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HOSTING

Fly Times is a publication of the North American Dipterists Society. All issues are hosted on the webpages of the Society, at both the new website <https://dipterists.org> and the longstanding website <http://nadsdiptera.org>. The new website is fully hosted by the Society, with webmaster Steve Gaimari. The latter website, with Jim O'Hara as webmaster, is kindly hosted by the University of Guelph through arrangement with Steve Marshall.

DISTRIBUTION

Fly Times is simultaneously distributed in PDF and printed format twice yearly, with spring and fall issues.

SCOPE

Fly Times accepts submissions on all aspects of dipterology, providing a great forum to report on original research, ongoing projects, Diptera survey activities and collecting trips, interesting observations about flies, new and improved methods, to discuss the Diptera holdings in various institutions, to make specimen requests, to advertise opportunities for dipterists, to report on or announce meetings or events relevant to the community, to announce new publications and websites, to examine the historical aspects of dipterology and Diptera literature, and anything else fly-related that you can think of. And of course with all the images you wish to provide.

INSTRUCTIONS TO AUTHORS

Although not a peer-reviewed journal, all submissions are carefully considered by the editor before acceptance. We encourage submissions from dipterists worldwide on a wide variety of topics that will be of general interest to other dipterists, and hope that this will be an attractive medium for students through retirees to showcase their activities.

The requirements for submission are simple. Please send me a single-spaced text file (.rtf or .doc preferred) along with separate image files (.jpg or .png preferred).

Following are some specific do's and don't's, bearing in mind that consistency among manuscripts is important:

- 1) *Do not* embed images into the text file (but *do* indicate in the text file approximately where each image should be placed).
- 2) Only submit image files of a reasonable size (no more than about 1MB per image file).
- 3) *Do not* use embedded styles (e.g., the various heading styles, small caps, paragraph spacing, etc.). Limit styles to italics, bold, and (if you must) underline, and single-spaced.
- 4) *Do not* use different fonts, different font-sizes, or different colored fonts as headings.

The approximate deadlines for submission are the end of April and the end of October, although I can be flexible up to the time of publication (which will generally be early June (spring issue) and early December (fall issue). For larger manuscripts your submissions may be considered for inclusion in the *Fly Times Supplement* series.

Please submit manuscripts to the editor at:
sgaimari@gmail.com
and cc sgaimari@dipterists.com

NEW STYLE

This issue of *Fly Times* is presented with a new look and feel, separating the cover page and preliminary information from the actual content. This is only a draft format, as it will be refined as I learn more about using Adobe InDesign, software for layout and page-design.

Available online 31 December 2020

From the Editor – Welcome to the latest issue of *Fly Times*! This issue is again brought to you during the Covid-19 pandemic, with many of us still cooped up at home, with insect collections worldwide closed for business, and collecting expeditions largely curtailed. We can only hope that things will start to normalize (whatever that means) now that a few vaccines have been produced. Face-to-face interactions among colleagues is sorely missed. As is usual, I am impressed with the variety of excellent submissions, and I hope they are enjoyable to the readers, despite the lateness of publication! And yes, I am quite aware that this fall issue is published at the beginning of winter, but I am at least pleased that it was produced during 2020!

The (Fly) Times they are a-changin'

As you can see, there have been some changes to the layout of the *Fly Times*. Nothing radical, but time to start a face-lift. Change is nothing new for the *Fly Times*, which has been in existence since the first issue in October 1988. Further changes will be forthcoming as I start using software meant for layout and page-design rather than word processing. The history of the newsletter is the subject of *Fly Times Supplement 3*, found at https://dipterists.org/assets/PDF/flytimes_supplement03.pdf.

I now take this opportunity to lay out some other changes... to the North American Dipterists Society itself. This will be the subject of the next *Fly Times Supplement* coming in the next month or two providing more detail, but I thought it prudent to give a brief overview to our current readers.

The North American Dipterists Society

The concept of incorporating the Society has been a topic of discussion over many years, even from its very inception. This discussion waxed and waned, but never really gained enough traction for someone to step forward to get the legwork done. So, let's go back to 2018... a group of California dipterists (myself included) put in a successful bid to host the 10th International Congress of Dipterology in the USA (see the announcement in this issue). After getting the nod from the Council of ICDs, we started the process before year's end, first enlisting the help of a conference organizer to look into possible venues. Very quickly it became apparent that institutional backing would be necessary to navigate the complexities and liabilities of putting together such a meeting. And so, the idea of



incorporating the North American Dipterists Society came again to the forefront. Beyond our timely need, it was clear that an incorporated nonprofit society could do so much more for dipterology, and after reviving and discussing this concept with about 40 dipterists in 2019, I rented a Post Office Box under the organizational name "North American Dipterists Society." This is a funny first step, but you need a mailing address to incorporate! So, on 27 November 2019 the Articles of Incorporation were filed with the Secretary of State of California, as a Nonprofit Public Benefit Corporation. Official recognition as a nonprofit is not instant however – that is just the category of incorporation to start. Over the next eight months, I performed all the tasks necessary to submit the Application for Recognition of Exemption Under Section 501(c)(3) of the Internal Revenue Code (IRS form 1023). I can say this is not a simple process, but the 96-page document (consisting of the form plus supplementary documents) was submitted in July 2020, with hopeful expectation to hear the result sometime in January (the IRS says it takes six months after submission).

I would like to interject here a bit of vision for this Society as an incorporated, nonprofit entity. Although repeated on our webpage, in our bylaws, and in the paperwork submitted to the IRS, it is worth repeating:

Our Mission is to advance the scientific study, understanding and appreciation of the insect order Diptera, or true flies. To accomplish this, we aim to foster communication, cooperation and collaboration among dipterists, and to promote the dissemination and exchange of scientific and popular knowledge concerning dipterology.

You will note that there is no specificity to only North American dipterology! The *Fly Times* has been in a trend towards becoming more international for years, with authors and readers from all over. Yes, the Society is based in North America, but I hope that the dipterological community will recognize its value and embrace this as an **international society**. There are no boundaries, and our core activities are geared towards all dipterists, not a subset.

What do we aim to do? First, we want this Society to be a common stage for all dipterists, a place where our community can closely interact. We will continue to produce Society publications, maintain our organizational website and social media, organize Society and other Diptera-related meetings and events, provide grants and awards in support of dipterological activities and achievements, perform outreach activities and provide educational resources to those who need them. We as a group can make this society as fruitful and successful as we want!

So, what was done besides filling out and submitting the long and detailed IRS form 1023?

- 1) Appointed a small group of initial Directors (who also serve as the initial Officers) to get things started. The intent is that this Society will grow and take on a life of its own, independent of this initial group. But it is critical that we stay focused and organized in this starting phase for the Society, and dividing up some of the various tasks helps things run smoothly, and allows for a variety of ideas when discussing Society goals and objectives.
- 2) With the help of an attorney specializing in nonprofits and the initial Directors, set up and adopted bylaws for the Society, which can be found at <https://dipterists.org/bylaws.html>. The bylaws are written to allow for the Society to grow and expand.
- 3) Set up the website for the North American Dipterists Society at <https://dipterists.org>. I encourage each and every one of you to visit! The long-standing website at <http://nadsdiptera.org> maintained by Jim O'Hara coexists and continues to be a great resource for dipterists. All issues of *Fly Times* and *Fly Times Supplement* will reside on both websites.
- 4) Set up a bank account for the Society.
- 5) Set up the Support page at <https://dipterists.org/support.html> and the Membership page at <https://dipterists.org/membership.html>. To make the Society into something bigger (see the details in the website), we need to have a robust membership and a healthy level of support, as well as institutional sponsorships. I set up a "Founding Member" category for those who would want to join with a higher level of support for the first year, which will help us to have a strong start. Handling all our electronic payments is the company iATS Payments, a group specializing in nonprofits. This system will also be used for things like meeting registrations and anything else involving transactions into the Society bank account (maybe we'll eventually sell t-shirts and other gear).
- 6) Set up the files and infrastructure for the Directory of World Dipterists, which is at https://dipterists.org/dipterists_directory.html. Currently you have the ability to sign up to be in the Directory (and I encourage you to do so!), but there is also an element of this in the "What are the things I have yet to do" section below. The Directory of North American Dipterists still resides at the nadsdiptera.org website, and you can still provide your

information to Jim O'Hara (at james.ohara@canada.ca) at any time for inclusion in that directory (which is separate from the World Directory), noting that the submission form that has been a mainstay as the last page of the *Fly Times* has been retired – I doubt there have been many mailed forms in some years!

- 7) Set up the Dipterists mailing list server at <https://lists.dipterists.org/mailman/listinfo/dipterists> as a primary mode of communication among dipterists. Announcements of the Society will be made via this mailing list server, including such things as grants and awards, meetings and other events, soliciting manuscripts for *Fly Times* and other Society publications, news items, as well as anything else Diptera-related that people submit that would be of interest to such a broad audience. This will also be the primary method for distributing announcements, news and circulars for the upcoming **10th International Congress of Dipterology**. Note, this will replace the direct emails I send asking for manuscripts and announcing publication of the *Fly Times*.

Although I do have a large email list of Dipterists from ICD9 and other sources, I am not yet sure if I can add them myself to the mailing list server. It may be that individuals will need to sign up themselves. In any case, there will be more news on this matter at a later time, when I either send out emails to 2500 dipterists (!) asking them to sign up, or set up the mailing list server with those addresses allowing an option to "opt out" or unsubscribe. This is my first mailing list server, so I am not yet entirely sure!

- 8) Set up a social media presence. We have recently set up a Facebook page for the Society at <https://www.facebook.com/dipterists>. So please visit and like us! This is a "page" as opposed to a "group", which means you don't join, but rather you can like and follow the page. Like most society pages, the administrators will add the content and anyone is free to comment. You are of course free to contact us on the page if you have something you would like posted. I guess there will be further clarity on the scope of the page as it becomes more active, but it can serve many purposes – to announce new publications on Diptera, to spread the word about Diptera-related events and projects, to post photos of flies, and for general discussions among dipterists. All of our Society announcements will go here, to supplement our mailing listserver. The same is all true for our upcoming Twitter account at <https://twitter.com/dipterists>, with the handle @dipterists. Our social media presence is quite new, so we are just getting our feet wet in this regard!

What are the things yet to do?

- 1) Set up the query structure for the Directory of World Dipterists, which is at https://dipterists.org/dipterists_directory.html. The Directory is fine (although not yet heavily populated), but I need to set up the search interface. On a related note, I hope word will spread about this Directory so that it will grow to include the worldwide dipterist community.
- 2) Receive recognition of the nonprofit status of the Society from the Internal Revenue Service (expected in the next month or so).
- 3) Add even more resources to the Resources page at <https://dipterists.org/resources.html>. Please send me links of pages you think belong here!
- 4) Add more diversity to the webpage rotating banner of flies. Folks are welcome to send me your images, but with very strict requirements. That is, each image must be your own, and saved as a .jpg file measuring exactly 460 pixels width, 350 pixels height, 72 pixels/inch.
- 5) Expand the content for the ICDX webpage at <https://dipterists.org/icdx.html>.

Stephen D. Gaimari

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Fly Times, 65 – Erratum

Erratum – The article title of the Hardy, Dufour & Oosterbroek (2020) paper in *Fly Times* issue 65 (Fall 2020) was mistyped by me on pages iv and 15.

The full and correct title is:

High altitude crane flies (Tipuloidea) and their importance as food for birds

Stephen Gaimari, editor
2 January 2021

(this *erratum* sheet is unpaginated and double sided, and may be placed between the front matter and content of *Fly Times* issue 65, between pages iv and 1)

NEWS

Dipterological survey of Tasmania, with focus on Dolichopodidae (Diptera) and Gondwanan relict species (November 28 – December 21, 2019)

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Summary

With over 160.000 described species the insect order Diptera currently represents 1/6 of the global insect diversity. Within Diptera, Dolichopodidae include over 5% of all described fly species which renders it the fourth most species rich family in this insect order. Overall, most dolichopodids prefer humid conditions and the most diverse communities are thus encountered in rainforests, humid heathlands and peatbogs, saltmarshes, swamps and all kinds of riparian habitats. Many species are confined to specific habitat types and serve well as bio-indicators. Adult and nearly all larval dolichopodids are predators that feed on small soft-bodied invertebrates. Many species in the genus *Medetera* are notorious antagonists of bark beetles (Coleoptera, Curculionidae, Scolytinae) which makes them potential biological control agents. Unlike the dolichopodid fauna of mainland Australia that has received a lot of attention since the early 80'ies mainly by Dr Dan Bickel (Australian Museum, Sydney), Tasmania has been more neglected in this respect. Nevertheless, considering the very different climatological conditions and biomes it can be expected that its dolichopodid fauna differs greatly from that of the Australian mainland. It is also assumed to contain a considerable number of endemics including Gondwanan relict species, related to species from southern Chile and New Zealand. With a three week survey in some of the island's most valuable areas we attempted to achieve preliminary estimates of α -, β - and γ -diversity of Dolichopodidae in Tasmania. We also wanted to get an idea how significant endemic and Gondwanan relict species are on the island. And finally, we aimed at gaining information on the ecology (habitat affinity) of the different species. We conducted our survey during early summer (December), the main activity period of most dolichopodid species. Five National Parks and multiple other sites within other Conservation Areas and beyond, distributed all over the island, were investigated. Dolichopodidae were collected mainly with sweep nets for 2–3 days in seven different regions. In addition, at one site (Claude Road, SW of Sheffield) over one hundred pan traps of three colours were operational for four days in three adjacent, different and suitable biotopes. A total of 123 samples were subsequently processed in the Belgian lab where Dolichopodidae and 16 other dipteran families were pulled from the samples. Nearly all of these fractions were transferred to Dr Simon Grove, Tasmanian Museum and Art Gallery (TMAG, Hobart), who forwarded some of them to taxonomic experts while identifying the others himself. Significant findings on ecology and/or biodiversity and descriptions of new species, at least of certain lineages (e.g., Achalcinae, *Somillus*), will further be published in scientific journals in collaboration with Australian colleagues. Type specimens and other identified dolichopodid material will be deposited in the TMAG collections. With this survey, we intend to document on the dolichopodid fauna of some prime Tasmanian conservation areas for the first time and as such, fill an existing knowledge gap on this fly family of Tasmania.

1 General research framework

Research background

Though mainland Australia has been the focus of several in depth studies on Diptera (e.g., Asilidae: Lavigne 2006; Empidoidea: Sinclair 2003; Limoniidae: Theischinger *et al.* 2018; Pipunculidae: De Meyer & Grootaert 1992, Skevington 1999; Therevidae: Winterton *et al.* 1999, Irwin & Winterton 2016; Tipulidae: Dobrotworsky 1968; Stratiomyidae: Lessard *et al.* 2019; Syrphidae: Mengual & Thompson 2015), the Tasmanian fauna has received much less attention in some taxa and/or parts of Tasmania. Apart from the Warra-Mount Weld altitudinal transect project carried out in and near the SW Wilderness World Heritage Area (2001–2002) (Grove 2004, Driessen & Mallick 2013), no dedicated Diptera surveys seem to have been recently conducted on the island. Moreover, the drier eastern and northern parts of the Island are considerably better investigated than the sometimes hardly accessible western and southern parts (Yeates, pers. comm.). Nevertheless, considering the very different climatological conditions and biomes it can be expected that its dolichopodid fauna differs greatly from that of the Australian mainland and that it contains a considerable number of endemics.



Figure 1. *Somillus parapicalis* from Tasmania (NHMUK collection, London)

Also Gondwanan relict species, related to species from southern Chile and New Zealand, are believed to occur on the island. The island thus holds optimal conditions for biodiversity and evolutionary research in invertebrates.

Most Gondwanan lineages feature a southern temperate distribution and are often associated with cool and humid forests. At present they are mainly found in South America (southern Chile in particular), New Zealand, Australia, New Caledonia, India, Madagascar and South Africa (Yeates *et al.* 2009). In Australia Gondwanan representatives have been encountered in 14 Dipteran families, mainly within Nematocera and lower Brachycera (incl. Dolichopodidae). Next to particular species groups within the sciapodine genera *Heteropsilus* and *Parentia* (Bickel 1994, 2006), other lineages are known to occur in Tasmania, especially in the temperate rainforests in the western part of the island (e.g., *Sympycnus*, *Chrysotimus*). *Somillus* is another example of a Gondwanan lineage, being nearly entirely restricted to the Neotropics and most diverse in Chile but also present in Tasmania (see Figure 1).

Study area

Tasmania (see Figure 2) lies about 240 km separated from the southeastern coast of mainland Australia and encompasses over 68.000 km², much of it covered by pristine forest and mountains although industrial activities such as agriculture, logging and mining are also prominent on the island. The most authentic part of Tasmania can be found in the west and southwest, much within national parks. Rugged mountain ranges with temperate rainforest alternate with treeless plains (mainly buttongrass moorland) (Figure 3), while the coastal range is characterized by cliffs, sandy beaches and saltmarshes (Figure 4). Tasmania separated from mainland Australia only about 11,000 years ago due to rising sea levels that flooded low-lying areas. Though being part of the Australian mainland, geologically Tasmania was originally connected to New Zealand, South America and

Antarctica. Its geology thus has much in common with Antarctica, in particular the presence of dolerite rock that is absent in mainland Australia. Other evidence of this ancient link is found in fossilized plants, with similar species present in southern Chile and New Zealand.



Figure 2. Map of Tasmania with National Parks indicated

Focal taxon

Collecting techniques like pan traps gather a wide array of invertebrates, but the focal taxon of the present survey is Dolichopodidae (Diptera). With about 6900 species (Pape *et al.*, 2009) in more than 220 genera worldwide, this family represents over 5% of all described fly species, which renders it the fourth most species rich family in this insect order. However, as is the case for many other invertebrate taxa, these numbers must be considered merely a fraction of the real diversity in the tropics and many southern temperate regions where numerous species still await discovery and/or to be described.

Long-legged flies occupy all semi-aquatic and terrestrial habitats in every zoogeographical realm although most species seem to prefer humid habitats. As such, they are most diverse and abundant in saltmarshes, reed marshes and swamps, humid deciduous forests, humid heathlands and peatmoors, and on banks of streams and stagnant water bodies (Pollet, 2000). In the Neotropics, this taxon reaches a high diversity especially along streams in rainforests. In general, adults are found on broad-

leaved vegetation and humid or muddy soils, whereas larvae occur mostly in mud, humid soils and among leaf litter. Contrary to this pattern, most *Medetera* species are confined to vertical structures and tree trunks in particular, where larvae of many species live in the subcortical galleries of bark beetles and feed on all stages of the latter insects.

While White (1916) only recorded 12 dolichopodid species from Tasmania, Parent (1932, 1933a) added substantially to the knowledge of this family in Tasmania. Seems *et al.* (1992) recorded 46 species but seem to have overlooked some of the 52 species listed by Bickel and Dyte (1989). In the latter list, the subfamilies Sympycninae, Sciapodinae and Diaphorinae are best represented, while others are entirely (e.g., Dolichopodinae, Achalcinae, Rhapsiinae) or largely (e.g., Medeterinae) lacking.



Douglas-Apsley National Park (Northeast)



Balfour Track Forest Reserve (Tarkine Drive) (Northwest)



Cradle Mountain National Park (Centre)



Mount Field National Park (Centre - South)

Figure 3. Selection of inland sampling sites investigated during our 2019 survey



Mount William National Park (Northeast)



Saltmarsh along Cantara Road, Smithton (West)



Estuary of Port Sorell river (nr Harford) (North)



Macquarie Heads nr Strahan (West)

Figure 4. Selection of littoral sampling sites investigated during the 2019 survey

Collecting techniques and strategy

Due to diverse life histories and behaviours, sampling techniques that are traditionally used to collect flying insects prove highly complementary (e.g. Pollet & Grootaert, 1987). Hence, each invertebrate survey implies an array of different techniques. An accurate sampling design can even retrieve additional information on the ecology and behaviour of the different species. In this context, strong and frequent flyers will be collected in largest numbers in Malaise traps, and predominantly soil-dwelling species in pan traps. Moreover, whereas most species are mainly attracted to pale coloured (yellow, white) pan traps, arboreal species are collected in highest numbers in blue traps whereas distinctly epigeic species are most abundant in red traps (Pollet & Grootaert, 1987, 1994).

After careful consideration, we decided not to employ Malaise traps. Indeed, most sites would be visited only during 2–3 days which seems often too short for Malaise traps to produce a good sample. And taking into account the effort needed to find a good sampling spot and the actual installation of the trap, this was regarded as a very low return on investment. The following three major techniques

were used instead: **(i) sweep nets**: together with Malaise traps, this is the most widely used method for collecting flies. Though standardized sampling with this technique is rather hard to realize, it allows the researcher to visit and collect samples in many different sites during a short period of time and to select specific sites to collect, including microhabitats (springs and seeps, rocks in rivers, ...) that sometimes house species that are hardly found beyond them. Therefore, this was the main collecting method in all Tasmanian locations. In fact, in situations where pan traps are less effective (e.g., rainy season) or not useful (e.g., visits of less than one day), sweep netting can be very productive, especially when executed for a sufficient amount of time in the same sites (Pollet *et al.* 2018b); **(ii) coloured pan traps** (Figures 5–6): their rather small size, light weight and easy employment make them an excellent device to gather information about the distributional patterns of species, even within sampling sites. Moreover, combining pan traps of different colours yields information on the ecology of the species (see above). This method has been part of the standard sampling protocol, applied in each of our previous surveys in the Neotropics since 2003 (e.g., Pollet 2009, Pollet *et al.* 2015, 2018a, Pollet & De Braekeleer 2020). In Tasmania pan traps were only in operation at one location where we resided for a longer period of time; **(iii) hand collecting**: dolichopodids on hard substrates (tree trunks, rocks) are best collected by hand (with a small polymere jar) as they tend to stick to the surface and cannot easily be collected by sweep netting. This method that has recently been developed and optimized (Pollet 2012) is most effective to collect e.g., *Medetera*.



Yield of yellow pan trap in sedge field after four days

Close-up of pan trap yield (incl. Dolichopodidae)

Figure 5. Yields of yellow pan traps in sedge field at Claude Road (5–9/12/2019)

At each of the 7 locations, we would attempt to collect a fair number of samples by sweep netting and collecting by hand in as many habitat types as possible, including at least the most representative ones (e.g., rainforest, buttongrass moorland, beach). Sweep netting would be applied in two ways: specimens are collected (i) on sight (SW) or (ii) through random sweeping soil, vegetation or hard substrates (MSW). The former procedure entails the retrieval of individual specimens from the net, whereas in the second approach the entire sweep netting yield is transferred into a collecting jar. The MSW approach is most useful if sweep net yields are large and/or contain very small dolichopodid species. Samples collected by both SW and MSW are processed in a similar way.

The basic set-up for pan traps consists of a unit of yellow, white and blue traps. The local situation, i.e. habitat diversity, usually determines the number of sampling sites and traps of each type. Two strategies can be applied: (i) one primary site with units of 10 blue, white and yellow traps and supplementary sites with only one unit of 10 yellow pan traps, or (ii) multiple sites with units of 5 traps of each colour. Pan traps are generally installed at soil surface level, fixed with metal pins and filled for 2/3 with a mild formalin solution and detergent.



Sampling site CL_01 (Eucalyptus forest)



Sampling site CL_02 (seep in forest edge)



Pan trap sampling site at Claude Road



Sampling site CL_03 (sedge field)

Figure 6. Pan trapping in three habitat types at Claude Road (5–9/12/2019)

2 Objectives of the mission

With the survey described here, we want to answer the following research questions (with regard to Dolichopodidae):

1. What is the α -, β - and γ -diversity of Dolichopodidae in Tasmania? At least in each of the investigated sites, the species richness will be estimated and the survey should also provide some clue about the distribution range of the species on the island. For the entire survey, a rarefaction analysis will be carried out that should reveal what fraction of the extant diversity has been sampled. The sampling strategy has been designed for this purpose.
2. What fraction of the sampled faunas is endemic and/or can be termed Gondwanan? Accounts on the dolichopodid fauna of New Zealand by Parent (1933b) and Bickel (1991), Australia (Bickel 1983, 1986a,b,c, 1987a,b,c, 1992, 1994, 1996, 1998, 1999a,b, 2008, 2013a,b; Bickel & Tasker 2004) and Chile (Van Duzee 1930; Pollet & Arias 2014) provide useful benchmark data for this comparison.
3. What are the ecological characteristics of Tasmanian dolichopodid species, and do the different lineages behave similarly to their relatives in other parts of the world? Pan traps of different colours attract particular ecological groups (see above).

3 Administrative requirements

Obviously the first (and only right) thing to do before visiting these foreign places is to get in touch with the local people and organisations dealing with invertebrate biodiversity research. In the case of Tasy, Dr Simon Grove of the Tasmanian Museum and Art Gallery (TMAG) in Hobart is the person you want to meet. Next to providing us with fixative fluids like alcohol and formaline crucial to our survey, Simon was also very helpful in many other ways (and is a very nice guy in general).

To enter Australia as a Belgian citizen, we had to purchase a visum via <https://visumcentrale.be/eta-order>. In addition, to conduct scientific research and to export material, a research and export permit are needed respectively. The Department of Primary Industries, Parks, Water and Environment (DPIPWE) provides both clear guidelines and handy forms on their [website](#) for that purpose. The evaluation of the application can take up to four weeks. DPIPWE also expects a report within 28 days (!) of the permit expiry date. In our specific case, fortunately, we did not need an export permit as the fauna we dealt with proved not protected.

In case a National Park is included in one's survey (most of which can only be reached by car), it's most interesting to acquire a Parks Pass beforehand, which saves some time at the Park's counter. This can be done quite easily on the portal of the Parks and Wildlife Service, Tasmania (<https://passes.parks.tas.gov.au/>). If several Parks are involved, achieving this pass is even more recommended as it saves one quite some money. Best always leave the Pass behind the windshield in the car in case of vehicle control by park rangers.

Acquiring all permits and passes went very smoothly, contrary to many other countries.

4 Preliminary results

In general

Table 1 presents an overview of the key data on the seven visited regions in Tasmania. A map with

the location of all collected samples is given in Appendix. Five National Parks together with 6 sites in Protected Areas and many other sites were ultimately investigated. Dolichopodid flies were collected with sweep nets in all locations, ranging from mountain moorland and temperate rainforest (Figure 3) over inland marshes and Eucalyptus forests (Figure 6) to sandy and rocky beaches and saltmarshes (Figure 4). At one location, i.e., Claude Road SW of Sheffield in the north, three sampling sites were selected for pan trap sampling: (i) dry eucalyptus woodland, (ii) a seep in the edge of this forest and (iii) a sedge field at the edge of a pond. In each of these sites, 2 sets of 5 blue, 5 white and 5 yellow pan traps were in operation for 4 days. During servicing, yields of 5 traps of the same colour per site were pooled into one sample.

Sample processing and expected results

Collected samples were transferred to the Belgian lab for processing. Dolichopodidae and 16 other fly families were sorted from the samples and stored separately, while other invertebrates made up the residue samples. Sample processing ultimately produced 444 subsamples, most of which were transferred to Dr Simon Grove (TMAG, Hobart) for further study, while others were forwarded by Simon or us to the respective taxonomic experts (see Table 2). Also the residue samples were deposited in the TMAG.

Data on locations, sampling sites, and samples have been incorporated in a personal Microsoft® Access database, NEOTROPICS¹, currently holding data on nearly 13,600 samples from 21 Neotropical countries.

Table 1. Overview of the regions and areas under investigation during our 2019 survey

region	residence	Protected Areas included in the survey	sampling period	no. samples (SW)	no. samples (PT)
Southeast	Coles Bay	Freycinet National Park; Douglas-Apsley National Park	30/11–3/12/2019	14	–
Northeast	Binalong Bay	Mt William National Park	3–5/11/2019	7	–
North	Claude Road (SW Sheffield)	Cradle Mountain-Lake Saint Clair National Park; Mount Roland Regional Reserve	5–10/12/2019	26	24
West - Northwest	Smithton	Balfour Track Forest Reserve; Arthur River (as part of The Tarkine Drive)	10–13/12/2019	13	–
West	Strahan	Hogarth Falls; Nelson Falls Nature Trail; Franklin River Nature Trail	13–16/12/2019	12	–
Southwest	Ellendale	Cradle Mountain Lake Saint Clair National Park; Mount Field National Park	16–19/12/2019	25	–
Southeast	Hobart	Mount Wellington	19–20/12/2019	2	–
Total no. samples				99	24

¹ The current name of this database does not seem appropriate to hold data on Tasmanian Dolichopodidae, but the database structure is entirely suitable for data storage and retrieval.

