Project Updates:
Development of new phylogenetic markers

A new study of Ephemeroptera in North West Algeria

Quest for a western mayfly to culture

Joint International Conf.
Items for the silent auction at the Aracruz meeting (to support the scholarship fund)

How to donate to the International Permanent Committee on Ephemeroptera Conferences

2018 Joint International Conference - Aracruz, Brazil

Call for Nominations for Lifetime Achievement Awards

Announcements and News

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Mayfly Bibliography

The diversification of evolutionary young species (<20 million years) is often poorly understood because standard molecular markers may not accurately reconstruct their evolutionary histories. Only a handful of nuclear DNA markers have been used to reconstruct phylogenetic relationships within mayflies. Most of these markers are conserved and do not provide enough phylogenetic resolution for recently diverged species.

In a recent collaboration with several research institutes, we developed a bioinformatics program called "DiscoMark" (Rutschmann et al. 2017a) to streamline the design of nuclear DNA markers based on genomic data (i.e., it is not required to have an annotated whole genome). We then used 59 markers to reconstruct fine-scale relationships within the Cloeon dipterum s.l. (Baetidae) cryptic species group using coalescent-based phylogeographic approaches (Rutschmann et al. 2017b; Figure 1). DiscoMark designs primer pairs suitable for both Sanger sequencing and next-generation sequencing (NGS). As input, the user provides genomic data of one or several target species. We, for example, used genomic data sets of the four mayfly species Baetis sp., Ephemera danica Müller 1764, Eurylophella sp., and Isonychia bicolor Walker 1853 and obtained 53 primer pairs for potential new markers. The program, user guide, and example data set are freely available on GitHub (https://github.com/hdetering/discomark). We are happy to assist new users of the program and general questions both on the program and molecular marker development may be addressed directly to us.

Applying the large set of newly developed markers we found support for several trans-oceanic colonization events and fully reconstructed the evolutionary history of the C. dipterum s.l. species group. Cloeon dipterum s.l. includes at least three taxonomically recognized species. Previous work of ours showed that some representatives of the species group have colonized the Macaronesia archipelagos (Azores, Madeira, Canary Islands; Figure 1) from Europe and possibly Africa within the last 15 million years. However, using standard mitochondrial markers, we were not able to fully resolve their phylogenetic relationships. In contrast, the use of a large nuclear marker set resulted in fully resolved phylogenetic trees and supported the existence of at least six distinct C. dipterum s.l. species, exhibiting a widespread, partially overlapping geographic distribution. So far, it seems that the distinct species possess different distribution patterns (i.e. some are restricted to the islands and others occur on the islands and their mainland counterparts) possibly due to different dispersal abilities or life history traits. Overall, our findings revealed two colonization events from the mainland to the Canaries, respectively Azores and one within the archipelago between Madeira and the Canaries (Figure 1). As long-term goal of this project we aim to find out how historical dispersal and subsequent diversification shape present-day biodiversity.
Link to download the bioinformatics program:
https://github.com/hdetering/discomark

Reference of the bioinformatics program:

Reference of the phylogeographic study:
A new study about Ephemeroptera Suborder Schistonota diversity in the Tafna basin, North West Algeria.
Nadhira Benhadji¹, Karima Abdellaoui Hassaine²

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Overview:
The Tafna basin (northwest Algeria) has been in the past – and still is – the theatre of several hydrobiologic and taxonomic researches, especially about the Ephemeroptera fauna. The most exhaustive and well known studies are those of Gagneur & Thomas (1988).

Ephemeroptera are indicators of water quality and are important components of the food web. Our study is trying to answer several objectives relating to Ephemeroptera in northwest Algeria. These include determining the taxonomic composition and the biogeography of the suborder Schistonota to identify the rate of endemism, and the assessment of the water quality and habitats of the Tafna watershed based on biotic indices.

The mayfly larvae are found in several habitats, though they are much more abundant in habitats with aquatic vegetation and periphyton, and have higher diversity in upstream sampling sites than in downstream ones, which are polluted. The identification of the specimens to species is necessary and will make it possible to compare our species with the ones found by Gagneur and Thomas in the late 1980s. Initially, this work encountered a real obstacle in correctly identifying the species and considering the importance of the biogeography in species distributions – the absence of Ephemeroptera identification keys specific to our region (except for published species descriptions) which would show the characters and criteria for determining the specimens.

