

## THE BRITISH SIMULIID GROUP (BSG) - AN HISTORICAL SKETCH

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**ABSTRACT** – The key points in the development of knowledge of Simuliidae in Britain are briefly summarized as background to an account of the British Simuliid Group and its current activities. The formation, purposes, membership, meeting attendance, and publications of the Group are briefly described and references provided to its Internet and Web associations. A chart is included showing the numbers of members on the mailing list since the Group started in 1979 up to the present time (2006). Notable points pertaining to the *British Simuliid Group Bulletin*, the Group's hard copy and electronic publication, are highlighted.

**KEY WORDS:** British Simuliid Group, history, Simuliidae

## SIMULIID RESEARCH IN BRITAIN - MAIN HIGHLIGHTS

### Early years:

In the early days of blackfly studies, the eighteenth and nineteenth centuries, British naturalists contributed little to the advance of knowledge. There was nobody in Britain to equate with J.W. Meigen (1764-1845) in Germany. In contrast to Meigen, who between 1804 and 1838 described many species and established a good footing for the western European fauna (MEIGEN, 1804, 1838), only one species was described in Britain in the whole of the nineteenth century - *Simulium trifasciatum*, which the artist-naturalist John Curtis (1791-1862) named and illustrated in his *British Entomology* (CURTIS, 1839). Worthy of mention, however, is the fact that Edward Newman (1801-1876) used the collective Latin noun Simuliites for blackflies in the *Entomological Magazine* for the first time (NEWMAN, 1834) and that under the rules of nomenclature this constitutes establishment of Simuliidae as the valid family name.

### The middle period:

At the turn of the twentieth century, blackflies were scarcely better known in Britain than they had been fifty years and more earlier - there was little literature and much ignorance. A decade later, however, matters were much improved by the appointment in 1911 of F.W. Edwards (1888-1940) as a dipterist in the British Museum (Natural History) in London - an institution later known simply as the Natural History Museum (NHM). Edwards was responsible for Nematocera and soon published two ground-breaking papers on British simuliids in the *Bulletin of Entomological Research*, the first on adults (EDWARDS, 1915) and the second on aquatic stages (EDWARDS, 1920). Both works contained descriptions and keys to known and new species and attempted to relate names in the continental European literature to the British fauna. Carl Lundström (1844-1914) of Helsinki had shown the importance of male genitalia in the taxonomy of Simuliidae (LUNDSTRÖM, 1911), and Edwards was not slow to follow, illustrating the hypopygium for each British species. During the 1920s, Edwards was mentor to I.M. Puri, who came to Britain from the Punjab and published (PURI, 1925) a much-admired and still widely consulted work on the morphology and anatomy of the larva. The 1930s and 1940s were the era of John Smart (1907-1986). A Scot from Edinburgh, he joined the NHM in 1934, working alongside Edwards in the Diptera Section and formally becoming responsible for the Simuliidae when Edwards died prematurely in 1940. In the 1930s, Smart researched the biology and adult anatomy of *Simulium ornatum*. In the next decade he turned to taxonomy, preparing keys to the British fauna for the Freshwater Biological Association (FBA) (SMART, 1944) and a monograph on world classification (SMART, 1945), both important works but strongly derivative from Edwards. Oddly, the importance of the postgenal cleft in larval recognition was overlooked, just as it always had been by Edwards. In 1943 the NHM issued Smart's *Handbook for the Identification of Insects of Medical Importance*, a book valued by a broad public concerned with arthropod-borne disease.

