



CHIRONOMUS

Newsletter on Chironomidae Research

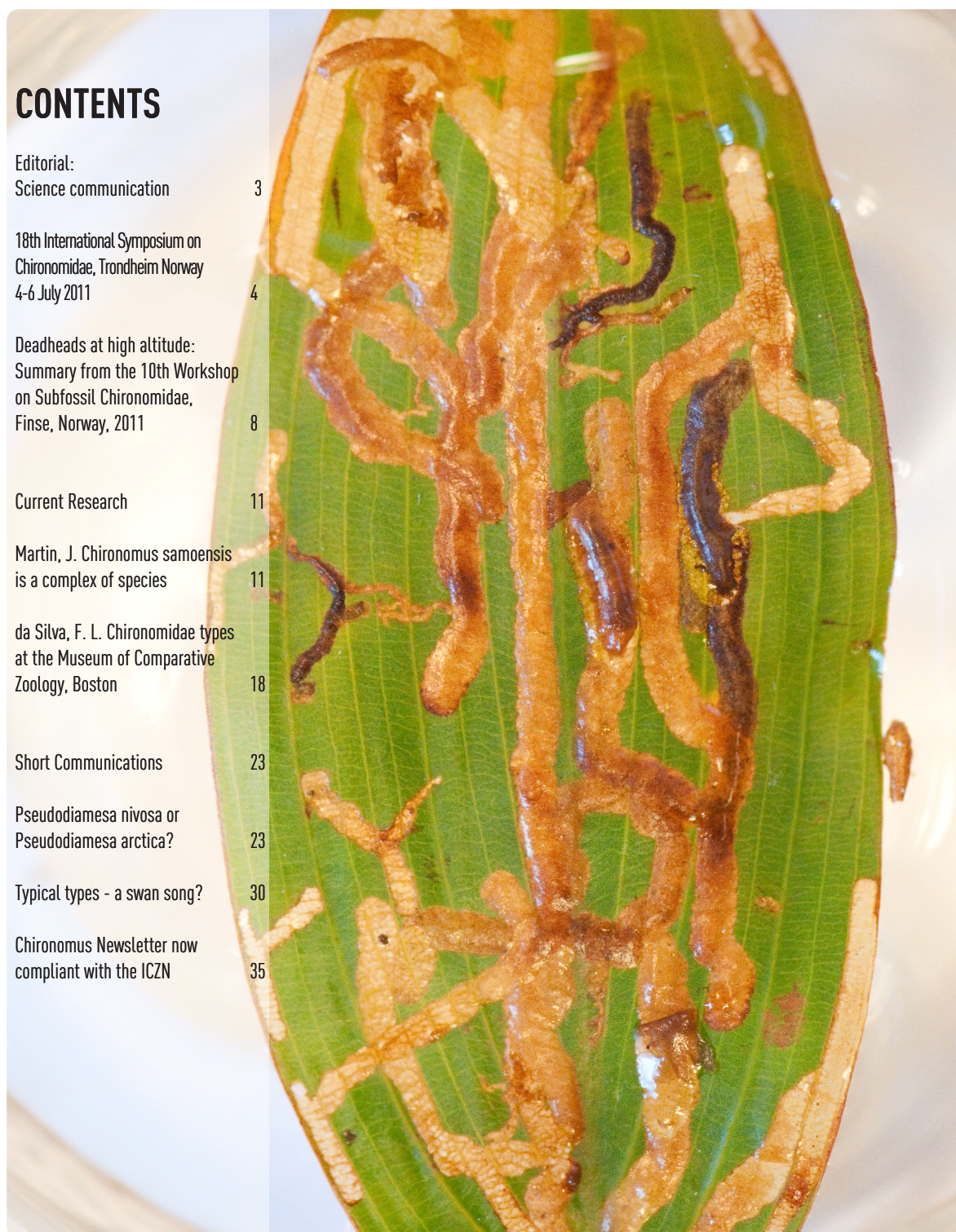
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Cricotopus brevipalpis mining *Potamogeton natans* leaves. Photo by Susan Gresens and Torbjørn Ekrem

CHIRONOMUS Newsletter on Chironomidae Research

Editors

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The *CHIRONOMUS Newsletter on Chironomidae Research* is devoted to all aspects of chironomid research and aims to be an updated news bulletin for the Chironomidae research community. The newsletter is published yearly in October/November, is open access, and can be downloaded free from this website: <http://www.ntnu.no/ojs/index.php/chironomus>.

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Front page layout: Chironomid in title from photograph by Steve Marshall, Graphic design by Kolbjørn Skarpnes, NTNU Information Division.

Front page photo: *Cricotopus brevipalpis* larvae mining *Potamogeton natans* leaves.
Photo by Susan Gresens and Torbjørn Ekrem.

Editorial

Science communication

Communication of research results may take many different forms. Some are modern in expression and content, while others definitely are more traditional. Traditional ways of communicating science does not mean that they are unsuitable in a modern research society, however. Printed articles in journals and newspapers and conferences and symposia are flourishing as never before and although many of these also have online versions, there is little doubt that many of us prefer to read text on paper instead of screen - not the least when sitting at the microscope with descriptions and identification keys. Moreover, certain research results must be either printed on paper or deposited in at least five publicly accessible libraries to be valid in the scientific community.

This is the case for nomenclatorial changes in zoology as governed by the current [International Code of Zoological Nomenclature \(1999\)](#). This issue of the *CHIRONOMUS Newsletter on Chironomidae Research* will be the first in a number of years that is actually printed in a limited number of copies and sent to selected public science libraries in Europe and North America (see previous page). We will also send a copy to *Zoological Record*. This will allow us to publish descriptions of new species as well as nomenclatorial changes and we hope that you will consider *Current Research* in *CHIRONOMUS Newsletter* as a future venue for publication of your taxonomic research.

This issue of the newsletter contains multiple additional examples of how science communication is performed in our community. We have reports from two recent meetings, current research articles and ongoing taxonomic discussions in our *Short Communications* section. The *Current Bibliography* that has been maintained by Odwin Hoffrichter for so many years, and is a valuable source of information on chironomid literature, unfortunately is not contained in this issue. We are currently discussing ways of maintaining this resource for the future, preferably in an online database, but a final solution is not yet ready.

In the meantime, revival of the tradition of circulating reprints, perhaps by email attachment to reduce the cost, would ensure that references to papers published, particularly in journals 'obscure' outside the country of publication, would not be omitted and citations missed.

We hope that you enjoy this issue of the *CHIRONOMUS Newsletter* and look forward to see your contributions for the 2012 issue.

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18TH INTERNATIONAL SYMPOSIUM ON CHIRONOMIDAE TRONDHEIM NORWAY 4-6 JULY 2011

On the 4th of July 2011 about 80 chironomists from as far afield as Japan, New Zealand, Argentina and Canada converged on the Norwegian University of Science and Technology (NTNU), a short walk uphill from Trondheim city centre. After registering, the delegates were warmly welcomed by Kaare Aagaard, Elisabeth Stur and Torbjørn Ekrem, before the Symposium was officially opened by the NTNU Museum Director Prof. Axel Christophersen. The honorary Thienenamnn lecture was delivered by Oliver Heiri entitled 'Traces of past environments in the chemical composition of chironomid remains: stable isotopes in chironomid palaeoecology'. For the oldest of us, what has become possible in chironomid research – the analysis of stable isotopes in the fragments of long dead chironomid larval head capsules in order to reconstruct past climate changes, nitrogen pollution and the carbon food sources of lake foodwebs – is truly mind-boggling. One can only hope that there will be place still for the amateur chironomist with minimal equipment and finance. However, this is what these symposia are all about: widening the appreciation and knowledge of what can be done and is being done in the subject to which we are dedicated. This was an excellent start to a highly informative and exciting program.

18th International Symposium on Chironomidae



Logo from the symposium. Design: Elin Sandbakk

After a very agreeable lunch in the university canteen (repeated on the following two days), the general program took off with two sessions of papers on palaeolimnology: six papers on what is being done on little bits of subfossil chironomid larval head capsules. For those of us who find difficulty in identifying a complete extant larva the palaeolimnological identifications appear little more than

wishful thinking, but as they so well demonstrated you do not have to have specific identification to derive useful information from the exercise. Once again the use of a carbon isotope to determine the food source and therefrom the eutrophication states of a lake, demonstrated just how sensitive the technique can be: it so happens that during periods of eutrophication more of the carbon food source is derived from methanogenic bacteria and this can be detected in the $\delta^{13}\text{C}$ values derived from the subfossil chironomid larval head capsules.

There followed extreme activity in the lobby area outside the lecture theatre as posters were rapidly displayed on the substantial notice boards and the first period of viewing commenced. There was a wide variety of presentations including ecology, biodiversity, systematics traditional (even of some strange Mesozoic fossils with long biting proboscis) and more advanced (CAD and CO1 sequencing), six new species, species reappraised and species reinstated, and more palaeolimnology.

That evening an organ recital had been arranged at the Nidaros Cathedral, which has two organs: half the program was played on the older Baroque organ (Bach, including the famous Toccata and Fugue) and the second half on the main more recent Steinmeyer organ over the entrance to the cathedral (Egil Hovland – a composer new to most of the delegates). The organist was Øyvind Kåre Pettersen whose virtuosic performance, ending in a piece of Hovland fireworks, was pure artistic enjoyment for those of the delegates whose musical appreciation extends to that of works for large, loud organs. Rounding the evening off was a wine and canapés reception in the neighbouring restaurant: excellent provision for chatting the evening away with those of like mind.

Tuesday morning was devoted to taxonomy and systematics. Before the coffee break five papers based on morphology and after, four based on molecular techniques and one on morphology were presented, demonstrating the wide variety of techniques being used at this time to distinguish species. The use of the polymerase chain reaction for separating *Chironomus* species at any stage of development is a novel addition to the techniques already in use for the genus.

There followed a period of seventeen presentations on ecology and biomonitoring that lasted until lunch of the following day (Wednesday), that



Group photo of symposium participants outside University main building. Photo: Arnstein Staverløkk.

took the delegates across the world from arctic Canada through Iceland, Europe, India, and Korea to New Zealand, from alpine pools to lowland lakes and from freezing temperatures to geothermal waters. The talks gave a fascinating overview of the variety of studies that chironomids can stimulate.

These presentations were punctuated by the Tuesday evening Conference Dinner, held at Ringve Botanical Garden. The delegates were first shown round the garden by Vibekke Vange. The garden includes a large pond, where some delegates took the opportunity to do some collecting. The meal was a feast for the eye as well as for the palate, the evening further lifted by the camaraderie natural in the chironomist community.

The last session of the oral proceedings began after lunch on Wednesday on toxicology, cytology and genetics. The seven presentations covered genetic control of behaviour, stress response to endocrine-disrupting compounds, desiccation tolerance mechanisms, gamma radiation tolerance in *Chironomus ramosus*, DNA, chromosome responses to toxic contaminants and centromere structure. The Chironomidae are being comprehensively scrutinized and exhibiting just how plastic is their general physiology and cytology.

The final session entitled “Chironomidae Symposium Forum”, began with in memoriam accounts

of chironomists recently deceased: Paul Freeman and Arthur Harrison by Peter Cranston, and Alevtina Shilova and Alexander Konstantinov by Andrey Przhiboro; a minute’s silence was observed in their memory. The award for student presentation was awarded to Alyssa Anderson and for the student poster was presented to Isabelle Proulx. Two presentations were then given for the venue of the next symposium: Naime Arslan’s invitation to Turkey was followed by Jolana Tátošová’s to the Czech Republic; I could have happily gone to either location, but the vote went to the Czech Republic.

The Symposium was brought to a very enjoyable conclusion with a social held in the garden of Kaare Aagaard’s home. Our grateful thanks go to Kaare and his family for the warm welcome they gave and the excellent refreshments.

The day following many of the delegates participated in the post symposium tour to the UNESCO cultural heritage site Røros, where we were given a guided tour of this post-mining community: exceedingly spartan living seems to have been a way of life for the miners – the tiny wooden cottages have left a lasting memory. Thence we travelled to the Sølendet Nature Reserve, where the wildflowers punctuated the fen with colour and the spring stream and fen pools provided the dedicated collectors an opportunity to get their nets in

action again. Wet but happy we boarded the coach again to pass over the scenically spectacular mountains to Tydal Valley and Sylane Mountains, where we were feasted at a remarkable restaurant in “the middle of nowhere”. We had a short time to photograph the wild flowers and do some more collecting before we were off again, now on our way back to Trondheim, but there was one more stop along the River Nea, a river regulated for hydroelectric power. We were given a guided tour of the large hydroelectric plant in the bowels of the mountain, which seems to be under the control of just two engineers. Culture, nature, spectacular scenery and pleasant company provided an experience that participants were very happy not to have missed.

On behalf of all the delegates I offer our grateful thanks to Elisabeth Stur, Torbjørn Ekrem, Kaare Aagaard and their helpers for a most educational, well organised and memorable symposium and to the NTNU for providing the venue.

Peter Langton
Londonderry

Memories of the 18th International Symposium on Chironomidae

What a great symposium! I would qualify my first international symposium on Chironomidae as being refreshing, resourceful and helpful. Being used to attending much bigger gatherings, I really appreciated the more one-on-one, friendly and personal feeling of this symposium. Having the time to talk to people who work with chironomids and authors whom I had known only through their publications was really rewarding. In my doctoral research, *Chironomus* species identification has been my biggest challenge, and so I came to this meeting with the specific objective of getting some feedback on the work I have been doing. Not only was I able to get some answers to my questions, but I also made new and very helpful contacts. I would really like to thank the organisers for this wonderful, well-organised and pleasant symposium. I only have good memories of my experience in Trondheim!

