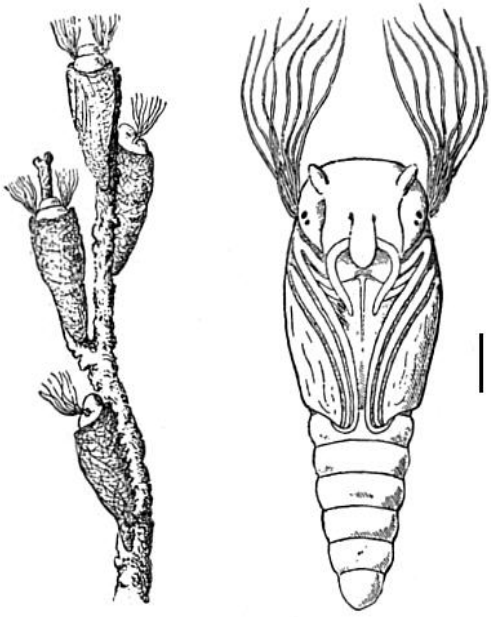
The British Simuliid Group Bulletin

Number 27 January 2007



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THE BRITISH SIMULIID GROUP BULLETIN

Number 27 January 2007

CONTENTS

From the editor 1

Lewis Davies 1

Future Meetings 1

The 2nd International Simuliidae Symposium 2006 1

The Black Fly (Diptera:Simuliidae) Genome and EST Project
Charles Brockhouse 3

Membership Notices 4

On the geography of *Simulium posticatum* in Britain
Roger W. Crosskey, Jon A.B. Bass & Doreen Werner 5

Cover Image from the 1912 reprint of Professor L. C. Miall's book 'The Natural History of Aquatic Insects', Macmillan and Co., London, first published 1895.

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The British Simuliid Group Bulletin is an informal publication intended to disseminate information about the Simuliidae. It is published twice each year and is distributed free to all members of the British Simuliid Group.

Content covers papers presented at the Group's Annual Meeting, which is usually held in September, short research notes, notices and accounts of meetings, and articles of anecdotal or general interest that would not normally be found in international journals. Geographical cover is world-wide, and is not restricted to
the British Isles. Reports of research carried out by graduates, young scientists and newcomers to the subject are particularly encouraged. It is an ideal medium for offering new ideas and stimulating discussion because of the very short interval

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THE BRITISH SIMULIID GROUP

The British Simuliid Group (BSG) is an informal gathering of scientists of any discipline, from many countries, who have an interest in the Simuliidae. The group's members include entomologists, parasitologists, environmentalists, ecologists and medics, with interests in ecology, bionomics, taxonomy, cytotaxonomy, disease transmission, freshwater biology etc. Our aim is to assemble as diverse a group as possible in order to encourage a wide interchange of ideas and information.

At present the BSG has about 130 members in the UK, Europe, Africa, Australia, New Zealand and the Americas. Membership is FREE - if you are not already a member of the BSG all you have to do is give us your name and postal and e-mail addresses. Annual meetings have been held at different locations in the UK since 1978. Abstracts of papers presented are published in our Bulletin which is sent to all members of the group.

The Group also runs an electronic news list with the name "Simuliidae" which is now on JISCmail. To join "Simuliidae" send the following command as one line of text in an e-mail message without subject heading- join Simuliidae your-firstname lastname to: jiscmail@jiscmail.ac.uk. Membership of "Simuliidae" does not automatically make you a member of the BSG. You have to join each separately. The Simuliidae list owners are the Hon. Secretary and the Editor of the Bulletin. Recent back numbers of the Bulletin can be viewed on the World Wide Web at URL: http://www.blackfly.org.uk. Inquiries about the Group and its activities should be made to John Davies: address inside back cover and e-mail daviesjb@liverpool.ac.uk

Notes for Contributors

To avoid copy-typing, the editor (address above) would prefer to receive contributions on disc or by e-mail, or typewritten. Details as follows:-

1. Via conventional mail on IBM PC formatted 720Kb or 1.4Mb 3.5 inch diskettes, as unmodified word processor files (most common DOS or Windows word processor formats are acceptable) or as RTF, PDF, ASCII or DOS text files (We usually have to change pagination and heading format, anyway). Mark the disc with the format, word processor name and file name(s). Complicated tables and figures can be accepted as separate graphics files (not OLE embedded, please!) but we may ask for a hard copy as a check that all detail has been retained. Remember that figures should have legends and small detail drawn large enough to be visible when reduced to 100mm by 70mm. Diskettes will be returned on request.
2. By electronic mail via the Internet. Send your file in MSWord .DOC or in .RTF or .PDF format or as an ASCII file (also known as DOS or txt File), and e-mail it either as part of the message or preferably as an attachment to: daviesjb@liverpool.ac.uk.

If neither of the above methods are available, then post to me printed copy on A4 paper (210x297 mm), single spaced, ready for scanning. Heading styles as in the

Bulletin. Format for References is flexible. Please refer to the Bulletin for the form appropriate to your article. Scientific Communications should quote the full title and journal name, but Notes and Abstracts may optionally omit titles and show only the

FROM THE EDITOR

This number of the *Bulletin* contains two innovations. The first, which I hope you will have already noticed, concerns the manner in which this issue has been produced. Instead of laying out the text with a commonly available word processor, it has been set up using a dedicated desk-top publishing program. John Day has kindly volunteered to do this, after which he will forward a to the Natural History Museum for duplication and distribution. As I write this I have not seen the final version, but anticipate that members will find it an improvement.

Secondly, for the first time a supplement is attached to a *Bulletin*. This contains the complete set of abstracts as they were printed in the Program & Abstracts Book included with the documents given to participants at the 2006 2nd International Simuliidae Symposium, Novi Sad, Serbia (see below). They are being published here because not all the papers in the Book were actually presented, because some intended participants were unable to attend, and also because not all presentations have been offered for publication in the *Acta Entomologica Serbica*.

John Davies

Lewis Davies

It is with great sadness that we have to report the death of Lewis Davies at his home on Saturday 9th December 2006. He will be remembered by European simuliidologists as the author of the first comprehensive keys and distribution records of the Simuliidae of Britain, published in 1968.