### The modern era:

#### (1) The 1950s

Paul Freeman was appointed to the NHM in 1947 and took responsibility for the Simuliidae, Smart having moved to Cambridge University in the previous year. In world terms the Museum has the largest simuliid collections and relevant libraries, hence workers starting into simuliid research or needing help from Freeman with specimen identification gravitated towards the NHM. Freeman never collected simuliids personally or worked on the British fauna but even so it is appropriate to regard him as initiator in the early 1950s of the modern era of research. With his South African colleague, Botha de Meillon (1902-2000), he prepared a fine monograph entitled the *Simuliidae of the Ethiopian Region* (FREEMAN & DE MEILLON, 1953) which the NHM issued in 1953. It was a landmark, enabling workers in Africa to identify the species that were or might be vectors of 'river blindness' (human onchocerciasis) and which needed to be dealt with in order to control this major filarial disease. Two medical entomologists with a background in African onchocerciasis took root in the Museum, working beside Freeman, D.J. Lewis ex Sudan and R.W. Crosskey ex Nigeria. Lewis (1909-1986) was employed by the Medical Research Council from 1956 onwards but worked at the NHM for access to the collections, Crosskey was with the Commonwealth Institute of Entomology within the Museum from 1959 and transferred to the NHM formally in 1972. Their research was largely taxonomic. On other fronts, research was just starting in a big way, most evidently with ecological work of Lewis Davies at Durham University and physiological research by H.E. Hinton (1912-1977) at Bristol University. Hinton's work helped greatly in the understanding of larval and pupal respiration and the significance of pharate phases in life-stage metamorphosis.

## (2) The 1960s to mid 1970s

Research in Britain intensified in the late 1950s but got more fully into stride in the 1960s and 1970s. Africa was a main focus and several large papers appeared, one of them (for example) providing (1960) the first keys to the larvae of West African species. Lewis Davies tackled the British fauna taxonomically in the early '60s, preparing a new faunal monograph which was published by both the Royal Entomological Society (1966) and the FBA (1968); it had new keys superseding those of Smart, and, being a major text for identification, was welcomed in mainland Europe as much as Britain. *Simulium posticatum* began towards the end of the decade to be a man-biting pest in the south of England (Dorset), where it was soon dubbed the 'Blandford Fly' after the town most affected. Public pressure required that something be done to alleviate the problem and, under the leadership of M. Ladle, the fly was soon subjected to intensive research at the FBA River Laboratory. However, for many simuliidologists in Britain onchocerciasis was the all-absorbing theme - so much so that Ladle warned at the BSG founder-meeting (1979) that the Group must not become a mouthpiece just for medical entomologists. It was a point well made.

## (3) Mid 1970s to 1990

In the mid-1970s the World Health Organization began its massive scheme - the OCP or Onchocerciasis Control Programme - to eradicate 'oncho' from much of West Africa and this was drawing many people in Britain into research where the rationale was primarily to assist WHO (e.g. with their field problems caused by vector reinvasion of controlled areas and insecticide resistance). About this time the NHM was designated by WHO as an international reference centre for *Simulium*. Some of the many research topics in Britain at this time were *Simulium damnosum* cytology and morphometrics, *S. neavei* group taxonomy and taxonomy of associated crabs, oviposition and egg pheromones, flight range, larval morphology and nutrition, fungal and mermithid parasites, laboratory colonization, and *Onchocerca* transmission. Liverpool University, the Schools of Tropical Medicine at Liverpool (LSTM) and London (LSHTM) and the Anti-Locust Research Centre - since metamorphosed through several moults into Greenwich University - were some of the centres where such research took place. An important new development occurred at the NHM when (1979) A.J. Shelley was recruited from Brazil for research on Neotropical blackflies, especially the taxonomy and parasitology of onchocerciasis vectors in the Amazon basin.

Much of the work undertaken in Britain in the 1970s continued into the next decade, usually with considerable development. Investigations of R.S. Wotton into larval biology, especially nutrition, begun in the late '70s, continued through the '80s and resulted in publications on the little-studied lake outlet species *S. noelleri* and on unusual topics (coprophagy, for instance). Work at many institutions continued apace, not least at the River Laboratory, where J.A.B. Bass and colleagues discovered that *S. posticatum* has a unique oviposition strategy, laying its eggs in river-bank soil above the waterline. At Liverpool School of Tropical Medicine, four groups headed by H. Townson, R.J. Post, P. Ham and J.B. Davies concentrated on the *S. damnosum* complex investigating isoenzyme electrophoresis and morphometrics, cytology, immunological reactions by the vector to parasites, and vector/*Onchocerca* transmission dynamics, respectively.

