CHIRONOMUS Newsletter on Chironomidae Research

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Yin and yang? *Chironomus dilutus* gynandromorph. Photo: Quentin Lang, Department of Genetics, The University of Melbourne

CONTENTS

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Contributions to *CHIRONOMUS Newsletter on Chironomidae Research* should be submitted per e-mail to: Torbjørn Ekrem: Torbjorn.Ekrem@vm.ntnu.no or Peter H. Langton: PHLangton@kylebegave.fsnet.co.uk. Please use the following formatting: Text in 12 point Times New Roman, first page must include title, name, address and email address of all authors. Headings should be bold faced. Cite relevant references in parentheses without comma between name and year [ex. (Langton 1991)]. List all references alphabetically in the format of the *Current Bibliography* at the end of the manuscript. Tables can be included directly in the text. Text should preferably be submitted as MS Word or rtf files. All figures should be supplied separately as tiff or jpg files.

Would you like to see your picture on the front page? Please send us your favourite midge photograph or drawing (Torbjorn.Ekrem@vm.ntnu.no).

Editorial

XVII International Symposium on Chironomidae, July 5-10, 2009, Tianjin, China

It must be the dream of many people in the world to visit China and for us this dream came true: China is awesome and the XVIIth International Symposium on Chironomidae was a real joy to attend. Our hosts, Xinhua Wang, Wei Liu and their student helpers turned themselves upside down to make us at our ease and have the program run smoothly. Nothing seemed too much for them: they were the perfect hosts.

The Symposium began on the Sunday evening with a social gathering that brought together long standing researchers and students in the Chironomidae in a relaxed and convivial environment. A very enjoyable event with 60+ delegates from every biogeographical region except the poles - a lot to catch up on and new contacts to make. It was unfortunate that the distances involved and the recession meant that some previous symposium participants were unable to attend, but this venue opened up the conference to far eastern colleagues, so fulfilling one of the Symposia's roles of gathering together, in dialogue, chironomid researchers from across the world.

The scientific programme started at 9.00 the following morning in a spacious new lecture theatre in the new Building of the College of Life Sciences with a short inauguration ceremony, followed by the Thienemann Honorary Lecture, an excellent and polished delivery by Jon Martin entitled "From bands to base pairs: Problems in the identification of *Chironomus* species, using the example of *Chironomus* oppositus Walker." Then the series of oral communications commenced, 29 papers authored and co-authored by about 60 researchers. Papers covered morphology, molecular phylogeny, karyology, systematics, ecology and biogeography; equally diverse were the ages of those giving the talks: from 16 to 70+! An outstanding array of posters embellished the walls of the large airy foyer to the lecture theatre, where delegates browsed and discussed the submissions at break times while consuming many lychees! The program and abstracts can be viewed on the symposium website: http://entomology.nankai.edu.cn/17chiro. For one (Peter) who has been studying these insects for half a century, there was much to marvel at and a question to ponder: will the use of DNA sequences to clarify relationships and delineate species reduce the opportunities for biologists without such facilities/techniques to contribute to progress in the Chironomidae?

The Symposium banquet was held in an astonishing restaurant: a massive greenhouse containing a tropical jungle of mature trees and palms under which the tables were distributed. In the centre of each circular table was a turntable, to which were added time and time again new dishes to try: a really exotic gustatory experience in an equally exotic environment. Through this 'jungle' flows a stream populated by large Koi Carp and a lagoon that contains seals which add a touch of the incredulous to the already fantastic venue.

On the Wednesday we were taken on a river boat cruise of the Hai He river that runs through Tianjin. Although the skim net was in the water for the duration, no exuviae were obtained, presumably due to the mid summer pause in emergence. This was a great way to see outstanding examples of the architecture of modern Tianjin and of the many different highly ornate bridges under which we passed. We visited an exceedingly modern museum with exceptional ambience containing artefacts from distant history to the modern day; the early artefacts were especially fascinating as China has such a long cultural history.

The Symposium concluded with a forum session on Thursday afternoon: the next symposium in two years' time will be in Trondheim, courtesy of Torbjørn Ekrem and Elisabeth Stur. Their presentation gave the delegates a taste of the area – so different from that of the present venue! – and their proposed arrangements.

The post symposium tour took place on the Friday. A coach took us to experience the Great Wall, with views of the wall receding into the distance perched on the ridges of successive hills. It is indeed a marvel of human endeavour and we felt privileged to be walking a portion of it. After that we were transported into Beijing and were guided through the Forbidden City in reverse – a concession to parking the coach! The succession of halls and courtyards were awe inspiring and a real insight into China history.

Amongst our souvenirs we always have some entomological trophies: this time we have two large cicadas (the song of cicadas filled the air wherever we went all day – a similar sound took over at night generated by presumed bushcrickets), some cicada exuviae, two large prettily coloured homopteran bugs and one chironomid pupal exuviae collected in a lotus filled canal at the university: *Glyptotendipes paripes*!!

Xinhua Wang, Wei Liu and their helpers are to be congratulated on a most impressive and very well organised symposium and providing great memories through food and visits. On behalf of all participants we propose a big THANKYOU!

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TRENDS AND DEVELOPMENT IN CHIRONOMID PALAEOECOLOGY: SUMMARY FROM THE 9TH WORKSHOP ON SUBFOSSIL CHIRONOMIDAE

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The 9th workshop on Subfossil Chironomidae was held at the Biological Institute, University of Copenhagen on May 4–6, 2009. There were 27 palaeo-chironomid researchers present, representting 14 different nationalities (Fig. 1, group photo). The purpose with these workshops is to exchange ideas and to have critical and fruitful discussions about topics ranging from larval identification to ecological interpretation – whether people are working with subfossil or contemporary data. Problems and progresses in chironomid palaeoecology are discussed among people with their fingers deep in the mud, and the informal presentations give a fine overview of current state-of-the-art research and development.

The workshop was organised into six sessions with oral presentations, one session of general discussion and a one-day field excursion. The field excursion on the first day took us around to the North Zealand birch forest in full leaf. We had a short lunch break at the Freshwater Biological Laboratory belonging to the University of Copenhagen in the town of Hillerød. At the shore of Lake Esrum, the laboratory's Grand-Old-Man, Pétur Jónasson (born 1920) (Fig. 2), gave a fine summary of his illustrious work on life-cycles, respiration, secondary production and benthic-pelagic coupling of *Chironomus anthracinus* in Lake Esrum (Jónasson 1972).

With three sessions under the climate topic, it is evident that chironomid-inferred temperature reconstruction is still a central issue. Subfossil chironomids are still used as the primary quantitative climate indicator in multi-proxy studies of e.g., Early Weichselian, as presented by Stefan Engels, and Late Glacial sediments, as presented by Mateusz Plociennik. New quantitative temperature models are being developed and improved. Results of two merged European data sets were presented by Steve Brooks, a Finnish data set was shown by Tomi Luoto, and two independent data sets from Northern Russia are being developed and were presented by Larisa Nazarova and Angela Self. Along with these studies, preliminary stratigraphies and taxonomic problems were addressed by Verana de Hoog. A novel idea from Angela Self was to incorporate "continentality" into

Figure 1. Participants at the workshop. Photo: Katrine Kongshavn.

the quantitative models. Down-core continentality reconstructions from the Putoran Plateau suggest a lengthening of the growing season despite relatively constant temperature over the 1950s–2000.

Figure 2. Professor Pétur M. Jónasson speaking about *Chironomus* population dynamics at the shore of Lake Esrum. Photo: Katrine Kongshavn.

Analyses of recent climate change over the last few hundred years were presented from the far north in Spitsbergen (Katrine Kongshavn) to the south in Patagonia (Peter Langdon). Comparisons to instrumental and independent records (e.g., known past fluctuations in glacier extent), are used in order to assess the potential for reconstructing accurately climate change over longer (millennial scale) time periods (Peter Langdon). High-resolution analyses from annually varved sediments are likewise used along with instrumental records in evaluation of model performance in Switzerland (Isabelle Larocque).

Studies of past environmental change in the Bolivian Andes were presented by Joseph J. Williams. In this project they are tracing the natural history of an endangered woodland ecosystem in order to evaluate if the patchy distribution of *Polylepis* observed today is a relict of past more widespread dominance and if the current distribution is human and/or climate driven. The chironomids are used as independent climate proxies.

Human induced environmental impacts, aside from climate change, were in focus of many studies. Enrichment (eutrophication) effects of human settlement were discussed from Northern Ireland by Naomi Holmes. Models across Europe have suggested that events such as the adoption of agriculture in Europe are climatically driven and hints of this relationship are present in existing North Mayo data. The environmentally sensitive nature of the area means that North Mayo is an ideal case study for the relationships between climate change and changes in human settlement. From Africa, Bob Rumes demonstrated a clear evidence for anthropogenic presence and influence on the landscape in Western Uganda dating back 2000 years. Although there were pronounced natural climate variations in the area, the effect of these is not always clear and, at times, difficult to distinguish from anthropogenic changes. Complex ecological responses to eutrophication and recent climate in Denmark were analysed against environmental monitoring data using fine interval sampling (Wing Wai Sung). Recent human impact on lake food webs by e.g., introduction of fish is also a new field in chironomid palaeolimnology. Such studies are carried out in subalpine lakes in France (Virgile Baudrot), in south Swedish lakes (Kimmo Tolonen) and in crater lakes at the Azores (Klaus P. Brodersen). The role of natural changes, such as succession in primary producers, food resources, oxygen conditions, intra- and inter-specific competition and changes in benthic communities is studied by Nina Reuss. She is studying stable isotope signatures on the most common chironomid taxa from West Greenland as well as on their potential food resources. Successful results will allow down-core inference of changed food-web structures and lake dynamics.