Isabelle Proulx
INRS Eau Terre Environnement
Université du Québec,
Québec (QC), Canada



Len Ferrington, Pete Cranston and Anker Halvorsen discussing midges during a coffee break. Photo: Elisabeth Stur.

First time impressions of the International Symposium on Chironomidae

The list of speakers and attendees of the 18th International Symposium on Chironomidae reads very much like the bibliography of any rigorous literature review of the subject. Any misgivings one might have about attending such a specialized and esteemed event are quickly forgotten after meeting the participants. This community of researchers is very welcoming and it was encouraging to listen to veteran attendees who told of similar apprehensions when they arrived for their first symposium. The expertise each of the speakers was unequivocal and the breadth of knowledge was clear in the insightful questions and discussions. However, the most prominent feature of this group is the passion that people share for their subject. Not only do the participants exude zeal for their research, but many have stories of personal collections, research performed without funding and for personal interest, and some of us cannot walk by a pond or stream without looking for the presence of larvae or exuviae. The personal investment in this work seems so great that many of the people in attendance do not even seem aware of the legacy of their research. Outside the seminars people stand around microscopes, trade slides and specimens, and discuss taxonomic features as if recollecting the appearance of old friends. Others debate the best habitats to find certain species and swap stories of collecting trips. There is no substitution for being present at this conference. There are no identification keys precise enough or species list long enough to replace the value of these shared discussions. One cannot help but be impressed at the diversity of session topics and the addition of the Chironomid Subfossil Workshop held in Finse, Norway, prior to the conference only serves to in-

crease the number of participants and demonstrate the versatility of midges in answering ecological, biogeographical, physiological and genetic questions. While the monetary costs of attending an international conference can be high, the value here is far greater. The hosts of this event deserve special recognition and gratitude. Elisabeth Stur, Torbjørn Ekrem and the Museum of Natural History and Archaeology organised a memorable programme of talks, outings and social events.

Christopher Luszczyk
York University
Toronto, Canada.

The 18th International Symposium on Chironomidae

Participation in the Chironomidae Symposium in Trondheim was an important step for my PhD thesis and future work with chironomids. It was a wonderful opportunity to meet the best experts from all the fields, in which this amazing animal group can be used. It was really surprising for me how friendly and helpful were the people that I met, especially the “good old” experts. To have these contacts and to know that there is always someone you can ask for help, is the most important thing for a young scientist. Finally, this Symposium was the easiest way to get to Chironomidae heaven!

Jarmila Lešková
Comenius University
Bratislava, Slovakia.

The 18th International Symposium on Chironomidae

Attending the 18th International Symposium on Chironomidae in Trondheim, Norway, has given me the chance to present my own work and listen to talks on a wide variety of Chironomidae research. Researchers from all over the world attended the conference, presenting their work on different subjects, ranging from taxonomy to ecology. The conference was very well organized along with social events, which included an organ recital at the Nidaros Cathedral, a visit to the botanic gardens and a day trip to Røros and neighbourhood. I feel this conference is an important venue for scientists to meet, present their work, get to know each other and create collaborations.

Elisabet Ragna Hannesdóttir
University of Iceland
Reykjavik, Iceland.

DEADHEADS AT HIGH ALTITUDE: SUMMARY FROM THE 10TH WORKSHOP ON SUBFOSSIL CHIRONOMIDAE, FINSE, NORWAY, 2011.

The 10th workshop on Subfossil Chironomidae was held at Bergen Museum/Finse Alpine Research Center, University of Bergen on June 30. – July 2. 2011, and organised by Dr. Gaute Velle. There were 23 palaeo-chironomid researchers present, representing 10 different nationalities (see 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.

After lunch, the workshop group went on the scenic Bergen-Oslo railway line to the field station at Finse (1222 m a.s.l.). A social ice-breaker hike to Hardangerjøkulen glacier was guided by Gaute Velle. The hike in the wet and midge rich snow melt-water landscape, together with discussions on the glacier advance and retreats, gave a fine inspiration to the following two days workshop.

The workshop was organised into four sessions with oral presentations; isotopes, transfer functions, climate, and environmental change. There were two practical sessions on taxonomy and statistics, and one session of general discussion.

A number of ongoing projects (4 presentations) involve stable isotope analyses of either subfossil



Participants at the workshop. Photo: Klaus P. Brodersen.

The pre-workshop day on June 30th in Bergen, was initiated with a welcome by Dr. Kari Hjelle, Head of Department at Bergen Museum. Dr. Richard Telford from the Department of Biology gave a presentation on “Numerical pitfalls in chironomid palaeoecology”. The talk was an introduction to the practical on statistics later on during the workshop (see below). A tour around the laboratory facilities with demonstration of the museums new automated identification and enumeration equipment was lead by Arild Breistøl and Gaute Velle.

headcapsules, modern headcapsules, living larvae or food items from different habitats. Many methods and ideas from macroinvertebrate stable isotope research over the last decades are now being evaluated and implemented on subfossil material. The ongoing work involves optimization of analytical procedures with very small sample size, pre-treatment procedures, signal similarities between headcapsules and larvae, influence of food sources, in-lake and among lake variability etc. Combining the ecological information from C-13,

N-15 and O-18 with the information from the long-term subfossil records may open new windows to interpretation of catchment-, lake- and ecosystem development.

The sessions on transfer functions and climate mainly contributed with both new and well known thoughts on the strengths and weaknesses of quantitative chironomid-based temperature models (e.g., previous workshops, Langdon et al. 2007, Brodersen et al. 2009, see also Velle et al. 2010). Interfering and confounding environmental variables both for the modern transfer functions assemblages and for the fossil assemblages still requires serious attention.

The presentations on (human) environmental change brings the interpretation beyond discussion of climate and temperature. An interesting attempt to combine the changes in the chironomid (temperature) record with numerous findings of pre-historic human occupation and changing environment in SW Swedish Lapland, underlines the challenges in the eventual interpretations. Likewise, a study of a sediment filled lake basin (a lake that is no longer there; Danube lowlands, Slovakia) also requires interpretational aspects that challenge the analytical skills out of the quantitative modelling. Modern DNA sequencing methods has also reached palaeoecology. These methods have recently been used to confirm taxonomic identifications, such as a likely placement of the fossil *Corynocera oliveri* type into the parthenogenetic *Tanytarsus heliomesonycitios* Langton (Stur and Ekrem 2011), parse out relationships between cryptic species, and harmonize taxonomic nomenclature. However, the application of DNA sequencing has more diverse utilities than taxonomic clarification. Eventually, the analyses will be able to reconstruct population differences and link divergence events with geographic locations and perhaps clear our understanding of ambiguous indicator species, such as *Corynocera ambigua*.

The discussions and challenges mentioned above perfectly set the scene for the practical session on statistics, tutored by Dr. Richard Telford. Using the statistical language R, Telford presented a method to test the statistical significance of a quantitative palaeo-environmental reconstruction inferred from biotic assemblages and transfer functions. A reconstruction is considered statistically significant if it explains more of the variance in the fossil data than most reconstructions derived from transfer functions trained on *random* environmental data (Telford & Birks, 2011). The workshop participants used the newly developed codes in R

(see Telford & Birks, 2011) and tested the significance of reconstructions resulting from data that was provided or from their own data (see workshop photo). Such significance testing fills a major gap in the range of numeric procedures available to palaeoecologists and it is recommended that these tests are used whenever a reconstruction is published.



Practical on statistics tutored by Richard Telford. Photo: Klaus P. Brodersen

Workshops are a fine stage for commencing on position papers. In the discussion session, some ideas for joint publications were presented and discussed. Many of us have data-sets that individually are small, but that together can constitute a wealth of information. Such data-sets include numerous data-points at a broad temporal and spatial resolution that can be used to test hypothesis on topics such as large-scale environmental influences, training set diversity, down-core diversity, reconstruction significance testing, or colonization. The repeated workshops on subfossil Chironomidae and the presence of identification guides, such as Brooks et al. 2007, help ensure that we have a common platform and that the taxonomy is comparable among data-sets. We anticipate this and future workshops will result in shared efforts and joint papers.

It was generally agreed that having the workshop

at field stations or similar type of residence halls were a great success, giving rise to a good social, informal, fruitful and efficient workshop. Then, there is nowhere to escape from the discussion! We thank all for active participating and constructive discussions. The next workshop on subfossil Chironomidae will be in spring or early summer, 2013, most likely in the UK.

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CURRENT RESEARCH

CHIRONOMUS SAMOENSIS IS A COMPLEX OF SPECIES

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Abstract

Chironomus samoensis, as currently recognised, is not a single species but a complex of more or less closely related species. *C. samoensis* Edwards 1928 is redescribed from additional material, and considered to occur only in the Pacific region. Reasons for excluding material from other areas are given. *C. flaviplumus* Tokunaga 1940 is confirmed as the correct name for the Japanese material, the Indian material described by Chattopadhyay *et al.* (1991) is given the new name *C. indiaensis*, and new names are required for material from Australia and additional species from India.

Introduction

Chironomus samoensis Edwards 1928 was originally described from Samoa, American Samoa (Pago Pago) and Tonga. Since then, the species has been reported from other parts of Oceania (Tokunaga 1964, Cranston and Martin 1989), Australia (Martin 2011), Japan (Hashimoto 1977; Sasa and Hasegawa 1983), Taiwan (Yamamoto 1996), China (Wang 2000) and India (Chattopadhyay *et al.* 1991). However, as I will endeavour to show, most of these reports are misidentifications, and *C. samoensis* is probably limited to Oceania.

I have not had the opportunity to examine the Edwards types, and his description does not include many characters important for species identification and is without illustrations. However, he did provide sufficient details to exclude many specimens described as *C. samoensis* from belonging to that species. One important feature is the superior volsella (SV) of the male, which Edwards compares specifically to the SV figured for *C. imberbis* (Kieffer 1917), as well as to other species such as *C. dorsalis*, and *C. hawaiiensis*, which all have a superior volsella (SV) of the D type (Strenzke 1959). While Kieffer's illustration of the nomen dubium *C. imberbis* is not all that clear, all the known *Chironomus* species around

the Sydney area, the type location of *C. imberbis*, have a SV of the D type. In contrast to the Edwards (1928) description, some other descriptions of *C. samoensis* refer to the male as having a boot- or foot-shaped superior volsella (e.g. Fig. 12a in Tokunaga 1964 (but see below), Chattopadhyay *et al.* 1991), corresponding to Strenzke's (1959) S type.

I believe that specimens I collected as larvae from Mapusaga, Tutuila Island, American Samoa (-14.29, 170.70), (29 February 1971), as well as a specimen from Faratogo, Tutuila (coll: N.R. Spencer, 29 June 1964) from the Bishop Museum collection, are most probably the species described by Edwards, and they will therefore be more fully described here. The Bishop Museum specimen is labelled as *C. samoensis*, perhaps by Tokunaga, but this point is not certain. This will include a description of the immature stages for the first time. In general, the morphological terminology follows Sæther (1980), Webb & Scholl (1985) and Vallenduuk & Moller Pillot (1997). Colour could not be determined from these slide-mounted specimens.

Results and Discussion

Male

Head: AR - 2.94 (2.51 - 3.23, 4); frontal tubercles 33 μ m (29-38, 4) long and 15 μ m (14-17, 3) wide; palpal proportions (micron) - 46 : 46 : 193 : 234 : 354; clypeal setae 17-23.

Thoracic setae: Acrostichal - at least 14 or 15; dorsolateral - 17-21; prealar - 4-5; scutellar in two rough rows, ant. 5-12, post. 12-15.

Wing length 2.58 mm (2.40-2.68, 4), width 0.63 mm (0.60-0.66, 4), VR 1.03 (1.02-1.04, 4).

Legs: pale, tarsi slightly darker. Relative length of leg segments in Table 1.

Table 1. Lengths and ratios of leg segments of *Chironomus samoensis*

| Leg | Fe | Ti | Ta ₁ | Ta ₂ | Ta ₃ | Ta ₄ | Ta ₅ | LR | F/T | BR |
|------|------|------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------|-----------|-----------|
| PI | 1107 | 1000 | 1507 | 810 | 750 | 670 | 330 | 1.50-1.52 | 1.08-1.12 | 1.54-1.75 |
| PII | 1170 | 1040 | 675 | 365 | 245 | 160 | 115 | 0.62-0.67 | 1.07-1.17 | |
| PIII | 1290 | 1245 | 1185 | 513 | 385 | 233 | 153 | 0.78-0.82 | 1.03-1.05 | |

Abdomen: pale, with darkening as described by Edward. Hypopygium: (Fig. 1) similar to that of *C. dorsalis*, with the SV of the D type, similar to fig. e of Strenzke (1959). The inferior volsella (IV) has mainly simple, curved setae, but a small number appear to have a small simple fork near the tip. About 4-6 setae on the 9th tergite near the base of the anal point.

Ta₁ 1020 ; Ta₂ 620 : Ta₃ 470 : Ta₄ 610 : Ta₅ 340; Ta₄ about same length as Ta₂, and about one third longer than Ta₃.

