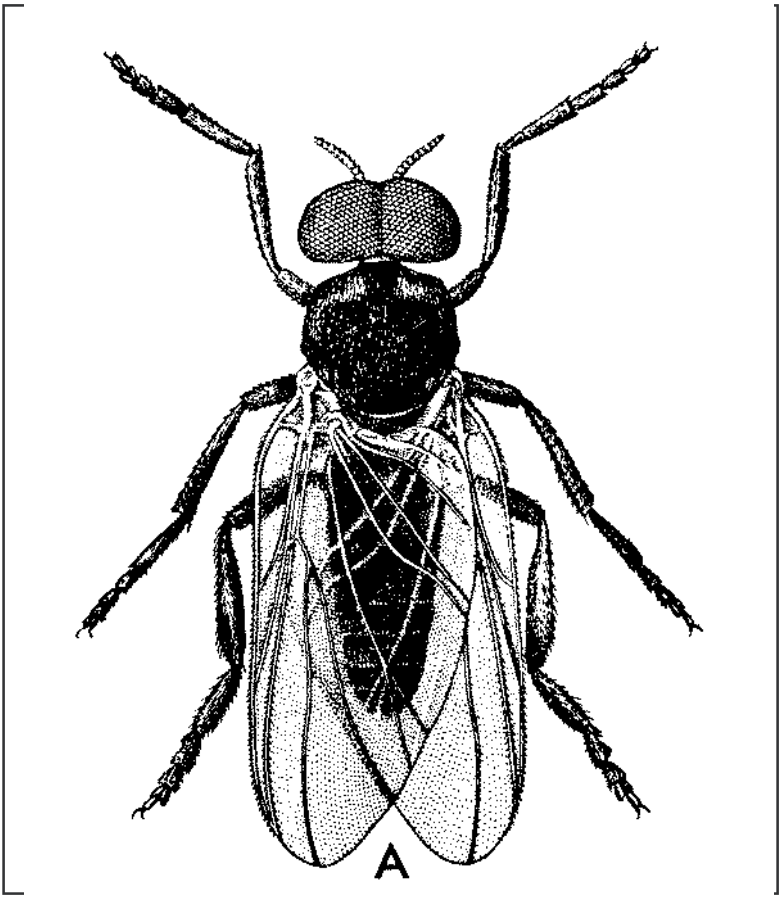
The British Simuliid Group Bulletin



NATURAL HISTORY MUSEUM

THE BRITISH SIMULIID GROUP BULLETIN

Number 29 January 2008

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Cover Image: Figure 1. Simulium nolleri *from Rubtsov's Blackflies (Simuliidae) Fauna of the USSR Diptera Volume 6, Part 6. 1990*

FROM THE EDITOR

The time for publishing the *Bulletin* comes round twice a year with inevitability similar to that of taxes and the seasons. In this number we have the proceedings of our 28th Annual Meeting, and welcome photographs of attendees provided by Brenda Walsh (who sadly omitted to include a picture of herself).

Particularly welcome is the inclusion of an updated checklist of the blackflies of Finland. Your Editor thinks that the *Bulletin* is a very useful medium for publishing such lists because of the short delay between presentation and publication. It also allows authors to "get something in print" as a preliminary to publishing in greater detail in one of the established international journals with a wider circulation than our 120 or so members.

Another encouraging note is that papers keep coming in. It is several years since the editor has been obliged to stimulate members to send in material. But don't get complacent. Remember that the *Bulletin* is there and in an improved format – use it.

John Davies

MEETINGS

28TH ANNUAL MEETING 2007

The British Simuliid Group 28th Annual Meeting was held in the lecture theatre of the Oxford University Museum of Natural History on Wednesday 12th September 2007.

The previous evening, those members and their consorts and friends who were staying overnight met for the customary pre-meeting dinner at the Chiang Mai Kitchen in central Oxford. Altogether 17 persons were present, and everyone enjoyed the variety of Thai dishes that were available, and the lively chat that accompanied the meal.

The meeting opened at 10.00 am with coffee and biscuits in the common room, after which we all adjourned to the lecture theatre. After a short welcome and introduction from John Davies, Prof. Rory Post took the chair to introduce the speakers, and control the meeting. Seventeen members were present.

28th ANNUAL MEETING PRESENTATIONS

A genomic DNA BAC library from *Simulium damnosum* s.l.

