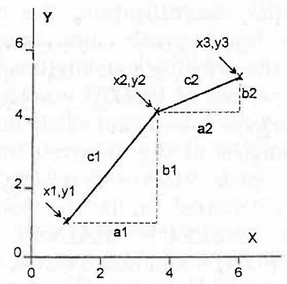
Under the dissecting microscope, the dorsal lines of larvae were traced on paper using the drawing tube. The respective magnification was always noted, and the drawing was then taped onto the digitizing tablet. Once the tablet was calibrated to the particular magnification, the curved lines were traced with the cross hair cursor and the drawing thus digitized.

The new version of ROOTS was the only software package I used that easily displays the total lengths of the digitized lines on the screen (pick "VERIFY" in the main menu, turn "chains" on in the submenu and choose "INSPECT CHAINS"). Older versions of ROOTS and also TOSCA do not display total lengths of digitized lines. I also could not convince EasyCAD to do this, although I am sure it would be willing to give these results, if only fed with the right macro (mini-program) for the calculation. I imagine other CAD programs could do the job, too.

When confronted with this problem - your software won't give you the total

lengths of your digitized lines - you can still use it and easily calculate on your own. All you need from your digitizing process are, in fact, the **coordinates** of each point you digitized. As you go along a curved line with the cursor on your digitizing board (tracing drawings of larvae) you click the button on the cursor and, thus, store the coordinates of as many points as you choose along that line. So, a curved line is not actually digitized as a curved line but rather as a set of many straight sections composing the curve. The more bend the traced line is, the smaller the straight sections will have to be digitized to approximate the curve.

The resulting data from digitizing one curved line in n straight sections (vectors) will be stored in a vector file containing $n+1$ pairs of x- and y-coordinates representing $n+1$ points in your pre-defined coordinate system on the tablet. These $n+1$ points are the start and end points of each of the respective vectors that make up your digitized curve. You can now calculate the length of each vector by simply consulting the old Greek philosopher Pythagoras who is said to have invented that $a^2+b^2=c^2$, where a and b are the short sides and c the



hypotenuse of a rectangular triangle.

In my example (see Fig.), c is the length of vector *c1* (or *c2*) defined by the two points with the coordinates *x1*, *y1* and *x2*, *y2* (or *x2*, *y2* and *x3*, *y3*). According to Pythagoras:

$$c_1 = \sqrt{a_1^2 + b_1^2} = \sqrt{(x_1-x_2)^2 + (y_1-y_2)^2}$$

$$c_2 = \sqrt{a_2^2 + b_2^2} = \sqrt{(x_2-x_3)^2 + (y_2-y_3)^2}$$

Summing up all calculated vectors from 1 to n gives the total length of the curved line.

TOSCA produces vector files with the corresponding coordinates in ASCII format, so you can read the data with a simple editor and easily import them into a spreadsheet program for the calculations. In case you use EasyCAD, choose "path" as your drawing entity instead of "line" to trace the drawings and then export your data as EXF-files which your ASCII-editor can read.

So if your software will not produce the desired results but only gives coordinates of the digitized points - just remember Pythagoras and use a spreadsheet program for the calculation. It's quick and easy!

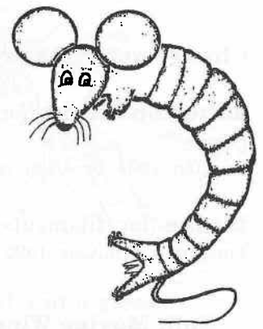
Literature cited:
Nolte 1990. Freshw. Biol. 24: 443-451.
Strayer 1986. Oecologia 69: 513-516.
Strayer 1994. Freshw. Biol. 32: 83-90.

Prices (March 1995) / addresses:
digitizing tablet: Summagraphics Corporation tablets 6x9"=US$ 130-180, 12x12"=US$ 160-220.
ROOTS: Decision Images, Inc., 9 Charlton Street, Princeton, NJ, 08540, USA (around US$ 200).
TOSCA: Jeffrey R. Jones, Clark University, Graduate School of Geography, Worchester, MA, 01610, USA (ask price).
EasyCAD2: Evolution Computing, 437 South 48th Street, Suite 106, Tempe, AZ, 85281, USA (US$ 250-300, much less for educational institutions!).

For readers living in countries where it is uncommon to buy computer hard and software just around the next corner: Try to import tablet and software directly from US dealers. You will find up to date and very comprehensive information on hard and software in the COMPUTER SHOPPER (One Park Av. New York, NY 10016), a monthly journal published in the U.S.A. If you have difficulty locating this journal in your library, try the bookstores at international airports.

Rainer Haase
Fundação Ecotrópica
Caixa Postal 3008
78060-200 Cuiabá-MT (Brazil)

***Mustendipes scurrilis*, gen. n., sp. n.**
Epler 1995, from Florida



Midgie Mouse

Concerning Midgie Mouse, I've considered placing it into the new taxon *Mustendipes scurrilis*. It apparently is paedogenetic, for no adults are known. It seems that being in the proximity of this species also keeps one "young". It is known only from Lake Buena Vista and connected water bodies (Lake Buena Vista is the main lake in Disney World, Florida), although I expect it may eventually be found in California, France and Japan. In terms of size, it's as big (or as small) as you want it to be. It is found year round, and apparently feeds on laughter, good will, candy and lots of money !

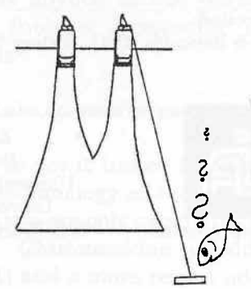
An Inexpensive Emergence Trap
(including a warning to lone males)

Emergence traps may be constructed from ladies' tights as follows: A 120 cm length of 4 mm galvanized wire is bent into a circle and the ends pushed into a short length of plastic tubing to hold them in place. The waist of a pair of robust ladies' tights is sewn around the wire ring. A jam jar is pushed into the toes of each leg. By adjusting the amount of air in the jars the apparatus floats at or below the water surface. For shallow water the length of the net can be shortened by tying knots in the legs of the tights above the jam jars. A nylon cord attached at one end to a short length of a lead piping and the other to the toe of one leg acts as an anchor.

The twin emergence containers can pose problems on collection: it is wise to hold the two jars together with an elastic band before reaching underneath to attach the lids to the jam jars before retrieval from the water. A number of these nets successfully elucidated the distribution of species in a large pond, July 1994.

A word of warning to lone males: Speciation in ladies' tights has its parallel in *Chironomus*! (Glaringly obvious variable characters can too easily be overlooked when the character is considered irrelevant.) Naively I entered a likely store to be confronted by a bewildering array of these articles. Requiring help, I rehearsed mentally and delivered with somewhat undue haste "I require some pairs of tights, large, strong and cheap". "Oh yes?", the assistant replied with a disarming smile, "and what colour would you prefer?" I was about to explain why the colour was immaterial, but it occurred to me that she might find it more credible that I should disport myself in a pair of oversized robust tights than that I would put jam jars up their toes and suspend them upside-down in a pond! "Brown" I replied.

Peter H. Langton

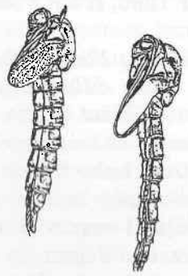


Notice - Board

Change in terminology published over the past year.

adhesion marks (for "muscle marks" / "Fensterflecken" on pupae)
Langton. 1994. Br. J. ent. nat. hist. 7: 89-91

teniae (for "filaments" on pupae)
Langton & Armitage. 1995. Br. J. ent. nat. hist. 8: 11



Split Moving Window boundary analysis on small, artificially ordered, dataseries from chironomid communities.

In *CHIRONOMUS* No. 5, I presented the computer program SMWBA that performs the SMW method of Cornelius and Reynolds (1991) on small datasets. Several people have contacted me since, and it seems that this program may be a valuable tool for the analysis of datasets on chironomid communities.

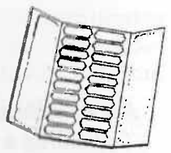
SMWBA was written in Microsoft Qbasic 1.0 and was rather slow. Now a new version in C++ is available. This version is much faster. It can be compiled for any type of PC (386 or better) or other computer. It allows the user to choose the window width, reorder the data according to any physical or chemical parameter and transform the data. The similarity profile is based on Bray Curtis similarity coefficients. These graphs can be saved in GIF format. If anyone is interested in this program, please contact me and I will send you a copy.

Literature cited:
Cornelius & Reynolds. 1991. Ecology 72: 2057-2070.

universiteit antwerpen

Luc Int Panis
Dept. of Biology
University of Antwerp
Universiteitsplein 1
2610 Wilrijk/Antwerpen
(Belgium)

Cutting costs in slide preparation.

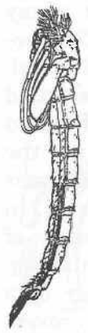


Those who have to purchase their own materials will be only too aware of the cost of cover slips these days, the smaller they are the more expensive they tend to be, e.g. in Britain, 10 mm circles cost £ 5.01 per hundred whereas 18 mm squares cost £ 0.85 per hundred. Using a cheap pen-style diamond glass cutter sold here both for engraving personal belongings as a deterrent against theft and for hobby glass engraving (different packaging, same item!), it is easy to cut an 18 mm square into four 9 mm squares, i.e. making 2300 for the price of 100 10 cm circles!

Tips to ensure success: (a) use a slide as a bed on which to cut the cover slip (any slight irregularity of the bed will result in uneven fragmentation), (b) if the slip does not split into two, move the scratch over the edge of the bed and press down gently on the projecting half, (c) use another slide as a straight edge, and (d) spend some time cutting slips - practice rapidly develops the pressure required for success (too strong and the slip shatters, too weak and the glass is not scored).

Peter H. Langton

Update on "A Key to Pupal Exuviae of West Palaearctic Chironomidae"



The key to the genus *Chironomus* has been expanded to include all the taxa now known to me from the west Palaearctic. Copies are available from me at the address below upon request:

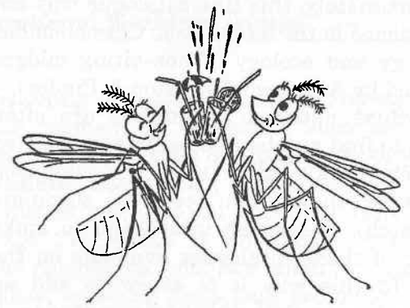
Peter H. Langton
3, St. Felix Road,
Ramsey Forty Foot,
Huntingdon,
Cambridgeshire PE17 1YH
(England)

Invitation for Cooperation

The group of hydrobiologists at the University of Perm (west Ural) conducts broad-scale studies on the benthic fauna of the Kama reservoirs as well as of small streams. Special attention is paid to Chironomidae. Long-term and seasonal dynamics in the development and energy balance of chironomids and their communities are recorded, and at the Kama Biological Station researchers study growth patterns of the predominant taxa. Other aspects of interest are the zonation patterns of chironomid communities in the Kama river and its reservoirs. (For further information see page 21.) Benthic chironomid communities of small streams are studied in respect to their diversity, composition, seasonal and spatial dynamics, and their significance as bioindicators of human impacts.

I invite all interested chironomid workers for cooperation, and shall be happy to receive reports on chironomids from different regions of the world. Please contact:

M.S. Aleksevnina
Department of Biology
University of Perm
16, Bukirev st.
614600 Perm (Russia)



Six-legged and legless

Some years ago I (P. H. L.) was appreciating the tail end of a meal on a camp site, when I noticed a female chiro (the size of *Dicrotendipes*) alight on the neck of the opened wine bottle. She remained there for some minutes, head down on a drop of wine, apparently drinking. She then fell off the bottle and staggered about the table, her leg movements lacking any coordination, obviously "tipsy"! Further evidence that chironomids will imbibe liquids when they have the chance?

Chironomids in cyberspace

Recently I have started a 'chironomid home-page' on the World Wide Web (WWW). The information on this page can be consulted by anyone in the world with a PC and an Internet connection. The URL of this site is :

http://www.uia.ac.be/u/intpanis/index.html

I will try to get it linked to other WWW sources on entomology as soon as possible.

At present you can only consult the catalogue of Belgian Chironomidae (Goddeeris & Behen 1991) and a more recent addendum.

Unfortunately, this fine catalogue was not mentioned in the recent book: Chironomidae. Biology and ecology of non-biting midges (edited by Armitage, Cranston & Pinder).

Because national inventories are often hard to find and tend to become antiquated rather quickly after they are published (because they often seem to stimulate research), it may be interesting to make more of these catalogues available on the net. In this way it is easier to add an addendum to the published inventories. If you decide to make another catalogue (or some other useful information on Chironomidae) available on WWW, please contact me so that we can link all available sources.

Literature cited:
Goddeeris & Behen. 1991, p.:46-56 In Grootaert et al. (eds.): Catalogue of the Diptera of Belgium. Studiedocumenten van het K.B.I.N. 70: 46-56.

Luc Int Panis
Dept. of Biology, University of Antwerp
Universiteitsplein 1, 2610 Wilrijk/Antwerp
(Belgium)

HELP, PLEASE ...

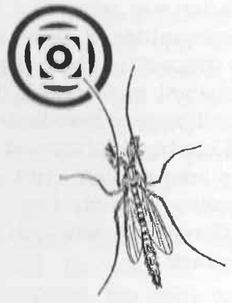
I am about to embark on sediment phosphate release experiments as part of my PhD research on the ecology of Chironomidae of Lough Neagh, Northern Ireland. These will be carried out on resettled sediment cores in the laboratory. I would be grateful for any references on the subject, or advice on the techniques involved. I am especially interested in methods of sieving and frequency of sampling once the experiment is running. Also, I would be intersted to hear of a German to English dictionary which covers either Scientific terms or more specifically Chironomid and Benthological terminology. If anyone can help, I would be very pleased to here from them:

Lesley A. McLarnon
Freshwater Lab., University of Ulster
Traad Point
Ballyronan, Co. Londonderry BT45 6LR
(Northern Ireland)

Universidade Federal de Mato Grosso, Brazil
Insituto de Biociências - Laboratorio de Entomologia

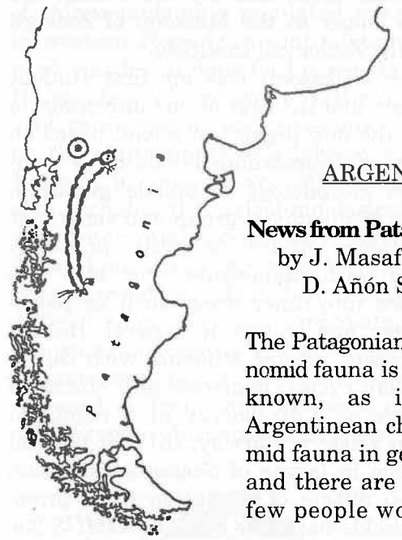
Guest Lecturer and Researcher
(in succession to Dr Ulrike Nolte)

Position available to give post-graduate courses and do research on Chironomidae (either ecology or taxonomy). Minimum contract term is one year, maximum four years. Knowledge of either Portuguese or Spanish is required.
Informal enquiries as well as application with a Ph.D. certificate (or equivalent) to Profª Mirian A. da Silva Serrano, Laboratório de Entomologia, IB, Universidade Fedral de Mato Grosso, Av. Fernando Corrêa, 78060-900 Cuiabá - MT (Brazil).



Closing date for application is 31 December 1995.

Presentation of Current Research and Working Groups



ARGENTINA

News from Patagonia

by J. Masaferro & D. Añón Suárez

The Patagonian chironomid fauna is poorly known, as is the Argentinean chironomid fauna in general, and there are only a few people working at present on chironomids from this region. This is surprising, in that Patagonia is an important biogeographic region, where data on paleo-environmental and ecological conditions are scarce.

Since 1991, the CONICET (Consejo Nacional de Investigaciones Científicas y Técnicas) supports PROGEBA (Programa en Gea Bariloche) in San Carlos de Bariloche (Argentina). The main objective of this project, which is part of the Global Change Program, is to contribute to the knowledge on climate evolution, environment and biota in north Patagonia during the Holocene. Research topics of PROGEBA are sedimentology, geochronology, geochemistry and micro-paleontology.

Cores of bottom sediments from the main lakes of the Nahuel Huapi National Park (41°S, 71°W) are studied in order to record temporal changes in environmental conditions, such as temperature, salinity, trophic situation. One of the studies performed is the analysis of fossil chironomid communities by means of head capsules found in the sediments of lakes. Because Chironomidae are significant bioindicators and, thus, reflecting ecological conditions present at the moment of deposition, such analyses allow reconstruction of the lakes' history. Dr. **Julieta Masaferro**, who recently has finished her doctoral thesis in Italy (see page 27), works at PROGEBA, studying the paleofauna from two north Patagonian lakes, collected from long sediment cores (Lake El Trebol, 7m long cores) and Lake Mascardi, 11m) .

Studies on the recent chironomid fauna are done in the Centro Regional Universitario Bariloche (Universidad Nacional del Comahue), where Lic. **Diego Añón Suárez** is studying ecological aspects of the chironomids of Lake Escondido, a monomictic warm lake of 8 ha surface area and a maximum depth of 8 m. His research is focused on the structure and dynamics of chironomid communities in relation to different temperature regimes, and, additionally, he is interested in feeding habits of Tanypodinae. His studies are part of a larger research project on lacustrine environments in north Patagonia, that includes studies on zooplankton, phytoplankton, periphyton and benthos.

The most severe problem when analyzing chironomids is their identification, because (i) almost all keys deal with the Holarctic fauna, and (ii) almost nothing is known about Patagonian chironomids, so the identification of the larvae is very difficult and, in many cases, impossible. Dr. **Analia Paggi**, J. Masaferro and D. Añón Suárez hope to produce a guide and keys for the chironomids of Patagonia in the near future.

Julieta Masaferro
PROGEBA-CONICET
Box Ap.No. 47
8400 Bariloche (Argentina)

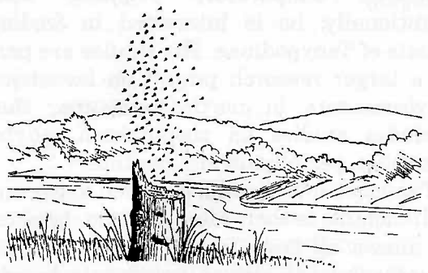
Diego Añón Suárez
Centro Regional Universitario Bariloche
CC 1336, 8400 Bariloche (Argentina)

ENGLAND

Incipient swarming of chironomists at Birmingham University.

Dr **Jon Sadler** has moved to the School of Geography at Birmingham University; he is examining aspects of eutrophication and chironomids in Midland resrvoirs, and considering chironomid population dynamics in two Scottish lochs (Loch Davan and Kinord in berdeenshire). He has two Ph.D. students working on chironomids: **Jan Jones**' research into Late Glacial chironomids shows great promise and **Esther Hawtin** has begun an examination of the distribution of chironomid communities in lotic freshwater systems in respect to water quality and physical habitat. Dr **Sandy Milner** is joining them from Alaska: he is interested in chironomids with respect to water temperatures.

Peter H. Langton



NORWAY

Current research at the University of Bergen

by Ole A. Sæther

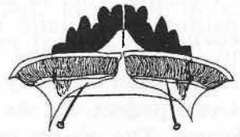
Studies on various aspects of chironomids have since 1977 been conducted at the Museum of Zoology, University of Bergen. (Recently the museum was joined with the Department of Zoology to form a Zoological Institute. However, the Department of Systematic Zoology retains the name Museum of Zoology. That means that two chironomid workers, Godtfred Anker Halvorsen and Øyvind Schell, are now no longer at the Museum of Zoology, but at the Zoological Institute.)

Endre Willassen was my first student in Bergen and the first at our university to receive the new degree dr. scient. based on a study of Diamesinae including a comparative morphology of female genitalia, revision of the *davisi* group and some new descriptions. Endre is still primarily working with diamesines, but also has expended into other areas such as paleolimnology, and ecology in general. He has three recent master students with theses on: (i) life cycles, densities and effects of discharge on *Chironomus* in a regulated river in western Norway; (ii) diel vertical migration in larvae of *Sergentia coracina*; and (iii) effects of predation from three-spine stickle-back (see *CHIRONOMUS* No. 4: 29).