Pupa: (Fig. 2)

Exuviae length 6.8 (6.5-7.0, 3) mm (male), inner margin of wing case about 1.34 (1.27-1.42, 3) mm (male). Pale, with darkened caudolateral spurs. Cephalic tubules 87 (76-115, 3) µm long and 66

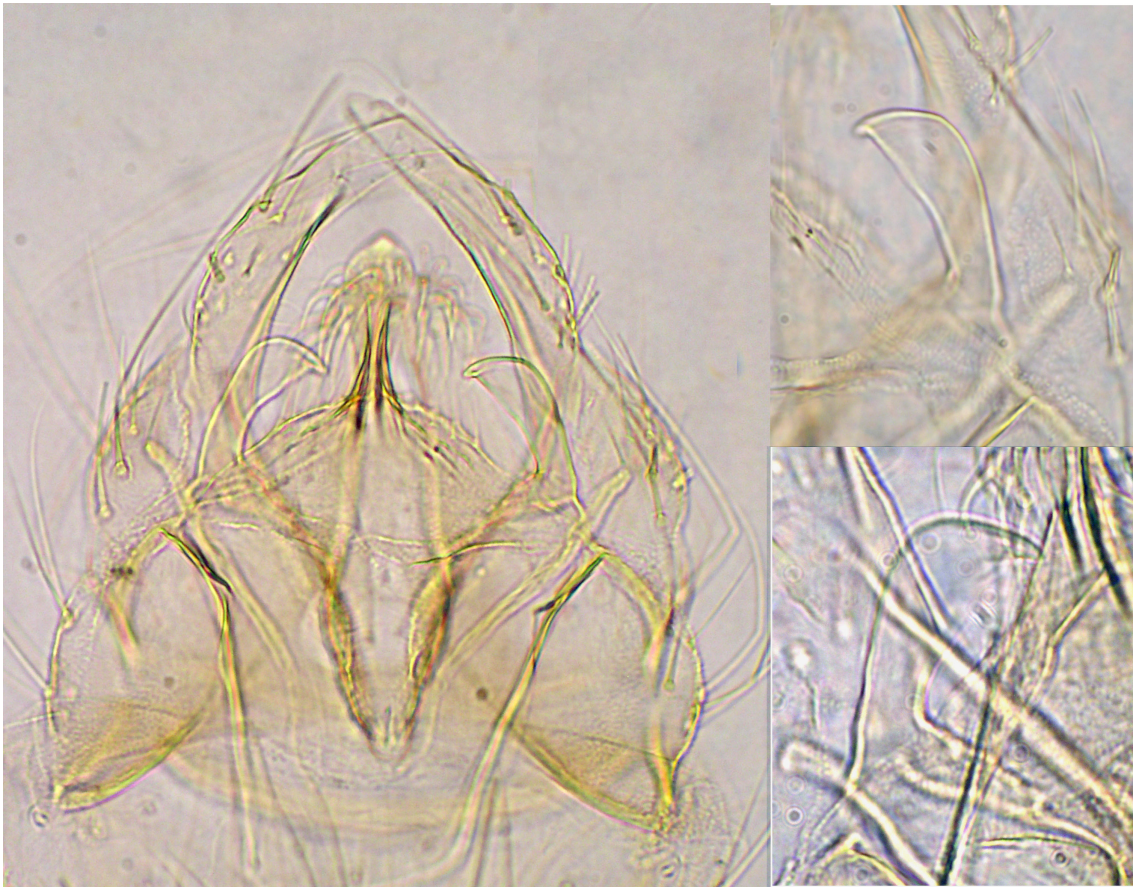


Figure 1. Male hypopygium of *Chironomus samoensis* (left), superior volsella (right). Note the partly beaked apex of SV in the lower figure.

Female:

No adult females are available amongst the present material, but one pupa with a pharate female was present. An important character is the relative proportions of the fore leg, particularly the tarsi, as Tokunaga (1964) notes that the Ta₄ of specimens he assigned to *C. samoensis* was unusually long. The approximate lengths of these segments were measured (in micron) as: Fe 900 ; Ti 750 ;

(56-80, 3) µm across the base, subterminal bristle about 68-80 µm in length. Basal ring about 151 (129-164, 3) long and 70 (54-85, 3) µm. About 67-77 hooks in row on segment II. Slight development of Pedes spurii B on segment II, progressive development of Pedes spurii A from segments IV to VI. Caudolateral spur of segment VIII about 180 (155-200, 3) µm long, with 1 to 3 spines. 78-88 taeniae on each side of the anal lobe of male.

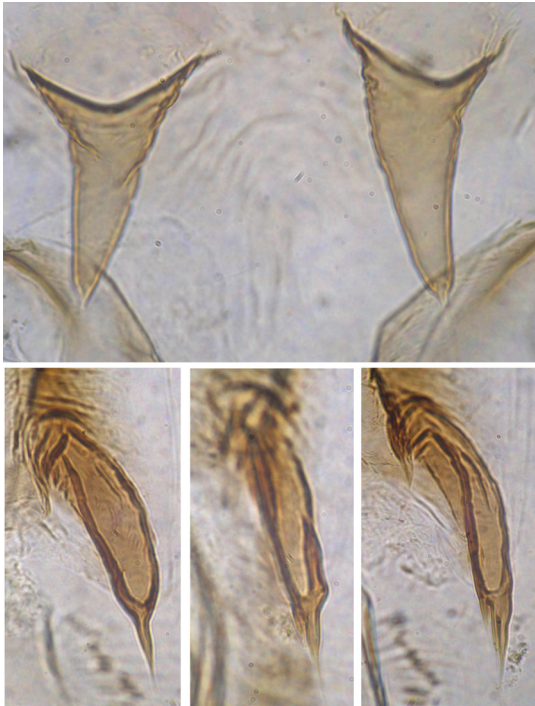


Figure 2. Pupal exuviae of *Chironomus samoensis*. Cephalic tubercles (above) and variations of spines on caudolateral spurs of segment VIII (below).

Larva: (Fig. 3)

A medium sized plumosus-type; length about 12.5-12.7 mm (female) and 10.8-11.8 mm (male); lateral tubules about 280-360 μm ; ventral tubules relatively long (anterior 1.76-2.16 mm; posterior 1.80-2.68 mm), posterior pair longer and coiled; anal tubules moderately long (about 1.6-2.6 times longer than wide), dorsal pair (240-410 μm) slightly longer than ventral pair (215-370 μm). Head capsule pale with darkening of the posterior half of the gula, frontal apotome sometimes pale but mostly with slight darkening, ventral head length 261-318 μm . Distance between antennal bases greater than the distance between the S4 setae. Mentum wider than usual, about 0.6 of ventral head length; centre trifid teeth with c2 teeth well developed (essentially type IV); 4th laterals reduced to about the level of 5th laterals (type II), 6th lateral variable, sometimes arising at same level as other laterals but generally appearing to be at a slightly lower level, apparently due to breakage resulting from wear. Ventromental plates separated by about 35-41% of the width of the mentum; each with about 32-35 striae. Pecten epipharyngis with about 13 (10-16, 8) sharp pointed teeth. Premandible with sharp teeth, outer tooth shorter than inner tooth, which is about twice as wide as the outer tooth. Mandible about 208-228 mm long, with 3rd inner tooth relatively pale and only partly separated (type II), about 13 (12-14, 8) striae on inner margin

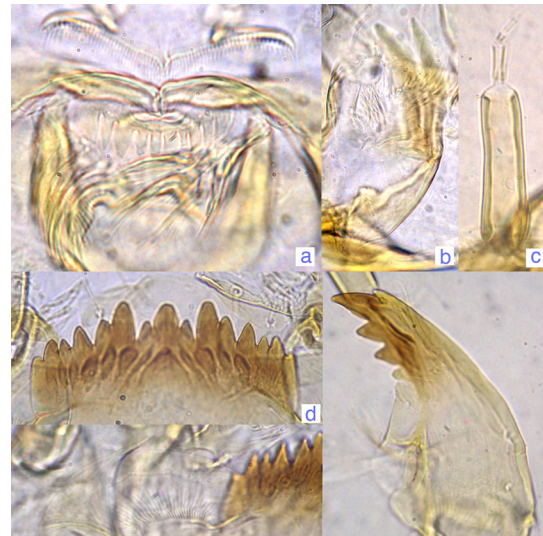


Figure 3. Features of the larval head capsule of *Chironomus samoensis*. a. Labrum and pecten epipharyngis, b. Premandible, c. Antenna, d. Mentum, e. Ventromentum, f. Mandible.

at base, pecten mandibularis sparse, with about 8 (7-10, 5) setae. Antenna five segmented, with A1 almost 4 times longer than wide, RO between 0.4 and 0.5 up from the base of the segment; relative length of antennal segments (micron) 110 : 24 : 6 : 11 : 7 ; AR 2.03-2.30.

Cytology

The polytene chromosomes (Fig. 4) available from six salivary gland squashes, prepared by the technique of Martin *et al.* (2006), are not of high quality, but are sufficiently good to show significant differences to those of other species that have been called *C. samoensis*. The arm combination is similar, being pseudothummi-cytocomplex (AE, BF, CD, G). There are at least two nucleoli, one central in arm G, and one about region 20 of arm F, with a large puff that may be a nucleolus near the middle of arm C. There are two Balbiani rings near one end of arm G. The only banding pattern that could be completely identified was that of arm A, which is the basic pattern of *C. holomelas* (Wuelker 1980).

Based on these descriptions, diagnostic features of the species are: Frontal tubercles relatively long; LR about 1.50 -1.52, fore Ta5 about one third of the length of the fore tibia, SV of the D-type, or "beaked"; in female fore Ta4 longer than Ta3 and about the same length as Ta2. In larva, antennal segment 3 relatively short, usually shorter than A5. In the polytene chromosomes, the nucleolus in arm G is median, and there is a further nucleolus about region 20 of arm F and usually a large puff in arm C.

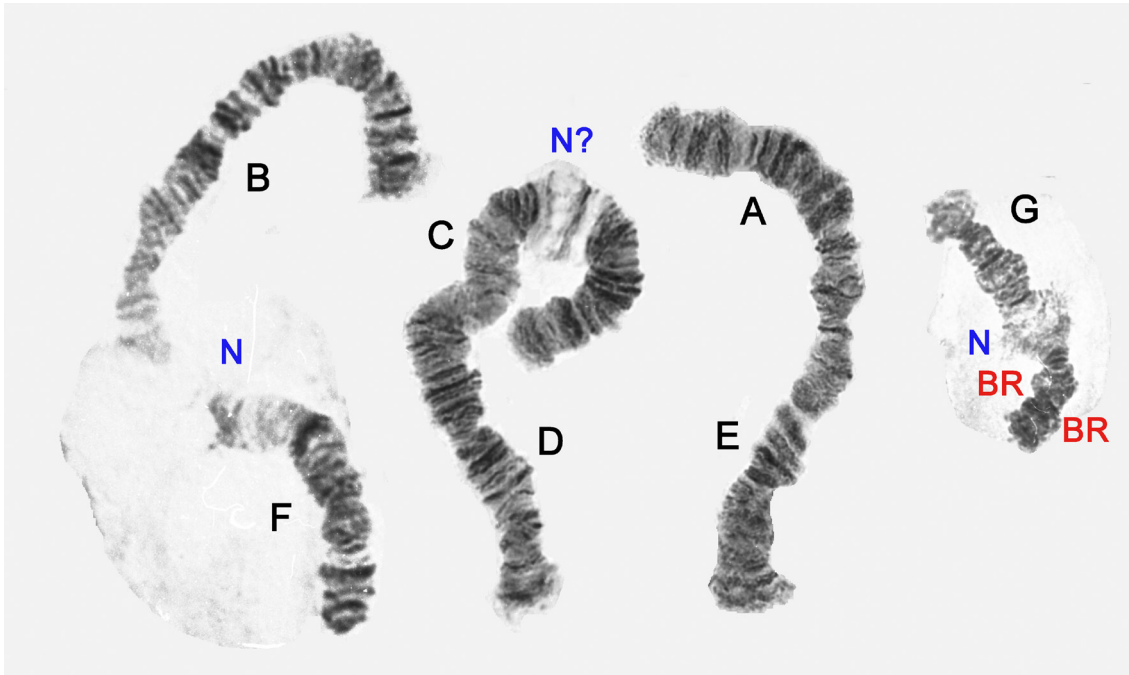


Figure 4. Salivary gland chromosome complement of *Chironomus samoensis*. A-G - chromosome arm identifications, N - Nucleolus, BR - Balbiani ring.

The first re-description of *C. samoensis* was by Tokunaga (1964). While the male colouration, AR and LR are quite similar to those described by Edwards, and Tokunaga describes the SV as similar to *C. dorsalis*, his figure has a triangular apex which can be misinterpreted as an S-type. However, Tokunaga's illustration of the SV is presumably intended to depict the somewhat "beaked" SV seen in some specimens (for which there is no equivalent in Strenzke's SV types). Tokunaga makes particular comment on the relative length of the tarsal segments of the fore leg of the female - "in female the fore tarsus with segment 4 far longer than 3 and slightly longer than 2". He then gives the relative lengths of the segments as Fe 110 ; Ti 86.5 Ta1 163.5, Ta2 84.5 ; Ta3 81.5 ; Ta4 88.5 ; Ta5 38.5. The relative lengths are about the same as those found for the Samoan specimen. The specimens described by Tokunaga from Micronesia are probably *C. samoensis*, although their LR is higher (1.75-1.84) and Tokunaga mentions the female abdomen as having faint oval spots on the terga, while Edwards states only that it is without distinct markings. In the event that re-examination of Tokunaga's specimens (the specific location of which is not given) indicates that this is a different species, the name *Chironomus eximius* Johannson (1946) might be an available name. Otherwise, the Tokunaga description provides details of adult morphology not included in the present re-description.