This news was received just as this *Bulletin* was being prepared for the press and it is intended to publish a fuller obituary in the next *Bulletin.*

MEETINGS

Future Meetings

Following the most successful International Meeting in Novi Sad in September 2006, it is proposed that we repeat the arrangement and combine with the forthcoming 3rd International Simuliidae Symposium to be held in Vilnius, Lithuania in 2008. Thus our 28th Meeting will be held in Oxford on the 12th September 2007, see page 15 for details (Adrian Pont and John Day offered to make arrangements) and the 29th meeting will combine with the International Meeting in Vilnius sometime in 2008.

The 2nd International Simuliidae Symposium 2006

Novi Sad, Faculty of Agriculture in Novi Sad, Serbia.

Following on from the success of The 1st International Simuliidae Symposium held at the Humboldt University in Berlin, Germany in 2004. The **2nd International Simuliidae Symposium** was held from the 3rd -6th of September 2006 at the University of Novi Sad, Faculty of Agriculture in Novi Sad, Serbia.

One of major goals was to gather the members of black fly working groups of Central Europe and Great Britain, as well as those working in the same subject but spread in other working groups:

the European Mosquito Control Association-Black fly working group and North American Black Fly Association. The organisers made great efforts to encourage the participation of scientists and students involved in black fly research, and were successful in attracting 48 participants from 14 countries (Austria, Belgium, Finland, France, Germany, Italy, Lithuania, Mexico, Russia, Serbia, Slovakia, Spain, UK, USA) and demonstrated that this Symposium showed an increasing interest in topics related to black flies. During two working days 31 out of 35 submitted scientific presentations were given, within the main topics of the program: Systematics, Evolution, Biogeography, Ecology, Behaviour, Physiology, Natural Enemies, Symbiotic Interactions, Management. All the submitted abstracts, (including those of authors from Ghana, Poland and Turkey, who unfortunately had to cancel their participation at the last moment), were provided to the meeting in the Abstract and Programme Book (ISBN 86-7520-094-3) which is also available a Supplement to this *British Simuliid Group Bulletin* , volume 27. Those presentations, which were subsequently submitted in full will be published soon in a Supplement Volume of *Acta Entomologica Serbica*.

The symposium represented the current status of knowledge and ongoing trend of research in the field of black flies. The presentations were followed by creative discussion, exchange of experiences and ideas for the future work. Lively discussions were continued during the breaks between the sessions and during social activities, spent together in relaxed and friendly

atmosphere. During the Social Dinner at the unique and pleasant ambient of the Fortress of Petrovaradin the

participants enjoyed a wide assortment of the typical food, drink and folklore music of the region. Certainly, one of the unforgettable events during the Symposium was the: Danube cruise on the Royal Military boat “Kozara” (constructed in Germany in 1939) with champagne, lunch and and sandy beaches; the exciting concert of Serbian orthodox spiritual songs performed by a young chorus at the First Serbian Gymnasium in the village of Sremski Karlovci; and the visit to the Honey and Wine Museum and wine-cellar, followed by tasting of domestic products... Pleasant weather typical for September allowed the participants to enjoy equally both the sunny part of day and the long evenings outdoors.

The organization of the Symposium was kindly supported by several Sponsors to whom we owe special gratitude: Ministry of Science and Environmental Protection of the Republic of Serbia; Provincial Secretariat of Environmental Protection and Sustainable Development of the Autonomous Autonomous Province of Vojvodina; Utility Affairs Department of the City of Novi Sad; European Mosquito Control Association; Valent BioSciences Corporation; Syngenta; Makhteshim Magan- Yu; Ciklonizacija- Novi Sad; Miva- Inðija; and Institute for

The Organizing Committee and myself, wish to express our gratitude to the Scientific Committee for the great effort, useful suggestions and help in preparation and realization of the Symposium, to all the authors and participants for their contribution to the success of the Symposium and for creating such wonderful, creative and friendly atmosphere that made this event really unforgettable.

Aleksandra Ignjatoviæ Æupina

The Black Fly (Diptera: Simuliidae) Genome and EST Project

Charles Brockhouse
Marine & Aquatic Genetics, Biology, Creighton University, Omaha, NE, USA

We have (finally!) submitted a "White Paper" to NIAID proposing a *Simulium* genome and EST project. The abstract is appended below; the full white paper can be read at: http://biology.creighton.edu/faculty/brockhouse/SimuliumWhitePaper.pdf (For those of you interested, the "White Paper" process of NIAID is described at http://www.niaid.nih.gov/dmid/genomes/mscs/req_process.htm).

The goal of the project is to both produce an annotated genome sequence and create DNA arrays that will be available to the "black fly community". We would appreciate letters of support and/or interest in using the data generated. Letters describing how the project would aid your research will be especially helpful. Suggestions for agencies that would be likely to share financial support of the project would be extremely helpful.

Charles Brockhouse

Black Fly Genome Consortium

Organizing Laboratories

1. Marine & Aquatic Genetics, Biology, Creighton University, Omaha, NE. USA (Brockhouse)
2. Center for Genomics and Biotechnology(CGB), Indiana University, Bloomington, IN, USA. (Colbourne)
3. Department of Entomology, Natural History Museum, London, U.K. (Post)
4. Biodiversity of Medically Important Arthropods Laboratory, Clemson University, Clemson, SC., USA (Adler)
5. Noguchi Memorial Institute for Medical Research, University of Ghana, Legon,Accra, Ghana, (Wilson, Boakye)
6. Freshwater Ecology Laboratory, University of South Alabama, Mobile, AL, USA. (McCreadie)

Abstract

We propose a full genome sequencing project and an accompanying cDNA sequencing project for the Simuliidae (Black Flies). The full genome sequence will be an invaluable resource for the insect genomics community, that will allow order-wide functional genomic comparative analysis of genomic contents and their organization, as well as functional analyses of critical parameters such attributes linked to their capacity to transmit disease agents. These attributes include blood feeding (haematophagy), parasite/pathogen transmission, symbiosis, and insecticide resistance. The EST project is critical to assembling the full genome in the face of the absence of genetic presence of inversion polymorphisms, and will enormously enhance efforts to genetically map the black fly genome and explore gene regulation, differences among species, and symbiosis. The cDNA project is a critical component of this proposal, to facilitate the annotation of the genome sequence and to produce reliable microarrays that will be used to explore the conservation of

transcriptional regulators under conditions that are shared by species that vector the agents of disease. This project aims to make a significant impact in furthering genomic knowledge of vector biology, by promoting comparative research on a disease vector that has close phylogenetic relationships to both mosquitoes (*Anopheles*, *Aedes*) and non-haematophagous insects.