At present Endre is together with Eugene A. Markachenko, Vladivostok, revising the subfamily Diamesinae. Together with Karl Thunes, one of our PhD-students, he has a paper in press concerning chironomids in bracket fungi. He has several short papers in preparation or MS concerning different isolated finds, a paper on the paleolimnology of the high mountain area at Finse, and is working on some chironomids from Tibet. Together with Øyvind Schnell he is preparing a paleolimnological study of the acidification of a lake in southern Norway.

G. Anker Halvorsen has for the last several years been working full time on different projects in the projects division. He has been sorting material and identifying mostly other insects than chironomids. Unfortunately, he has been able to devote very little time to the completion of his large world revision of the *Cardiocladius* - *Eukiefferiella* complex. Fortunately, however, not much work remains and Anker hopes at least to have the first parts in press within a year.

Øyvind A. Schnell is also working in the projects division, but on a permanent basis, and with duties connected with chironomids. He has continued the study of chironomids on a regulated river, Ekso, in western Norway; a continuation of the work which was done for his master thesis. He also has a large study on the results of acid precipitation and consequent liming on the chironomids of a lake in southern Norway in preliminary MS. This study also includes the paleolimnological study with Endre mentioned above. Øyvind also is working on a revision of the genus *Stictochironomus*. This has proven more difficult than originally anticipated, since the genus apparently includes some cryptic chromosome species. Together with Kaare Aagaard in Trondheim he has a checklist of Norwegian chironomids in press.



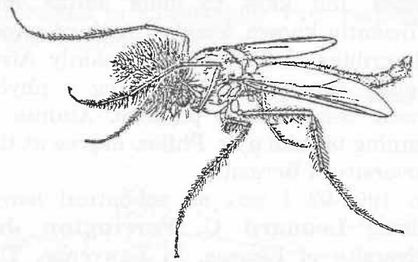
A new arrival on the scene of chironomidology is **Trond Andersen**, your new treasurer. Trond is an expert on caddis flies, but has published several papers also on butterflies and knows a number of other insect groups and for that matter other animals well. His interest in chironomids was awakened when he led an expedition of the Museum to Tanzania and was asked to supervise a graduate student working on chironomids and to collect chironomids for me. We have several joint papers published, in press or in preparation. These include a paper describing the first *Buchonomyia* from the New World; new species of *Beardius* from Central America; the first species of the genera *Doithrix* and *Georthocladius* from Africa; the first species of the tribus Pseudochironomini from the Afrotropical region, a *Manoa*; and a description of new species of *Orthocladius*, with a phylogenetic evaluation of the validity of the subgenera of this genus. He also has a joint paper with Xinhua Wang on dark-winged *Heleniella* from Thailand and China in press. His largest chironomid project, however, is a revision of the tribe Pseudochironomini, partly in collaboration with me.

I (**Ole A. Sæther**) have, in addition to the cooperative papers with Trond mentioned above, together with **Xinhua Wang**, Nankai Univertsity, Tianjin, China, just completed a world revision of the genus *Paraphaenocladius*, and have two other cooperative papers with Xinhua, one revising the genus *Propsilocerus* including *Tokunagayusurika*, and one on some *Hydrobaenus* from China and USA. I have also recently completed the second revisionary paper on the genus *Metriocnemus*. This paper includes descriptions of seven new species and keys to male adults and sufficiently known females. A third paper redescribing the remaining, mainly Afrotropical, types, and attempting a phylogenetic treatment is planned. Xinhua is planning to take a dr. Philos. degree at the University of Bergen.

In 1992-93 I was on sabbatical leave, visiting **Leonard C. Ferrington Jr.**, University of Kansas, in Lawrence. The main purpose was to complete a collaborative revision of the genus *Pseudosmittia*. While revising the genus a large number of types and material determined as *Pseudosmittia* were examined. Many of these did not fit into our concept of the genus and resulted in the recognition of several new genera or combinations. Some of the results are already published, the latest being the new genus *Physoneura* published in Aquatic Insects, others are yet to come. The revision of *Pseudosmittia* is in preliminary manuscript, waiting for Len to complete the drawings.

Several other smaller papers are in press including one together with one of my students, Liv Kristoffersen, on the previously mistaken interpretation of the wing nervature of the *Corynoneura* - group. Together with Richard E. Jacobsen,

University of Pittsburgh, a revision of *Nanocladius* subgen. *Plecopteracoluthus* is in preparation. The chironomid part of a Manual of Palaearctic Diptera together with Paddy Ashe, Dublin, is in preliminary manuscript. (I have also completed the Chaoboridae and Corethrellidae for this manual as well as the Chaoboridae for a couple of other manuals.) I have long planned to revise the genus *Parametriocnemus*. Type material has been borrowed, other material collected and a preliminary key made. However, other matters became more pressing and the revision was laid aside. I hope to continue that revision, shortly. How much time there will be for this and other endeavours depends on assistance, funding, and time.



The Museum of Zoology, University of Bergen, is the only Norwegian institution where phylogenetic systematics and historical biogeography form an integrated part of the education. In recent years the research projects have primarily been directed towards biodiversity of tropical areas (Tanzania, Ghana, China, Costa Rica, Thailand, etc.). As a consequence, we decided in 1988 to erect a **working group on biodiversity**. The objectives (missions) of the group are:

1. To initiate and actively participate in the international work needed to discover, describe, and inventory global species diversity in order to maintain adequate levels of biodiversity.
2. To concentrate our effort on tropical "hot-spot" areas in order to increase the knowledge about these areas, thereby getting the attention of the need for protection of these vulnerable rain forest areas.
3. To analyze and synthesize the information derived from taxon-based systematics through phylogenetic interpretations into a predictive classification system that reflects the history of life.
4. To strengthen research, education, and recruitment in systematic zoology, both in Norway and in developing countries through teaching and training of students and technicians.

Up to now, the group mainly has been working on chironomids, caddis flies, fungus gnats, and to some extent, on bark beetles, but several other groups have been sorted and sent to experts for closer examination and determination. The largest project of the biodiversity group is the NUFU (Norwegian Universities´ Committee for Development Research and Education) - Project in Ghana. We are involed with giving a concentrated course in phylogenetic systematics, zoogeography and freshwater entomology at the University of Ghana, and, in cooperation with the Institute of Aquatic Biology in Accra, doing inventory of the insects of Ghanaian fresh waters. This year is the last of the 4-year project, but we will apply for an extension. The course includes 45 hours of lectures, 90 hours of laboratory course, and about 20 hours of seminars

over a 4-5 week period. As our stay in Ghana is for only 7-8 weeks, relatively little time is available for collecting. However, the material collected is overwhelming with a very high percentage of new species. **Joseph S. Amakye** is the liaison with the Institute of Aquatic Biology. At the moment, he is working on a revision of the *Endochironomus* complex in Africa. He has a paper on a new species of *Collartomyia* in press. Two technicians and two master students have been trained at the Museum in Bergen. In addition to chironomids from Ghana, our students are working on caddis flies (one Ph.D. student, one master student) and fungus gnats (one post doc.).

There are four master students presently working on Afrotropical chironomids at our museum. **Asbjørn Sundal** is describing members of the *Polypedilum ontario* group (Chironomini Genus *C* of Pinder & Reiss in the Holarctic key), also including species from other regions. The group apparently deserves subgeneric rank. **Liv Kristofferen** is revising Afrotropical members of the genus *Stenochironomus*. At the start, she intended to include all Afrotropical species. However, we soon found that there are too many new species to be included in a master thesis, so she is now concentrating on those 6-7 species which will key to *S. spatuliger* Kieffer or *S. polychaetus* Kieffer. **Rosina Kyerematen** from Ghana is decribing Afrotropical species of *Rheotanytarsus*. This genus appears to be both species rich and abundant in the streams of the rain forests. **Joseph Issufu Adam**, also from Ghana, is decribing several new Afrotropical species of the genus *Nilothauma*.

Ole A. Sæther
Museum of Zoology, Bergen Museum
Muséplass 3, N-5007 Bergen (Norway)
e-mail: ole.sather@zmb.ulb.no

RUSSIA: THE VOLGA BASIN

Research in the Ural region

by M.S. Aleksevnina

The Kama river, the biggest tributary of the Volga river, is 1800 km long and enters the Volga at the Kuibyshev reservoir (ca 55°N, 49°E). Since 1961 the Kama has been regulated over long reaches, forming today a more than 200 km long reservoir north of Perm (Kama reservoir) and a 150 km long reservoir further downstream (Votkin reservoir).

In 1925, the first chironomid samples were taken from the Kama river by A.L. Behning, who sent the material to F. Lenz in Plön (Germany) for identification. This analysis resulted in 30 taxa, and Behning (1928) stated that "on sandy sediment *Cryptochironomus* was most characteristic, on silty sediment it was *Tanypus* and also *Polypedilum*, on firm substratum with stones, snags etc. *Paratanytarsus* and *Orthocladius*, and in submerged vegetation *Pelopia*. *Chironomus* and *Tanytarsus* were rather restricted, and only found on some 'islands'. In terms of quantity, the Kama benthos was richer than the Volga benthos."

From 1935 on, V.V. Gromov, a researcher at the Kama Biological Station, continued with detailed studies on chironomids. He investigated the river's chironomid fauna before and after the Kama had been regulated. Before regulation, i.e. from 1935 to 1961, 117 taxa were recorded, 51 of which by means of associated metamorphoses (Gromov & Demidova 1971). Rheo-psammophilous taxa such as *Cryptochironomus* and *Tanytarsus sexdentatus* were dominant. From 1940 to 1961 river pollution increased, mainly caused by

waste water of paper-mills, thus the number of oxiphilous chironomids decreased (in particular Orthocladiinae), whereas the number of euryoxibionts increased. After the Votkin reservoir had been flooded in 1962, the number chironomid taxa decreased again: practically all rheo-psammophilous and rheo-lithophilous species disappeared. Pelophilous and phytophilous species became dominant.

At present, 84 chironomid taxa have been recorded in the Votkin reservoir, 57 of them from the subfamily Chironominae. Orthocladiinae are represented by 18 species and Tanypodinae with 9 species. *Procladius ferrugineus* is predominant everywhere, and *Polypedilum bicinctus* and *Glyptotendipes paripes* together with *Procladius* predominate the littoral zone. However, in the Otchera Bay, which is biggest one of the reservoir, *Chironomus plumosus* is eudominant.

Before the Kama river was regulated (the period 1935 - 1961), chironomid biomass varied from 0.07 - 0.5 g/m^2 in the region of Ochansk (situated at the today northern end of the Votkin reservoir) (Gromov & Demidova 1971). From 1962 to 1990, i.e. after the Kama had been dammed, the annual mean biomass of chironomid larvae varied from 0.21 - 0.86 g/m^2 in the central part of the Votkin reservoir. The results of long-term studies on the formation of biological regimes within the reservoir are published in a monograph (Aleksevnina 1988), where specific attention was paid to the production and decomposition of organic matter by zoobenthos, and assessment of the reservoir's sanitary conditions.

At present, the Department of Invertebrate Zoology and Marine Ecology of the University of Perm, headed by Dr. **M.S. Aleksevnina**, studies zoobenthos of the Kama river reservoirs, as well as of small streams in the western Ural. Our interest is mainly focused on the Chironomidae; community composition, temporal and spatial distribution and variability, development and growth patterns, and production in various types of reservoirs.

In the eastern Ural, chironomid research is carried out by Dr. **M.P. Kovalkova** at the Ural Section of the State Research Institute for Fish Protection in Jekaterinburg. She studies macrozoobenthos of lakes, with emphasis on chironomids, their community composition, seasonal population dynamics, growth patterns and production.

Dr. **G.A. Sokolova** from the Institute of Agricultural Sciences in Jekatarinburg surveys the chironomid fauna of small streams in the eastern Ural.

Literature cited:
Aleksevnina 1988 (ed.). Biology of the Votkinskoje reservoir. Monograph, Irkutusk.
Behning 1928. Stud. Volga Biol. Station 1X (4-5): 237-292.
Gromov & Demidova 1971. Limnologica 8: 79-81

Margarita S. Aleksevnina
Department of Biology
University of Perm
16, Bukirev st.
614600 Perm (Russia)

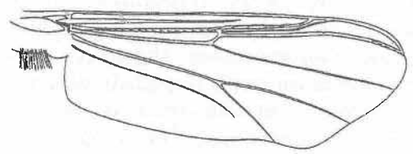
The Caspian Sea, a Unique Ecosystem

by T.D. Zinckenko

The Volga river basin together with the Caspian Sea form an integrated hydrological system of ecological uniqueness. Unfortunately, river regulation has caused a drastic decrease in the water level of the Caspian Sea during this century, in particular from 1958 to 1977. As a consequence of this, and of pollution, the composition of benthic communities have changed. This was also promoted by an unpredicted rise in the sea level starting from 1978.

There exist very few publications on Chironomidae from the Volga delta until 1970. Behning (1924), for example reported low chironomid abundances, whereas Idelson (1941) presented quite contrary data of 5261 ind/m^2 and biomass values of up to 80.8 g/m^2.

From 1953 to 1955, when the Volga impoundments were flooded, Kosova (1958) recorded a biomass of 16.8 g/m^2 and identified 20 chironomid taxa.



After 1970, intense research was started by members of the Astrakhan University and, later on, also by the Caspian Research Institute of Fisheries. Aleksevnina (1973) identified 78 chironomid species from the Volga delta, most of them known to have a broad European distribution. She also detected the remarkable mass occurrence of *Fleuria lacustris* Kieff. in the avandelta (Aleksevnina 1974), which is a species with a very interesting biology. It should be mentioned that *F. lacustris* swarms and mates on firm substratum (Shilova 1978). Another interesting species is *Chironomus albidus*, which we found with up to 4000 ind/m^2 and a standing stock of 12 g/m^2. In the mid-Caspian Sea, we detected *C. albidus* at a depth of 130 m and, thus, assess this chironomid to be a representative of the pontic Caspian fauna. The fry of the sturgeon species (Acipenseridae) that live in the Caspian Sea are known to feed on chironomid larvae. Unfortunately, until now no specific research has been done on food webs at these unique sites. Merely these few examples show that the lower Volga and the Caspian Sea are very special ground for chironomid research. And much remains to be done.

Presently we are trying to make up for the lost time. A hydrobiological group has been recently established at our Institute of Ecology that will permanently stay in Astrakhan to proceed with chironomid research at the lower Volga. We are going to conduct large-scale research in cooperation with other organizations and institutions and together with foreign experts in order to study the fauna of large and small water bodies, reservoirs, riverine deltas, saltish waters, and also marine chironomids.

I hope this information will be of interest to chironomid workers abroad, and if you are interested in our present and future projects, please contact me. One starting point could be a joint research expedition.

Our suggestions on this topic are going to be discussed at the 10th Symposium on Chironomidae, which will take place in Borok in September 1995.

Literature cited:
Aleksevnina 1973. Hydrobiol. J. 9: 61-63
Aleksevnina 1974. Zool. Zh. 53: 720-727
Behning 1924. Monogr. volzh. biol. Sta., Saratov 1: 398
Idelson 1941. Transact. VNIRO 16: 103-111
Kosova 1958. Transact. Astrakh. Reserve 4: 159-194
Shilova 1978. Inf. Bul. IBIW, Leningrad 19: 29-34

Tatiana D. Zinchenko
Institute of Ecology of the Volga River Basin
Russian Academy of Sciences
Togliatti 445003 (Russia)

News from Saratov

by I. Sergeyeva

Our working group at the Medical University of Saratov, which is headed by Prof. Dr. **S.I. Belianina**, have been collecting data to relate caryology, morphology and phylogenetics of several chironomid species.

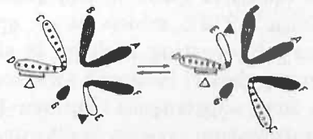
N. Polukonnova studies the genus *Chironomus*, with emphasis on the *C. plumosus* group (*C.agilis*, *C.balatonicus*, *C.bonus*, *C.entis*, *C.muratensis*, *C.plumosus*, *C.usenicus*). Morphological features were used to mark the developmental phases in the formation of species, and the following sequence in the origin of the species could be established: *C.muratensis* (0.860), *C.agilis* (0.810), *C.entis* (O.290); the species *C.balatonicus*, *C.usenicus*, and *C.bonus* rose somewhat later. The morphology of all stages of *C.heterodentatus* Konst. (= *C. acutiventris* Wülk. et al.) was studied with the result that this species differs from all other taxa of the *C.obtusidens* group in the following characters: (i) male imago; structure of gonostylus and upper appendages, (ii) pupa: structure of anal lobe and hooklets on tergite II, (iii) larva; mentum, setae of submentum (gular), and sensilla of antenna.

N. Dournova studies the caryology and morphology of *Glyptotendipes glaucus* Mg. populations from water bodies near Saratov (51°N, 46°E). A detailed chromosome chart and cadastre of disk sequences in the chromosomes of this species was compiled.

E. Morozova studies six species of *Cryptochironomus* Kieff. from the Volga river near Saratov: *C.obreptans* Walk. (2n=4), *C.supplicans* Meig. (2n=4), *C.albofasciatus* Staeg. (2n=6), *C.psittacinus* Meig. (2n=6), *C.defectus* Kieff. (2n=6) and *C.redekei* Krus. (2n=6). The caryotypes of these species are distinct in numbers and locations of active sections, disk sequence, and the extent of chromosome polymorphism. Morphological characters to distinguish the larvae were ascertained.

I. Sergeyeva studies Tanypodinae from south Jamal, the Norilsk region and the Taimyr Peninsular in north Russia (ca 70°N, 70-90°E). *Derotanypus alaskensis* (Malloch) (2n=8), *Procladius* (*Holotanypus*) sp. (2n=8), *Psectrotanypus* sp. (2n=16), *Ablabesmyia phatta* (Eggert) (2n=12) and *A.longistyla* Fittk. (2n=12) were studied so far, and it was found that these northern Tanypodinae were characterized by high chromosome numbers and the prevalence of acrocentries (in some species all chromosomes were acrocentric). Further analyses showed a low polytenic structure of giant choromosomes, chromosomes like a "friable mass" with a slightly discernible or completely lost disk structure, completely fluffy telomeres, and the occurrence of "pompon"-like chromosomes. Morphological descriptions and morphometric analyses were done for the larva, pupa and imago of *D.alaskensis*, and the larvae and pupae of *A.phatta* and *A.longistyla*.

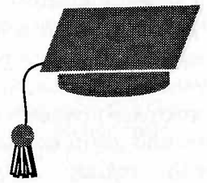
I. Sergeyeva
Medical University
Saratov 410017 (Russia)



THESES AND OTHER GREY LITERATURE

BELGIUM

Int Panis, L. 1995. The spatial distribution of benthic invertebrates in standing waters. Doctoral thesis, University of Antwerp, 181 pp. (In English with Dutch summary) Supervised by Prof. Dr. R.F. Verheyen, Dept. Biologie, Universitaire Instelling Antwerpen, Universiteitsplein 1, 2610 Wilrijk/Antwerpen.
Published: Int Panis, Kiknadze, Bervoets & Aimanova. Bull. Ann. Soc. roy. belg. Entomol. (in press) - Int Panis, Goddeeris & Verheyen. Hydrobiologia (in press) - Int Panis & Verheyen. Neth. J. Aquat. Ecol. (in press) - Int Panis, Goddeeris & Verheyen. Neth. J. Aquat. Ecol. (in press) - Int Panis, Goddeeris & Verheyen. Hydrobiologia (in press)



Abstract - Our main objective is to elucidate the influence of oxygen on the spatial distribution and adaptations of the benthic fauna in shallow standing waters. Our attention was focused on the Chironomidae that are abundant in our study site: small eutrophic ponds at Niel (near Boom, Belgium). It is well known that oxygen controls the specific occurrence and macro-distribution of chironomid larvae in standing waters, but it is unclear how the respiratory environment of these organisms is defined. We have studied the oxygen micro-stratification in order to elucidate its significance for the vertical distribution of chironomid larvae. Some species of the upper sediment layer supposedly ventilate oxygen rich water from above the sediment-water interface. But there are indications that burrowing chironomid species rely on the oxygen-poor water of the micro-stratification layer for their respiration.