Examination of fossil midge assemblages from surface sediments of small shallow lakes in Finland took us back to basics in interpretation of chironomid palaeolimnology. Tomi Luoto presented multi- and intra-lake studies to emphasize that the controlling environmental factors are scale dependent from temperature over lake depth to hypolimnetic oxygen conditions. Intra-lake dataset from eastern Finland showed that the most important environmental factors controlling midge distribution within a lake basin were river contribution, water depth and submerged vegetation patterns. It also appeared that the fossil midge assemblages represented fauna that lived in close proximity to the sampling sites thus enabling investigation of intra-lake gradients in midge assemblages.

Novel studies on the potential of using subfossil chironomids as indicators of palaeoflow regimes were discussed by Lynda Howard. Chironomidae, identified to species level where possible, could be classified into groups of “Lotic invertebrate Index for Flow Evaluation”. This information was used to reconstruct the palaeoflow regime of a river and associated changes to in-stream habitats.

Improvement of subfossil taxonomy and identification has always been a central subject in these workshops. Boris Ilyashuk presented current knowledge and palaeoecological perspectives regarding the genus *Pseudodiamesa*. The aim was to clarify the morphological characters of head capsules of the *Pseudodiamesa* larvae which can be clearly visible within subfossil remains and reliable used for an identification of the subgeneric morphotypes. A short summary of the zoogeography and ecology of *Pseudodiamesa* species was also given which is very helpful in palaeoecological interpretation of subfossil records.

A general discussion on palaeoenvironmental inferences at the extremes of the environmental gradient was introduced and chaired by Gaute Velle. The modern calibration data set lake samples include chironomid head capsules and concurring environmental variables. However, it is not straightforward to use the calibration data set to infer environmental variables that are near the lower or upper end of the gradient captured by the modern data. Gaute Velle pointed out typical challenges, such as:

(1) The edge effect. Inferring variables at the end of the gradient must be done with caution. The so-called 'edge effect' caused by a truncation of the taxa responses, results in a tendency to pull the predicted values towards the mean of the environmental range in the calibration data set.

(2) Few modern taxa at the extremes. Since there often are more lakes in the mid-range of the calibration data sets, fewer taxa are captured from the gradient extremes. Hence, the response functions for the taxa at the extremes are less confident as they are based on fewer observations.

(3) Low fossil diversity. Sites or time periods with extreme environments may have additional challenges as these often have a low diversity. When there is a low diversity in the fossil assemblage, the taxa that are present influence the palaeoenvironmental inference to a large extent and the inference may be more prone to bias caused by inadequate response functions or to stochastic variables.

(4) Low abundance. Sites or time periods at extreme environments often have a low abundance of chironomids. Any quantitative palaeoenvironmental inference should be based on >50 head capsules.

(5) Pioneer assemblages. In extreme habitats, such as newly formed cold proglacial lakes, the pioneer fauna may be in disproportion with concurrent environments because they are specialist pioneers or because they are opportunists.

In summary, the workshop was very fruitful and inspiring. Chironomid palaeoecology is still growing, but also developing away from blind routine temperature reconstructions of past climate conditions. In the summary of the previous workshop in Reykjavik, Langdon *et al*. (2007) stated: "…*in other words palaeoecological simplicity may need to be considered more carefully in the face of ecological complexity*". Many discussions at the workshop clearly demonstrated that other human and natural impacts, aside from climate and temperature, are affecting the fossil assemblages, and that many of these parameters can be successfully interpreted. It is also positive that many from the new generation of chironomid palaeoecologists are going back to basics to critically assess the strengths and weaknesses of their models and methods. We strongly encourage such efforts and also efforts made to integrate neo- and paleolimnological approaches to refine interpretations of environmental change (e.g., Saros 2009). Such efforts are important in order to understand the biological mechanisms driving the species distribution and abundance.

We thank all for active participation and constructive discussions. The next workshop on subfossil chironomidae is arranged by Gaute Velle in Bergen, Norway, in May 2011.

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MEMORIES OF THE XVIITH CHIRONOMID SYMPOSIUM IN TIANJIN, CHINA

This was the first time I have attended an International Symposium on Chironomidae, held in Tianjin, China, during July 5-10, 2009. It was an excellent way to contact people working in the area and was a great experience to discuss their work on chironomids. I was very well integrated in the group from the first day and I strongly recommend this Symposium to all people working with Chironomidae. See you in Norway!

Pedro Raposeiro, PhD Student, Universidade dos Açores discute, Departamento de Biologia, Rua Mãe de Deus, 13A 9501-801 Ponta Delgada, Portugal.

My name is Mónika Tóth from the University of Debrecen, Hungary. This was the second time that I have attended the International Symposium on Chironomidae. I think this conference was a good opportunity for students and Ph.D. students, who deal with non-biting midges, to meet with academic scientists and ask for help with their work. This time I had a poster and I got valuable recommendations and comments to continue my studies. I enjoyed the conference and interesting conversations. This was my first time in China, which is a very amazing country. Thank you Xinhua Wang, Liu Wei and their students for the organisation of the symposium.

Mónika Tóth, University of Debrecen, Hungary.

The Tianjin Symposium was a fantastic introduction to Chironomidae Symposiums and certainly what I hope will be the first of many. The 'seasoned' delegates provided a very welcoming environment for 'first timers', and the enthusiasm of all attendees was quite stimulating. I found the quality of the presented research to be phenomenal, and the Symposium was the perfect venue to have exciting conversations with scientists from around the world who I had known before only through their publications. Additionally, having the conference in Tianjin provided many of us with the opportunity to broaden our cultural horizons as well as scientific: experiences such as a trip to the Great Wall, a river boat trip on the Hai He River, trying out traditional Chinese cuisine, and, of course, having ample opportunity to find the perfect souvenir provided cultural treats that could please everyone. All-in-all, the symposium was very well organised, a great opportunity to make new contacts, and an opportunity to learn from other cultures. I'm already looking forward to the next conference in Trondheim!

Alyssa M. Anderson, Department of Zoology, University of Minnesota, St. Paul, Minnesota 55108.

The 17th International Symposium on Chironomidae was held in Nankai University this year. It was a distinct opportunity for us to meet a number of renowned experts working on different fields of Chironomidae, meanwhile updated information was conveyed. The lectures they delivered regaled our senses and helped quite a lot in our study. The posters that the participants brought showed their research results and created a kind of bright scenery in the hall of the meeting place.

Being service staff, we felt tired but excited and delighted after each busy day. The smiling faces of the foreign friends will not be forgotten till the cows come home. Both of us wish the close friendship to grow deeper and deeper between the researchers all over the world and Nankai University through this symposium. What's more, we are looking forward to the next symposium where we can get together again.

Hui Sun & Xue Yu, College of Life Sciences, Nankai University.

CHIRONOMID RESEARCH IN NORTHERN PATAGONIA

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Patagonia is the southernmost territory of South America and was traditionally considered as belonging to the Neotropical region (Sclater 1858, Wallace 1876). Based on these zoogeographic schemes, the Argentinean biogeographer Raul Ringuelet (1961) divided Patagonia into the Araucanian Subregion, characterized by dominance of Austral or Notogeic fauna, and the Andean-Patagonian Subregion, having a dominant mixture of Notogeic, Brasilic, and Nearctic elements. Later, Cabrera & Willink (1973) proposed a biogeographic scheme for South America and the Caribbean in which the Andean-Patagonian region was part of the Neotropical region and Araucania. They named the region the Sub-Antarctic province, which was part of the Antarctic region and was based on the floristic and faunistic affinities of southwestern Patagonia with Antarctica, Australia and New Zealand. Further biogeographic schemes considered Patagonia as a part of a Holantarctic region (Takhtajan 1986) or Sub-Antarctic subregion and Patagonian subregion of the Andean Region (Morrone 2001). The extraordinary amount of different biogeographic schemes reflects the complexity of the affinities of the biota of Patagonia.

From an ecological perspective, Patagonia is highly influenced by the Andes cordillera. The climate in western Patagonia is cool-temperate but rainfall decreases drastically eastwards towards the steppes. Therefore, climate and soil conditions make Patagonia extremely water-limited and this is reflected in the aquatic ecosystems. The western part of Patagonia is covered by two eco-regions. The Valdivian temperate forest, covering a narrow continental strip between the western slope of the Andes and the Pacific Ocean, and running from 35°S to 48°S, is characterized mainly by deciduous and evergreen forests and Valdivian rainforest. The eastern part of Patagonia is distinguished (from north to south) by the Argentinean Monte, dominated by scrub vegetation, the Patagonian steppe, with shrub vegetation, and the Patagonian grassland, with grass-steppe interspersed with shrubs (Olsen et al. 2001).

The habitats and communities in Patagonian freshwater ecosystems have been modified by different extents and causes. The construction of dams and the resulting reservoirs to regulate rivers and control floods have modified seasonal flow patterns, thus affecting environmental conditions for most species. As a result, lotic watercourses have become lentic environments. Other important alterations of the physical environment in Patagonia are the consequence of mining activities, urban development and degradation derived from tourism. Ironically, wetlands are essential for sustaining biodiversity and wildlife. Patagonian wetlands present complex aquatic communities and provide habitat for threatened species and a high number of endemic species.