This study aims to refresh the faunistic checklist of the Ephemeroptera Suborder Schistonota of the Tafna watershed in North West Algeria, and several sampling sites (Fig.1-6) have been investigated. It is an exceptional study for the region because it is conducted on three levels (ecology, taxonomy and phylogeny). The phylogenetic aspect was fleshed out by barcoding in order to have DNA sequences for almost all taxa. This study would not have been accomplished without the help and collaboration of Michel Sartori and Jean-Luc Gattolliat from the Cantonal Zoology Museum of Lausanne - Switzerland. Their great intervention in the process of larval identification and molecular phylogeny was more decisive and for that, we are tremendously grateful.

Reference
**Quest for a western USA mayfly to culture**

Jim Lazorchak¹ and William Thoeny²

¹Research Aquatic Biologist U.S. EPA Office of Research and Development Cincinnati
²Taxonomist Pegasus c/o U.S. EPA Cincinnati

We are looking to develop a culture and test method for a western NA Mayfly species. We want to take a similar approach that we have already done with the eastern mayfly *Neocloeon triangulifer*. See publications:


**Here is what we have tried thus far:**

Species received for trials: *Tricorythodes minutus, Baetis bicaudatus* and *B. tricaudatus*

**Tricorythodes minutus**

Two batches of *Tricorythodes minutus* nymphs were received during September 2016 from streams in Colorado in an attempt to establish a culture of this mayfly for use in toxicity testing. Nymphs were maintained in aerated Colorado stream water mixed with Labline within an environmental chamber at 22°C and 16:8 light:dark photoperiod and fed with slides colonized by the mixed diatoms used for *N. triangulifer* culture. Adults emerged, but, matings were not witnessed and attempts to induce mating artificially were unsuccessful. Eggs were surgically collected from several females and maintained at 20-22°C in case any of the eggs were parthenogenetically produced and might hatch. Several eggs from a batch collected on August 11 hatched and are being maintained within an environmental chamber at 22°C and 16:8 light:dark photoperiod and fed with the mixed diatoms used for *N. triangulifer* culture. We could not be sure if this female had mated, or the eggs were pathogenetically produced.

**Baetis bicaudatus**

Rob Hood from US Geological Survey, National Water Quality Laboratory, Lakewood, CO collected what is reported to be *Baetis bicaudatus* mayflies on July 18 2016 and shipped to AWBERC. Before their arrival on July 19, an environmental chamber in Room 789 was set up at 15°C and 15:9 Light: Dark photoperiod for culturing these mayflies. Several slides that had been colonized with the mixed diatom cultures were provided for food and the mayflies fed readily on the diatoms. Additional food slides were provided as needed.

Several mayflies emerged the following day (July 20), but remained as subimago until molting to adults early the following day. These mayflies were placed into an emergence chamber within the EC with water from the Colorado stream that was aerated with an air stone and mesh was provided for perching above the water. When checked the following morning, no egg laying had occurred and mayflies had drowned. One individual was dissected to remove eggs, which were placed into a container of water for observation. No hatching occurred.

Several more subimagos emerged and this container with the subimagos was placed within an emergence chamber containing aerated Colorado river water within the EC to allow them access to the water after emerging as adults. No eggs were observed. All remaining nymphs were found dead on July 24 and were removed. Emergence chamber was monitored for any egg hatching, but none occurred.
Baetis tricaudatus

*Baetis tricaudatus* mayflies and several egg masses were obtained from Pete Cadmus and associates on August 16, 2017. Both were placed into an environmental chamber set to hold water temperatures at approximately 15°C. Mayfly larvae were placed into two tanks with water from the Colorado stream source with aeration and provided a source of food via diatom colonized microscope slides that are used for culturing *N. triangulifer*.

Several of the PVC pipe huts that are used for egg deposition by the fathead minnows were stacked in the tanks so that the top hut was above the water level in an attempt to provide landing and oviposition sites. This mayfly typically lands on boulders in fast moving streams and enters the water to deposit eggs on the rocks below the water level.