One of the most obvious adaptations that can enable a species to cope with unfavourable oxygen conditions is an increase of the concentration of hemoglobin. However, a clear interspecific, univariate correlation between the concentration of hemoglobin and the vertical distribution in the sediment has never been found. We have shown that body size is also important, and that only a combination of both factors can explain the spatial distribution in the sediment.

To accomplish our objectives, a number of diverse methodological problems had to be solved. The results of detailed studies on the performance of a Petite Ponar grab, Monte Carlo based methods for data analysis (including SMW, see *CHIRONOMUS* No. 5: 20-21) and taxonomic studies of Belgian Chironomidae are also included in this thesis.

Luc Int Panis
Dept. Biologie
Universitaire Instelling Antwerpen
Universiteitsplein 1
2610 Wilrijk/Antwerpen (Belgium)

BRAZIL

Wiedenbrüg, S. 1993. Aspects of the spatial structure of the benthic macrofauna of Lake Emboaba, Rio Grande do Sul. (Aspectos da estrutura espacial da macrofauna bêntica da lagoa Emboaba, RS. Dissertação de mestrado, UFRS.) Master thesis, Federal University of Rio Grande do Sul, 157 pp. Supervised by Dr. Norma L. Würdig, Depto. Zoologia - IB, UFRS, Rua Paulo Gama s/n, BR-90046-900 Porto Alegre - RS.

Abstract - The 600 km long shore line of the Brazilian state Rio Grande do Sul features numerous lagoons and lakes, many of which suffer from human impact. Lagoa Emboaba is a small, shallow lake that is located 10 km inland (30°S/51°W). The macrobenthos of this lake was studied in winter (August 89) and summer (February

90) by means of 20 samples taken on each sampling occasion with a van-Veen grab. The unpreserved samples were sieved in the field using a 500 µm mesh. For every individual sampling site pH, temperature, dissolved O_2, depth, presence of macrophytes, grain size, and POM was recorded.

It was found that the spatial habitat structure, such as presence or absence of macrophytes and grain size, along with the water depth mainly determined the quality and quantity of the macrobenthos. As a result of these findings, three main 'habitat types' were defined in lake Emboaba: (I) the central lake area, (II) the littoral, and (III) the northern margin of the lake that showed a well developed phytal belt (largely protected from the strong NE winds, common in this region). The fauna associated with sediments and macrophytes were analyzed separately, when possible.

Chironomidae were among the most abundant macroinvertebrates, and they were recorded with 18 genera. In the central area (area I) with finer sediments and higher depths, the macrobenthos was relatively sparse (72 ind/m^2), and *Coelotanypus* spp. was the dominant midge. However, correlation analysis showed no significant relationships between this genus and the ambient parameters considered. In the rich benthos of the littoral (area II), *Polypedilum* spp., *Paralauterborniella* spp., and *Tanytarsus* spp. dominated the insect assemblages.

Abundances of these taxa were positively correlated with medium sand and the presence of macrophytes (*Scirpus*). Here (area II), *Cryptochironomus* spp., *Cladopelma* spp., *Coelotanypus* spp., *Djalmabatista* spp., *Tanypus* spp., and "Gen B" Roback 1966 were also observed. At the northern margin (area III), the benthos was richly developed (4,239 ind/m^2), and completely dominated by Chironomidae. The abundances of the most frequent genera *Beardius* spp., *Tanytarsus* spp., and *Chironomus* spp. were positively correlated with the presence of macrophytes (*Utricularia*, *Ceratophyllum*, *Eichhornia*, *Myriophyllum*, *Cabomba*). *Parachironomus* spp. and *Ablabesmyia* spp. were also present. Here, *Chironomus* spp. was more abundant in the sediment, and *Goeldichironomus* spp. and *Cricotopus* spp. in the vegetation.

Sofia Wiedenbrüg
Zoologische Staatssammlung
Münchhausenstraße 21
D-81247 München (Germany)

Messias M.C. 1995. Contribution to studies on the intersexuality of adult Chironomidae from Brazil induces by larvae of Mermithidae. (Contribuição ao estudo da intersexualidade induzida pelo parasitismo por larvas de mermitídeos (Nematoda: Mermithidae) em adultos de quironomídeos (Diptera: Nematocera, Chironomidae) no Brasil. Dissertação de mestrado, UFRRJ.) Master thesis, Rural Federal University of Rio de Janeiro, 55 pp. Supervised by Rubens Pinto de Mello, Depto. Parasitologia Animal - IB, UfRRJ, km 47 da Antiga Rod. Rio - São Paulo, 23581-970 Itaguaí, RJ; and Sebastião José de Oliveira, Instituto Oswalso Cruz, Av. Brasil 4365, 2104-900 Rio de Janeiro, RJ.

Abstract - The intersexuality of Chironomidae induced by mermithid parasites (Nematoda) is analyzed and discussed. The inspected material stems from the Entomological Collection of the Oswaldo Cruz Institute and was restricted to chironomids from Brazil. A total of 50,000 alcohol preserved specimens was analyzed, among which 975 individuals were found to be parasitized by mermithids. These 975 chironomids represented 6 known and 104 undescribed species from 26 known genera, and 18 undescribed genera. All taxa belonged to the three subfamilies Tanypodinae, Orthocladiinae and Chironominae. Morphological abnormalities were predominantly found in the structure of the antennae, abdomen and genitalia. Females generally were stronger affected than males.

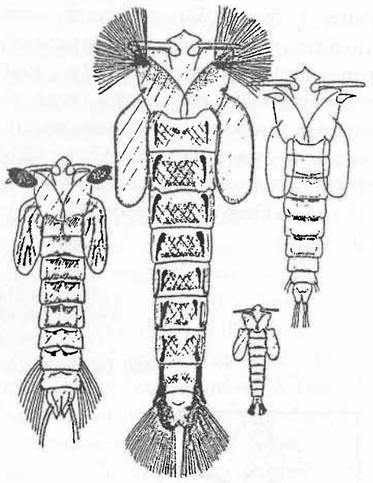
Maria Conceição Messias
Instituto Oswaldo Cruz
Rio de Janeiro (Brazil)

FRANCE

Baudon, C. 1995. Ecologie des Chironomidae (Diptera, Nematocera) d'un marais charentais: structure spécifique, phénologie, densité des populations d'adultes. [Ecology of the Chironomidae (Diptera: Nematocera) in a marsh (Charentes, France): community structure, phenology and abundance of adults]. Thèse Doctorat d'Université, Université de Rennes 1, 140 + 72 pp. (in French). Supervised by Prof. J.C. Lefeuvre and Dr. A. Neveu, Lab. Evolution des Systèmes Naturels et Modifiés. (Board of examiners: Dr. J.C. Lefeuvre, F. Ramade, A. Neveu, P. Tréhen, H. Laville, Y.R. Delettre, C. Chevallier).

Abstract - Chironomids are studied in a former salt marsh currently managed with freshwater for agriculture. The drainage network is fully looped (450 km of shallow ditches with dense beds of submerged vegetation and slow flows). Some ditches are cleaned every 4 years (syndical ditches) but most of them are not (private ditches). Seven study sites are chosen in contrasted hydraulic conditions.
Species composition (60 spp.), community structure and adult biomass are analysed and correlated with mesologic conditions. Five species (*Paratanytarsus inopertus*, *Corynoneura carriana*, *Cricotopus caducus*, *C. sylvestris*, and *Monopelopia tenuicalcar*) account for more than 90% of total abundance at each site. The abundance of floating vegetation is a good indicator of water stagnation. Its influence on oxygen conditions is one of the main factors explaining the spatial heterogeneity of species composition, community structure and biomass. Ditches with the most important flow have the less abundant floating vegetation and the best adults production. The study of a ditch before and after cleaning demonstrates a fast recolonization process and the influence of cleaning on the environmental conditions in the bottom sediment. The production of emerging adults is generally low (0.13 to 2.7 g m^{-2} year^{-1}) owing to the small size of species. The second part analyses emergence phenology and sex-ratio of the 12 main species. Four to six generations year^{-1} are observed with large variations in the importance of a generation from site to site. High voltinism, opportunism and dispersal abilities allow the species to survive in this heterogeneous, fluctuating and unpredictable environment.

C. Baudon
Université de Rennes 1
Laboratoire d'Ecologie du Sol et de Biologie des Populations
Station Biologique de Paimpont
F-35380 PLELAN-LE-GRAND (FRANCE)



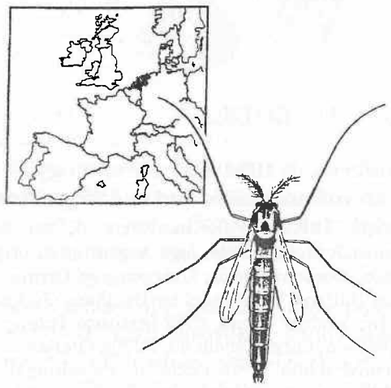
ITALY / ARGENTINA

Masaferro, J. 1994. Paleolimnology of six Italian volcanic lakes and one Argentinean glacial lake. (Paleolimnologia di sei laghi vulcanici Italiani e di un lago Argentino di origine glaciale.) Doctoral thesis, University of Parma, 180 pp. (in Italian). Supervised by Dr. Piero Guilizzoni and Dr. Andrea Lami, CNR-Instituto Italiano di Idrobiologia, Largo Tonolli 50, I-28048 Pallanza. Published: Lami et al. (1994) J. Paleolimnol. 10: 181-197.

Abstract - The aim of the present work was to elucidate the trophic evolution of six volcanic lakes in Italy (Albano, Bolsena, Bracciano, Martignano, Mezzano, Nemi) and one glacial lake in Argentina (El Trebol). Short sediment cores of 1 m length were taken from the deepest part of each lake in order to reconstruct the histories of the lakes during the past two centuries. Sub-

samples of 2 cm thickness were analyzed in respect to some physical conditions present in the sediments (magnetic susceptibility, density of sediment), geochemical parameters (OM, CO_3Ca, biogenic silica, heavy metals, nutrients) and biological features (fossil pigments, fossil Chironomidae). Sedimentation rates were estimated from banded layers of silt and sand (varves) present in most of the cores. Canonical analyses (CANOCO) were run to evaluate the various data sets obtained from the sediment cores. The relationship between the history of chironomid assemblages and the history of environmental conditions was evident, showing a course of development of the lakes towards eutrophication, which is in accordance with the intensified land use and increasing human impact during the last years.

Julieta Masaferro
PROGEBA-CONICET
Box Ap.No. 47
8400 Bariloche (Argentina)



SPAIN

Calle Martinez, D. 1994. Chironomidae of the upper Guadalquivir river: An ecological, faunistic and systematic study, with observations on emergence patterns. Doctoral thesis, University of Granada, 366 pp. (in Spanish). Supervised by Dr. J. Jesús Casa Jiménez and Dr. Antonio Vílchez-Quero, Dept. Biología Animal y Ecología, Campus Universitario de Fuentenueva, ES-18071 Granada.

Abstract - Chironomids of the upper Guadalquivir river were studied (38°N / 2°-3°W, Andalusia) considering the different degree of human impact to their habitat. A study area, located in the natural reserve of the Sierra de Segura (Biosphere Reserve since 1983, bird protection since 1988), was chosen to compare clean headwaters with a stretch further downstream which is severely disturbed by urban waste, industrial waste (such as organic input from olive oil extraction) and river regulation (reservoirs). Analyses of abiotic parameters showed that increasing mineralization, organic pollution, oxygen reduction, and disturbance frequency along the river are most important for the composition and structure of chironomid communities.

Benthos analyses were congruent to the drift samples of pupal skins in terms of quantity and quality. It was found that the most representative samples of exuviae were collected during dusk, i.e. one to two hours before complete darkness, as well as approximately four hours after sunrise (n = 9 24-hours sample cycles). The emergence patterns of 27 species were studied in detail. Emergence seems to be triggered by photoperiod together with air temperature, and I distinguished three emergence patterns as follows: (i) emergence only during the day, (ii) at sunset or/and at night, and (iii) a bimodal night and day rhythm. The latter pattern was followed by many Orthocladiinae, while many Chironominae emerged at night. Among the 165 recorded chironomid species, 86 species were new for the upper Guadalquivir river, 21 species were first records for the Iberian Peninsula, and a further four species are new to science and are yet to be described. They belong to the genera *Paracricotopus*, *Parametriocnemus*, *Paracladopelma* and Chironomini gen ?. All together there are now 376 chironomid species recorded from the entire Iberian Peninsula. It was shown that the chironomid fauna of the upper Guadalquivir river is very similar to those of the French Pyrénées and Massif Central.

The comparison of the chironomid communities from the two river stretches showed that *Eukiefferiella pseudomonatana*, *E.brehmi*, *E.cyanea*, *Parametriocnemus* sp. (undescribed), *Pseudorthocladius berthelemyi*, *Paramerina divisa*, *Nilotanypus dubius*, and *Lithotanytarsus dadesi* were characteristic for the unpolluted headwaters in the Sierra de Segura. *Chironomus riparius* and *Paratrichocladius rufiventris* were abundant below inlets of organic waste.

Denetrio Calle Martínez
Dept. Biología Animal y Ecología
Universidad de Granada
Campus Universitario de Fuentenueva
18071 Granada (Spain)

SWEDEN

Goedkoop, W. 1995. Microbial food resources for profundal zoobenthos in lakes. Doctoral thesis, Uppsala University. Supervised by Dr. Richard K. Johnson, Swedish University of Agricultural Sciences, Uppsala, Sweden.

Abstract - In a number of field and laboratory studies, the utilization of sediment bacteria and seasonal inputs of diatoms by profundal zoobenthos in lakes was investigated.
The importance of bacteria as a food resource for benthic macroinvertebrates was inversely related to lake trophic state according to a predictive model. Predicted sediment bacterial production and invertebrate carbon requirements were quite well balanced in oligotrophic lakes, where bacteria could cover as much as 47% of macroinvertebrate carbon demands. In hypertrophic lakes, only 2.1% of deposit-feeder carbon demands could be accounted for by bacteria.
Activity of *Monoporeia affinis*, *Chironomus riparius*, and *Tubifex tubifex* had pronounced positive effects on bacterial production in the sediment, thereby increasing bacterial carbon available for ingestion. Only the oligochaete *Tubifex tubifex*, however, caused a decrease in bacterial abundance in the sediment. From treatments with a mechanical stirrer, it was concluded that mechanical disturbance of sediment was the predominant causal mechanism. In a case study, juveniles of the amphipod *M. affinis* could cover only between 1.7 and 6.3% of their energy requirements by consumption of bacteria in a eutrophic sediment, despite the fact that bacterial production alone exceeded the amphipods' carbon demands. The amphipods' ingestion rate was found to be limiting a higher absorption of bacterial carbon.
A carbon budget for pelagic-benthic coupling during spring in Lake Erken showed that only 3.7% of sedimenting diatom carbon was processed by sediment bacteria, leaving a large proportion directly available to benthic fauna. Less than 1% of deposited phytodetrital carbon was processed by benthic meiofauna, and deposit-feeding chironomids utilized less than 2% of phytodetrital C. In a quantitative laboratory study using ^{14}C-labeled diatoms, however, chironomids accounted for a considerably larger share, processing 28% of a simulated spring bloom in 8 days. Incorporation of diatom carbon by added *Chydorus sphaericus* and ambient meiofauna in the sediment was less than 1%. The laboratory study elucidated the role of chironomids for the decomposition of diatom detritus in benthic communities.

Willem Goedkoop
Institute of Limnology
Uppsala University
S-752 36 Uppsala, (Sweden)

THE NETHERLANDS

van de Bund, W. 1994. Food web relations of littoral macro- and meiobenthos. Doctoral thesis, University of Amsterdam, 106 pp. (in English with Dutch summary) Supervised by Prof. Dr. W. Admiraal and Dr. C. Davids, Dep. Fundamental and Applied Ecology, University of Amsterdam, Kruislaan 320, NL-1098 SM Amsterdam. Publications related to chironomids: van de Bund, Davids & Spaas. Hydrobiologia (in press) - van de Bund & Groenendijk. Arch. Hydrobiol. (in press) - van de Bund & Davids. Freshwat. Biol. 29: 1-6. - van de Bund, Goedkoop & Johnson. J.N.Am. Benthol. Soc. 13: 532-539.

From the Contents - This thesis addresses factors regulating the populations of chironomid larvae and chydorid cladocerans. These organisms are usually the principle representatives of the macro- and meiobenthos in wind-exposed sandy littoral of lakes. Earlier work clarified the importance of predation and abiotoc factors for chironomid pouplations in Lake Maarsseven I. The present thesis continues this line of research, focussing on factors related to food availability, including intraspecific interactions among the (macrobenthic) chironomids and (meiobenthic) chydorids.

Smit, H. 1995. Macrozoobenthos in the enclosed Rhine-Meuse Delta. Doctoral thesis, Catholic University of Nijmegen, 192 pp. ISBN 90-9007897-5. (in English with Dutch summary) Supervised by Prof. Dr. C. den Hartog Katholieke, Universiteit Nijmeigen (The Netherlands) and Prof. D. G. van der Velde, Vrije Universiteit Brussel (Belgium).

Publications related to chironomids: van Nes & Smit. 1993. Arch. Hydrobiol. 127: 185-203. - Smit, van der Velden & Klink. 1994. Netherl. J. Aquat. Ecol. 28: 199-212. - Smit, Klaren & Snoek. 1991. Verh. Int. Verein. Limnol. 24: 2918-1923. - Smit, Heinis, Bijkerk & Kerkum. 1992. Netherl. J. Aquat. Ecol. 26: 431-440. - Smit, Dudok van Heel & Wiersma. 1993. Freshw. Biol. 29: 37-46. - van Urk, Kerkum & Smit. 1992. Can. J. Fish. Aquat. Sci. 49: 2291-2299.

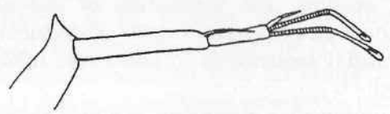
From the Contents - chapter 2: Multivariate analysis of macrozoobenthos in Lake Volkerak-Zoommeer (The Netherlands): changes in an estuary before and after closure; chapter 3: macrozoobenthos in littoral sediments; chapter 4: Ecology of *Lipinella arenicola* Shilova; chapter 5: Determination of macroinvertebrate biomass; chapter 7: Macrozoobenthos in contaminated sediments; chapter 8: Ecosystem developments in the Rhine-Meuse Delta during two decennia after enclosure and prospects for etuary restoration.

Grey Literature

Trivinho-Strixino, S. & Strixino, G. 1995. Larvas de Chironomidae (Diptera) do Estado de São Paulo: Guia de indentificação e diagnose dos gêneros. (Larvae of Chironomidae from the state of São Paulo: an identification guide with generic diagnoses.) Informal manual published by the Federal University of São Carlos in the scope of the post graduation program, 125 pp., 108 plates (written in Portuguese).

Characters for the identification of midge larvae of the family Chironomidae are presented with keys and illustrations for 62 common genera of the three subfamilies (Tanypodinae, Orthocladiinae, Chironominae) that were collected in the state of São Paulo (Brazil). The purpose of this guide is to facilitate the identification of this group to anyone interested in the fauna that is associated with the benthal and phytal of Brazilian inland waters.

The booklet can be obtained from: Secretaria do Programa de pós-graduação em ecologia e recursos naturais, Universidade Federal de São Carlos, Box c.p. 676, 13565-905 São Carlos - SP (Brazil). Brazilians please send R$ 5,00 for postage; for non-Brazilians postage is US $ 20.00.