On the other hand it can be shown that the species identified as *C. samoensis* from other geographic areas do not fit these descriptions of the species. Material from Japan has been described both as *C. samoensis* (Hashimoto 1977) and as *C. flaviplumus* Tokunaga 1940, and, while there is agreement that there is only one species, there is uncertainty as to which name should be used. Sasa (1978) used the name *C. flaviplumus* on the basis that the AR of Japanese specimens was higher (about 4.0) than that of *C. samoensis*, and the fore Ta5 was longer compared to the fore Ti (about 0.42). Although he gave the lengths of the leg segments of the female, he did not note that those of the fore tarsi did not agree with those of *C. samoensis* as specified by Tokunaga (1964). Ta4 is only the same length as Ta3 and shorter than Ta2. Despite this, Sasa and Hasegawa (1983) accepted the synonymy of the two species and it has been used in this way by many authors (Sasa and Kawai 1987; Elbetieha and Kalthoff 1988; Kuhn *et al.* 1987; Wuelker *et al.* 1989). Wuelker *et al.* recognized the synonymy as doubtful, but incorrectly stated the probable correct name was *C. fulvipilus*. These authors also gave the banding sequences of chromosome arms A, E. and F., and photographs of the other arms were kindly made available to the author. These show that at least arms A and G differ from those of *C. samoensis*. Arm A does not have the basic sequence of *C. holomelas*, but differs by complex inversions: flaA1, 1a-i, 2k-d, 9 - 4, 13 - 14, 3h-i, 12 - 10, 2c - 1k, 3a-g, 15 - 19 (Wuelker *et al.* (1989).

The nucleolus in arm G is virtually terminal, not central.

Given the differences noted above, it is clear that Sasa's 1978 assessment was correct and the Japanese material should be called *C. flaviplumus*.

Chironomus samoensis has also been reported from Taiwan (Yamamoto 1996) and China (Wang 2000), but no details of the specimens were given. It is therefore unclear whether they are *C. flaviplumus* or another species.

A species occurring in northern Australia was initially identified as *C. samoensis* (Martin 2011), but the morphology and cytology now indicate that this is incorrect. The Australian species is a close relative of *C. flaviplumus*, but is not identical. The AR of the adult males is lower (2.4-2.9), the LR is higher (1.82-1.96 cf. 1.63) and the fore Ta5 is slightly shorter (about 0.37 of Ti in males, 0.34 in females). The tarsal proportions of the female are similar to those of *C. flaviplumus*. Cytologically, the nucleolus in arm G is virtually terminal, but arm A carries the basal sequence as in *C. samoensis*, and arm F differs from that of *C. flaviplumus* by a simple inversion In14d-9. A new name will be required for this species.

Finally, *C. samoensis* has also been reported from India, with a detailed description of West Bengal specimens by Chattopadhyay *et al.* (1991). I have been sent material identified as *C. samoensis* from Jammu and Kashmir, but these specimens do not agree with the description of Chattopadhyay *et al.*, or that of *C. flaviplumus*. The Jammu and Kashmir material may be comprised of two different species, although one may be *C. incertipenis* Chaudhuri and Das, 1996. The essential difference from *C. samoensis* evident in the description of Chattopadhyay *et al.* (1991) is that the superior volsella is a definite boot-shape (S-type), rather than similar to that of *C. dorsalis*, and so differs from any of the species discussed above. The fore Ta5 is slightly shorter, at 0.28 of Ti, but the description makes no mention an unusually long Ta4 in the female. While colour can be variable, it may be noted that the Indian specimens are described as generally brown rather than the green or yellowish colour of *C. samoensis* or *C. flaviplumus*. There are also differences in the larva. The larval head capsule is described as pale, the premandible has the outer tooth longer, the AR is lower (only 1.86) and the A3 segment is relatively longer (longer than A4, not shorter). There is no cytological data definitely associated with this species. This species therefore requires a new name, and is renamed *C. indiaensis*.

The material from Jammu and Kashmir requires further study as it comprises mostly larvae, with only a few adults. The situation is compounded by the fact that there are a number of described Indian species which are close cytologically, and have adults similar to those of the *C. samoensis* group. These include *C. incertipenis* Chaudhuri and Das 1996, which differs mainly in the dark, pointed anal point of the adult male and the shorter blunt inner tooth of the larval premandible, and *C. ramosus* Chaudhuri, Das and Sublette 1992, where the most obvious differences are the higher number of teeth in the larval pecten epipharyngis and the essentially equal teeth of the premandible. DNA sequence of the mitochondrial COI gene is available for a number of the Jammu and Kashmir specimens, including three adult males, and these indicate relationship to *C. flaviplumus*, with only 5-7% base differences. The adult males (Fig. 5), while close to the *C. samoensis* group, are not *C. samoensis* and probably not *C. flaviplumus*. These adults are missing many leg segments or the antennae, which makes comparison difficult. They all have a "beaked" superior volsella. The AR is lower (about 3); LR is about 1.6 on the only specimen with the fore tarsi, and fore Ta5 is about 0.4 of Ti.



Figure 5. Male hypopygium of a *Chironomus* species from Farooq Nagar, Jammu and Kashmir, India (Coll: P. Khanna) related to *C. samoensis*. Inset: "beaked" superior volsella.

The larvae from Jammu and Kashmir do not seem to belong to either *C. samoensis* or *C. flaviplumus*, or to *C. indiaensis*. The head capsules generally have a darkened gula and the FA is very dark, sometimes mainly at posterior. The antennae

seem variable, with only some having a very short segment A3, others being longer than A5; AR about 1.9-2.0; the premandible teeth are nearer to equal length, and the outer tooth is about three quarters as wide as the inner tooth.

Cytologically, most of these specimens have the arm F sequence flaF1 of Wuelker *et al.* (1989), but some specimens have the basal arm A sequence homA1, as in *C. samoensis*, while others a sequence that differs from flaA1 by a simple inversion. The nucleolus in arm G is generally subterminal, but the presence of a nucleolus cannot be definitely established in some specimens. While related to *C. incertipennis* and *C. ramosus*, they do not appear to be either of those species. *C. ramosus* characteristically has a nucleolus in arm B, and not in arm G (Nath and Godbole 1997), while *C. incertipennis* is present in Jammu and Kashmir, but differs in the mtCOI sequence (unpublished data).

The presence of *C. flaviplumus* in India cannot be definitely ruled out, but it is more likely that at least two new names will be required for the material from Jammu and Kashmir.

Summary

These observations indicate that *C. samoensis* has not been found in any area other than the on Islands of the Pacific Ocean. *C. flaviplumus* could be more broadly distributed than its current range in Japan and Korea, the species described as *C. samoensis* by Chattopadhyay *et al.* (1992) can be renamed as *C. indiaensis*, while two or three new names will be required for other specimens from India, and Australian material.

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CHIRONOMIDAE TYPES AT THE MUSEUM OF COMPARATIVE ZOOLOGY, BOSTON

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Abstract

The Chironomidae (Insecta: Diptera) type collection at the Museum of Comparative Zoology (MCZ) is reviewed. It comprises 23 primary types, as well as paratypes and paralectotypes for an additional 29 species, mostly resulting from research by H. Loew and H. K. Townes, respectively. Notes updating the taxonomic status are provided for several species.

Introduction

The chironomid collection of the Museum of Comparative Zoology (MCZ) at Harvard University in Boston, Massachusetts (USA), includes about 1,200 specimens mostly stored dry on pins, with a small number mounted on slides. It is historically relevant but not well known. The main parts of this material have resulted from respective research endeavors by H. Loew (1807-1879) and H. K. Townes (1913-1990). Its geographic emphasis lies in the United States and Central America.

The annotated checklist presented below (Table 1) was generated during a research visit to the Museum of Comparative Zoology in February 2011 that was partly financed by an Ernst Mayr Travel Grant in Animal Systematics from MCZ/Harvard University.

Results

The collection includes 52 type specimens now classified as 10 holotypes, 5 lectotypes and 8 syntypes, as well as paratypes and paralectotypes of an additional 29 Chironomidae species (Table 1). The majority of the types belong to the subfamilies Chironominae and Tanypodinae.

All names of species and references were checked with the corresponding literature. The notes on the species' taxonomic status are based on *Systema Dipteroorum* (Thompson & Pape 2010), as well as on published papers, catalogs (Oliver et al. 1990, Spies & Reiss 1996, Ashe & O'Connor 2009) and/or information on the collection labels. Some of the primary types were found labeled merely with "type". The present respective interpretations of such specimens as holotypes, syntypes, etc., are based on all available data, e.g. those in the respective corresponding publications.

The information presented here will be included in the database of primary types of Chironomidae already accessible online as part of the MCZ Entomology database (<http://insects.oeb.harvard.edu/mcz>).

Table 1. Chironomidae species with types deposited in the collection of the Museum of Comparative Zoology at Harvard University, Boston. Abbreviations: H = holotype, L = lectotype, P = paratype, PL = paralectotype, S = syntype, M = male, F = female, AU = Australian, NE = Nearctic, NT = Neotropical

| CHIRONOMINAE | | | | | | | | |
|--------------|-------------------|-------------------|-----------------------|------|------|-------------|--------------|------|
| Type number | Original genus | Original species | Author/Reference | Type | Sex | Preparation | Distribution | Note |
| MCZT 07433 | <i>Chironomus</i> | <i>brachialis</i> | Coquillett, 1901: 607 | S | M, F | Pinned | NE | 1 |
| MCZT 19425 | <i>Chironomus</i> | <i>bulbosa</i> | Gerry, 1933: 97 | S | M, F | Pinned | NT | 2 |
| MCZT 15655 | <i>Chironomus</i> | <i>imperator</i> | Walley, 1926: 64 | P | M, F | Pinned | NE | 3 |

| | | | | | | | | |
|---------------|-------------------------|----------------------|--------------------------|------|------|--------|-------|----|
| MCZT 19424 | <i>Chironomus</i> | <i>jamaicensis</i> | Gerry, 1933: 96 | S | M, F | Pinned | NT | 4 |
| MCZT 25385 | <i>Chironomus</i> | <i>nigricans</i> | Johannsen, 1905: 219 | P | M, F | Pinned | NE | 5 |
| MCZT 07434 | <i>Chironomus</i> | <i>taeniapennis</i> | Coquillett, 1901: 607 | S | F | Pinned | NE | 6 |
| MCZT 25404 | <i>Glyptotendipes</i> | <i>testaceus</i> | Townes, 1945: 140 | P | M, F | Pinned | NE | |
| MCZT 25393 | <i>Harnischia</i> | <i>amachaerus</i> | Townes, 1945: 168 | P | M | Pinned | NE | 7 |
| MCZT 25381 | <i>Harnischia</i> | <i>argentea</i> | Townes, 1945: 164 | P | M | Pinned | NE | 8 |
| MCZT 25389 | <i>Harnischia</i> | <i>carinata</i> | Townes, 1945: 158 | P | M | Pinned | NE | 9 |
| MCZT 25398 | <i>Harnischia</i> | <i>cuneata</i> | Townes, 1945: 163 | P | M | Pinned | NE | 10 |
| MCZT 25401 | <i>Harnischia</i> | <i>potamogeti</i> | Townes, 1945: 159 | P | M | Pinned | NE | 11 |
| MCZT 25387 | <i>Omisus</i> | <i>pica</i> | Townes, 1945: 27 | P | M | Pinned | NE | |
| MCZT 25394 | <i>Polypedilum</i> | <i>simulans</i> | Townes, 1945: 43 | P | M | Pinned | NE | |
| MCZT 25399 | <i>Pseudochironomus</i> | <i>banksi</i> | Townes, 1945: 17 | H, P | M | Pinned | NE | |
| MCZT 25386 | <i>Pseudochironomus</i> | <i>crassus</i> | Townes, 1945: 15 | H | M | Pinned | NE | |
| MCZT | <i>Stenochironomus</i> | <i>albipalpus</i> | Borkent, 1984: 66 | P | M, F | Slide | NE | |
| MCZT | <i>Stenochironomus</i> | <i>fuscipatellus</i> | Borkent, 1984: 64 | P | M | Slide | NE | |
| MCZT | <i>Stenochironomus</i> | <i>woodi</i> | Borkent, 1984: 91 | P | M, F | Slide | NE | |
| MCZT 27258 | <i>Tanytarsus</i> | <i>subtendens</i> | Townes, 1945: 65 | P | M, F | Pinned | NE | 12 |
| MCZT 25391 | <i>Tribelos</i> | <i>protectus</i> | Townes, 1945: 69 | P | M | Pinned | NE | 13 |
| MCZT 25403 | <i>Tendipes</i> | <i>atroviridis</i> | Townes, 1945: 114 | P | M, F | Pinned | NE | 14 |
| MCZT 25384 | <i>Tendipes</i> | <i>biseta</i> | Townes, 1945: 127 | P | M, F | Pinned | NE | 15 |
| MCZT 25395 | <i>Tendipes</i> | <i>carus</i> | Townes, 1945: 118 | P | M | Pinned | NE/NT | 16 |
| MCZT 25397 | <i>Tendipes</i> | <i>ochreatus</i> | Townes, 1945: 115 | P | M | Pinned | NE | 17 |
| MCZT 25382 | <i>Tendipes</i> | <i>tuberculatus</i> | Townes, 1945: 128 | H, P | M, F | Pinned | NE | 18 |