Biological material will be supplied by participating laboratories (Noblet, Brockhouse, Adler, Post, McCreadie, Wilson, Boakye), while the CGB will carry out the genomic projects in support of the genome sequencing and effort, including cDNA library construction/screening, sequence assembly validations, EST characterization, and related bioinformatics. The principal investigators will solicit the involvement of a growing insect genomics research community for the overall analysis and annotation. The resulting database will be incorporated into VectorBase and within the proposed InsectBase.

The full White Paper is available at this URL: http://biology.creighton.edu/faculty/brockhouse/SimuliumWhitePaper.pdf.

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DEATHS

Lewis Davies (see page 1)

On the geography of *Simulium posticatum* in Britain

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The reputation of *Simulium posticatum* Meigen, 1838, has travelled far and wide over the past thirty years or so on account of its noxiousness as a man-biting pest in east Dorset, particularly in the area of Blandford, the town after which it has become vernacularly known - the Blandford This simuliid is the only one in the British fauna that has been the target of an insecticidal control operation, and, partly in association with this, is one that has generated an important literature on its biology (Ladle & Welton, 1996: review). Knowledge of geographical distribution of *S. posticatum* in Britain has, nevertheless, remained rather inadequate, the focus of attention having been on the biting problem in Dorset and latterly in Oxfordshire. Still, a considerable quantity of geographical data can be derived from material in the Natural History Museum, London (BMNH), in the Centres for Ecology and Hydrology (CEH) (under the aegis of the Natural Environment Research Council, NERC), in the collection of DW (Berlin), and from the published literature. These four main sources have provided the basis on which we here synthesise the presently available knowledge of distribution range. Information is given in the form of county records, accompanied by a map (Fig. 1) based on the conventional 10km-square National O.S. Grid system

Concerning material we should note that specimens in the BMNH consist mainly of adult flies deposited there by various collectors from the early twentieth century onwards, whereas the CEH specimens are nearly all larvae and derive from the aquatic macroinvertebrate sampling undertaken on British rivers in the period 1978-2004. The DW material in Berlin is comprised of alcohol-
preserved immature stages.

We have not been able to take all published records at their face value. Absence of voucher near-certainty) that the *Simulium* concerned has been misidentified. Another difficulty, applying particularly to CEH material, is that even when larval voucher specimens can be found long fluid storage has often faded the head capsules so completely that the diagnostic pigmentation has disappeared (see pattern figure 17A in Bass, 1998: 43). To deal with these difficulties we give the geographical information in four sections: **1**. New or verified records based on examined material; **2**. Records not backed by voucher specimens but almost certainly valid; **3**. Records backed by voucher specimens but their identity uncertain; **4**. Other records, erroneous or very dubious.

We have consulted the punch-card index to the Lewis Davies British simuliid collection and refer to it when appropriate. (His collection and the index were gifted to the BMNH in 1984 and afterwards integrated with the Museum's own collection.) Most of the cards in the index, and several works in the general published literature, use one or other of the earlier names for *S. posticatum*, namely *S. austeni* (now recognized as a synonym) or *S. venustum* (an old misidentification). We use the style 'Hansford (1978, as *austeni*)' to provide the links with former nomenclature.

1. New or verified records based on examined material

Unless CEH is indicated, the listed material is in the BMNH (pinned flies in drawer 18 of the British simuliid collection and alcohol material in jar 25) or with DW (marked as recorded by Werner & Pont, 2004). The material cited 'CEH' is catalogued in the National Invertebrate Database (NID). The data elements we give for the examined voucher specimens are: place of collection; National Grid reference for the place of collection (at least to 10km square level, more precisely when possible); date of collection; surname of collector (cited as CEH for Centre for Ecology and Hydrology samples); life stage of specimen(s), as F - adult female - M, adult male - L, larva - P, pupa.

Buckinghamshire: River 1km SW of Padbury and 4km SSE of Buckingham town centre (SP 711303), 13.v.1978 (Crosskey) (L, P)[1]

Cambridgeshire: Cambridge (TL 4658), 6.v.1916 (Jenkinson) (M)[2]. Grantchester, Granta river near Cambridge (TL 4355), 28.iv.1916 and 1-3.v.1916 (Edwards) (F, M, P)[3]. Kirtling (TL 6857), 9.v.1920 (Collin) (F, M). Stapleford (TL 4751), 28.iv.1916 (Edwards) (M, P)[3]. Wood Ditton (TL 6658), 10.v.1920 (Collin) (F).

Devon: Axe river, 5km SW of Axminster (SY 261946), 4.v.1989 (CEH) (L). Axe river, Devon-Dorset border at Broom, 5km NE of Axminster (ST 326025), 4.v.1989 (CEH) (L).

Dorset: Blandford (ST 8806), 2.vi.1958 (Barton) (F). Blandford, Stour river (ST 8806), v.1963 (? collector) (M). Iwerne Minster (ST 8614) v.1970 (Grainger) (F)[5]. Tollard Royal area (ST 9417), v.1970 (Grainger) (F)[5]. Hod Hill, 5km NW of Blandford Forum (ST 8510), 22.v.1968 (Parmenter) (M). Badbury Rings, 5 km NW of Wimborne Minster (ST 961031), 12.v.1970 (Service) (F, M)[4]. Ferndown (SU 0600), 30.v.1967 (F), 10.v.1968 (M) and 15.v.1968 (F) (Parmenter). Holt, 5 km N of Wimborne Minster (SU 0304), 29.v.1984 (Maxwell-Darling) (F)[5]. Longham, Stour river (SZ 065973), 22.iv.1976 (Hansford) (L, P). West Moors, Wimborne area (SU 1003), v.1911 (Collins) (P)[3]. West Moors Station (SU 0803), 19.v.1908 (Yerbury) (M)[2].

Essex*:* Epping Forest (TQ 49), 1928 [? month] (Leeson) (M).

