The Simuliid Bulletin

Number 58 July 2022

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Cover Image: *Simulium maximum* female (photo: Samuel Krčmárik)

From the Editor

After more than two years of covid pandemics, I can begin this editorial with good news. The travel restrictions are lifted, and we can finally meet in person. All black fly researchers, students, and enthusiasts are cordially invited by Boutaïna Belqat and the other members of the organization committee to the IX International Simuliidae Symposium, which will take place in Chefchaouen, Morocco. The abstracts from the meeting will be published in the January issue of the Simuliid Bulletin.

Tatiana Kúdelová, Editor

FORTHCOMING MEETINGS

The IX International Simuliidae Symposium, Chefchaouen, Morocco

September 19-23, 2022

Dear friends and colleagues,

You are cordially invited by Boutaïna Belqat and the other members of the organizing committee to **Chefchaouen, Morocco** to meet with colleagues and share your research ideas on black flies.

Arrivals and registrations will begin Monday, **September 19.**

Accommodation

We suggest **the Parador Hotel**, 4 stars, where the conference will be held. https://www.hotel-parador.com/es/index.html

We also suggest a 5-star hotel, for those who wish: **Lina Ryad & Spa** in the Old Town at 750 m of Chefchaouen center.

Rooms in traditional houses can also be arranged

For more information, please contact belqat@gmail.com.

Special Dietary Needs

If you have special dietary requirements for the conference meals, please contact Dr. Boutaïna Belqat (belqat@gmail.com) upon registration.

Visa

For more information, please visit the web site http://www.travel-inmorocco.com/modules/

Letters of Invitation

Please, note that official letters of invitation for grant purposes or visa will be sent to you upon request by emailing Boutaïna Belqat (belqat@gmail.com).

Arrival/Transportation

Tangier Ibn Battouta International Airport has some direct links to continental Europe. It is located about 10 km from Tangier city.

Getting from Tangier Airport to Chefchaouen takes about 2.5 hours.

Special “Grand-Taxi’s” are the public option available to get from Tangier airport to the city (10 €). Transport to Chefchaouen can be done by a second taxi from Tangier to Chefchaouen (70 € paid between 6 travelers) or directly from the airport to Chefchaouen (800 Dh).

The organizers can arrange for participants with similar arrival times to share taxis to reduce costs.

Ferry: ferries crossing the Strait of Gibraltar are also available for participants that

want to travel in their own vehicles. Ferries depart from Algeciras and Tarifa (southern Spain) to Tangier-Med or Tangier city.

For more information on how to get to Chefchaouen please contact us.

Registration

Standard registration fee is **200 €** (1), with second delegate rate for spouses/accompanying persons of **150 €** (2). Late registration fee is 250 €. The registration fee for students is **100 €** (3).

The details of the bank account for your registration to the IX International Simuliidae Symposium are:

IBAN: ES75 2100 2701 1315 0004 8468

BIC: CAIXESBBXXX

Please indicate the title of the operation; please note: IX International Simuliidae Symposium

Abstract Deadline July 20, 2022

Please, the Abstract of your talk or poster for the meeting can be emailed to simuliidaesymposium.morocco@yahoo.com, with the subject line IX Simuliidae Symposium Abstract. All meeting abstracts will be published in the Simuliid Bulletin.

(1, standard fee) All the prices of the following events are included in the registration fee: Arrival cocktail, coffee breaks, 3 lunches (September 20 – 22), the dinner gala (September 21), the rental of the landrovers for the excursion to the Park and all the other conference charges.

(2, additional delegate fee) Arrival cocktail, coffee breaks, 3 lunches (September 20 – 22), the dinner gala (September 21) and the rental of the landrovers for the excursion to the National Park of Talassemtane.
(3, student fee) Arrival cocktail, coffee breaks, 3 lunches (September 20 – 22) and the dinner gala September 21).

Preliminary Agenda

Monday, September 19
From 16.00h Registration opening (Hôtel Parador)
19.30-21.30h Welcome Cocktail (Terrace of Hôtel Parador)

Tuesday, September 20

8.30-9.00h Welcome and Registration continued
9.00-9.30h Opening of the Symposium

9.00-10.00h Keynote Lecture 1

10.00-11.00h Oral Presentations - Session 1

11.00-11.30h Coffee break

11.30-13.00h Oral Presentations - Session 2

13.00-15.00h Lunch

15.00-17.30h Exhibition Posters Session

18.00h Guided tour of the center (médina) of Chefchaouen

Wednesday, September 21
9.00-10.00h Keynote Lecture 2
10.00-11.00h Oral Presentations - Session 3
11.00-11.30h Coffee break
11.30-13.00h Oral Presentations - Session 4
13.00-15.00h Lunch
15.00-16.30h Discussions Posters Session

16.30-17.00h Coffee break
17.00h Simuliid Group Meeting
20.30h Gala Dinner

Thursday, September 22

9.00-20.00h Field trip in the National Park of Talassemtane with Lunch in a hostel in the center of the Park. The menu will include foods from aboriginal organic culture.