ORTHOCLADIINAE

| Type number | Original genus | Original species | Author/Reference | Type | Sex | Preparation | Distribution | Note |
|---------------|----------------------|---------------------|----------------------------|------|------|-------------|--------------|------|
| MCZT 01260 | <i>Chasmatonotus</i> | <i>bimaculatus</i> | Osten-Sacken, 1877: 191 | S | M | Pinned | NE | |
| MCZT 10388 | <i>Chasmatonotus</i> | <i>unimaculatus</i> | Loew, 1864: 50 | S | M, F | Pinned | NE | |

TANYPODINAE

| Type number | Original genus | Original species | Author/Reference | Type | Sex | Preparation | Distribution | Note |
|-------------|---------------------|------------------------|-----------------------|-------|------|--------------|--------------|------|
| MCZT | <i>Ablabesmyia</i> | <i>parajanta</i> | Roback, 1971: 373 | P | M | Slide | NE | |
| MCZT | <i>Ablabesmyia</i> | <i>tarella</i> | Roback, 1971: 368 | P | M | Pinned/Slide | NE | 19 |
| MCZT 31778 | <i>Coelotanypus</i> | <i>cletis</i> | Roback, 1963: 174 | H | M | Slide | NT | |
| MCZT 10367 | <i>Tanypus</i> | <i>bellus</i> | Loew, 1866: 4 | L, PL | M, F | Pinned/Slide | NE | 20 |
| MCZT 19423 | <i>Tanypus</i> | <i>brooksi</i> | Gerry, 1933: 95 | S | M | Pinned | NT | 21 |
| MCZT 07431 | <i>Tanypus</i> | <i>concinus</i> | Coquillett, 1895: 308 | S | M, F | Pinned | NE/NT | 22 |
| MCZT 15660 | <i>Tanypus</i> | <i>cornuticaudatus</i> | Walley, 1925: 277 | P | M, F | Pinned/Slide | NE | 23 |
| MCZT 15657 | <i>Tanypus</i> | <i>currani</i> | Walley, 1925: 276 | P | F | Pinned | NE | 24 |
| MCZT 10368 | <i>Tanypus</i> | <i>flavicinctus</i> | Loew, 1861: 309 | H | M | Slide | NE | 25 |
| MCZT 15658 | <i>Tanypus</i> | <i>garretti</i> | Walley, 1925: 275 | P | F | Pinned/Slide | NE | 26 |
| MCZT 10369 | <i>Tanypus</i> | <i>hirtipennis</i> | Loew, 1866: 5 | H | M | Slide | NE | 27 |
| MCZT 10376 | <i>Tanypus</i> | <i>humeralis</i> | Loew, 1866: 3 | L, PL | M, F | Pinned/Slide | NE/NT | 28 |
| MCZT 15661 | <i>Tanypus</i> | <i>mallochi</i> | Walley, 1925: 273 | P | M | Pinned | NE | 29 |
| MCZT 15662 | <i>Tanypus</i> | <i>peleensis</i> | Walley, 1926: 64 | P | M, F | Pinned/Slide | NE/NT | 30 |
| MCZT 15656 | <i>Tanypus</i> | <i>pilicaudatus</i> | Walley, 1925: 277 | P | M | Pinned/Slide | NE | 31 |
| MCZT 10370 | <i>Tanypus</i> | <i>pilosellus</i> | Loew, 1866: 5 | L, PL | F | Pinned/Slide | NE/NT | 32 |
| MCZT 10371 | <i>Tanypus</i> | <i>pinguis</i> | Loew, 1861: 308 | H | F | Pinned | NE | 33 |
| MCZT 15659 | <i>Tanypus</i> | <i>prudens</i> | Walley, 1925: 275 | P | M | Slide | NE | 34 |
| MCZT 10372 | <i>Tanypus</i> | <i>pusillus</i> | Loew, 1866: 5 | H | M, F | Pinned | NE | 35 |
| MCZT 10373 | <i>Tanypus</i> | <i>scapularis</i> | Loew, 1866: 2 | L, PL | M, F | Pinned/Slide | NE/NT | 36 |
| MCZT 31777 | <i>Tanypus</i> | <i>telus</i> | Roback, 1971: 61 | H, P | M, F | Pinned/Slide | NE | |
| MCZT 10374 | <i>Tanypus</i> | <i>thoracicus</i> | Loew, 1866: 4 | L, PL | M, F | Pinned/Slide | NE | 37 |
| MCZT 10375 | <i>Tanypus</i> | <i>tricolor</i> | Loew, 1861: 309 | H | F | Pinned | NE/NT | 38 |

TELMATOGETONINAE

| Type number | Original genus | Original species | Author/Reference | Type | Sex | Preparation | Distribution | Note |
|-------------|---------------------|---------------------|------------------|------|------|-------------|--------------|------|
| MCZT 27639 | <i>Thalassomyia</i> | <i>setosipennis</i> | Wirth, 1947: 121 | P | M, F | Pinned | AU | 39 |

Notes on Table 1

- Chironomus brachialis* Coquillett, 1901 is now *Demeijerea brachialis* (Coquillett, 1901).
- Chironomus bulbosa* Gerry, 1933, the spelling of which has been corrected to *C. bulbosus*, is a nomen dubium in Chironominae.
- Chironomus imperator* Walley, 1926 is a junior synonym of *Chironomus plumosus* (Linnaeus, 1758).
- Chironomus jamaicensis* Gerry, 1933 is a nomen dubium in Chironominae.
- Chironomus nigricans* Johannsen, 1905 is now *Endochironomus nigricans* (Johannsen, 1905).
- Chironomus taeniapennis* Coquillett, 1901 is a junior synonym of *Stenochironomus hilaris* (Walker, 1848).
- Harnischia amachaerus* Townes, 1945 is now *Cladopelma amachaerus* (Townes, 1945).
- Harnischia argentea* Townes, 1945 is now *Cyphomella argentea* (Townes, 1945).
- Harnischia carinata* Townes, 1945 is now *Parachironomus carinatus* (Townes, 1945).
- Harnischia cuneata* Townes, 1945 is now *Demicryptochironomus cuneatus* (Townes, 1945).
- Harnischia potamogeti* Townes, 1945 is now *Parachironomus potamogeti* (Townes, 1945).
- Tanytarsus subtendens* Townes, 1945 is now *Endochironomus subtendens* (Townes, 1945).
- Tanytarsus protectus* Townes, 1945 is now a junior synonym of *Tribelos jucundum* (Walker, 1848).
- Tendipes atroviridis* Townes, 1945 is now *Chironomus atroviridis* (Townes, 1945).
- Tendipes biseta* Townes, 1945 is now *Chironomus biseta* (Townes, 1945).
- Tendipes carus* Townes, 1945 is now *Goeldichironomus carus* (Townes, 1945).
- Tendipes ochreateus* Townes, 1945 is now *Chironomus ochreateus* (Townes, 1945).
- Tendipes tuberculatus* Townes, 1945 is now *Chironomus tuberculatus* (Townes, 1945).
- Ablabesmyia tarella* Roback, 1971 is a junior synonym of *Ablabesmyia mallochi* (Walley, 1925).
- Tanypus bellus* Loew, 1866 is now *Procladius bellus* (Loew, 1866).
- Tanypus brooksi* Gerry, 1933 is nomen dubium in Pentaneurini.
- Tanypus concinnus* Coquillett, 1895 is now *Coelotanypus concinnus* (Coquillett, 1895).
- Tanypus cornuticaudatus* Walley, 1925 is now *Helopelopia cornuticaudata* (Walley, 1925).
- Tanypus currani* Walley, 1925 is now *Conchapelopia currani* (Walley, 1925).
- Tanypus flavicinctus* Loew, 1861 is a junior synonym of *Clinotanypus pinguis* (Loew, 1861).
- Tanypus garretti* Walley, 1925 is a junior synonym of *Psectrotanypus dyari* (Coquillett, 1902).
- Tanypus hirtipennis* Loew, 1866 is a junior synonym of *Macropelopia decedens* (Walker, 1848).
- Tanypus humeralis* Loew, 1866 is now *Coelotanypus humeralis* (Loew, 1866).
- Tanypus mallochi* Walley, 1925 is now *Ablabesmyia mallochi* (Walley, 1925).
- Tanypus peleensis* Walley, 1926 is now *Ablabesmyia peleensis* (Walley, 1926).
- Tanypus pilicaudatus* Walley, 1925 is now *Helopelopia pilicaudata* (Walley, 1925).
- Tanypus pilosellus* Loew, 1866 is now *Labrundinia pilosella* (Loew, 1866).
- Tanypus pinguis* Loew, 1861 is now *Clinotanypus pinguis* (Loew, 1861).
- Tanypus prudens* Walley, 1925 is a junior synonym of *Ablabesmyia pulchripennis* (Lundbeck, 1898).
- Tanypus pusillus* Loew, 1866 is a junior synonym of *Procladius bellus* (Loew, 1866).
- Tanypus scapularis* Loew, 1866 is now *Coelotanypus scapularis* (Loew, 1866).
- Tanypus thoracicus* Loew, 1866 is a junior synonym of *Clinotanypus pinguis* (Loew, 1861).
- Tanypus tricolor* Loew, 1861 is now *Coelotanypus tricolor* (Loew, 1861).
- Thalassomyia setosipennis* Wirth, 1947 is valid with the spelling *Thalassomyia setosipennis*.

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I am very grateful to Dr. Philip Perkins, Museum of Comparative Zoology, for his hospitality during my stay, and to Dr. James Hanken and Catherine Weisel for helping me organize my visit. Thanks also to Martin Spies, Dr. Marion Kotrba, Dr. Susana Trivinho-Strixino and Dr. Dalva Matos for supporting my application for an Ernst Mayr Travel Grant, and to Dr. Alaide Fonseca-Gessner for valuable suggestions on the manuscript. Finally, I would like to thank Zaki Habib-Gómez for checking the English text. The author has received financial support from the Ernst Mayr Fund (MCZ - Harvard University) and the National Council for Scientific and Technological Development (CNPq - Brazil).

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SHORT COMMUNICATIONS

***Pseudodiamesa nivosa* or *arctica*? A confounded story of a midge moustache and an attempt at some taxonomic orthodontics**

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Midges of *Pseudodiamesa* are fascinating examples of insect adaptations to cold environments. Adults may be observed when they have emerged shortly after spring ice-thaw in mountain lakes and brooks. In extreme cases this may be as late as mid October in western Norwegian mountains when winter precipitation with snow has been particularly high. Adults may be swarming when temperature and wind allow them. Otherwise they will sit in the snow or some other substrate waiting for better times. The immature stages can also stand up against some rough treatment from the environment. I have seen larvae, deflated and looking like miniature sausage peels, trapped and completely surrounded by ice, when they recover from the melting ice and regain their body shape and vitality within minutes after the ice has thawed around them.

Oliver (1959) advanced the idea that the North American *Pseudodiamesa arctica* is so morphologically distinctive by comparison with the European *P. nivosa* that it qualified for a subgenus of its own which he called *Pachydiamesa*. In the larvae, the alleged exclusive possession of a pair of labral lamellae (Oliver 1959, 1983) has since figured in some papers as the key character to identify *P. arctica* from other *Pseudodiamesa* larvae.

It was particularly the observation of such labral lamellae (see Figure 1C) that led Schnell and Willassen (1991) in a technical report to literally follow Oliver (1959, 1983) with some hesitation and to identify *Pseudodiamesa arctica* in Norwegian mountains. Moreover, since we were unable to observe clear cut *D. nivosa* characteristics as laid out by Oliver (1959) in the details of wing morphology, leg ratio and male genitalia we even suggested that the two taxa might possibly represent the same species. These were arguments to back up our identification but they were never intended as a formal nomenclatorial act of synonymisation. We did not have N. American material available for comparison and we also pointed to the taxonomic challenge that the candidate senior synonym, *P. arctica*, was originally described from a female. Basically we simply applied the authoritative taxonomic identification literature of that time to conclude that *Pseudodiamesa arctica* in the sense of Oliver was also observable in Norway. The only problem was that we could not see the difference from *P. nivosa*. When I brought specially fixed larvae to Novosibirsk for karyotype identification, Dr. Irina Kerkis identified the species to *P. nivosa* from chromosome characteristics. It is still not clear to me whether there was also a karyotype characterisation of something called *P. arctica* in place to compare with, but the cytotaxonomic interpretation of *P. nivosa* (at least at the time) corresponded to a species that actually has the “moustache” we would call labral lamellae (Figure 1C), although according to Oliver (1959, 1983) *nivosa* was not supposed to have one.

Curiously, in another paper by Oliver (1976:1054) also including a record of *P. arctica* from Peary Land Greenland, there is no mention of labral lamella as a distinguishing character, - simply a statement about *nivosa* and *arctica* being very similar and that: “Based on a single larva of *nivosa* available for study, it may be possible to separate the larvae of the two species by the shape of the procercus.”.

In the description of *P. nivosa* larvae from the Alps, Schmid’s drawings (1993:49, fig.21D) clearly show the labral lamellae that *P. nivosa* is not supposed to have. Although Schmid refers to Oliver (1983) in his list of taxonomic literature he states, contrary to Oliver without further comment, that the labral lamellae are the character that separates *P. nivosa* from *P. branickii*. So how can we actually identify *arctica* and *nivosa* from *branickii* larvae?