Gloucestershire: Lechlade, Coln river (SU 204988), 9.v.2000 (CEH) (L).

Hampshire: New Forest, Beaulieu (SU 3802), 1.v.1920 (Edwards) (F, M)[3]. New Forest, Black Water, at crossing of A35 road (SU 254047), 22.iv.1976 (Hansford) (L)[6]. New Forest, Brockenhurst (SU 302030), 2-10.v.1920 (Edwards) (F, P)[3]. New Forest, Brockenhurst river, near Brockenhurst (SU 315024) [as Lymington river in Hansford], 22.iv.1976 (Hansford) (L, P)[6]. New Forest, Highland Water, crossing of A35 road (SU 276066), 22.iv.1976 (Hansford) (L)[6]. New Forest, Lymington river, near Brockenhurst Bridge (SU 302030), v.1920 (Edwards) (L)[3]. New Forest, Lymington river

[1] Recorded also in Crosskey & Crosskey (2002).
[2] Recorded also in Edwards (1915, as *austeni*).
[3] Recorded also in Edwards (1920, as *venustum*).
[4] Recorded also in Service (1972, as *austeni*, grid ref. as 964028).
[5] Recorded also in Crosskey (2005, in man-biting data).
[6] Recorded also in Hansford (1978, as *austeni*).

(SU 297036 & SZ 320984), 28.iv.1982 (CEH) (L). New Forest, Lyndhurst (SU 2907), 3.v.1920 (Edwards) (M). New Forest, Lyndhurst Road (SU 3309), 8.v.1897 (Yerbury) (F, misassociated paratype of *S. morsitans*). New Forest, Lyndhurst Road (SU 3309), 3.v.1920 (Edwards) (M). New Forest, Ober Water, at crossing of A35 road (SU 250038), 22.iv.1976 (Hansford) (L)[2]. New Forest, Ober Water (SU 227036 & SU 268027), 28.iv.1982 (CEH) (L). New Forest, Brockenhust, Brookley Stream (SU 759199, 2.v.1991 (CEH, voucher material missing). New Forest (no other locality), 23.v.1970 (Hill) (F).

Hertfordshire: Clothall, Quickswood (TL 2732), 13.v.1917 (Edwards) (M). Letchworth (TL 23), v.1917 (Edwards) (M). Letchworth (TL 23), vi.1917 (Edwards) (F)[3]. Letchworth (TL 23), 18.v.1919 (Edwards) (M)[3].

Kent: Goudhurst (TQ7137), 22.v.1934 (Richards) (M).

Monmouthshire (Wales): Lower Wye river, Redbrook, c.8km downstream from Monmouth (SO 534100), 21.iv.2004 (CEH) (L).

Northamptonshire: Aynho Wharf, 2km SW of Aynho, Oxford canal (SP 498323), 7.iv.-5.v.2004 (Werner) (L, P)[4]. Oxfordshire border, Cherwell river at Clifton (SP 492319), 25.iv.-19.v.2004 (Werner) (L, P)[4].

Oxfordshire: Shotover (SP 5706), 16.v.1908 (Hamm) (M, paratype No. 236590 of *S. austeni*)[5]. Charlbury (SP 361197), 26.iv.2004 (Werner) (F)[6]. Cassington (SP 4510), 5.v.1959 (Smith) (M). Charlbury, Crowborough Villas (SP 361197), 10-16.v.2004 (Handley) (F). Charlbury, Crowborough Villas (SP 361197), 10.v.2004 (Werner) (F). Charlbury, Evenlode river (SP 361197), 9.v.2004 (Werner) (F, M); Evenlode at Charlbury (SP 354195), 2.iii.-27.v.2004 (Werner) (L, P)[4] [also 16.v.2004 (F), BMNH]. Combe, Evenlode river (SP 420148), 13.v.2004 (Werner) (F, L, M, P). Cherwell river, Enslow (SP 477184), 18.iii.-26.v.2004 (Werner) (F, L, M, P)[4]. Cherwell river, west of Lower Heyford (SP 478249), 11.iii.-26.v.2004 (Werner) (L, P)[4]. Cherwell river, Upper Heyford (SP 493261), 25.iii.-26.v.2004 (Werner) (L, M, P)[4]. Cherwell river, east of Grange Farm (SP 489277), 1.iv.-26.v.2004 (Werner) (L, P)[4]. Cherwell river, Kidlington (SP 505138), 26.iii.-25.v.2004 (Werner) (L, P)[4]. Cherwell river, Shipton-on-Cherwell (SP 481165), 31.iii-25.v.2004 (Werner) (L,[4]. Cherwell river, Somerton (SP 493291/494291), 25.iii.-25.v.2004 (Werner) (L, P)[4]. Glyme river, Wootton (SP 439196), 4.iii.-26.v.2004 (Werner) (L, P)[4] [also 23.iv.2004 (M) and 29.iv.2004 (F, M), BMNH]. Glyme river, Glympton (SP 425215), 11.iii-12.v.2004 (Werner) (L, P)[4]. Glyme river, Kiddington (SP 414227), 11.iii.-12.v.2004 (Werner) (L, P)[4]. Glyme river, Radford (SP 409237), 11.iii.-12.v.2004 (Werner) (L, P)[4]. Dorn river, east of Wootton (SP 447198), 25.iii-26.v.2004 (Werner) (L, P)[4]. Stonesfield, Evenlode river (SP 393165), 7.v.2004 (Werner) (F, M, P). Wytham, labelled with former county location 'Berkshire' (SP 4708), 22.v.1955 (Smith) (F, M) and 20.v.1962 (Pont) (M).

Staffordshire: Newton, Blithe river (SK O48259), 4.v.1979 (CEH) (L). Hamstall Ridware, Blithe river (SK 109190), 4.v.1979 (CEH) (L).

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[1] Recorded also in Edwards (1920, as *venustum*).
[2] Recorded also in Hansford (1978, as *austeni*).
[3] Recorded also in Edwards (1920, as *venustum*).
[4] Recorded also in Werner & Pont (2004).
[5] Recorded also in Edwards (1915, as *austeni*).
[6] Recorded also in Crosskey (2005).