The freshwater insect biodiversity of Patagonia is poorly known and knowledge is constrained by a lack of adequate identification guides and reference collections. In addition, there is poor public understanding of the importance of wetlands for biodiversity. In order to address these issues, a three year Darwin Initiative project, entitled “Capacity Building for Aquatic Insects in Patagonia” and supported by the Department for Environment, Food and Rural Affairs (Defra, UK), began in 2006. The study area is the Nahuel Huapi National Park (NHNP) in northern Patagonia, Argentina. NHNP covers 7050 km^2 of Patagonian steppe, temperate deciduous forest and Valdivian rainforest. The latter ecosystem is recognised as one of the most threatened eco-regions in the world by the Global 2000 initiative launched by WWF and the World Bank. The main objectives of the Darwin Initiative project are to increase knowledge of freshwater insect biodiversity; to promote conservation of the various freshwater ecosystems in this protected area; and to communicate, share and educate citizens in different aspects of biodiversity. The project brings together a team of British and Argentinean scientists from the Natural History Museum

London, The Natural History Museum La Plata, The Institute of Limnology La Plata, The University of Patagonia in Esquel, The Central Regional University at Bariloche and the National Parks Administration Bariloche.

A key task for the team is to study the major freshwater insect groups in NHNP including Chironomidae, Ceratopogonidae and Simulidae (Diptera); Plecoptera; Ephemeroptera; Odonata; Trichoptera; and aquatic Coleoptera. With invaluable logistics support from the park rangers and other NHNP staff, more than 200 sites have been sampled covering the various freshwater environments represented in NHNP. The sampling methods included Malaise trap, light trap, sweep net, drift net and kick sample. Taxonomic, ecological and distributional data resulting from this collecting effort is being entered into a database of freshwater insects from NHNP. The species distribution data will be linked to a vegetation classification and the physical and chemical attributes of the water bodies, using GIS and digital imaging, and will be used to model freshwater insect data spatially and create a biodiversity data repository, the first of its kind in Patagonia. Another important project goal was addressed by building infrastructure in NHNP to provide a wetland interpretation centre and laboratory where tourists, sport anglers, students and researchers can study freshwater insects and understand their role in freshwater ecosystems.

Patagonian chironomid fauna

The first records and knowledge of Chironomidae from Patagonia are due to the invaluable work of the English entomologist Frederick Wallace Edwards (1888-1940). To obtaining collections of insects from the southern Andes, a joint expedition was arranged in 1926 by the British Museum of Natural History and the Bacteriological Institute of the National Department of Hygiene of Argentina. Edwards went to collect for the British Museum and Mr. Raymond C. Shannon for the Argentine Government. At the end of the field trip, they collected collections of over 20000 insects each one (Edwards 1927). After the study of the material collected, Edwards published in 1931 published the chapter referred to Chironomidae as a part of the book “Diptera of Patagonia and South Chile” and he described 71 new species and gives the foundation of the chironomid Patagonian knowledge.

Preliminary data on Chironomidae collected during the project, supplemented by examining collections made by earlier entomologists and literature searches, has shown that the chironomid fauna of NHNP includes 104 species in 48 genera and 6 subfamilies. Analysis of subfossil larvae from lake sediments collected in NHNP include 52 morphotypes in 36 genera and 4 subfamilies (Donato et al. 2008). The number of chironomid species found in NHNP constitutes a relatively high proportion of the chironomid diversity of Patagonia. Nine subfamilies are recorded from this region, including the monotypic subfamily Chilenomyiinae which is endemic for the area. Of the 111 known genera from South America, 53 are present in the study area. Approximately 20 % of the genera recorded from Patagonia are endemic to the region. One hundred and seventy seven species of Chironomidae have been recorded from Patagonia, 98% of them are endemic, 3 % are considered *nomina dubia* and about 17 % require revision since their systematic position is doubtful. Taking the Andean cordillera as a boundary, 55 species are endemic to the eastern side, 57 are endemic to the western side and 65 are common to both sides. The original descriptions of the chironomid species from Patagonia are based mainly on males (n=58) or males and females (n=43) which represents 57 % of the total. The rest of the species have been described using different combinations of stages from their life cycle (Donato et al., 2009). The Patagonian chironomid fauna shows affinities with the Australasian region (i.e. with a strict transantarctic distribution) exemplified by the Chironominae genera *Megacentron* Freeman and *Riethia* Kieffer, the Podonominae genus *Rheochlus* Brundin, and the Orthocladiinae genera *Austrocladius* Freeman, *Botryocladius* Cranston & Edwards, *Parapsectrocladius* Cranston, *Rhinocladius* Edwards and *Stictocladius* Edwards. Based on the material collected, mounted and studied so far during the last three years, we have found 16 new species that are waiting for more data (mostly concerning their immature stages) before they are described.

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DEVELOPMENT OF A NEW DESIGN OF AN INSECTARY MODEL FOR REARING AND ENVIRONMENTAL ASSESSMENT STUDIES ON CHIRONOMID MIDGES

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Chironomus ramosus Chaudhuri (1992), is one of the common tropical midges that form an abundant group of sediment-dwelling macro invertebrates of slow-flowing freshwater ecosystems of the Indian subcontinent, vulnerable to numerous fluctuating environmental conditions. Midges not only play an important role in maintaining a balanced aquatic ecosystem, being a major prey for the invertebrate and vertebrate fauna and preying upon lower invertebrates, but are also important rate determining conduits useful as indicators for water quality bioassessment (Merritt et al. 2009). In recent times, chironomid midges have emerged as a useful model system for environmental biomonitoring studies of acute and chronic toxicity of large number of pollutants of the aquatic ecosystem.

Although laboratory based studies may provide a preliminary assessment of various biotic and abiotic factors circulating in the environment, they are mere auxiliary tools to the interpretation of *in situ* bioassays. For this reason, assessment of the responses of test organisms to laboratory exposures along with field based studies would help minimize the biases associated with lab-to-field extrapolation. Unfortunately, very few attempts have helped clarify this issue. A few of such studies have exploited midges, thus providing a better understanding of whether *in situ* and laboratory tests demonstrate comparable results (Faria et al. 2007). However, the absence of an *in situ* control group of the biota is one of the limitations noticed in many contemporary experimental designs.

In an attempt at overcoming the shortcomings of comparative studies comprising laboratory and field samples, our laboratory team has come up with a novel *ex situ* technique suitable for rearing and carrying out simulation studies on *C. ramosus* in an insectary. This insectary is specially designed to meet the conditions as similar as possible to the prevailing natural environment. Further, rearing is carried out in small water tanks supplemented with phytoplankton and protists, thus mimicking the conditions in a lentic water body. Of the two tanks inside the insectary, one serves for *ex situ* control studies and the other for corresponding experimental studies in which stressor concentrations can be manipulated as per the requirement of the experimental design. The insectary is kept covered with a shade net in order to prevent the entry of other insects. The design of the insectary is depicted in Fig.1 a-c. This technique has been successfully standardized for the maintenance and breeding of *C. ramosus* and is cost effective involving less labour input. To the best of our knowledge, there are no reports of similar techniques practised for chironomid midges where natural populations can be maintained and subjected to natural seasonal variations.

The tanks were constructed of clay bricks reinforced with concrete columns. To begin with, egg masses collected from the field were reared and developmental stages were validated for taxonomic identification using morphological and cytotaxonomic keys (Chaudhuri et al. 1992, Nath and Godbole 1997). To initiate rearing, ≈100 late fourth instar larvae each were transferred to rearing tubs (Ø=35 cm) placed in a net cage under laboratory conditions (Fig. 1 d), which were maintained exactly as described by Nath and Godbole (1998). Similarly, ≈100 larvae were transferred to the insectary tanks, covered with net cages and the base of the tanks was layered (2 cm) with silt and finely ground moss that served as soft substratum for tube building. Special food formulation (Nath and Godbole 1998) was supplied to the developing cultures every two days.