Table 2. Overview of sorted fly families and respective taxonomic expert involved. (* these fly families were identified by Dr Grove)

Taxonomic groups	No. subsamples	to be treated by/send to
Asilidae	3	Greg Daniels (AU)
Dolichopodidae	95	Marc Pollet (BE)
Empidoidea (minus Dolichopodidae)	71	Brad Sinclair (CA)
Mycetophilidae	31	Simon Grove
Phoridae	4	Simon Grove
Psychodidae	33	Gregory Curler (US)
Bibionidae	2	Simon Grove
Ceratopogonidae	1	Simon Grove
Lauxaniidae	1	Simon Grove
Simuliidae	1	Simon Grove
Tabanidae	1	Simon Grove
Rhagionidae	6	Simon Grove*
Sciomyzidae	8	Jonas Mortelmans (BE)
Sphaeroceridae	38	Steve Marshall (CA)
Syrphidae	13	Simon Grove*
Therevidae	13	Simon Grove*
Tipulidae	24	Simon Grove
residue Diptera	86	Simon Grove

5 Further steps and goals

Dolichopodid samples are temporarily stored in my personal collection and specimens must still be identified to (morpho)species level. Representatives of the subfamily Acalcinae and some selected Gondwanan genera will be examined in more detail and incorporated in ongoing personal projects. Obviously, the results of this identification process will be added to the other survey data in the NEOTROPICS database.

The dolichopodid diversity of Tasmania will be analysed in collaboration with Dr Dan Bickel (Australian Museum, Sydney, Australia) and Dr Simon Grove (TMAG). If successful (= sufficiently high yields of dolichopod specimens, undescribed species in relevant lineages), the survey as designed above should produce data for at least two, possibly three, papers in a 5–10 year period after the survey:

- Results of the dipterological survey of Tasmania – partim Dolichopodidae
- Acalcinae of Tasmania (with descriptions of new species, if collected)
- Gondwanan connections in Dolichopodidae among Tasmania, Australia, New Zealand and Chile

During the examination of the Dolichopodid specimens, the collection will thus temporarily reside at the Belgian lab. Ultimately, type material (including holotypes) will be deposited in the TMAG collections. Depending on the number of specimens available, a fair number of paratypes will be deposited in the entomological collections of the RBINS and in my private collection.

6 Conclusive remarks and recommendations

Despite the fact that December was considered the very best period to collect flies in general and dolichopodids in particular in Tasmania, surprisingly enough a number of very promising sites hardly produced any specimens or sometimes even none. This was especially the case in many of the mountain and rainforest sites situated in the western half of the island, including Cradle Mountain Lake Saint Clair National Park. It has been assumed that the activity season in these parts might start later on. Also many sites in the National Parks in the southeast (e.g., Freycinet NP, Douglas-Apsley NP) proved severely dried out rendering them also unfavourable for Dolichopodidae. In contrast, largest numbers were gathered in several of the studied saltmarshes, both in the northeast, north, northwest and southwest. Also the pan trap campaign proved successful, both in terms of specimens and species.

If I would conduct another dipterological survey in Tasmania, I might choose to visit the island in January rather than December, hoping that Spring brought sufficient amounts of rain to the eastern part. Also, I would more strongly focus on saltmarshes, restrict the number of locations to investigate and employ pan traps at all study sites.

7 Acknowledgements

First of all, we want to express our sincere gratitude to Dr Simon Grove for his great help during the preparation and execution of this amazing journey. Also thanks to Dr Dan Bickel (AMS, Sydney) and Dr David Yeates (ANIC, Canberra) who provided us with useful information on past surveys in Tasmania. The Research Foundation FWO-Vlaanderen (Brussels, Belgium; <https://www.fwo.be/en/>) kindly provided financial support for this expedition. We resided at the following Airbnb accommodations: Sorell Barracks (Sorell), The Strand (Coles Bay), Sea Eagle Cottage (Binalong Bay), Secret Little Eden (Claude Road), Island View Spa Cottage (Smithton), The Red Door (Strahan), Platypus Cottage and Farm Stay (Ellendale) and Bellerive House (Hobart). All were great, some definitely beyond our league but our ultimate favourites were Secret Little Eden with its secluded fairy tale cottage with *Platypus* in the pond and pademelons joining us at each sunset to graze on the lawns (not to forget the amazing pan trap campaign) and Bellerive House with a truly impeccable service. Thanks, Dominic (owner of Secret Little Eden) and David and Jacquelyn (owners of Bellerive House) for your kindness and making our trip unforgettable.

References

- Bickel, D.J. (1983) Two new Australian *Teuchophorus* Loew (Diptera: Dolichopodidae). *Journal of the Australian Entomological Society* 22 (1): 39–45.
- Bickel, D.J. (1986a) *Atlatlia*, a new genus of Dolichopodidae (Diptera) from Australia. *Entomologica Scandinavica* 17: 165–171.
- Bickel, D.J. (1986b) Australian species of *Systemus* (Diptera: Dolichopodidae). *Records of the Australian Museum* 38 (5): 263–270.
- Bickel, D.J. (1986c) *Thrypticus* and an allied new genus, *Corindia*, from Australia (Diptera: Dolichopodidae). *Records of the Australian Museum* 38 (3): 135–151.
- Bickel, D.J. (1987a) A revision of the Oriental and Australasian *Medetera* (Diptera: Dolichopodidae). *Records of the Australian Museum* 39: 195–259.
- Bickel, D.J. (1987b) Babindellinae, a new subfamily of Dolichopodidae (Diptera) from Australia, with a discussion of symmetry in the dipteran male postabdomen. *Entomologica Scandinavica* 18: 97–103.

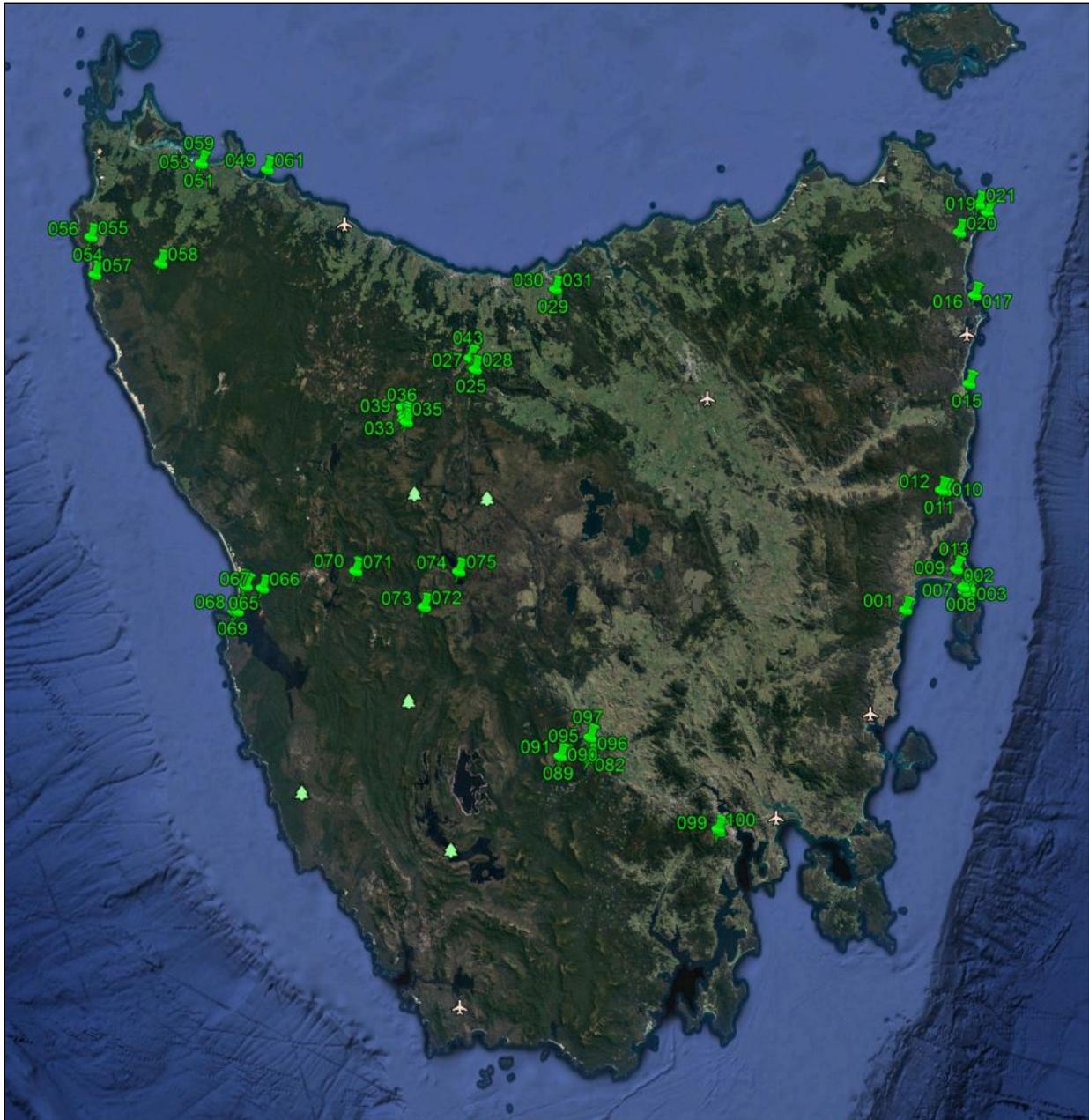
- Bickel, D.J. (1987c) *Kowmungia* (Diptera, Dolichopodidae), a new genus from Australia. *Invertebrate Taxonomy* 1: 147–154.
- Bickel, D.J. (1991) Sciapodinae, Medeterinae (Insecta: Diptera) with a generic review of the Dolichopodidae. *Fauna of New Zealand* 23: 1–74.
- Bickel, D.J. (1992) The Australian Sympycninae (Diptera: Dolichopodidae): introduction and description of a new genus, *Yumbera*. *Invertebrate Taxonomy* 6 (4): 1005–1017.
- Bickel, D.J. (1994) The Australian Sciapodinae (Diptera: Dolichopodidae), with a review of the Oriental and Australasian faunas, and a world conspectus of the subfamily. *Records of the Australian Museum Suppl.* 21: 1–394.
- Bickel, D.J. (1996) Australian *Asyndetus* and *Cryptophleps* Lichtwardt (Diptera: Dolichopodidae), with notes on the Oriental and Western Pacific Faunas. *Invertebrate Taxonomy* 10: 1151–1170.
- Bickel, D.J. (1998) Australian, Melanesian and Micronesian *Acropsilus* Mik (Diptera: Dolichopodidae). *Tijdschrift voor Entomologie* 141: 1–17, figs. 1–21.
- Bickel, D.J. (1999a) Australian *Antyx* Meuffels & Grootaert and the New Caledonian connection (Diptera: Dolichopodidae). *Australian Journal of Entomology* 38: 168–175.
- Bickel, D.J. (1999b) Australian Sympycninae II: *Syntormon* Loew and *Nothorhaphium*, gen. nov., with a treatment of the Western Pacific fauna, and notes on the subfamily Rhapsiinae and *Dactylonotus* Parent (Diptera: Dolichopodidae). *Invertebrate Taxonomy* 13: 179–206.
- Bickel, D.J. (2006) *Parentia* (Diptera: Dolichopodidae) from Fiji: a biogeographic link with New Caledonia and New Zealand. In: Evenhuis, N.L. & Bickel, D.J. (Eds). *Fiji Arthropods V*. Bishop Museum Occasional Papers 89: 45–50.
- Bickel, D.J. (2008) The Dolichopodinae (Diptera: Dolichopodidae) of New Caledonia, with descriptions and records from Australia, New Zealand and Melanesia. In: Najt, J. & Grandcolas, P. (Eds). *Zoologia Neocalidonica 6*. Biodiversity studies in New Caledonia. *Mémoires du Muséum national d'Histoire naturelle* 196: 13–47.
- Bickel, D.J. (2013a) *Phrudoneura* (Diptera: Dolichopodidae) from Australia and Melanesia. *Zootaxa* 3680 (1): 38–54.
- Bickel, D.J. (2013b) The family Dolichopodidae (Diptera) of the Pilbara region, Western Australia in its Australasian biogeographic context, with the description of 19 new species. *Records of the Western Australian Museum, Supplement* 83: 291–348.
- Bickel, D.J. & Dyte, C.E. (1989) Family Dolichopodidae. In: Evenhuis (ed.). *Catalog of the Diptera of the Australasian and Oceanian Regions*. Bishop Museum Press, Honolulu & E.J. Brill, Leiden: pp. 393–418. Bishop Museum Press, Honolulu.
- Bickel, D.J. & Tasker, E.M. (2004) Tree trunk invertebrates in Australian forests: conserving unknown species and complex processes. In: Lunney, D. (Ed.). *Conservation of Australia's Forest Fauna* (second edition): pp. 888–898. Royal Zoological Society of New South Wales, Mosman, NSW, Australia.
- De Meyer, M. & Grootaert, P. (1992) Pipunculidae (Diptera) from Australia: the genera *Cephalops* Fallén and *Beckerias* Aczél. *Invertebrate Systematics* 6(1): 143–158.
- Dobrotworsky, N.V. (1968) The Tipulidae (Diptera) of Australia I. A review of the genera of the subfamily Tipulinae. *Australian Journal of Zoology* 16(3): 459–494.
- Driessen, M.M. and Mallick S.A., editors (2013) The distributions of invertebrate species along the Warra–Mount Weld Altitudinal Transect in 2001–2002 and identification of taxa restricted by altitude. *Nature Conservation Report* 13/4, Department of Primary Industries, Parks, Water and Environment, Hobart.
- Grove, S. (2004) Warra - Mount Weld Altitudinal Transect Ecotonal and Baseline Altitudinal Monitoring Plots (BAMPs): Establishment report. Technical Report no. 17/2004, Division of Forest Research and Development, Forestry Tasmania.

- Irwin, M.E. & Winterton, S.L. (2016) New genera of Australian stiletto flies (Diptera, Therevidae). *Zookeys* 19: 97–128.
- Lavigne, R.J. (2006) A new species of *Chrysopogon* from South Australia (Diptera: Asilidae: Dasypogoninae). *Transactions of the Royal Society of South Australia*: 130(1). doi: 10.1080/3721426.2006.10887048.
- Lessard, B.D., Yeates, D.K. & Woodley, N.E. (2019) Review of the Stratiomyinae soldier flies of Australia (Diptera: Stratiomyidae), with a new genus and first records of *Prosopochrysa* de Meijere, 1907. *Insect Systematics & Evolution*. <https://doi.org/10.1163/1876312X-00002307>
- Mengual, X. & Thompson, F.C. (2015) Australian *Allograpta* Osten Sacken (Diptera, Syrphidae). *ZooKeys* 2015(513): 65–78. doi: 10.3897/zookeys.513.9671
- Parent, O. (1932) Contribution à la faune diptérologique (Dolichopodidae) d'Australie-Tasmanie. *Annales de la Société scientifique de Bruxelles (B) (Mémoires)* 52: 105–176.
- Parent, O. (1933a) Nouvelle étude sur les Diptères Dolichopodides de la région Australienne. *Annales de la Société scientifique de Bruxelles (B)* 53: 170–187.
- Parent, O. (1933b) Etude monographique sur les Diptères Dolichopodides de Nouvelle-Zélande. *Annls Soc. scient. Brux. (B)* 53: 325–441.
- Pollet, M. (2009) In search for dolichopodid flies in southern Ecuador: the true story. *Fly Times* 42: 36–51.
- Pollet, M. (2012) 'Uitgestorven' slankpootvliegen, en nieuwe soorten voor België, ontdekt in de Denderstreek. *Dendriet* 11 (1): 22–27.
- Pollet, M. & Arias, E. (2014) The position of the Chilean dolichopodid fauna in the Neotropics (Diptera: Dolichopodidae): a first assessment. *Abstracts of the 8th International Congress of Dipterology, Potsdam 2014*: 265.
- Pollet, M. & De Braekeleer, A. (2020) The 2020 dolichopodid survey of lowland and montane rain forests in Costa Rica (Diptera: Dolichopodidae). *Fly Times* 64: 1–15.
- Pollet, M., Dumbardon-Martial, E. Maréchal, P. (2018a) Dolichopodid survey of Martinique (Diptera: Dolichopodidae). *Fly Times* 60: 4–12.
- Pollet, M., Leponce, M., Pascal, O., Touroult, J. & Van Calster, H. (2018b) Dipterological survey in Mitaraka Massif (French Guiana) reveals megadiverse dolichopodid fauna with an unprecedented species richness in *Paraclius* Loew, 1864 (Diptera: Dolichopodidae). In Touroult J. (Ed.). “Our Planet Reviewed” 2015 large-scale biotic survey in Mitaraka, French Guiana. *Zoosystema* 40 (21): 471–491. <https://doi.org/10.5252/zoosystema2018/40/21>.
- Pollet, M., Touroult, J. & Pascal, O. (2015) Preliminary results of the Mitaraka expedition (French Guiana). *Fly Times* 55: 3–10.
- Skevington, J.H. (1999) *Cephalosphaera* Enderlein, a genus of Pipunculidae (Diptera) new for Australia, with descriptions of four new species. *Australian Journal of Entomology* 38(4): 247–256.
- Sinclair, B.J. (2003). Taxonomy, phylogeny and zoogeography of the subfamily Ceratomerinae of Australia (Diptera: Empidoidea). *Records of the Australian Museum* 55(1): 1–44. doi: 10.3853/j.0067-1975.55.2003.1373
- Theischinger, G., Billingham, Z. & Gowns, I. (2018) *Ozeoura* – A new genus of Chioneinae (Insecta: Diptera: Tipuloidea: Limoniidae) from Australia. *Records of the Australian Museum* 70(5): 447–468.
- Van Duzee, M.C. (1930) Dolichopodidae. *Diptera of Patagonia and South Chile* 5(1): 1–92 + 3 pls. *British Museum (Natural History)*, London.
- White, A. (1916) The Diptera-brachycera of Tasmania: Part III. Families Asilidae, Bombylidae, Empidae, Dolichopodidae and Phoridae. *Papers & Proceedings of the Royal Society of Tasmania*: 148–266.

- Winterton, S.L., Irwin, M.E. & Yeates, D.K. (1999) Systematics of *Nanexila* Winterton & Irwin, gen. nov. (Diptera: Therevidae) from Australia. *Invertebrate Taxonomy* 13(2): 237 – 308.
- Yeates, D.K., Bickel, D., McAlpine, D.K. & Colless, D.H. (2009) Chapter Eight. Diversity relationships and biogeography of Australian flies. In: Pape, T., Bickel, D. & Meier, R. (Eds.). *Diptera Diversity: Status, Challenges and Tools*. Koninklijke Brill NV: pp. 227–256.

Appendix

Location of the 123 samples collected during the dipterological survey in Tasmania in 2019



High latitude crane flies (Tipuloidea) and their importance as food for birds

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It is well known that larvae and adults of Arctic crane flies are important as food for birds, especially during the breeding season (McKinnon et al. 2012, Machin et al. 2017, Leung et al. 2018; a chapter on the importance of Arctic crane flies in the nutrition of birds during their breeding season is found in Lantsov & Chernov 1987). Although less known, this is also the case for some high altitude bird species, in the Alps and the Caucasus, and as we discuss here, also in the Andes. The data presented here for the Swiss Alps and the Caucasus refer to crane flies of the family Tipulidae, for North America to Tipulidae and Pediciidae, and for the Andes to limoniid crane flies.

The Swiss Alps

The highest known crane fly altitudes in the Swiss Alps are 3.100 m for *Tipula (Pterelachisus) glacialis* (Pokorny) and *T. (Vestiplex) montana* Curtis (Dufour 1992). Among the 154 species of crane flies found in Switzerland, 39 reach altitudes above 2.000 m, but only eight (5.2%) are truly alpine, with the following median elevation ranges (all above 2.000 m): *Tipula (Pterelachisus) glacialis* Pokorny (2.200 m), *Tipula (Pterelachisus) irregularis* Pokorny (2.370 m), *Tipula (Pterelachisus) sauteri* Dufour (2.423 m), *Tipula (Pterelachisus) subglacialis* Theowald (2.180 m), *Tipula (Savtshenkia) gorziensis* Strobl (2.175 m), *Tipula (Vestiplex) crolina* Dufour (2.428 m), *Tipula (Vestiplex) excisa* Schummel (2.050 m) and *Tipula (Vestiplex) montana* Curtis (2.150 m).

In the Swiss Alps, White-winged Snowfinches (*Montifringilla nivalis nivalis* (Linnaeus)) in late spring and early summer forage preferentially next to invertebrate-rich, melting snow patches where Tipulidae larvae abound. They feed primarily on these larvae, which are also important in the diet of their nestlings, as studied by Heiniger (1991) and Resano-Mayor et al. (2019). The Heiniger 1991 study is summarized by Schneider 2017 as follows: While outside of the breeding season the snowfinches eat almost exclusively seeds from alpine plants, their main nourishment during the breeding season is thought to be arthropods (larvae, Lepidoptera, Arachnida, etc.), which they collect from the ground. The main component of the nestling food is larvae from Tipulidae, because they are especially nutritious. The Tipulidae larvae live in the cavern between the snow blanket and the ground. In the evening they freeze in the melt water and are released when the snow melts on the following day. That is why there are many Tipulidae larvae at the edge of snow patches, which are easily accessible for the Snowfinches (Fig. 1).

Alexander (1962) suggests that certain crane flies found at high altitudes are blown up by the wind. This is a common phenomenon for some insects such as butterflies and has also been observed with crane flies. In Switzerland, a male of *Nephrotoma cornicina* (Linnaeus), a lowland colline (foothill) species (median altitude 550 m) was observed in August 1978, above the Flüelapass, on snow, at 2.600 m (Dufour 1986).



Fig 1. White-winged Snowfinch at the edge of a patch of snow, where they prefer to feed (after Heiniger 1991).

Allochthonous, wind transport or migrating insects can play a significant role in high altitude ecosystems. In the frame of a large scale research program in alpine ecology on an alpine meadow (*Caricetum firmae*) situated on the top of Munt la Schera (2.540 m) in the Swiss National Park, Dethier (1984) concludes that “In the soil, detritivorous species clearly dominate the arthropod community, whereas, in the herbaceous layer, predators are remarkably abundant in comparison with the indigenous potential

prey. Moreover, a non-negligible part of their food consists of wind transport, erratic or migrating insects, especially at the beginning of the season. This ecosystem, therefore, can be considered to be somehow *subsidized* by other ecosystems found at lower altitude”.

The Andes

The highest crane fly altitudes are found in the Andes, namely 5.600 m for *Dicranomyia* (*Dicranomyia*) *perexcelsior* (Alexander) from Bolivia (Alexander 1962) and (so far the highest) 5.680 m for what has been identified by Dmitry Gavryushin as “quite certain” being *D. (D.) hirsutissima* (Alexander) from Peru (Fig 2). Adults of the last-mentioned species were observed by DRH at several altitudes while ascending the Quelccaya Ice Cap in Peru. For example, at 5.520 m a pair of White-winged Diuca Finches (*Idiopsar speculifera*) were observed feeding on these crane flies, which is one of several bird species using crane flies as a food resource in the area, another species being the White-fronted Ground Tyrant (*Muscisaxicola albifrons* (von Tschudi)) (Fig. 3). In DRH’s experience, these limoniid crane flies are active in the area during April and October, bracketing the colder, winter dry season (June–August). In April 2014, crane flies were abundant (and entering our tents) at our 5.200 m camp, indicating they were living at that elevation and not blown up from a lower elevation. Considerable biological activity is present in this area (Fig. 4), right



Fig. 2 (top). *Dicranomyia* (*Dicranomyia*) *hirsutissima* female, identification by Dmitry Gavryushin as “quite certain”.



Fig. 3 (right). White-fronted Ground Tyrant in the vicinity of its nest beneath the glacier, carrying crane fly adults and perhaps larvae or caterpillars.

up to the glacier margin, ranging from insects to lizards to frogs to mammals and birds. Crane flies appear to be important as food during the austral autumn and spring, for at least the birds. During DRH's years visiting Quelccaya (2003–2018), adults of *D. (D.) hirsutissima* were also observed at the summit automated weather station at 5.680 m (Fig. 5).



Fig 4. Lake and bofedal (wetland) adjacent to DRH camp at Quelccaya Ice Cap, April 2016 (5.200 m). The ice cap margin where nesting White-winged Diuca Finches and White-fronted Ground Tyrants have been studied is currently ~600 m to the right of the photo; another part of the glacier is visible ~5 km in the background.

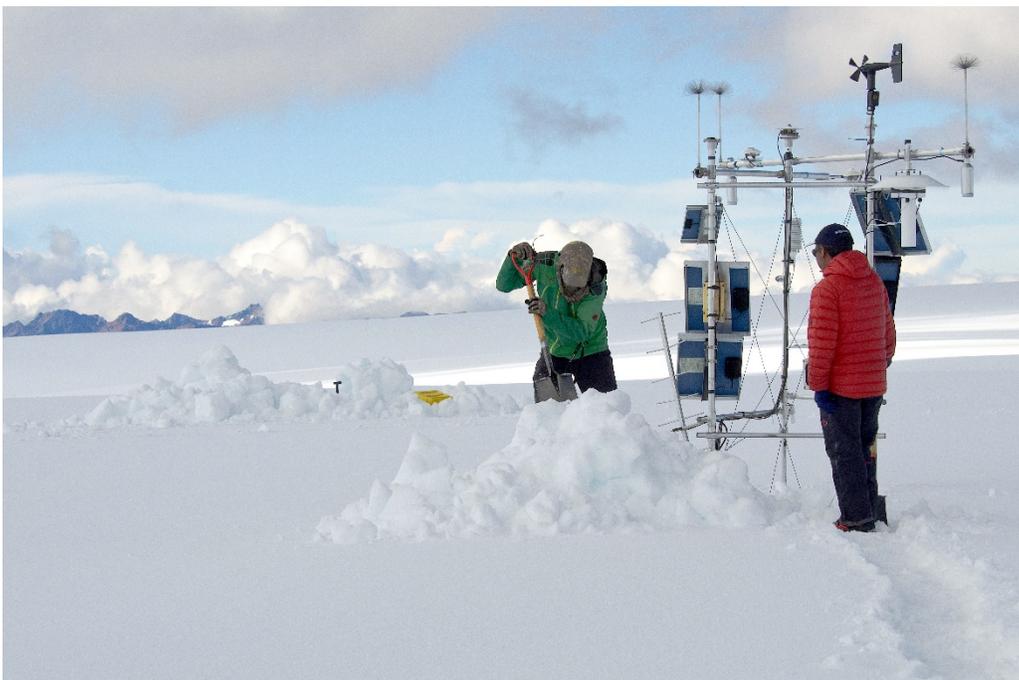


Fig 5. Weather station on the Quelccaya Ice Cap summit, Peru, 5.680 m, 4 April 2014.

Upon each visit, 1–2 m excavations were made into the snow until reaching the enclosures for dataloggers; along the vertical aluminum tubing, dozens of the adult crane flies were often found, and sometimes in mating pairs. It cannot be said with confidence whether they were alive or not upon the encounters, yet the regularity of their discovery suggests that in the Andes crane flies regularly fly – or are transported by wind – to at least about 5.700 m.

D. (D) hirsutissima was originally described from the Chacaltaya glacier in the Cordillera Real in Bolivia, from an altitude of 5.000 m (Alexander 1962). It is at this type locality where Diuca Finches were first associated with glaciers (Niethammer 1953), which are now known from research at Quelccaya to be the only bird species in the world which nests on glaciers (Hardy et al. 2018). Unfortunately, the Chacaltaya glacier disappeared by 2009.