J. L. Crainey[1], M. Wilson[2] and R.J. Post[1,3]

[1]The London School of Hygiene and Tropical Medicine.
[2]The Noguchi Memorial Institute for Medical Research, University of Ghana
[3]The Natural History Museum, London

A genomic DNA BAC library has been prepared from *Simulium damnosum* s.l. The library is composed of 12,288 clones containing an average insert size of >128KB. The

library is currently being maintained at the Natural History Museum (in London) and at the London School of Hygiene and Tropical Medicine. It was made from 3000 field-collected larvae taken from the river Pawnpawn (6 10'N 0 12' W) in Ghana at the end of November 2006. Individual larvae were verified morphologically as belonging to the *S. damnosum* species complex before being frozen live in liquid nitrogen. Larvae were then stored bellow -70ºC until immediately before their genomic DNA was extracted. Extracted Genomic DNA was partially digested with the *Hind* III restriction enzyme and then cloned into *E. Coli* DH 10B, using the pIndigoBAC-5 cloning vector. Over 99% of >2000 *S. damnosum* s.l. larvae previously collected from same river Pawnpawn field site have been identified as *S. squamosum*. Fifty out of 50 larvae collected at the same time as the frozen material were also verified as *S. squamosum*. The *S. damnosum* genomic DNA in this BAC library is therefore proposed to be predominantly, if not exclusively, from the *S. squamosum* cytospecies. The genome-coverage of the library is currently being assessed.

On the Simuliidae of Lithuania

Rasa Bernotienë

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There are several records on outbreaks of bloodsucking blackflies in Lithuania and Latvia (Fig. 1). The first outbreak was recorded in 1940 – 1941 in northern Lithuania (Milaknis, 1942) where the pest species was determined as *Simulium maculatum* (Mg.). Another outbreak was recorded in south-eastern part of Latvia in 1968 – 1970 and the pest species was determined by Sternbergs (1971) as *Simulium (Schoenbaueria) pusillum* Fries. Larvae of this species developed in the largest river of Latvia. There is also a paper on an outbreak in northern Lithuania in 1979 – 1980 (Jakimavicius, 1982). But there is no data about the pest species.

The last outbreak of bloodsucking blackflies started in the 1970s in the south-eastern part of Lithuania. The biting activity had been increasing and had become a serious problem by 1990. Until this time there was no data on the fauna of blackflies in Lithuania. Just two species of blackflies were known – *S. ornatum* Mg. and *S. maculatum*. This last outbreak prompted investigations into the Simuliidae in Lithuania.

In order to find out the pest species several different rivers were investigated. The Skroblus River (average annual discharge 0.75 m^3/s), the Merkys River (average annual discharge - 33 m^3/s), the Neris River (180 m^3/s) and the Nemunas River (average annual discharge of the middle Nemunas is about 250 m^3/s).

The Skroblus River was populated by *Simulium equinum* (L.) and *S. ornatum*. The Merkys River was populated by *Simulium equinum* and *S. lineatum* (Mg.). The Neris River was populated by *S. lineatum*, *S. morsitans* Edw., *S. reptans* (L.) and *S. erythrocephalum* De Geer. The main pest species in the south-eastern part of Lithuania was determined as *Simulium maculatum* Mg. (Zygutiene, Sprangauskaite, 1998). Larvae

of *S. maculatum* developed in the largest river of Lithuania, the Nemunas River. Lower densities of *S. maculatum* larvae were determined in the lower reaches of the Nemunas River and in the Neris River. Thus, the Nemunas River was dominated by *S. morsitans*, *S. reptans, S. erythrocephalum* and *S. maculatum*.

During winter the Nemunas River is usually covered by ice. Drifting of the ice usually begins at the beginning of March. The middle Nemunas channel is densely covered by water plants (*Glyceria, Batrachium, Potamogeton*). In the end of April the development of *S. reptans* larvae starts, and by the beginning of May the larvae of *S. maculatum* begin their development. Later, at the end of May or at the beginning of June the development of *S. erythrocephalum*, *S. lineatum* and *S. morsitans* starts.

In 1997 the density of *S. maculatum* larvae in the middle reaches of the Nemunas River in May was 1400 ± 230 larvae per 1 dm^2 of water plant surface. As *S. maculatum* produces two generations per year the first generation develops in May – June and the second one develops in August. The first generation is very abundant while the second generation is not so numerous. The density of *S. maculatum* larvae in the low reaches of the Nemunas River in 1997 was 30.4 ± 20 larvae per 1 dm^2 of water plant surface.

Blackfly control was started in Lithuania in 1998 using a biological preparation applied when larvae of *S. maculatum* predominated over larvae of *S. reptans* and other species of blackflies.

The preparation used in 1998 was Baktoculicid®. From 1999 to 2007 VectoBac® 12AS was used. Both preparations are based on the effect of *Bacillus thuringiensis* var. *israelensis*. From 4000 to 8500 kg of preparation was used each year for blackfly control in the Nemunas River. The discharge of the Nemunas River varied during the application in different years. The preparation was sprayed out from a ship in 1999 over a distance of 107 km of the river. The effect of the larvicide was monitored over the all applied distance and another 80 km downstream from the last point of application.