Surrey: Bookham (TQ 1256), 14.v. and 17.v.1942 (Parmenter) (M). Bookham (TQ 1256), 9.v.1948 (Parmenter) (M). Box Hill (TQ 1751), 9.v.1950 (van Emden) (F). Horley (TQ 2742), 31.v.1915
(Bedford) (M)[1]. Mickleham (TQ 1753), 7.v.1961 (Parmenter) (M). Place name in Surrey illegible, v.1940 (Jobling) (F, one specimen with erroneous Jobling det. label as 'Simulium monticola').

Sussex (East): Robertsbridge (TQ 734247), 26.iv.1961 (M) and 20.v.1962 (Roper) (M). Dudwell river at Willingford 2.5km SW of Burwash (TQ 657226), 25.iv.1981 (Crosskey) (L, P)[2]. Rother river near Salehurst 1km N of Robertsbridge (TQ 735246), 29.iv.1978 (Crosskey) (L)[2].

Sussex (West): Pulborough (TQ 01), vi.1993 (King) (M). Arun river at new bridge crossing of Wisborough Green to Billingshurst road (TQ 068260), 17.v.1980 (Crosskey) (M, P)[2]. Rother river near Selham between Midhurst and Petworth (SU 935214), 23.iv.1985 (Crosskey) (L)[2]. Sparr Farm, 1.5 km NW of Wisborough Green (TQ 042273), 12.v.1980 (F) and 17.v. 1980 (? collector) (F)[2].

Warwickshire: Rugby (SP 57), 23.iv.1893 (Austen) (M, holotype No.236584 and paratypes Nos. 236585 and 236586 of *Simulium austeni*)[3].

West Midlands (Solihull U.A.): Blythe river at Temple Balshall (SP 208763), 26.iv.1982 (CEH) (L).

Wiltshire: Nadder river near Burcombe (SU 073310), 28.iv.1964 (Davies) (F, L, M, P). Salisbury (SU 1429), 26.v.1958 (Thompson) (F).

2. Records not backed by voucher specimens but almost certainly valid

To our knowledge there is no surviving material to back the following records but most of them we do not doubt and accept as valid. When considered so they feature for 10km square positional dots
on the Fig. 1 map.

a) Edwards (1920, as *venustum*).A specimen, presumably female, recorded from Oxford
b) Davies (punch card records, as *austeni*). The cards report a few specimens that should be in BMNH but are not: Durweston near Blandford (ST859090), 2.v.1968 (Merryweather) (M), Pimperne near Blandford (ST907095), 11.v.1968 (F), and 15.v.1968 (F). These were originally in the London School of Hygiene and Tropical Medicine collection but were not present among the simuliids when that collection was transferred to the BMNH.
c) Service (1966, as *austeni*). A female captured on human bait recorded from Brownsea Island, Poole Harbour (SZ 018886), 1.vi.1965. According to the Davies record card the

[1] Recorded also in Edwards (1920, as *venustum*).
[2] Recorded also in Crosskey & Crosskey (2002).
[3] Edwards (1915, recorded and described as *austeni*).

specimen was identified by him and retained in Durham; it should now be in the BMNH but is missing. The identification was almost certainly correct.

d) Hansford (1978, as *austeni*). Contains results from a distribution survey for *S. posticatum* in 1973-75, based on aquatic stages collected at sampling points on the Dorset Stour river and in several of its tributaries. Breeding sites in the latter were in rivers Cale (in ST Lydden (in ST 71) and Allen near Wimborne (in SU 00), and on the main river in the stretch near Stour Provost and Marnhull (ST 72), at Blandford (ST 80) and near Wimborne (SZ 09).

e) Welton et al. (1987). Two points representing the upstream and downstream limits of larval distribution along the Dorset Stour are mentioned, viz. respectively Shillingstone (ST 923121) and Longham (SZ 065973). Eggs, apart from at Blandford (ST 886061), were obtained from the Stour in the vicinity of Durweston (ST 8608), Bryanston (ST 8706), Charlton Marshall (ST 9004), Shapwick (ST 9301) and Canford (SZ 0398).

f) Cassella & Hay (1991). These authors reported *S. posticatum* biting man in June 1989 at Saffron Brook near Knighton, about 5km south of Leicester City Centre (10km square SK 6000). A medical report was provided but no data on number of specimens or their identification. We have no information about specimens relating to this record, which our knowledge is the only one at present relating to Leicestershire. However, noting that *S. posticatum* breeds not far away in the Blythe river (Warwickshire), we suspect that sites for it will be found in Leicestershire: provisionally we treat the Cassella & Hay report as based on a valid identification.

g) Welton & Ladle (1993). These authors have given a map (p. 773, fig. 1(b)) outlining the approximate limit over which Dorset has been affected by Blandford Fly biting activity at its maximum extent (1988). The O.S. grid is not marked on the map but when the grid is superimposed it becomes evident that *S. posticatum* can be validly recorded as present (sometimes at least) in the following 10km squares: ST 60, ST 70, ST 71, ST ST 81, ST 82; SU 00, SU 01, SU 11; SY 69, SY 78, SY 79, SY 88, SY 89, SY 97, SY 98, SY 99; SZ 07, SZ 08, SZ 09, SZ 19, SZ 29. (Note that extant specimens verifying the occurrence in ST 80, ST 81, ST 90, ST 91, SU 00, SU 10 and SZ 09 are present in the
BMNH collection, as entered in the material list above.)

h) Williams (1991). This work reported the collection of aquatic stages from rivers in the SP 31), Glyme (in SP 41), Ock (in SU 49), Seacourt (in SP 40), Thame (in SU 59, SU 60), Thames (in SP 41) and Windrush (in SP 30). (See the paper for full details of places and complete six-numeral Grid references.) So far as we know there is no surviving to prove for certain that all the material was correctly identified. However, recent investigations by one of us (DW) have shown that *S. posticatum* breeds abundantly in the rivers of north Oxfordshire and this does much to suggest corroboration for findings. At the time of his collections Williams was at the Institute of Virology and Environmental Microbiology but a check on our behalf (Jenny Cory, pers. comm. to A.C. Pont, 20 pupae on which the Williams paper is based were either not kept or were abandoned and later lost.

i) McCrae & Hill (1994). In May-June 1993 these authors collected female flies near the Evenlode river at Stonesfield, Oxfordshire, where biting *Simulium* are known as the 'Stonesfield Stinger'. The material was used for blood-meal and ovarian development investigations and there are no preserved voucher specimens backing the record (McCrae

to RWC, pers. comm. September 2003). Nevertheless, as Angus McCrae knew *S. posticatum* in Dorset, and as the field-work of one of us (DW) has shown the species to be abundant in Oxfordshire we are sure that it was correctly identified. A sample was obtained from Stonesfield (SP3916) on 5.vi.1993.

j) CEH missing voucher material. In a few instances no CEH material was found linking to database records, viz. those for Dorset: Sturminster Newton, Lydden river (ST 765147),
4.iv.1991; Stalbridge, Cale river (ST 759199), 2.v.1991; West Moors, Uddens Water 297023), 2.v.1991. These are all likely to be valid as they correspond closely with vouchered sites listed in Section 1 or in Hansford, see (d) above.