North America

High altitude records for North American mountains include *Tipula (Pterelachisus) simondsi* Alexander, described from a single brachypterous female, collected in the Sierra Nevada, on a snowfield along the Mount Whitney Trail, at 3.810 m (Alexander, 1965). Other alpine records from California are *Tricyphona subaptera* (Pediidae) from the East Donohue Pass in the Ansel Adams Wilderness at 3.241 m (Medeiros & Schoville 2017; altitude kindly provided by Matthew Medeiros) and *Tipula (Eremotipula) leiocantha* Alexander from Mount Barcroft in the White Mountains at 3.810 m (Gelhaus 2005). In the Rocky Mountains of Colorado, a species of *Tipula (Beringotipula)* was collected at the Loveland Pass at 3.658 m (Gelhaus pers. comm.). At the lower elevation of 2.100 m in the high desert of Nevada, heavy predation was observed of *Tipula (Eremotipula) spaldingi* Dietz by Brewers Blackbirds (*Euphagus cyanocephalus* Wagler) (Gelhaus 2005).

The Caucasus

For the Caucasus, Lantsov (2007) mentions 22 species of Tipulidae that reach altitudes above 2.000 m but none from above 3.000 m, although crane flies are without doubt to be found above that limit (Lantsov pers. comm.). Altitudes up to or above 2.500 m are recorded for: *Nephrotoma cornicina* (Linnaeus) (up to 2.700 m), *Nephrotoma pratensis* (Linnaeus) (3.000 m), *Nephrotoma tenuipes* (Riedel) (2.500 m), *Tipula (Emodotipula) obscuriventris* Strobl (2.500 m), *Tipula (Lunatipula) theowaldi* Savchenko (2.500 m), *Tipula (Pterelachisus) luteobasalis* Savchenko (3.000 m), *Tipula (Pterelachisus) trichopleura* Savchenko (2.950 m), *Tipula (Pterelachisus) varipennis* Meigen (2.500 m), *Tipula (Savtshenkia) gimmerthali* Lackschewitz (2.650 m), *Tipula (Savtshenkia) nivalis* Savchenko (3.000 m), *Tipula (Vestiplex) pallidicosta pullata* Savchenko (2.700 m) and *Tipula (Vestiplex) semivittata* Savchenko (2.700 m).

In the Caucasus, tipuloid dipterans are regarded essential components of food for certain bird species, such as the Tree Pipit (*Anthus trivialis* (Linnaeus)) and the Caucasian Water Pipit (*A. spinoletta coutelli* Audouin) (Polivanov & Polivanova 1998). For these and other insectivorous birds of high mountains it can be assumed with a high degree of probability that this refers to the adults and larvae of the high mountain crane flies *T. (V.) semivittata*, *T. (V.) pallidicosta pullata* and *T. (S.) nivalis* (Lantsov 2003, Lantsov pers. comm.). Especially *T. (V.) semivittata* shows high abundance in high mountain communities (Lantsov 2003). The Tree Pipit inhabits forest edges and the Caucasian Water Pipit the alpine and subalpine meadows. Tipulids constitute up to 52–69% of the Caucasian Water Pipit diet during the nesting period (Polivanov & Polivanova 1998). *T. (S.) nivalis* is endemic to the Central Caucasus and dominates the highlands in the range of 2.300–3.000 m. The species is active at the edge of snowfields and mating is observed on the snow. The species is considered an essential food component for birds living at these altitudes (Lantsov pers. comm.).

The Himalayas

High altitudes in the Himalayas are 4.877 m for *Tipula (Pterelachisus) scandens* Edwards (Starkevich et al. 2020) and 5.182 m for *T. (Sinotipula) hypsistos* Alexander and *T. (S.) exquisita* Alexander (Alexander 1962).

The genus *Chionea*

Not mentioned above are high altitude records for members of the limoniid genus *Chionea*. It seems unlikely that they can play a role as important food for birds. *Chionea*'s are small (3–5 mm, rarely up to 8 mm), flightless, winter-active crane flies, frequently found on the snow, in small numbers. It is a Holarctic genus with 38 species and subspecies (de Jong and Ciliberti 2014, Oosterbroek 2020). Some species are typically found at lower altitudes, others in more mountainous habitats. There are several records up to 2.500 m but as far as we know only four from above 3.000 m. The species *C. alpina* Bezzi and *C. araneoides* Dalman are recorded from 3.035 m in Austria (Thaler & Knoflach 2001) and for North America, Byers (1983) mentions 3.200 m for *C. durbini* Byers in the Sierra Nevada of California and 3.500 m for *C. nigra* Byers in the Rocky Mountains of Central Colorado.

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References

- Alexander, C.P. (1962) Beiträge zur Kenntnis der Insektenfauna Boliviens, XVII. Diptera II. The crane-flies (Tipulidae, Diptera). *Veröffentlichungen der Zoologischen Staatssammlung München* 7: 9–159.
- Alexander, C.P. (1965) Undescribed species of Nearctic Tipulidae (Diptera). VI. *Great Basin Naturalist* 25: 49H-53.
- Byers, G.W. (1983) The crane fly genus *Chionea* in North America. *The University of Kansas Science Bulletin* 52: 59–195.
- Dethier, M. (1984) Étude des communautés d'arthropodes d'une pelouse alpine au Parc National Suisse. *Bulletin de la Société Entomologique Suisse* 57: 314–334.
- Dufour, C. (1986) Les Tipulidae de Suisse (Diptera, Nematocera). *Documenta Faunistica Helvetiae* 2: 1–187, fiches 1–149.
- Dufour, C. (1992) High altitude Tipulidae in Switzerland (Diptera, Nematocera). *Acta Zoologica Cracoviensia* 35: 113–134.
- Gelhaus, J.K. (2005) Systematics and biogeography of the desert crane fly subgenus *Tipula (Eremotipula)* Alexander (Diptera: Tipulidae). *Memoirs of the American Entomological Society* 46: 1–235.
- Hardy, S.P., Hardy, D.R. & Castañeda Gil, K. (2018) Avian nesting and roosting on glaciers at high elevation, Cordillera Vilcanota, Peru. *The Wilson Journal of Ornithology* 130: 940–957. <https://doi.org/10.1676/1559-4491.130.4.940>
- Heiniger, P.H. (1991) Anpassungsstrategien des Schneefinken *Montifringilla nivalis* an die extremen Umweltbedingungen des Hochgebirges. *Der Ornithologische Beobachter* 88: 193–207.

- De Jong, H. & Ciliberti, P. (2014) How cold-adapted flightless flies dispersed over the northern hemisphere: phylogeny and biogeography of the snow fly genus *Chionea* Dalman (Diptera: Limoniidae). *Systematic Entomology* 39: 563–589.
- Lantsov, V.I. (2003) Biology, ecology and preimaginal stages of the crane fly *Tipula semivittata semivittata* (Diptera, Tipulidae). *Zoologicheskyy Zhurnal* 82: 1466–1474 (in Russian with English summary) (English translation: *Entomological Review* 83: 906–913).
- Lantsov, V.I. (2007) *Crane-flies (Diptera, Tipulidae) of high altitude landscapes of the Caucasus*. In: Mountain ecosystems and their components. Materials of the first international conference, 13–18 August 2007, Nalchik, 2: 94–99 (in Russian, English translation from Vladimir Lantsov, lantsov@megalog.ru).
- Lantsov, V.I. & Chernov, Y.I. (1987) *Tipuloid crane-flies in the tundra zone*. Moscow, Nauka: 1–176 (in Russian, English translation of the chapter on Arctic crane flies and birds is available from Vladimir Lantsov, lantsov@megalog.ru).
- Leung, M.C.-Y., Bolduc, E., Doyle, F.I., Reid, D.G., Scott Gilbert, B.S., Kennedy, A.J., Krebs, C.J. & Bêty, J. (2018) Phenology of hatching and food in low Arctic passerines and shorebirds: is there a mismatch? *Arctic Science* 4: 536–556.
- McKinnon, L., Picotin, M., Bolduc, E., Julliet, C. & Bêty, J. (2012) Timing of breeding, peak food availability, and effects of mismatch on chick growth in birds nesting in the High Arctic. *Canadian Journal of Zoology* 80: 961–971.
- Machin, P., Fernandez-Elipe, J., Flinks, H., Laso, M., Aguirre, J.I. & Klaassen, R.H.G. (2017) Habitat selection, diet and food availability of European Golden Plover *Pluvialis apricaria* chicks in Swedish Lapland. *Ibis* 159: 657–672.
- Medeiros, M.J and Schoville, S.D. (2017) Two new records of wing-reduced Tipulidae from North America. *Proceedings of the California Academy of Sciences* 64: 31–35.
- Niethammer, G. (1953) Zur Vogelwelt Boliviens. *Bonner Zoologische Beiträge* 4:195–303.
- Oosterbroek, P. (2020) *Catalogue of the Craneflies of the World*. Online available at ccw.naturalis.nl (consulted 19 November 2020).
- Polivanov V.M. & Polivanova, N.N. (1998) On the ecology of *Anthus spinoletta coutellii* Audouin in the Northern Caucasus. *Russian Ornithological Journal* 49: 3–10.
- Resano-Mayor, J., Korner-Nievergelt, F., Vignali, S., Horrenberger, N., Barras, A.G., Braunisch, V., Claire A. Pernollet, C.A. & Arlettaz, R. (2019) Snow cover phenology is the main driver of foraging habitat selection for a high-alpine passerine during breeding: implications for species persistence in the face of climate change. *Biodiversity and Conservation* 28: 2669–2685.
- Schneider, A. (2017) Influence of environmental factors on nestling growth of the white-winged snowfinch (*Montifringilla nivalis nivalis*). Bachelor Thesis. Environmental Science, ETH Zurich: 1–43.
- Starkevich, P., Men, Q.-L. & Siveli, D. (2020) Redescriptions of the poorly known crane fly species *Tipula (Vestiplex) scandens* and *Tipula (Vestiplex) subscripta* from Tibet and Yunnan, China (Diptera, Tipulidae). *Zookeys* 917: 127–140.
- Thaler, K. & Knoflach, B. (2001) Funde hochalpiner Spinnen in den mittleren Ostalpen (Tirol, Graubunden) 1997–2000 und Beifänge. *Veröffentlichungen des Museum Ferdinandeum in Innsbruck* 81: 195–203.

A preliminary list of serial publications on Diptera (past and present)

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Following is a preliminary list of serial print publications that are specifically focused on Diptera. This includes journals, society and association newsletters, bulletins, and certain other serially produced publications. Although some of these may have a few articles on other groups (e.g., *Marcellia*, which has some papers on non-cecidomyiid gall-makers), the primary focus is flies. An exception where only 50% of the stated focus is on flies is *Zeitschrift für Systematische Hymenopterologie und Dipterologie*, which was included due to how specific its stated focus was.

In considering what to include, it was sometimes nebulous as to what is a book and what is a serial in the sense of our list. For example, we decided to include *Die Fliegen, A Catalogue of the Diptera of the Americas South of the United States* and the *Diptera of Patagonia* series, but not certain 2- or more volume books that were published in series such as Papavero's *History of Neotropical Dipterology*, and the multi-volume regional manuals and catalogs (with the exceptions above).

To be clear up front (as stated in the title), this is a **preliminary** list. There are data missing, including bits and pieces, and very likely entire series. We encourage you to send us corrections and additions so we can keep this as a growing and up-to-date list. Once there are updates to be made, the full list will be posted and maintained as a resource on the website of the North American Dipterists Society at <https://dipterists.org>.

What is not included

There are a number of serials that are not included. Among them are abstracts, proceedings and program books of regular meetings, which were not included because they were more event-oriented rather than topic-oriented. The same reasoning was used for annual reports, as they are more society- or organization-related. It would be a major undertaking to compile these sorts of series, but would certainly be a welcome expansion on the scope of this list!

As mentioned in the introduction, some manuals and catalogs which may have been produced in series (e.g., the various regional Diptera manuals and catalogs) are not included.

There are a number of dipteran-borne disease-specific journals that are also not included, such as *WHO Malaria Control* and *Mosquito-Borne Disease Bulletin*. Although they are focused on dipteran disease vectors, the journals were mostly focused on the diseases and not the flies themselves. Some of these seemed more relevant than others, but we decided to leave these out for now.

There are numerous online-only and digital-only publications that would belong here by topic, but that are not included because our focus is on print publications. Many of the publications listed herein do have PDF or other digital distribution, which is mentioned for each of the records, but we do not include those that have only ever been online or digital. Compiling a list of these resources would be a useful focus for a future project to expand the scope of this list. Among these kinds of

resources are 1) those distributed on CD-ROM or other stand-alone digital means, such as the *Diptera Data Dissemination Disk* (see https://dipterists.org/digital_media.html), 2) email-only distributed newsletters such as *Drosophila Information Newsletter* and the *Dipterists Bulletin*, and 3) online-only newsletters such as *Gnatwork* (<https://www.gnatwork.ac.uk/>), *Northants Diptera* (<https://northantsdiptera.blogspot.com/p/northants-and-peterborough-diptera.html>), and many more.

The *Diptera Recording Schemes* from the United Kingdom warrant special mention because there are many newsletters and publications from these series. We record here only those that had print-runs, and do not list those that are or were digital-only, or that were encompassed within the *Bulletin of the Dipterists Forum*. In the latter case, the "newsletters" were effectively articles within the *Bulletin*, and not stand-alone newsletters.

There were some publications that appear on their face to be Diptera-focused, but actually have nothing specific to do with flies. For example, *Flycatcher* is a newsletter of a nature society in Hertfordshire, UK, and *Flygblatt* is the newsletter of the Statens växtskyddsanstalt (Swedish plant protection agency). A particularly odd case was the magazine simply called *Drosophila*, which ran under that title in 2008–2009, changing to *Boletín Drosophila* until dissolving in 2017, which was devoted to general natural history and not even specifically about insects.

How the list is organized

Each named publication series is recorded by its name as presented in the works themselves. Where possible, we included the ISSNs (noting we only include here the print ISSN, not the online ISSN). For each of these the *Association* (e.g., society, organization, institution, person, publisher) is given for the series, if there is one or if it is known. The *Years of publication* section gives the span of years of the series, and the *Place of publication* describes where it was published. In some cases, only the most recent known place or places of publication are given, although searching through each volume or issue will likely yield some variation. To a more limited extent, the association can also vary. When we know of variation in any of these fields (e.g., there were several different associations or places of publication over the years), we indicate the time span for each. After the above details, we provide our own comments in the *Comments* section, sometimes providing clarifications or details not obvious from the other data. If we know of links to these publications, or to parts of these series, we provide them in the *Links* section.

We tried to record the full history of the titles for each of these resources with an entry for each. So even though a "single" newsletter may have gone by several different titles, each name is treated separately and cross-referenced to its other names. In this way, a history of each is compiled which may not have been otherwise obvious. The details for these are provided in the *Comments* sections for the relevant records.

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The list:

AMCA Bulletin

[ISSN: 0099-7188]

Association: American Mosquito Control Association.

Years of publication: 1947–2007.

Place of publication: New York, USA.

Comments: This journal is published intermittently, with 7 volumes published between 1947 and 2007. Topics in mosquito biology and control covered included use of aircraft, ground equipment and insecticides, rearing and experimental techniques, biocontrol, and biorational control. It is unknown whether this is still in production.

Links: Some are apparently digitized by Google Books, but are not publicly viewable.

Acta Dipterologica – see *Makunagi*

AMCA Newsletter

Association: American Mosquito Control Association.

Years of publication: 1975–1995.

Place of publication: USA.

Comments: This publication was issued quarterly and was renamed the *AMCA Newsletter: The American Mosquito Control Association's Vector Review* in 1995.

Links: Some are apparently digitized by Google Books, but are not publicly viewable.

AMCA Newsletter: The American Mosquito Control Association's Vector Review

Association: American Mosquito Control Association.

Years of publication: 1995–present.

Place of publication: USA.

Comments: This was the new name (as of the November/December 1995 issue) for the *AMCA Newsletter*.

Links: This newsletter is behind a members-only paywall at <https://www.mosquito.org/page/publications>.

Anthomyiidae Newsletter – see under *Diptera Recording Scheme Newsletters*

Anthomyiidae Recording Scheme Newsletter – see under *Diptera Recording Scheme Newsletters*

Anthomyiidae Study Group Newsletter – see under *Diptera Recording Scheme Newsletters*

British Simuliid Group Bulletin

[ISSN: 1363-3376]

Association: British Simuliid Group.

Years of publication: 1992–2015.

Place of publication: United Kingdom.

Comments: This publication superseded the *Newsletter of the British Simuliid Group* after its final issue in 1987, and was then superseded itself by *The Simuliid Bulletin*. In addition to the numbered issues, there are Supplement issues with some of the later volumes, which are not part of a separately numbered "Supplement series" that would warrant its own entry. These supplemental issues are the program and abstracts for the International Simuliid Symposia.

Links: All issues are available for download at <http://www.blackfly.org.uk/recentbulls.htm>,

noting that the bulletin was available as internet-only as of issue 36 in July 2011, and there are indexes to bulletins 1–20 and 21–32. These are also available at <https://simuliid-bulletin.blogspot.com/>, a website set up specifically to enable the world to access the *Simuliid Bulletin* and its predecessors.

British Tephritidae – see under *Diptera Recording Scheme Newsletters*

Bulletin d'information sur les glossines et les trypanosomoses

[ISSN: 1812-2450]

Association: Programme de lutte contre la trypanosomose africaine (PLTA).

Years of publication: 2004–2016.

Place of publication: Italy.

Comments: This is the French version of the journal *Tsetse and Trypanosomiasis Information*. Further, this journal name replaced *Bulletin Trimestriel d'information sur les glossines et les trypanosomoses* with volume 27 in 2004. This was concurrent with the English version changing its name to *Tsetse and Trypanosomiasis Information*. The journal disseminated information on all aspects of tsetse and trypanosomiasis research and control. This journal is produced in both English and French versions –see *Tsetse and Trypanosomiasis Information* for the English version.

Links: All issues are available as PDFs at <http://www.fao.org/paat/resources/bulletin/en/>.

Bulletin of the Dipterists Forum

[ISSN: 1358-5029]

Association: Dipterists Forum (Society for the Study of Flies (Diptera), affiliated with the British Entomological and Natural History Society).

Years of publication: 1995–present.

Place of publication: United Kingdom.

Comments: This bulletin is a continuation of the *Diptera Recording Schemes Bulletin*, whose last issue was 38 in August 1994. Issue 39 was produced in March 1995 with the inception of the Dipterists Forum as a full-fledged society.

Links: All issues are available as PDFs at <https://www.dipterists.org.uk/bulletin>, and also at <http://www.micropezids.myspecies.info/node/301>.

Bulletin Trimestriel d'information sur les glossines et les trypanosomiasis

[ISSN: 1020-4954]

Association: Programme de lutte contre la trypanosomose africaine (PLTA).

Years of publication: 1998–2003.

Place of publication: Italy.

Comments: This is the French version of the journal *Tsetse and Trypanosomiasis Information Quarterly*, which was established to disseminate current information on all aspects of tsetse and trypanosomiasis research and control to institutions and individuals involved in the problems of African trypanosomiasis. The word "Trimestriel" was dropped from the name after volume 26.

Links: Starting with volume 12 (1990), all issues are available as PDFs at <http://www.fao.org/paat/resources/bulletin/en/>.

BuzzWords

Association: Florida Mosquito Control Association.

Years of publication: 1989–present.

Place of publication: Florida, USA.

Comments: This is the official newsletter of the FMCA, published 6 times per year to keep

members up-to-date on mosquito control issues and activities of the association.

Links: The webpage for this newsletter is at https://www.floridamosquito.org/Public/FMCA_Publications/Buzzwords.aspx, although only a single issue is included (Volume 1, No. 1, Jan/Feb 2017).

A Catalogue of the Diptera of the Americas South of the United States

Association: Departamento de Zoologia, Secretaria da Agricultura do Estado de São Paulo, Brazil (20 May 1966 or before–before 30 June 1970); Museu de Zoologia, Universidade de São Paulo, Brazil (30 June 1970–20 July 1984).

Years of publication: 1966–1984.

Place of publication: São Paulo, Brazil.

Comments: This work was published in fascicles over a period of 18 years (hence its inclusion here as a serial publication), with each a treatment of a single family. The introduction lists a set of 110 fascicles that were to be published, but 20 were not published (although for some families, separate works were published later, outside this serial, e.g., Sciaridae, Culicidae, Lauxaniidae, Therevidae). However, some families were added that were not included in the introductory list, and were indicated with A, B, *etc.*, along with most closely related family. Issues were not published sequentially by fascicle number, with fascicles 10, 11, 13, 18, 32, 42, 45, 73, and 92 all published on 20 May 1966, shortly after the introductory chapter. Certain superfamilies were given a heading page at the start of that series of fascicles, even if those fascicles were published at different times.

Links: The entire series can be viewed or downloaded from Biodiversity Heritage Library, at <https://doi.org/10.5962/bhl.title.110114>.

Cecidologica Indica

Association: Cecidological Society of India.

Years of publication: 1966–1979.

Place of publication: India.

Comments: This was the official bulletin of the Cecidological Society of India, and 14 volumes were produced on an irregular schedule. Although predominantly about cecidomyiids, this journal did cover other non-dipteran gall producers.

Links: Although apparently digitized (<https://catalog.hathitrust.org/Record/009164568>), neither the contents nor articles are available online.

Cecidologica Internationale

Association: Cecidological Society of India.

Years of publication: 1980–1993.

Place of publication: India.

Comments: This replaced the journal *Cecidologica Indica* after volume 14 by that name, starting over with volume 1 and continuing through the dual volume 13/14. Although predominantly about cecidomyiids, this journal did cover other non-dipteran gall producers.

Links: Although apparently digitized (<https://catalog.hathitrust.org/Record/009190624>), neither the contents nor articles are available online.

Ceratopogonidae Information Exchange Newsletter

Association: No official association.

Years of publication: 1968–present.

Place of publication: United Kingdom (1968 – *ca.* 1985); Florida, USA (*ca.* 1985–1994), Georgia, USA (1994–2000), Tennessee, USA (1994–present).

Comments: This newsletter has long served to facilitate communication among ceratopogonid workers. Although hard copies were still printed and mailed out, the website does not provide PDFs from 1995–2010 (issues 56–85), but instead presents the newsletters as webpages. Starting in 2010 with issue 86, the newsletter was switched to presentation as PDFs.

Links: All issues starting with volume 56 (1995) are available online at <http://campus.belmont.edu/cienews/cie.html#cie>. Pre-1995 issues are likely only available in hard copy.

Chironomus Journal of Chironomidae Research

[ISSN: 0172-1941]

Association: None stated.

Years of publication: 2015–present.

Place of publication: Trondheim, Norway.

Comments: This journal publishes open-access peer-reviewed research articles on all aspects of Chironomidae, also serving as the news bulletin for the chironomid research community.

Links: This journal underwent several name changes since its 1967 beginnings in fits and starts. The current name for the journal began with volume number 28 (2015), replacing *Chironomus Newsletter on Chironomidae Research*. At the same time, they announced that starting with the 2016 issue, the journal would be online-only, and no longer a print journal. The current issue (volume 33) is online at <https://www.ntnu.no/ojs/index.php/chironomus/issue/view/319>, and all past issues (of all iterations of this journal) are available at <http://www.chironomidae.net/newsletter.html> and in the archive at <https://www.ntnu.no/ojs/index.php/chironomus/issue/archive>.

Chironomus Mitteilungen aus der Chironomidenkunde

Association: Max-Planck-Institut für Limnologie.

Years of publication: 1967–1968.

Place of publication: Germany.

Comments: Individual papers were in German or English. This journal name only lasted for one volume (5 issues), after which (and after a gap of 10 years) the journal was renamed to include “Newsletter of Chironomid Research” starting with volume 2.

Links: All issues are available at <http://www.chironomidae.net/newsletter.html> and in the archive at <https://www.ntnu.no/ojs/index.php/chironomus/issue/archive>.

Chironomus Mitteilungen aus der Chironomidenkunde Newsletter of Chironomid Research

Association: None stated.

Years of publication: 1978–1984.

Place of publication: Germany (1978–1982, 1984); New Mexico, USA (1982–1984).

Comments: Individual papers were in German, French or English. This journal name was replaced (after a gap of 8 years) to exclude the “Mitteilungen aus der Chironomidenkunde” part of the name. This time period encompassed volumes 2 (with 4 issues) and 3 (with 2 issues).

Links: All issues are available at <http://www.chironomidae.net/newsletter.html> and in the archive at <https://www.ntnu.no/ojs/index.php/chironomus/issue/archive>.

Chironomus Newsletter of Chironomid Research

[ISSN: 0172-1941]

Association: None stated.

Years of publication: 1992–1999.

Place of publication: Sweden.

Comments: In a second rebirth after an 8 year gap, this journal superseded *Chironomus*

Mitteilungen aus der Chironomidenkunde Newsletter of Chironomid Research, and individual papers were only in English hereafter. From this point forward, the journal was published with one issue per year, with a few exceptions (e.g., 2 issues in 1995). This journal name was again replaced, this time by *Chironomus Newsletter on Chironomidae Research* starting with issue 13 in 2000.

Links: All issues are available at <http://www.chironomidae.net/newsletter.html> and in the archive at <https://www.ntnu.no/ojs/index.php/chironomus/issue/archive>.

Chironomus Newsletter on Chironomidae Research

[ISSN: 0172-1941]

Association: None stated.

Years of publication: 2000–2014.

Place of publication: Norway (not mentioned until volume 25, but likely prior to this given a co-editor and the treasurer were located there).

Comments: This journal name was again replaced, this time by *Chironomus Journal on Chironomidae Research* starting with issue 28 in 2015. The journal went online with volume 24 in November 2011, with an online ISSN recorded as 1891-5426.

Links: All issues are available at <http://www.chironomidae.net/newsletter.html> and in the archive at <https://www.ntnu.no/ojs/index.php/chironomus/issue/archive>.

Conopidae Recording Scheme incorporating the Lonchopteridae Study Group Newsletter – see under *Diptera Recording Scheme Newsletters*

Conopidae Recording Scheme Note – see under *Diptera Recording Scheme Newsletters*

Contributions to Blood-Sucking Dipteran Insects

Association: Shanghai Institute of Technology and Science.

Years of publication: 1989–1993.

Place of publication: China.

Comments: Only three volumes of this serial were published, all edited by Yuxin Yu, and dealing primarily with Ceratopogonidae, but also including a few articles on Tabanidae, and Culicidae. The dates on the covers are not always the actual publication dates. Actual dates are: Volume 1 “1989” [= April 1990]; Volume 2 “1990” [= December 1990]; Volume 3 “1991” [= September 1993].

Links: These volumes are not available online.

Cranefly News, The Newsletter of the Cranefly Recording Scheme for Tipuloidea, Trichoceridae and Ptychopteridae – see under *Diptera Recording Scheme Newsletters*

Cranefly Recording Scheme Newsletter – see under *Diptera Recording Scheme Newsletters*

CSG News. The Newsletter of the Chironomid Study Group – see under *Diptera Recording Scheme Newsletters*

Die Fliegen der Paläarktischen Region

Association: E. Schweizerbart'sche Verlagsbuchhandlung.

Years of publication: 1924–1993.

Place of publication: Germany.

Comments: The fascicles in each volume were not issued in chronological order, but instead grouped by topic. In total, 331 fascicles were published, although volume 331 came out 9 years after

volume 330.

Links: This series is not available online, but many volumes are available for purchase from various booksellers, and occasional PDFs can be found.

Die Vliegenmepper

[ISSN: 1388-3178]

Association: Nederlandse Entomologische Vereniging, Sectie Diptera.

Years of publication: 1992–2018.

Place of publication: Netherlands.

Comments: Most contributions are from members of the society, with such regular features as announcements of activities, discussions of recent literature, reports of rare finds, faunistic overviews, and taxonomic and nomenclatural discussions. This newsletter has 27 volumes so far, with most years having 2 issues.

Links: This series is available at <https://www.nev.nl/diptera/nieuwsbrief.html> and <https://www.nev.nl/diptera/vliegenmepper/>.