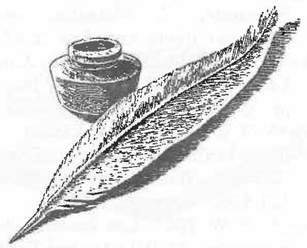


Moog, O. (ed.) 1994. Datensammlung und Einstufungskatalog zur Autökologie aquatischer Organismen Österreichs. (Checklist of Austrian aquatic organisms along with data on their ecological profile.) In German. Austrian Federal Ministry for Agriculture and Forestry.

Besides some information about functional feeding groups, community structure and saprobic lists, the Chironomidae section is actually an updated faunistic checklist for Austria. This part is authored by; Ruth **Contreras-Lichtenberg**, Berthold F.U. **Janecek**, Otto **Moog**, Cristian **Moritz**, Claus **Orendt** and Reinhard **Saxl**. For further information please contact:

Berthold F.U. Janecek
Abt. für Hydrobiologie
Max Emanuel Strasse 17
A-1180 Wien (Austria)

PERSONALIA



Dr. Ruth Contreras-Lichtenberg has been appointed Director of the Zweite Zoologische Abteilung (Department of Entomology) of the Naturhistorisches Museum Wien, Austria.

Awards

In August 1994, only a few weeks before his sudden death, **Dr. Willis Wagner Wirth** was awarded the **C. P. Alexander Award** at the 3rd International Congress of Dipterology in Guelph, Canada.

In November 1994, **Prof. Dr. Ernst Josef Fittkau** was awarded the **Medal of the Oswaldo Cruz Institute**, Rio de Janeiro, Brazil, in appreciation of his research on Chironomidae from the Amazon region.

Addresses changed

Dr. Luc Janssens de Bisthoven
Ecology Building,
Ecochemistry-Ecotoxicoloy
Lund University
Sölvegaten 39
22362 Lund (Sweden)
Fax: +46 46 103790

Editorial Office of *CHIRONOMUS*

Dr. Ulrike Nolte
c/o Dr. Peter S. Cranston
Entomology, CSIRO
P.O. Box 1700
Canberra, ACT 2601
(Australia)

This address will be valid until 1 April 1996, i.e. at least until the deadline for the coming *CHIRONOMUS* issue.

From July until November 1995 my private address will be:
Ulrike Nolte
von-Ossietzky-Strasse 16
37085 Göttingen (Germany)

Obituary Notices

Dr. Willis W. Wirth
17.10.1916 - 03.09.1994

The world suffered the loss of yet another systematic dipterist on 3 September 1994 when Dr. Willis W. Wirth, known to everyone as "Bill", passed away in Gainesville, Florida, U.S.A., after being diagnosed with cancer less than two years previously.

Willis Wagner Wirth was born on 17 October 1916 in Dunbar, Nebraska. He completed a Bachelor of Science degree at Iowa State in 1940; a Master of Science degree at Louisiana State University in 1947; and a Doctor of Philosophy degree at the University of California at Berkeley in 1950. He served with the United States Public Health Service from 1942-1946. In 1949 he began his position of Research Entomologist at the USDA Systematic Entomology Laboratory, United States Museum of Natural History, Washington, D.C. (the "USNM"). He retired in 1984 and

moved to Gainesville, FL, where he was a resident Research Associate of the Florida State Collection of Arthropods. Although "retired", he continued to work with and publish on the Ceratopogonidae.

Although perhaps best known for his work with the family Ceratopogonidae, Bill also published several papers dealing with Chironomidae; his early papers dealt with marine midges. He also published on the Canacidae, Dolichopodidae and Ephydridae. He authored or co-authored approximately 400 papers.

I first met Bill Wirth in 1979, when I was beginning my revision of the Nearctic species of *Dicrotendipes*. At the time Bill was still at the USNM. He was very kind and helpful to a student finally beginning a serious systematic study! Bill continued in that vein after his move to Gainesville; he was always willing to look over my ceratopogonid material from the US and Costa Rica, and to chat about chironomids. We will all miss him.

Bibliography on Chironomidae

Wirth, W.W. 1947. Notes on the genus *Thalassomyia* Schiner, with descriptions of two new species. Proc. Hawaii. ent. Soc. 13: 117-139.

Wirth, W.W. 1947. A review of the genus *Telmatogeton* Schiner, with descriptions of three new Hawaiian species (Diptera: Tendipedidae). Proc. Hawaii. ent. Soc. 13:145-191.

Stone, A. & W.W. Wirth. 1947. On the marine midges of the genus *Clunio* Haliday (Diptera, Tendipedidae). Proc. ent. Soc. Wash. 49: 201-224.

Wirth, W.W. 1949. A revision of the Clunioninae midges with descriptions of a new genus and four new species. Univ. Calif. Publs. Ent. 8: 151-182.

Wirth, W.W. 1952. Notes on marine midges from the eastern United States (Diptera: Tendipedidae). Bull. mar. Sci. Gulf Caribb. 2: 307-312.

Wirth, W.W. 1952. Los insectos de las Islas Juan Fernandez. 7. Heleidae and Tendipedidae (Diptera). Revta. chil. Ent. 2: 87-104.

Wirth, W.W. & A. Stone. 1956. Aquatic Diptera. In: Usinger, R.L. (ed.). Aquatic Insects of California, pp. 372-482. Univ. of Calif. Press.

Wirth, W.W. 1957. The species of *Cricotopus* midges living in the blue-green alga *Nostoc* in California (Diptera: Tendipedidae). Pan-Pacific Ent. 33: 121-126.

Wirth, W.W. 1957. Los insectos de las Islas Juan Fernandez. 32. Heleidae and Tendipedidae (Supplementary reports). Revta. chil. Ent. 5: 399-401.

Wirth, W.W. 1961. Instructions for preparing slides of Ceratopogonidae and Chironomidae. Studies ent. 4: 553-554.

Wirth, W.W. & J.L. Gressitt. 1967. Diptera: Chironomidae (midges). In: Gressitt, J.L. (ed.). Entomology of Antarctica. Antarc. Res. ser. 10: 197-203.

Wirth, W.W. & N. Marston. 1968. A method for mounting small insects on microscope slides in Canada balsam. Ann. ent. Soc. Am. 61: 783-784.

Wirth, W.W. 1969. New species and records of Galápagos Diptera. Proc. Calif. Acad. Sci. 36: 571-594.

Wirth, W.W. & J.E. Sublette. 1970. A review of the Podonominae of North America with descriptions of three new species of *Trichotanypus* (Diptera: Chironomidae). J. Kans. ent. Soc. 43: 335-354.

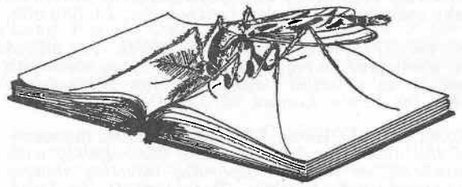
Sublette, J.E. & W.W. Wirth. 1972. New genera and species of West Indian Chironomidae (Diptera). Fla. Ent. 55: 1-17.

Wirth, W.W. 1979. *Siolimyia amazonica* Fittkau, an aquatic midge new to Florida with nuisance potential. Fla. Ent. 62: 134-135.

Sublette, J.E. & W.W. Wirth. 1980. The Chironomidae and Ceratopogonidae (Diptera) of New Zealand's subantarctic islands. New Zealand J. Zool. 7: 299-378.

John H. Epler

CURRENT BIBLIOGRAPHY



Current Bibliography: 1 Jan. 1994 - 31 Dec. 1994

by Odwin Hoffrichter
[© 1995 by *CHIRONOMUS*, and O. Hoffrichter - Associated Editor]

Abolhassani-Dadras, S., Vázquez-Nin, G. H., Echeverría, O. M., Boutinard Rouelle-Rosier, V. and Fakan, S. 1994a. ESI in situ analyses of extrachromosomal RNP particles.- *J. Microsc., Lond. 174*: 233-238.

Ahiska, S. ve Karabatak, M. 1994a. Seyfe (Kırşehir) gölünün dip faunası. (Benthic fauna of the Lake Seyfe (Kırşehir).- *Turk. J. Biol. 18*: 61-75.

Ahrens, B. 1994a. Die Mücken- und Fliegenfamilien am ehemaligen Steinbruch Eskesberg.- *Jber. naturwiss. Ver. Wuppertal 47*: 139-141.

Alaimo, J., Ogle, R. S. and Knight, A. W. 1994a. Selenium uptake by larval *Chironomus decorus* from a *Ruppia maritima*-based benthic/detrital substrate.- *Archs envir. Contam. Toxic. 27*: 441-448.

Alderweireldt, M. 1994a. Prey selection and prey capture strategies of linyphiid spiders in high-input agricultural fields.- *Bull. Br. arachnol. Soc. 9*: 300-308.

Ali, A., Ceretti, G., Barbato, L., Marchese, G., D'Andrea, F. and Stanley, B.1994a. Attraction of *Chironomus salinarius* (Diptera, Chironomidae) to artificial light on an island in the saltwater lagoon of Venice, Italy.- *J. Am. Mosquito Contr. Ass. 10*: 35-41.

Andersen, T. and Sæther, O. A. 1994 (1993)a. *Colosmittia clavata* gen. n., sp. n., a new orthoclad from the West Usambara Mountains, Tanzania (Diptera: Chironomidae).- *J. Kans. ent. Soc. 66*: 439-443.

Andersen, T. and Sæther, O. A. 1994b. *Usambaromyia nigrala* gen. n., sp. n., and Usambaromyiinae, a new subfamily among the Chironomidae (Diptera).- *Aquat. Insects 16*: 21-29.

Ankley, G. T., Benoit, D. A., Balogh, J. C., Reynoldson, T. B., Day, K. E. and Hoke, R. A. 1994a. Evaluation of potential confounding factors in sediment toxicity tests with three freshwater benthic invertebrates.- *Envir. Toxic. Chemy 13*: 627-635.

Ankley, G. T., Call, D. J., Cox, J. S., Kahl, M. D., Hoke, R. A. and Kosian, P. A. 1994a. Organic carbon partitioning as a basis for predicting the toxicity of chlorpyrifos in sediments.- *Envir. Toxic. Chemy 13*: 621-626.

Arias, A. M. and Drake, P. 1994a. Structure and production of the benthic macroinvertebrate community in a shallow lagoon in the Bay of Cádiz.- *Mar. Ecol. Progr. Ser. 115*: 151-167.

Ashe, P. and O'Connor, J. P. 1994a. *Eukiefferiella ancyla* and *Paratanytarsus grimmii* (Diptera: Chironomidae), new to Ireland, with a second record for *Orthocladius (Symposiocladius) lignicola*.- *Ir. Nat. J. 24*: 364-366.

Baekken, T. 1994a. Effects of highway pollutants on a small Norwegian lake.- *Sci. tot. Envir. 146/147*: 131-139.

Basaguren, A. and Pozo, J. 1994a. Leaf litter processing of alder and eucalyptus in the Agüera stream system (Northern Spain). II. Macroinvertebrates associated.- *Arch. Hydrobiol. 132*: 57-68.

Basaguren, A. and Riaño, P. 1994a. Trophic structure variability of the macroinvertebrate communities in the Agüera Stream (Northern Spain).- *Verh. int. Verein. Limnol. 25*: 1727-1732.

Battegazzore, M., Guzzini, A. and Pagnotta, R. 1994a. Compared use of macroinvertebrate samplers for the evaluation of water quality in rivers of different sizes.- *Limnologica 24*: 43-49.

Baurén, G. and Wieslander, L. 1994a. Splicing of Balbiani ring 1 gene pre-messenger RNA occurs simultaneously with transcription.- *Cell 76*: 183-192.

Bazzanti, M., Seminara, M. and Tamorri, C. 1994a. Depth distribution and relationships to the trophic state of sublittoral and profundal macrobenthos in Lake Vico (Central Italy).- *Limnologica 24*: 13-21.

Belikov, S. and Wieslander, L. 1994a. Improved preservation of chromatin structure in ethanol-fixed cells.- *Nucleic Acids Res. 22*: 1928-1929.

Bell, J. G., Ghioni, C. and Sargent, J. R. 1994a. Fatty acid compositions of 10 freshwater invertebrates which are natural food organisms of Atlantic salmon parr (*Salmo salar*): a comparison with commercial diets.- *Aquaculture 128*: 301-313.

Bendell-Young, L., Chouinard, J. and Pick, F. R. 1994a. Metal concentrations in chironomids in relation to peatland geochemistry.- *Archs envir. Contam. Toxic. 27*: 186-194.

Berg, S., Jeppesen, E., Søndergaard, M. and Mortensen, E. 1994a. Environmental effects of introducing whitefish, *Coregonus lavaretus* (L.), in Lake Ring.- *Hydrobiologia 275/276*: 71-79.

Bergman, E. and Greenberg, L. A. 1994a. Competition between a planktivore, a benthivore, and a species with ontogenetic diet shifts.- *Ecology 75*: 1233-1245.

Bervoets, L., Int Panis, L. and Verheyen, R. 1994a. Trace metal levels in water, sediments and *Chironomus* gr. *thumni* [sic!], from different water courses in Flanders (Belgium).- *Chemosphere 29*: 1591-1601.

Besser, J. M., Kubitz, J. A., Giesy, J. P. and Ingersoll, C. A. 1994a. Relationship of metal bioaccumulation to toxicity in freshwater invertebrates.- *Bull. N. Am. benthol. Soc. 11*: 153.

Bird, G. A. 1994a. Use of chironomid deformities to assess environmental degradation in the Yamaska River, Quebec.- *Envir. Monit. Assess. 30*: 163-175.

Bird, G. A. 1994b. Use of chironomid menta deformities to assess contaminant effects.- *Bull. N. Am. benthol. Soc. 11*: 155.

Bitušík, P. 1994a. Report of some present trends of Chironomidae research in Slovakia.- *Dipterol. bohemoslov. 6*: 17-23.

Bitusík, P. and Langton, P. H. 1994a. Further records of chironomids (Diptera: Chironomidae) from Slovakia.- *Biológia, Bratisl. 49*: 235-237.

Boothroyd, I. K. G. 1994a. Description of *Naonella* n. gen. (Diptera: Chironomidae: Orthocladiinae).- *N. Z. Jl Zool. 21*: 309-315.

Bothwell, M. L., Sherbot, D. M. J. and Pollock, C. M. 1994a. Ecosystem response to solar ultraviolet-B radiation: influence of trophic-level interactions.- *Science, Wash. 265*: 97-100.

Botts, P. S. 1994a. Chironomid assemblages and temporal dynamics of wetlands on Gull Point, Presque Isle, PA.- *Bull. N. Am. benthol. Soc. 11*: 187.

Bozek, M. A., DeBrey, L. D. and Lockwood, J. A. 1994a. Diet overlap among size classes of Colorado River trout (*Oncorhynchus clarki pleuriticus*) in a high-elevation mountain stream.- *Hydrobiologia 273*: 9-17.

Bradford, L. and Tuchman, N. C. 1994a. Changes in a Lake Michigan benthic rock reef community since the invasion of zebra mussels.- *Bull. N. Am. benthol. Soc. 11*: 132.

Braz, E. and Joly, P. 1994a. Micro-habitat use, resource partitioning and ecological succession in a size-structured guild of newt larvae (g. *Triturus*, Caudata, Amphibia).- *Arch. Hydrobiol. 131*: 129-139.

Breitenmoser-Würsten, C. 1994a. Die Fliessgewässerfauna im System der Saane (Berner Oberland, Schweizer Nordalpen) als Grundlage der Nahrungsökologie der Wasseramsel (*Cinclus cinclus*).- *Mitt. schweiz. ent. Ges. 67*: 77-135.

Breneman, D. H. and Pontasch, K. W. 1994a. Stream microcosm toxicity tests: predicting the effects of fenvalerate on riffle insect communities.- *Envir. Toxic. Chemy 13*: 381-387.

Brewin, P. A. and Ormerod, S. J. 1994a. Macro-invertebrate drift in streams of the Nepalese Himalaya.- *Freshwat. Biol. 32*: 573-583.

Brunke, M., Schwoerbel, J. und Wendling, K. 1994a. Die Auswirkungen eines Flußtunnels auf die Fließgewässerbiozönose: Makrozoobenthon und Fischfauna.- *Limnologica 24*: 297-322.

Bund, W. van de 1994a. *Food web relations of littoral macro- and meiobenthos*.- Ph. D. Diss., Univ. Amsterdam. 107 pp.

Bund, W. J. van de and Davids, C. 1994a. The influence of biotic factors on life-history parameters of a littoral chironomid species.- *Verh. int. Verein. Limnol. 25*: 2482-2484.

Bund, W. J. van de and Groenendijk, D. 1994a. Seasonal dynamics and burrowing of littoral chironomid larvae in relation to competition and predation.- *Arch. Hydrobiol. 132*: 213-225.

Bund, W. J. van de, Goedkoop, W. and Johnson, R. K. 1994a. Effects of deposit-feeder activity on bacterial production and abundance in profundal lake sediment.- *J. N. Am. benthol. Soc. 13*: 532-539.

Burton, T. M. and Ulrich, K. E. 1994a. The effects of whole-tree harvest on insects associated with leaf packs in small streams in New Hampshire.- *Verh. int. Verein. Limnol. 25*: 1483-1491.

Bylén, E. K. C. 1994a. *Ultrastructure and taxonomy of the microsporidia (Protozoa: Microspora) with emphasis on the microsporidia infecting midges (Diptera: Chironomidae)*.- Doct. Diss., Univ. Lund. 168 pp.

Bylén, E. K. C. and Larsson, J. I .R. 1994a. Ultrastructural study and description of *Pernicivesicula gracilis* gen. et sp. nov. (Microspora, Pereziidae), a rod-shaped microsporidium of midge larvae, *Pentaneurella* sp. (Diptera, Chironomidae), in Sweden.- *Eur. J. Protistol. 30*: 139-150.

Bylén, E. K. C. and Larsson, J. I. R. 1994b. Ultrastructural study and redescription of *Coccospora micrococcus* (LÉGER & HESSE, 1921) KUDO, 1925 (Microspora, Thelohaniidae), a parasite of midge larvae of the genus *Arctopelopia* sp (Diptera, Chironomidae) in Sweden.- *Arch. ProtistKde 144*: 271-282.

Bylén, E. K. C. and Larsson, J. I. R. 1994c. *Napamichum cellatum* n. sp. (Microspora, Thelohaniidae), a new parasite of midge larvae of the genus *Endochironomus* (Diptera, Chironomidae) in Sweden.- *J. eukaryot. Microbiol. 41*: 450-457.

Calle Martinez, D. 1994a. *Quironómidos (Diptera: Chironomidae) del alto Guadalquivir: estudio ecológico, faunístico y sistematico. Ciclos nictemerales de emergencia*.- Tes. Doct., Univ. Granada. 366 pp.

Campeau, S., Murkin, H. R. and Titman, R. D. 1994a. Relative importance of algae and emergent plant litter to freshwater marsh invertebrates.- *Can. J. Fish. aquat. Sci. 51*: 681-692.

Canfield, T. J., Kemble, N. E., Brumbaugh, W. G., Dwyer, F. J., Ingersoll, C. G. and Fairchild, J. F. 1994a. Use of benthic invertebrate structure and the sediment quality triad to evaluate metal-contaminated sediment in the upper Clark Fork River, Montana.- *Envir. Toxic. Chemy 13*: 1999-2012.

Case, S. T. and Smith, S. V. 1994a. Synthetic and recombinant domains from a midge's giant silk protein: role for disulfide bonds.- In: Kaplan, D., Adams, W. W., Farmer, B. and Viney, C. (eds.): *Silk polymers: materials science and biotechnology. Am. chem. Soc. Symp. Ser. 544*: 91-97.

Case, S. T., Powers, J., Hamilton, R. and Burton, M. J. 1994a. Silk and silk proteins from two aquatic insects.- In: Kaplan, D., Adams, W. W., Farmer, B. and Viney, C. (eds.): *Silk polymers: materials science and biotechnology. Am. chem. Soc. Symp. Ser. 544*: 80-90.

Casper, A. F. 1994a. Population and community effects of sediment contamination from residential urban runoff on benthic macroinvertebrate biomass and abundance.- *Bull. envir. Contam. Toxic. 53*: 796-799.