Several vials of eggs were held in the 15°C EC and one vial was placed into a 24°C EC that houses the *N. triangulifer* cultures. Eggs held at 25°C began to hatch on August 22 and were placed into a larger jar with aeration and diatom food source within the 24°C EC. Eggs being held in the 15°C EC began hatching on Aug 28 and some were reared in the 15°C EC before being acclimated to the 25°C EC.

Larvae from the eggs held at 24°C were placed into an emergence chamber within the 25°C EC with aerated Labline water and several of the PVC pipe fish egg huts to provide egg deposition sites. Two egg masses were obtained and several larvae emerged and were reared in an emergence chamber with the PVC pipe huts for possible egg deposition.

No eggs were obtained from these individuals, and this concluded the current attempt to rear this species.

Future attempts.

Now that it is known that these western mountain stream mayflies can survive at the same temperature as *Neocloeon triangulifer*, any future attempts at culturing could begin acclimating the mayflies to the warmer temperatures immediately in order to obtain more emerging adults and possibly more egg masses.

Could attempt *Tricorythodes* again at the warmer temperature.

Here are the criteria I have used thus far to choose the species we have attempted:

1) Distribution at least most of the rocky mountains west and where possible eastern Oregon and Washington and Idaho
2) Multivoltine or at least bivoltine
3) Grazer or scraper that could be reared on diatoms similar to the eastern mayfly
4) Parthenogenetic if possible but sexual reproduction is also acceptable
5) As sensitive as our eastern mayfly or *Ceriodaphnia*

Any suggestions on different mayfly species we should attempt to collect and try to rear?

Any suggestions on a caddis fly or stonefly that we might want to try?

James M Lazorchak

lazorchak.jim@epa.gov
**Do you have items to donate for the auction in support of Ephemeroptera and Plecoptera meeting scholarships at the next International Joint Meeting?**

If you are attending the meeting in Aracruz, Brazil, and can take your auction items with you to the meeting, just look for any of the organizers once you are there, to pass the items along for the auction.

If you can’t attend the meeting, but would like to donate an item, please send it to Frederico Salles at the address below:

Prof. Frederico Salles  
UFES / CEUNES / DCAB  
Rodovia BR 101 Norte, Km. 60, Bairro Litorâneo  
CEP 29932-900, São Mateus – ES, BRAZIL

**How to Donate to the International Permanent Committee on Ephemeroptera Scholarship Fund**

This fund (Canadian Tax Reg. No. BN 88915 1379 RR001) provides travel scholarships to assist upcoming scientists to attend our international conferences. You have several options to donate to the mayfly travel fund. The committee can accept a cheque, a wire transfer or you can use our PayPal account. More details are provided below.

1) **Cheque.** Please make cheque payable to: “International Permanent Committee on Ephemeroptera” and mail to Alexa at the address below.

2) **Wire transfer.** Wire transfer. By arrangement with the treasurer. Please email alexa@ecobmi.com

3) **PayPal.** Business account: International Permanent Committee for Ephemeroptera Scholarship Fund, Merchant account #: X5YQ83HA2AFML  
Email: alexa@ecobmi.com.

Do let me know how I can help if any of this information is unclear.

**Alexa C. Alexander Trusiak,**  
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**Need PDFs for Ephemeroptera Galactica**

**Two questions:**

Have you published a paper on mayflies?  
If so, did you send a PDF to EG?

Ephemeroptera Galactica (EG) is a web site that was developed by Mike Hubbard and is now maintained by Arnold Staniczek. One of the great features of EG is the bibliography of mayfly literature at this site. PDFs of hundreds of mayfly articles are available. To keep this bibliography updated, please send a PDF of your articles on mayflies to Arnold (arnold.staniczek@smns-bw.de).
2018 Joint International Conference – Aracruz, Brazil

Registration is open for the 2018 Joint Meeting of the XV International Conference on Ephemeroptera and XIX International Symposium on Plecoptera will take place in Aracruz, Brazil, 2018.

The conference will be held at the SESC Praia Formosa, a pleasant place located less than one hour (or 45 km) from the airport of Vitória, capital of Espírito Santo. With more than 200 rooms, conference halls, exposition areas, restaurants, and a huge area in front of the beach, SESC Praia Formosa is the perfect place for hosting the conference in Brazil.