Diptera of Patagonia and South Chile

Association: The British Museum (Natural History).

Years of publication: 1929–1951.

Place of publication: London, United Kingdom.

Comments: This series was intended to review the state of knowledge of the flies in the southern forested region of South America, including the Patagonian plateau. In addition to reviewing what was known at the time, many new taxa were described, and this remains a critical resource for flies of this part of the world. There were 6 volumes published, containing a total of 20 fascicles.

Links: Although Google Books has them scanned, only snippets are available for viewing, and not as downloadable PDFs.

Diptera Recording Schemes Bulletin

[ISSN: 0963-2182]

Association: Diptera Recording Schemes.

Years of publication: ca. 1976–1994.

Place of publication: United Kingdom.

Comments: This bulletin was continued as the *Bulletin of the Dipterists Forum* after issue 38 in August 1994. Some publications mistakenly refer to this as the Bulletin of the Diptera Recording Schemes.

Links: All issues (except for #2) are available as PDFs at <http://www.micropezids.myspecies.info/node/301>.

Diptera Recording Scheme Newsletters

Association: Various semi-independent “taxon study groups” (1973–ca. 1994); Dipterists Forum (Society for the Study of Flies (Diptera), affiliated with the British Entomological and Natural History Society) (ca. 1994–present).

Years of publication: various, see comments.

Place of publication: United Kingdom.

Comments: The series of Diptera recording scheme newsletters cover various families and cover various time periods. Sometimes, these newsletters were replaced by inclusion of recording scheme news within the pages of the *Bulletin of the Dipterists Forum*, and some recording schemes were only ever presented in the Bulletin. Only those which had their own separate newsletters are

listed here, which leaves out those present only in the *Bulletin* or online. Most, but not all, issues of the newsletters are available (see Links). For any given recording scheme, the newsletters go by various names. Following is a list of recording schemes with their own newsletters, including the various names they go by, and the inclusive years and issues:

Anthomyiidae: *Anthomyiidae Newsletter* [ISSN: 1369-1104] (1995–1999, issues 1–6; 2013, issue 9); *Anthomyiidae Study Group Newsletter* (2009–2010, issues 7–8); *Anthomyiidae Recording Scheme Newsletter* (2019–present, issues 11–12).

Chironomidae: *CSG News. The Newsletter of the Chironomid Study Group* (1993, issue 1); *The Edwardsian. The Newsletter of the Chironomid Study Group* (1994 – 1997). [no issues available online].

Conopidae: *Conopidae Recording Scheme incorporating the Lonchopteridae Study Group Newsletter* (1988–1995, issues 1–6); *Conopidae Recording Scheme Note* (2006). Note, issue 1 did not have a date indicated, but is presumed to be 1988.

Cranefly: *Cranefly Recording Scheme Newsletter* (1973–2010, issues 1–20); *Cranefly News, The Newsletter of the Cranefly Recording Scheme for Tipuloidea, Trichoceridae and Ptychopteridae* (2011 – present, issues 21–35). Note, this recording scheme covers Tipuloidea, Ptychopteridae, and Trichoceridae.

Dixidae: *Recording Scheme for Diptera: Dixidae* (1988, issues 1–2). Note, although this newsletter quickly disappeared, the recording scheme was revived in 2013 also including Thaumaleidae, but with no newsletter. [no issues available online].

Empididae and Dolichopodidae: *Dollies and Empids Study Group Newsheet* (1986, issue 1); *Empid and Dolichopodid Study Group Newsheet* [ISSN: 1360-3957] (1986–1999, issues 2–15); *Empidid & Dolichopodid Recording Scheme Newsletter* (2011–present, issues 16–25).

Flat-footed Fly: *Flat-footed Fly Recording Scheme Newsletter* (2016–present, issues 1–3). Note, this recording scheme covers the families Platypezidae and Opetiidae.

Fungus Gnats: *Fungus Gnats Recording Scheme Newsletter* (2008–2018, issues 1–11). Note, this recording scheme covers Mycetophilidae and allies.

Hoverfly: *Hoverfly Newsletter* [ISSN: 1360-3949] (1982–present, issues 1–68). Note, this recording scheme covers the family Syrphidae.

Larger Brachycera (replaced after 2010 by Soldier Flies and Allies): *Larger Brachycera Recording Scheme Newsletter* [ISSN: 0962-5569] (1982–2010, issues 1–28). Note, this recording scheme covers 11 families: Acroceridae, Asilidae, Athericidae, Bombyliidae, Rhagionidae, Scenopinidae, Stratiomyidae, Tabanidae, Therevidae, Xylophagidae, and Xylomyidae. [link: <https://www.brc.ac.uk/soldierflies-and-allies/newsletters>].

Micropezid & Tanypezid: *Micropezids & Tanypezids, Stilt & Stalk Fly Recording Scheme Newsletter* (2019–present, issues 1–2). Note, issue 1 covers the Recording Scheme contents from the *Bulletin of the Dipterists Forum* from 1999–2019. [link: <http://www.micropezids.myspecies.info/node/292>].

Oestridae: *Oestridae Study Group Newsletter* (2009–2012, issues 1–2).

Picture-winged flies: *Picture-Winged Flies Recording Scheme Newsletter* [ISSN: 1369-1112] (1997–1999, issues 1–2), *Picture-Winged Flies Recording Scheme Note* (2006). [no issues of the newsletter available online].

Pipunculidae: *The Piercer, A Pipunculidae Newsheet* (1989–1992, issues 1–2); *The Piercer, A Pipunculidae Newsletter* (2002, issue 3).

Sciomyzidae: *Sciomyzidae Recording Scheme Newsletter* (1983–2010, issues 1–5); *Sciomyzidae Recording Scheme News* (2010, issue 6).

Sepsidae: *Diptera Recording Schemes Sepsidae Newsletter* (1983–1984, issues 1–2).

Soldier Flies and Allies (replaced Larger Brachycera): *Soldier Flies and Allies Recording Scheme Newsletter* (2013–present, issues 1–7). Note, like its predecessor, this recording scheme

covers 11 families: Acroceridae, Asilidae, Athericidae, Bombyliidae, Rhagionidae, Scenopinidae, Stratiomyidae, Tabanidae, Therevidae, Xylophagidae, and Xylomyidae.

Tachinidae: *Tachinid Recording Scheme Newsletter* (2005, issue 1). Although the newsletter is within the links below, the recording scheme has its own webpage at <http://tachinidae.org.uk/blog/>.

Tephritidae: *British Tephritidae* (1983–1998, issues 1–7) [no issues available online].

Links: Information about the various Diptera recording schemes is given at <https://www.dipterists.org.uk/schemes>, even for those that do not have newsletters, or are very new. However, some recording schemes that had newsletters have no information listed or issues available online. Besides the two exceptions that have their own webpages (links above), for those recording schemes with newsletters (listed in the comments above), two main sources should be consulted, as they do not overlap 100% (some issues are absent from one or the other), at <https://www.dipterists.org.uk/recording-scheme-newsletters> and <http://www.micropezids.myspecies.info/node/344>. Links for each newsletter topic are not given individually in the list above, as the two webpages each cover the whole list.

Diptera Recording Schemes Sepsidae Newsletter – see under *Diptera Recording Scheme Newsletters*

Dipterists Digest

[ISSN: 0953-7260]

Association: Privately published by Derek Whitely (1988 – 1994, First Series and volume 1 of Second Series); Dipterists Forum (Society for the Study of Flies (Diptera), affiliated with the British Entomological and Natural History Society) (1995–present).

Years of publication: 1988–1994 (First Series), 1994–present (Second Series).

Place of publication: United Kingdom.

Comments: This journal has a broad scope related to Diptera, including works on behavior, ecology and natural history of flies, collecting and rearing techniques, conservation, reports from the various Diptera Recording Schemes, local faunistic accounts and field meeting results, descriptions of new species, notes on identification, etc.

Links: Information for purchase of available issues, and links to those available as PDFs are at <https://www.dipterists.org.uk/digest>.

Dipterological Research

[ISSN: 1021-1020]

Association: Latvian Museum of Nature (1990–1992), with technical support from the Zoological Institute of the Russian Academy of Sciences (1992).

Years of publication: 1990–1992.

Place of publication: Latvia (1990–1992).

Comments: This journal was thereafter renamed *An International Journal of Dipterological Research*. Note, the ISSN Portal indicates the number as a suppressed ISSN, but it is recorded in the Smithsonian Libraries Library Catalog.

Links: A list of issues through 18 can be found at <http://hbs.bishopmuseum.org/dating/diptres.html>, but with no contents. Neither contents nor PDFs are available online, and hard copies of the journal are difficult to acquire.

Dipteron, Bulletin of the Dipterological Section of the Polish Entomological Society

[ISSN: 1895-4496]

Association: Polish Entomological Society.

Years of publication: 1985–present.

Place of publication: Poland.

Comments: This journal started as print-only, but is currently an electronic-only, open-access journal covering Old World flies.

Links: The current volume of the journal (volume 36, 2020) is on the journal's front page, at <http://pte.au.poznan.pl/dipteron/>. All back issues are available as PDFs in the archive at <http://pte.au.poznan.pl/dipteron/archiv.htm>.

Dipteron, Zeitschrift für Dipterologie

[ISSN: 1436-5596]

Association: Privately published by Christian Kassebeer.

Years of publication: 1998–2001.

Place of publication: Germany.

Comments: There were four volumes published, volume 1 (1998) with 3 issues, volume 2 (1999) with 9 issues, and volumes 3 and 4 with 2 issues each.

Links: These are not available online.

Dollies and Empids Study Group Newsheet – see under *Diptera Recording Scheme Newsletters*

Drosophila Information Service

[ISSN: 0070-7333]

Association: Carnegie Institute of Washington (1934–1959); University of Oregon (1960–1978); FlyBase Consortium (1979, 1982, 1985–1987, 1990–1991, 1994, 1997); University of Kansas (1980–1987); Pennsylvania State University (1988); University of Oklahoma (1991–present).

Years of publication: 1934–present.

Place of publication: New York, USA (1934–1959); Oregon, USA (1960–1978); Massachusetts, USA (1979, 1982, 1985–1987, 1990–1991, 1994, 1997); Kansas, USA (1980–1987); Pennsylvania, USA (1988); Oklahoma, USA (1991–present).

Comments: Currently with 102 issues, this journal is one of the older Diptera-only journals. The focus is to disseminate useful information to researchers, teachers, and students on studies of *Drosophila* genetics, development, population biology, and evolution. Note, three compendia (with author and subject indexes) were issued by E. Novitski in the 1950s for issues 1–14 (through the University of Missouri), 15–24 and 25–27 (through the University of Oregon), under the title *Research and Technical Notes. Drosophila Information Service*. In volume 70, it was announced that an associate newsletter, the *Drosophila Information Newsletter*, would be distributed quarterly as electronic-only (by email) to interested people as a forum for rapid communication, which would then be reprinted within the pages of the *Drosophila Information Service* for those without email access.

Links: Most issues are available online at <https://ou.edu/journals/dis/byissue.html>. Exceptions include “Special Issues” published by the FlyBase Consortium, with the website directing to FlyBase (<http://flybase.org/>) for current information.

The Edwardsonian. The Newsletter of the Chironomid Study Group – see under *Diptera Recording Scheme Newsletters*

Empid and Dolichopodid Study Group Newsheet – see under *Diptera Recording Scheme Newsletters*

Empidid & Dolichopodid Recording Scheme Newsletter – see under *Diptera Recording Scheme Newsletters*

European Mosquito Bulletin

[ISSN: 1460-6127]

Association: European Mosquito Control Association.

Years of publication: 1998–2012.

Place of publication: Not stated.

Comments: This journal had the byline “Journal of the European Mosquito Control Association” throughout its history, but was renamed (dropping “European Mosquito Bulletin”) with volume 31 in 2013. The journal was intended to provide a forum for information about European mosquitoes, including all aspects of their biology, ecology, identification, taxonomy, distribution, disease relations and control.

Links: All articles in each issue are listed and linked at <http://e-m-b.org/content/overview-all-emb-publications>, including those from its current and former titles.

Flat-footed Fly Recording Scheme Newsletter – see under *Diptera Recording Scheme Newsletters*

Flies of the Nearctic Region

Association: E. Schweizerbart'sche Verlagsbuchhandlung.

Years of publication: 1980–2004.

Place of publication: Germany.

Comments: This series aimed to emulate *Die Fliegen der Paläarktischen Region* for the Nearctic dipteran fauna. Like *Die Fliegen*, the issues of each volume were not issued in chronological order, but instead by topic. Series suspended when its editor, Graham C.D. Griffiths passed away. Only the following families had parts published (none complete): Anthomyiidae, Blephariceridae, Bombyliidae, Diopsidae, Dolichopodidae.

Links: This series is not available online, but many volumes are available for purchase from various booksellers.

Fly

[ISSN: 1933-6942]

Association: No association; publisher is Taylor & Francis.

Years of publication: 2007–present.

Place of publication: United Kingdom.

Comments: This journal is focused on *Drosophila* research ranging from developmental biology and organogenesis to sensory neurobiology, circadian rhythm and learning and memory, to sex determination, evolutionary biology and speciation. After starting with 6 issues per year for volumes 1 and 2, the journal switched to 4 issues per year thereafter, in later years sometimes combining issues.

Links: All issues of this journal are available online, but behind a paywall, at <https://www.tandfonline.com/loi/kfly20/>.

Fly Times

Association: North American Dipterists Society.

Years of publication: 1988–present.

Place of publication: Ontario, Canada; California, USA.

Comments: The journal started out largely as a newsletter to keep dipterists in North America informed about various goings-on among colleagues, but has become an international publication with authors and readers from all over, covering all aspects of dipterology.

Links: All issues of the newsletter are freely available at <http://www.nadsdiptera.org/News/FlyTimes/Flyhome.htm>, and at the new North American Dipterists

Society website at https://dipterists.org/fly_times.html. *Fly Times Supplement* issue 3 gives a history and various indexes for the *Fly Times* through issue 60.

Fly Times Supplement

Association: North American Dipterists Society.

Years of publication: 2017–present.

Place of publication: Ontario, Canada; California, USA.

Comments: The supplement series was started to accommodate larger manuscripts to be submitted to the *Fly Times*, generally containing only a single work.

Links: All issues of the supplement are freely available at <http://www.nadsdiptera.org/News/FlyTimes/Flyhome.htm>, and at the new North American Dipterists Society website at https://dipterists.org/fly_times_supplement.html.

The Flyer

Association: Smithsonian Institution, USDA-SEL and Bishop Museum.

Years of publication: 1986–1988.

Place of publication: Washington DC, USA.

Comments: This journal had only 2 issues (issue 1 was also issued in a second edition (with corrections) and issue 2 was indicated as “draft” although it was circulated). This was intended to be a newsletter for and about Diptera workers, to increase communication among people interested in flies. It was quickly superseded by *Fly Times*.

Links: These issues are available at the new North American Dipterists Society website at <https://dipterists.org/resources.html#journals>.

Fragmenta Dipterologica

[ISSN: 1565-8015]

Association: Privately published by the late Andy Z. Lehrer.

Years of publication: 2006–2013.

Place of publication: Israel.

Comments: The journal had 41 issues, which consisted of 1 to a few articles per issue, mostly in French and mostly authored by the late Andy Lehrer. The papers therein consisted frequently of “hit pieces”, *ad hominem* attacks against dipterists who disagreed with his taxonomic opinions or were targeted for other reasons.

Links: The issues of this journal do not have a website, but issues can sometimes be found online.

Fruit Fly News

Association: International Biological Programme, Working Group on Fruit Flies (1972–1977); International Organization for Biological Control of Noxious Animals and Plants (IOBC), West Palaearctic Regional Section, Working Group on Fruit Flies of Economic Importance (1979–1985); IOBC, Working Group on Fruit Flies of Economic Importance (1987); IOBC, Global Working Group on Fruit Flies of Economic Importance (1989–1992); Tephritid Workers Database (2009–present).

Years of publication: 1972–1992, 2009–present.

Place of publication: Switzerland (1972–1992), Austria (2009–present).

Comments: This newsletter had a slow start in 1972, publishing an issue every 1–3 years until 1992 before ceasing altogether until rebooting in 2009. At this time, it came back under the auspices of the Tephritid Workers Database to continue in this endeavor, providing timely information on fruit fly management, research, publications, news, upcoming events and job opportunities. Although the

2009 reboot was really an upgrade from the electronic-only series *Tephritid Workers Database News Digest*, it took on the mantle of the *Fruit Fly News* starting with issue 12, after the otherwise defunct version stopped after issue 11 in 1992.

Links: This newsletter is available through the IAEA/NAIPC webpages at <https://nucleus.iaea.org/sites/naipc/twd/Newsletters/Forms/Fruit%20Fly%20News1.aspx>.

Fungus Gnats Recording Scheme Newsletter – see under *Diptera Recording Scheme Newsletters*

Hana Abu

Association: Dipterist's Club of Japan.

Years of publication: 1996–present.

Place of publication: Japan.

Comments: The journal has been focused mainly on Syrphidae, but there are many papers included on other flies.

Links: The contents of all issues are given at <http://syrphidae.a.la9.jp/hanaabuC.htm>, and some at <http://kawamo.co.jp/roppon-ashi/sub305.htm>, but none are available as PDFs.

Hoverfly Newsletter – see under *Diptera Recording Scheme Newsletters*

International Cecidology Newsletter

Association: Loyola College, Entomology Research Unit, Madras.

Years of publication: 1979–1986.

Place of publication: India.

Comments: With 14 volumes, this newsletter had two issues per year.

Links: No issues of this newsletter have been found online.

An International Journal of Dipterological Research

[ISSN: 1021-1020]

Association: Latvian Museum of Nature and Zoology, & Zoological Institute of the Russian Academy of Sciences.

Years of publication: 1993–2018.

Place of publication: Russia.

Comments: This journal was previously named *Dipterological Research*. As of 2018, there were at least 29 volumes of this journal. It is unknown whether this is still in production, and the editor-in-chief, Sergei Kuznetsov, recently passed away, making its continued production uncertain.

Links: A list of issues through 18 can be found at <http://hbs.bishopmuseum.org/dating/diptres.html>, but with no contents. Neither contents nor PDFs are available online, and hard copies of the journal are difficult to acquire.

International Journal of Mosquito Research

[ISSN: 2348-7941]

Association: None indicated.

Years of publication: 2014–present.

Place of publication: India.

Comments: An open access journal with articles on all aspects of mosquitoes, including taxonomy, vector biology, diseases, epidemiology, ecology, surveillance, and control. This journal publishes 4 issues (sometimes broken into parts A, B, etc.) per volume, so far with 7 volumes.

Links: As an open-access journal, all issues can be found at <http://www.dipterajournal.com/archives>.

Journal of the American Mosquito Control Association

[ISSN: 8756-971X]

Association: American Mosquito Control Association.

Years of publication: 1985–present.

Place of publication: Washington DC, USA.

Comments: The journal *Mosquito News* was renamed with the March 1985 issue, starting over at volume 1, and keeping the “Mosquito News” subtitle.

Links: The association website has a link to search this AMCA publication through 2004, as well as *Mosquito Systematics*, and *Mosquito News*, at <https://www.mosquito.org/page/journalsearch>, which links directly to Biodiversity Heritage Library with a search for items contributed by “American Mosquito Control Association”. From 2004–2017, the issues are all found on BioOne at <https://bioone.org/journals/journal-of-the-american-mosquito-control-association/issues>, and issues after 2017 are found at <https://mosquito-jamca.org/> and <https://meridian.allenpress.com/jamca/issue>. The latest volume available is 36, issue 2 from 2020.

Journal of the American Mosquito Control Association. Supplement

[ISSN: 1046-3607]

Association: American Mosquito Control Association.

Years of publication: 1988, 1990.

Place of publication: Louisiana, USA.

Comments: The first supplement covered the biology of the then recently introduced exotic species *Aedes albopictus*, and the second covered the medical importance of rice land mosquitoes. Subsequent supplements were produced irregularly as supplemental issues in the normal volume of the *Journal of the American Mosquito Control Association* rather than as a separate numbered series.

Links: There is no website for this journal, although PDF's can be found for the issues.

Journal of the European Mosquito Control Association

[ISSN: 2054-930X]

Association: European Mosquito Control Association.

Years of publication: 2013–present.

Place of publication: Not stated.

Comments: This is a continuation of what was formerly called the *European Mosquito Bulletin*, always with the byline “Journal of the European Mosquito Control Association”.

Links: All articles in each issue are listed and linked at <http://e-m-b.org/content/overview-all-emb-publications>, including those from its current and former titles. The journal was intended to provide a forum for information about European mosquitoes, including all aspects of their biology, ecology, identification, taxonomy, distribution, disease relations and control.

Journal of the Florida Anti-Mosquito Association

[ISSN: 0743-1554]

Association: Florida Anti-Mosquito Association.

Years of publication: ca. 1922–1989.

Place of publication: Florida, USA.

Comments: Although information is scarce on the early volumes of this journal, in 1989 volume 60 was published. Thereafter, the journal was called the *Journal of the Florida Mosquito Control Association*, along with the change in name for the association.

Links: This journal is not available online, although the Florida Mosquito Control Association has an archive page at

https://www.floridamosquito.org/Public/Publications/Archives/Public/FMCA_Publications/Archives.aspx that appears to have future plans for this ("FAMA Archives").

Journal of the Florida Mosquito Control Association

[ISSN: 1055-355X]

Association: Florida Mosquito Control Association.

Years of publication: 1990–present.

Place of publication: Florida, USA.

Comments: This journal is published yearly and accepts manuscripts of research articles, operational or scientific notes, annual meeting abstracts, etc. The journal is a continuation of *Journal of the Florida Anti-Mosquito Association*, with the volume number continuing from volume 61 since 1990.

Links: The webpage for this publication is at

https://www.floridamosquito.org/Public/Publications/JFMCA/Public/FMCA_Publications/JFCMA.a.spx, with only volumes 66 and 67 (2019 and 2020, respectively) available.

Larger Brachycera Recording Scheme Newsletter – see under *Diptera Recording Scheme Newsletters*

Makunagi, Acta Dipterologica

[ISSN: 0917-4710]

Association: Societas Dipterologica.

Years of publication: 1966–present.

Place of publication: Japan.

Comments: No further information.

Links: The 22 volumes of this journal published so far are not available online.

Makunagi, Acta Dipterologica Supplement

Association: Societas Dipterologica.

Years of publication: 1999–present.

Place of publication: Japan.

Comments: At least 3 supplements have been published, as of 2018.

Links: The published supplements of this journal are not available online.

Malloch Society Research Report

[ISSN: 1465-1513]

Association: Malloch Society.

Years of publication: 1993–1998.

Place of publication: Scotland, United Kingdom.

Comments: There were four issues of this journal published, and it is unknown whether additional issues will be produced. The last report in 1998 was a biography of the dipterist J.R. Malloch by Geoff Hancock.

Links: The issues of this journal can be found at

<http://www.mallochsociety.org.uk/publications/>. Note, issue 2 does not contain a link, but looking at the page source revealed the PDF at http://static1.1.sqspcdn.com/static/f/113625/26262889/1432822241873/shingle_spey_1993.pdf.

Marcellia

[ISSN: 0025-2794]

Association: Institute de botanique de Strasbourg.

Years of publication: 1902–1978.

Place of publication: Italy (early years), Germany (1954–1972), United Kingdom (1973–1978).

Comments: This journal is apparently related to *Cecidologica Indica* and *Cecidologica Internationale* (which are indicated as "new titles" of this journal by the Hathi Trust Digital Library), but there is overlap in their dates, so this may not be so. Although predominantly about cecidomyiids, this journal did cover other non-dipteran gall producers. At least during the years this produced in Italy, it had the byline "Revista Internazionale di Cecidologia."

Links: Some volumes are available online at <https://catalog.hathitrust.org/Record/007883864>, while others are digitized but only available for limited search.

Micropezids & Tanypezids, Stilt & Stalk Fly Recording Scheme Newsletter – see under *Diptera Recording Scheme Newsletters*

Mosquito News

[ISSN: 0027-142X]

Association: Eastern Association of Mosquito Control Workers (1941–1944, volumes 1–4(1)), American Mosquito Control Association (1944–1984, volumes 4(2)–current).

Years of publication: 1941–1984.

Place of publication: New York, USA.

Comments: The Association underwent a name change in 1944. This publication was renamed *Journal of the American Mosquito Control Association* in 1985 (starting over at volume 1) after the final issue of volume 44 at the end of 1984.

Links: The association website has a link to search this AMCA publication, as well as *Mosquito Systematics*, and *Journal of the American Mosquito Control Association*, at <https://www.mosquito.org/page/journalsearch>, which links directly to Biodiversity Heritage Library with a search for items contributed by “American Mosquito Control Association”.

Mosquito Systematics

[ISSN: 0091-3669]

Association: American Mosquito Control Association.

Years of publication: 1972–1996.

Place of publication: various, depending on society headquarters.

Comments: This journal was previously the *Mosquito Systematics Newsletter*. After 23 volumes, this journal was eliminated by the society, with its kind of content to be included within future issues of the *Journal of the American Mosquito Control Association*.

Links: The association website has a link to search this AMCA publication, as well as *Mosquito News*, and *Journal of the American Mosquito Control Association*, at <https://www.mosquito.org/page/journalsearch>, which links directly to Biodiversity Heritage Library with a search for items contributed by “American Mosquito Control Association”.

Mosquito Systematics Newsletter

[ISSN: 0091-3677]

Association: American Mosquito Control Association.

Years of publication: 1969–1971.

Place of publication: North Carolina, USA.

Comments: This journal was issued quarterly, and was renamed *Mosquito Systematics* in 1972 with volume 4.

Links: The association website has a link to search this AMCA publication, as well as *Mosquito News*, and *Journal of the American Mosquito Control Association*, at <https://www.mosquito.org/page/journalsearch>, which links directly to Biodiversity Heritage Library with a search for items contributed by “American Mosquito Control Association”.

Mosquito Systematics Supplement – see *Supplements to Mosquito Systematics*

Myia

[ISSN: 2352-5762]

Association: Privately published by Paul H. Arnaud, Jr., and supported in part by the California Academy of Sciences (1979 – 2004); North American Dipterists Society (1999–2011).

Years of publication: 1979–2011.

Place of publication: California, USA (1974 – 2004); Washington DC, USA (1999 – 2011).

Comments: This journal was started by Paul H. Arnaud, Jr., devoted to dissemination of research and other information about flies. Paul published 6 volumes through 2001, and volume 7 was incomplete (2004). Volume 8 was reserved for Paul, but never published. Beginning in 1999 (date on cover is 1998) with volume 9, F. Christian Thompson became editor and published through volume 12 under the auspices of the North American Dipterists Society. Despite the time lag, further volumes will be forthcoming.

Links: The website for this journal is from the North American Dipterists Society, at <https://dipterists.org/myia.html>.

Neotropical Diptera

[ISSN: 1982-7121]

Association: Departamento de Biologia, of the Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto, of the Universidade de São Paulo.

Years of publication: 2008–2014.

Place of publication: Brazil.

Comments: Each issue is either a complete catalog or manual of a family of flies of the Neotropical Region. Of the 25 volumes produced, 18 of them were in the single year 2009.

Links: The webpage for the issues, which gives a full list, is at http://revistas.ffclrp.usp.br/Neotropical_Diptera/issue/archive, but there are no download links.

Newsletter of the British Simuliid Group

[ISSN: 0962-4384]

Association: British Simuliid Group.

Years of publication: 1979 (April), 1982–1987.

Place of publication: United Kingdom.

Comments: This newsletter was published twice yearly. Note, although it was the same newsletter, in issues 2–6 the title was given as *Newsletter of the British Simulium Group*. The last issue was #13 in 1987, and publications from this group ceased until 1992 with the *British Simuliid Group Bulletin*.

Links: All issues and an index are available for download at <http://www.blackfly.org.uk/recentbulls.htm>. These are also available at <https://simuliid-bulletin.blogspot.com/>, a website set up specifically to enable the world to access the *Simuliid Bulletin* and its predecessors.

Newsletter of the British Simulium Group

Association: British Simuliid Group.