Chaloner, D. T. and Wotton, R. S. 1994a. Influence of substratum on development of *Cricotopus sylvestris* (Diptera: Chironomidae) larvae.- *Bull. N. Am. benthol. Soc. 11*: 189.

Champlin, D. T. and Lis, J. T. 1994a. Distribution of B52 within a chromosomal locus depends on the level of transcription.- *Molec. Biol. Cell 5*: 71-79.

Chang, P. S. S., Cobb, D. G., Flannagan, J. F. and Sæther, O. A. 1994a. Light trap collections of mayflies, caddisflies and chironomids from Lake Winnipeg during 1969 and 1971.- *Can. Manuscr. Rep. Fish. aquat. Sci. 2223*: 1-27.

Chapman, G. and Fernando, C. H. 1994a. The diets and related aspects of feeding of Nile tilapia (*Oreochromis niloticus* L.) and common carp (*Cyprinus carpio* L.) in lowland rice fields in northeast Thailand.- *Aquaculture 123*: 281-307.

Charbonneau, C. S., Drobney, R. D. and Rabeni, C. F. 1994a. Effects of *Bacillus thuringiensis* var. *israelensis* on nontarget benthic organisms in a lentic habitat and factors affecting the efficacy of the larvicide.- *Envir. Toxic. Chemy 13*: 267-279.

Chigbu, P. and Sibley, T. H. 1994a. Diet and growth of longfin smelt and juvenile sockeye salmon in Lake Washington.- *Verh. int. Verein. Limnol. 25*: 2086-2091.

Claus, P., Schulze, E. and Wis;niewski, J. R. 1994a. Insect proteins homologous to mammalian high mobility group proteins I/Y (HMG I/Y). Characterisation and binding to linear and four-way junction DNA.- *J. biol. Chemy 269*: 33042-33048.

Clements, W. H. 1994a. Benthic invertebrate community responses to heavy metals in the Upper Arkansas River Basin, Colorado.- *J. N. Am. benthol. Soc. 13*: 30-44.

Clements, W. H. and Kiffney, P. M. 1994a. Integrated laboratory and field approach for assessing impacts of heavy metals at the Arkansas River, Colorado.- *Envir. Toxic. Chemy 13*: 397-404.

Clements, W. H., Oris, J. T. and Wissing, T. E. 1994a. Accumulation and food chain transfer of fluoranthene and benzo(a)pyrene in *Chironomus riparius* and *Lepomis macrochirus*.- *Archs envir. Contam. Toxic. 26*: 261-266.

Cline, J. M., East, T. L. and Threlkeld, S. T. 1994a. Fish interactions with the sediment-water interface.- *Hydrobiologia 275/276*: 301-311.

Closs, G. P. and Lake, P. S. 1994a. Spatial and temporal variation in the structure of an intermittent-stream food web.- *Ecol. Monogr. 64*: 1-21.

Collins, K. P. and Shiozawa, D. K. 1994a. Dynamics of plankton and benthic invertebrates in backwater areas of the Green River, Utah.- *Bull. N. Am. benthol. Soc. 11*: 158.

Convey, P. and Block, W. 1994a. Antarctic dipterans: colonisation processes and physiological limits.- *Abstr. 5th Eur. Congr. Ent.*: 59. IFAB Communs, Univ. York.

Copp, G. H., Warrington, S and Bruine, Q. de 1994a. Comparison of diet in bullhead, *Cottus gobio* and stone loach, *Barbatula barbatula* in a small English lowland river.- *Folia zool. 43*: 171-176.

Cortes, R. M. V., Graça, M. A. S. and Monzón, A. 1994a. Replacement of alder by eucalypt along two streams with different characteristics: Differences on decay rates and consequences to the system functioning.- *Verh. int. Verein. Limnol. 25*: 1697-1702.

Culotta, E. 1994a. UV-B effects: bad for insect larvae means good for algae.- *Science, Wash. 265*: 30.

Cunningham, E. J., Tierney, J. F. and Huntingford, F. A. 1994a. Effects of the cestode *Schistocephalus solidus* on food intake and foraging decisions in the three-spined stickleback *Gasterosteus aculeatus*.- *Ethology 79*: 65-75.

Cwynar, L. C., Levesque, A. J., Mayle, F. E. and Walker, I. 1994a. Wisconsinian late-glacial environmental change in New Brunswick: a regional synthesis.- *J. quat. Sci. 9*: 161-164.

Czisch, M., Liebers, V., Bernstein, R., Chen, Z., Baur, X. and Holak, T. A. 1994a. Conformations of peptide fragments comprising the complete sequence of component III of *Chi t* I and their relationship to T-cell stimulation.- *Biochemistry 33*: 9420-9427.

Day, K. E., Kirby, R. S. and Reynoldson, T. B. 1994a. Sexual dimorphism in *Chironomus riparius* (Meigen): impact on interpretation of growth in whole-sediment toxicity tests.- *Envir. Toxic. Chemy 13*: 35-39.

De Pauw, N., Lambert, V., Kenhove, A. van and Vaate, A. bij de 1994a. Performance of two artificial substrate samplers for macroinvertebrates in biological monitoring of large and deep rivers and canals in Belgium and The Netherlands.- *Envir. Monit. Asses. 30*: 25-47.

Delettre, Y. R. 1994a. Fire disturbance of a chironomid (Diptera) community on heathlands.- *J. appl. Ecol. 31*: 560-570.

Diaz, R. J. 1994a. Response of tidal freshwater macrobenthos to sediment disturbance.- *Hydrobiologia 278*: 201-212.

Di Brizio, M., Ranocchia, D., Giorgi, P., Fossati, G. e Colarusso, F. 1994a. Esperienza di lotta integrata ai chironomidi nel bacino del lago Trasimeno.- *Disinfestazione Ig. amb. 11*: 27-31.

Dobbs, M. G., Farris, J. L., Reash, R. J., Cherry, D. S. and Cairns, J. Jr. 1994a. Evaluation of the resident-species procedure for developing site-specific water quality criteria for copper in Blaine Creek, Kentucky.- *Envir. Toxic. Chemy 13*: 963-971.

Dobson, M. 1994a. Microhabitat as a determinant of diversity: stream invertebrates colonizing leaf packs.- *Freshwat. Biol. 32*: 565-572.

Dolédec, S. and Chessel, D. 1994a. Co-inertia analysis: an alternative method for studying species-environment relationships.- *Freshwat. Biol. 31*: 277-294.

Drissner, J., Havelka, P. und Funke, W. 1994a. Dipterengesellschaften einer Streuobstwiese. 1. Ceratopogonidae.- *Carolinea [=Beitr. naturk. Forsch. SWDtl.] 52*: 111-114.

Dudgeon, D. 1994a. The influence of riparian vegetation on macroinvertebate community structure and functional organization in six new [sic!] Guinea streams.- *Hydrobiologia 294*: 65-85.

Duffy, W. G. and Labar, D. J. 1994a. Aquatic invertebrate production in southeastern USA wetlands during winter and spring.- *Wetlands 14*: 88-97.

Echaubard, M. 1994a. Évaluation de l'état écologique et écotoxicologique des habitats et des peuplements aquatiques rhénans.- In: Weidmann, H. und Meder, H. (eds.): *Sandoz-Rheinfonds. Verh. Symp. 3.-4. Sept. 1992, pp.* 76-83. Sandoz, Basel.

Elke, C., Vögtli, M. and Lezzi, M. 1994a. DNA-binding studies using bacterially expressed ecdysteroid receptor and ultraspiracle from *Chironomus tentans* and *Drosophila melanogaster*.- *Experientia 50*: A21.

Epler, J. H. and Ferrington, L. C. Jr. 1994a. The immature stages of *Paratendipes basidens* Townes (Diptera, Chironomidae, Chironominae).- *J. Kans. ent. Soc. 67*: 311-317.

Erwin, K. L., Smith, C. M., Cox, W. R. and Rutter, R. P. 1994a. Successful construction of a freshwater herbaceous marsh in south Florida, USA.- In: Mitsch, W. J. (ed.): *Global wetlands: Old World and New, pp.* 493-508. Elsevier, Amst., Lausanne, N. Y., Oxf., Shannon, Tokyo.

Esteves, K. E. and Galetti, P. M. Jr. 1994a. Feeding ecology of *Moenkhausia intermedia* (Pisces, Characidae) in a small oxbow lake of Mogi-Guaçú River, São Paulo, Brazil.- *Verh. int. Verein. Limnol. 25*: 2198-2204.

Evrard, M. 1994a. Check-list of the Chironomidae (Diptera) of the river Meuse and two of its tributaries.- *Annls Limnol. 30*: 123-129.

Evrard, M. 1994b. Daily evolution of the drift of pupal exuviae of Chironomidae (Diptera) in a chalk trout stream (the Samson, Belgium).- *Belg. J. Zool. 124*: 115-126.

Fan, M. Z. and Li, Z. Z. 1994a. Two new pathogens of dipteran insects.- *Mycotaxon 50*: 307-314.

Fargašová, A. 1994a. A comparative study of the toxicity and inhibitory effects of inorganic tin compounds on various biological subjects.- *Biológia, Bratisl. 49*: 307-311.

Ferrington, L. C. Jr. and Kavanaugh, J. L. 1994a. - and -diversity of Chironomidae emergence from prairie streams with differing flow regimes.- *Bull. N. Am. benthol. Soc. 11*: 172.

Ferrito, V. 1994a. Les macroinvertébrés benthiques de la rivière Simeto (Sicile) et de quelques-uns de ses affluents.- *Annls Limnol. 30*: 33-56.

Filinkova, T. N. i Belyanina, S. I. 1994a. Novyi vid roda *Camptochironomus* (Diptera, Chironomidae) iz Zapolyar'ya. (A new species of the genus *Camptochironomus* (Diptera, Chironomidae) from the trans-polar region.)- *Zool. Zh. 73, 6*: 61-67.

Finlay, J. C. and Hershey, A. E. 1994a. The effect of bryophytes on invertebrate community structure in an arctic stream.- *Bull. N. Am. benthol. Soc. 11*: 160.

Flecker, A. S.and Feifarek, B. 1994a. Disturbance and the temporal variability of invertebrate assemblages in two Andean streams.- *Freshwat. Biol. 31*: 131-142.

Fossati, O., Wendling, B. and Danigo, A. H. 1994a. Freshwater invertebrate fauna of Nuku-Hiva Island (French Polynesia): Comparison between wet and dry season.- *Verh. int. Verein. Limnol. 25*: 1841-1843.

Francis, D. R. and Edlund, M. B. 1994a. Diet and habitat characteristics of *Pagastiella ostansa* (Diptera: Chironomidae).- *Bull. N. Am. benthol. Soc. 11*: 188.

Frantzen, N. M. L. H. F., Visser, J. de and Nes, E. H. van 1994a. Colonization and succession of macroinvertebrates in recently freshened Lake Volkerak-Zoom (The Netherlands).- *Hydrobiologia 275/276*: 323-334.

Frouz, J. 1994a. Influence of soil water regime on the larval development of terrestrial chironomid *Smittia nudipennis* (Diptera, Chironomidae).- *Biológia, Bratisl. 49*: 229-234.

Frouz, J. 1994b Changes in the terrestrial chironomid community (Diptera: Chironomidae) during secondary succession in old fields.- *Pedobiologia 38*: 334-343.

Fruget, J. F. 1994a. Invertebrate communities in a regulated floodplain of the middle Rhône River.- *Verh. int. Verein. Limnol. 25*: 1549-1554.

Frutos, R., Federici, B. A., Revet, B. and Bergoin, M. 1994a. Taxonomic studies of *Rickettsiella, Rickettsia*, and *Chlamydia* using genomic DNA.- *J. Invert. Path. 63*: 294-300.

Gabor, T. S., Murkin, H. R., Stainton, M. P., Boughen, J. A. and Titman, R. D. 1994a. Nutrient additions to wetlands in the interlake region of Manitoba, Canada: effects of a single pulse addition in spring.- *Hydrobiologia 279/280*: 497-510.

Galli, J. and Wieslander, L. 1994a. Structure of the smallest salivary-gland secretory protein gene in *Chironomus tentans*.- *J. molec. Evol. 38*: 482-488.

Gardarsson, A. and Einarsson, A. 1994a. Responses of breeding duck populations to changes in food supply.- *Hydrobiologia 279/280*: 15-27.

Giles, N. 1994a. Tufted Duck (*Aythya fuligula*) habitat use and brood survival increases after fish removal from gravel pit lakes.- *Hydrobiologia 279/280*: 387-392.

Gíslason, G. M., Hrafnsdóttir, T. Gardarsson, A. 1994a. Long-term monitoring of numbers of Chironomidae and Simuliidae in the River Laxá, North Iceland.- *Verh. int. Verein. Limnol. 25*: 1492-1495.

Glova, G. J. and Sagar, P. M. 1994a. Comparison of fish and macroinvertebrate standing stocks in relation to riparian willows (*Salix* spp.) in three New Zealand streams.- *N. Z. Jl mar. Freshwat. Res. 28*: 255-266.

Gower, A. M., Myers, G., Kent, M. and Foulkes, M. E. 1994a. Relationships between macroinvertebrate communities and environmental variables in metal-contaminated streams in south-west England.- *Freshwat. Biol. 32*: 199-221.

Gresens, S. E. and Lowe, R. L. 1994a. Periphyton patch preference in grazing chironomid larvae.- *J. N. Am. benthol. Soc. 13*: 89-99.

Growns, I. O. and Davis, J. A. 1994a. Longitudinal changes in near-bed flows and macroinvertebrate communities in a Western Australian stream.- *Aust. J. mar. Freshwat. Res. 45*: 963-975.

Grubbs, S. A.and Cummins, K. W. 1994a. Processing and macroinvertebrate colonization of black cherry (*Prunus serotina*) leaves in two streams differing in summer biota, thermal regime and riparian vegetation.- *Am. Midl. Nat. 132*: 284-293.

Hamburger, K., Dall, P. C. and Lindegaard, C. 1994a. Energy metabolism of *Chironomus anthracinus* (Diptera: Chironomidae) from the profundal zone of Lake Esrom, Denmark, as a function of body size, temperature and oxygen concentration.- *Hydrobiologia 294*: 43-50.

Hankeln, T., Fillippova [sic!], M. A., Kiknadze, I., I., Aimanova, K. G. and Schmidt, E. R. 1994a. Centromeric heterochromatin and satellite DNA in the *Chironomus plumosus* species group.- *Genome 37*: 925-934.

Hankeln, T., Rohwedder, A., Weich, B. and Schmidt, E. R. 1994a. Transposition of minisatellite-like DNA in *Chironomus* midges.- *Genome 37*: 542-549.

Hanson, M. A. and Butler, M. G. 1994a. Responses to food web manipulation in a shallow waterfowl lake.- *Hydrobiologia 279/280*: 457-466.

Hare, L., Carignan, R. and Huerta-Diaz, M. A. 1994a. A field study of metal toxicity and accumulation by benthic invertebrates: implications for the acid volatile sulfide (AVS) model.- *Limnol. Oceanogr. 39*: 1653-1668.

Hargeby, A., Andersson, G., Blindow, I. and Johansson, S. 1994a. Trophic web structure in a shallow eutrophic lake during a dominance shift from phytoplankton to submerged macrophytes.- *Hydrobiologia 279/280*: 83-90.

Harkey, G. A., Landrum, P. F. and Klaine, S. J. 1994a. Partition coefficients of hydrophobic contaminants in natural water, porewater, and elutriates obtained from dosed sediment: a comparison of methodologies.- *Chemosphere 28*: 583-596.

Harkey, G. A., Landrum, P. F. and Klaine, S. J. 1994b. Preliminary studies on the effect of feeding during whole sediment bioassays using *Chironomus riparius* larvae.- *Chemosphere 28*: 597-606.

Harkey, G. A., Landrum, P. F. and Klaine, S. J. 1994c. Comparison of whole-sediment, elutriate and pore-water exposures for use in assessing sediment-associated organic contaminants in bioassays.- *Envir. Toxic. Chemy 13*: 1315-1329.

Harrahy, E. A. and Clements, W. H. 1994a. Uptake and elimination of a mixture of heavy metals in sediment by *Chironomus tentans* (Diptera: Chironomidae).- *Bull. N. Am. benthol. Soc. 11*: 140.

Harrison, A. D. 1994a. *Nanocladius (N.)* Kieffer from Africa south of the Sahara, with two new species and key (Insecta, Diptera, Chironomidae, Orthocladiinae).- In: Baehr, M. (ed.): *Contributions to the systematics of the Chironomidae (Insecta, Diptera). Spixiana Suppl. 20*: 99-114.

Hastrich, A. 1994a. Makrozoobenthos in der mittleren und unteren Oder im Herbst 1992 und im historischen Vergleich.- *Limnologica 24*: 369-388.

Hauck, A. 1994a. Lampenbürstenchromosomen. Ein Beispiel für "Riesenchromosomen".- *Mikrokosmos 83*: 3-9.

Heard, S. B. 1994a. Pitcher-plant midges and mosquitoes: a processing chain commensalism.- *Ecology 75*: 1647-1660.

Heinis, F., Sweerts, J.-P. and Loopik, E. 1994a. Micro-environment of chironomid larvae in the littoral and profundal zones of Lake Maarseveen I, The Netherlands.- *Arch. Hydrobiol. 130*: 53-67.

Heitkamp, U. 1994a. Übersicht über die Fauna des Harzes.- In: Matschullat, J., Heinrichs, H., Schneider, J. und Ulrich, B. (eds.): *Gefahr für Ökosysteme und Wasserqualität. Ergebnisse interdisziplinärer Forschung im Harz, pp.* 55-82. Springer-Verl., Berl., Heidelb., N. Y., Lond., Paris, Tokyo, Hong Kong, Barcelona, Bpest.

Heitkamp, U. und Willers, J. 1994a. Zooplankton und Zoobenthon von Oderteich und Sösetalsperre.- In: Matschullat, J., Heinrichs, H., Schneider, J. und Ulrich, B. (eds.): *Gefahr für Ökosysteme und Wasserqualität. Ergebnisse interdisziplinärer Forschung im Harz, pp.* 379-394. Springer-Verl., Berl., Heidelb., N. Y., Lond., Paris, Tokyo, Hong Kong, Barcelona, Bpest.

Henry, C. J., Higgins, K. F. and Buhl, K. J. 1994a. Acute toxicity and hazard assessment of Rodeo®, X-77 Spreader®, and Chem-Trol® to aquatic invertebrates.- *Archs envir. Contam. Toxic. 27*: 392-399.

Herzig, A., Mikschi, E., Auer, B., Hain, A., Wais, A. und Wolfram, G. 1994a. Fischbiologische Untersuchung des Neusiedler Sees.- *BFB [= Biol. ForschInst. Burgenl.]-Ber. 81*: 1-125.

Hickley, P., North, R., Muchiri, S. M. and Harper, D. M. 1994a. The diet of largemouth bass, *Micropterus salmoides*, in Lake Naivasha, Kenya.- *J. Fish Biol. 44*: 607-619.

Hicks, B. J. 1994a. Foregut contents of adult *Ilybius* Erichson (Coleoptera: Dytiscidae) from Newfoundland.- *Coleopterists Bull. 48*: 199-200.

Hirabayashi, K. and Hayashi, H. 1994a. Horizontal distribution of benthic macroinvertebrates in Lake Kizaki, Japan.- *Jap. J. Limnol. 55*: 105-114.

Hoffman, E. R. and Fisher, S. W. 1994a. Comparison of a field and laboratory-derived population of *Chironomus riparius* (Diptera: Chironomidae): biochemical and fitness evidence for population divergence.- *J. econ. Ent. 87*: 318-325.

Hoiland, W. K., Rabe, F. W. and Biggam, R. C. 1994a. Recovery of macroinvertebrate communities from metal pollution in the South Fork and mainstem of the Coeur d'Alene River, Idaho.- *Wat. Envir. Res. 66*: 84-88.

Holomuzki, J. R., Collins, J. P. and Brunkow, P. E. 1994a. Trophic control of fishless ponds by tiger salamander larvae.- *Oikos 71*: 55-64.