The 1980s was a 'bumper' decade at the NHM because research on Simuliidae became officially recognized as one of the priority aims of the Entomology Department. The Canadian W.S. Procunier was taken on for chromosome studies on onchocerciasis vectors but was succeeded, after a short tenure, by another cytologist, Magda Charalambous. Shelley became a 'frequent-flier' to South America and produced a major series of papers on the Neotropical fauna authored jointly

with Brazilian collaborators. Crosskey's taxonomic interests shifted gradually from Africa towards the southwestern Palaearctic region, resulting in papers on the simuliids of the Atlantic and Mediterranean islands and (later) the Middle East and Spain. In 1988 the first complete checklist of Simuliidae since Smart's 1945 catalogue was published (CROSSKEY, 1988) and in 1990 Crosskey published a book called *The Natural History of Blackflies* that attempted to provide a comprehensive account of simuliid biology (CROSSKEY, 1990).

#### (4) 1991-2006

To some degree blackfly research declined in Britain during this period, but there was nevertheless much going on here and there, either in continuation of projects from the previous decade or in the starting up of new research lines. New lines are exemplified by a project, headed by R.J. Post (NHM), in which simuliids - beginning with the British fauna and the African *S. damnosum* complex - will be taxonomically 'barcoded' by molecular cytogenetics. Prime among the continued projects are the research on Neotropical simuliids under Shelley and the struggle with *S. posticum* on the Stour river in Dorset. In the 1990s the Neotropical research work brought in Charalambous to provide the cytological arm and this produced several papers by her jointly with Shelley and other authors; most of these were concerned with South American onchocerciasis vectors. The Neotropical work was strengthened by acquisition in the late '90s of the latest specimen-imaging equipment, and in 2004 by formal appointment of L. Hernandez-Triana to work alongside Shelley. In England, Ladle finally got approval in 1991 to use *Bti* insecticide against *S. posticum* and the Stour was dosed that year and the next in a control operation - the only one ever against *Simulium* in Britain - that has been "generally regarded as a success". Elsewhere in Britain blackfly records were gathered as part of the river surveys conducted by the Centres for Ecology and Hydrology. New identification keys to larvae and pupae of British species were published by Bass (BASS, 1998) and now largely replace the earlier keys of Davies (DAVIES, 1966, 1968). For the Afrotropics mention should be made of research by R.A. Cheke (Greenwich University) and P.J. McCall (LSTM) in Bioko, which led on to a comprehensive investigation of the simuliids of the Gulf of Guinea islands, involving Post's expertise in *S. damnosum* cytotaxonomy, and apparently successful onchocerciasis vector eradication from Bioko. Research on onchocercal transmission and host-parasite immunology was pursued at several centres, for example by M.-G. Basañez at Imperial College. To conclude this short synopsis of recent activities, reference is apposite to a taxonomic and geographical inventory of world Simuliidae by Crosskey and Theresa M. Howard; this was first issued by the NHM in 1997 (CROSSKEY & HOWARD, 1997) as a printed monograph and was updated to 2004 on the Web (CROSSKEY & HOWARD, 2004).