Years of publication: 1979 (November)–1981.

Place of publication: United Kingdom.

Comments: Note, this is the same as the *Newsletter of the British Simuliid Group*, but used this different title for issues 2–6 only.

Links: All 13 issues and an index are available for download at <http://www.blackfly.org.uk/recentbulls.htm>.

Newsletter of the Societas Dipterologica (Sōshi Gakkai nyūsu)

[ISSN: 0917-4745]

Association: Societas Dipterologica.

Years of publication: 1982–?.

Place of publication: Japan.

Comments: No further information is known to us.

Links: The issues of this newsletter are not available online.

Oestridae Study Group Newsletter – see under *Diptera Recording Scheme Newsletters*

Pacific Basin Diptera News

Association: J. Linsley Gressitt Center for Research in Entomology, Bishop Museum.

Years of publication: 1989–1991.

Place of publication: Hawai'i, USA.

Comments: This newsletter was meant to bring together dipterists working in the Australasian and Oceanian Regions by listing the latest publications, field collecting, and other information of interest to dipterists.

Links: The 5 issues are available at the new North American Dipterists Society website (this will be announced soon via the *Fly Times Supplement* series) at <https://dipterists.org/resources.html#journals>.

Phorid News

Association: Privately published by Brian Brown.

Years of publication: 1994.

Place of publication: California, USA.

Comments: This newsletter was meant as a means of communication among dipterists interested in Phoridae. After the single issue, it was renamed *Phorid Newsletter*.

Links: The single issue is not available online, although it was indexed by the Internet Archive Wayback Machine (<https://web.archive.org/>), and an html version can be seen at <https://web.archive.org/web/20020316193557/http://nhm.co.la.ca.us/research/entomology/phorids/pnews1.htm>.

Phorid Newsletter

Association: Privately published by Brian Brown.

Years of publication: 1994–2008.

Place of publication: California, USA.

Comments: This newsletter was meant as a means of communication among dipterists interested in Phoridae. After the first issue of *Phorid News*, it was renamed *Phorid Newsletter*.

Links: All 11 issues (2–12) are available at <http://phorid.net/phoridae/newsletters.php>.

Picture-Winged Flies Recording Scheme Newsletter – see under *Diptera Recording Scheme Newsletters*

Picture-Winged Flies Recording Scheme Note – see under *Diptera Recording Scheme Newsletters*

The Piercer, A Pipunculidae Newsheet – see under *Diptera Recording Scheme Newsletters*

The Piercer, A Pipunculidae Newsletter – see under *Diptera Recording Scheme Newsletters*

Recording Scheme for Diptera: Dixidae – see under *Diptera Recording Scheme Newsletters*

Sciomyzidae Recording Scheme News – see under *Diptera Recording Scheme Newsletters*

Sciomyzidae Recording Scheme Newsletter – see under *Diptera Recording Scheme Newsletters*

The Simuliid Bulletin

[ISSN: 2397-5067]

Association: Simuliid Research Group.

Years of publication: 2016–present.

Place of publication: United Kingdom.

Comments: This represents the continuation of the *British Simuliid Group Bulletin*, starting with issue 45. In addition to the numbered issues, there are Supplement issues with some volumes, which are not part of a separately numbered "Supplement series" that would warrant its own entry. These supplemental issues are mostly the program and abstracts for the International Simuliid Symposia, but some are original works.

Links: All issues are available at <https://simuliid-bulletin.blogspot.com/>, a website set up specifically to enable the world to access the *Simuliid Bulletin* and its predecessors.

Siruna Seva. Blätter für Fruchtfliegen-Kunde

Association: Privately published and edited by E.M. Hering.

Years of publication: 1940–1953.

Place of publication: Germany.

Comments: This series dedicated to fruit flies consisted of 8 volumes (issues).

Links: There is no website with any issues of this journal available.

Soldier Flies and Allies Recording Scheme Newsletter – see under *Diptera Recording Scheme Newsletters*

Sōshi Gakkai nyūsu – see *Newsletter of the Societas Dipterologica*

Sphaero News

Association: Produced by Brian Pitkin, The Natural History Museum, London.

Years of publication: Cumulative years unknown to us, but issue 3 was produced in *ca.* 1988.

Place of publication: United Kingdom.

Comments: The details of this newsletter are unknown to us, but we look forward to including them at a future date.

Links: There is no webpage for this newsletter, and no issues or further information was found online.

Studia Dipterologica

[ISSN: 0945-3954]

Association: Privately published by Andreas Stark, Ampyx-Verlag (1994–2008); Senckenberg Deutsches Entomologisches Institut (2010–2020).

Years of publication: 1994–2020.

Place of publication: Germany.

Comments: This is a journal of taxonomy, systematics, general biology, ecology, zoogeography, behavior and faunistics of flies, in addition to dipterist biographies, reports of expeditions, collections, catalogs and checklists, meeting and congress reports, and other topics with a focus on Diptera. So far there have been 23 full volumes published, each with 2 issues.

Links: The website of the journal, at <http://www.studia-dipt.de/contente.htm>, has the contents with abstracts available through volume 22, issue 1 (2015).

Studia Dipterologica Supplement

[ISSN: 1433-4968]

Association: Privately published by Andreas Stark, Ampyx-Verlag.

Years of publication: 1997–2009.

Place of publication: Germany.

Comments: This is a supplement to the journal *Studia Dipterologica* for larger dipterological monographs in the same general topic areas as the journal. There have been 18 volumes through 2009, and it is unknown whether this part of the journal will continue.

Links: The contents and abstracts for each volume are found at <http://www.studia-dipt.de/supple.htm>.

Supplements to Mosquito Systematics

Association: American Mosquito Control Association.

Years of publication: 1981 (only one known).

Place of publication: California, USA.

Comments: The header to the single volume read "*Supplements to Mosquito Systematics*," but the journal is abbreviated in the same work as "*Mosq. Syst. Supplement*" No other issues are known. It may be that further supplemental volumes were included as part of the normal series *Mosquito Systematics*, as that was the approach taken when the name changed to *Journal of the American Mosquito Control Association*.

Links: The single issue can be downloaded at <http://mosquito-taxonomic-inventory.info/files/Darsie%20%26%20Ward%201981.pdf>.

Syrphos

Association: Not known to us.

Years of publication: Ca. or before 1980–?.

Place of publication: Unknown.

Comments: The byline for this journal is "A newsletter for Syrphidae (Diptera) workers." Not having seen issues of this publication, much remains unknown to us, but we hope to have further information soon. We have seen volume 2 issue 1 cited as being from 1980, but we do not know when issue 1 was published, nor how many were published after.

Links: There is no webpage for this journal, and no issues or further information was found online.

TAAO Newsletter

Association: Tephritid Workers of Asia, Australia and Oceania.

Years of publication: 2015–present.

Place of publication: Australia.

Comments: This is an annual newsletter, so far with 7 issues, with the intent to facilitate communication and collaboration among fruit fly workers across the region.

Links: This newsletter is available through the IAEA/NAIPC webpages at <https://nucleus.iaea.org/sites/naipc/twd/Newsletters/Forms/TAAO%20Newsletter.aspx>.

Tachinid Recording Scheme Newsletter – see under *Diptera Recording Scheme Newsletters*

The Tachinid Times

[ISSN: 1925-3435]

Association: Agriculture and Agri-Food Canada. Science and Technology Branch.

Years of publication: 1988–present.

Place of publication: Ontario, Canada.

Comments: This is an annual newsletter for persons interested in research on parasitic flies (Diptera) of the family Tachinidae. This newsletter acts as a forum for informal communication about current projects, recent research findings, field trips, and similar types of information relating to the Tachinidae. The emphasis is on news and research notes that would not ordinarily be published elsewhere but would be of interest to the readership.

Links: All 33 issues published so far are freely available at <http://www.nadsdiptera.org/Tach/WorldTachs/TTimes/TThome.html>.

TEAM Newsletter

Association: Tephritid Workers of Europe, Africa and the Middle East.

Years of publication: 2005–2015.

Place of publication: Greece.

Comments: This is an annual newsletter, so far with 16 issues, with the intent to facilitate communication and collaboration among fruit fly workers across the region. It is unknown whether this newsletter will continue, as the last issue was in 2015.

Links: This newsletter is available through the IAEA/NAIPC webpages at <https://nucleus.iaea.org/sites/naipc/twd/Newsletters/Forms/TEAM%20Newsletter.aspx>.

Technical Bulletin of the Florida Mosquito Control Association

Association: Florida Mosquito Control Association.

Years of publication: 2000–2016.

Place of publication: Florida, USA.

Comments: This bulletin has had a least 10 volumes. It is unknown whether this is still in production.

Links: The webpage for this publication is at https://www.floridamosquito.org/Public/Publications/Technical_Bulletins/Public/FMCA_Publications/Technical_Bulletins.aspx, with only volume 10 (2016) available, although various issues and articles can be found through online searches, e.g., volumes 7–10 are found at <https://amedsjc.org/programs/education/workshops/2004-2016-workshops-fmca-bulletins/>.

Tephritid Taxonomy and Biology Newsletter

Association: CABI.

Years of publication: 1987–?.

Place of publication: United Kingdom.

Comments: The editor of this newsletter was Ian White, and we only found mention of it in two places – issue 9 of *Fruit Fly News* (1987) and the *IOBC Newsletter* issue 40, both referring to issue 1. The *Fruit Fly News* refers to its distribution with the newsletter, and the *IOBC Newsletter* refers to a next issue to be published. However, no other issues were located.

Links: No website was found with any issues or further information.

Tiger Tales

Association: American Mosquito Control Association.

Years of publication: 1989–1997.

Place of publication: USA.

Comments: This newsletter was started by the AMCA's *Aedes albopictus* Subcommittee, to deal with issues about the then recently introduced Asian tiger mosquito. This newsletter was distributed along with the *AMCA Newsletter*, and may have been, at least for part of its run, part of that newsletter rather than a separate publication. It is unknown how many issues there were, as citations usually followed the issue number for the *AMCA Newsletter*.

Links: There is no website with any issues of this journal available.

Tsetse and Trypanosomiasis Information

[ISSN: 1812-2442]

Association: Programme Against African Trypanosomiasis (PAAT).

Years of publication: 2004–2016.

Place of publication: Italy.

Comments: This name replaced the *Tsetse and Trypanosomiasis Information Quarterly*, a journal established to disseminate current information on all aspects of tsetse and trypanosomiasis research and control to institutions and individuals involved in the problems of African trypanosomiasis. This journal is produced in both English and French versions – see *Bulletin d'information sur les glossines et les trypanosomes* for the French version.

Links: All issues are available as PDFs at <http://www.fao.org/paat/resources/bulletin/en/>.

Tsetse and Trypanosomiasis Information Quarterly

[ISSN: 0142-193X]

Association: Programme Against African Trypanosomiasis (PAAT).

Years of publication: 1978–2003.

Place of publication: Italy.

Comments: This journal was established to disseminate current information on all aspects of tsetse and trypanosomiasis research and control to institutions and individuals involved in the problems of African trypanosomiasis. This journal was produced in both English and French versions starting in 1998 – see *Bulletin Trimestriel d'information sur les glossines et les trypanosomes* for the French version.

Links: Issues starting with volume 12 (1990) are available as PDFs at <http://www.fao.org/paat/resources/bulletin/en/>.

Volucella, die Schwebfliegen-Zeitschrift

[ISSN: 0947-9538]

Association: Staatliches Museum für Naturkunde, Stuttgart.

Years of publication: 1995–2007.

Place of publication: Germany.

Comments: This was an annual journal about Syrphidae of the Palearctic Region, covering all

aspects such as taxonomy, systematics, morphology, ecology, ethology, biogeography, faunistics, and conservation.

Links: The 8 published volumes of this journal are not available online; but PDFs, along with an index to volumes and articles, are available at https://www.zobodat.at/publikation_series.php?id=21048.

Wing Beats

[ISSN: 1053-0738 (AMCA), 2576-4551 (FMCA)]

Association: Florida Mosquito Control Association, and American Mosquito Control Association (after 1996).

Years of publication: 1989–present.

Place of publication: Florida, USA.

Comments: This magazine became recognized in 1997 as the AMCA's operational magazine for mosquito control personnel, and although it is behind a members-only paywall on the AMCA's website, it is freely available on the website of the FMCA.

Links: The volumes of this magazine from 2016 to present are available at https://www.floridamosquito.org/Public/FMCA_Publications/Wing_Beats.aspx, with all of the back issues available at <http://wingbeats.floridamosquito.org/WingBeats/>.

Xylota

Association: Not known to us.

Years of publication: Not known to us (see comments).

Place of publication: Denmark.

Comments: This is the newsletter for hoverfly collectors in Denmark (Nyhedsbrev for svirrefluesamlere i Danmark). The years of publication are not known to us, but we do know that issue 15 was published in 1991. Not having seen issues of this publication, much remains unknown to us, but we hope to have further information soon.

Links: There is no webpage for this journal, and no issues or further information was found online.

Zeitschrift für Systematische Hymenopterologie und Dipterologie

[ISSN: 0863-1867]

Association: Privately published and edited by W. Kronow.

Years of publication: 1901–1908.

Place of publication: Germany.

Comments: This was a bimonthly journal that ran from January 1901 through May 1908, and was succeeded by *Deutsche Entomologische Zeitschrift*.

Links: All issues available on BHL at: <https://www.biodiversitylibrary.org/bibliography/12360#/summary>.

Wanted: Fresh or alcohol material of Lonchopteridae

Michael Tröster & Marion Kotrba

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We just published a paper (Kotrba et al. 2020) on the morphology and ultrastructure of the spermatozoa of *Lonchoptera lutea* Panzer, 1809 (Diptera: Lonchopteridae). Therein we show that *L. lutea*, which is very common in Europe, has exceptionally large spermatozoa, with a length of 2,200 μm and a width of 1.4 μm . Furthermore, females of this species have very long, tubular spermathecae (Fig. 1), which can exceed a length of 4.1 mm and often contain densely packed bundles of spermatozoa.

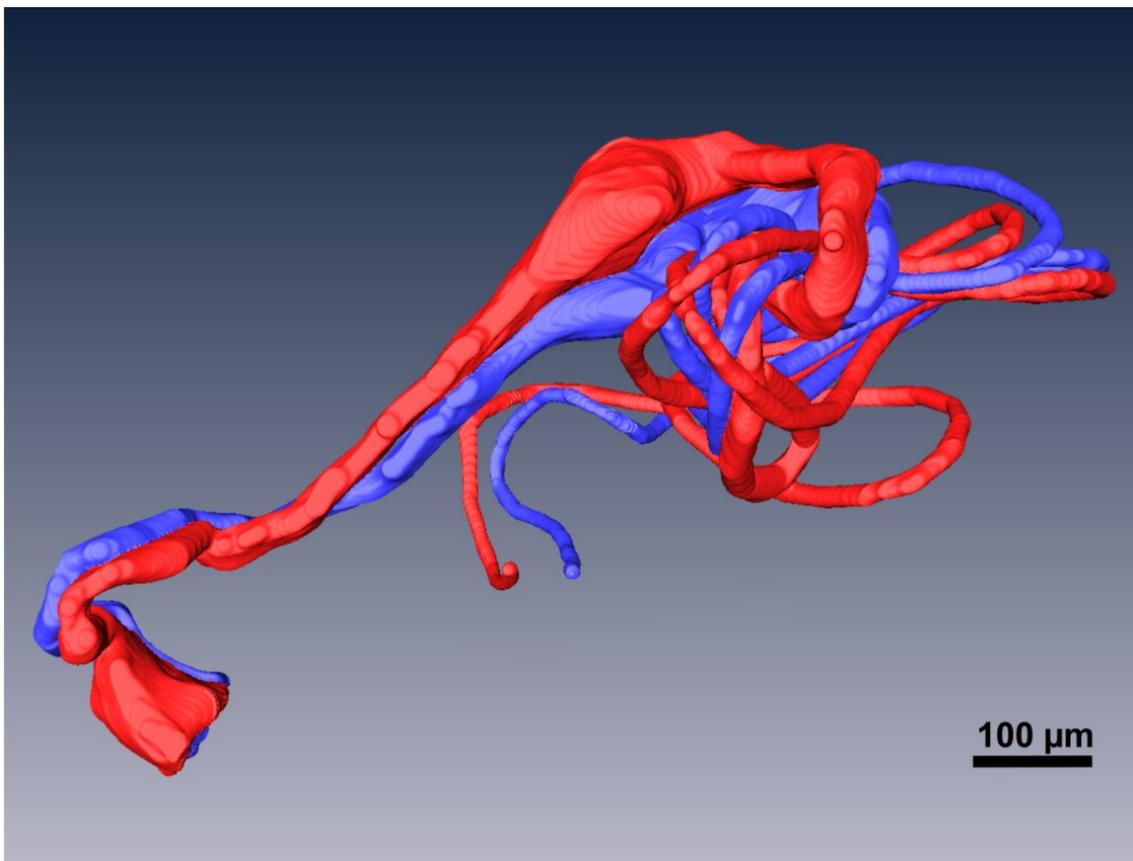


Fig. 1. Spermathecal ducts of *Lonchoptera lutea* Panzer, 3D-reconstruction from serial sections

Another very common species in Europe is *Lonchoptera bifurcata* (Fallén, 1810, senior synonym of *Lonchoptera furcata* (Fallén, 1823)). Its spermathecae are of similar shape but only 0.7–1 mm long and never contain spermatozoa. DeMeijere (1906) interprets this as an adaptation to parthenogenesis, especially because males of this species are extremely scarce. This hypothesis is plausible but requires substantiation by outgroup comparison.

To resolve the evolutionary trajectories of the length of the spermathecae and the length of the spermatozoa and the potential relationship between these two traits in Lonchopteridae, it is necessary

to study other species of this family. From the Bavarian State Collection of Zoology we could already acquire alcohol material of the species *L. fallax* DeMeijere, 1906, *L. tristis* Meigen, 1824, *L. scutellata* Stein, 1890 and *L. nitidifrons* Strobl, 1899 for further investigations. However, in order to cover the phylogenetic range of the family, it is essential to study more European species, such as *L. mejerei* Collin, 1938, *L. impicta* Zetterstedt, 1848, *L. nigrociliata* Duda, 1927, *L. strobli* DeMeijere, 1906 or *L. pictipennis* Bezzi, 1899, but also species from other regions of the world. Therefore we would be very thankful, if you could provide fresh or alcohol material of male and/or female adults of the family Lonchopteridae for serial sectioning.

Reference

Kotrba M., Tröster M., Gensler H., Ruthensteiner B. & Heß, M. 2020. Morphology and ultrastructure of the spermatozoa of *Lonchoptera lutea* Panzer, 1809 (Diptera: Lonchopteridae). *Arthropod Structure & Development* 2021, 60:101004. doi: 10.1016/j.asd.2020.101004 (open access at <https://www.zsm.mwn.de/publikation/marion-kotrba/?lang=en> until 19 January 2021)

Field/Photo ID for Flies

Even Dankowicz

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Chris Cohen and I discussed interesting new taxa, behaviors, and other records from iNaturalist in the article, “Diptera and iNaturalist: A case study from Asiloidea” (April 2019, issue 62). However, most observations on iNaturalist represent well-documented species. The value of these records lies in their data, as well as the opportunity to help others learn about biodiversity. Many iNaturalist Diptera remain unidentified due to the challenges of recognizing flies in photos.

Published keys generally depend on microscopic characters. Although taxa may have a unique habitus or patterning, these are sometimes only mentioned in descriptions. As a result, only top experts can typically recognize flies in photos. For example, a beautifully-patterned *Orphnabaccha jactator* on BugGuide stumped experts for 15 years before a second observation of the same species on iNaturalist (Fig. 1) was identified by Gil Felipe Gonçalves Miranda. Much recent literature is accessible online and fully illustrated, for example articles in the Canadian Journal of Arthropod Identification and the Manual of Afrotropical Diptera. Identification with these resources is generally difficult without specimen examination.



Fig. 1. *Orphnabaccha jactator* seen in Miami, Florida by Noah Frade, <https://www.inaturalist.org/observations/25131250>, used with permission

Common Greenbottle Fly (*Lucilia sericata*)

Males are identified by the following combination:

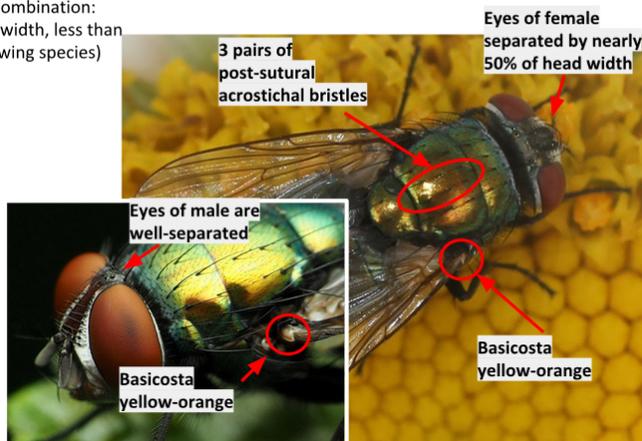
- Eyes separated 10-15% of head width, less than Australian Sheep Blow Fly (following species)
- The [basicosta](#) is yellow-orange

Females of the Common Greenbottle Fly and the Australian Sheep Blow Fly (following species) are together recognized by the following combination of characters:

- Eyes separated by nearly 50% of head width
- The [basicosta](#) is yellow-orange
- 3 pairs of post-sutural acrostichal bristles

Females of these two species are separated by microscopic characters [as explained here](#), or by location.

Widespread



male © Katja Schulz, [iNaturalist / CC BY](#)

female © Even Dankowicz / [CC BY-NC](#)

Fig. 2. Screenshot from my guide to common Calliphoridae of the Southeastern USA, https://docs.google.com/presentation/d/1dsGdgo2DVcZ99AtunaOXw-hJ_ZRyANav_HJXTIk4T6k/preview

Combining information from literature, feedback from experts, and specimen work, I've shared simplified 'field/photo ID' treatments of Diptera at <https://sites.google.com/view/flyguide/diptera> (Fig. 2), collaborating with Arturo Santos and Caleb Scholtens for some sections. In addition to a global synoptic treatment of Diptera families, we've put together 'field guides' to common Syrphidae and Calliphoridae of North America, with others in development. Many iNaturalist users have begun using these to identify and learn more about Diptera, and I wanted to mention them here for readers who may be interested.

A Fly's Time: commentary on life lessons from a fleetingly famous fly

James N. Hogue

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As a prelude to this article, I would like to encourage you to not take this too seriously. Treat this as a bit of timely, dipterological fun; a diversion from the norm with perhaps a message from one of our two-winged subjects of interest in these troubling times.

As someone interested in events where insects participate in the cultural affairs of humans, this incident was too good to let slide into obscurity without discourse. And that it involves flies makes it all the more enjoyable and appropriate for our newsletter.

If fame is associated with familiarity, prominence, notoriety, and possessing a widespread and celebrated reputation, then insects are famous. Next to plants (and our own species), insects are the most apparent group of organisms and we share many aspects of our lives with them. And as is clear to us dipterists, among the most notable groups of insects that touch human lives, for better or worse, are flies. As a group, they have had significant impact on human evolution, life, culture, and history (Cloudsley-Thompson 1976, Berenbaum 1995). But their fame in these events was a collective achievement. What about individual flies? Does the action of an individual fly ever merit much notice? In some cases, yes.

Fictitious individual flies have made their way into our literature (e.g., the short story “The Fly” in Mansfield 1923), poetry (Hudson 2020), fables (Perry 1965), and art (Impelluso 2003). But these are human constructs, albeit inspired by real flies.

Now there certainly have been notorious, and thus famous, individual flies in history; but although we know they existed, we never got to meet them. The mosquito that vectored the *Plasmodium* sporozoites into Alfred Russel Wallace during his expedition through the Malay Archipelago, that resulted in his first bouts of malaria and that may have played a role in his brain's perception of the process of natural selection was such a fly (Raby 2001). But this was probably a short, unwitnessed encounter. The great English traveler, naturalist, and champion of evolutionary theory likely never saw this two-winged caller. Its time on the world stage was significant, and yet occurred in anonymity. Such impersonal incidents are common in human history. On the other hand, experiential encounters of comparable or greater significance, especially those viewed by the masses and/or recorded for posterity, are virtually non-existent. This want was recently satisfied.

Like many millions of other Americans, I watched the vice presidential debate between candidates Vice President Michael Pence and U. S. Senator Kamala Harris. This event on the evening of 7 October 2020, was held at the University of Utah in Salt Lake City. Over an hour into the debate during a discussion on police reform a rather large fly (my guess is a dark-colored calliphorid such as *Muscina* sp.) alighted on the vice president's head (Figure 1). Much like a young boy perched in a tree at a 19th century town square stump speech, it seemed oblivious to the gravity of the event, yet there because it is the place to be at the moment. It stayed there, mostly without moving, for two minutes and three seconds. As a dipterist I was delighted to see a fly steal the show. It was hands-down, the best part of the debate. Apparently, the rest of the country felt the same way. Has a single fly ever received such notoriety? This is certainly a candidate for the most famous of flies.



Figure 1. Vice presidential candidate U. S. Senator Kamala Harris (left) and Vice President Michael Pence as they appeared at debate on 7 October 2020. Note the fly on Mr. Pence's head.

Sadly, as entertaining as this may be for lovers of the absurd, the life cycle of the fly's story in the media and the minds of the people was as fervent and short as that of the life of the fly itself. But its story need not end here as just an amusing side story on the current political stage. Perhaps the fly itself had more in mind. By taking such a prominent resting place on this grand stage, could this fly have been trying to tell us something?

This fly certainly knew what it was doing. The chosen background by such a dark-colored fly, combined with the significance of the event made this the most efficacious of perches for visibility and import. What better place was there from which to be seen? How lucky we are that the right fly, background, and high-definition television came together at just the right time.

Flies are among the most symbolically charged of the insects. To the general public, their likeness brings up a host of associations; almost none of them good. Flies are generally considered symbols of disease, pestilence, decay, and evil. Consequently, the public responded as expected. Even though this fly didn't get but a fraction of its 15 minutes of fame, it soon generated countless headlines, jokes, memes, songs, a line of politically-motivated fly swatters (15,000 sold that night), and a Twitter account with over 120 thousand followers. Nearly all of the jokes are crude plays on the symbolically-negative associations of flies, and were thus derogatory and therefore not appropriate to repeat, but a few are rather clever – but still divisive. But is this what our little interloper had in mind? Perhaps this visitor was more sophisticated and was familiar with its aforementioned fictitious brethren of art and poetry.

Quite a few painters of the Renaissance Era incorporated individual flies into their work (i.e., see *Musca Depicta*, Chastel 1984) for a variety of reasons. One technique with ancient roots, known as *trompe-l'oeil* (optical illusion), was employed to trick the eye of the viewer. For example, the fly might be painted at an appropriate scale and location to make it look like it was not part of painting but a real fly sitting on the frame. Flies were also included to show off the technical skill of the painter, who could clearly render an object so structurally complicated as a fly (Chastel 1986, Connor 2007). In other cases, the presence of the flies in paintings is symbolically charged, often in a different manner than previously mentioned. Such is the case in what are known as “Vanitas” paintings; especially those of 16th and 17th century Dutch artists (Figure 2, and note the serendipitous resemblance to Figure 1). They used individual flies (and other perceived short-lived organisms) to symbolize the transience of life, and the constant presence of death. Such depictions indicate, that compared to our life in the hereafter, our lives and endeavors here on Earth do not have



Figure 2. Self portrait of the Master of Frankfurt and his wife. Note the fly on the hat of the painter's wife.

much merit, and thus they are empty, futile, and unworthy of the significance we give them. This is similar in meaning to what is conveyed in William Blake's 1794 poem “The Fly” (Erdman 1988). Here the focal fly symbolizes a natural insignificance that is summarily applied to the human poet who is contemplating the meaning of life and his earthly role, rather than to the fly itself. Conversely, the fly is not concerned with human affairs, but is merely happy to be alive and has focused its emotional attention and energy on living rather than on death. I like to think that these flies are proclaiming to us today, through the ancient symbolism of art and poetry, the title phrase of the old-time song popularized by the Carter Family in the late 1920s – “Keep on the sunny side of life.”