Hudson, L. A. and Ciborowski, J. J. H. 1994a. Teratogenic and genotoxic responses of larval *Chironomus* (Diptera: Chironomidae) to contaminated sediment.- *Bull. N. Am. benthol. Soc. 11*: 152.

Il'inskaya, N. B. 1994a. Sezonnye izmeneniya politennykh khromosom u khironomid. (Obzor). (Seasonal variations in polytene chromosomes of chironomids. (Review).)- *Tsitologiya 35*: 605-623.

Ingólfsson, A. 1994a. Species assemblages in saltmarsh ponds in western Iceland in relation to environmental variables.- *Estuarine coastal Shelf Sci. 38*: 235-248.

Int Panis, L., Kiknadze, I., Bervoets, L. and Aimanova, K. 1994a. Karyological identification of some species of the genus *Chironomus* MEIGEN, 1803 from Belgium.- *Bull. Annls Soc. r. belge Ent. 130*: 135-142.

Jackson, J. K. and Sweeney, B. W. 1994a. Egg and larval development times for 1117 species of tropical stream insects from Costa Rica.- *Bull. N. Am. benthol. Soc. 11*: 118.

Jackson, J. K., Sweeney, B. W., Bott, T. L., Newbold, J. D. and Kaplan, L. A. 1994a. Transport of *Bacillus thuringiensis* var. *israelensis* and ist effect on drift and benthic densities of nontarget macroinvertebrates in the Susquehanna River, Pennsylvania.- *Can. J. Fish. aquat. Sci. 51*: 295-314.

Janecek, B. F. U. and Moog, O. 1994a. Origin and composition of the benthic invertebrate riprap fauna of impounded rivers.- *Verh. int. Verein. Limnol. 25*: 1624-1630.

Janssens de Bisthoven, L. and Speybroeck, D. van 1994a. Some observations of deformed midge larvae (Diptera, Chironomidae) in Kenya.- *Verh. int. Verein. Limnol. 25*: 2485-2489.

Jørgensen, S. E. 1994a. Management of a shallow lake, Glumsø, by use of a eutrophication model (Denmark).- In: Patten, B. C., Jørgensen, S. E. and Dumont, H. (eds.): *Wetlands and shallow continental water bodies. Vol. 2: Case studies, pp*. 265-300. SPB Acad. Publ., The Hague.

Johansson, A. and Nielsson, A. N. 1994a. Insects of a small aestival stream in northern Sweden.- *Hydrobiologia 294*: 17-22.

Johnson, A. A. and Kleve, M. G. 1994a. *Lanceimermis minnesotensis* n. sp. and *Gastromermis parvispicularis* n. sp. (Nematoda: Mermithidae) from adult chironomids emerging from Lake Itasca, Minnesota, U. S. A.- *Trans. Am. microsc. Soc. 113*: 177-189.

Johnson, J. H. and Dropkin, D. S. 1994a. Biology of subyearling carp (*Cyprinus carpio*) in the Juniata River, Pennsylvania.- *J. Pa Acad. Sci. 68*: 34-36.

Jones, R. C., Winesett, P. S. and Morgan, D. R. 1994a. An evaluation of multivariate statistical methods and multimetric approaches in assessing urbanization impacts on stzream.- *Bull. N. Am. benthol. Soc. 11*: 79.

Junger, M. and Planas, D.1994a. Quantitative use of stable carbon isotope analysis to determine the trophic base of invertebrate communities in a boreal forest lotic system.- *Can. J. Fish. aquat. Sci. 51*: 52-61.

Kalytta, T. 1994a. Pilotprojekt: Naturnahe Umgestaltung des Brettenbachs/Emmendingen.- *Mitt. bad. Landesver. Naturk. Naturscb. N. F. 16*: 125-142.

Kampen, V. van, Becker, W.-M., Chen, Z., Rihs, H.-P., Mazur, G., Raulf, M., Liebers, V., Isringhausen-Bley S. and Baur, X. 1994a. Analysis of B-cell epitopes in the N-terminal region of *Chi t* I component III using monoclonal antibodies.- *Molec. Immunol. 31*: 1133-1140.

Kampen, V. van, Liebers, V., Czuppon, A. and Baur, X. 1994a. Chironomidae hemoglobin allergy in Japanese, Swedish, and German populations.- *Allergy 49*: 9-12.

Kao, W.-Y., Trewitt, P. M. and Bergtrom, G. 1994a. Intron-containing globin genes in the insect *Chironomus thummi*.- *J. molec. Evol. 38*: 241-249.

Kemble, N. E., Brumbaugh, W. G., Brunson, E. L., Dwyer, F. J., Ingersoll, C. G., Monda, D. P. and Woodward, D. F. 1994a. Toxicity of metal-contaminated sediments from the upper Clark Fork River, Montana, to aquatic invertebrates and fish in laboratory exposures.- *Envir. Toxic. Chemy 13*: 1985-1997.

Kemble, N. E., Ingersoll, C. G., Brumbaugh, W. G., Dwyer, F. J. and Canfield, T. J. 1994a. Toxicity of metal-contaminated sediments from the upper Clark Fork River, MT, to aquatic invertebrates and fish in laboratory exposures.- *Bull. N. Am. benthol. Soc. 11*: 139.

Kent, D. J., McNamara, P. C., Putt, A. E., Hobson, J. F. and Silberhorn, E. M. 1994a. Octamethylcyclotetrasiloxane in aquatic sediments: toxicity and risk assessment.- *Ecotoxic. envir. Saf. 29*: 372-389.

Kettani, K., Vilchez-Quero, A., Calle Martinez, D. et El Ouazzani, T. 1994a. Les Chironomidés (Diptera) du bassin de l'Oued Laou (Versant méditerranéen du Rif, Maroc).- *Annls Limnol. 30*: 25-32.

Kiffney, P. M. and Clements, W. H. 1994a. Structural responses of benthic macroinvertebrate communities from different stream orders to zinc.- *Envir. Toxic. Chemy 13*: 389-395.

Kiffney, P. M. and Clements, W. H. 1994b. Effects of heavy metals on a macroinvertebrate assemblage from a Rocky Mountain stream in experimental microcosms.- *J. N. Am. benthol. Soc. 13*: 511-523.

Kiknadze, I. I., Siirin, M. T. and Wülker, W. 1994a. Siberian species of the *riihimakiensis*-group in the genus *Chironomus*. 2. Inversion polymorphism and cytophylogeny.- In: Baehr, M. (ed.): *Contributions to the systematics of the Chironomidae (Insecta, Diptera). Spixiana Suppl. 20*: 115-125.

Kim, Y. J. and Park, H. S. 1994a. Skin reactivity and specific IgE antibody to two nonbiting midges in Korean respiratory allergy patients.- *J. Korean med. Sci. 9*. 42-46.

Kirk, E. J. and Perry, S. A. 1994a. Macroinvertebrate production estimates in the Kanawha River, West Virginia.- *Hydrobiologia 281*: 39-50.

Kiseleva, E., Wurtz, T., Visa, N. and Daneholt, B. 1994a. Assembly and disassembly of spliceosomes along a specific pre-messenger RNP fiber.- *EMBO J. 13*: 6052-6061.

Knight, J. G. and Ross, S. T. 1994a. Feeding habits of the Bayou darter.- *Trans. Am. Fish. Soc. 123*: 794-802.

Kohring, R. 1994a. Eine Chironomiden-Larve (Insecta, Diptera) aus der Fur Formation (Paleozän, ? Unter-Eozän, NW-Dänemark).- *Palaeont. Z. 68*: 411-418.

Kondo, S. and Sasa, M. 1994a. Chironomidae (Diptera) during the winter season at the middle reaches of the Riso River.- *Jap. J. sanit. Zool. 45*: 285-287.

Kornijów, R. and Kairesalo, T. 1994a. *Elodea canadensis* sustains rich environment for macroinvertebrates.- *Verh. int. Verein. Limnol. 25*: 2270-2275.

Kornijów, K. and Kairesalo, T. 1994b. A simple apparatus for sampling epiphytic communities associatad with emergent macrophytes.- *Hydrobiologia 294*: 141-143.

Koskenniemi, E. 1994a. Colonization, succession and environmental conditions of the macrozoobenthos in a regulated, polyhumic reservoir, Western Finland.- *Int. Revue ges. Hydrobiol. 79*: 521-555.

Kowarc, V. A. 1994a. Impact of sills on the structure of bedsediments and the colonization of a second order prealpine stream.- *Verh. int. Verein. Limnol. 25*: 1599-1604.

Kownacki, A. 1994a. Diurnal periodicity in the drift of high mountain stream invertebrates (6South Tirol, Italy).- *Verh. int. Verein. Limnol. 25*: 1768-1772.

Kozhova, O. M., Izmest'eva, L. R. and Erbaeva, E. A. 1994a. A review of the hydrobiology of Lake Khubsugul (Mongolia).- *Hydrobiologia 291*: 11-19.

Krantzberg, G. 1994a. Spatial and temporal variability in metal bioavailability and toxicity of sediment from Hamilton Harbour, Lake Ontario.- *Envir. Toxic. Chemy 13*: 1685-1698.

Kratz, K. W., Cooper, S. D. and Melack, J. M. 1994a. Effects of single and repeated experimental acid pulses on invertebrates in a high altitude Sierra Nevada stream.- *Freshwat. Biol.* 32: 161-183.

Kretzschmar, A. U. und Böttger, K. 1994a. Die Chironomidae (Diptera, Nematocera) eines kleinen, naturnahen Baches im Norddeutschen Tiefland (Kremper Au), Schleswig-Holstein).- *Lauterbornia 19*: 161-169.

Kronberg, I. 1994a. Die Schwarze Zone. Ein extremer Lebensraum im Spritzwasserbereich der Felsküsten.- *Mikrokosmos 83*: 307-313.

Kubitz, J. A., Besser, J. M. and Giesy, J. P. 1994a. Toxicity of Detroit River sediments to benthic invertebrates.- *Bull. N. Am. benthol. Soc. 11*: 140.

Kuvangkadilok, C. 1994a. Laboratory studies on the life cycle and breeding of the midges *Chironomus plumatisetigerus* (Diptera: Chironomidae).- *J. Sci. Soc. Thailand 20*: 425-433.

Lami, A., Niessen, F., Guilizzoni, P., Masaferro, J. and Belis, C. A. 1994a. Paleolimnological studies of the eutrophication of volcanic Lake Albano (central Italy).- *J. Paleolimnol. 10*: 181-197.

Lammerding-Köppel, M., Spindler-Barth, M. and Drews, U. 1994a. 20-OH-Ecdysone-induced morphogenetic movements in a *Chironomus* cell line are accompanied by expression of an embryonic muscarinic system.- *Wilhelm Roux's Archs dev. Biol. 203*: 439-444.

Langeland, A. and Nøst, T. 1994a. Introduction of roach (*Rutilus rutilus*) in an oligohumic lake: 1. Competition impacts on whitefish (*Coregonus lavaretus*).- *Verh. int. Verein. Limnol. 25*: 2113-2117.

Langton, P. H. 1994a. A redescription of *Parakiefferiella* sp. D. Wülker, the pupa of *Parakiefferiella wuelkeri* Moubayed (Diptera: Chironomidae), a species new to Britain.- *Br. J. Ent. nat. Hist. 7*: 11-13.

Langton, P. H. 1994b. Adhesion marks on the abdomen of pupal Chironomidae (Diptera).- *Br. J. Ent. nat. Hist. 7*: 89-91.

LaVoie, W. J. IV and Hubert, W. A. 1994a. Use of drifting invertebrates by young-of-year brown trout in stream-margin habitat.- *J. Freshwat. Ecol. 9*: 37-43.

Leeper, D. A. and Taylor, B. E. 1994a. Benthos abundance, biomass and production in a Carolina bay wetland.- *Bull. N. Am. benthol. Soc. 11*: 182.

Lenat, D. R. and Crawford, J. K. 1994a. Effects of land use on water quality and aquatic biota of three North Carolina Piedmont streams.- *Hydrobiologia 294*: 185-199.

Lester, P. J., Mitchell, S. F. and Scott, D. 1994a. Effects of riparian willow trees (*Salix fragilis*) on macroinvertebrate densities in two small Central Otago, New Zealand, streams.- *N. Z. Jl mar. Freshwat. Res. 28*: 267-276.

Levesque, A. J., Cwynar, L. C. and Walker, I. R. 1994a. A multiproxy investigation of late-glacial climate and vegetation change at Pine Ridge Pond, southwest New Brunswick, Canada.- *Quat. Res. 42*: 316-327.

Levings, C. D., Hvidsten, N. A. and Johnsen, B. Ø. 1994a. Feeding of Atlantic salmon (*Salmo salar* L.) postsmolts in a fjord in central Norway.- *Can. J. Zool. 72*: 834-839.

Liao, C., Rovira, C. and Edström, J. E. 1994a. Constant and variable parts of the 155-bp centromeric repeat in *Camptochironomus*.- *J. molec. Evol. 39*: 112-114.

Liebers, V. and Baur, X. 1994a. Chironomidae haemoglobin *Chi t* I - characterization of an important inhalant allergen.- *Clin. exp. Allergy 24*: 100-108.

Liebers, V., Raulf, M. and Baur, X. 1994a. Allergen-induced expression of cell surface markers on lymphocytes of *Chi t* I-sensitized patients.- *Allergy 49*: 163-169.

Lindegaard, C. 1994a. The role of zoobenthos in energy flow in two shallow lakes.- *Hydrobiologia 275/276*: 313-322.

Lobón-Cervià, J. and Rincón, P. A. 1994a. Trophic ecology of red roach (*Rutilus arcasii*) in a seasonal stream; an example of detritivory as a feeding tactic.- *Freshwat. Biol. 32*: 123-132.

Löderbusch, W. 1994a. Auswirkungen von verschiedenen Grabenräumungsmethoden auf die Fauna von Entwässerungsgräben.- *Veröff. Nstursch. Landschaftspfl. Baden-Württ. 68/69*: 73-108.

Lods-Crozet, B. and Lachavanne, J.-B. 1994a. Changes in the chironomid communities in Lake Geneva in relation with eutrophication, over a period of 60 years.- *Arch. Hydrobiol. 130*: 453-471.

Loginova, N. V. 1994a. *Morfologicheskii i kariotipicheskii analiz vidov roda* Chironomus *Meigen (1818) (Chironomidae, Diptera). (Morphology and kariotype analysis of species of the genus* Chironomus *Meigen (1818) (Chironomidae, Diptera).*)- Avtoref. Diss. Kand. biol. Nauk, Sankt-Peterb. Gos. Univ. 16 pp.

Loginova, N. V. i Belyanina, S. I. 1994a. Novyi vid *Chironomus* iz gruppy *plumosus* - *Chironomus usenicus* sp. n. (Chironomidae, Diptera). (A new species of the genus *Chironomus* from the group *plumosus* - *Chironomus usenicus* sp. n. (Chironomidae; Diptera).)- *Zool. Zh. 73, 11*: 93-105.

Lydy, M. J., Hayton, W. L., Staubus, A. E. and Fisher, S. W. 1994a. Bioconcentration of 5,5',6-trichlorobiphenyl and pentachlorophenol in the midge, *Chironomus riparius*, as measured by a pharmacokinetic model.- *Archs envir. Contam. Toxic. 26*: 251-256.

Maier, K.-J. 1994a. Effects of spates on the benthic macroinvertebrate community of a prealpine river (First results).- *Verh. int. Verein. Limnol. 25*: 1605-1608.

Makarchenko, E. A. 1994a. Chironomids of the subfamily Diamesinae (Diptera, Chironomidae) from Japan. II. *Sympotthastia* PAGAST, 1947.- *Bull. natn. Sci. Mus. Tokyo, Ser. A 20*: 51-58.

Makarchenko, E. A. 1994b. Chironomids of the subfamily Diamesinae (Diptera, Chironomidae) from Japan. III. *Boreoheptagyia unica* sp. nov.- *Bull. natn. Sci. Mus. Tokyo, Ser. A 20*: 87-90.

Malard, F., Reygrobellet, J.-L., Mathieu, J. and Lafont, M. 1994a. The use of invertebrate communities to describe groundwater flow and contaminant transpoort in a fractured rock aquifer.- *Arch. Hydrobiol. 131*: 93-100.

Margreiter-Kownacka, M. 1994a. Benthos reaction on some man-caused changes in alpine rivers.- *Verh. int. Verein. Limnol. 25*: 1615-1617.

Margreiter-Kownacka, M. 1994b. The impact of water intakes on the communities of Alpine streams.- *Verh. int. Verein. Limnol. 25*: 2507-2509.

Markic, M., Munda, P., Emeršic, S. and Slaher, M. 1994a. Macrozoobenthos as indicator of saprobiological condition of the brooks in the Ruse Pohorje mountain chain.- *Verh. int. Verein. Limnol. 25*: 1933-1935.

Martin, A. J., Seaby, R. H. M. and Young, J. O. 1994a. Does body size difference in the leeches *Glossiphonia complanata* (L.) and *Helobdella stagnalis* (L.) contribute to co-existence?.- *Hydrobiologia 273*: 67-75.

Martin, A. J., Seaby, R. M. H. and Young, J. O. 1994b. The consequence of a food refuge collapse on a guild of lake-dwelling triclads and leeches.- *Hydrobiologia 277*: 187-195.

Masaferro, J. 1994a. *Paleolimnologia di sei laghi vulcanici italiani e di un lago argentino di origine glaciale*.- Tesi Dott. Ecol., Univ. Parma. 187 pp.

Mathooko, J. M. and Mavuti, K. M. 1994a. Diel dynamics of organic drift transport in a second-order, high-altitude river in Kenya.- *Afr. J. Ecol. 32*: 259-263.

McDaniel, R. E. and Harp, G. L. 1994a. Food habits of *Etheostoma moorei* Raney and Suttkus.- *Bull. N. Am. benthol. Soc. 11*: 148.

McElligott, P. E. K. and Lewis, D. J. 1994a. Relative efficiencies of wet and dry extraction techniques for sampling aquatic macroinvertebrates in a subarctic peatland.- In: Finnamore, A. T. and Marshall, S. A. (eds.): *Terrestrial arthropods of peatlands, with particular reference to Canada. Mem. ent. Soc. Can. 169*: 285-289.

Meyer-Rochow, V. B. and Reid, W. A. 1994a. Male and female eyes of the Antarctic midge *Belgica antarctica* (Diptera, Chironomidae) - a scanning electron microscope study.- *Appl. Ent. Zool. 29*: 439-442.

Michailova, P. 1994a. Sympatric speciation in the family Chironomidae (Diptera).- In: Beaumont, A. R. (ed.): *Genetics and evolution of aquatic organisms, pp.* 414-423. Chapman & Hall, Lond., Glasgow, N. Y., Tokyo, Melbourne, Madras.

Michailova, P. and Hirvenoja, M. 1994a. Cytotaxonomical characteristics of chironomid species (Diptera, Chironomidae) from Finland.- *Abstr. 5th Eur. Congr. Ent.*: 94. IFAB Communs, Univ. York.

Michailova, P. and Petrova, N. 1994a. Cytogenetic characteristics of *Chironomus balatonicus* Devai, Wülker, Scholl (Diptera, Chironomidae) from the Chernobyl region.- *Cytobios 79*: 15-29.

Michailova, P., Rieradevall, M. and Real, M. 1994a. New chromosome arm combination of genus *Glyptotendipes* Kieff. (Diptera, Chironomidae).- *Caryologia 47*: 81-95.

Mihuc, T.and Toetz, D. 1994a. Determination of diets of Alpine aquatic insects using stable isotopes and gut analysis.- *Am. Midl. Nat. 131*: 146-155.

Milan, D. J. 1994a. Preliminary results of a nitrogen freeze-coring methodology for determining the vertical distribution of benthic invertebrates from the lowland River Babingley, UK.- *Verh. int. Verein. Limnol. 25*: 1406-1409.

Miller, A. M. and Golladay, S. W. 1994a. Response to flooding by a perennial and intermittent stream community.- *Bull. N. Am. benthol. Soc. 11*: 171.