This lead to the decision to apply the larvicide to one or two points of the river from the year 2000. The preparation was poured into the river from the bank in one or two points in 2000 - 2007. The efficacy of application was from 95.9% (at 25 km distance from the point of application) to 49.8% (at 164 km distance from the point of application). The density of *S. maculatum* larvae per 1 dm^2 of water plant surface in 1999 was reduced to 163.3 ± 54.8 / 1dm^2. The highest bloodsucking activity of blackflies of 356.7 ± 112.6 per 10 min in 1999 was reduced to 23.3 ± 16.6 per 10 min during 2000 – 2006.

Some water parameters were examined to elucidate factors which could have an influence to distribution of different species of blackflies among different rivers and different segments of the same river. The most important parameters were river discharge (for *S. maculatum, S. reptans, S. equinum, S. lineatum* and *S. ornatum*), thermal regime of the river (for *S. maculatum, S. lineatum* and *S. rostratum*), amount of oxygen dissolved in the water (for *S. reptans*), biochemical oxygen demand (for *S. reptans, S. lineatum, S. equinum*), and amount of nitrates in the water (for *S. ornatum, S. morsitans, S. rostratum*).

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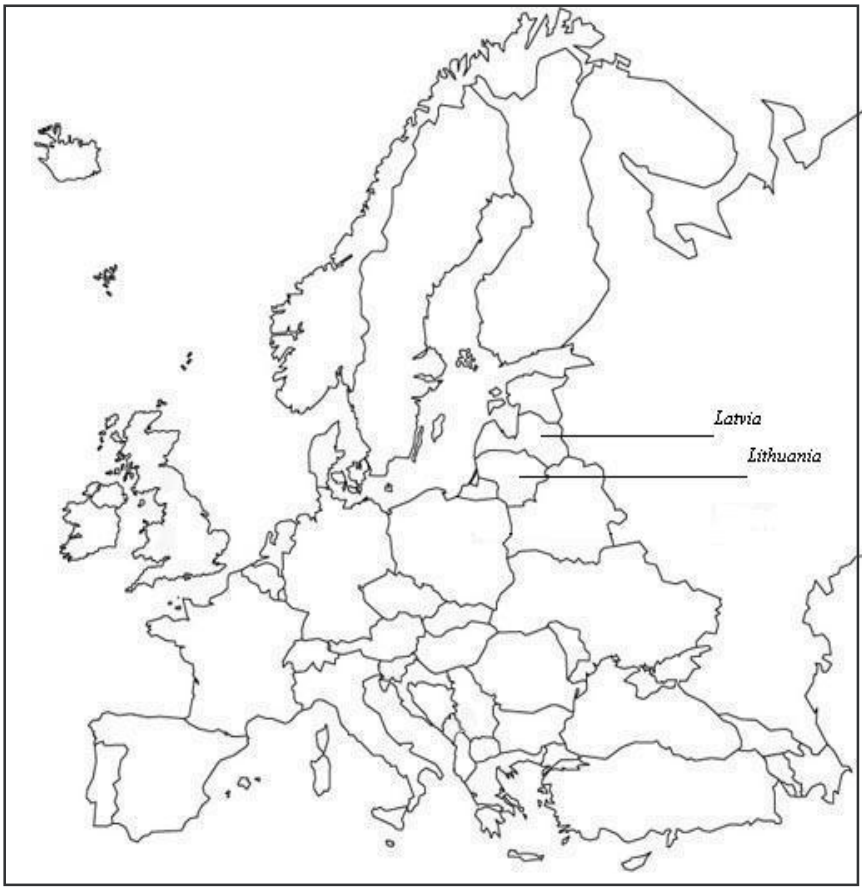

Figure 1. Location of Latvia and Lithuania in Europe.

The Blackfly Vernacular Names Project: An Update

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This is an on-going project whose objective is to collect the common names given to blackflies in order to provide a resource available to anyone planning to visit unfamiliar areas. To attempt to link the names to specific species and also to record the names before minority languages disappear.

A preliminary list was presented as a wall map at the 2004 International Simuliidae Symposium, Berlin 2004 and published in the Proceedings of that meeting (Davies 2006).