Overnight in Chefchaouen.

Friday, September 23 No organised activities, Departure.

OBITUARIES

Professor Rolf Garms
1931 – 2021

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Professor Rolf Garms, 6 October 2011 (Photograph: R.A. Cheke)

Rolf Garms, who died on 5 October 2021 aged 89, was an outstanding and distinguished medical entomologist who began and ended his career at the Bernhard Nocht Institute for Tropical

Medicine (BNITM) in Hamburg. Dr. Garms was foremost amongst experts on blackfly biology and on the transmission and control of onchocerciasis.

Rolf Garms began studying zoology at the University of Hamburg in 1950 and was awarded a PhD in 1958. He was employed at the BNITM in 1962 working there until 1996 when he retired, but he continued working as an Emeritus Professor until his final illness. In 1958 he was appointed Director of the Liberian Research Unit of the BNITM, based at Bong Mine. Rolf Garms achieved his habilitation (an academic procedure common in Germany as a prerequisite to becoming a full Professor) in 1984 and the *venia legendi* (an authority to teach, given a successful habilitation) in 1988. In 1992 Dr. Garms was appointed as full professor at the University of Hamburg.

After initiating his career with research on mosquitoes, Rolf began his lifelong fascination with blackflies during extensive and arduous field work in Guinea where he discovered new species, documented the distribution of *Simulium damnosum* s.l. and conducted trials of DDT and fenthion on the latter. He pursued similar research in Liberia and this West African experience led to his subsequent contributions to the World Health Organization's Onchocerciasis Control Programme in West Africa (OCP). He was involved from the outset, being one of the scientists who attended the first planning meeting in Tunis in 1968 (WHO 1969), which led to the Preparatory Assistance to Governments Mission whose report in November 1973 (WHO 1973) was followed by the foundation of the OCP in January 1974. Dr. Garms was a member of the Scientific and Technical Advisory Committee of the (OCP) and he was soon involved as a consultant, especially when the programme could not explain the continued presence of biting flies in controlled zones. Suspecting reinvasions from untreated areas, Rolf masterminded pioneering studies with John Davies and Frank Walsh that demonstrated that savannah members of the *Simulium damnosum* species complex could migrate as far as 500 km. For this work they were awarded the Düsseldorfer Hygienepreis Silver Medal in 1980. The first reinvasion studies were conducted in the west of the OCP but, together with Robert Cheke and many other collaborators, Rolf conducted similar studies in the eastern region of the OCP and showed that, in addition to the savannah species, *Simulium squamosum* was also involved in displacements of 150 km or more.

In addition to his reinvasion work, Dr. Garms contributed a great deal of knowledge about the biology and the transmission efficacy of different blackfly taxa, often working in laboratory and field with his assistant the late Magdalene Kerner. Rolf published 147 articles between 1958 and 2021, i.e. spanning more than 60 years (full list below), including analyses of the morphology of *Simulium* species, their cytotaxonomy, phylogeny, ecology, geographic distribution, seasonal variation, transmission abilities, histochemical differentiation, non-*Onchocerca volvulus* and other filarial larvae, anthropophily and zoophily, mostly in West Africa, but also in Guatemala, Uganda and Yemen. However, apart from his reinvasion studies, Rolf's tireless and dedicated work in Uganda led to another major achievement: the interruption of the transmission of *Onchocerca* by larvicides in many foci, involving controlling both *S. neavei* group members and *S. damnsoum* s.l.

During his career Dr. Garms consistently inspired generations of participants on the BNITM courses on tropical infectious diseases with his engaging lectures on parasites and vectors and guided a multitude of doctoral dissertations. Dr. Garms served on the Advisory Committee of the Special Programme for Research and Training in Tropical Diseases (WHO/TDR) and was awarded an honorary membership of the German Society of Parasitology in 2016. He was a Fellow of the Royal Society of Tropical Medicine and Hygiene and for many years he was one of the editors of the journal *Tropical Medicine and Parasitology* (now *Tropical Medicine & International Health*).