### THE BRITISH SIMULIID GROUP

#### Formation and membership of the Group

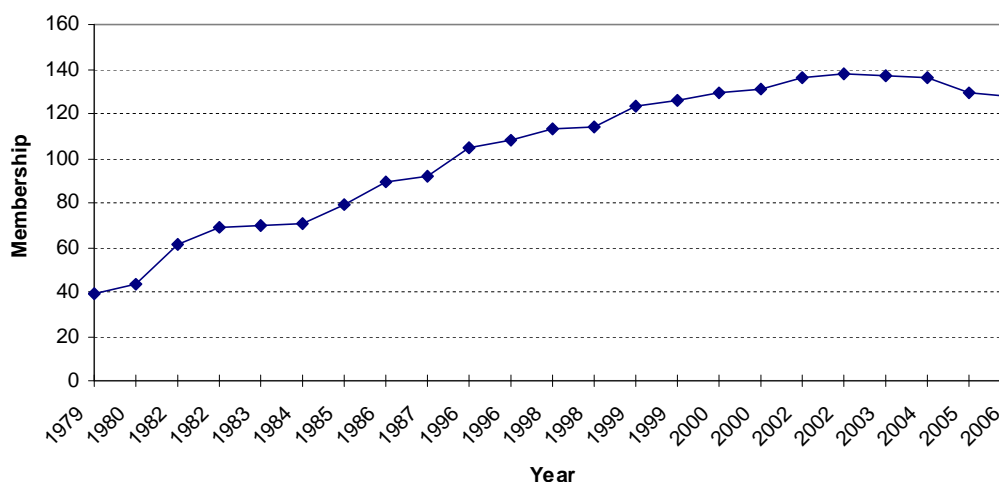
By the late 1970s, with so much going on around Britain, it seemed that it would be mutually beneficial if closer liaison could be established between those working on different but often related topics. At a meeting organized by RWC at the Natural History Museum in London it was agreed to form a 'British Simuliid Group' with (initially) Trefor Williams of Liverpool University as the prime organizer of an informal get-together once each year and also as the producer of a modest Newsletter. Group membership would be free of charge (as it remains today) and open to anyone expressing an interest in blackflies. As a start, 39 people in Britain provided Trefor Williams with their names, addresses, and research topic interests and formed the nucleus of the membership. The first *Newsletter* appeared in April 1979 and the first scientific meeting was held at

Liverpool School of Tropical Medicine later that year. Announcement in the first *Newsletter* established that the Group was:

“... aimed at maintaining and developing contacts between those interested in simuliids and will provide for the exchange of news, information, requests, and ideas concerning all aspects of simuliid biology”

Membership grew at an average rate of four new members each year, and by the time of the Group's 25th Annual Meeting in 2003 (the time of its Silver Jubilee), the list stood at a near-maximum of 137 members. The membership figures at particular times are shown on the accompanying chart (Table 1).

Table 1. Number of members on mailing list.



Much of the increased membership, particularly over the past ten years, has been due to the interest in the Group shown by workers outside Britain, and from a range of disciplines. This has led to an expanded version of the Group's purpose, which now reads:

“The British Simuliid Group 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, cytogenetics, 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 composition of the membership is currently about 47% from Britain and 53% from overseas (Europe including Iceland and Baltic States 19%; North America 18%; South and Central America 7%; Africa 7%; Asia and Australasia 2%).

One meeting is normally held annually and there has been a BSG meeting every year since the meeting mentioned above at the Liverpool School of Tropical Medicine (LSTM) in 1979 - with

the exception of 2004, when the BSG meeting was combined with that of the German equivalent group of BSG to form an international meeting in Berlin, and this year (2006), when there will be no meeting separate from the Second International Simuliidae Symposium at Novi Sad (Serbia). The meetings have been distributed between 12 different locations in England and attendance at them has fluctuated between 12 and 45, with about 29 persons about average. A recent trend is for attendance by overseas members, and at various times BSG meetings have been able to welcome friends from Argentina, Belgium, Brazil, Canada, Colombia, Germany, Ghana, Guatemala, India, Italy, Ivory Coast, Netherlands, Nigeria, Norway, Portugal, Russia, Serbia, Slovakia, Spain, and Venezuela. Over the last few years, as some older members died, retired or abandoned science there has been slight loss of membership and the membership total now stands at 129.