Perhaps this is the fitting message we can take from our little friend's visit on the national stage. As a country, we have been so engrossed in the political machinations surrounding our recent election, and we are all dealing with the uncertainty and anxiety surrounding the coronavirus pandemic, that we could use the distraction of this now famous fly to ground us in reality once again.

In the end of course, this was just a fly that landed on a man's head; albeit for all the world to see. We can celebrate this fly and the brief moment of entertainment it provided. We don't often get to delight in such inane and insignificant things. And what of the fly itself? By now the election is over and this now dead fly is likely gathering dust in some window sill of Kingsbury Hall on the campus of the University of Utah. It is soon to be lost forever, but not forgotten. As far as I can tell, and I did some

checking, no entomologist went looking for this fly. That is too bad. What a great specimen this would be to have in a collection.

Lastly, may this little tale of flies and men serve in some way to keep the memory of this famous fly alive for posterity's sake and to remind us of just how fleeting so much of what we put stock in can be.

References

- Berenbaum, M. R. 1985. Bugs in the system: insects and their impact on human affairs. Addison-Wesley, Reading, Massachusetts.
- Chastel, A. 1984. *Musca depicta*. Franco Maria Ricci, Milan, Italy.
- Chastel, A. 1986. Iconology of the fly. *FMR* 4(19):62–81.
- Cloudsley-Thompson, J. L. 1976. *Insects and history*. St. Martin's Press, New York, New York.
- Connor, S. 2007. Flysight. *Cabinet* 25:78–84.
- Erdman, D. V. 1988. *The complete poetry and prose of William Blake*. Doubleday, New York.
- Hudson, R. 2020. *The poet and the fly: art, nature, God, mortality, and other elusive mysteries*. Broadleaf Books, Minneapolis, Minnesota.
- Impelluso, L. 2003. *Nature and its symbols*. The J. Paul Getty Museum, Los Angeles, California.
- Mansfield, K. 1923. *The doves' nest and other stories*. Constable and Co., London.
- Perry, B. E. 1965. *Babrius and Phaedrus*. Harvard University Press, Cambridge, Massachusetts.
- Raby, P. 2001. *Alfred Russel Wallace: a life*. Princeton University Press, Princeton, New Jersey.

Investigations on the Mycetophilidae of North Central Nevada – Summer and Fall 2020

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I am continuing my studies of Mycetophilidae in North Central Nevada. I had many plans for this year, only a few of them were carried out because of the press of work and caring for my spouse with terminal cancer. Even so, I made some significant progress in this study during 2020. I found species of mycetophilids I had not seen before, investigated habitats not sampled before, and reared adults out of new species of mushrooms. Two of the genera I associated with mushrooms for the first time. I used a variety of techniques in this study including Malaise traps, emergence traps, Berlese funnels, a water barrel, sieves and various types of rearing chambers. Some of the mycetophilids I collected would not really key out in the *Manual of Nearctic Diptera* so I am unsure what to do with them, except keep them in hopes of future progress in this area. Some species of mycetophilids seen in previous years were not seen at all in 2020.

At the end of last winter, the last week of February, I put an emergence trap (Figure 1) over a green patch of moss in the desert, near a place called Iron Point. Though the site was dry and rocky, there was a considerable amount of moss here, green and very alive. The moss was identified as *Syntrichia ruralis* by George Greiff (Figure 2). I kept this trap up until the end of May, changing the killing jar weekly. The trap itself was sealed off with dirt piled around the wings of the device so that anything caught had to come out of the moss. A surprising number and variety of insects came out of this small patch of ground but none of them were mycetophilids. I planned to find a different kind of moss in a damper habitat in the Santa Rosa Mountains but that did not come to pass.



Fig. 1. Emergence Trap over moss



Fig. 2. *Syntrichia ruralis*

There were fewer mushrooms out this year than last, those that were out I collected and put in rearing chambers. Since previous efforts at rearing mycetophilids out of almost all mushrooms had failed in previous years, I tried taking substrate that the mushroom grew out of as well. This generally meant soil, sometimes decaying wood – I did this because I thought there was a chance the larvae might be

developing on mycelium in these areas rather than the mushrooms themselves. This year in addition to the *Tricholoma* I reared *Rymosia* out of, I reared adults of three additional genera of mushrooms: *Panaeolus* sp. (Figure 3), *Coprinopsis sect. atramentarii* (Figure 4), and *Psathyrella* sp. (Figure 5). *Rymosia* sp. emerged out of all of these. I was a little surprised to see emergence from *Coprinopsis* sp. as these mushrooms quickly melted down into a black mass. On September 12 I saw a dozen or more *Psathyrella* growing at the edge of a tule marsh fringing a pond in Battle Mountain. The habitat was very damp, bordering on wet. I collected some of these mushrooms and put them in a rearing chamber, and out of them came 27 *Exechia*, 20 *Mycetophila* and 1 *Rymosia*. There were a number of cocoons in the chamber (Figure 6), in one I found an unemerged adult *Exechia*, so that settled what mycetophilid these were associated with. The cocoons were white, with a fairly dense weave, about 5 mm long by 2.5 mm wide. They were egg shaped, one end being larger than the other. They were not coated with the substrate of sand and peat moss, but they were attached to it by silken strands. They were all on the surface, not buried as *Rymosia* cocoons are, and they were all at the bases of the mushrooms, or very near to that. There were not enough cocoons visible there to account for all the adults found. I sifted through all the substrate looking for cocoons or remains of pupal cases but found nothing. I recognized this mushroom as one that I had seen in spring 2019 growing in large numbers on the banks of the Humboldt River in very wet conditions. I had collected and put some of these mushrooms in rearing chambers at that time but reared no mycetophilids out of them. So it is a mystery to me why so many adults, from three genera emerged from the ones collected in the fall.



Fig. 3. *Panaeolus* sp.



Fig. 4. *Coprinopsis sect. atramentarii*



Fig. 5. *Psathyrella* sp.



Fig. 6. *Exechia* sp. cocoon

In January and February of this year I had collected adults, pupae and possibly larvae of *Boletina* sp. out of leaf litter. They all disappeared by April. I thought they might develop in the soil under the leaf litter, as I had found none in the dry litter run through a Berlese funnel. On May 21 I began excavating the soil under a part of the leaf litter in question and sifting it, one partial trowelful at a time, through a sieve I made from my Berlese funnel (Figure 7). I sifted the soil into a box lid and examined the coarse material left in the sieve, and the fine material that came through into the box lid. In the top two inches of soil I found a few beetle larvae, below that there was no sign of any life. I admit to being mystified at this result. But maybe there are eggs in the soil or leaf litter that don't hatch out until rain soaks the substrate in the fall. I plan on looking into that in the near future.

I had plans to visit a number of new habitats this year to trap mycetophilids but got to only a few. In May I went to a steep walled, nameless valley in the southern part of the Santa Rosa Mountains. The interesting thing about this valley was the vegetation. The east wall of this valley was covered with thickets of a bush I think was *Amelanchier* sp. (Figure 8) – I got there too late to see the flowers so I can't be sure. This vegetation went up the valley side to nearly 7000 feet. I put a Malaise trap up in this vegetation at 6120 feet and left it there for two weeks. It snowed during that time. When I went through the trap catch I found two mycetophilids I had not seen before – one was a species of *Megalopelma* new to me, the other keyed out to *Macrocera* – the wing venation fit that genus, but the antennae were short, only the length of the thorax. In 2021 I will go up there and run a trap until June at least – I will be able to identify the bushes making up the main part of this plant community, and may get a better sampling of the mycetophilids there.



Fig. 7. Sieving for *Boletina* larvae



Fig. 8. *Amelanchier* sp. ?

In August I hiked up to an island of Aspen in the Bloody Run Mountains and put up a Malaise trap there (Figures 9 and 10). This area had been burned over in the mid-nineties and had grown back up after the fire. A dry streambed ran through the forest. Not far away I found another patch of forest, this one made completely of Chokecherries (Figure 11). I put a trap up there as well. I left the traps there for two weeks, then took them down. I found no mycetophilids in either, but an obvious difference in the makeup of the insects caught in each location. I think these both could have an interesting mycetophilid fauna that I might learn something about if I put traps up there in the early spring when things were still moist.

Some of the other substrates I have investigated are dung accumulations fallen from swallow colonies, abandoned bird nests, moldy cattail roots, and nesting materials, some made of grass, others from what appears to be rabbit fur – no mycetophilids from any of these. I have continued to catch mycetophilids in the EVS



Fig. 8. Aspen Forest Island



Fig. 10. Malaise Trap in Aspen Forest Island



Fig. 11. Malaise Trap in Chokecherry Forest

traps I set out for mosquito sampling. In looking through catches from New Jersey light traps carried out ten years or more ago I have found mycetophilids, mostly *Mycetophila* sp. I have a rain barrel in my yard in which I have caught many mycetophilids, some of which I have not been able to identify. This part of Nevada has many island-like habitats that would be interesting to sample – I will focus more effort on those in the coming year. I will also make efforts to sample different moss habitats, as well as animal burrows in the upcoming season.

HISTORICAL DIPTEROLOGY

Amnon Friedberg – Obituary

Ariel Leib Leonid Friedman¹ & Netta Dorchin^{1,2}

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Amnon Friedberg was born in Haifa, Israel, on September 18, 1945. Already as a child he showed a strong interest in nature, animals, and travel, exploring the Carmel Ridge with his friends or alone, and expanding his trips to other parts of the country as he grew older. His zoological interests were at that time focused on reptiles; as a schoolboy he already had a small collection of live local reptiles, mainly snakes. Little did he know at the time that he would dedicate the rest of his life to entomology.

Amnon started his formal studies in biology in 1965 towards a BSc degree in Tel Aviv University, where he spent his entire career. During his BSc studies (in 1968) he was hired by Prof. Jehoshua Kugler (1916–2007), the founder and first curator of the entomological collection in Tel Aviv University (now part of the Steinhardt Museum of Natural History, Tel Aviv University (SMNHTAU)), to collect tachinid flies (Tachinidae) for Kugler's taxonomic and faunistic research. Within a short time Amnon proved himself to be an extraordinarily successful collector and supplied Kugler with many new and rare species. Amnon's relationship with Kugler remained very close and

warm through the years. During this period Amnon became the leader of a group of entomologists (Kugler's students) who revived the taxonomic study of insects in Israel through their intensive collecting, observations, and publications.

Amnon completed his MSc thesis on the fruit-flies (Tephritidae) of Israel in 1971 and his PhD dissertation on the Reproductive behavior and reproductive isolation in fruit-flies in 1978 under Kugler's supervision. Upon completion of his MSc degree, he joined Kugler for his first trip to East and South Africa (and indeed his first trip abroad), which lasted more than three months, in order to deepen his knowledge on the Tephritidae. They travelled through Ethiopia, Kenya, Uganda, and Tanzania in a small Volkswagen, and collected flies, predominantly Tephritidae and Tachinidae, establishing the basis for the outstanding exotic collection of Diptera at the SMNHTAU, which Amnon continued to develop throughout the years. During that trip, Amnon met the famous South-African tephritid taxonomist Hugh Kenneth Munro (1894–1986), who became his tutor in Afrotropical fruit flies. Amnon always attributed his later professional success to the time he worked with Munro and on Munro's collection.

In 1979–1980 Amnon accepted a post-doctoral position to work on the insect collections of the Smithsonian Institution, Washington DC, USA. These were productive years of intensive work, together with famous dipterists (such as Curtis W. Sabrosky, Lloyd V. Knutson, Wayne N. Mathis and others) that resulted in several important publications. His work there was never completed, however, as he was recalled to Israel in 1980 to accept the position of a researcher in Tel Aviv University and the curator of the insect collection, following Kugler's retirement, a position he fulfilled until his retirement in 2013. Under his leadership, the insect collection grew considerably thanks to intensive field collecting by Amnon himself, his students and technicians (20,000–50,000 specimens per year), the exchange of material with colleagues abroad, and the absorption of collections from other institutions.



Typical photos of Amnon in the field in Israel; Nimrod, 2012 (left), Deir Hajla, 2004 (right).

Between 1972–2016 Amnon made numerous collecting trips abroad, including a worldwide trip in 1993 (which was partly dedicated to working in different collections), visiting 64 countries, some of which several times. Many of these were purely collecting trips, whereas others were private family trips, participation in congresses and meetings, or visits to museums, collections, and colleagues. However, such trips almost always included intensive collecting, as one of Amnon's most important principles was to use any opportunity for collecting in order to enrich the SMNH-TAU collection and obtain representatives of as many taxa as possible, particularly Tephritidae. He collected in remote countries with unstudied faunas, as well as in numerous countries around Europe and the eastern USA whose insect faunas had been well studied.



Amnon with colleagues during collecting trips in Ethiopia 2005 (top left), Madagascar, 2007 (top right), Papua New Guinea, 2013 (bottom left) and Malawi 2010 (bottom right).

Nevertheless, most of Amnon's collecting efforts were concentrated in Sub-Saharan Africa: Benin, Burundi, Cameroon, Ethiopia, Kenya, Madagascar, Malawi, Namibia, Nigeria, South Africa, Tanzania, Togo, Uganda and Zambia. He visited most of these countries more than once, and some (like Ethiopia and Kenya) were visited every few years, with particular emphasis on mountainous areas. Southern Asia also appealed to him, and he visited India and Thailand several times, carried out extensive collecting in Nepal, Taiwan, Vietnam, and the Philippines, and occasionally visited China, Hong Kong, Singapore, and Japan. Unfortunately, for political reasons he was unable to enter Sri Lanka and Malaysia. In the Americas Amnon participated in expeditions to Peru, Bolivia, and the Lesser Antilles (Antigua, Dominica, St. Vincent, Barbados), organized by the Smithsonian Institution, and collected intensively in Canada, USA, Mexico, and Costa Rica, mainly during family

trips research, fieldwork in the Americas and meetings with world leading dipterists. By contrast, Amnon's visits to the Australasian Region included only occasional collecting in Hawaii and north-eastern Australia, but these were balanced by an 80-day expedition to Papua New Guinea in 2012–2013. He was particularly interested in the fauna of the East Mediterranean and collected intensively over the years throughout Israel. It is difficult, if not impossible, to name a place in the country where he did not collect. Visiting neighboring countries in the Near East, North Africa and Western Asia has always been difficult or impossible due to complicated political and security situations. By contrast, Amnon was able to make about 20 collecting trips to the Sinai Peninsula when it was under Israeli control and revisited the area several times in later years.

Amnon's usual approach to a collecting trip was to hire a car and drive from site to site, spending three days at most at a particular locality in order to sample as wide a range of habitats as possible. One of his life rules was that "It is persistent collecting that makes the collection vital and active; no collecting will necessarily lead to degradation". Amnon was an extraordinary insect collector. He collected mainly by sweeping with a large net, and was able to collect and mount up to 500 specimens per day. In his best years he collected 10,000–15,000 specimens a year. However, the quantity did not come at the expense of quality. At the end of each collecting day he dedicated long hours to pinning the freshly collected specimens, turning the process into a kind of art: specimens were pinned with extreme precision, directly or on double mounts, and arranged in the box in straight rows. Often, following a day of hard fieldwork, he would sit for hours during the evening and night to pin the catch of the day. While the aesthetic aspect was important to him, the scientific aspect was paramount, as specimens that are pinned when still fresh are the most complete and informative. Amnon devoted a lot of time to pinning even the tiniest of flies that are often ignored by other collectors. Another notable habit of his was to produce large series of any species, particularly of those he considered to be new or otherwise interesting. This often allowed him to base taxonomic descriptions on diverse and better understood characters, generously share material with other colleagues and distribute paratype specimens to many other museums.



Pinning insects in Kenya, 2005 (left) and Costa Rica, 2010 (right).

Rearing insects from their host plants was another technique he used often, which provided invaluable information on host associations as well as undamaged specimens. He had an extensive

botanical knowledge that enabled him to recognize many plant families and genera, which was critical for the study of plant-feeding flies. One of the things that made Amnon such an amazing collector was his broad knowledge and interest in flies in general; he was one of a handful of expert dipterists able to recognize most families and many genera in the field, and when recognizing he collected something rare or unique, he tried to figure out what it was doing so that he could collect more of it.



Scanning plants for tephritids.
Israel, 2009 (left); Ethiopia, 2015 (right).

Amnon was a world-renowned taxonomist of Tephritidae, particularly of the Afrotropical Region. However, he had a very wide range of interests and a deep understanding of many other groups of Diptera, their taxonomy, phylogeny, life history, and behavior. In addition to publications on the Tephritidae and their relatives (Lonchaeidae, Platystomatidae, Piophilidae, Ulidiidae), he published on 25 other Diptera families, including Agromyzidae, Anthomyzidae, Asteiidae, Aulacigastridae, Bengaliidae, Canacidae, Carnidae, Cecidomyiidae, Curtonotidae, Dixidae, Ephydriidae, Hippoboscidae, Lauxaniidae, Limoniidae, Micropezidae, Milichiidae, Neminidae, Periscelididae, Psilidae, Scatophagidae, Sciomyzidae, Stratiomyidae, Tachinidae, Tethinidae and Xenasteiidae. Most publications on non-Tephritoidea were papers on the Israeli fauna, and some were new taxa descriptions or revisions. It is difficult to point to Amnon's favorite families, but there is no doubt he had a particularly strong interest in the smallest flies seldom treated by other researchers, including Asteiidae, Aulacigastridae, Carnidae, Chloropidae, Chyromyiidae, Cryptochaetidae, Drosophilidae, Marginidae, Milichiidae, Neminidae, Neurochaetidae, Sepsidae, Tethinidae, Xenasteiidae and others. In addition to his research on Diptera, Amnon participated in taxonomic, faunistic, and ecological studies and publications on other insect groups, including beetles (Apionidae, Carabidae, Chrysomelidae), bugs (Nabidae, Thaumastocoridae, Tingidae), homopterans (Dictyopharidae, Psylloidea), and hymenopterans (Formicidae), mainly together with his students and technicians.

However, Amnon's real love was fruit flies, and he devoted most of his time and efforts to studying their taxonomy and phylogeny. Nevertheless, he also paid much attention to studying their life

history, particularly to host associations. Amnon believed in integrating data on life history, behavior and taxonomy, and that the host associations of herbivorous insects are paramount to understanding their taxonomy and phylogeny. Consequently, he combined field collecting and observations with morphological and genetic studies in the laboratory, and many of his studies were dedicated to the behavior of flies (which is rather unusual for a typical taxonomist), in particular to courtship and mating trophallaxis. Amnon also had a deep interest in gall-inducing insects, which is manifested by several publications on Tephritidae and other flies, and in training his student, Netta Dorchin, to become a gall-midge (Cecidomyiidae) expert.

Amnon has published numerous faunistic works (e.g., on the fruit flies of Crete and of the Kakamega Forest in Kenya) but his most important publication is probably the seminal book on the tephritid fauna of Israel (Freidberg & Kugler 1989). Nevertheless, he often referred to his faunistic work as secondary, perceiving taxonomic revisions to be of greater importance. Amnon revised numerous groups of fruit flies, leaving his footprint on a wide range of higher taxa including Tephritini (Freidberg 1980; Freidberg & Hancock 1989; Freidberg & Merz; 2006; Morgulis *et al.* 2015, 2016), Terellini (Freidberg 1979, 1985, 1999; Freidberg & Mathis 1986, 1990), Myopitini (Freidberg 1979; Freidberg & Norrbom 1990, 1999), Oedaspidini (Freidberg & Kaplan 1992), Eutretini (Freidberg & Kaplan 1993), Carpomyini (DeMeyer & Freidberg 2005; Freidberg 2016), Ceratitidini (DeMeyer & Freidberg 2000, 2006, 2012), and Gastrozonini (Kovac *et al.* 2006; Freidberg *et al.* 2017). He also worked on revisions of the Adramini, Acanthonevrini, Gastrozonini and particularly Tephrellini, for some of which he had more or less complete manuscripts, but did not manage to publish these before he passed. However, Amnon's greatest passion was the tribe Schistopterini, a large palaeotropical group of mainly minute fruit flies with peculiarly ornamented wings, mostly belonging to as yet undescribed genera and species. He collected and reared numerous species of this group in Africa, Southern Asia, and Papua, and has amassed probably the largest collection in the world of these beautiful flies. The first steps in describing new taxa within the Schistopterini and revising old ones have already been made (Freidberg 2002; Zonstein & Freidberg 2006 and Liat Gidron-Heinemann's unpublished PhD dissertation under Amnon's supervision), but much more work remains to be done and it is unclear who would be able to take over this huge task.

Despite his focus on fly collecting, Amnon also collected intensively other insects of many orders, partly to enrich the SMNHTAU collection and promote knowledge about the relevant groups and partly as a generous favor for colleagues. Amnon had many friends and colleagues around the world with whom he shared his knowledge, specimens and literature. Hundreds of insect taxa have been described based partly or entirely on material collected by him, and it is not surprising that 100 taxa (97 species and three genera) have been named in Amnon's honor to date.

In Amnon's mind, unpublished knowledge was virtually meaningless, which is why he always encouraged his colleagues, students and technical assistants to publish their findings. During his 40-year career he described 252 taxa, predominantly flies, and authored more than 150 scientific publications, including books, book chapters, catalogs, and abstracts. In his publications he always endeavored to be as explicit as possible, producing identification keys and taxa descriptions. Amnon was also involved in numerous agricultural and ecological projects, such as studies of the biology and control of the leaf-miner *Liriomyza trifolii* (Agromyzidae), a survey of cotton insect pests (published as a book, in Hebrew), taxonomic and biological studies on Drosophilidae, Agromyzidae and Chironomidae, life history, taxonomy, and control of bulb flies (Syrphidae), insect biodiversity on tamarisk, and climatic effects on insect populations. He was also a pioneer in forensic entomology in Israel, who contributed to several criminal investigations and trials and supervised two police officers in their MSc studies in this field.

From 1978 until his retirement in 2013, Amnon taught (together with Danny Simon) the “Insect Faunistics” course in Tel Aviv University, which included lectures on and exhibits of living and preserved insects in the lab as well as field excursions around the country, during which students had to prepare their own insect collection. For years the course has been a top priority for Amnon and he devoted much time and thought to finding proper localities for field excursions, appropriate entomological supplies, and preparation of engaging and informative lectures. The course was highly favored by students and has always been regarded as one of the highlights among courses offered in the George S. Wise Faculty of Life Sciences, although students often complained about the lengthy and detailed lectures in the class and field...



Amnon with students during a field excursion in the insect faunistics course, 2008.

At the beginning of his career Amnon was less interested in supervising students, mainly because he enjoyed doing everything himself, but he later recognized the great potential in raising a new generation of co-workers, colleagues and specialists in other groups of insects. Several of his 20 MSc and PhD students pursued an academic career in taxonomy and ecology, while others became teachers, professional entomologists or biologists in government agencies and collection managers in the SMNHATAU. Amnon has always encouraged technical assistants in the SMNHATAU to engage in scientific work, and some of them have indeed become specialists in their groups of interest and published in the scientific literature.

For years Amnon was chief editor of the *Israel Journal of Entomology* (1982–1986, 1990–1998, 2005–2012), often being the only person working on all aspects of its production. Pedantic to the extreme, he always strived to achieve excellence, which posed a great challenge for him and for contributing authors and co-editors, but as a result the *IJE* persisted and flourished. Among Amnon’s numerous duties as the curator of the insect collection, he also endorsed six colleagues – new repatriates from the former USSR and Romania, and helped them to acclimate in Israel in general and in the museum in particular, taking upon himself a lot of the associated bureaucratic work. He took this task very seriously and devoted much of his personal time to it, realizing the invaluable

contribution such trained biologists would make to the entomological staff and seeking to ease their absorption in Israel. His efforts have usually yielded wonderful results, as most of these colleagues are now members of the entomological staff in the SMNH TAU.



Staff of the entomology section in the Steinhardt Museum of Natural History, Tel Aviv University; 2019.

Amnon had an immense contribution to Israeli entomology. In the 1980s, he participated in the publication of the Encyclopedia of the Fauna and Flora of Israel, edited by Kugler. He wrote many of the entries himself and coined many of the modern Hebrew names of insects. He was a member of the Flora and Fauna committee of the Israel Academy of Sciences and Humanities and of the committee for Zoological Terminology of the Academy of the Hebrew Language, which recently completed the list of Hebrew terminology for all insect orders and all Diptera families in Israel. These contributions and activities were recognized by an honorary membership in the Entomological Society of Israel in 2015.

Amnon was married to Pnina, who accompanied him devotedly on some of his trips, being an “innocent victim” of his entomological enthusiasm. Three species of flies were named in her honor: *Euarestella pninae* Freidberg, *Pherbellia pninae* Knutson & Freidberg, and *Procanace pninae* Mathis & Freidberg (Tephritidae). Amnon’s daughters, Vered and Liat, were also immortalized in the names of *Sepedonea veredae* Freidberg, Knutson & Abercrombie (Sciomyzidae), and *Goniglossum liat* Freidberg (Tephritidae).

This obituary is a shortened and somewhat revised version of Amnon’s biography, recently published in a special issue of the Israel Journal of Entomology on the occasion of Amnon’s 75th birthday (Friedman A.L.L. 2019, Dr. Amnon Freidberg – 75 years. *Israel Journal of Entomology*, 49(2): 1–40. doi: 10.5281/zenodo.3890302).

Knut Rognes (8 April 1943 – 7 October 2020)

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*“We are too few taxonomists and endless numbers of
insects, and our life is way too short”* (Knut Rognes)
[cited from Okstad (2012) *Fluefangeren*. *Univers*
[2012] (3): 23–27, in Norwegian.]

Knut was so much of an authority on blow flies and their relatives that it often came as a big surprise to his colleagues, when they learned that his *Candidatus realium* (i.e., PhD-thesis) and first scientific work from the early 1970s was on a group of ray-finned fishes. With meticulous detail and painstaking documentation through 149 pages and more than one hundred plates, Knut described and explained the head skeleton and jaw mechanism of wrasses (Teleostei: Labrinae) from Norwegian waters. Soon after, Knut moved from Bergen to Stavanger with wife Agnete and sons Torbjørn and Stig to take up a position at Stavanger University College, Faculty of Teacher Education, to teach biology and chemistry. He never pursued a career in ichthyology, but along with his early years of teaching he began to study the various insects found in his back yard.



Knut Rognes collecting flies in a meadow near Oslo in July, 2016. [Photo: Agnete Rognes]

He soon concentrated on the group of insects that dominates the northern temperate ecosystems – the calyptrate flies – and in a surprisingly short time he produced national checklists of the families Fanniidae, Muscidae, Sarcophagidae, Rhinophoridae and Tachinidae. After having published this almost complete national conspectus of calyptrate flies, his focus targeted at the blowflies, which he was now exploring with a newly acquired skill: phylogenetic analysis. He showed with overwhelming evidence that the genus *Helicobosca* (now *Eurychaeta*) should be moved out of the flesh flies and be considered a blow fly, and in two large papers in *Systematic Entomology*, he revised the taxonomy of a part of the complicated genus *Pollenia* (at that time considered part of the family Calliphoridae) with a remarkable authority. These papers, along with several smaller ones, were submitted in 1988 as a thesis for *Doctor philosophiae* (the Norwegian 'grand doctorate') under the title “Revision of North European blowflies, with contributions to the phylogeny of the genus *Pollenia* Robineau-Desvoidy (Diptera: Calliphoridae)”. A few years later, in 1991, this taxonomic tour de force culminated in the monograph “Blowflies (Diptera, Calliphoridae) of Fennoscandia and Denmark” in the series *Fauna Entomologica Scandinavica*, which is one of the very few volumes that sold so well as to be reprinted. Four more authoritative papers on the genus *Pollenia* followed in short succession, and Knut had taken the taxonomy of this genus a quantum leap forwards.