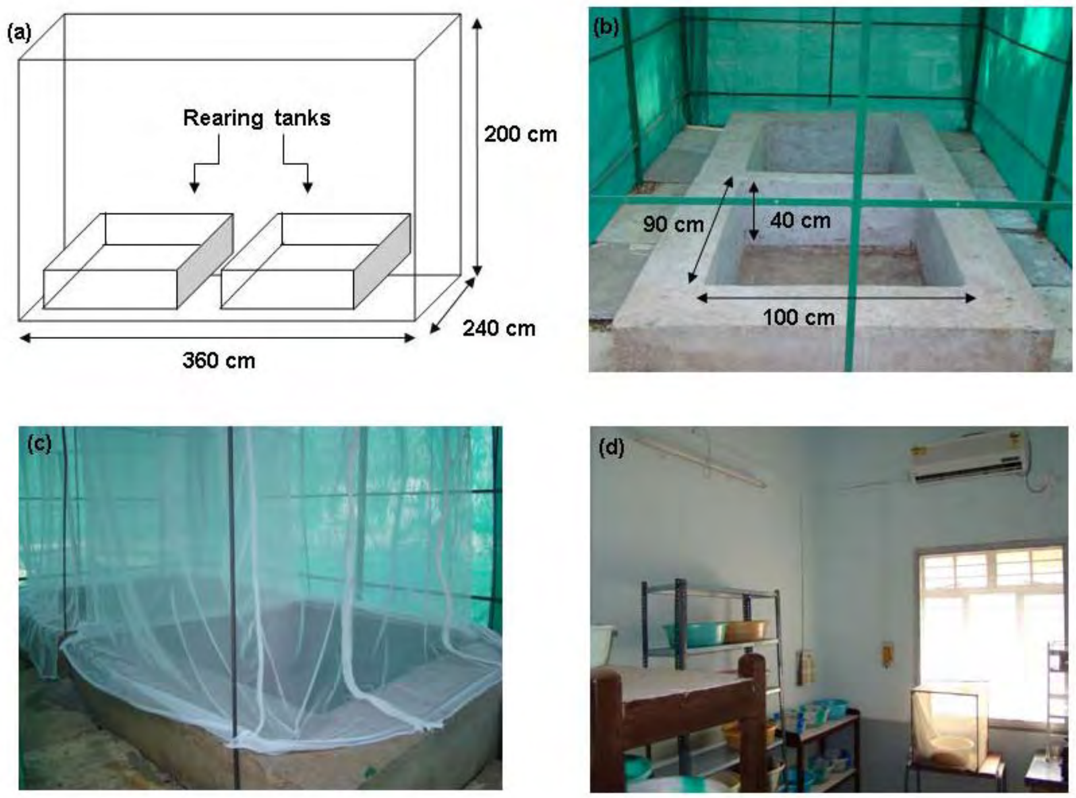

Fig. 1: a) Blue print of the insectary showing the location of the rearing tanks within the insectary. **b)** Interior view of the insectary showing the two rearing tanks. The insectary is shown covered with a shade net. **c)** Interior view of the insectary showing the two rearing tanks covered with net cages and each filled with about 130 litres of water. **d)** Special laboratory facility for rearing populations under ambient laboratory conditions.

The absence of predators of *C. ramosus*, placed it at the last trophic level of the food chain in the rearing tanks. It was found unnecessary to change the water of the tanks on a routine basis, thus saving both time and effort. However, whenever cleaning of the ponds was demanded, the water was flushed out through a small outlet present at one of the basal corners of the tanks. The desired level of water in the tanks was maintained through appropriate replenishments.

Our observations indicated that the life cycle of *C. ramosus* from egg to adult in the laboratory reared populations was completed in about 36 days, while it took about 33 days for the insectary reared population. The differences of growth parameters found in the two groups was found to be negligible (ANOVA, P> 0.05) (Table1).

Table 1: Comparison between lab reared (LR) and insectary reared (IR) populations for various growth, developmental and emergence parameters. d = duration in days.

Parameter	**LR population**	**IR population**
Hatching of eggs	2d	2d
1st to 4th instar stage	29 ± 1.25 d	25 ± 2.06 d
Pupal stage	3 ± 0.11d	3 ± 0.21 d
Adult life span	2.5 ± 0.68 d	3 ± 0.32 d
# of swarming adults on the day of egg laying	20 ± 3.25	25 ± 2.66
Sex ratio on the day of egg laying	1:1	1:1
Total egg masses obtained	6	9

The suitability of this novel technique proved successful when egg masses (i.e. 1st generation) were obtained from the founder population. When reared in a similar manner, these egg masses perpetuated to successive generations (so far, 4 generations have been successfully reared in the tanks). Therefore, the rearing conditions maintained in the insectary showed future potential for undertaking genetic toxicological studies. Most of the ecotoxicological research has been aimed at investigating the responses of field samples under laboratory experimental regimes. But what these studies lack is an *in situ* understanding and implications of the stressors. The novel approach adopted by us, would provide an alternative design for *ex situ* assessment of toxicants using chironomid midges as model systems and gaining useful insights to queries of the ecological implications of the abiotic factors that prevail in the natural environment and whose role in the various developmental processes cannot be played-out. We hope that the model of the insectary presented here, would attract the attention of chironomidologists for designing simulation experiments, often required in environmental assessment studies.

Acknowledgements

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SYNONYMY OF *CHIRONOMUS PLUMATISETIGERUS* TOKUNAGA, 1964, WITH *CHIRONOMUS CIRCUMDATUS* KIEFFER, 1916

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Recently, Pramual *et al*. (2008) noted the synonymy of *Chironomus plumatisetigerus* with *Chironomus circumdatus*, based on the information of the web page of Martin (2007). That web page is not a recognised publication and, further, the synonymy is not indicated in either the title or abstract of the paper. This note is therefore intended to provide a more formal notification and basis for the synonymy.

C. circumdatus was described by Kieffer (1916) from Formosa (Taiwan), and the type is presumably lost. However, the species has been redescribed by a number of people, of whom the most relevant here is that of Chaudhuri *et al.* (1992), since material used for cytological studies in India (Kumar and Gupta 1990; Tripathi *et al.* 2004) is based on this description.

C. plumatisetigerus was described by Tokunaga (1945) from several islands of Micronesia. Material identified as this species was found in Australia (Bugledich *et al.* 1999), and this material was the basis for publications on the cytology of this species in Thailand (Kuvangkadilok 1985) and India (Saxena 1995).

Comparison of the published chromosome maps from the studies under these two names clearly showed that the banding patterns and most of the inversion polymorphisms were identical, indicating that all studies were of the same species. This cytologically defined species becomes *C. circumdatus*, since that name has priority, and so *C. plumatisetigerus* must be considered as a junior synonym.

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A BRIEF ANALYSIS OF MORPHOLOGY AND TERMINOLOGY FOR THE GENUS *ABLABESMYIA* (TANYPODINAE)

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The genus *Ablabesmyia* is well represented in both the north and south Americas, though the latter region is inadequately studied. A few months ago, the authors of this note made contact to exchange type material and literature on the known species of *Ablabesmyia* from South America. Almost immediately, we faced the problem that we were referring to the same structures by different names, so we decided to sort and organize the different terminologies used along with the most important bibliography of this genus. Furthermore, we wanted to share the misunderstandings we faced with others who want to study *Ablabesmyia* so they can learn from our mistakes.

Megaseta of the adult male gonostylus

When describing the male hypopygium of *Ablabesmyia*, Johannsen (1946: 271) wrote the following: "styles of the hypopygium about as those of a typical *monilis* except that the articulated pre-apical stylet is straight and acute at apex". Roback some years later (1959: 116) separated the main subgenera, *Ablabesmyia s. str*. and *Karelia*, by the characteristic "preapical stylet pointed (P) or expanded (E)", however, the same author used different names for the same structure later in the same paper: "preapical spine of the distyle" and "preapical spur of the distyle has retained the simple apex" (p. 117). Roback (1971: 356, 357 and 365) employed the name "preapical spur", and in 1982 (p. 106) "spur of dististyle". In 1983, the same author used "gonostylus spur expanded or sharp" (Roback 1983: 237, table 1).

Later, Roback (1985) introduced the term "megaseta", in his subgeneric adult diagnosis of the subgenera *Karelia* (p. 169) and *Ablabesmyia* (p. 178), probably adopting the nomenclature of Sæther & Sublette (1983) for the homologous structure in Orthocladiinae. Unfortunately, Murray & Fittkau (1989), in their Tanypodinae diagnosis for the Holarctic genera, erroneously used the term "megaseta" to refer to the apex of the gonostylus: "gonostylus simple…distally with megaseta, mostly without but occasionally with simple or apically expanded subterminal seta (*Ablabesmyia*)…" (p. 38); followed by "gonostylus as long as or slightly longer than gonocoxite, slender and tapering; megaseta cochleariform with distally expanded or pointed subterminal seta" (p.42). This misunderstanding confused us and generated doubts on which structure actually is the megaseta.

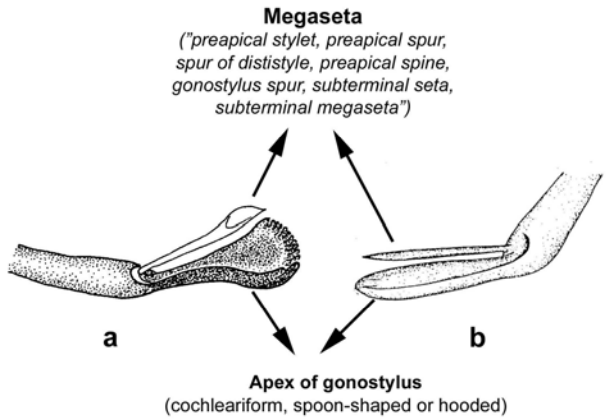

Figure 1. Distal portion of gonostylus. a) extracted from Paggi & Añón Suarez 2000. b) extracted from Paggi 1987

In order to clarify and unify the use of terms describing the subterminal seta on the gonostylus of Tanypodinae, we suggest that the name "megaseta" (Roback 1985) should be used. The megaseta lies parallel to the "hooded or cochleariform" apex of gonostylus (Fig. 1). In descriptions of *Ablabesmyia* hypopygia, it is very important to consider the shape of the megaseta (expanded or sharpened) to differentiate the subgenera and to avoid the wrong interpretation. Furthermore, it is very important to place the structures in their correct position during slide mounting, keeping the apex of the gonostylus and megaseta a little separated from another. The gonostylus should preferably be mounted in lateral view to avoid possible misinterpretations (Fig. 1).