By September 2007 approximately 155 names had been recorded and their distribution and frequency is shown on the accompanying map. The number can only be approximate because similar sounding names may be spelled differently in different languages and the decision as to whether this constitutes a "new" name is somewhat arbitrary. Names have been recovered by searching the scientific literature and from accounts by travellers and explorers, as well as from personal communications and the

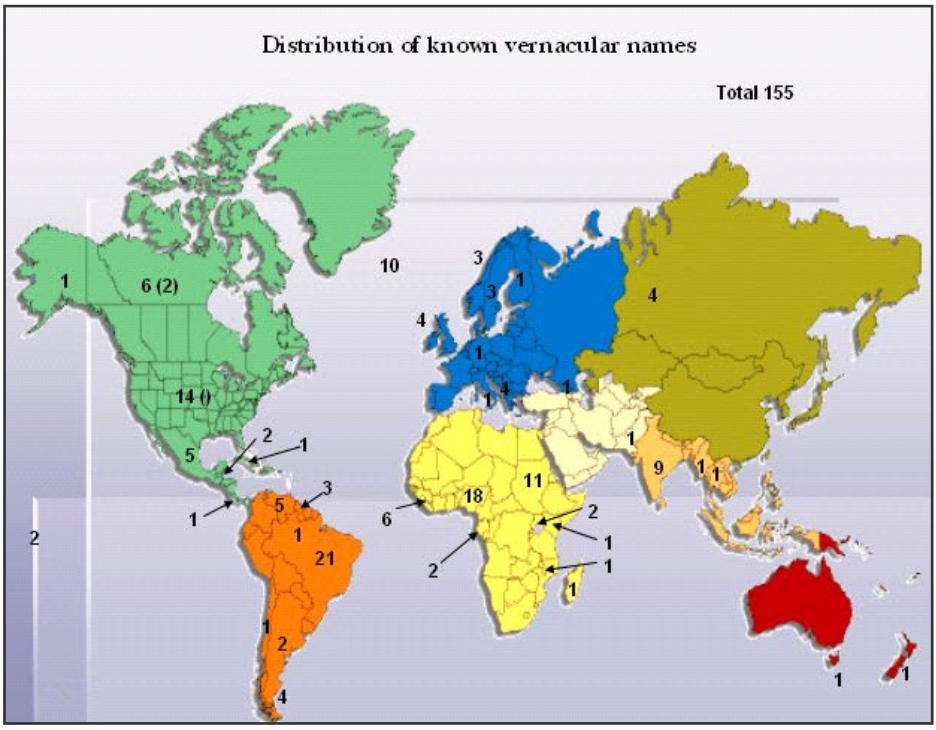

Figure 1. Distribution of recorded vernacular names, September 2007.

Some interesting situations have arisen.

1. Areas where many indigenous languages are still spoken have many names. For example, Brazil, Nigeria, Sudan, and India (coincidentally, these are also areas which have been much travelled by enthusiastic simuliidologists). In contrast, in North America where blackflies are a serious pest in many areas, only 2 out of the 20 recorded names are not of English or French origin. What has happened to the names that must have been used by indigenous North American peoples?
2. Ten names have been found in Iceland.
3. Two names from the Pacific Marquesas Islands.
4. The ubiquitous use of "sandfly" in Australia and New Zealand.
5. Virtually no information yet from central and northern Asia.

Since September 2007 new names have been received from Latvia, Lithuania, Norway, U.K., and the Atlantic Island of St. Helena.

The lists of names have been posted on the internet in the form of "Wiki" pages which can be accessed via the Blackfly site at **http://www.blackflies.info/Names2W/** or **http://www.blackfly.org.uk** and following the links.

ACKNOWLEDGEMENTS

The following have contributed enormously to this list: R.W. Crosskey V. Py-Daniel, M- G. Bazáñez, R. Bernotienë, P. Brogden, R.A. Cheke, G.M. Gislason, M. Laird, B. Malmqvist, A.W.R. McCrae, M. L. Strahan, J. E. Raastad, and D. Werner. Their help is much appreciated.

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Other papers listed by title only

Biodiversity of black flies (Diptera:Simuliidae) in Thailand and Argentina - **Luiz Hernandez**

The blackflies (Diptera: Simuliidae) in the digital revolution - **Luis Hernandez & Edward**

Caught on camera at the dinner or at the meeting: Left to right. Top row. R.J. Post, R Bernotienë, D Werner, J.B.Davies, J.L.Crainey, C.Post, M.W.Service. Center row: W.Service, F.J.Walsh, R.A.Cheke, M.E.Crosskey,. Bottom row: M-G Basáñez, J.N.Raybould, J.Day, L.Hernandéz,

Future Meetings

In the general discussion that followed the scientific session, it was pointed out that, as had been decided at the Berlin Symposium of 2004, an International Symposium will be held in Lithuania in September 2008. This will incorporate the meetings of the British Simuliid Group and the European Simuliidae Symposium. Details are given elsewhere in this Bulletin. There was a discussion as to whether it would be desirable to hold a separate BSG meeting in 2008 for the benefit of those who would be unable to travel to Lithuania. It was proposed that Rory Post should investigate whether we might combine with one or other of the freshwater biologists groups. Rory did make contact with the London Freshwater Group, but it seems that the papers presented at their last meeting would not have been of great interest to simuliidologists. However, the matter remains open, and any further input from members will be welcome. It was proposed that the 2009 meeting should be held in London.