In a more recent taxonomic review of *Pseudodiamesa* Ilyashuk *et al.* (2010) refer to Makarchenko’s (1985

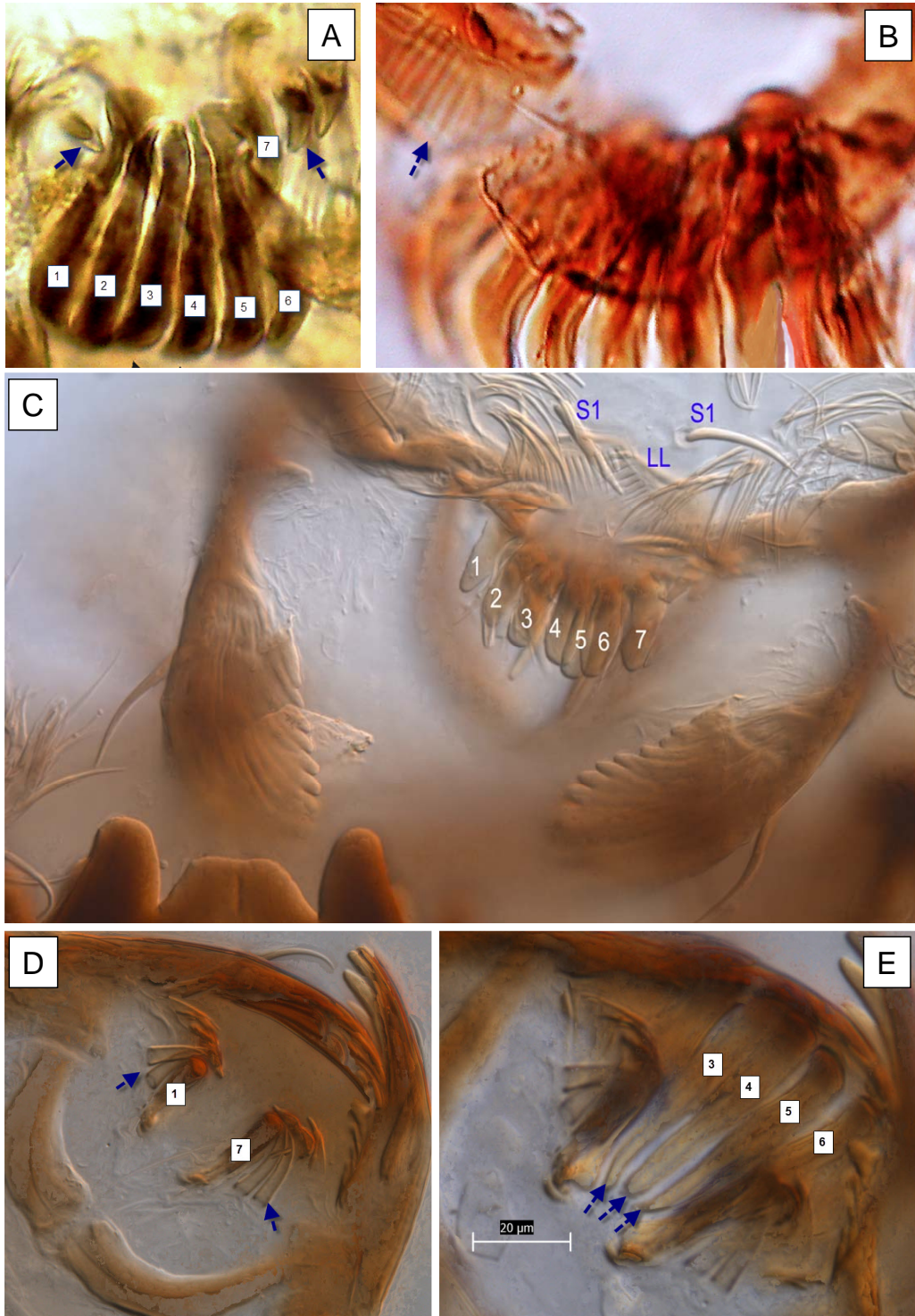


Figure 1. A) Epipharynx of *Pseudodiamesa nivosal* larva as pictured by Ilyashuk *et al.* (2010: fig. 1C). The present author has added arrows to indicate the two pairs of chaetulae basales flanking seven scalelike teeth (also marked by the present author). B) Detail of *Pseudodiamesa nivosal* larva according to Ilyashuk *et al.*'s (2010) fig. 1D. The present author has pointed an arrow to the labral lamella which according to Ilyashuk *et al.* is absent in *P. nivosal*. Details of *Pseudodiamesa* larva from Norway that would key out to *P. arctica* from Oliver (1983) and to *P. nivosal* from Schmid (1993) Epipharynx has seven scale like teeth (1-7) and a pair of comb shaped labral lamellae (LL). Notice also that the right sensilla S1 is apically bifid while the left is simple. D) Photostack of the ventral part of epipharynx showing chaetulae laterales, the two pairs of chaetulae basales (arrows, also see Figures 1A, D, E) and teeth number 1 and 7. E) The same as D but with focus constrained more dorsally showing odd number symmetry of (totally 7) teeth next to tooth number 4 (Photos: C-E by E. Willassen)

et seq.) studies of the pecten epipharyngis stating that: “The pecten epipharyngis of the

P. nivosa-group larvae consists of an even number, namely 3–4 pairs, of broad, elongate, apically blunt scales (fig. 1c, d), but that of the *P. branickii*-group larvae is characterized by an odd number, namely seven scales (fig. 1e, f)”. However, a closer look at their fig. 1c (see Figure 1A) shows that there are indeed seven epipharynx teeth (my numbering) in the specimen they identified as *P. nivosa*. There is no doubt that the counting of these structures can sometimes be a challenge, particularly in somewhat squashed microslide preparations. But in this case it seems pretty obvious to me. If we use the pairs of distinctive chaetulae basales as landmarks to define the outer margins of the pecten (Figures 1A, D), we see that there is symmetry around only one median tooth, the one which is numbered 4 in Figures 1 C-D. In other words, the assertion by Ilyashuk *et al.* (2010) stating that all previous authors (including Oliver, Schmid, Janecek) were wrong when counting seven epipharynx scales in species other than those of the *branickii* – group does not seem justified.

Ilyashuk *et al.* (2010) are also maintaining the notion that the labral lamellae are a unique feature of *P. arctica* larvae. If so, we should conclude that Schmid also has documented presence of *P. arctica* in the Alps, but then what should we do with *P. nivosa*? I find it intriguing that while Ilyashuk *et al.* (2010) repeatedly state that *P. arctica* is the only species with labral lamellae, they also show a photo (Ilyashuk *et al.* 2010:fig.1D) of what they call *P. nivosa* in which the specimen clearly seems to possess a labral lamella (Figure 1B). Was this taxonomically important detail (as this paper testifies) overlooked by the authors or was it perhaps being interpreted as another type of structure? It is tempting to suspect that when Oliver (1983) described some *Pseudodiamesa* larvae (other than *arctica*) as having lamelliform SI setae, he may perhaps actually have referred to labral lamellae. Could this be one of the loose ends of the confounding problems with the taxonomy of *Pseudodiamesa*? With admittedly limited experience with *Pseudodiamesa* larvae from other parts of the world I have never come across what I would describe as lamelliform SI setae in *Pseudodiamesa*. What I have seen, however, is that the apically bifid SI claimed to be unique (Ilyashuk *et al.* 2010) to the American endemic *P. pertinax* may also be observed in Norwegian larvae with labral lamellae (Figure 1C). The specimen pictured here actually has a split on the right SI only. It is a sort asymmetry that is not uncommon in setae of immature Diamesinae so I would be sceptical to use it a litmus test of species identity.

The observation that Ilyashuk *et al.* (2010) may have got the numbers of epipharynx teeth wrong in what they call *nivosa* unfortunately also leaves their claim that *arctica* has eight epipharynx teeth somewhat suspect. So are *arctica* and *nivosa* really separable as larvae? In his key to subgenera Oliver (1983) also included eight anal setae on the procercus as a distinctive feature for *arctica*. Figure 2A shows a specimen from Norway that would key out to *Pachydiamesa arctica* because it has 8 anal setae and labral lamellae. So why is it a problem with this record of *P. arctica* from Europe? Obviously because the differences between the larvae of *arctica* and *nivosa* described by Oliver (1983) and recently reiterated by Ilyashuk *et al.* (2010) don't appear to hold up and the relationship between the two nominal taxa is still in need of critical review.

But *Pseudodiamesa arctica* and *P. nivosa* could of course be inseparable in the larval stage and still be different species if we could observe distinctive and consistent differences in the adults. Ilyashuk *et al.* (2010) refer to a poster presentation by Makarchenko (2009) in which the statement is that *P. arctica* differs from *P. nivosa* by a more finger like distal part of the gonostylus and a posterolateral projection of the ninth tergite. However, the latter feature (Figure 2C) is also observable in specimens from Norway (Figure 2B) and does not seem to be a consistent difference although a few idiosyncratic drawings in the taxonomic literature could perhaps leave that impression. Moreover, when comparing Oliver's (1959) drawing of *P. arctica* (Figure 2C) with specimens from Norway (Figures 2B) I am unable to see that *P. arctica* in the sense of Oliver (1959) is strikingly different and more finger like in the shape of the gonostylus. Is *P. arctica* *sensu* Oliver (1983) actually the same as *P. arctica* *sensu* Makarchenko (2009) and how do they relate to *P. arctica* *sensu* Malloch and to *P. nivosa* *sensu* authors?

I am probably contributing my share to what seems to be a present state of chaos in *Pseudodiamesa* taxonomy by maintaining that I still cannot see the difference between the species that European workers have called *P. nivosa* and *P. arctica* in the sense of Oliver (1959). In anticipation of a more substantial documentation than a conference abstract I would also feel uncomfortable by having to choose between *arctica* and *nivosa* based on a critical value of 0.56 in leg ratio (Makarchenko 2009). It seems to me that molecular data could help in getting us out of some of the troubled waters that *Pseudodiamesa* taxonomy appears to be in these days. But even more so important is it that we try to resolve the taxonomic problems that may

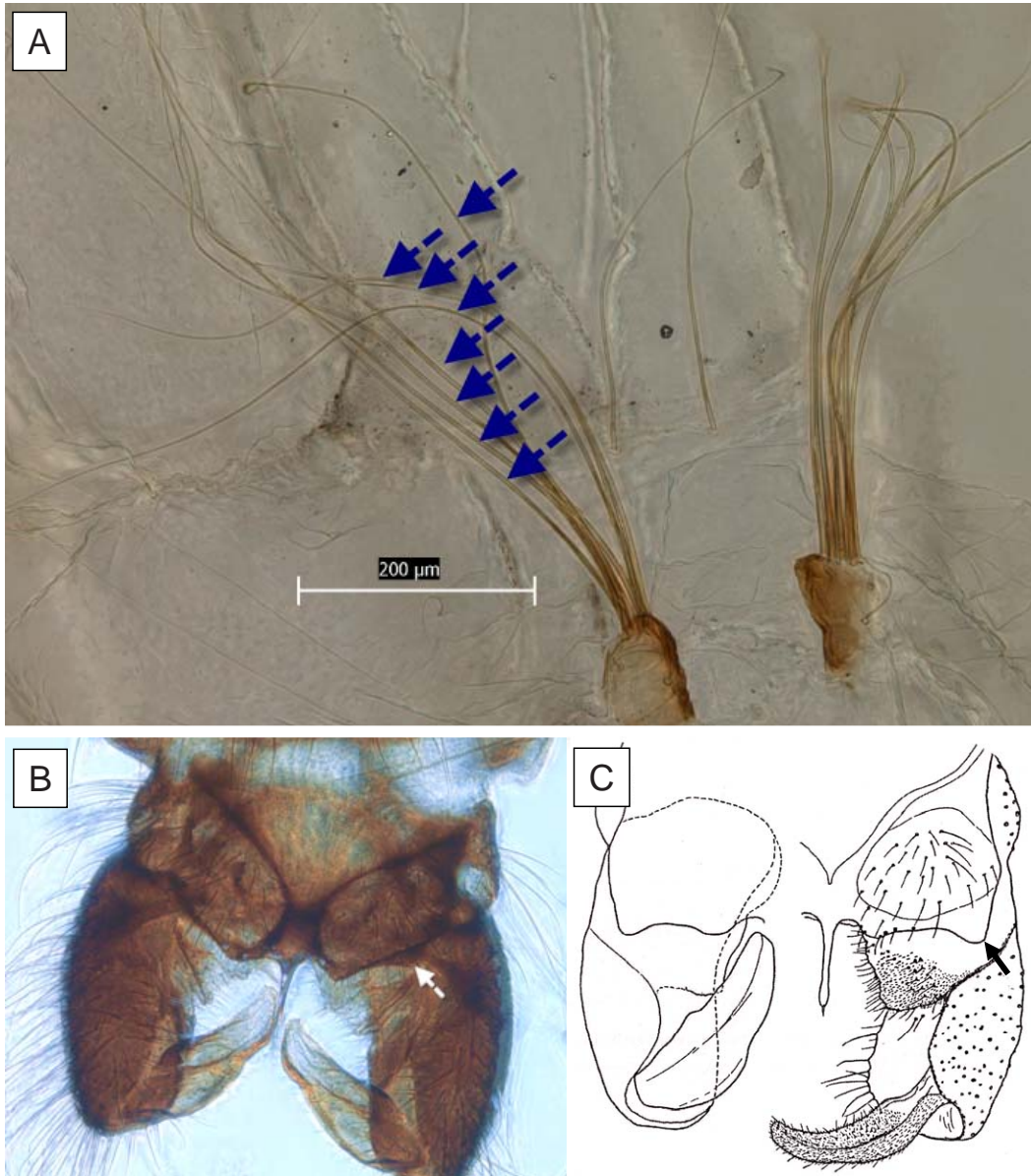


Figure 2. A) Procerci of *Pseudodiamesa* larva from Norway that would key out to *P. arctica* from Oliver (1983). Arrows point to eight anal setae. B) Male hypopygium of *Pseudodiamesa* from Norway with arrow pointing to caudolateral projection of tergite which according to Makarchenko (2009) is a key character to separate *P. arctica* from *P. nivosa*. C) Drawing of *P. arctica* hypopygium from Oliver (1959). The present author disputes that the gonostyli are conspicuously more fingerlike than in the species that has been known as *P. nivosa* in Europe. (Photos: A,B by E. Willassen)

be rooted in ill-defined characters, misconceptions based on mismatching terminologies and particularly from blind acceptance of old taxonomic decisions that did not seem to stand the test of additional material and new observations. We have never been better equipped technologically and electronic pictures are a blessing.