More information on scientific program, dates, deadlines, costs, proceedings, and accompanying persons program is available, or will be available soon, at http://ephemeroptera.com.br/jointmeeting/. You can also access information on our International Conference on Mayflies and Stoneflies, BRAZIL, 2018 page on Facebook (https://www.facebook.com/groups/101188675495931/) or contact us by e-mail (ffsalles@gmail.com).

The draft program, information about the mid and post-conference trips, and preliminary information concerning the accommodations are available on the conference website.

Please, if you wish to receive the next announcements and/or if you want to help us to organize a nice meeting in Brazil, fill the attendance interest form at the following link https://goo.gl/forms/aBm4has2kUWMmWcJ2.

You can also access information on our website (http://ephemeroptera.com.br/jointmeeting/), on our page on Facebook (International Conference on Mayflies and Stoneflies, BRAZIL, 2018) or contact us by e-mail (ffsalles@gmail.com).

Registration fees and important dates

Registration for the Ephemeroptera and Plecoptera Joint Meeting 2018 includes:

- lodging for 6 nights (June 3-9);
- all meals (including a barbecue on Wednesday and a conference dinner on Friday);
- a day trip to Vargem Alta.

We will also provide transfer from the airport in Vitória to SESC Praia Formosa at three specific times on Sunday.

**Early bird rates (January 31, 2018)**
- Shared room: R$ 2,300,00
- Private room: R$ 2,600,00
- Post-conference trip: R$ 350,00

**Between February 1 and June 3, 2018**
- Shared room: R$ 2,700,00
- Private room: R$ 3,000,00
- Post-conference trip: R$ 400,00

The deadline for abstract submission is April 03, 2018.
Call for nominations: Lifetime Achievement Award

Since 2008, The Permanent Committee of the International Conferences on Ephemeroptera have acknowledged the important contributions of mayfly workers by presenting to them a Lifetime Achievement award. This award is presented at the Joint International Ephemeroptera and Plecoptera meeting, which will be held in 2018 in Aracruz, Brazil.

The previous recipients of these awards were:
2008 (Stuttgart): Ingrid Müller-Liebenau, Janice Peters, John Flannagan
2012 (Wakayama): Peter Malzacher, Pat W. McCafferty
2015 (Aberdeen): Elda Gaino, Tomas Soldan, Ian Campbell

If you know a mayfly worker who has made important contributions to the study of mayflies, please contact Michel Sartori (michel.sartori@vd.ch), explaining your reasons for the nomination.

Announcements and News

A Kayak named “MayFly” (Submitted by Peter Grant)
(HTTP://JACKSONKAYAK.COM/BLOG/KAYAK/MAYFLY/)

Ephemeroptera workers may be interested to know that a new fishing kayak has been named for our favourite insect!
(from the company website:)

“The MayFly is a fly fishing oriented sit-on-top, loaded with features to make kayak fly fishing more fun and user friendly. The MayFly has a versatile hull optimized for tracking, stability, and speed in popular fly fishing conditions and destinations, including tropical flats, slow-moving rivers, lakes and ponds. Recognizing the unique challenges faced by fly fisherman, particularly fly line management, the MayFly includes a myriad of design aspects to address the needs of fly fisherman creating the ultimate kayak fly fishing platform.
Snag-free footrests and features, protected fly box storage, unique fly rod storage options, rod butt props for dealing with tangles, integrated and protected fly patches, and more cater to the high-performance features expert fly fisherman need while being versatile and stable enough to bring new kayak fly anglers into the sport.”
The Ephemeroptera Facebook group was started by Bjørnar Berg on 16 November 2010. Back then, the original thought was to give fly fishermen a place to find more information and share experiences and photos about one of the most fascinating water-dwelling insects for fishermen - the mayfly. The first few years it was mostly fishermen in the group, and the information shared reflected that purpose. Over time, a lot of the fishermen “fell off the wagon”, so to say, and more and more entomologists came in. After that, the pictures and the information developed more of a professional feel.