The Aedegal complex

With regard to the aedeagal complex we also recorded different morphology terminology for the same structures. Roback (1959, 1971) described this complex as being formed of four pairs of structures (aedeagal blades, dorsal lobes, lateral filaments and lateral lobes). Later, Sæther (1980) named these structures volsellas (superior, median and inferior volsellas), but he did not mention the "lateral lobes" described by Roback. It is possible that they were hidden by the other structures or absent in the examined specimens. Roback (1983) did not agree with Sæther (1980) on the homology of the lobes with the volsellas of the other subfamilies. He introduced the term basidorsal lobe of the gonocoxite and suggested that it might be the true inferior volsella of the other subfamilies. We therefore think it is appropriate to describe the aedegal complex, to accurately name the different structures, and choose one set of terminology to avoid confusion. This has been attempted in Fig. 2.

Maxillary palps in adults and larvae

Older works on chironomids, describe four palpomeres in the maxillary palp of the adult male. Recent papers describe the palps to consist of 5 segments, following the works by Sæther (1971, 1980). The new interpretation acknowledges the first palpomere as a small, basal, weakly sclerotized segment that is deprived of setae. This means that what was previously considered to be the third palpomere, now is the fourth, and that the fourth palpomere (not the third) is shorter than the third (not the second as described by Fittkau 1962: 416 and Roback 1971: 354).

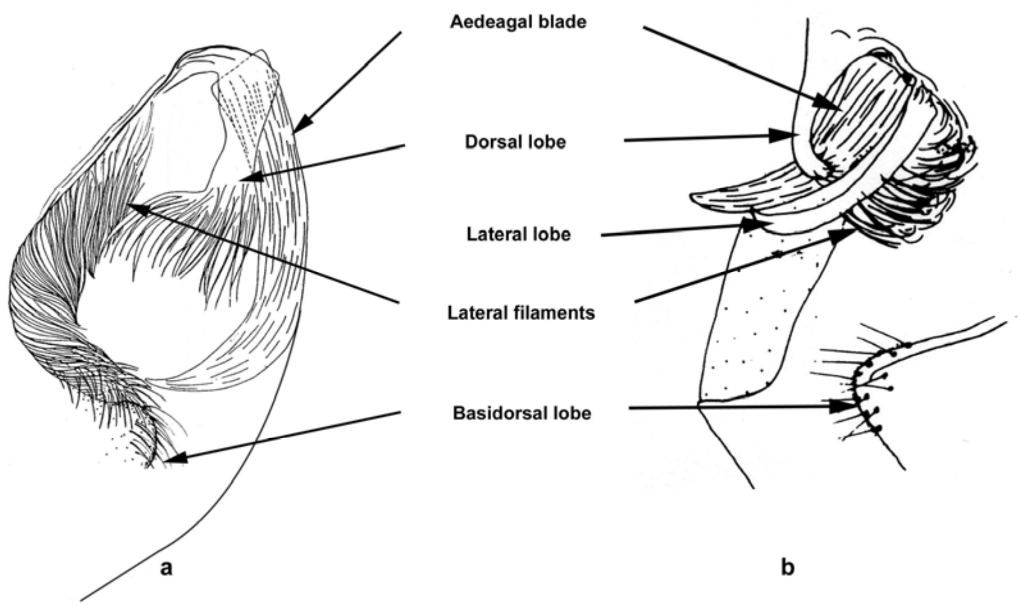

Figure 2. Aedeagal complex. a) *Ablabesmyia bianulata*, modified from Paggi 1987. b) *Ablabesmyia simpsonii*, modified from Roback 1985

Numbering of the larval palpal segments has likewise been done differently by authors and thus caused inconsistency in the calculation of the length ratio between the first and second palpal segments. Roback (1985, fig. 42) started the numbering from the apical palpomere while Epler (2001: 4.20) named the most basal palpomere segment 1. Since the number of palpomeres in *Ablabesmyia* larvae increase by the addition of segments basal to the ring organ, we suggest following Roback's (1985) numbering for the future. Thus the palpomere distal to the ring organ should be named P1.

Different use of morphology terminology can easily result in erroneous interpretation of identification keys, both at the subgenus and species level in *Ablabesmyia.* We hope that the above clarification of names for structures observed in this genus will aid in future nomenclature consistency.

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PALEOLIMNOLOGICAL EVIDENCE CONFIRMS THAT *PAROCHLUS STEINENII* (GERKE) IS NOT A RECENT INTRODUCTION TO THE ANTARCTIC PENINSULA REGION

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Introduction

Chironomid remains are common in lake sediments, and have been used widely as indicators of change in climatic conditions. Far fewer studies, however, have made use of the palaeobiogeographical potential of these remains to investigate past species distributions and the origins of isolated faunas.

Two models have been suggested for the origin of Antarctic populations of the chironomid *Parochlus steinenii* (Gerke) (Allegrucci et al. 2005). It was originally suggested that this species could have been introduced to the Antarctic Peninsula region from farther north by human activities, beginning with whaling in the mid-to-late 1800s (Convey and Block 1996). This suggestion was predicated on the quite recent initial observation (1950s) of this species in the South Shetland Islands and the Antarctic Peninsula (Torres 1956).

Molecular studies indicated a different story. Analysis of 28S ribosomal RNA from three distinct populations of *Parochlus steinenii* suggested that the populations on the Antarctic Peninsula and the nearby South Shetland Islands had been separated from the other populations on a time scale of million of years, and that each population was limited to particular tectonic plates (Allegrucci et al. 2005).

In this short note we use palaeolimnological techniques to test these models, and conclude an ancient origin for the Antarctic Peninsula/South Shetland Island population of *Parochlus steinenii*.

Methods

The study site was a small lake on Byers Peninsula, Livingston Island (62°40'S, 61°00'W, Figure 1), that has been the centre of a concerted scientific study (Toro et al. 2007), and which has become known as Limnopolar Lake. See www.aslo.org/photopost/showphoto.php/photo/706/ppuser/158 for a picture of the lake. Livingston Island is in an active volcanic area, with nearby Deception Island having erupted as recently as 1969 (Pallàs et al. 2001).

During the Antarctic field season of 2002/2003 a 29.2 cm sediment core was obtained from Limnopolar Lake using a modified hybrid Glew corer and Kajak corer. The core did not reach bedrock. The core was sectioned on site into 0.2 cm sections (0-10 cm), 0.5 cm sections (10-25 cm), or 1.0 cm sections (25-29 cm). The sections were then transferred into labelled whirlpak bags, and stored at 4°C until analysed.

Animal remains were isolated by placing approximately 1 g of wet sediment in a 20 ml scintillation vial and adding distilled water to disperse the sediment. The sediment was sieved on 44 µm and 100 µm mesh, and the material retained on the sieves was treated with Rose Bengal to stain biological components. The material was examined under a dissecting microscope and chironomid remains isolated for further study.

Radiocarbon dating of the sediments, estimation of the relative abundance of aquatic moss (on an arbitrary scale), and measurement of abundance of tephra (microscopic shards of volcanic glass) were undertaken as described elsewhere (Agius 2006).

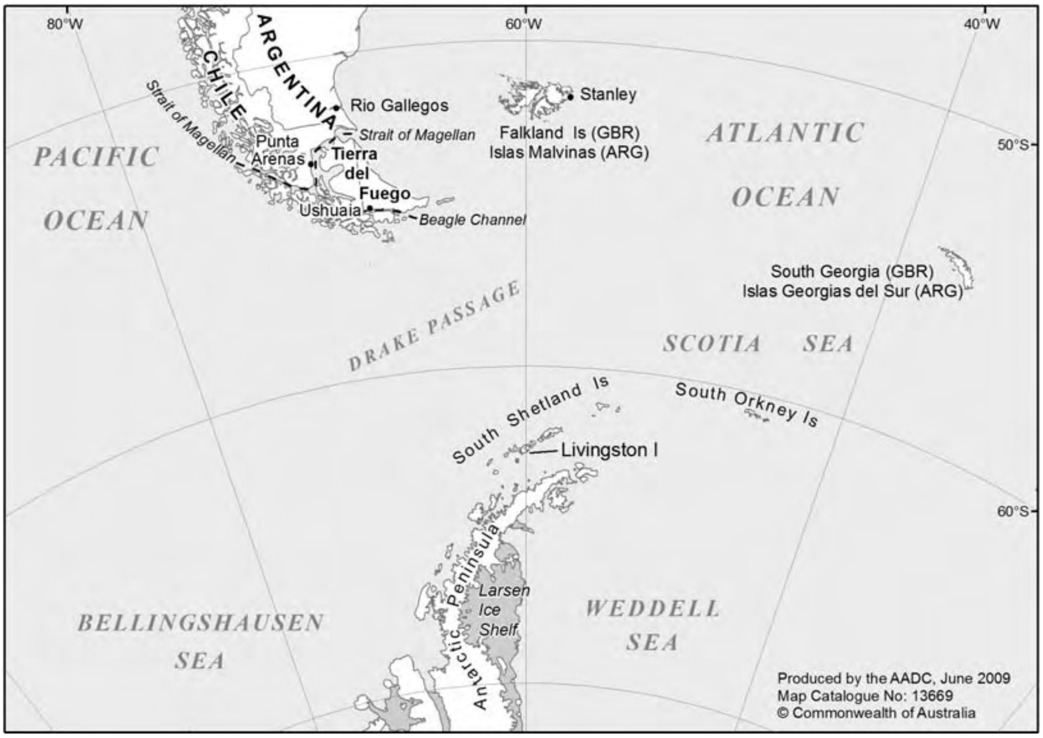

Figure 1. Map of southern South America and the Antarctic Peninsula showing the location of Livingston Island, as well as other areas inhabited by *Parochlus steinenii* (Terra del Fuego and continental South America, South Georgia, South Shetland Islands, Antarctic Peninsula mainland).