3. Records backed by voucher specimens but their identity uncertain

a) CEH material. This category concerns larvae held by the CEH which re-examination (by JABB, iii.2006) has shown to be not definitely identifiable as *S. posticatum* because of the bleached condition of the head capsules. Some if not most of the records perhaps correctly apply. They are: Hampshire: New Forest, Ober Water (SU 227036, SU 268027), 28.iv.1982. Oxfordshire: Evenlode river, Cassington (SP 448102), Fawler (SP 366173) and Lyneham (SP 274197), 15.v.1978. Staffordshire: Uttoxeter area, Blithe (SK 024334), 4.v.1979. Warwickshire: Blythe river at Packington Ford, 4km SSE of Coleshill (SP 218852), 26.iv.1982. It is quite likely that re-sampling at these sites would validate these records. Those for Ober Water and the Evenlode river correspond with vouchered sites mentioned above in the county list.

4. Other records, erroneous or very dubious

a) Edwards (1915, as *austeni*). A female from Suffolk, Barnham (TL 8779) was mentioned within the original description of the male of *S. austeni*. No precise capture date was given but Edwards gave the date range for all the mentioned specimens as 23 April to 22 May (fitting for *posticatum*). However, the specimen is missing and in its absence record is dubious because Edwards was unsure that it was truly *austeni* "Female (if correctly identified in a single specimen from Barnham)". The same point about the date range applies also to a male missing from BMNH that Edwards (op. cit.) recorded from
Felden, Herts (TL 0404).

b) Edwards (1920, as *venustum*). The female recorded (p. 233) from 'Shrewsbury, *S. posticatum*. Unaware of this, Davies marked (as *austeni*) the Shrewsbury record on his punch cards and included a 10km square dot on his map for this species in the position of Shrewsbury (SJ 41) (Davies, 1968: 117, map 26). Because of the dot should be removed from map 26 and marked at SJ 41 on his map 25 for *morsitans*. It is a significant change inasmuch as there are few reliable records for *S. morsitans* and the Davies map dot in position SJ 41 makes *S. posticatum* range appear to extend further northwest than (on present knowledge) it should.

c) Cloudsley-Thompson (1955, as *venustum*). This record concerns two female simuliids collected while biting the author in his garden at Esher (Surrey), not far from the river

Ember (Mole) (TQ 145659), on 14.viii. and 5.ix.1954. Identification (as *venustum*) was by John Smart. The specimens are no longer in Cloudsley-Thompson's hands and we have not been able to locate them, but the August-September dates would be exceptionally late for the univoltine *S. posticatum* and we believe them to have been misidentified.

d) Davies (punch card records, as *austeni*). A card reports a male fly caught by P. Roper near the Medway river at Tonbridge (TQ 5845), 14.viii.1961. The specimen is clearly the basis for the spot marking for 10km square TQ 54 on the map for *S. posticatum* (as *austeni*) in Davies (1968: 117, map 26). It should be in the BMNH but is missing. A reason to doubt the record is the exceptionally late seasonal collection date.
(NY 996844), Middleton (NZ 053842) and Meldon (NZ 119850). The head capsules are too bleached for the identity of the larvae to be confirmed and we treat the Wansbeck records as particularly dubious. There is no other evidence for *S. posticatum* breeding so far north in Britain. The position is marked on Fig. 1.

5. Collection dates in relation to identification

Simulium posticatum has a univoltine generational strategy (Hansford, 1978; Welton et al., 1987; Welton & Ladle, 1993). Eggs are laid in about June and, remaining in a lengthy diapause, do not hatch until about February or March of the following year. Pupation takes place in April or May (typically mid or late May). This tight seasonal restriction on when adults are on the wing implies that an identification as *S. posticatum* of any adult fly captured much later than the normal adult date range has to be treated as suspect - even though natural minor variations year to year in emergence patterns occur.

Already, early on, Edwards seems to have guessed the significance of dates. Commenting on the time of adult appearance, he observed that "the dates of capture of the specimens examined only from 23rd April to 22nd May" (Edwards, 1915: 33, as *austeni*); the "only" suggests he found such a short period unexpected. The earliest and latest capture dates among the adult flies in the BMNH collection (now enormously enlarged from Edwards' time) are nearly identical, the range extending from April 23rd to June 2nd (in the case of males from April 23rd-May 31st and females from April 26th-June 2nd). Later dates, but not much later, have been reported in the literature. Ladle et al. (1985) found gravid females seeking oviposition sites on June 4th [1984], Ladle (1979) observed swarming activity up to but not after June 12th [1973/1974], and McCrae & Hill (1994) observed flies at Stonesfield on June 5th and 10th [1993], a time when flies were coming 'to the end of the biting season'.