A great deal of Rolf Garms' research interest was dedicated to the taxonomy of Afrotropical blackflies. He contributed to the description of eight new species. Chronologically these were: *Simulium futaense* Garms & Post 1966, *S. geigyi* and *S. weyeri* Garms & Häusermann 1968, *S. liberiense* Garms 1973, *S. audreyae* Garms & Disney 1974, *S. yemenense* Crosskey & Garms 1982, *S. rasyani* Garms, Kerner & Meredith 1988 and *S. pandanophilum* Krüger, Nurmi & Garms 1998. In addition, he was involved in descriptions of the following new cyto- and morphoforms: the 'Tanzania' form of *S. mcmahoni* (Garms & Disney, 1974), 'type III' and 'type IV' forms of *S. sirbanum* (Cheke, Garms, Walsh & Phillips 1987, confirmed cytotaxonomically by Fiasorgbor & Cheke 1992) and three forms of *S. soubrense*: 'Beffa' (Meredith, Cheke & Garms, 1983), 'Farmington' and 'St Paul' (Güzelhan & Garms, 1987). A new freshwater crab, *Potamonautes rukwanzi* Corace, Cumberlidge &

Garms 2001 was also discovered during his field work in Uganda. Furthermore he is remembered in the eponymous *Simulium garmsi* Crosskey 1969, *Onchocerca garmsi* Schulz-Key & Bain 1976 (a parasite of Red Deer *Cervus elaphus*), two Muscid flies *Pyrellina garmsi* Zielke 1971 and *Helina garmsi* Zielke 1974 and the Saturniid moth *Orthogonioptilum garmsi* Bouyer 1995. Also, a pygmy grasshopper (Orthoptera: Tetrigidae) that he collected in Liberia will soon be named after him, reflecting some of his other entomological interests which also encompassed Tiger beetles (Coleoptera: Cicindelidae).

During his last 10 years Dr. Garms was involved in research on native European and invasive mosquitoes of metropolitan Hamburg, including studies of host-feeding patterns and the presence of viruses in mosquitoes. Research on native mosquitoes had almost ceased after the disappearance of malaria in Europe. Thus, Rolf concluded his research work on topics with which he had started his scientific career at BNITM in the 1960s and he continued to support graduate students during sampling campaigns and drafting manuscripts. The demise of Dr. Garms will certainly leave a huge vacuum in the field of transmission and control of onchocerciasis and characterization of the *Simulium* vector. His legacy of hard work and a lifetime's dedication to his subject will continue to inspire us all, as we remember a humble and charming man, possessed of an enviable intelligence and scientific acumen.

Professor Rolf Garms in his office at the Bernhard Nocht Institute for Tropical Medicine, Hamburg, Germany, 7 October 2015 (photograph: R. A. Cheke).

In 1958 Rolf Garms married Elke Biel who survives him, along with their son Gunnar and their daughters Grietje and Janna.

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SCIENTIFIC PAPERS

The University of Georgia Black Fly Research and Resource Center

Elmer W. Gray[1], Darold Batzer[1], Danny Mead[2] & Peter H. Adler[3]

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The University of Georgia (UGA) Black Fly Research and Resource Center has been awarded a third year of support with the National Institutes of Health (NIH), National Institute of Allergy and Infectious Diseases (NIAID) of the United States Department of Health and Human Services. This contract provides support for the world's only black fly colony and continues a collaborative effort between NIH/NIAID and the University of Georgia Entomology Department to continue the operation of this unique scientific resource. Darold Batzer is the principal investigator for this project, with Danny Mead serving as a co-principal investigator and Elmer Gray as the assistant project

Figure 1. A black fly "runway" where larval and pupal development occur.

director. Ray Noblet, the former UGA Entomology Department head and long-time principal investigator for this laboratory, serves as a scientific advisor to the project.