Results

Chironomid remains were encountered at abundances up to 180 per g dry weight (g_{dw}^{-1}). The remains, which were typically of the order of 200 µm in length, were mainly portions of adults and discarded pupae, with many anatomical features present (Figure 2). The remains could be identified by comparison to literature figures, in particular the figure of adult and pupa in Wirth and Gressitt (1967). Identification was confirmed by P. Convey, British Antarctic Survey, UK. Somewhat surprisingly, no larval head capsules were observed.

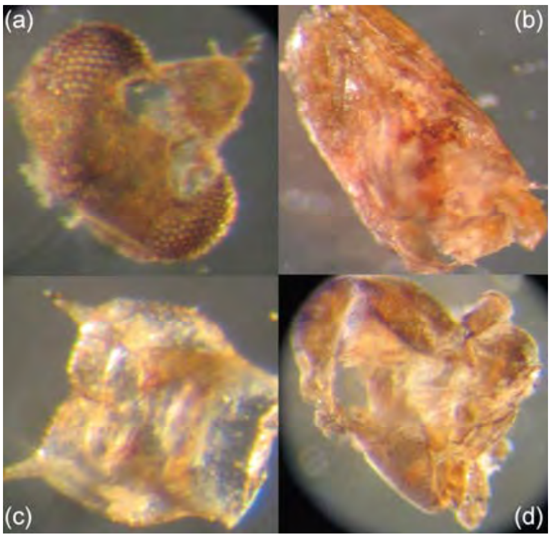

Figure 2. Photographs of representative *Parochlus steinenii* remains: (a) head capsule and eyes of adult; (b) wings and legs of pupa; (c) tail of pupa; and (d) adult thorax.

The distribution within the core (Figure 3) exhibited peaks at depths of 8 cm, 10-15 cm and 25 cm separated by periods of low abundance. The distribution of the chironomid remains showed qualitatively similar trends to that of aquatic moss, with both the moss and the chironomids less abundant after periods of significant tephral input.

The age of the sediments was difficult to determine due to contamination with old carbon, possibly through partial melting of permafrost (J. Gibson and A. Quesada, unpublished results). The most parsimonious interpretation of the data suggested that the core covered approximately 2000 years of sedimentation, but this figure must be viewed with caution.

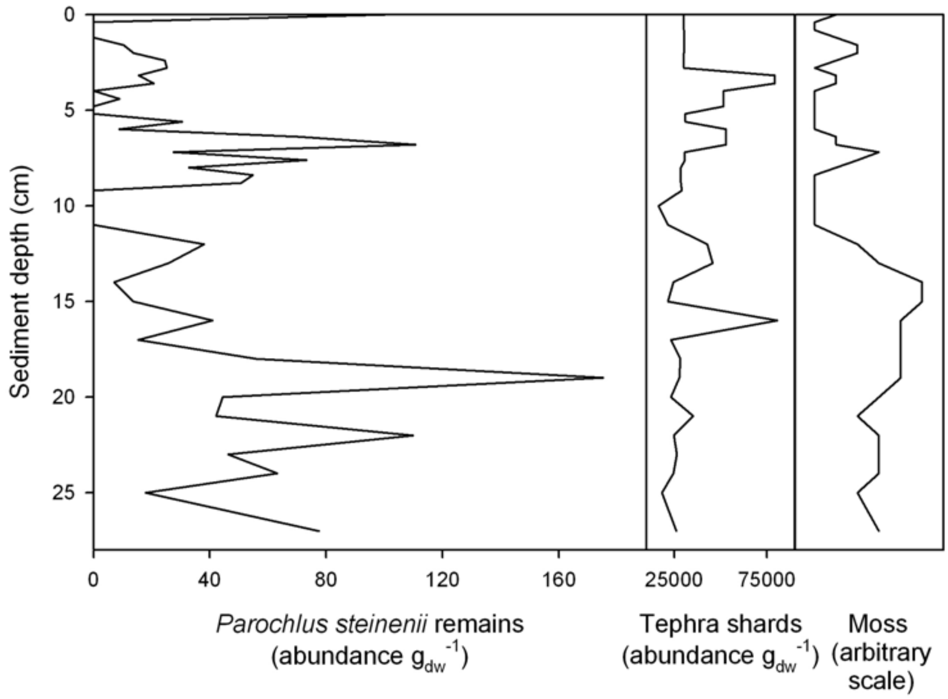

Figure 3. Abundance of *Parochlus steinenii* remains (per gram dry weight) in a sediment core from Limnopolar Lake as a function of depth. Also shown are the abundance of tephra shards and a qualitative estimate of the amount of dead moss present in the sediment. The time span covered by the sediment core is probably of the order of 2000 years.

Discussion

The occurrence of remains of *Parochlus steinenii* at nearly all depths sampled within the sediment core indicates that the species was present throughout the time the sediment was deposited. While the precise time interval the core represents cannot be determined, it is certain that the chironomid has been present on Byers Peninsula for an extended period, and that the suggestion that the species was introduced by whalers can be almost certainly refuted. The observed distribution within the sediment is consistent with the conclusions of Allegrucci et al. (2005), who suggested an ancient origin for this species and therefore the presence of glacial refugia either on the Antarctic Peninsula or within the South Shetland Islands. Recognition of similar glacial refugia across Antarctica is increasing (Convey et al. 2008)

The distribution of the remains in the core gives some indication of the habitat preferences of the species: it appears to be more abundant when significant moss growth occurs in the lake. Toro et al. (2007) reported that *Parochlus steinenii* was most likely to be present in Livingston Island lakes that also contained benthic mosses, which is consistent with this conclusion. Abundance appears to be negatively impacted by deposition of tephra from nearby volcanic eruptions, which would smother food sources. Similar observations have been made during the study of a Chilean lake impacted by tephral deposition (Urrutia et al. 2007). However, it may also be that these apparent correlations are artefacts stemming from changes in sedimentation rates as a result of tephra and other volcanic inputs. The absence of larval head capsules in the sediment is surprising, as larvae inhabit Limnopolar Lake (Toro et al. 2007). The conclusion to be drawn from this observation is that the head capsules of *Parochlus steinenii* are not preserved in the sediment.

Acknowledgements

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Chironomidae photo database of the Sasa collection opened on the home page of the National Museum of Nature and Science, Tokyo

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As presented in Chironomus Newsletter No.19 (2006) by Dr. Toshio Iwakuma, the late Professor Dr. Manabu Sasa (1916-2006) began his studies on Chironomidae in 1974, when he was 58 years old, while vice director of the National Institute for Environmental Studies (NIES). In those days, nuisance chironomids were causing a big problem around Kasumigaura Lake, which is located near the Institute. When he began his studies, he visited Dr. M. Tokunaga, still alive at Kyoto, and was given charge of Dr. Tokunaga's library.

Dr. Sasa described 1,151 species of Chironomidae as new. Information on the types including the current names (as of November, 2007) are listed in the Appendix of YUSURIKA Supplement 2 ('In Memory of Professor Dr. Manabu Sasa') delivered by the Japanese Group for Chironomidae Studies in November, 2007. If anyone wants to see the Appendix, the author could send it to him as a pdf file.

After Dr. Sasa passed away in April, 2006 at Kurobe, Toyama, the part of his library relevant to the Chironomidae and about fifty thousand slide specimens were entrusted to the author. His library of 1,105 items was delivered to Dr. K. Hirabayashi of Shinshu University with the list in July, 2006. All slide mounted specimens of Chironomidae used by Dr. Sasa had been transferred to NIES from Kurobe in September, 2000. After this, in February, 2003 they were transferred to the annex of the National Museum of Nature and Science (NMNS), Shinjuku, Tokyo, as The Sasa Collection. The author had arranged the collection and compiled the database. In autumn, 2004, he was asked to take photos of all the types by Dr. A. Shinohara of the Museum. The photos consisted of the type slides themselves, and microscope photos of the male hypopygium, wing, and so on.

Screen shot of the Type Specimen Database

The photo database opened recently on the homepage of NMNS http://www.type.kahaku.go.jp/TypeDB/ is based on these photos. If it is absolutely impossible to see the needed characters in the available photographs, a request can be made to Dr. A. Shinohara shinohar@kahaku.go.jp for loan of the types.

Next International Chironomidae Symposium to be held in Trondheim, Norway

The 18th International Symposium on Chironomidae Research will be hosted by the Museum of Natural History and Archaeology at the Norwegian University of Science and Technology in Trondheim, Norway in **2011**. We are very pleased that our bid to hold the next chironomid meeting was so well received by the recent symposium in Tianjin, and will do our best to make this a memorable event both scientifically and socially.

The city of Trondheim as seen from the city forest

Trondheim is situated in middle Norway (~ 63° N) and is Norway's third largest city with almost 170 000 inhabitants. It is home to one of the largest universities (approximately 18 000 students) and the oldest natural history collection in the country which can be dated back to the work of bishop Gunnerus (1718-1773). The Museum of Natural History and Archaeology was founded as the Royal Norwegian Society of Sciences and Letters as early as 1760.

Nature research and management is strong in Trondheim, and institutions like the University, The Norwegian Institute of Nature Research, the Directorate of Nature Management and The Norwegian Biodiversity Information Centre contributes to a considerable focus on biodiversity in our region.

Like most Norwegian cities, the city centre of Trondheim is close to nature. We hope that our meeting in Trondheim will give you the opportunity to experience some regional culture and wild life (don't forget your net) and look forward to see you here. For more information on the city and its surroundings, please see www.trondheim.no and www.visit-trondheim.com.