It is because of the date question that we hesitate to accept at face value the records (see above under Cloudsby-Thompson and Davies punch cards) for two females from Esher (Surrey) with the capture dates August 14th and September 5th, and the record for a male from Tonbridge (Kent) with the capture date August 14th. None of the three specimens concerned has been found, though that from Tonbridge should be in the BMNH ex Davies collection. Given the highly dubious nature of

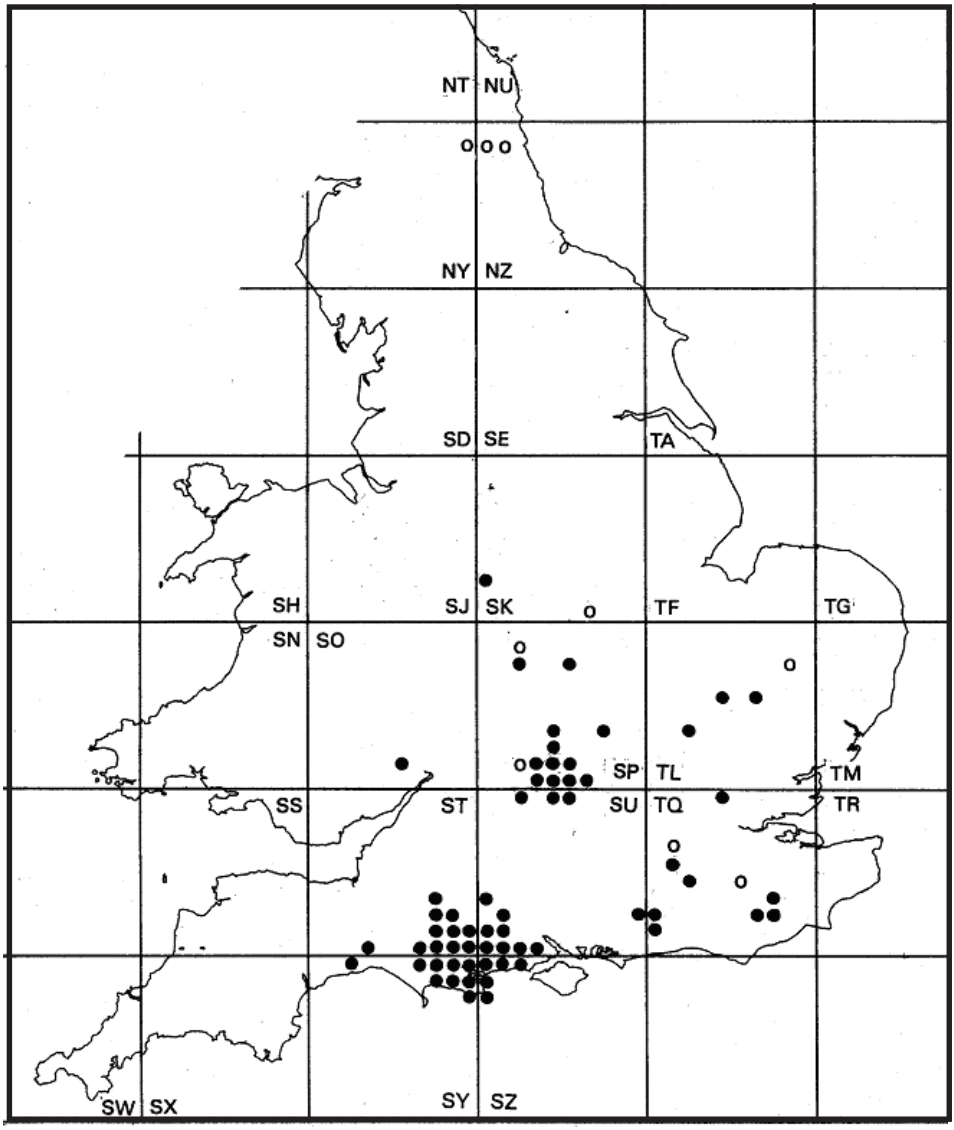

Figure 1 The geographical distribution of *Simulium posticatum* in Britain shown on the 10km square National Grid system and based on records provided in the text. Solid black dots represent at least one verified or accepted record for the square concerned, open circles indicate questionable records in other squares.

6. Overview of the British distribution of *S. posticatum*

Edwards (1939) observed that the "distribution of *S. venustum* [=*posticatum*] in Britain ... is almost confined to the south and south-east of England". At that time there were still few British records, but Edwards' geographical picture was supported later by Davies, who provided the first map (1968, as *austeni*, p. 117, map 26). Now, when there are considerably more records than were available to Davies, the pattern of distribution can be seen as more extensive than previously realised, but even so the near-confinement of the breeding range to England south of the Trent and east of the Severn - as demonstrated by the new map we provide (Fig. 1) - is striking. However, this limitation will prove to be false if the presence of *S. posticatum* in the Wansbeck Northumberland can be verified (as said above, the extant CEH larvae from here are too bleached to confirm the species). Still, Gloucestershire, Monmouthshire and Staffordshire are examples of counties now confirmed as coming within the breeding distribution range. Virtual absence of records from East Anglia remains curious, especially as *S. posticatum* was not found in the course of Post's (1981) collections of Simuliidae in Norfolk, some of which were undertaken during the spring, the time of year likely to reveal the early stages in the sampled rivers. As to Scotland, of Man and the Channel Islands, the absence of *S. posticatum* can probably be attributed in large part if not entirely to the lack of suitable rivers to provide the breeding habitat.

It is an interesting question why *S. posticatum* should have a much more restricted geography than the species such as *S. erythrocephalum*, *S. equinum* and *S. ornatum* s.l., which are often sympatric with it but occupy a much more widespread total range (all occurring at least over most of England and to some extent into Scotland and Ireland). It seems that a limiting factor, if not limiting factor, might be the 'fussy' nature of the oviposition habits and requirements - as first described by Ladle et al. (1985) from observations on the Dorset Stour. Instead of seeking conventional laying sites where the eggs are submerged in river water the gravid flies enter cracks river bank above the waterline and there release the eggs. Providing these stay sufficiently damp the eggs will survive prolonged dormancy to hatch several months after being laid, when they become properly wetted following the winter rise of river level. The criteria applying most importantly to this oviposition strategy are that the river banks should be nearly vertical, the river bank soil moist, loamy and brown, and the soil fissures not very deep (Welton, et al. , 1987; Ladle & Welton, 1996); shaded stretches of river appear to favour egg-laying. Presumably soil of a crumbly nature would be necessary so that the eggs become readily released from the broken soil into the river when ready to hatch. After the long dormancy the subsequent release of hatching larvae from the river bank soil and their access to lowland rivers might be helped by extended periods of inundation. It is noteworthy that floods occur over relatively short timescales in high gradient upland watercourses and are more irregular in occurrence in South East England; both scenarios possibly restrict the stimulation of egg hatching and/or timely release of larvae into the river.