Knut enjoyed using technological advances in his work, and he had an above-average practical knowledge of computers, to the extent that they even appeared in his Acknowledgements (e.g., “Thanks also to my Commodore PC 10 computer, boosted with a 20MB plus hardcard”; *Fauna Ent. Scand.* 24: 9 [1991]). Knut had successively expanded his phylogenetic toolbox, and when the personal computer brought with it a new way of quantifying scientific support through explicit analyses, Knut picked it up immediately, although without jumping to conclusions. He began fine-tuning the definitions of the various subgroups of blow flies and analysing the relationships between them. In a series of oral presentations at international meetings, he enlightened us of his progress: First Nordic Phylogenetic Systematics Network Meeting (Stockholm, 1993); Third International Congress of Dipterology (Guelph, 1994); Third Nordic Phylogenetic Systematics Network Meeting (Bergen, 1996); and XX International Congress of Entomology (Firenze, 1996). Finally, he integrated all his comparative studies and complex analyses and in 1997 published a paper in *Cladistics* with the humble title: “The Calliphoridae (blowflies) (Diptera: Oestroidea) are not a monophyletic group”. Humble, because the notion of calliphorid non-monophyly was not entirely new, as already Willi Hennig, an outstanding dipterist and by many considered the founder of phylogenetic systematics, had incriminated that this might well be the case. No one, however, had been able to provide convincing scientific arguments neither for nor against – until Knut did this with completely convincing clarity.

After the several years spent analysing the phylogenetic relationships of the blow fly subfamilies, Knut had acquired such a thorough understanding of the underlying algorithms of PAUP or Pee-Wee, which were two of the most sophisticated software packages for phylogenetic analysis at the time, that he could follow up with two additional papers in *Cladistics*, this time uncovering possible pitfalls that users should avoid during their analyses.

Knut was an eminent observer and a rational mind, and he untiringly strived for arriving at the simplest explanations based on the strongest possible evidence. Evidently, he did not have much respect for colleagues who fell much below his high standards for taxonomic identifications, and he did not hesitate to express this in writing. Addressing a particularly grave example of careless misidentifications, Knut wrote that the author's “profound incompetence makes one wonder about the reasons why he writes about Italian blowflies at all” [*Boll. Mus. St. Nat. Venezia*, 65: 103–120 (2014)]. Unsurprisingly, this brought him into a clash with the controversial dipterist A.Z. Lehrer,

whose idiosyncratic and self-righteous approach was just about as far from Knut's as one can get. Knut daringly threw the gauntlet by publishing his powerful paper on "Bengalomania" (*Studia dipterologica* 12 [2005] (2): 443–471), and rather than wasting time on the numerous perfidious rebuttals, he went on to publish four revisionary papers on the genus *Bengalia*, which are probably among the finest taxonomic works in dipterology.

Paraphrasing the quote at the beginning of this communication, we have too few taxonomists like Knut, and their life is way too short. Knut's private collection of about 15.000 specimens (appr. 1000 species) was donated to the Oxford University Museum of Natural History.



Zoë Simmons and Knut Rognes preparing for shipping fly specimens to Oxford. [Photo: Agnete Rognes.]

Harold Ernest Robinson (17 March 1932 – 17 December 2020)

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Harold Robinson was born in 1932 and raised in Winchester, Virginia. From an early age, he showed an interest in the natural world and has long balanced a focus on plants with a profound interest in zoology. Robinson carried out his undergrad studies at Ohio University, where he majored in Botany and minored in Zoology. He then continued at the University of Tennessee, where he earned a Master's degree with a Botany major and Entomology minor. Although his thesis focused on flowering plants, he also began working on mosses, which were the focus of his Ph.D. research at Duke University. Robinson graduated from Duke in 1960, again with a Botany major and a Zoology minor. After a brief stint at Wofford College, he accepted a position at the Smithsonian in 1962.



During his 49 years as a Curator in the Department of Botany, and subsequently as a resident Curator Emeritus, Robinson was incredibly productive, publishing more than 950 papers. Using comparative morphology, Robinson carried out extensive studies of the largest and incredibly diverse families of plants (Asteraceae, over 27,000 species). This work capitalized on the use of micromorphology, not extensively employed prior to his work on the family, and required a large collection like that in the United States National Herbarium. He was also a specialist on the Dolichopodidae, a group of flies, with more than 30 publications on this side interest. Despite these broad interests in the sunflower family and flies, Robinson also kept up with work on the mosses, which was where he got his start in graduate school. He continued to occasionally study these plants using the same micromorphological techniques he employed elsewhere, published 50 research papers on bryophytes, and continued to curate these plants in the United States National Herbarium. In 2010, his work was recognized with the Asa Gray award from the American Society of Plant Taxonomists.

Chronological list of his publications on Diptera

(compiled by Marc Pollet)

Robinson, H. (1960) Four new Dolichopodidae from the eastern United States (Diptera). *The Ohio Journal of Science* 60 (5): 271–273.

Robinson, H. (1963) A new species of *Acropsilus* from the Solomon Islands (Diptera: Dolichopodidae). *Canadian Entomologist* 95 (8): 830–831.

Robinson, H. (1964) A Synopsis of the Dolichopodidae (Diptera) of the southeastern United States and adjacent regions. *Miscellaneous Publications of the Entomological Society of America* 4 (4): 105–192.

Robinson, H. (1964) Two new genera of Dolichopodidae from Mexico (Diptera). *Proceedings of the Entomological Society of Washington* 66 (4): 245–252.

- Foote, R.H., Coulson, J.R. & Robinson, H. (1965) Family Dolichopodidae. In: Stone, A., Sabrosky, C.W., Wirth, W.W., Foote, R.H. & Coulson, J.R. (eds), A catalogue of the Diptera of America North of Mexico. United States Department of Agriculture, Agricultural Research Service, Agriculture Handbook, 276: pp. 482–530.
- Robinson, H. (1965) *Discopygiella*, a new genus of Dolichopodidae from Mexico (Diptera). Proceedings of the Entomological Society of Washington 67 (1): 51–55.
- Robinson, H. (1966) A new species of *Calyxochaetus* from Mexico (Diptera, Dolichopodidae). Proceedings of the Entomological Society of Washington 68 (3): 272.
- Robinson, H. (1966) A revision of the Neotropical genus *Symbolia* (Diptera: Dolichopodidae). Annals of the Entomological Society of America 50 (3): 489–496.
- Robinson, H. (1967) *Neoparentia*, a new genus of American Dolichopodidae (Diptera). Proceedings of the Entomological Society of Washington 69 (3): 252–259.
- Robinson, H. (1967) New species of Dolichopodidae from the United States and Mexico. Proceedings of the Entomological Society of Washington 69 (2): 114–127.
- Robinson, H. (1967) New species of *Micromorphus* from the United States and Mexico. Proceedings of the Entomological Society of Washington 69 (4): 329–334.
- Robinson, H. (1967) Revision of the genus *Harmstonia* (Diptera: Dolichopodidae). Proceedings of the United States National Museum 123 (3615): 1–16.
- Robinson, H. (1967) A Revision of the Subfamily Stolidosominae (Diptera: Dolichopodidae). Annals of the Entomological Society of America 60 (5): 892–903.
- Robinson, H. (1969) A monographic study of the Mexican species of *Enlinia* (Diptera: Dolichopodidae). Smithsonian Contributions to Zoology 25: 1–62.
- Robinson, H. (1970) The subfamilies of the family Dolichopodidae in North and South America (Diptera). Papéis Avulsos do Departamento de Zoologia, Universidade de São Paulo 23 (6): 53–62.
- Robinson, H. (1970) 40. Family Dolichopodidae. In: Papavero, N. (ed.), A catalogue of the Diptera of the Americas south of the United States, 40: 1–92. Universidade de São Paulo, Museu de Zoologia.
- Robinson, H. & Arnaud Jr., P.H. (1970) The genus *Enlinia* Aldrich in America north of Mexico (Diptera: Dolichopodidae). Occasional Papers of the California Academy of Sciences 83: 1–9.
- Steyskal, G.C. & Robinson, H. (1970) Dolichopodidae from the Patuxent Wildlife Refuge, Maryland, with the descriptions of three new species of *Neurigona* (Diptera). Proceedings of the Entomological Society of Washington 72 (4): 448–453.
- Robinson, H. (1973) Two new species of *Enlinia* from the southwestern United States (Diptera: Dolichopodidae). Proceedings of the Entomological Society of Washington 75 (4): 419–422.
- Steyskal, G.C., Robinson, H., Ulrich, H. & Hurley, R.L. (1973) *Hydrophorus* Fallén, 1823 (Insecta, Diptera, Dolichopodidae): request for suppression under the plenary powers of the designation by Macquart, 1827 of *H. jaculus* Fallén as type of the genus in favour of *H. nebulosus* Fallén in order to conserve consistent usage. Bulletin of Zoological Nomenclature 30 (2): 118–120.
- Robinson, H. (1975) The family Dolichopodidae with some related Antillean and Panamanian species (Diptera). Smithsonian Contributions to Zoology 185: 1–141.
- Robinson, H. (1977) A new species of *Dominicomya* from Brasil (Diptera: Dolichopodidae). Proceedings of the Entomological Society of Washington 79 (3): 310–312.
- Robinson, H. (1977) Dolichopodidae. In: Hurlbert, S.H. (ed.), Biota Acuatica de Sudamérica Austral, pp. 305–306. San Diego State University, San Diego, California.
- Robinson, H. (1980) Three new species of *Thrypticus* from Maryland (Diptera: Dolichopodidae). Proceedings of the Entomological Society of Washington 82 (3): 469–473.

- Robinson, H. & Vockeroth, J.R. (1981) 48. Dolichopodidae. In: McAlpine, J.F., Peterson, B.V., Shewell, G.E., Teskey, H.J., Vockeroth, J.R. & Wood, D.M. (eds.), *Manual of Nearctic Diptera*, Volume 1: 625–639. Biosystematics Research Institute, Ottawa.
- Robinson, H. (1982) Dolichopodidae. In: Hurlbert, S.H. & Villalobos-Figueroa, A. (eds.), *Aquatic Biota of Mexico, Central America and the West Indies*, pp. 462–463. San Diego State University, San Diego, California.
- Robinson, H. (1992) Two new species of *Pelastoneurus* from Roosevelt Island, District of Columbia (Diptera: Dolichopodidae). *Proceedings of the Entomological Society of Washington* 94 (4): 576–579.
- Robinson, H. & Deyrup, Mark (1997) Two new species of *Asyndetus* Loew, and notes on the identity of *A. interruptus* Loew (Diptera: Dolichopodidae). *Proceedings of the Entomological Society of Washington* 99 (3): 477–482.
- Robinson, H. (2003) Five new species of *Xanthina* Aldrich (Diptera: Dolichopodidae) from Mexico and Central America. *Proceedings of the Entomological Society of Washington* 105 (2): 352–361.
- Robinson, H. & Woodley, N.E. (2005) A new species of *Harmstonia* (Diptera: Dolichopodidae) from Bolivia. *Proceedings of the Entomological Society of Washington* 107 (2): 436–440.
- Robinson, H. & Knowles, M. (2008) The Robinson expeditions to spout run, Arlington County, Virginia: Notes on *Gymnopternus* (Diptera: Dolichopodidae). *Proceedings of the Entomological Society of Washington* 110 (3): 562–576.
- Runyon, J.B. & Robinson, H. (2010) *Hurleyella*, a new genus of Nearctic Dolichopodidae (Diptera). *Zootaxa* 2400: 57–65.
- Evenhuis, N.L., Bickel, D.J. & Robinson, H. (2012) Case 3591. *Argyra* Macquart, 1834 (Insecta, Diptera, Dolichopodidae): proposed conservation of the name by suppression of *Porphyops* Meigen, 1824. *Bulletin of Zoological Nomenclature* 69 (3): 195–199.

Douglas A. Craig (1939 – 2020)

Douglas C. Currie

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The year 2020 will not be remembered fondly by history, but especially so for friends and colleagues of Doug Craig, who passed away from complications with cancer in early January. Doug was a multitalented fixture of the Canadian entomological community for more than half a century, publishing more than 100 papers that spanned the realms of insect morphology, paleontology, embryology, microscopy, hydrodynamics, systematics and biogeography. He was, however, best known for his contributions to the study of black flies (Diptera: Simuliidae) — a little loved but fascinating group of bloodsucking insects.

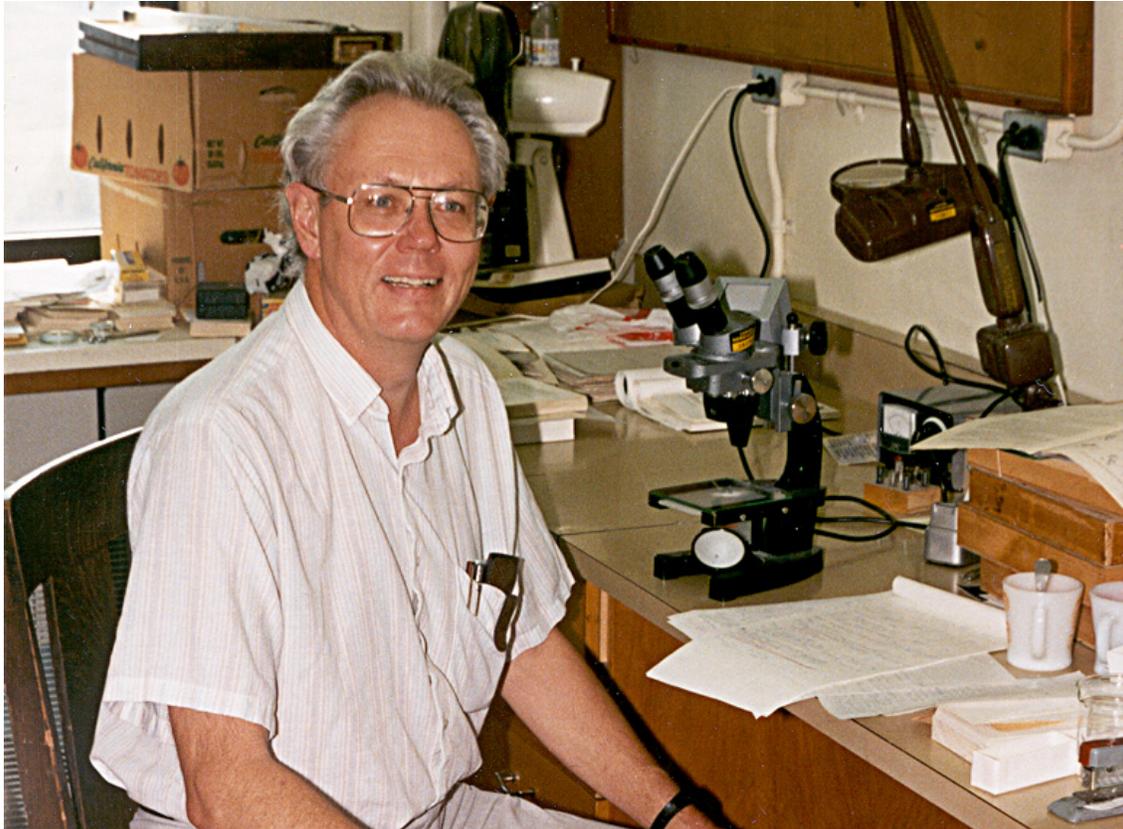
A tribute to Doug's life and career can be found in the June 2020 Bulletin of the Entomological Society of Canada 52(2): 113–116, <https://esc-sec.ca/wp-content/uploads/2020/05/Bulletin-Volume52-number2-June2020.pdf>.

**Donald Montgomery (Monty) Wood
(December 22, 1933 – August 24, 2020)**

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Monty Wood in his office in the Diptera Unit of the Canadian National Collection of Insects, Ottawa, in 1991.
(Photo by Jim O'Hara)

It is with great sadness that we report that our dear friend and colleague Monty Wood, a hugely knowledgeable and pivotal scientist in our Dipterist community, passed away in Ottawa at the age of 86 after a partial recovery from a serious illness earlier in the summer. We have written a tribute to Monty in recognition of his diverse dipterological interests and remarkable achievements, which was published in the December 2020 issue (volume 54(4): 206–210) of the *Bulletin of the Entomological Society of Canada*, available online at:

https://esc-sec.ca/wp-content/uploads/2020/12/2020_4_December_ESC_Bull-1.pdf.

A video of portions of the Memorial Service held in Ottawa in remembrance of Monty on 19 September 2020 is available on YouTube at <https://www.youtube.com/watch?v=DroihFcHWyI>.

MEETING NEWS

10th International Congress of Dipterology (ICDX)

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We are pleased to announce that ICDX will be held in Reno, Nevada (USA) from the 24th–29th July 2022. The organizing committee comprises Shaun Winterton (Co-Chair), Stephen Gaimari (Co-Chair), Christopher Borkent, Brian Brown, Martin Hauser, Peter Kerr, Alessandra Rung, and Michelle Trautwein. We will be broadly distributing the first circular for ICDX in January 2021 via an mailing list server with more event information, including invitations for symposia, travel information, venue details, registration, etc. Make sure to mark your calendars and we hope to see you all there.

**The next Field Meeting of the North American Dipterists Society
is scheduled for 2023 due to the pandemic**

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I was asked to organize the next field meeting of the North American Dipterists Society for 2021 in the mid-Atlantic region around Philadelphia. These field meetings are a wonderful chance for dipterists to gather at an interesting field site, collect together and learn new field techniques, hear the latest research from colleagues (most often student dipterists) and just enjoy each other. These meetings have been part of the earliest origins of the Society, the first occurring in April 1989 at Archbold Biological Station (Brodo, 1989) and continuing in odd numbered years ever since (to avoid conflict with the International Congress of Dipterology held ever fourth even numbered year). For a number of us who have attended, it was a chance to meet our dipterist heroes and mentors, develop new collaborations, and make discoveries that led to published papers. For example, at that first meeting in 1989 Chen Young and I discovered the larvae and pupae of the enigmatic crane fly genus *Brachypremna*, which we published on a few years later (Gelhaus and Young, 1991).

As I started to plan with possible sites earlier this year, the developing pandemic and its long-term consequences started to cast a larger shadow. By this fall, the second surge of the pandemic was in full development and deaths in the USA had far exceeded 200,000, and even with the release of vaccines, experts were warning that life would not be returned to a pre-pandemic semblance before summer 2021. I could not see how to plan a meeting with this uncertainty and reached out to my colleagues for their input. They responded that they could also not envision a meeting occurring safely in 2021, and with the International Congress of Dipterology set for Reno, Nevada in 2022, it was generally agreed that the next field meeting will be set for May or June 2023.

I am focusing my planning on choosing from two different areas which offer a range of habitats, accessible properties allowing collecting, and nearby housing, the New Jersey Pinelands and the Pennsylvania Pocono Mountains. We have used both areas for teaching classes and research activities, and also used the housing sites for our student environmental camps and weekend classes. Both lodging sites have areas to serve as labs, meeting areas for presentations, and food preparation and eating areas, and have local food catering options. Both also offer interesting collecting right on site in addition to nearby areas. Other lodging options (motels, B & Bs, camping) are available near to each of the lodging sites.

The New Jersey Pinelands includes “1.1 million acres and occupies 22% of New Jersey's land area and is the largest body of open space on the Mid-Atlantic seaboard between Richmond and Boston” (<https://www.nj.gov/pinelands/reserve/>). Located on the Outer Coastal Plain, it is an area of pine and oak dominated forest, sandy soils and naturally acidic bogs, marshes and rivers. The forest is maintained through fires (wild and prescribed) and the area includes natural open barrens. I am impressed by the diversity of fly groups associated with arid habitats, including Therevidae, Asilidae and Tachinidae. The wetlands offer a rich diversity of aquatic and semi-aquatic Diptera groups including Tipuloidea, Ceratopogonidae, Chironomidae, Empidoidea and others. The Atlantic Coastal Plain, in which the New Jersey Pinelands is in the most northern extent, was recently designated a global Biodiversity Hotspot due to its high diversity of endemic plants and animals, and the conservation threats to this biota (Noss et al. 2015). Elevation is close to sea level.



New Jersey Pinelands: (left) Typical sand road – the areas I am looking at have various trails and roads for access; (right) the Wading River



New Jersey Pinelands: (left) typical Atlantic White Cedar-sphagnum bog (right) a view of the Pygmy Forest area where trees barely reach higher than 4–5 feet.

Housing would be in a nearby remnant Coastal Forest site (different than true Pinelands forest), with access to numerous sites including a 9000 acre Pinelands property with a mix of fire histories. Philadelphia, and the collection at the Academy of Natural Sciences, is a little over an hour away,

and offers a chance to use the collection during an evening, or in the event of an extended rain event. The Academy's collection includes extensive sampling from this region, particularly from 2006 on, including pinned and ethanol material, from sweeps, pitfalls, lights and malaise traps. We have fully inventoried all the 100,000 identified species in the Academy's collection and the holdings are searchable at <http://symbiont.ansp.org/entomology/>. Airports within an hour or so of the Pinelands site include Philadelphia, Atlantic City, Trenton and Newark.



New Jersey Pinelands: (left) typical Pinelands stream; (right) forest regrowth in the year a prescribed fire occurred

The other area I have been considering is the Pocono Mountain area of northeastern Pennsylvania. The area is part of the Allegheny Plateau and the Ridge and Valley Province of Pennsylvania and consists of hills from 100–650 m elevation. The region is forested with a mixture of northern hardwood and Appalachian oak forests. Abundant aquatic habitats include fast flowing rocky bottomed streams, lakes and reservoirs, bogs and other wetlands. The lodging site is part of a protected forested watershed for a natural lake, and nearby areas include state park and state game lands areas. We have not intensely sampled this area recently for insects as we have in the Pinelands.



Poconos: (left) a natural lake; (right) sphagnum bog surrounding lake



Poconos: (left) trail marker in one of the many state parks in the region; (right) a small stream

The Poconos area is more remote from major airports (Philadelphia, Newark are several hours away) but a close smaller airport is in Scranton, Pennsylvania. This site would not allow easy access to the Academy’s collection, as it is a 2.5–3 hour drive from Philadelphia, although this could be accessed before and after the field meeting if desired.

As I work through the two choices, I would welcome any feedback. If you are a regular attendee at the field meetings, or likely to attend in 2023, and have a preference, please feel free to let me know.

References

- Brodo, F. 1989. First Annual Meeting of the North American Dipterists' Society. *Fly Times* 3: 3. <http://www.nadsdiptera.org/News/FlyTimes/issue03.pdf>
- Gelhaus, J. K. and C. W. Young. 1991. The immature instars and biology of the crane fly genus *Brachypremna* Osten Sacken (Diptera: Tipulidae). *Proceedings of the Entomological Society of Washington* 93(3): 613–621.
- Noss, R., W. J. Platt B. A. Sorrie A. S. Weakley D. B. Means J. Costanza and R. K. Peet. 2015. How global biodiversity hotspots may go unrecognized: lessons from the North American Coastal Plain. *Diversity and Distributions* 21(2): 236–244. <https://doi.org/10.1111/ddi.12278>

OUT-OF-PLACE DIPTERA

So busy that it didn't even notice it has been supplanted!

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«The busy bee has no time for sorrow»

Photography exhibition, State of Mexico

DIPTERA ARE AMAZING!



While photographing a colony of *Bembix* sand wasps, this scene was captured of a wasp carrying its *Eristalis* (Syrphidae) prey to its nest while being larvi-/oviposited on by a satellite fly in the genus *Senotainia* (Sarcophagidae). Photographed by Bob Parks, 9 July 2020, in Cochise County Arizona.

BOOKS AND PUBLICATIONS

A reboot of the 'Books and Publications' section

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After nearly 20 years (off and on) of helping produce the list of 'Books and Publications' for the *Fly Times*, Chris Borkent has decided it's time to pursue other endeavors. As editor, I must say how much I have appreciated all that Chris has done in this regard, both under my editorship and the years of editing by his dad (Art Borkent) and Jeff Cumming. This change has caused me to reflect a bit on this regular section of the *Fly Times*, and to do a little digging into what made it become what it currently is. So I offer here a short historical look at the 'Books and Publications' section, as a prelude to rebooting the section, bringing it back to its roots moving forward.

In the early days of *Fly Times*, this section was used to highlight one or a few particular publications of interest about flies, often with commentary and description of the contents. In fact, in those early days, it was not so much a "section" as it was a contribution along with all the others. The first issue of *Fly Times*, in October 1988, had no section for books and publications. Starting with the second issue (April 1989), there was an article called 'Books and Publications' embedded among all the other articles, which consisted of listing one to several recent works, usually larger or otherwise significant or interesting, chosen by the editors, and giving information about their contents and sometimes a mini-review or commentary about the works. This continued until issue 12 (April 1994) when the 'Books and Publications' section began to occupy the position it still holds, as the last item before the Submission Form for the Directory of North American Dipterists (which has long occupied the last page of the *Fly Times*). The section typically ran from half a page up to two pages.

With issue 22 in April 1999, a couple years after the editors abandoned the old 9-dot matrix printer in favor of laser printing, this section was recognized on the front page as being one of the "regular" items, and so it proceeded. By this time, the section was usually just a simple list of publications, presumably works that the editors found interesting or most significant. Only occasionally were any citations accompanied by descriptions of content or commentary after this point. But they still only occupied from about half a page up to two pages.

And so it continued until issue 29 (October 2002), which was the first to acknowledge Chris Borkent, thanking him for completing the literature search. Chris continued in this role through issue 39 (October 2007), the last one edited by Art and Jeff. During this time, the list of publications was still occupying up to two pages, but numbers of citations were increasing, with 31 citations in issue 33 (October 2004) holding the record.

Starting with my editorship of issue 40 (April 2008), this section got a small facelift. First, I'll note that no one suggested to me that Chris might still be willing to continue doing the searches for this section! So I just tackled it, and I think got a little over excited. My first effort yielded a whole 2-1/2 pages (38 citations), as a simple list of papers without description or commentary (although some with links to downloads). At the start, I was mostly searching *Zoological Record* to put the list

together, in addition to papers I had seen myself in the CDFA library, and I generally focused on either broad-based or larger works, or works specific to the Nearctic or New World, fauna, noting that the list would be much larger if I included papers on Old World flies. I also suggested people should send me citations of papers they would like to see in the list.

By issue 42 (April 2009), the section was up to five pages (granted, I did change the spacing), with 58 citations, and more and more Old World papers sneaking in. With issue 43 (October 2009), the section was again five full pages, but single-spaced, with 76 citations. The section continued to grow, and with issue 46 (April 2011), I decidedly expanded the scope beyond the New World, trying to make this more appealing to the international dipterist community. This was a result of having heard more and more from dipterists outside North America, giving me citations to add, and sending manuscripts for *Fly Times*, I came to realize that interest was growing, as was the readership from all over. This issue had 14 pages with 236 citations listed, and the next one was 19 pages. So really, the current style of this section is not even 10 years old!

Then in 2012 a most fortunate thing happened. I took Chris Borkent on as a postdoc to work with me in Sacramento! After a short time, I realized (we realized) that Chris might be willing to take on this task again for the *Fly Times*! (this wasn't the only reason hiring him as a postdoc was a fortunate thing!). So starting with issue 48, Chris climbed back onboard and produced his first literature list in the “new” way, *i.e.*, long-form. Chris has consistently (and with good cheer) kept up this pace, doing a remarkable job compiling lists of recent literature for each issue of the *Fly Times*, with page numbers exploding up to 22 pages of citations for issues 50 and 64 (and consistently very thorough through all of the years). In total (including his five years under the previous editors), Chris has been responsible for more than 300 pages of content (291 of which were from issue 48 to present)! I did not go through the number of citations he recorded in those pages, but it is easily more than 10 times that number (at least since 2012, a page comprised from about 14 to 20 citations).

So with Chris' departure from this task, it is now time to rethink this section. As a general observation, we now have much greater and faster access to the kinds of information we typically present here, via resources like researchgate.net, Google Scholar, academia.edu, Zoological Record, Web of Science and many others. With that fact, I do not want to abandon this section. Not at all! I just want to give it another facelift, making it into something different. But rather than reinventing the wheel, I think a return to first principles is in order. Those first years of this section provided something more for the reader than the list of references it has become. They provided something to read, that is, information on the contents for recent works, with commentary. It was more for the reader than just skimming through a list of papers trying to find those of particular interest.