Torbjørn Ekrem, Elisabeth Stur & Kaare Aagaard

A World Catalogue of Chironomidae (Diptera). Part 1. Buchonomyiinae, Chilenomyiinae, Podonominae, Aphroteniinae, Tanypodinae, Usambaromyiinae, Diamesinae, Prodiamesinae and Telmatogetoninae

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Part 1 of A World Catalogue of Chironomidae (Diptera) is expected to be published in December 2009. A quote from the publisher has now been received and the price for each copy has now been fixed at Euro 42 to which the relevant amount of postage must be added. The number of pages will be approximately 370-400 and the volume will weigh about 1.3 to 1.4 kg. It is possible therefore to estimate the postage cost (Airmail only) to anywhere in the world. The total cost of a copy plus postage and packing can be determined from the table given below.

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The Catalogue is being published by The Irish Biogeographical Society in association with The National Museum of Ireland.

Once the Catalogue is published and available for sale it will be announced on the website of The Irish Biogeographical Society: http://www.irishbiogeographicalsociety.com/

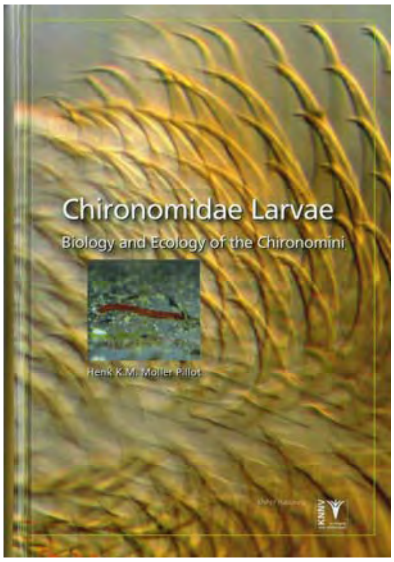
The Bank which handles The Irish Biogeographical Society account will be consulted to determine the easiest and cheapest method for receiving payment from abroad – this information will be included on the website when the Catalogue is published. Money received from the sale of Part 1 will be used to help pay some of the cost of Part 2.

Anyone wishing to order a copy can contact the senior author, Dr Patrick Ashe, by e-mail: *patrick.ashe@upcmail.ie*

New books

Chironomidae larvae – Biology and Ecology of the Chironomini

H.K.M. Moller Pillot is one of those leading chironomidologists in the Netherlands, if not the leading person, who have a long experience in taxonomy and ecology of chironomid larvae. His splendid identification keys have been published in the early 1980s, but exclusively in Dutch. Those keys were the basis of the development of chironomid research in the Netherlands. With the new series "*Chironomidae Larvae of the Netherlands and Adjacent Lowlands*", published in English, his knowledge now becomes accessible for the international scientific world. The first book of the series, "*Chironomidae larvae - General ecology and Tanypodinae*", written by H.J. Vallenduuk and H.K.M. Moller Pillot, was published in 2007. It was quite original as it includes, together with an ecological review, a lot of very new, unknown and practical characters making the identification of Tanypodid larvae much easier, sometimes already possible by the stereomicroscope alone (see review by Elisabeth Stur in *Chironomus newsletter of Chironomidae research* volume 20).



The bulk of the second book in the series, "*Chironomidae larvae – Biology and ecology of the Chironomini*", is mainly limited to larval autecology (Pseudochironomini are also included, i.e. *Pseudochironomus prasinatus*). It is a fundamental synthesis per species(-group) in a rather constant pattern of topics (as far as data are available): life cycle, microhabitat, feeding, swarming and oviposition, dispersal, densities, water type (current, dimensions, permanence, shade, …), pH, salinity, trophic conditions and saprobity, etc. When other specific environmental requirements are known, they are treated separately. Distribution in Europe is mainly based on Sæther & Spies (2004) to which specific data concerning the Netherlands are added. The book is limited to Dutch species; concerning their ecology, the situation in other countries is also taken into account, but the accent still remains on Central European lowland. The accounts are concise and they also include a lot of hidden literature and unpublished data; the work of Russian chironomidologists , e.g., is largely considered.

The last chapter (p. 239-247) concerns four tables with biological and ecological properties of Chironomini in the Dutch situation: (1) general ecology of each species(-group): number of generations, flying period, duration of larval development, diapausing instar stage, number of eggs, food and substrate of the larvae, (2) occurence in relation to saprobity and oxygen concentration, (3) in relation to pH and chlorinity, and (4) in relation to water velocity and permanence. Each variable in table 2-4 is subdivided into several classes (mostly five) and a score from 0 to 10 is given to the relative occurrence of each species (-group) in these classes. It is not clear how these occurrence scores have been calculated and what confidence may be given to them: the author must have had a lot of (unpublished) data at his disposal, both from himself and from his network, but the exact number for each species is not given.

"*Chironomidae larvae – Biology and ecology of the Chironomini*" does not contain identification keys, but warnings concerning misidentifications and indications of correct diagnostic descriptions in literature are mentioned; a few drawings sometimes illustrate specific characters. In any case, these remarks are so welcome that the reader becomes anxious to have the revised keys already at his disposal; the publication of these keys is foreseen for the next volume in this series.

One may regret that the book (and series) is mainly limited to species of the Netherlands and that even some aspects of their ecology only refer to Western European lowland conditions. Including data from other countries in the ecological tables of chapter 4 was not an option: (1) in different climatic conditions the species may react in another way, e.g. living in cool lakes in northern regions versus running waters in temperate regions, and (2) a dominance of Dutch data compared to other countries could be expected, which would distort our view on the ecology of the species at e.g. a European level. Moreover, the author is mainly involved in alpha-taxonomy, faunistics and environmental requirements of chironomid larvae in the Netherlands, the species with which he has been involved on a day-to-day basis. An extended edition including other European regions would have postponed, eventually cancelled this publication.

These short words to stress the high value of this publication. It is a must for everybody involved with chironomids. The "high" price compared to the volume of this book may not be taken into consideration: the content of this book is important and a gain of time for all of us who work with European chironomids.

Dr. Boudewijn Goddeeris, K.B.I.N., Vautierstraat 29, 1000 Brussels, Belgium.

Book reference

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In addition to supplements to the last two preceding years the publications of the present year are shown: almost one citation per day, which gives the average speed of publishing with regard to chironomids. The compilation was achieved, as usual, from many sources: databases, tables of contents of journals, references and citations of papers, inspection of many periodicals, lists and pdf's provided by authors (thanks to you!). In particular, publisher issued search alerts proved to be rich in results. As a rule, only printed titles are reported here with the occasional, but obviously increasing, exception of online-only journals (PLoS or BioMed Central journals, e.g.). Titles announced "in press", even with available DOI numbers, are not considered before printing. In general, online information should be retrieved elsewhere; best check the chironomid home page for eventual references regularly, or use individual websites with a host of chironomid-related data. Publications using chironomids as prey or food for animals are not treated comprehensively; in particular, studies with frozen midge larvae only for use to feed experimental animals are totally disregarded.

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Abstracts from the XVIIth International Symposium on Chironomidae in Nankai University, Tianjin, China, 2009 (sequence in abstracts book, Wang, X.-H., ed.))

A. Oral presentations:

Martin, J. 2009a. From bands to base pairs: Problems in the identification of *Chironomus* species, using the example of *Chironomus oppositus* Walker. - 11.

Al-Shami, S. A., Che Salmahi, M. R., Siti Azizah, M. N. and.Abu Hassan, A 2009b. Distribution of Chironomidae (Diptera) under the influence of several environmental parameters in polluted rivers of Juru River Basin, Penang, Malaysia. - 12.

Anderson, A. M., Bouchard, R. W. and Ferrington, L. C. 2009a. Hibernal emergence of Chironomidae in relation to stream size in Kansas. - 13.

Ashe, P. and O'Connor, J. P. 2009a. Part 1 of a world catalogue of Chironomidae (Diptera). - 14.

Brabec, K., Jarkovsky, J. and Kubosova, K. 2009a. Occurrence and co-occurrence of stream chironomids: associations with environmental gradients and community characteristics. - 15.

Chon, T., Tang, H., Qu, X., Bae, M., Song, M. and Park, Y. 2009a. Community structure and species abundance distribution in chironomids collected in streams in different pollution levels. - 16.

Ebrahimnezhad, M. and Allahbakhshi, E. 2009a. Chironomidae (Diptera) genera from Golpayegan River, Iran. - 17.

Ekrem, T., Willassen, E. and Stur, E. 2009a. Molecular phylogeny of *Micropsectra* and allies: indications of new generic synonyms (Diptera: Chironomidae): - 18-19.

Ermolaeva, O. 2009b. Comparative karyological analysis of the subfamily Diamesinae (Diptera, Chironomidae). - 20.

Ferrington Jr., L. C., Westrick, M. and Karns, B. 2009a. Alpha, beta and gamma diversities of Chironomidae emergence from 20 spring-runs in the Saint Croix River basin, Minnesota. - 21-22.

Golygina, V. V., Istomina, A. G. and Kiknadze, I. I. 2009a. Interspecific hybridization between sibling species of *Chironomus plumosus* group (Diptera: Chironomidae). - 23-24.

Gresens, S. E. 2009a. Response of Chironomidae to multiple gradients of urban impact. - 25.

Gunderina, L. I. and Katokhin, A. V. 2009a. Variation and divergence of rDNA ITS-1 region in species of genus *Chironomus* (Diptera: Chironomidae). - 26-27.