Evergreen n’Grooved (Benhadji Nadhira) was made administrator on 12 January 2016 - and that's when the group finally started getting some momentum. Benhadji Nadhira is a PhD biology student in the University of Tlemcen in Algeria. She has been a hydrobiologist since the early years of her engineering training, passing through the Magister to her doctoral studies where she became interested in Ephemeroptera and is working now on the Ephemeroptera taxonomy, phylogeny and Ecology. She joined the group hoping that it will improve her knowledge and identification skills about this order.

Having Daan Drukker in the group was a blessing, since he added much information and helped with most of the identifications. Daan Drukker became interested in mayflies when he started his internship for his MSc in Biology at Wageningen University. In collaboration with the Dutch organisation for Insect Knowledge (EIS - Kenniscentrum Insecten), he started to work on a key for the Dutch and Belgian mayflies, which he is currently finalising. After graduation, he continued to work for EIS and there he currently works on a large variety of invertebrate groups, especially in freshwater. He joined the facebook-group hoping that more people can be informed about mayfly identification (based on photographs in particular)

“It's been a fun ride. From the first few pictures of what I seem to remember being an E. vulgata sitting on a fly rod, up to real nifty macro pictures of nymphs.”

Bjørnar Berg

Group Description:
Welcome to the group on Ephemeroptera. You can post anything related to mayflies, larvae, imagines and subimagines all alike, such as:

- Identification questions
- Interesting photos
- Tips and tricks for mayfly photography
- Tips and tricks how to find mayflies in the field
- Articles and new publications
- Observations

We would appreciate it that if you post a picture, that the DATE and LOCATION is stated. We might be able to help you with the identification, especially when the species comes from the West-Palearctic (Europe, North-Africa and rest of the Mediterranean).

If you know people with any interest in mayflies, please recommend and hopefully together we can share and combine even more knowledge from around the world

Cheers!
The admins
The following list of publications has been compiled for the Mayfly Newsletter. It is not intended to be an exhaustive list, but rather it is one that includes papers and reports with an emphasis on mayflies. Please report corrections and additions to me, and I will publish an update in the Summer Newsletter.


Camp AA and Buchwalter DB. 2016. Can’t take the heat: Temperature-enhanced toxicity in the mayfly Isownychia bicolor exposed to the neonicotinoid insecticide imidacloprid. Aquatic Toxicology, 178: 49–57.


Tsiounova TM and Kluge N. 2016. Redescription of Paraleptophlebia falcata Traver 1934 with notes on


We’re looking for submissions to the *Mayfly Newsletter*!

Do you have anything you’d like to share with your fellow ephemeropterists? In addition to the Notices, Mayfly Bibliography, and information about the upcoming International Meeting, we’d like to include project updates, book reviews, notices of upcoming meetings of interest to Ephemeroptera workers, requests for collaboration, and any interesting notes about mayflies.

So - my questions to you - Are you looking for collaborators on a project? Do you have some spectacular mayfly photos that you’d like to share with your colleagues? Is there a special collecting site or new collecting method whose details would be of interest to other mayfly workers? Have you ever had an adventure in collecting mayflies? We publish our data in our research papers, but sometimes the story behind the story is equally interesting!

**Deadlines:**
- Summer issue: May 15
- Winter issue: Dec. 1

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*Ametropus fragilis*, collected during the Mackenzie Valley Pipeline Study (13 Sept. 1971, from the mainstem of the Mackenzie River near Inuvik, NWT, Canada). photo: D.Giberson

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**Our “new” Mayfly Newsletter**

Starting with the Winter 2016 issue, the Mayfly Newsletter has gone digital! You will be able to find the link to the issues on *Ephemeroptera Galactica* ([http://www.ephemeroptera-galactica.com](http://www.ephemeroptera-galactica.com)). If you haven’t already passed your email address to Peter Grant, remember to contact Donna (giberson@upei.ca) with your email address if you would like to receive notification when new issues are posted. Unfortunately, due to costs of printing and postage, we won’t be able to send a printed newsletter out by post.

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**The Mayfly Newsletter** is the official newsletter of the Permanent Committee of the International Conferences on Ephemeroptera and is published to facilitate communication among ephemeropterists.

Subscriptions to the Newsletter are free. To place your name on the e-mailing list or to contribute information for the next issue, contact:

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