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Moustached *Pseudodiamesa* is still in waiting for a modern cytogenetic approach and a taxonomic revision: a reply to Willassen

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Beginning with the study of chironomid subfossils in Schwarzsee ob Sölden, the Austrian Alps (Ilyashuk et al. 2011), we have tried to compile all available information about aquatic invertebrates in this high-alpine lake. To our surprise, we found rather contradictory data on the *Pseudodiamesa* species. Janecek (1998) reported that *P. nivosa* inhabits the lake whereas Raddum *et al.* (2004) have found that the *Pseudodiamesa* subfossils from a short core taken in the lake are represented by *P. branickii*. To all appearances, difficulties in the identification of *Pseudodiamesa* subfossils resulted in the mentioned taxonomic inconsistency. The following study of contemporary *Pseudodiamesa* larvae and their subfossils showed that the genus is represented by *P. nivosa* in this lake (Ilyashuk et al. 2011). However, we encountered a number of contradictions in the available literature for identification of contemporary *Pseudodiamesa* larvae. Some of them are noted in Willassen (2011). In Ilyashuk *et al.* (2010), we summarise current experience in splitting the genus into two intra-genus morphotypes within the subfossil material from different Arctic and Alpine regions. Later, working with subfossils from another high-alpine lake, we got chironomid remains of much better preservation and found that the *P. nivosa* subfossils have the labral lamellae and the pecten epipharyngis consisting of seven scales (Fig. 1), as is described in Schmid (1993). The observations by Willassen (2011) based on contemporary material confirm it as well. Nevertheless, we would like to emphasize that the mentum is a well-preserved structure in subfossil specimens and can be one of the best morphological characters for differentiating *Pseudodiamesa* species-group morphotypes in subfossil material (Ilyashuk et al. 2010).

The current state of knowledge on the genus *Pseudodiamesa* does not allow us to confirm or disprove hypotheses concerning synonymisation of some species. Schnell and Willassen (1991) suppose that *P. nivosa* is synonymous with *P. arctica* and Makarchenko (1998) assumes that *P. nepalensis* is a synonym of *P. nivosa*. Both hypotheses are realistic and testable, taking into account modern cytogenetic approaches and techniques. Unfortunately, the discussion in Willassen (2011) does not add new data to check the hypothesis about synonymisation of *P. nivosa* and *P. arctica*. However, there are the first successful steps in resolving some *Pseudodiamesa* taxonomic problems. A recent comparative study of karyotypes of some

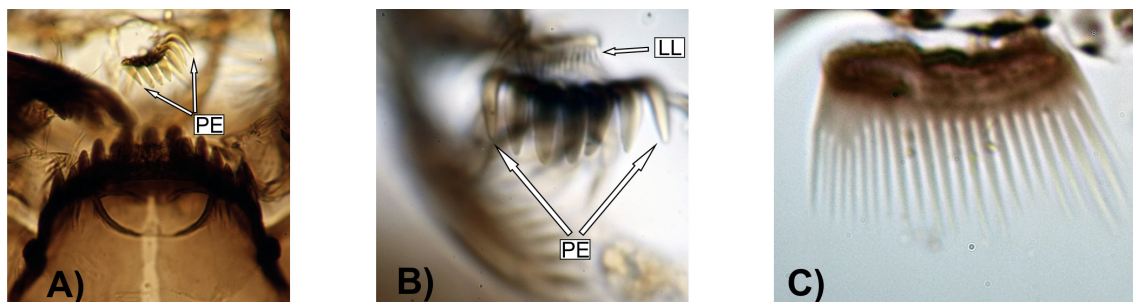


Figure 1. *Pseudodiamesa nivosa* (Goetghebuer) subfossils from a high-mountain lake in the Italian Alps: A) pecten epipharyngis (PE); B) pecten epipharyngis (PE) and labral lamella (LL); C) labral lamella.

Pseudodiamesa species, conducted by Ermolaeva (2005) and supervised by Dr. E. Makarchenko and Dr. I. Kiknadze, provides evidence that *P. nivosa*, *P. stackelbergi*, and *P. latistyla* are valid species. Moreover, comparative karyological analysis of *P. branickii*, collected from different regions in Eurasia (Germany, Bulgaria, Kyrgyzstan, Russian Far East, and Japan) revealed that there are at least four distinct chromosomal races, which may represent sibling species corresponding to the *P. branickii* morphotype (Ermolaeva 2005). Hopefully, other species of this genus will be included in subsequent comparative karyological analyses.

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***Pseudodiamesa nivosa* (Goetghebuer, 1928) is not a synonym of *Pseudodiamesa arctica* (Malloch, 1919), but what about the separation of immature stages of these species?**

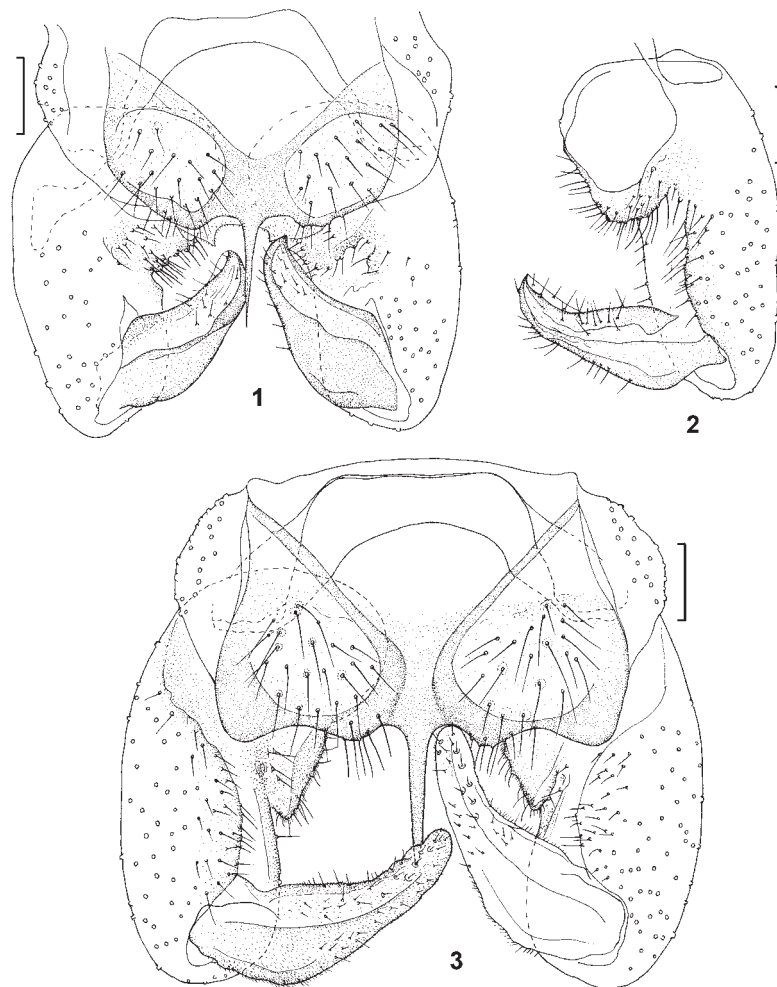
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As I showed in my poster “*Pseudodiamesa nivosa* (Goetghebuer, 1928) is not synonym of *Pseudodiamesa arctica* (Malloch, 1919)” at the XVIIth Chironomid symposium in Nankai University (Makarchenko, 2009), both are a good and valid species and can be separated by some features of male imagines adduced below.

1. LR_1 0.52–0.54. Basal lobe of gonocoxite with narrow and triangular or roundish triangular apex. Tergite IX with projection of posterior-lateral angle. Gonostylus in apical 1/3 finger-shaped, with roundish apex ... *P. arctica* (Mall.) (Fig. 3).

– LR_1 0.65–0.69. Basal lobe of gonocoxite with wide and roundish apex. Tergite IX without projection of posterior-lateral angle. Apical 1/3 of gonostylus of different shape, with beak-shaped apex ... *P. nivosa* (Goetgh.) (Figs 1–2).



Figures 1–3. Male imagines of *Pseudodiamesa nivosa* (Goethebuer) from Norway (1–2) and *Pseudodiamesa arctica* (Malloch) from Devon Island of Canada (3). 1, 3 – total view of hypopygium, from above; 2 – gonocoxite and gonostylus. Scale bars are 100 μ m.

The hardest problem is to separate larvae of *P. nivosa* and *P. arctica*. Nobody has studied numerous specimens of larvae and has not checked variation of some larval features, namely shape, presence or absence of labral lamellae. When I studied larvae of the *nivosa* group, sometimes I checked labral lamellae, sometimes not, but in the same population of the same river. Yes, for deciding taxonomic problems of these and other species of *Pseudodiamesa* we need to revise the species by larvae, pupae and imago from various places of the Holarctic region using traditional morphological methods and karyology and DNA analysis. Also we need to study biology and ecology of these species because it can help us in deciding taxonomic problems. **At first we need to get fresh material of *P. nivosa* and *P. arctica* from type localities, which for the first is the French Alps and for the second is Arctic Canada.** I think it is a good joint work for an international project and a team of chironomidologists, karyologists, molecular biologists and ecologists. I think we must and can decide this interesting problem but only all together.

Let us co-operate!

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Typical types – a swan song? Observations on chironomids in the Linnean collections, and corresponding general considerations

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Introduction

At the 18th International Symposium on Chironomidae in Trondheim, Norway, this past July I gave a short presentation to draw attention to an online resource that has become available recently. On webpages provided by the Linnean Society of London, under <http://www.linnean-online.org/view/insects/tipula.html>, a list of electronic links can be found which use scientific species names made available by Linnaeus in original combination with the genus name *Tipula* Linnaeus. Each link leads to a series of digital images of pinned adult specimens still preserved in the Linnean collections under the corresponding species name.

On a visit to London in August I then had the opportunity – thanks to the Society's honorary curator of insects and two curators of Diptera at The Natural History Museum – to examine all Linnean specimens known to be extant and to represent species of Chironomidae. Some of the results as presented below are more or less preliminary, as so far the animals could be viewed merely at relatively low magnification, in the dry-pinned and shriveled condition in which they have been preserved all along. State-of-the-science microscopic (and possibly genetic) analysis could be performed only if permission for 'destructive sampling' is applied for, and granted by, the Linnean Society.

Chironomids in the Linnean collections

The chironomid material comprises five specimens under three species names: 1 male each under *Tipula littoralis* L., 1758 and *T. monilis* L., 1758, and 1 male plus 2 females under *T. plumosa* L., 1758. Only one specimen per species name is accompanied by a hand-written name label (see the online images referred to above; the scale rulers shown are graded in mm) but, unless there is evidence to the contrary in a particular case, all specimens are equally eligible for consideration as original type material (Day & Fitton 1978; the second author now is the responsible curator).

The male under *T. littoralis* is well-preserved in general, but the posterior end of the abdomen is missing and probably lost. The wing crossvein RM is darkened; the venation pattern and tibial armament are as in

Chironomini; the fore tarsi are distinctly bearded. The taxonomically relevant evidence is consistent with what Linnaeus treated as the one of his two variant forms of *T. littoralis* that had been collected in forests (“habitat in nemoribus”), e.g. under the variant designators “#1136” in Linnaeus (1746) and “β” in Linnaeus (1760). An alternative possibility of connection to the name *Tipula arundineti* L., 1760 – raised by a second name label apparently added to the pin relatively recently – can be ruled out, as several observable morphological features differ significantly from Linnaeus’ diagnosis for *T. arundineti*. In any case, without the specimen’s hypopygium, current knowledge of external morphology does not allow positive identification. In summary, *T. littoralis* should remain a nomen dubium in *Chironomus* Meigen or, more conservatively, in Chironomini.

The male under *T. monilis* L., judging from what can be evaluated in the pinned condition, looks consistent with the current and long-standing interpretation of the described species as a member of *Ablabesmyia* Johannsen. However, there is reason to suspect that it might not represent the taxonomic species for which the name *A. monilis* has been used. For instance, compared to the figures of tibial spurs in Fittkau (1962: 422), especially the midleg spur configuration of the Linnean specimen is like the one ascribed to *A. phatta* (Egger), not like that labeled “*Ablabesmyia monilis*” by Fittkau. A slide-mount of the hypopygium would be necessary and likely sufficient to clarify whether this Linnean specimen belongs to any currently recognized species of *Ablabesmyia* and, if so, to which one.