#### Publications and the World Wide Web

With membership so widely distributed around the world, the Group is held together by its publications, currently the *Bulletin* which replaced the *Newsletter*. The latter ran from April 1979 to June 1987 in 13 issues, when it suffered an eclipse until reborn as the much improved *Bulletin*, No. 1 of which was issued in May 1992. So far we have been able to issue the *Bulletin* every 6 months free of charge to members and some libraries, and its wide-ranging contents are recorded in the Zoological Record. To date, 26 issues have been published, initially by the University of Liverpool and since 2002 by the Natural History Museum, London. The editorship passed from Trefor Williams to John Davies in 1994. Copies of the *Bulletin* are posted on the internet and are available for download at [www.blackfly.org.uk](http://www.blackfly.org.uk), the website devoted to general blackfly information, run by the *Bulletin*'s editor. The Group also subscribes to an electronic mail/discussion list – “Simuliidae” – which anyone can join at [jiscmail@jiscmail.ac.uk](mailto:jiscmail@jiscmail.ac.uk) or [www.jiscmail.ac.uk](http://www.jiscmail.ac.uk).

## 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: 1-102.
- CROSSKEY, R.W., 1988. An annotated checklist of the world blackflies (Diptera: Simuliidae). pp 425 -520. in KIM, K.C. & R.W. MERRITT (Eds), *Black flies: ecology, population management, and annotated world list*. XV+ 528 pp. (1987) Pennsylvania State University, University Park and London.
- CROSSKEY, R.W., 1990. The Natural History of Blackflies. ix + 711 pp. John Wiley, Chichester.
- CROSSKEY, R.W. & T.M. HOWARD, 1997. A new taxonomic and geographical inventory of world blackflies (Diptera : Simuliidae). 144 pp. The Natural History Museum, London.
- CROSSKEY, R.W. & T.M. HOWARD, 2004. A revised taxonomic and geographical inventory of world blackflies (Diptera : Simuliidae), <http://www.nhm.ac.uk/research-curation/projects/black-flies/index.html>
- CURTIS, J., 1839. British Entomology, 16 plates, 722-769. London.
- DAVIES, L., 1966. The taxonomy of British black-flies (Diptera: Simuliidae). Transactions of the Royal Entomological Society of London, 118 (14) : 413-511.

- DAVIES, L., 1968. A key to the British species of Simuliidae (Diptera) in the larval, pupal and adult 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 (1): 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 (3): 211-246.
- FREEMAN, P. & B. DE MEILLON, 1953. Simuliidae of the Ethiopian region, vii + 224 pp. British Museum (Natural History), London.
- LUNDSTRÖM, C., 1911. Beiträge zur Kenntnis der Dipteren Finlands VII. Melusinidae (Simuliidae). Acta Societatis pro Flora et Fauna Fennica, 34 (12): 5-25.
- MEIGEN, J.W., 1804. Klassifikation und Beschreibung der europäischen zweiflügeligen Insekten. (Diptera Linn.) 1. Erste Abtheilung. xxviii + 1-152 pp., Braunschweig [= Brunswick].
- MEIGEN, J.W., 1838. Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten 7 (supplementary volume), xii + 434 pp. Hamm.
- NEWMAN, E., 1834. Attempted division of British insects into natural orders. Entomological Magazine 2: 379-431.
- PURI, I.M., 1925. On the life history and structure of the early stages of Simuliidae (Diptera, Nematocera) [Part I]. Parasitology, 8 (3): 295-335 .
- SMART, J., 1944. The British Simuliidae with keys to the species in the adult, pupal and larval stages. Freshwater Biological Association of the British Empire Scientific Publication 9, 1-57.
- SMART, J., 1945. The classification of the Simuliidae (Diptera). Transactions of the Royal Entomological Society of London, 95 (8) : 463-528.