Meeting 2008 – Preliminary Notice

The 3rd International Simuliidae Symposium, including the 29th meeting of the British Simuliid Group and the 7th European Simuliidae Symposium will be held in Vilnius in 9-12 September, 2008.

The Symposium will be held at the Academy of Sciences, Gediminas Ave. 3, in the center of Vilnius, the capital of Lithuania. Lithuania has been a member of EU since 2004

The Symposium will embrace all areas of black fly research. The official language of the Symposium is English. Those proposing to attend are asked to register by completing the form available on the website or by contacting the Organising Committee.

For more general information consult the web pages at *www.travel.lt* and *www.vilnius2009.lt* or for the latest information, the meeting's site at: w**ww.entomologai.lt/ simuliidae2008.**

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Updated checklist of the black flies (Diptera: Simuliidae) of Finland

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INTRODUCTION

Ilmonen and Kuusela (2006) published a checklist of the black flies (Diptera: Simuliidae) of Finland, enumerating 52 species. During the years 2005 to 2007, additional species were found in Finland, necessitating an updated checklist. Six newly recorded species are presented, and one species is deleted, resulting in a total of 57 species now known from Finland. By comparison, Sweden has 67 species (Adler et al. 1999; Adler & Malmqvist, unpublished), suggesting that more species eventually will be added to the Finnish list.

MATERIAL & METHODS

Larvae and pupae were hand collected from stones and trailing vegetation, and fixed in 95% ethanol or in three changes of Carnoy's solution (1:3 acetic ethanol). Adults were collected using bilateral Malaise traps (length 1.1 m, width 0.7 m, height 1.4 m) and pyramid-shaped emergence traps (sides 0.75 m, height 0.5 m) placed above streams. Cytotyped larvae were deposited in the Clemson University Arthropod Collection. Voucher specimens (adults) were deposited in the Diptera collection of the Helsinki Museum of Zoology. All other material was placed in the personal collection of J. Ilmonen. The abbreviations of biogeographical provinces are from the map in Figure 1 of Ilmonen and Kuusela (2006). Unless otherwise indicated, samples were collected and the morphological identifications made by JI, and cytological analyses were conducted by PHA.

RESULTS AND DISCUSSION

Apart from tw larval polytene chromosomes. Adults were found for four of the newly recorded species; all new records were made or validated by analyses of species. We also have identified a number of cytoforms that require further study to determine their species status (Table 1). These results demonstrate the importance of tandem cytological- morphological studies, but they also highlight the need for further studies. In total, six species new for the Finnish black fly fauna are recorded, and one is deleted

***Simulium (Hellichiella) usovae* (Golini)**

Li: Inari, Vanhapäänmorosto S, 76205:35523 Finnish grid (27°E); 12 cytotyped larvae, June 17 2005.

Oa: Isojoki, Peräkorpi, 69014:32472 Finnish grid (27°E); 20 cytotyped larvae May 30 2006.

In Inari, northern Finland, larvae of *S. usovae* were collected from a small seep (width 0.2- 0.5 m, depth 1-5 cm) with peat substrate and trailing sedges (*Carex* spp.) on a mire. A Malaise trap and two pyramid-shaped emergence traps were also placed on the seep (June 14 to August 10). In a parallel sample collected in ethanol, larvae morphologically identified as *Simulium dogieli* (Rubtsov) dominated. Males and females of *S. dogieli* were also dominant in the adult catches; the other specimens collected were *Greniera ivanovae* (Ivaschenko), *Simulium silvestre* (Rubtsov), *Simulium* cf. *truncatum* (Lundström), *Simulium* cf. *ornatum* Meigen, and *Simulium baffinense/crassum*.

In Isojoki, western Finland, 20 larvae were collected and cytotyped from a small seep (width 0.2 m, depth 1-5 cm) with peat substrate and trailing sedges (*Carex* spp.) on a mire. In an earlier (May 24 2005) ethanol sample, 110 larvae and one pupa morphologically identified as *S. dogieli* were collected.

Chromosomes of larvae from these sites conform to the description by Rothfels & Golini (1983) for *Hellichiella* species near *dogieli* (= *S. usovae*). Morphological identifications of *S. dogieli* have been made in similar habitats scattered across Finland and Sweden. Given the morphological similarity and the geographical proximity of our records of *S. usovae* to the type locality of *S. dogieli* in the Russian Karelia, we suppose that *S. usovae* is a synonym of *S. dogieli*. However, cytological material from the type

Ab: Nummi-Pusula, Myllykoski 35523 Finnish grid (27°E); 5 cytotyped larvae, June 20 2007.