The third Linnean lot, under *T. plumosa* L., may raise the most critical questions. As I had suspected from the online images and mentioned at the Trondheim symposium, the three corresponding specimens appear to belong to a species in the currently recognized subgenus *Chironomus* (*Camptochironomus*). If so, they would be incompatible with the long-standing application of the name *C. plumosus* (L.) to a species complex or species in *Chironomus* (*Chironomus*). From inspection of the pinned material the *Camptochironomus* identification is certain so far only for the male in the series, but the two females have not shown any contradicting evidence. Further support comes from the information on the species’ larva and sampling sites given by Linnaeus (e.g. 1746: 333 under “#1135”, referred to by Linnaeus 1758: 587 under “*plumosa*”; see also the next-following reference there). The adult and larval specimens of *Tipula plumosa* personally examined by Linnaeus (1758) had come from two sites in the Baltic Sea along the coasts of southern Sweden (see also Hirvenoja 2006: 374, and 376 left column). Linnaeus (1746) described the larvae as showing ventral tubules of the posterior abdomen longer than the posterior parapods. This fits the ‘plumosus type’ known, e.g., from larvae currently placed in *Camptochironomus*, but not the ‘semireductus type’ shown by brackish-water specimens subsumed in recent taxonomic concepts to which the name *C. plumosus* (L.) has been applied.

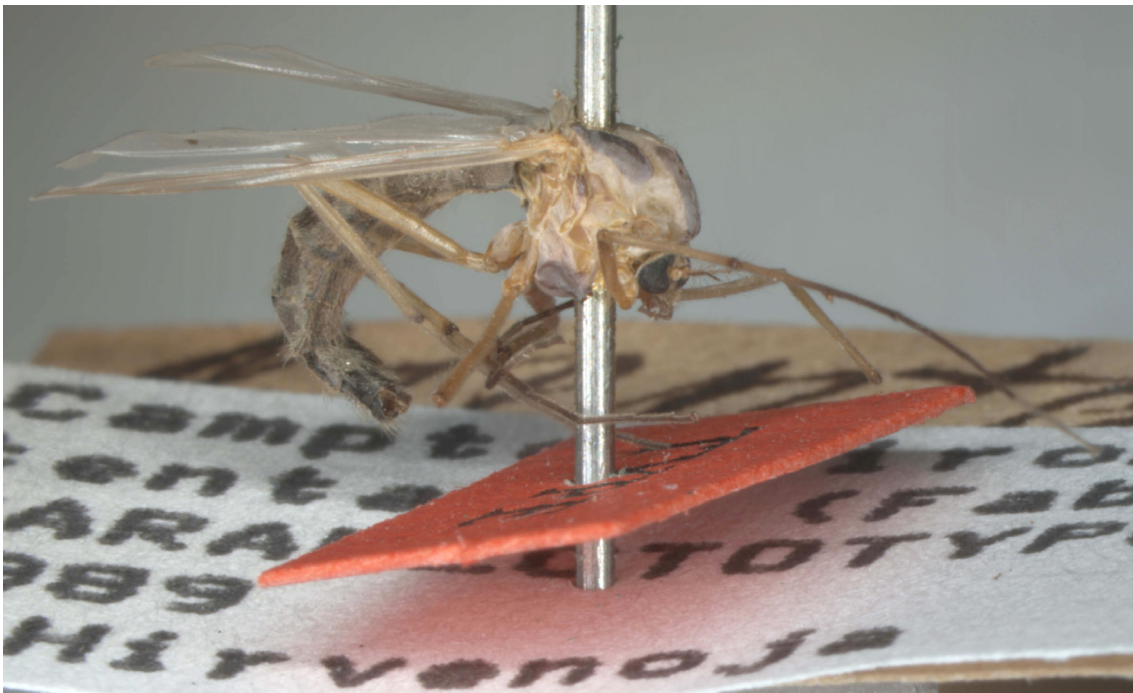


Figure 1. *Chironomus tentans* Fabricius; paralectotype (ZMUC, Copenhagen), lateral view. The lectotype, also an adult female, has been slide-mounted (Hirvenoja 2006). Photo by M. Kotrba & M. Spies.



Figure 2. *Chironomus tentans* Fabricius; paralectotype, dorsal view. Photo by M. Kotrba & M. Spies.

After my presentation in Trondheim I heard the expected argument that any change to the application of the name *Chironomus plumosus* to make the latter reflect the taxonomic identity of the Linnean specimens would cause significant difficulties with accessing corresponding data published earlier not only in taxonomy, but also in ecology, faunistics, etc. While this argument, of course, has its merit in principle, it seems to miss the essential mark here. With the possible exception of identifications based on karyological/cytological evidence (i.e. on the larval giant chromosome banding patterns), ‘recent usage’ (whichever way one might define this term) of the name *C. plumosus* can hardly be seen as anywhere near unanimous and stable. Instead, wherever identification as *C. plumosus* was not based on karyological determinations, and especially wherever the methods or references used to arrive at such identification were not made sufficiently clear, one cannot determine reliably to which of the species in the *Chironomus plumosus* sibling species aggregate (e.g., Hirvenoja 2006) the corresponding data actually apply. Incidentally, for the same reason we used to be unable to address the issues – much more interesting to the biologist than matters of nomenclature – which species Linnaeus had encountered, whether it still lives where he found it, why not if it does not, and so on.

Consequently, it is quite doubtful that there has been any “prevailing usage” (ICZN 1999) of the name *C. plumosus*, and thus any corresponding body of reliable biological data, that is definable and significant enough so that it could or should be protected in place of original facts such as the taxonomic identity of the type material. On the contrary, it seems that recognizing the Linnean specimens as syntypes would not decrease but even increase stability of nomenclature and quality of the corresponding dataset, by finally providing a basis for reproducible species identifications in all life stages, where previously only larvae could be assigned to a ‘cytospecies’, the name for which has not been tied to any reproducible voucher.

It can be debated whether the current guidelines governing typification – e.g. the selection, designation, safe storage and consultation of physical vouchers such as type specimens – have been sufficient or require adaptation to progress in taxonomic methods. Conceivably, the assignment of type status could be made more flexible, instead of forcing taxonomists to work with or around specimens that are original types but no longer sufficiently informative. Such modifications could allow subsequent assignment of voucher status to carriers of information not included among the original type material, e.g. to specimens of other life stages reliably associated later, or to samples on the molecular level. However, this topic would be one for a separate discussion (see below) beyond the scope of the present paper.

As in the case of *Tipula monilis*, positive species identification of the Linnean specimens of *T. plumosa* would require microscopic evaluation of at least partial slide mounts. However, the special permission that would have to be obtained for such analysis is not the only obstacle here, as shall be discussed in the following text sections.

Types to guide usage, or vice versa?

The International Code of Zoological Nomenclature certainly is not the best guideline one could think of, but we cannot do without such a framework, and the Code is the only one around that has long been applied and can be applied reasonably. In its currently effective edition (ICZN 1999) the Code has attempted to serve the interests of scientific communication by allowing the application of taxon names to be influenced more by their recent usage rather than exclusively by criteria tied to the respective original publication. While this more flexible approach can be beneficial in some cases (for one example, see Spies & Sæther 2004: 27, second paragraph from top), it seems questionable whether the apparent conflict between the Linnean specimens of *Tipula plumosa* and the usage of *Chironomus plumosus* constitutes such a case.

Evidence versus hearsay

Have you ever played or watched the game variously called ‘(broken) telephone’, ‘grapevine’, ‘whisper down the lane’, etc.? In this pastime enjoyed in numerous variations the world over, information is transmitted along a chain of people, with each individual transfer involving two persons only, such that other players up or down the line cannot perceive or control the content of any transfer in which they are not directly involved. The attraction of this setup to an audience watching this game, e.g. on television, is as follows. “Errors typically accumulate in the retellings, so the statement announced by the last player differs significantly, and often amusingly, from the one uttered by the first. Some players also deliberately alter what is being said in order to guarantee a changed message by the end of it.” (http://en.wikipedia.org/wiki/Chinese_whispers).

Does this, by ‘chance’, remind you of any tradition that has been going on in chironomid research in general, and especially in the large body of literature using names in *Chironomus*? If it does not, then here is an example which also illustrates why identification of the ‘*Camptochironomus*’ species represented by the Linnean specimens under *Tipula plumosa* is not as easy as one should expect in a taxon, in which no more than two valid species names are currently recognized in Europe (Spies & Sæther 2011).

Basically, all taxonomic distinctions of *Camptochironomus* species to this day derive from the very brief characterizations proposed by Edwards (1929) for two species concepts under the names *C. tentans* Fabricius, 1805 and *C. pallidivittatus* Malloch, 1915. Edwards (1929: 382) stated: “I find there is a small but constant difference in the hypopygium, and therefore treat the two as distinct. They superficially resemble *C. plumosus*.” [The latter fact, by the way, could help explain why workers after Linnaeus have misapplied *Tipula plumosa* for species in *Chironomus* s. str.] Edwards’ diagnoses hardly presented any character state distributed discretely between the two supposed species; instead, one was said to be “rather smaller and lighter”, with an “anal point rather differently shaped”, and so on. The illustrations provided (op.cit.: 381, fig. 12a, b) do not show any full hypopygium as given for many other species in that work, but limit themselves to details of the anal point and flanking parts of the anal tergite. As could have become obvious a long time ago, the appearance of such parts in a microscope preparation can vary significantly with orientation of the specimen in the mount, degree of maceration, pressure when applying the cover slip, etc. No number of specimens analysed was given by Edwards to support his claim of a difference “constant” across variation to be expected among preparations studied, individuals in a sample, or populations of one or more species.

Apparently, Edwards (1929) had not seen any type of *C. tentans* Fabricius or *C. pallidivittatus* Malloch, but merely applied those names from the literature to his British material. In spite of this and the quite obviously less than water-tight identifications (see, e.g., Hein & Schmulbach 1971: 458), everyone in the subsequent long chain of authors on these and other *Camptochironomus* species (Townes 1945, Beermann 1955, Hein & Schmulbach 1971, Sæther 1977, Shobanov et al. 1999, Langton & Pinder 2007 – to name just a few cornerstone examples) have merely continued the game started (in this case) by Edwards, working mostly from more or less uncritically accepted information handed down along that line of letters on patient paper. To my knowledge I am now the first ever to gather all relevant voucher material (in this case by Fabricius, Malloch, and Edwards) for direct comparison. [Incidentally, I also seem to be the first chironomid worker since Linnaeus to have looked at his specimens of non-biting midges.]

As shown repeatedly (e.g. in Spies & Sæther 2004) there is one case like this after another that would have to be looked at seriously – which would be necessary if, in contrast to audiences watching ‘whisper’ games, our purpose in chironomid research runs a little deeper than trivial amusement. Taking such a hard look, then, one cannot help but find that anything we present without truly reproducible evidence is tantamount to hearsay or speculation, i.e. essentially unreliable, and does not qualify to be labeled and employed as science. If significant portions of the data in any system such as chironomid research are non-reproducible, e.g. because they are not based on evidence that remains accessible and observable, then the system is degraded from one built on, and aiming for, evidence-based knowledge to one running on mere beliefs. If members of a research community like ours are inclined or forced to blindly follow what they have seen in publications only, rather than being willing and able to critically test what they examine directly, then entropy inadvertently growing underneath a seemingly orderly surface is bound to cause the corresponding data and system to deteriorate rather than increase in practical value.

Towards a discussion

Against the above background, please consider the following questions.

- Has there not been long-standing, significant imprecision and inconsistency in the application of the name *Chironomus plumosus*?
- Are situations like this not exactly what typification has been invented for, and with good reason?
- Does reinterpretation of the name *Tipula plumosa* L. in accordance with original type specimens not constitute a good chance to increase or, rather, finally establish nomenclatural stability in this case, in which we have had only superficial semblance of stability, at best?
- If using and quoting taxonomic names with credit to the authors who have made them available is supposed to honor these people, would Linnaeus consider himself honored if we knowingly apply the name *Chironomus plumosus* to a species different from the one he coined it for?
- How can museums and other institutions – to which many of us would like to be able to look for employment – justify to funding agencies, etc., the efforts necessary to build, maintain or even improve the collections we would need and like to have at our disposal, if we do not actively and scientifically support them in this? Which parts of such collections could be more important to use and support than the holdings of type material?
- Are we allowing too much of chironomid research to run like a game of ‘whispering down the lane’? Or are we doing enough to make and keep every important bit we publish scientifically reproducible, so that we and others depending on input from us may work with a well-founded and well-growing body of reliable and useful information that deserves to be called knowledge?

It would be most welcome if answers to these questions, arguments supporting or countering any of those presented here, or any other constructive contributions, could be exchanged in a wide-open discussion. One appropriate forum for this could be the Chironomidae mailing-list (to sign up see <https://lists.ansatt.ntnu.no/vm.ntnu.no/info/chironomidae>), even though so far the list has seen as poor participation as several other potentially highly useful services offered to the chironomid ‘community’.

In closing, I would like to declare that responses, as well as silence, on the issues raised in this contribution will play no small part in determining whether and how I will proceed concerning the Linnean chironomids and similar matters. Consequently, if you have an opinion and would like to see it count, then by all means do let it be known.

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CHIRONOMUS Newsletter now compliant with the International Code of Zoological Nomenclature

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It is a pleasure to inform you that as of this issue, the newsletter complies with article 8.6 of the [International Code of Zoological Nomenclature](#). This means that texts published in the newsletter are to be regarded as a published work also for the purposes of zoological nomenclature, and that we now welcome papers that involve nomenclatorial acts. In order to comply with article 8.6, copies of the newsletter must be deposited in at least five major publicly accessible libraries. This and future issues of the *CHIRONOMUS Newsletter* will therefore be printed in a limited number of paper copies and distributed to the libraries listed on page two of this issue. We are very pleased that all libraries we contacted were willing to receive and store copies of the *CHIRONOMUS Newsletter* and look forward to receive more taxonomy manuscripts for our *Current Research* section.