Given this set of requirements it could be useful to seek out breeding sites of *S. posticatum* in areas where the rivers would probably be of suitable character but where little simuliid sampling has been done, for example in Bedfordshire, Northamptonshire and Suffolk. The oviposition habit may well explain the absence of *S. posticatum* from upland Britain, where the rivers are mainly swift and rocky and their banks unsuited to the specialized egg deposit strategy.

References

Bass, J. [A.B.] (1998). Last-instar larvae and pupae of the Simuliidae of Britain and Ireland: A key with brief ecological notes. *Freshwater Biological Association Scientific Publication* **55**: 1- 101 [+ 1 p. index unpaginated].

Cassella, J.P. & Hay, J. (1991). Dermal lesions and *Simulium posticatum*: a report from Central England. *Entomologist* **110**: 29-32.

Cloudsley-Thompson, J.L. (1955). The black-fly, *Simulium venustum*, biting man. *Entomologist* **88:** 18-19.

Crosskey, R.W. (2005).A perspective on anthropophily in British blackflies (Diptera, Simuliidae), with keys for the identification of the culprit species. *Dipterists Digest* **12**: 29-58.

Crosskey, R.W. & Crosskey, M.E. (2002). A breeding site survey of Simuliidae (blackflies) in South East England. Part 1. Sampling sites and species distribution records. *Dipterists Digest* **9**:
stages. *Freshwater Biological Association Scientific Publication* **24**: 1-126.

Edwards, F.W. (1915). On the British species of *Simulium*. - I. The adults. *Bulletin of Entomological Research* **6**: 23-42.

Edwards, F.W. (1920). On the British species of *Simulium*. - II. The early stages; with corrections and additions to Part I. *Bulletin of Entomological Research* **11**: 211-246.

Edwards, F.W. (1939). Nematocera. Pp. 1-66 in Edwards, F.W., Oldroyd, H. & Smart, J. British blood-sucking flies. viii + 156 pp. British Museum, London.

Hansford, R.G. (1978). Life-history and distribution of *Simulium austeni* (Diptera: Simuliidae) in relation to phytoplankton in some southern English rivers. *Freshwater Biology* **8**: 521-531.

Hansford, R.G. & Ladle, M. (1979). The medical importance and behaviour of *Simulium austeni* Edwards (Diptera: Simuliidae) in England. *Bulletin of Entomological Research* **69**: 33-41.

Ladle, M., Bass, J.A.B. & Cannicott, L.J. (1985). A unique strategy of blackfly oviposition (Diptera: Simuliidae). *Entomologist's Gazette* **36**: 147-149.

Ladle, M. & Welton, [J.] S. (1996). An historical perspective of the 'Blandford Fly' (*Simulium posticatum* Meigen) problem and attempted control of the pest species using *Bacillus thuringiensis* var. *israelensis*. *Integrated Pest Management Reviews* **1**: 103-110.

McCrae, A.W.R. & Hill, N. (1994). Host selection by the Blandford Fly (*Simulium posticatum* Meigen), with blood-meal identifications. *British Simuliid Group Bulletin* **3**: 23-27.

Post, R.J. (1981). The distribution of blackflies (Diptera: Simuliidae) in Norfolk. *Transactions of the Norfolk and Norwich Naturalists' Society* **25**: 153-163.

Service, M.W. (1972). Observations on swarming of adults of *Simulium (Simulium) austeni* Edwards (Dipt., Simuliidae). *Entomologist's Monthly Magazine* **107**: 167-168.

Welton, J.S., Bass, J.A.B., Ladle, M. & Merrett, W.J. (1987). Distribution of oviposition sites and characteristics of egg development in the 'Blandford Fly' *Simulium posticatum* (Diptera: Simuliidae). *Journal of Applied Ecology* **24**: 865-879.

Welton, J.S. & Ladle, M. (1993). The experimental treatment of the blackfly, *Simulium posticatum* in the Dorset Stour using the biologically produced insecticide *Bacillus thuringiensis* var. *israelensis*. *Journal of Applied Ecology* **30**: 772-782.

Werner, D. & Pont, A.C. (2004). Blackflies in the Cherwell District Council Area: a survey of the River Cherwell and its tributaries. Report to Cherwell District Council, 34 pp., Banbury, Oxfordshire.

Williams, T. (1991). The ubiquitous occurence [sic] of *Simulium posticatum* (Diptera) in rivers around Oxford. *Entomologist* **110**: 33-36.

The
British Simuliid Group
28th Annual Meeting

Oxford University Museum of Natural History

Wednesday 12th September 2007

The British Simuliid Group (BSG) is an informal gathering of scientists of any discipline, from many countries, who have an interest in the Simuliidae. The group's members include entomologists, parasitologists, environmentalists, ecologists and medics, with interests in ecology, bionomics, taxonomy, cytotaxonomy, disease transmission, freshwater biology etc. Our aim is to assemble as diverse a group as possible in order to encourage a wide interchange of ideas and information. The British Simuliid Group 28th Annual Meeting will be held in the lecture theatre of the Oxford University Museum of Natural History on Wednesday 12th September 2007, the meeting will open at 10.00 am and close at 4.30 pm. Members are invited to present novel work which will be published in abstract form in the British Simuliid Group Bulletin later in the year.

Presentations

Oral presentations will be allocated a 30 minute slot, with a maximum of 20 minutes for presentation, followed by 5 minutes for questions. Powerpoint presentations are encouraged, but slide and overhead projectors will also be available. Poster presentations should be designed to fit poster boards of 2x1m, in a portrait format.

All presenting authors must register, supplying a full title by the 31st May 2007 to John B. Davies (contact details below). Abstracts and short papers should be provided by the 1st August 2007.

Dinner

Adrian Pont will be arranging an informal dinner prior to the meeting on the 11th September 2007. The meal will be at the Chiang Mai Kitchen, a very popluar venue in Oxford. Those wishing to attend should contact Adrian via Email: pont.muscidae@btinternet.com as soon as possible in order to secure a table.

Enquiries

All enquiries regarding the Annual Meeting should be directed to:
John B. Davies, 57 North Parade, Hoylake, Wirral, CH47 3AL, UK.