Larvae were cytotyped from an 8-metre wide lake-outlet riffle with dense bryophyte cover, stone and boulder-dominated streambed, and trailing twigs of overhanging bushes and trees. A parallel sample collected in ethanol was dominated by immatures of the *Simulium aureum* group. The *Simulium ornatum* group and *Simulium tuberosum* (Lundström) were found in fewer numbers.

The cytotyped larvae of *S. velutinum* had the classic banding sequence, as presented by Leonhardt (1985) for *S. aureum* sibling I (= *S. velutinum*), and carried IIS-12 homozygously.

***Simulium (Nevermannia) dendrofilum* (Patrusheva)**

Li: Inari, Vanhapäänmorosto S, 76205:35523 Finnish grid (27°E); 3 larvae, June 17 2005.

Li: Inari, Akalauttapää NW, 76217:35564 Finnish grid (27°E); 3 females, June 3 to August 1 2004

Li: Inari, Keinokurumorosto S, 76234:35552 Finnish grid (27°E); 1 female, June 3 to July 6 2004

Larvae were collected in the same locality as *S. usovae* (see above). Females were collected by Malaise trap on a boggy seep (Akalauttapää NW) and along a spring brook on a mire. The habitats where the species was found are similar to those recorded for the species in Sweden (Adler et al. 1999).

***Simulium (Nevermannia) juxtacrenobium* Bass & Brockhouse**

Simulium juxtacrenobium has been recorded from 11 localities in southwestern Finland (biogeographical provinces Ab and N). The records, cytology, and taxonomy of this species are treated in detail by Ilmonen et al. (in preparation).

Simulium (Simulium) intermedium Roubaud

Ab: Kiikala, *Lammenlähde, 67110:33154* Finnish grid (27°E); *1 male, October 8 to November 17 2004.*

Ab: Nummi-Pusula, *Haijala, 67153:33433* Finnish grid (27°E); *1 cytotyped larva and 1 dissected male, May 4 2006.*

Ab: Nummi-Pusula, *Jäljänjärvi outlet, 67221:33373* Finnish grid (27°E); 1 dissected male, June 1 2006.

Ab: Vihti, Myllypuro, 66939:33621 Finnish grid (27°E); 4 dissected and 36 Malaise-trapped males, July 4 to October 20 2005; 4 Malaise-trapped males May 3 to June 2 2006.

N: Espoo, *Väärä-Musta outlet, 66936: 33684* Finnish grid (27°E); *11 cytotyped larvae, May 6 2006.*

N: Espoo, *Antiaanpuro, 66918:3364800* Finnish grid (27°E); 2 dissected and 11 Malaise- trapped males, August 1 to October 20 2005.

N: Espoo, Koivulan lehtopuro, 66944:33726 Finnish grid (27°E); 1 Malaise-trapped male, June 1 to 29 2006.

Kl: Parikkala, Lähdelampi outlet, 68260:36373 Finnish grid (27°E); 1 dissected and 1 reared male, May 11 2004.

Ta: Loppi, Melkutin outlet, 67394:33410 Finnish grid (27°E); 2 Malaise-trapped males, April 28 to May 30 2006.

Oa: Kauhajoki, Muurahaisluoma, 69028:32520 Finnish grid (27°E); 26 Malaise-trapped males, July 7 to August 15 2002.

Kb: Kontiolahti, specific date (early 20th century) and locality unknown; 1 male, leg. Wolstedt, det. "reptans" by C. Lundström, det. "ornatum group" by H. Zwick (1980).

Li: Utsjoki, Askasjohjavri S, 77444:35335 Finnish grid (27°E); 2 dissected males, August 7 2005.

Li: Utsjoki, Vuobme Galddojavri E1, 77482:35340 Finnish grid (27°E); 2 dissected males, August 5 2005.

Li: Utsjoki, Vuobme Galddojavri E2, 77487:35342 Finnish grid (27°E); 1 dissected male, August 9 2005.

Larvae were collected and cytotyped from 0.5-m wide brown-water, acidic streams. Chromosomes matched those of larvae from Sweden studied by Adler et al. (1999). Males with a ventral plate different from that of *Simulium ornatum* were