Inoue, E., Tsukada, M. and Hirabayashi, K. 2009a. Structural analyses of silk and nesting tubes of chironomid larvae (Diptera). - 28.

Kiknadze, I. and Istomina, A. 2009a. Karyological study of *Chironomus* species from the Netherlands. - 29-30.

Kaga, K., Kasuya, S., Kobayashi, T. and Ohtaka, A. 2009a. Identification of chironomid species by DNA sequence - especially genus *Hydrobaenus* including *H.* sp. Tsugaru. - 31.

Kobayashi, T., Ohtaka, A., Kasuya, S. and Kaga, K. 2009a. *Hydrobaenus* sp. Tsugaru with extremely short male antennae from Tsugaru Peninsula, northern Japan (Diptera: Chironomidae). - 32-33.

Langton, P. H. 2009a. Pupal exuviae structure further elaborated. - 34.

Lencioni, V., Marziali, L. and Rossaro, B. 2009b. Diversity and distribution of chironomids in natural and impacted springs in the Italian Prealps and Alps. - 35.

Liu, Y., Ji, C. and Chon, T. 2009a. Automatic detection of response behaviors of *Chironomus riparius* after exposure to toxic chemicals by using computational methods. - 36.

Makarchenko, E. A. and Makarchenko, M. A. 2009e. Fauna and taxonomy of the Orthocladiinae (Diptera: Chironomidae) of the Russian Far East. - 37.

Marziali, L., Rossaro, B. and Buffagni, A. 2009a. Temporal and spatial variability of chironomid assemblages in a large lowland river (Po River, Northern Italy). - 38-39.

Rossaro, B., Marziali, L., Boggero, A. and Lencioni, V. 2009a. Benthic

macroinvertebrates (Chironomidae, Oligochaeta) in Italian lakes. - 40-41.

McBean, J. E. 2009a. *Microtendipes* Kieffer prohumeral reversed setae – gratis mutation or functional asset? - 42.

McBean, S. F. 2009a. Questioning feeding related factors in niche separation in chironomid larvae, in particular mentum profile of Orthocladiinae and Chironominae. - 43.

Nath, B. B. and Babrekar, A. A. 2009a. Implications of hypoxic stress in *Chironomus ramosus* larvae with reference to iron. - 44.

Przhiboro, A. and Sæther, O. A. 2009a. Littoral chironomid communities of two small lakes in Northern Karelia (Russia) studied by emergence traps: species composition and changes over a 30-years period. - 45-46.

Stur, E. and Ekrem, T. 2009a. Exploring unknown life stages of Arctic Chironomidae (Diptera) with DNA barcoding. - 47.

Yamamoto, M. and Yamamoto, N. 2009a. A review of *Yaeprimus isigaabeus* Sasa & Susuki, 2000 (Diptera: Chironomidae). - 48.

Yamamoto, N., Hirowatari, T. and and Yamamoto, M. 2009a.The subgenus *Pentapedilum* of the genus *Polypedilum* (Diptera: Chironomidae) in Iriomote Island, the Ryukyus, Japan. - 49.

<u>B. Poster presentations</u>:

Ali, A., Leckel Jr., R. J. and Duxbury, C. V. 2009a. Chironomidae investigations in selected Florida wetlands . - 51-52.

Andersen, T., Mendes, H. F., Pinho, L. C., Roque, F. O. and Spies, M. 2009a. An updated check-list of Brazilian Chironomidae (Diptera). - 53-54.

Ashe, P. 2009a. A bibliography, with dates of publication, of J. J. Kieffer's publications on Chironomidae (Diptera). - 55.

Caldwell, B. A. 2009b. A novel pupa of *Pseudorthocladius* Goetghebuer, new Nearctic record for *Doithrix villosa* Sæther & Sublette, and variation in *Doithrix dillonae* Cranston & Oliver (Diptera: Chironomidae). - 56.

Cheng, M. and Wang, X. 2009b. .*Ablabesmyia* Johannsen (Diptera: Chironomidae: Tanypodinae) from China. - 57.

Przhiboro, A., Ekrem, T. and Stur, E. 2009a. Bionomics and taxonomy of *Tanytarsus recurvatus* Brundin, 1947. - 58.

Ermolaeva, O. 2009c. Comparative karyological analysis of the subfamily Prodiamesinae (Diptera, Chironomidae). - 59.

Fu, Y., Andersen, T. and Mendes, H. F. 2009a. *Paratrichocladius* Santos Abreu from Patagonia (Diptera: Chironomidae: Orthocladiinae). - 60.

Fu. Z., Inoue, E., K. Yoshizawa, K., Yoshida, N., Kazama, F. and K.Hirabayashi, K. 2009a. Horizontal distribution of chironomid larvae (Diptera) in Lake Saiko, Japan. - 61.

Grzybkowska, M. and Głowacki, Ł. 2009a. Chironomidae (Diptera) diversity in lowland rivers of different orders in central Poland. - 62.

Hirabayashi, K., Yoshizawa, K., Oga, K., Yoshida, N., Ariizumi, K. and Azama, F. K. 2009a. Population dynamics of benthic macroinvertebrates in a eutrophic-mesotrophic lake, Lake Kawaguchi, Japan. - 63-64.

Hu, Y. 2009a. A case study for effects of bt rice on non-biting midges in paddy field. - 65.

Ikutama, E., Inoue, E. and Hirabayashi, K. 2009a. Density dynamics of chironomid larvae (Diptera) in the middle reaches of the Shinano River, Japan: the response to floods. - 66.

Kawai, K., Okamoto, H. and Imabayashi, H. 2009a. A fundamental study on range expansion of chironomids. - 67.

Lencioni, V. and Rossaro, B. 2009a. Chironomids of springs, rivers and lakes in five provinces and in the Beijing Municipality of the People's Republic of China. - 68.

Bernabò, P., Caputi, L., Frassanito, R., Guella, G., Jousson, O. and Lencioni, V. 2009a. Cold resistance in *Pseudodiamesa branickii* (Nowicki): physiological, molecular and biochemical aspects. - 69.

Majumdar, U. 2009a. Indian species of *Glyptotendipes* Kieffer (Diptera: Chironomidae) with a short account of some aspects of biology. - 70.

Makarchenko, E. A. 2009a. *Pseudodiamesa nivosa* (Goetghebuer, 1928) is not synonym of *Pseudodiamesa arctica* (Malloch, 1919) (Diptera: Chironomidae). - 71.

Marziali, L., Rossaro, B. and Lencioni, V. 2009a. Chironomid drift behavior (Insecta, Diptera) in an arctic stream (Svalbard Islands) under natural and induced light conditions. - 72-73.

Wiedenbrug, S., Mendes, H. F. and Trivinho-Strixino, S. 2009a. New species of the genus *Onconeura* Andersen & Sæther, 2005 (Diptera, Chironomidae) from Brazil. - 74.

Móra, A. 2009a. The diversity of chironomid assemblages of streams in Lake Balaton’s catchment area. - 75.

Pinho, L. C. de and Froehlich, C. G. 2009a. Three new Neotropical species of *Fissimentum* Cranston *et* Nolte, 1996 (Diptera: Chironomidae: Chironominae). - 76.

Plank, A. 2009a. Chip – chironomid identification program: build your own determination key. - 77-78.

Raposeiro, P., Costa, A. C. and Hughes, S. J. 2009a. Preliminary results of the use of chironomid pupal exuviae technique in oceanic islands: Azores Archipelago. - 79-80.

Sergeeva, I. V. 2009a. Fauna and ecology of the Russia Tanypodinae (Diptera, Chironomidae). - 81.

Shimodoi, T., Kawai, K. and Imabayashi, H. 2009a. Fundamental study of fish effectiveness to control chironomid mass emergence. - 82.

Sonoda, K. C., Ortega, E., Vettorazzi, C. A. and Trivinho-Strixino, S. 2009a. Chironomidae assemblage from four Brazilian watersheds under different anthropogenic pressure. - 83-84.

Tóth, M., Kőműves, M. and Dévai, G. 2009a. Spatio-temporal distribution of phytal-dwelling chironomid assemblages (Diptera: Chironomidae) in submerged vegetation of two Hungarian backwaters. - 85.

Watanabe, T., Kawai, K. and Imabayashi, H. 2009a. A fundamental study to control adult chironomid midges by using the light traps. - 86.

Yan, C. and Wang, X. 2009a. A taxonomic discussion on a valid species of *Harnischia longispuria* Wang & Zheng, 1993 (Diptera: Chironomidae). - 87.

Zinchenko, T. D. and Golovatyuk, L. V. 2009a. Responds of the river chironomid communities (inflows of the hypersaline lake Elton, the Low Volga, south of Russia) to high mineralization. - 88-89.

C. Abstracts of Non-attending Colleagues

(Note: Several authors of contributions in paragraphs A and B did not attend the meeting either)

Chavan, R. J. 2009a. Diversity of chironomids (Diptera) in urban lakes at Aurangabad, India. - 91.

Jacobsen, R. E. 2009b. *Tanytarsus rexilius*, new species, from oligotrophic marshes in the Florida Everglades. - 92.

Morozova, Y. Y. 2009a. Ecologically-morphological analysis of *Cryptochironomus* Kieffer (Diptera: Chironomidae) species of the Volga River. - 93.

Zhang, E. 2009a. Fossil midges (Diptera: Chironomidae) as paleoecological indicators in Chinese lakes. - 94.