Miller, M. P. and Hendricks, A. C. 1994a. Determination of mechanism of zinc resistance in *Chironomus riparius*: a physiological/energetic approach.- *Bull. N. Am. benthol. Soc. 11*: 163.

Milner, A. M. 1994a. Colonization and succession of invertebrate communities in a new stream in Glacier Bay National Park, Alaska.- *Freshwat. Biol. 32*: 387-400.

Milner, A. M. and Petts, G. E. 1994a. Glacial rivers: physical habitat and ecology.- *Freshwat. Biol. 32*: 295-307.

Miskimmin, B. M. and Schindler, D. W. 1994a. Long-term invertebrate community response to toxaphene treatment in two lakes: 50-yr records reconstructed from lake sediments.- *Can. J. Fish. aquat. Sci. 51*: 923-932.

Mölleken, H. M. und Steffan, A. W. 1994a. Vergleich der Zuckmücken-Besiedlung bodenwassergespeister und straßenabwasser-belasteter Bachläufe (Diptera: Chironomidae).- *Ent. germ. 19*: 79-112.

Moog, O., Konar, M. and Humpesch, U. H. 1994a. The macrozoobenthos of the River Danube in Austria.- *Lauterbornia 15*: 52-51.

Morcillo, G., Díez, J. L. and Botella, L. M. 1994a. Heat shock activation of telomeric sequences in different tissues of *Chironomus thummi*.- *Expl Cell Res. 211*: 163-167.

Morin, A. and Dumont, P. 1994a. A simple model to estimate growth rate of lotic insect larvae and its value for estimating population and community production.- *J. N. Am. benthol. Soc. 13*: 357-367.

Morozova, E. E. 1994a. Morfologicheskie i kariologicheskie dannye k diagnostike volzhskikh vidov *Cryptochironomus* gr. *defectus* (Chironomidae, Diptera). (Morphological and karyological data concerning the diagnostics of the Volga species of the group *Cryptochironomus* gr. *defectus* (Chironomidae, Diptera).)- *Zool. Zh. 73, 3*: 72-82.

Moubayed, J. 1994a. *Parakiefferiella wuelkeri* n. sp. (Diptera: Chironomidae) from western Europe and North Africa.- *Br. J. Ent. nat. Hist. 7*: 7-10.

Mukhopadhyay, M. K., Ghosh, B. B. and Bagchi, M. M. 1994a. Toxicity of heavy metals to fish, prawn and fish food organisms of Hooghly estuarine system.- *Geobios 21*: 13-17.

Nakano, S. and Furukawa-Tanaka, T. 1994a. Intra- and interpecific dominance hierarchies and variation in foraging tactics of two species of stream-dwelling chars.-*Ecol. Res. 9*: 9-20.

Nath, B. B. and Godbole, N. N. 1994a.Cytogenetic studies on *Chironomus ramosus*.- *XVII. All India Cell Biol. Conf. Symp., Indore, Abstr. 27, p.* 42.

Nestrud, L. B. and Anderson, R. L. 1994a. Aquatic safety of *Lagenidium giganteum*: effects on freshwater fish and invertebrates.- *J. Invert. Path. 64*: 228-233.

Nielsen, B. O., Nielsen, L. B., Axelsen, J. and Elmegaard, N. 1994a. Winter abundance of soil Diptera larvae in arable soil.- *Pedobiologia 38*: 208-221.

O'Connor, N. A. and Lake, P. S. 1994a. Long-term and seasonal large-scale disturbances of a small lowland stream.- *Aust. J. mar. Freshwat. Res. 45*: 243-255.

Ohliger, K. und Kohl, R. 1994a. Ökologische Untersuchungen zur Makrofauna anthropogen entstandener Waldtümpel.- *Lauterbornia 19*: 115-140.

Olins, A. L., Olins, D. E., Olman, V., Levy, H. A. and Bazett-Jones, D. P. 1994a. Modeling the 3-D RNA distribution in the Balbiani Ring granule.- *Chromosoma 103*: 302-310.

Oliver, D. R. and Dillon, M. E. 1994a. Corrections and additions to "A catalog of Nearctic Chironomidae".- *Proc. ent. Soc. Wash. 96*: 8-10.

Oliver, D. R. and Dillon, M. E. 1994b. Systematics of some species of *Micropsectra* (Diptera: Chironomidae) living in low-order streams in southern Ontario, Canada.- *Can. Ent. 126*: 199-217.

Ormerod, S. J., Rundle, S. D., Wilkinson, S. M., Daly, G. P., Dale, K. M. and Juttner, I. 1994a. Altitudinal trends in the diatoms, bryophytes, macroinvertebrates and fish of a Nepalese river system.- *Freshwat. Biol. 32*: 309-322.

Owens, J. W., Swanson, S. M. and Birkholz, D. A. 1994a. Bioaccumulation of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin and 2,3,7,8-tetrachlorodibenzofuran and extractable organic chlorine at a bleached-kraft mill site in a northern Canadian river system.- *Envir. Toxic. Chemy 13*: 343-354.

Palau, A. and Rivero, C. 1994a. Effects of hypolimnetic discharge on some physico-chemical and biological characteristics of a river below a reservoir.- *Verh. int. Verein. Limnol. 25*: 1751-1755.

Palmer, C., Palmer, A., O'Keefe, J. and Palmer, R. 1994a. Macroinvertebrate community structure and altitudinal changes in the upper reaches of a warm temperate southern African river.- *Freshwat. Biol. 32*: 337-347.

Palomäki, R. 1994a. Response by macrozoobenthos biomass to water level regulation in some Finnish lake littoral zones.- *Hydrobiologia 286*: 17-26.

Parker, M. S. 1994a. Feeding ecology of stream-dwelling Pacific giant salamander larvae (*Dicamptodon tenebrosus*).- *Copeia 1994*: 705-718.

Parrish, D. L. and Margraf, F. J. 1994a. Spatial and temporal patterns of food use by white perch and yellow perch in Lake Erie.- *J. Freshwat. Ecol. 9*: 29-35.

Paterson, M. J. 1994a. Invertebrate predation and the seasonal dynamics of microcrustacea in the littoral zone of a fishless lake.- *Arch. Hydrobiol. Suppl. 99*: 1-36.

Peck, S. B. 1994a. Aerial dispersal of insects between and to islands in the Galápagos Archipelago, Ecuador.- *Ann. ent. Soc. Am. 87*: 218-224.

Peck, S. B. 1994b. Sea-surface (pleuston) transport of insects between islands in the Galápagos Archipelago, Ecuador.- *Ann. ent. Soc. Am. 87*: 576-582.

Petts, G. E. and Bickerton, M. A. 1994a. Influence of water abstraction on the maroinvertebrate community gradient within a glacial stream system: La Borgne d'Arolla, Valais, Switzerland.- *Freshwat. Biol. 32*: 375-386.

Phillipps, E. C. and Kilambi, R. V. 1994a. Use of coarse debris by Diptera in Ozark streams, Arkansas.- *J. N. Am. benthol. Soc. 13*: 151-159.

Phillips, G., Jackson, R., Bennett, C. and Chilvers, A. 1994a. The importance of sediment phosphorus release in the restoration of very shallow lakes (The Norfolk Broads, England) and implications for biomanipulation.- *Hydrobiologia 275/276*: 445-456.

Plenet, S. and Gibert, J. 1994a. Invertebrate community responses to physical and chemical factors at the river/aquifer interaction zone. I. Upstream from the city of Lyon.- *Arch. Hydrobiol. 132*: 165-189.

Pöysä, H., Rask, M. and Nummi, P. 1994a. Acidification and ecological interactions at higher trophic levels in small forest lakes: the perch and the common goldeneye.- *Annls zool. fenn. 31*: 397-404.

Popp, A. and Hoagland, K. D. 1994a. Changes in benthic invertebrate composition in response to reservoir aging.- *Bull. N. Am. benthol. Soc. 11*: 176.

Postma, J. F., Buckert-de Jong, M. C., Staats, N. and Davids, C. 1994a. Chronic toxicity of cadmium to *Chironomus riparius* (Diptera, Chironomidae) at different food levels.- *Archs envir. Contam. Toxic. 26*: 143-148.

Proviz, V., Goddeeris, B. R. and Belkov, V. 1994a. Speciation in Baikal Chironomidae (Diptera): an introduction.- *Arch. Hydrobiol. Beih. Ergebn. Limnol. 44*: 327-334.

Puppels, G. J., Otto, C., Greve, J., Robert-Nicoud, M., Arndt-Jovin, D. J. and Jovin, T. M. 1994a. Raman microspectroscopic study of low-pH-induced changes in DNA structure of polytene chromosomes.- *Biochemistry 33*: 3386-3395.

Pusey, B. J., Arthington, A. H. and Flanders, T. J. 1994a. An outdoor replicated artificial stream system: design, operating conditions, and initial invertebrate colonization.- *Ecotoxic. envir. Saf. 27*: 177-191.

Pusey, B. J., Arthington, A. H. and McLean, J. 1994a. The effects of a pulsed application of chlorpyrifos on macroinvertebrate communities in an outdoor artificial stream system.- *Ecotoxic. envir. Saf. 27*: 221-250.

Qin, J. G., Madon, S. P. and Culver, D. A. 1994a. Effect of larval walleye (*Stizostedion vitreum*) and fertilization on the plankton community: implications for larval fish culture.- *Aquaculture 130*: 51-65.

Rader, R. B. 1994a. Macroinvertebrates of the northern Everglades: species composition and trophic structure.- *Fla Scient. 57*: 22-33.

Rader, R. B. and Richardson, C. J. 1994a. Response of macroinvertebrates and small fish to nutrient enrichment in the northern Everglades.- *Wetlands 14*: 134-146.

Ramil Millarengo, J. y Cobo Gradín, F. 1994a. Primera cita de la subfamilia Podonominae (Diptera: Chironomidae) para la fauna ibérica.- *Boln Asoc. esp. Ent. 18*: 210.

Reck, H., Jansen, W., Buchweitz, M., Geißler, S., Hermann, G., Kaule, G., Rahmann, H. und Walter, R. 1994a. Monitoring für den Hochmoorkomplex Wurzacher Ried. Teil 3 Monitoring der Fauna. Teil 3.2 Gesamtkonzept Fauna.- In: Böcker, R. und Kohler, A. (eds.): *Feuchtgebiete. Gefährdung Schutz Renaturierung. Hohenheim. Umwelttag. 26:* 125-144. Verl. G. Heimbach, Ostfildern.

Reed, J. L., Campbell, I. C. and Bailey, P. C. E. 1994a. The relationship between invertebrate assemblages and available food at forest and pasture sites in three south-eastern Australian streams.- *Freshwat. Biol. 32*: 641-650.

Rehfisch, M. M. 1994a. Man-made lagoons and how their attractiveness to waders might be increased by manipulating the biomass of an insect benthos.- *J. appl. Ecol. 31*: 383-401.

Reynoldson, T. B., Day, K. E., Clarke, C. and Milani, D. 1994a. Effect of indigenous animals on chronic end points in freshwater sediment toxicity tests.- *Envir. Toxic. Chemy 13*: 973-977.

Ricciardi, A. 1994a. Occurrence of chironomid larvae (*Paratanytarsus* sp.) as commensals of dreissenid mussels (*Dreissena polymorpha* and *D. bugensis*).- *Can. J. Zool. 72*: 1159-1162.

Richard, K. J., Convey, P. and Block, W. 1994a. The terrestrial arthropod fauna of the Byers Peninsula, Livingston Island, South Shetland Islands.- *Polar Biol. 14*: 371-379.

Richards, C. and Bacon, K. L. 1994a. Influence of fine sediment on macroinvertebrate colonization of surface and hyporheic stream substrates.- *Gt Basin Nat. 54*: 106-113.

Riddiford, L. M. 1994a. Cellular and molecular actions of juvenile hormone I. General considerations and premetamorphic actions.- *Adv. Insect Physiol. 24*: 213-274.

Rieradevall, M. and Cambra, J. 1994a. Urban freshwater ecosystems in Barcelona.- *Verh. int. Verein. Limnol. 25*: 1369-1372.

Roghair, C. J., Buijze, A., Yedema, E. S. E. and Hermens, J. L. M. 1994a. A QSAR for base-line toxicity to the midge *Chironomus riparius*.- *Chemosphere 28*: 989-997.

Rudzinski, H.-G. 1994a. Zum Vorkommen von Dipteren auf einem Hausbalkon. Teil II: Sciaridae, Hybotidae und Empididae.- *Ent. Z. 104*: 461-468.

Ruf, H. H., Altemüller, A. G. and Gersonde, K. 1994a. Preparation and characterization of insect hemoglobins from *Chironomus thummi thummi*.- *Meth. Enzymol. 231*: 95-111.

Ruse, L. P. 1994a. Chironomid microdistribution in gravel of an English chalk river.- *Freshwat. Biol. 32*: 533-551.

Rutherford, J. E. and Mellow, R. J. 1994a. The effects of an abandoned roast yard on the fish and macroinvertebrate communties of surrounding beaver ponds.- *Hydrobiologia 294*: 219-228.

Saltveit, S. J, Bremnes, T. and Brittain, J. E. 1994a. Effect of a changed temperature regime on the benthos of a Norwegian regulated river.- *Regul. Rivers Res. Mgmt 9*: 93-102.

Samman, J., Amakye, J. S. and Asobayire, M. W. 1994a. Short-term effects of carbosulfan on drifting invertebrates in the Black Volta, Ghana.- *Bull. envir. Contam. Toxic. 52*: 286-291.

Scarsbrook, M. R. and Townsend, C. R. 1994a. The roles of grass leaf litter in streams draining tussock grassland in New Zealand: retention, food supply and substrate stabilization.- *Freshwat. Biol. 32*: 429-443.

Schartau, A. K. L. 1994a. Effects of low cadmium-contaminations on littoral freshwater populations and communities: Field-experiments performed in limnocorrals.- *NINA Forskningsrapp. 55*: 1-67.

Schmid, P. E. 1994a. Is prey selectivity by predatory Chironomidae a random process?- *Verh. int. Verein. Limnol. 25*: 1656-1660.

Schulze, E., Nagel, S., Gavenis, K. and Grossbach, U. 1994a. Structurally divergent histone H1 variants in chromosomes containing highly condensed interphase chromatin.- *J. Cell Biol. 127*: 1789-1798.

Scott, D., White, J. W. and Rhodes, D. S. 1994a. Invertebrate fauna of three streams in relation to land use in Southland, New Zealand.- *N. Z. Jl mar. Freshwat. Res. 28*: 277-290.

Shobanov, N. A. 1994a. Kariofond *Chironomus plumosus* (L.) (Diptera, Chironomidae): I. Standartizatsiya diskov politennykh khromosom. (The karyofund of *Chironomus plumosus* (L.) (Diptera, Chironomidae). I. Standartization of bands according to the Maximova system.)- *Tsitologiya 36, 1*: 117-122.

Shobanov, N. A. 1994b. Kariofond *Chironomus plumosus* (L.) (Diptera, Chironomidae): II. Inversionnye varianty khromosomnykh plech. (The karyofund of *Chironomus plumosus* (L.) (Diptera, Chironomidae). II. Banding patterns of chromosomal arms.)- *Tsitologiya 36, 1*: 123-128.

Shobanov, N. A. 1994c. Kariofond *Chironomus plumosus* (L.) (Diptera, Chironomidae): III. O zavisimosti kharakteristik kariofonda ot ob'ema vyborki i struktury populyatsii (The karyofund of *Chironomus plumosus* (L.) (Diptera, Chironomidae). III. On the dependence of karyofund characteristics upon the sample size and population structure.)- *Tsitologiya 36, 3*: 289-297.

Shobanov, N. A. 1994d. Kariofond *Chironomus plumosus* (L.) (Diptera, Chironomidae): IV. Vnutri- i mezhpopulyatsionnyi polimorfizm. (Karyofund of *Chironomus plumosus* (L.) (Diptera, Chironomidae). IV. Intra- and inter-population polymorphism.)- *Tsitologiya 36, 11*: 1129-1145.

Shobanov, N. A. i Pavlova, K. P. 1994a. Rasprostranenie vidov roda *Chironomus* Meig. (Diptera, Chironomidae) v raione Darvinskogo zapovednika v svyazi s gidrokhimicheskim rezhimom vodoemov. (Distribution of species of the genus *Chironomus* Meig. (Diptera, Chironomidae) in the region of the Darwin Reserve in connection with the hydrochemical conditions of reservoirs.- *Ekologiya 25, 1*: 28-35.

Siebeck, O. und Traunspurger, W. 1994a. Der Königssee.- eine limnologische Studie als Grundlage für eine Ökosystemanalyse.- *Verh. Ges. Ökol. 23, Innsbruck 1993*: 63-68.

Simpson, I. C., Roger, P. A., Oficial, R. and Grant, I. F. 1994a. Effects of nitrogen fertilizer and pesticide management on floodwater ecology in a wetland ricefield. 2. Dynamics of microcrustaceans and dipteran larvae.- *Biol. Fertility Soils 17*: 138-146.

Sirimongkonthaworn, R. and Fernando, C. H. 1994a. Biology of *Clupeichthys aesarnensis* (Clupeidae) in Ubolratana reservoir, Thailand, with special reference to food and feeding habits.- *Int. Revue ges. Hydrobiol. 79*: 95-112.

Smit, H., Reinhold-Dudok van Heel, H. C. and Wiersma, S. M. 1994a. Macrozoobenthic densities, biomasses and species composition in relation to environmental parameters in the Lower Rhine-Meuse (The Netherlands).- *Verh. int. Verein. Limnol. 25*: 1561.

Smit, H., Velden, J. A. van der and Klink, A. 1994a. Macrozoobenthic assemblages in littoral sediments in the enclosed Rhine-Meuse Delta.- *Netherl. J. aquat. Ecol. 28*: 199-212.

Smith, M. and Cranston, P. 1994a. Recovery in a tropical mine-impacted stream: the benthic macroinvertebrate story.- *Abstr. 5th Eur. Congr. Ent.*: 44. IFAB Communs, Univ. York.

Smock, L. A. 1994a. Movements of invertebrates between stream channels and forested floodplains.- *J. N. Am. benthol. Soc. 13*: 524-531.

Smock, L. A., Smith, L. C., Jones, J. B. Jr. and Hooper, S. M. 1994a. Effects of drought and a hurricane on a coastal headwater stream.- *Arch. Hydrobiol. 131*: 25-38.

Spies, M., Fittkau, E. J. and Reiss, F. 1994a. The adult males of *Parachironomus* Lenz, 1921, from the Neotropical faunal region (Insecta, Diptera, Chironomidae).- In: Baehr, M. (ed.): *Contributions to the systematics of the Chironomidae (Insecta, Diptera). Spixiana Suppl. 20*: 61-98.

Spindler, K.-D. and Spindler-Barth, M. 1994a. Inhibition of chitinolytic enzymes from *Streptomyces griseus* (Bacteria), *Artemia salina* (Crustacea), and a cell line from *Chironomus tentans* (Insecta) by allosamidin and isoallosamidin.- *Pestic. Sci. 40*: 113-120.

Staiber, W. 1994a. Effects of *Nosema algerae* infections on the gene activity of the salivary gland chromosomes of *Acricotopus lucidus* (Diptera, Chironomidae).- *Parasit. Res. 80*: 108-111.

Staiber, W. 1994b. Immunofluorescence study of spindle microtubule arrangements during differential gonial mitosis of *Acricotopus lucidus* (Diptera, Chironomidae).- *Cell Struct. Funct. 19*: 97-101.

Stanley, E. H., Buschman, D. L., Boulton, A. J., Grimm, N. B. and Fisher, S. G. 1994a. Invertebrate resistance and resilience to intermittency in a desert stream.- *Am. Midl. Nat. 131*: 288-300.

Steiner, W. A. 1994a. The influence of air pollution on moss-dwelling animals: I. Methodology and composition of flora and fauna.- *Revue suisse Zool. 101*: 533-556.