This laboratory has been in operation at UGA since 1999 when Ray Noblet and Elmer Gray established it after relocating from Clemson University. The colony of *Simulium vittatum* is a unique scientific resource that was initiated in 1981 at Cornell University (Bernardo et al. 1986). The colony system creates an environment that produces flowing water, incorporating nine aquatic rearing units that create miniature streams on "runways" (122 cm X 30 cm) to facilitate larval and pupal development (Fig. 1). Each unit can support approximately 300,000 larvae (Gray and Noblet 2014) and it is estimated that there are over 2 million specimens in colonization at any one time. The larvae are fed a mixture of soybean meal and rabbit chow (Lab Diet® 5322, Rabbit Diet, PMI Nutrition International, LLC, Arden Hills, MN) that has been ground to a uniform consistency and washed through a 53-micron sieve creating a "food slurry". This food slurry is stored in refrigeration and gradually pumped into the rearing units over the course of a day. After pupation, the adult flies emerge in the rearing units and are captured in a sealed, darkened emergence hood which is constructed of black plastic and fabric (Fig. 2). The phototactic behavior of the flies is exploited to draw the flies towards a clear, glass funnel at the apex of the emergence hood. A Tygon® tube attached to the funnel serves as a collection and mating site for the adult flies. The mated flies are later provided moistened cloth substrates in an oviposition chamber to serve as egg-laying sites. In nature, *S. vittatum* would deposit their eggs on surfaces that are "bathed in a film of water". The cloth substrates or "eggsheets" mimic this type surface and become covered with eggs. These eggsheets are pinned to the surface of a clean runway and provided a light flow of water to promote hatching, which typically occurs around day 5 at 25-28°C. The water flow is increased as the larvae grow to provide more surface area on the runway with rapid current. A particular advantage of *S. vittatum* is that the females are autogenous and can deposit a batch of eggs without a blood meal. Consequently, no animal resources are required to maintain the colony.

The colony has been used for a variety of research projects through the years, including studies of vector transmission, environmental monitoring, vector control, and larval feeding. The initiation of this branch of the colony took place in 1991 when eggs were received from the original colony that Ed Cupp had relocated to the University of Arizona. The Clemson branch was initiated to provide late-instar larvae to serve as standardized test subjects in an orbital shaker bioassay that was developed in collaboration with Abbott Laboratories (Barton et al. 1991) at Clemson University. Ray Noblet and Abbott Laboratories had been collaborating on field evaluations of the earliest *Bacillus thuringiensis* subsp. *israelensis* (Bti) based formulations and testing requests had exceeded our ability to conduct tests. To improve the efficacy of the early formulations and develop new, high-potency formulations that were stable in the tropical environment an extensive research and development effort took place to support the World Health Organization's Onchocerciasis Control Program.

Figure 2. Emergence hoods in place during the later stages of a rearing.

The Clemson University laboratory served as Abbott Laboratories' primary black fly research site until 1999 when the laboratory moved to the University of Georgia (UGA). The laboratory at UGA has also served as a research and development site for a variety of Abbott Laboratories and now Valent BioSciences black fly research endeavors (Overmyer et al. 2006; Iburg et al. 2010, 2011, 2012). Today, the laboratory continues a wide range of research projects in addition to providing all stages of the black fly life cycle to collaborating laboratories and scientists. Current research being conducted in the laboratory involves larvicidal efficacy evaluations, topical repellent evaluations, and growth studies related to climate change. The laboratory has always served as a preferred site for teaching and educational outreach visits for many students and researchers.

Those interested in receiving material from the black fly colony should work through the BEI Resources website (www.beiresources). The black fly material is listed under the Vector Resources toggle. All stages of the black fly life cycle are available, live or preserved, as well as total nucleic acid extracts from both male and female adults. These materials provide a unique opportunity for research on this important vector group and biological investigations on an organism that has been maintained in colony in isolation for over 40 years. The colony is pathogen free and was genetically characterized about 20 years ago (Brockhouse and Adler 2002), providing baseline information. Material from the colony could be used in studies of vector biology, insect pathology, genetics, predator-prey interactions, and a host of other research endeavors. The distribution of *S. vittatum* is transcontinental in North America, allowing widespread use of all materials. Regulatory processes associated with international distribution of live specimens would be the responsibility of the receiving institution.

Any specimens received will have been produced with the support of NIH Task Order C-08, Contract No. HHSN2722017000351, Task order No. 75N93020F00002. The UGA Black Fly Research and Resource Center will work in parallel with the NIH supported Filariasis Research Reagent Resource Center (FR^3) that is operated through the University of Georgia College of Veterinary Medicine under the direction of Andy Moorhead. The mission of FR3 is to provide filarial-related biological products to researchers. The UGA Center for Tropical and Emerging Global Diseases also has a new program, "The SporoCore", which can provide mosquitoes infected with routine or custom strains of rodent malarias to research units. These centers demonstrate the University of Georgia's commitment to world leadership in vector biology and vector-borne disease research. Interested parties should contact Elmer Gray (ewgray@uga.edu) for additional information related to black flies, Andy Moorhead (amoorhed@uga.edu) for information related to filarial materials, and Ash Pathak (ash1@uga.edu) for information related to the mosquito/malarial material.

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