or trapped from various localities across Finland. The nose-like lip of the ventral plate is proportionally much longer than the body in both lateral and posterior views and the posterior margin of the ventral plate has fewer teeth in *S. intermedium* than in *S. ornatum* (Figure 1). Numerous species, subspecies, and variations have been described from the *S. ornatum* species group by Rubtsov (1956), but none of the ventral plates illustrated by Rubtsov match those of males recorded from Finland. Collection of this form together with a cytotyped larva of *S. intermedium*, and comparison to *S. intermedium* males loaned from The Natural History Museum (London), confirmed that the males collected from Finland are *S. intermedium*. Ventral plates of the Finnish males are identical to those collected from the Canary Islands and Madeira (a total of 6 males, R.W. Crosskey leg. & det.). Though the shape of the ventral plate in both *S. intermedium* and *S. ornatum* (probably several sibling species) shows considerable delicate variation, the ventral plates are easily identifiable in lateral and posterior views (Figure 1). In the collection of the Helsinki Zoological Museum we found one male of *S. intermedium* that had been collected from Finland 100 years ago and identified as "*Melusina reptans*" by Carl Lundström, and later as a peculiar form of the *S. ornatum* group by Dr H. Zwick. Also, the male paratype of *Simulium rotundatum* (Rubtsov) (#5088, pinned and partly mounted, studied by JI) in the collection of the Zoological Institute of the Russian Academy of Sciences (St Petersburg), has a ventral plate similar to that of *S. intermedium*. This observation alone does not warrant synonymy of *rotundatum* with *intermedium*, but stresses the need for a revision of the *S. ornatum* species group.

Widely scattered records of *S. intermedium* suggest that it is common across Finland, frequently co-occurring (12 of 14 records) with *S. ornatum* in variable kinds of headwater streams, as in Sweden (Adler et al. 1999). Similar to *S. ornatum*, *S. intermedium* also emerges from early spring to autumn in Finland.

Ab: Vihti, Myllypuro, 66939:33621 Finnish grid (27°E); 1 male, June 1 to July 4 2005.

So far, only one specimen of *S. rubtzovi* has been collected in Finland. A male was collected with a Malaise trap over a 2-metre wide, third-order stream in a mixed forest. The streambed was dominated by stones and boulders, and bryophytes were abundant. Further records could be expected if more cytological material were collected. The larvae and pupae are morphologically not reliably separated from those of *Simulium curvistylus* Rubtsov and *Simulium morsitans* Edwards. *Simulium rubtzovi* is fairly common in northern Sweden (Adler et al. 1999), and probably in Finland, as well.

***Metacnephia trigoniformis* Yankovsky**

We were informed by A.V. Yankovsky (pers. comm.) that there are no known records of this species from Finland. The recorded distribution of *M. trigoniformis*, according to specimens identified as "trigonia" [in part] by Rubtsov in the collection of the Zoological Institute of the Russian Academy of Sciences, includes Murmansk region, Karelia, Leningrad region, and West Siberia. The species, therefore, is deleted from the checklist of black flies from Finland.

ACKNOWLEDGEMENTS

JI was supported by the Finnish Ministry of the Environment as part of the research program for insufficiently known and threatened forest species (PUTTE). We thank Teemu Tuovinen for collecting larvae in Carnoy's in Isojoki and for trapping in Kauhajoki, and Jukka Salmela for maintaining the Malaise traps in Inari. Dr Heide Zwick kindly shared her notes on the specimen in the Lundström's collection, Theresa Howard provided the specimens loaned from The Natural History Musem in London, and Dr A. V. Yankovsky provided information on *M. trigoniformis*.

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Helodon (Helodon) ferrugineus (Wahlberg)
Prosimulium hirtipes (Fries)*
Prosimulium luganicum Rubtsov
Prosimulium macropyga (Lundström)*
Prosimulium ursinum (Edwards)*
Greniera ivanovae Ivaschenko
Stegopterna trigonium (Lundström) '2a' Adler, Malmqvist & Zhang, 1999 (cytoform)**
Cnephia eremites Shewell*
Cnephia pallipes (Fries)
Metacnephia lyra (Lundström)
Metacnephia saileri Stone*
Metacnephia tredecimata (Edwards)
Simulium (Hellichiella) dogieli (Rubtsov)
Simulium (H.) usovae (Golini)**
Simulium (Boreosimulium) annulus (Lundström)
Simulium (B.) baffinense Twinn
Simulium (B.) crassum (Rubtsov)
Simulium (B.) tsheburovae (Rubtsov)
Simulium (Eusimulium) angustipes Edwards*
Simulium (E.) aureum Fries*
Simulium (E.) velutinum (Santos Abreu)**
Simulium (Nevermannia) angustitarse (Lundström)
Simulium (N.) beltukovae (Rubtsov)
Simulium (N.) bicorne Dorogostaisky, Rubtsov & Vlasenko*
Simulium (N.) carpathicum (Knoz)*
Simulium (N.) cryophilum (Rubtsov)
Simulium (N.) curvans (Rubtsov & Carlsson)
Simulium (N.) dendrofilum (Patrusheva)
Simulium (N.) fontinale Radzivilovskaya
Simulium (N.) juxtacrenobium Bass & Brockhouse*
Simulium (N.) lundstromi (Enderlein)
Simulium (N.) silvestre (Rubtsov)
Simulium (N.) vernum (Macquart) 'Knebworth' Brockhouse, 1985 (vernum cytostandard)**cf. 'Dorset IIS-1' Brockhouse, 1985 (cytoform)**
Simulium (Schoenbaueria) pusillum Fries
Simulium (S.) subpusillum (Rubtsov)
Simulium (Wilhelmia) equinum (L.)
Simulium (Boophthora) erythrocephalum (DeGeer)
Simulium (Simulium) annulitarse Zetterstedt*
Simulium (S.) argyreatum Meigen
Simulium (S.) curvistylus Rubtsov
Simulium (S.) frigidum (Rubtsov)
Simulium (S.) intermedium Roubaud*
Simulium (S.) monticola Frieder*
Simulium (S.) morsitans (Edwards)
Simulium (S.) murmanum (Enderlein)
Simulium (S.) noelleri Friederichs 'B' Adler & Kachvoryan , 2001 (cytoform)**
Simulium (S.) ornatum Meigen*
Simulium (S.) paramorsitans Rubtsov
Simulium (S.) posticatum Meigen
Simulium (S.) reptans (L.)
Simulium (S.) rostratum Lundström)*
Simulium (S.) rubtzovi Smart
Simulium (S.) transiens Rubtsov
Simulium (S.) truncatum (Lundström)*
Simulium (S.) tuberosum (Lundström)*
Simulium (S.) tumulosum Rubtsov
Simulium (S.) vulgare Dorogostaisky, Rubtsov & Vlasenko*