Stephenson, M., Mierle, G., Reid, R. A. and Mackie, G. L. 1994a. Effects of experimental and cultural lake acidification on littoral benthic macroinvertebrate assemblages.- *Can. J. Fish. aquat. Sci. 51*: 1147-1161.

Stevens, M. M. 1994a. Emergence phenology of *Chironomus tepperi* Skuse and *Procladius paludicola* Skuse (Diptera, Chironomidae) during rice crop establishment in southern New South Wales.- *Aust. J. exp. Agric. 34*: 1051-1056.

Stevens, M. M. and Warren, G. N. 1994a. Field evaluation of plaster-based temephos pellets for residual control of midge larvae (Diptera, Chironomidae) in establishing rice crops.- *Aust. J. exp. Agric. 34*: 659-664.

Stewart, T. W. and Haynes, J. M. 1994a. Benthic macroinvertebrate communities of southwestern Lake Ontario following invasion of *Dreissena*.- *J. Gt Lakes Res. 20*: 479-493.

Stigare, J., Buddelmeijer, N., Pigon, A. and Egyházi, E. 1994a. Analysis of a novel DNA-binding protein kinase CKII-like enzyme of Chironomus cells.- *Cell. molec. Biol. Res. 40*: 463-472.

Stigare, J., Lajic, S., Holst, M., Pigon, A. and Egyházi, E. 1994a. The salivary gland 42-kDa phosphoprotein is a single-stranded DNA-binding protein with characteristics of the epithelial casein kinase N42 in *Chironomus tentans*.- *Molec. cell. Biochem. 141*: 35-46.

Stolyarov, A. P. 1994a. Zonal'nyi kharakter raspredeleniya makrobentosa estuariya reki Chernoi (Kandalakshskii zaliv, Belое more). (The zonal pattern of distribution of macrobenthos in the estuary of Black River (Kandalaksha Bay, White Sea).)- *Zool. Zh. 73, 4*: 65-71.

Strayer, D. L. 1994a. Body size and abundance of benthic animals in Mirror Lake, New Hampshire.- *Freshwat. Biol. 32*: 83-90.

Streever, W. J. and Portier, K. M. 1994a. A computer program to assist with sampling design in the comparison of natural and constructed wetlands.- *Wetlands 14*: 199-205.

Sublette, J. E. and Sasa, M. 1994a. Chironomidae collected in onchocerciasis endemic areas of Guatemala (Insecta, Diptera).- In: Baehr, M. (ed.): *Contributions to the systematics of the Chironomidae (Insecta, Diptera). Spixiana Suppl. 20*: 1-60.

Suedel, B. C. and Rodgers, J. H. 1994a. Development of formulated reference sediments for freshwater and estuarine sediment testing.- *Envir. Toxic. Chemy 13*: 1163-1175.

Suedel, B. C. and Rodgers, J. H. 1994b. Responses of *Hyalella azteca* and *Chironomus tentans* to particle-size distribution and organic matter content of formulated and natural freshwater sediments.- *Envir. Toxic. Chemy 13*: 1639-1648.

Surakarn, R. and Yano, K. 1994a. Artificial rearing substrata of chironomid larvae (Diptera, Chironomidae).- *Jap. J. Ent. 62*: 325-331.

Suren, A. M. 1994a. Macroinvertebrate communities of streams in western Nepal: effects of altitude and land use.- *Freshwat. Biol. 32*: 323-336.

Tait, C. K., Li, J. L., Lamberti, G. A., Pearsons, T. N. and Li, H. W. 1994a. Relationships between riparian cover and the community structure of high desert streams.- *J. N. Am. benthol. Soc. 13*: 45-56.

Takács, V. and Tokeshi, M. 1994a. Spatial distribution of two chironomid species in the bottom sediment of Lough Neagh, Northern-Ireland.- *Aquat. Insects 16*: 125-131.

Tátrai, I., Lammens, E. H., Breukelaar, A. W. and Klein Breteler, J. G. P. 1994a. The impact of mature cyprinid fish on the composition and biomass of benthic macroinvertebrates.- *Arch. Hydrobiol. 131*: 309-320.

Tautz, C., Rihs, H.-P., Thiele, A., Zwollo, P., Freidhoff, L. R., Marsh, D. G. and Baur, X. 1994a. Association of class II sequences encoding DR1 and DQ5 specificities with hypersensitivity to chironomid allergen *Chi t* I.- *J. Allergy clin. Immunol. 93*: 918-925.

Taylor, E. J., Maund, S. J., Bennett, D. and Pascoe, D. 1994a. Effects of 3,4-dichloroaniline on the growth of two freshwater macroinvertebrates in a stream mesocosm.- *Ecotoxic. envir. Saf. 29*: 80-85.

Tierney, J. F. 1994a. Effects of *Schistocephalus solidus* (Cestoda) on the food intake and diet of the three-spined stickleback, *Gasterosteus aculeatus*.- *J. Fish Biol. 44*: 731-735.

Timm, T., Kangur, K., Timm, H. and Timm, V. 1994a. Responses of the macrozoobenthos to water-blooms in the eutrophied brown-water Lake Valguta Mustjärv, South Estonia.- *Proc. Eston. Acad. Sci., Ecol. 4*: 21-32.

Tokeshi, M. 1994a. Community ecology and patchy freshwater habitats.- In: Giller, P. S., Hildrew, A. G. and Raffaelli, D. G. (eds.): *Aquatic ecology. Scale, pattern and process, pp.* 63-91. Blackwell Scient. Publs, Oxf., Lond., Edinb., Boston, Melbourne, Paris, Berl., Vienna.

Tokeshi, M. and Osawa, N. 1994a. Niche relations in insect herbivore assemblages.- In: Leather, S. R., Watt, A. D., Mills, N. J. and Walters, K. F. A. (eds.): *Individuals, populations and patterns in ecology, pp.* 309-318. Intercept, Andover.

Towers, D. J., Henderson, I. M. and Veltman, C. J. 1994a. Predicting dry weight of aquatic macro-invertebrates from linear dimensions.- *N. Z. Jl mar. Freshwat. Res. 28*: 159-166.

Trayler, K. M., Pinder, A. M. and Davis, J. A. 1994a. Evaluation of the juvenile hormone mimic pyriproxyfen (S-31183) against nuisance chironomids (Diptera: Chironomidae) with particular emphasis on *Polypedilum nubifer* (Skuse).- *J. Aust. ent. Soc. 33*: 127-130.

Tundisi, J. G. 1994a. Ecosystem model for the Lobo (Broa) reservoir (Brazil).- In: Patten, B. C., Jørgensen, S. E. and Dumont, H. (eds.): *Wetlands and shallow continental water bodies. Vol. 2: Case studies, pp.* 217-234. SPB Acad. Publ., The Hague.

Vaate, A. bij de 1994a. Long-term changes in the macroinvertebrate fauna of River IJssel, the Netherlands.- *Verh. int. Verein. Limnol. 25*: 1563-1567.

Velde, G. van der und Brink, F. W. B. van den 1994a. Der Einfluss von Überschwemmungen auf die Wasser- und Bodenqualität und die Lebens-gemeinschaften in stehenden Gewässern am Niederrhein.- In: Weidmann, H. und Meder, H. (eds.): *Sandoz-Rheinfonds. Verh. Symp. 3.-4. Sept. 1992, pp.* 39-43. Sandoz, Basel.

Verschuren, D. 1994a. Sensitivity of tropical-African aquatic invertebrates to short-term trends in lake level and salinity: A paleolimnological test at Lake Oloiden, Kenya.- *J. Paleolimnol. 10*: 253-263.

Viney, C., Huber, A. E., Dunaway, D. L., Kerkam, K. and Case, S. T. 1994a.. Optical characterization of silk secretions and fibers.- In: Kaplan, D., Adams, W. W., Farmer, B. and Viney, C. (eds:): *Silk polymers: materials science and biotechnology. Am. chem. Soc. Symp. Ser. 544*: 120-136.

Wang, N. 1994a. Food and feeding of young perch (*Perca fluviatilis* L.) in Lake Constance.- *Verh. int. Verein. Limnol. 25*: 2148-2152.

Wang, S. 1994a. New and little-known Chironomidae (Diptera) from the southern provinces of China.- *Entomotaxonomia 16*: 135-148.

Ward, J. V. 1994a. Ecology of alpine streams.- *Freshwat. Biol. 32*: 277-294.

Watson, C. N. Jr. 1994a. The larva of *Apsectrotanypus algens* (Coquillet) (Diptera: Chironomidae).- *Bull. N. Am. benthol. Soc. 11*: 188.

West, C. W., Phipps, G. L., Hoke, R. A., Goldenstein, T. A., Van der Meiden, F. M., Kosian, P. A. and Ankley, G. T. 1994a. Sediment cores versus grab samples: evaluation of contamination and toxicity at a DDT-contaminated site.- *Ecotoxic. envir. Saf. 28*: 208-220.

Whitaker, J. O. Jr., Shalmon, B. and Kunz, T. H. 1994a. Food and feeding habits of insectivorous bats from Israel.- *Z. Säugetierk. 59*: 74-81.

Whitman, R. L., Andrzejewski, M. C., Kennedy, K. J. and Sobat, T. A. 1994a. Composition, spacial-temporal distribution and environmental factors influencing the interstitial beach meiofauna of southern Lake Michigan.- *Verh. int. Verein. Limnol. 25*: 1389-1397.

Wieslander, L. 1994a. The Balbiani ring multigene family: Coding repetitive sequences and evolution of a tissue-specific cell function.- *Progr. nucleic Acid Res. molec. Biol. 48*: 275-313.

Wildi, E., Nagel, R. and Steinberg, C. E. W. 1994a. Effects of pH on the bioconcentration of pyrene in the larval midge, *Chironomus riparius*.- *Wat. Res. 28*: 2553-2559.

Wilson, R. S. 1994a. Monitoring the effect of sewage effluent on the Oxford Canal using chironomid pupal exuviae.- *J. Instn Wat. envir. Mgmt 8*: 171-182.

Winfield, D. K. and Winfield, I. J. 1994a. Possible competitive interactions between overwintering tufted duck (*Aythya fuligula* (L.)) and fish populations of Lough Neagh, Northern Ireland: evidence from diet studies.- *Hydrobiologia 279/280*: 377-386.

Winfield, I. J. and Winfield, D. K. 1994a. Feeding ecology of he diving ducks pochard (*Aythya ferina*), tufted duck (*A. fuligula*), scaup (*A. marila*) and goldeneye (*Bucephala clangula*) overwintering on Lough Neagh, Northern Ireland.- *Freshwat. Biol. 32*: 467-477.

Wipfli, M. S. and Merritt, R. W. 1994a. Disturbance to a stream food web by a bacterial larvicide specific to black flies: feeding responses of predatory macroinvertebrates.- *Freshwat. Biol. 32*: 91-103.

Wipfli, M. S. and Merritt, R. W. 1994b. Effects of *Bacillus thuringiensis* var. *israelensis* on nontarget benthic insects through direct and indirect exposure.- *J. N. Am. benthol. Soc. 13*: 190-205.

Wiśniewski, J. R. and Schulze, E. 1994a. High affinity interaction of dipteran high mobility group (HMG) proteins 1 with DNA is modulated by COOH-terminal regions flanking the HMG box domain.- *J. biol. Chemy 269*: 10713-10719.

Wiśniewski, J. R., Ghidelli, S. and Steuernagel, A. 1994a. Region of insect high mobility group (HMG) 1 protein homologous to helix 2 of the rat HMG1-B box is in close contact with DNA.- *J. biol. Chemy 269*: 29261-29264.

Wiśniewski, J. R., Schulze, E. and Sapetto, B. 1994a. DNA binding and nuclear translocation of insect high-mobility-group protein-1 (HMG1) proteins are inhibited by phosphorylation.- *Eur. J. Biochem. 225*: 687-693.

Wotton, R. S. and Chaloner, D. T. 1994a. Tube building by three species of midge (Diptera: Chironomidae) inhabiting a group of temporary ponds.- *Bull. N. Am. benthol. Soc. 11*: 188.

Wright, J. F., Blackburn, J. H., Clarke, R. T. and Furse, M. T. 1994a. Macroinvertebrate-habitat associations in lowland rivers and their relevance to conservation.- *Verh. int. Verein. Limnol. 25*: 1515-1518.

Xue, R. D. and Ali, A. 1994a. Relationship between wing length and fecundity of a pestiferous midge, *Glyptotendipes paripes* (Diptera, Chironomidae).- *J. Am. Mosquito Contr. Ass. 10*: 29-34.

Xue, R. D. and Ali, A. 1994b. Oviposition, fecundity, and body size of a pestiferous midge, *Chironomus crassicaudatus* (Diptera, Chironomidae).- *Envir. Ent. 23*: 1480-1484.

Xue, R. D., Ali, A. and Lobinske, R. J. 1994a. Oviposition, hatching, and age composition of a pestiferous midge, *Glyptotendipes paripes* (Diptera, Chironomidae).- *J. Am. Mosquito Contr. Ass. 10*: 24-28.

Yiallouros, M., Storch, V., Thiery, I. and Becker, N. 1994a. Efficacy of *Clostridium bifermentans* serovar *malaysia* on target and nontarget organisms.- *J. Am. Mosquito Contr. Ass. 10*: 51-55.

Young, R. G., Huryn, A. D.and Townsend, C. R. 1994a. Effects of agricultural development on processing of tussock leaf litter in high country New Zealand streams.- *Freshwat. Biol. 32*: 413-427.

Yoshioka, T., Wada, E. and Hayashi, H. 1994a. A stable isotope study on seasonal food web dynamics in a eutrophic lake.- *Ecology 75*: 835-846.

Yudovich, Yu. B., Khalilov, F. Sh. and Dotsenko, B. N. 1994a. Limnobiological characteristics and fish production of the Central Asian reservoir, Lake Sarykamysh (Turkmeniya and Uzbekistan).- In: Patten, B. C., Jørgensen, S. E. and Dumont, H. (eds.): *Wetlands and shallow continental water bodies. Vol. 2: Case studies, pp.* 203-216. SPB Acad. Publ., The Hague.

Yuma, M. 1994a. Food habits and foraging behaviour of benthivorous cichlid fishes in Lake Tanganyika.- *Envir. Biol. Fishes 39*: 173-182.

Zander, C. D. 1994a. Einnischung von fünf Grundeln (Teleostei, Gobiidae) der Ostsee und ihre Deutung mit Hilfe der Präadaptationstheorie.- *J. zool. Syst. evol. Res. 32*: 220-234.

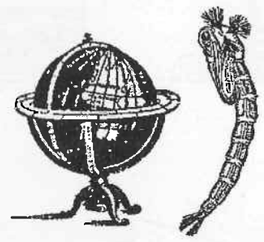
Zandt, P. T. J. van der, Heinis, F. and Kikkert, A. 1994a. Effects of narcotic industrial pollutants on behaviour of midge larvae (*Chironomus riparius* (Meigen), Diptera): a quantitative structure-activity relationship.- *Aquat Toxic. 28*: 209-221.

Zhang, Y.-J., Kamnert, I., López, C. C., Cohn, M. and Edström, J.-E. 1994a. A family of complex tandem DNA repeats in the telomeres of *Chironomus pallidivittatus*.- *Molec. cell. Biol. 14*: 8028-8036.

Zissler, D. 1994a. Struktur und Verhalten von Symbionten in Eizellen von Arthropoden.- *Verh. dt. zool. Ges. 87*: 122.

Zumwalt, D. C., Dwyer, F. J., Greer, I. E. and Ingersoll, C.G. 1994a. A water-renewal system that accurately delivers small volumes of water to exposure chambers.- *Envir. Toxic. Chemy 13*: 1311-1314.

Zurwerra, A., Beutler, R., Kovarc, V., Maier, K. J., Rasch, P., Tomka, I. und Turcsanyi, B. 1994a. Der Einfluss technischer Eingriffe an natürlichen Fliessgewässern auf die Fauna (am Beispiel der Sense).- In: Weidmann, H. und Meder, H. (eds.): *Sandoz-Rheinfonds. Verh. Symp. 3.-4. Sept. 1992, pp.* 39-43. Sandoz, Basel.



Editor and Layout
Ulrike **Nolte**
c/o Peter S. Cranston
Division of Entomology, CSIRO
P.O.Box 1700
Canberra, ACT 2601 (Australia)
Fax +61 6 246 4000
e-mail ~~peterer~~@ento.csiro.au
ulriken@ – 1

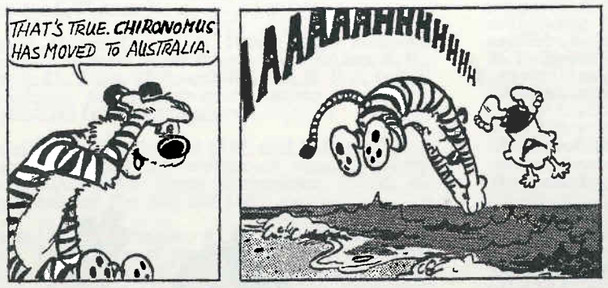
Production Editor
Richard K. **Johnson**
Department of Environmental Assessment
Swedish University of Agricultural Sciences
P.O. Box 7050
750 07 Uppsala (Sweden)
Fax +46 18 673156
e-mail richard.johnson@ma.slu.se

Treasurer
Trond **Andersen**
Museum of Zoology
University of Bergen
Muséplass 3
5007 Bergen (Norway)
Fax +47 55 321153

Associated Editors
Current Bibliography
Odwin **Hoffrichter**
Institut für Biologie I
Albertstrasse 21a
79104 Freiburg (Germany)
Fax +49 761 203 2596
e-mail hoffrich@sun1.ruf.uni-freiburg.de

Directory of Chironomid Workers
Don R. **Oliver** and Mary E. **Dillon** CLBRR,
Agriculture Canada
K. W. Neaty Building
Ottawa - ON, K1A 0C6 (Canada)
Fax +1 613 995 1823
e-mail oliverd@ncccot2.agr.ca

Ecotoxicology
Kees van de **Guchte**
Ecotoxicology Division
RIZA
P.O.Box 17
8200 AA Leystad (The Netherlands)
Fax +31 23 00 49218



...better send your contribution by mail, fax or e-mail.

We, in turn, shall provide you with the next issue.

Deadline: 1st of April '96

DIRECTORY FOR DIPTERA SYSTEMATICS - QUESTIONNAIRE

MAILING INFORMATION

LAST NAME (S) _____ FIRST NAME _____
MIDDLE NAME (S) _____ TITLE _____
ADDRESS _____
_____ TELEPHONE (S) _____
_____ FAX _____
_____ e-mail _____
CITY _____ STATE / PROVINCE _____
COUNTRY _____ POSTAL CODE _____
ADDRESS CHANGE? ☐

LANGUAGES (ACCEPTED FOR CORRESPONDENCE)

1 _____ 2 _____ 3 _____

TAXONOMIC INTERESTS and/or TECHNIQUES (CIRCLE ALL THAT APPLY)

ADULTS	EVOLUTION	BIOLOGY
IMMATURES	PHYLOGENY	ECOLOGY
MORPHOLOGY	GENETICS	BEHAVIOR
CLADISTICS	ELECTROPHORESIS / BIOCHEMICAL	OTHER (PLEASE LIST)
PHENETICS	PALEONTOLOGY (FOSSILS / AMBER)	_____

TAXONOMIC SPECIALTY (S) (LIST TAXA IN ORDER OF PREFERENCE / EXPERIENCE)

TAXON	ID?	NEARTIC	NEOTROPIC	AFROTROPIC	PALEARCTIC	ORIENTAL	AUSTRALASIA
Example: DIPTERA SYRPHIDAE	YES	YES	YES	NO	NO	NO	YES

(ID? = Will you do identifications?)

RESEARCH

DO YOU HAVE A PERSONAL RESEARCH COLLECTION? YES / NO

WHAT ARE YOUR RESEARCH INTERESTS? (15 WORDS OR LESS)

_____

_____

Mail to: F. Christian Thompson, Systematic Entomology Lab., ARS, USDA, NHB-168, Smithsonian Institution, Washington, D.C. 20560-USA