Table 1 Updated checklist of black flies (Diptera: Simuliidae) recorded from Finland. Nomenclature follows that of Adler et al. (1999) and Crosskey & Howard (2004). * = records partially based on

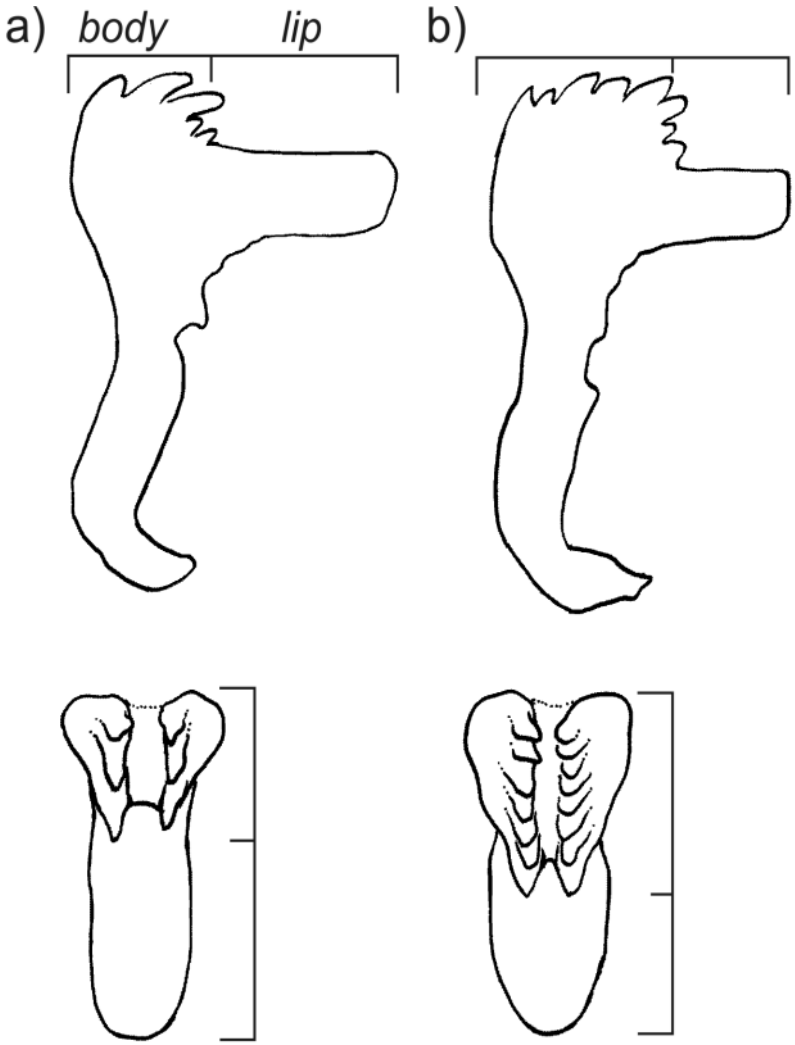

Figure 1. Ventral plate of co-occurring (Ab: Vihti, Myllypuro, 2005) specimens of a) *S. intermedium* and b) *S. ornatum* in lateral (upper) and posterior (lower) views, with lip and body of the ventral plate indicated.