So, unless there is a riot (and someone is just dying to do this), this issue contains the last of the “long” lists of publications. We go out on a high note, with more than 300 references in 20 pages. But we can now move on to a section where anyone can submit items that have to do with published works. They do not have to be only works published in the period since the last *Fly Times*, but this section is for more recent works. Treatments of older works will still be found in the pages of the Historical Dipterology section.

So, I invite everyone to contribute to this section. This can be in the form of book reviews, announcements of particularly significant works, etc. Really the main requirement is that it is something that will be of interest to dipterists!

Here is the latest (and lastest) offering of Diptera-related papers in this format. Many thanks to Chris Borkent for compiling this list, as well as all of the lists since issue 48! As usual we may have missed some papers that likely should have been cited here, but unfortunately the online resources do not always catch everything and are usually a couple of months behind. We also note that there are missing diacritics in some authors' names, which is unfortunately a product of searching in Zoological Record and Web of Science, where they are removed.

- Abraham, S., Castillo, G., Diaz, V., Van Nieuwenhove, G., Murua, G. and Rull, J. 2020. Promiscuous female *Euxesta eluta* derive nutrients for ovarian development by expelling and consuming ejaculates. *Insect Science* **27(3)**: 545–557. doi:10.1111/1744-7917.12658.
- Adams, B.J., Li, E.J., Bahlai, C.A., Meineke, E.K., McGlynn, T.P. and Brown, B. 2020. Local- and landscape-scale variables shape insect diversity in an urban biodiversity hot spot. *Ecological Applications* **30(4)**: 14. doi:10.1002/eap.2089.
- Adler, P.H. and Seitz, G. 2020. Chromosomal relationships of black flies (Diptera: Simuliidae) in the *Simulium aureum* Fries species group on the Greek island of Rhodes. *Proceedings of the Entomological Society of Washington* **122(3)**: 547–555.
- Ali, S., Shabbir, A. and Dhilepan, K. 2020. Bionomics and damage potential of fruit fly *Dacus persicus* (Diptera: Tephritidae): a prospective biological control agent of *Calotropis procera* (Apocynaceae). *Biocontrol Science and Technology* **30(7)**: 716–727.
- Almeida, E.A.B., Costa, A.M., Tavares, J.A., Zichinelli, M.M.P. and Quinteiro, F.B. 2020. Illustrated catalogue of type specimens of insects (Hexapoda) at Colecao Entomologica “Prof. J M F Camargo” (RPSP), Universidade de Sao Paulo, Brazil. *Zootaxa* **4842(1)**: 1–204. doi:10.11646/zootaxa.4842.1.1.
- Ament, D.C., Kung, G.A. and Brown, B.V. 2020. Forty-one new species of *Coniceromyia* Borgmeier (Diptera: Phoridae), an identification key, and new distributional records for the species of the genus. *Zootaxa* **4830(1)**: 1–61. doi:10.11646/zootaxa.4830.1.1.
- Amorim, D.D., Riccardi, P.R. and Rafael, J.A. 2020. First known extant species of *Alavesia* (Diptera: Atelestidae) in the Neotropical region: *Alavesia leukoprosopa*, sp. nov., from the southern Atlantic Forest, Brazil. *American Museum Novitates*(**3962**): 12.
- Amorim, D.d.S. and Greenwalt, D.E. 2020. Cretaceous and Eocene fossils of the rare extant genus *Synneuron* Lundstrom (Diptera: Canthyloscedidae): evidence of a true Pangean clade. *Cladistics* **36(4)**: 413–423.
- Anbalagan, S., Rekha, K., Vijayan, S., Balachandran, C., Dinakaran, S. and Krishnan, M. 2020. A new black fly species of *Simulium* (*Nevermannia*) (Simuliidae: Diptera) from the Southern Eastern Ghats, India. *Zootaxa* **4768(3)**: 374–382. doi:10.11646/zootaxa.4768.3.4.
- Andrade, D.C., Morais, S.A., Marteis, L.S., Gama, R.A., Freire, R.C.D., Rekowski, B.S., Ueno, H.M. and La Corte, R. 2020. Diversity of Mosquitoes (Diptera: Culicidae) in the Caatinga biome, Brazil, from the widespread to the endemic. *Insects* **11(8)**: 13. doi:10.3390/insects11080468.
- Andres, M., Su, M.P., Albert, J. and Cator, L.J. 2020. Buzzkill: targeting the mosquito auditory system. *Current Opinion in Insect Science* **40**: 11–17. doi:10.1016/j.cois.2020.04.003.
- Arimoto, K., MacGowan, I. and Su, Z.H. 2020. New data on lance flies (Diptera, Lonchaeidae) associated with figs (Moraceae, *Ficus* spp.) in Japan and Taiwan, with descriptions of two new species of the genus *Silba* Macquart. *Journal of Asia-Pacific Entomology* **23(2)**: 364–370. doi:10.1016/j.aspen.2019.11.007.
- Attia, M.M. and Salaeh, N.M.K. 2020. Ultrastructure of adult *Gasterophilus intestinalis* (Diptera: Gasterophilidae) and its puparium. *International Journal of Tropical Insect Science* **40(2)**: 327–335. doi:10.1007/s42690-019-00084-9.
- Azar, D. and Maksoud, S. 2020. A new species of *Protopsychoa* Azar et al., 1999 from the Lower Cretaceous Lebanese amber (Diptera: Psychodidae). *Palaeoentomology* **3(4)**: 352–356.

- Barahona-Segovia, R.M. and Barcelo, M. 2020. *Myopa nebulosa* sp. nov. and *Myopa bozinovici* sp. nov. (Diptera: Conopidae): New thick-headed flies from a threatened biodiversity hotspot in central Chile. *Zootaxa* **4780(2)**: 291–306. doi:10.11646/zootaxa.4780.2.4.
- Barahona-Segovia, R.M., Guzman, V.V., Barcelo, M. and Paninao-Monsalvez, L. 2020. A new spider fly (Diptera: Acroceridae: Ogcodinae: *Ogcodes* Latreille) from Chiloe Island's evergreen forest and new distributional records for other spider flies in Chile. *Zootaxa* **4779(1)**: 51–64. doi:10.11646/zootaxa.4779.1.3.
- Barahona-Segovia, R.M. and Paninao-Monsalvez, L. 2020. Desolation comes from the sky: Invasive Hymenoptera species as prey of Chilean giant robber flies (Diptera: Asilidae) through field observations and citizen science. *Journal of Asia-Pacific Entomology* **23(3)**: 840–844. doi:10.1016/j.aspen.2020.07.012.
- Barkalov, A.V. 2020. New data on the genus *Cheilosia* Meigen (Diptera, Syrphidae) from Central Asia, with descriptions of two new species and a key to the 'group C'. *Zootaxa* **4860(2)**: 243–256. doi:10.11646/zootaxa.4860.2.6.
- Bechev, D. and Kazandzhieva, S. 2020. A new species of *Stenophragma* Skuse from Borneo (Diptera: Mycetophilidae: Sciophilinae). *Zootaxa* **4819(1)**: 195–200. doi:10.11646/zootaxa.4819.1.12.
- Bezerra, R.H.S. and Bocchiglieri, A. 2020. Can the host phylogeny (Chiroptera) influence the community of ectoparasite flies (Diptera)? *Current Zoology* **66(3)**: 331–332. doi:10.1093/cz/zoz043.
- Bezerra-Santos, M.A. and Otranto, D. 2020. Keds, the enigmatic flies and their role as vectors of pathogens. *Acta Tropica* **209**: 11. doi:10.1016/j.actatropica.2020.105521.
- Bickel, D.J. 2020. *Nggela* (Diptera: Dolichopodidae), a new genus from the Solomon Islands. *Bishop Museum Occasional Papers* **134**: 1–6.
- Bickel D.J. and Martin J. 2020. *Binatangia* (Diptera: Dolichopodidae) a new genus from Papua New Guinea. In Robillard T., Legendre F., Villemant C. & Leponce M. (eds), *Insects of Mount Wilhelm, Papua New Guinea – volume 2*. Muséum national d'Histoire naturelle, Paris: 363–375 (Mémoires du Muséum national d'Histoire naturelle, **214**). ISBN: 978-2-85653-836-4.
- Bickel D.J. and Martin J. 2020. The genera *Plagiozopelma* and *Krakatauia* (Diptera: Dolichopodidae: Sciapodinae) in New Guinea and surrounding areas. In Robillard T., Legendre F., Villemant C. & Leponce M. (eds), *Insects of Mount Wilhelm, Papua New Guinea – volume 2*. Muséum national d'Histoire naturelle, Paris: 377–420 (Mémoires du Muséum national d'Histoire naturelle, **214**). ISBN : 978-2-85653-836-4.
- Bickel D.J. and Martin J. 2020. The *Chaetogonopteron appendiculatum* group (Diptera: Dolichopodidae: Sympycninae) in New Guinea, the Solomon Islands and Australia, with notes on the Oriental fauna. In Robillard T., Legendre F., Villemant C. & Leponce M. (eds), *Insects of Mount Wilhelm, Papua New Guinea – volume 2*. Muséum national d'Histoire naturelle, Paris: 421–458 (Mémoires du Muséum national d'Histoire naturelle, **214**). ISBN: 978-2-85653-836-4.
- Bin Kim, S., Park, J.-J. and Kim, D.-S. 2020. CLIMEX simulated predictions of the potential distribution of *Bactrocera dorsalis* (Hendel) (Diptera: Tephritidae) considering the northern boundary: With special emphasis on Jeju, Korea. *Journal of Asia-Pacific Entomology* **23(3)**: 797–808.
- Bistline-East, A., Burke, D., Williams, C.D. and Gormally, M.J. 2020. Habitat requirements of *Tetanocera elata* (Diptera: Sciomyzidae): case study of a dry meadow in western Ireland. *Agricultural and Forest Entomology* **22(3)**: 250–262. doi:10.1111/afe.12378.
- Bistline-East, A., Williams, C.D. and Gormally, M.J. 2020. Nutritional ecology of predaceous *Tetanocera elata* larvae and the physiological effects of alternative prey utilisation. *BioControl (Dordrecht)* **65(3)**: 285–296.

- Blanckenhorn, W.U., Baur, J., Busso, J.P., Giesen, A., Gourgoulianni, N., van Koppenhagen, N., Roy, J., Schaefer, M.A., Wegmann, A. and Rohner, P.T. 2020. Sexual size dimorphism is associated with reproductive life history trait differentiation in coexisting sepsid flies. *Oikos* **129(8)**: 1152–1162.
- Boardman, P. 2020. Twenty-one new species of craneflies (Diptera: Tipulidae and Limoniidae), and a new fold-wing crane fly (Diptera: Ptychopteridae) from Mount Kupe, Cameroon, with notes on eighteen other species new to the country from the same location. *Entomologist's Monthly Magazine* **156(3)**: 163–206.
- Borkent, A. and Dominiak, P. 2020. Catalog of the biting midges of the world (Diptera: Ceratopogonidae). *Zootaxa* **4787(1)**: 1–377. doi:10.11646/zootaxa.4787.1.1.
- Brahma, S., Chatterjee, S. and Hazra, N. 2020. Three new species of *Dasyhelea* Kieffer and new record of *D. flaviformis* Carter, Ingram and Mac is (Diptera: Ceratopogonidae) from the Deltaic Proper of Gangetic West Bengal, India. *Journal of Insect Biodiversity* **16(2)**: 55–80.
- Bratt, A.D., Knutson, L.V., Murphy, W.L. and Daniels, A.A. 2020. Biology, immature stages, and systematics of snail-killing flies of the genus *Colobaea* (Diptera: Sciomyzidae), with overviews of aspects of the tribe Sciomyzini. *Zootaxa* **4840(1)**: 1–64. doi:10.11646/zootaxa.4840.1.1.
- Brody, T., Yavatkar, A., Kuzin, A. and Odenwald, W.F. 2020. Ultraconserved non-coding DNA within Diptera and Hymenoptera. *G3-Genes Genomes Genetics* **10(9)**: 3015–3024. doi:10.1534/g3.120.401502.
- Brown, B.V., Gonzalez, L. and Haggqvist, S. 2020. Revision of the Oriental Region genus *Epicnemis* Borgmeier (Diptera: Phoridae). *Zootaxa* **4803(1)**: 103–124.
- Camargo, A., De Souza, F.C. and Zatwarnicki, T. 2020. First description of immature stages of Gastropini, *Gastrops willistoni* Cresson (Diptera: Ephydriidae) preying on eggs in a foam nest of *Leptodactylus knudseni* Heyer (Anura: Leptodactylidae) in Central Amazon. *Zootaxa* **4869(1)**: 131–145. doi:10.11646/zootaxa.4869.1.7.
- Campillo, L.C., Barley, A.J. and Thomson, R.C. 2020. Model-based species delimitation: Are coalescent species reproductively isolated? *Systematic Biology* **69(4)**: 708–721.
- Cane, R.P., Li, D.M., Turbitt, E. and Chambers, G.K. 2020. Molecular phylogenetic analysis of New Zealand mosquito species. *New Zealand Journal of Zoology* **47(4)**: 324–349. doi:10.1080/03014223.2020.1770305.
- Castelli, L.E., Gleiser, R.M. and Battan-Horenstein, M. 2020. Role of saprophagous fly biodiversity in ecological processes and urban ecosystem services. *Ecological Entomology* **45(3)**: 718–726.
- Cavalcante do Nascimento, J.M., Hamada, N. and Pepinelli, M. 2020. A new species in *Simulium* (*Trichodagmia*) (Diptera: Simuliidae) from Chapada Diamantina region, Brazil: cryptic diversity revealed by morphological and molecular evidence. *Acta Tropica* **206**: 105457.
- Cazorla, C.G. and Campos, R.E. 2020. Ceratopogonidae (Diptera) communities in a protected area threatened by urbanization. *Neotropical Entomology* **49(3)**: 361–368.
- Cerba, D., Koh, M., Ergovic, V., Mihaljevic, Z., Milosevic, D. and Hamerlik, L. 2020. Chironomidae (Diptera) of Croatia with notes on the diversity and distribution in various habitat types. *Zootaxa* **4780(2)**: 259–274. doi:10.11646/zootaxa.4780.2.2.
- Chagnon, M.E. and Sinclair, B.J. 2020. Revision of the Nearctic species of *Gimnomera* Rondani (Diptera: Scathophagidae), with morphological phylogeny and DNA barcodes. *Zootaxa* **4853(3)**: 369–403. doi:10.11646/zootaxa.4853.3.3.
- Chamutiova, T., Hamerlik, L. and Bitusik, P. 2020. Subfossil chironomids (Diptera, Chironomidae) of lakes in the Tatra Mountains: an illustrated guide. *Zootaxa* **4819(2)**: 216–264.
- Chesters, D. 2020. The phylogeny of insects in the data-driven era. *Systematic Entomology* **45(3)**: 540–551.

- Chisausky, J.L., Soley, N.M., Kassim, L., Bryan, C.J., Miranda, G.F.G., Gage, K.L. and Sipes, S.D. 2020. Syrphidae of Southern Illinois: Diversity, floral associations, and preliminary assessment of their efficacy as pollinators. *Biodiversity Data Journal* **8**: 32. doi:10.3897/BDJ.8.e57331.
- Chu, M.-Y. and Liu, G.-C. 2020. First record of genus *Epicnemis* Borgmeier, 1962 (Aenigmatiinae: Phoridae: Diptera) from China, with description of a new species. *Zootaxa* **4772(3)**: 593–596.
- Clavijo, P.A.R., Miret, L.M., Norrbom, A.L., Garay, L.C., Coronel, L.B.E. and Penaranda, E.A. 2020. New records of *Anastrepha* (Diptera: Tephritidae) from Paraguay. *Zootaxa* **4809(1)**: 141–155. doi:10.11646/zootaxa.4809.1.8.
- Cornel, A.J., Mayi, M.P.A., Kowo, C., Foncha, D., Andongma, E., Anong, D.N., Elad, M., Djomo, C., Tchuinkam, T., Brisco, K.K. and others. 2020. New species of *Culex* (*Culiciomyia*) (Diptera: Culicidae) from Talangaye Forest in Cameroon and descriptions and identification keys for males of the Afrotropical species of the subgenus. *Zootaxa* **4858(4)**: 451–506. doi:10.11646/zootaxa.4858.4.1.
- Couri, M. and Pont, A. 2020. Type specimens of Limnophorini (Diptera: Muscidae) deposited in the Museum fur Naturkunde, Humboldt-Universitat zu Berlin (Berlin, Germany). *Zoologia* **37**: 57. doi:10.3897/zoologia.37.e46879.
- Couri, M.S. and Pont, A.C. 2020. Type specimens of Coenosiini (Diptera, Muscidae) deposited in the Museum fur Naturkunde, Humboldt-Universitat zu Berlin (Berlin, Germany). *Zootaxa* **4781(1)**: 1–73. doi:10.11646/zootaxa.4781.1.1.
- Craig, T.P., Livingston-Anderson, A. and Itami, J.K. 2020. A small-tiled geographic mosaic of coevolution between *Eurosta solidaginis* and its natural enemies and host plant. *Ecosphere* **11(7)**: 23. doi:10.1002/ecs2.3182.
- Cranston, P.S. 2020. Life histories of *Paucispinigera* Freeman, *Paraborniella* Freeman and *Paratendipes* Kieffer (Diptera: Chironomidae) with phylogenetic considerations. *Zootaxa* **4853(4)**: 527–547. doi:10.11646/zootaxa.4853.4.3.
- Cutajar, T.P. and Rowley, J.J.L. 2020. Surveying frogs from the bellies of their parasites: Invertebrate-derived DNA as a novel survey method for frogs. *Global Ecology and Conservation* **22**: e00978.
- Da Silva, I.M., Ferreira-Keppler, R.L., Hamada, N. and Cazorla, C.G. 2020. Redescription of *Stilobezzia* (*Stilobezzia*) *albicoxa* Lane & Forattini, 1956 with new synonymy (Diptera: Ceratopogonidae). *Zootaxa* **4822(3)**: 443–445.
- Dantas, G.P.S., Amat, E. and Hernandez-Rangel, S.M. 2020. A new Andean species of *Ablabesmyia* Johannsen from Colombia (Diptera: Chironomidae) with an updated taxonomic key for Neotropical species. *Studies on Neotropical Fauna and Environment* **55(2)**: 96–102.
- Dantas, G.P.S., Pinheiro, M.P.G. and Hamad, N. 2020. An unusual new species of *Pentaneura* Philippi (Diptera: Chironomidae) from northeastern Brazil, with an emended diagnosis to the genus. *Zootaxa* **4786(1)**: 81–92. doi:10.11646/zootaxa.4786.1.6.
- David, K.J., Hancock, D.L., Salini, S., Gracy, R.G. and Sachin, K. 2020. Taxonomic notes on the genus *Campiglossa* Rondani (Diptera, Tephritidae, Tephritinae, Tephritini) in India, with description of three new species. *Zookeys*(**977**): 75–100. doi:10.3897/zookeys.977.57875.
- David, K.J., Hancock, D.L., Sankararaman, H., Sachin, K. and Sudhir, S. 2020. A new species of *Euphranta* Loew (Diptera: Tephritidae: Trypetinae: Adramini) from India. *Zootaxa* **4868(4)**: 584–590. doi:10.11646/zootaxa.4868.4.8.
- Dawah, H.A., Abdullah, M.A., Ahmad, S.K., Al-Dhafer, H. and Turner, J. 2020. An overview of the Syrphidae (Diptera) of Saudi Arabia. *Zootaxa* **4855(1)**: 1–69. doi:10.11646/zootaxa.4855.1.1.
- Dawah, H.A., Abdullah, M.A. and Deeming, J.C. 2020. The Muscidae (Diptera) of Saudi Arabia, descriptions of two new species, new records and updated list of species. *Zootaxa* **4869(1)**: 1–54. doi:10.11646/zootaxa.4869.1.1.

- Dawah, H.A., Abdullah, M.A. and Deeming, J.C. 2020. An overview of the Chloropidae (Diptera) of Saudi Arabia. *Zootaxa* **4791(1)**: 1–71. doi:10.11646/zootaxa.4791.1.1.
- Dawah, H.A., Ahmad, S.K., Abdullah, M.A. and Grichanov, I.Y. 2020. The family Dolichopodidae (Diptera) of the Arabian Peninsula: identification key, an updated list of species and new records from Saudi Arabia. *Journal of Natural History* **54(21–22)**: 1425–1454. doi:10.1080/00222933.2020.1800118.
- De Freitas, L., De Araujo, W.S. and Falcao, L.A.D. 2020. Structure of the interaction networks between bats (Mammalia: Chiroptera) and ectoparasite flies (Diptera: Streblidae, Nycteribiidae) on a latitudinal gradient. *Acta Chiropterologica* **22(1)**: 187–196. doi:10.3161/15081109acc2020.22.1.018.
- De Meyer, M., Goergen, G. and Jordaens, K. 2020. Taxonomic revision of the Afrotropical *Phytomia* Guerin-Meneville (Diptera: Syrphidae). *Zootaxa* **4803(2)**: 201–250. doi:10.11646/zootaxa.4803.2.1.
- de Sa, I.L.R., Hutchings, R.S.G., Hutchings, R.W. and Sallum, M.A.M. 2020. Revision of the *atratus* group of *Culex* (*Melanoconion*) (Diptera: Culicidae). *Parasites & Vectors* **13(1)**: 52. doi:10.1186/s13071-020-3982-x.
- de Sousa, J.R.P., Carvalho, F.D., Juen, L. and Esposito, M.C. 2020. The effects of cattle ranching on the communities of necrophagous flies (Diptera: Calliphoridae, Mesembrinellidae and Sarcophagidae) in Northeastern Brazil. *Journal of Insect Conservation* **24(4)**: 705–717. doi:10.1007/s10841-020-00246-y.
- De Souza, C.M., Pape, T. and Thyssen, P.J. 2020. *Oxysarcodexia* Townsend, 1917 (Diptera: Sarcophagidae) – a centennial conspectus. *Zootaxa* **4841(1)**: 1–126. doi:10.11646/zootaxa.4841.1.1.
- Dils, J. 2020. A new species of *Stomylomyia* from Turkey (Diptera: Bombyliidae). *Phegea* **48(3)**: 58–61.
- Djan, M., Stahls, G., Velickovic, N., Acanski, J., Vidakovic, D.O., Rojo, S., Perez-Banon, C., Radenkovic, S. and Vujic, A. 2020. The *Merodon planifacies* subgroup (Diptera, Syrphidae): Congruence of molecular and morphometric evidences reveal new taxa in Drakensberg mountains valleys (Republic of South Africa). *Zoologischer Anzeiger* **287**: 105–120. doi:10.1016/j.jcz.2020.05.010.
- do Nascimento, J.M.C., Hamada, N. and Pepinelli, M. 2020. A new species in *Simulium* (*Trichodagmia*) (Diptera: Simuliidae) from Chapada Diamantina region, Brazil: cryptic diversity revealed by morphological and molecular evidence. *Acta Tropica* **206**: 20. doi:10.1016/j.actatropica.2020.105457.
- Dong, Y., Li, T., Xi, X. and Sun, S. 2020. A protocol for fast identification of larval tephritid flies with a community-wide COI reference bank. *Conservation Genetics Resources* **12(3)**: 479–488.
- Doorenweerd, C., Ekayanti, A. and Rubinoff, D. 2020. The Dacini fruit fly fauna of Sulawesi fits Lydekker's line but also supports Wallacea as a biogeographic region (Diptera, Tephritidae). *Zookeys* **(973)**: 103–122. doi:10.3897/zookeys.973.55327.
- Doorenweerd, C., Sievert, S., Rossi, W. and Rubinoff, D. 2020. The paradoxical rarity of a fruit fly fungus attacking a broad range of hosts. *Ecology and Evolution* **10(16)**: 8871–8879. doi:10.1002/ece3.6585.
- Doyle, T., Hawkes, W.L.S., Massy, R., Powney, G.D., Menz, M.H.M. and Wotton, K.R. 2020. Pollination by hoverflies in the Anthropocene. *Proceedings of the Royal Society B-Biological Sciences* **287(1927)**: 9. doi:10.1098/rspb.2020.0508.
- Dunn, L., Lequerica, M., Reid, C.R. and Latty, T. 2020. Dual ecosystem services of syrphid flies (Diptera: Syrphidae): pollinators and biological control agents. *Pest Management Science* **76(6)**: 1973–1979. doi:10.1002/ps.5807.

- El-Hawagry, M.S.A., Abdel-Dayem, M.S. and Al Dhafer, H.M. 2020. The family Oestridae in Egypt and Saudi Arabia (Diptera, Oestroidea). *Zookeys*(**947**): 113–142. doi:10.3897/zookeys.947.52317.
- Elsayed, A.K., Skuhrov, M., Ohta, K., Yoshida, S. and Tokuda, M. 2020. Revision of the birch-associated genus *Massalongia* (Diptera, Cecidomyiidae), with description of a new species from Japan and a taxonomic key to worldwide species. *Zookeys*(**958**): 1–27. doi:10.3897/zookeys.958.54300.
- Escobar, Y., Guermache, F., Bon, M.C., Kerdellant, E., Petoux, L. and Desurmont, G.A. 2020. Biology, ecology, and impact of *Cryptonevra nigratarsis* Duda, a potential biological control agent against the giant reed *Arundo donax*. *Biological Control* **147**: 11. doi:10.1016/j.biocontrol.2020.104287.
- Evenhuis N.L. 2020. The hazards of nomenclatural archaeology? The Diptera names of Theodorus van Swinderen in his 1822 Index Rerum Naturalium quae conservantur in Museo Academico Groningano. *Zootaxa* **4859**(**3**): 383–396.
- Evenhuis, N.L. 2020. *Vladelektra*, an enigmatic new genus of killer fungus gnats (Diptera: Keroplatidae: *incertae sedis*) from Mid-Cretaceous Burmese amber. *Bishop Museum Occasional Papers* 139: 1–9.
- Fabiano, S. and Castelo, M.K. 2020. Heteromorphosis associated to host-exploitation in an atypical parasitoid, *Mallophora ruficauda* (Diptera: Asilidae). *Zoomorphology* **139**(**4**): 471–481. doi:10.1007/s00435-020-00500-6.
- Fachin, D.A., Santos, C.M.D. and Amorim, D.D. 2020. Endemism within endemism: a new species of *Austroleptis* Hardy, 1920 (Diptera: Austroleptidae) from the Brazilian Atlantic Forest highlands. *Zootaxa* **4803**(**3**): 483–494. doi:10.11646/zootaxa.4803.3.4.
- Feijen, H.R. and Feijen, C. 2020. A revision of the genus *Teleopsis* Rondani (Diptera, Diopsidae) in Sri Lanka with descriptions of two new species and a review of the other stalk-eyed flies from the island. *Zookeys* (**946**): 113–151. doi:10.3897/zookeys.946.53108.
- Ferguson, D.J., Li, X. and Yeates, D.K. 2020. Silent, underground warfare of flies: an endoparasitic bee fly (Diptera: Bombyliidae) larva parasitising a predatory assassin fly (Diptera: Asilidae) larva. *Austral Entomology* **59**(**3**): 582–592.
- Ferro, G.B. and Marshall, S.A. 2020. A redefinition of *Paragrallomyia* Hendel (Diptera: Micropezidae, Taeniapterinae) and a revision of the *P. albibasis* complex. *Zootaxa* **4822**(**1**): 39–70. doi:10.11646/zootaxa.4822.1.2.
- Fitzgerald, S.J. 2020. Revision of the Nearctic species of *Ditomyia* Winnertz and a new species from the Neotropical Region (Diptera: Ditomyiidae). *Zootaxa* **4859**(**2**): 239–262. doi:10.11646/zootaxa.4859.2.4.
- Fitzpatrick, J.L., Bridge, C.D. and Snook, R.R. 2020. Repeated evidence that the accelerated evolution of sperm is associated with their fertilization function. *Proceedings of the Royal Society Biological Sciences Series B* **287**(**1932**): 20201286.
- Freidberg, A., Zonstein, I. and Friedman, A.-L.-L. 2020. *Tanzanimyia*, a new Afrotropical genus of Schistopterini with four new species (Diptera: Tephritidae: Tephritinae). *Israel Journal of Entomology* **50**(**1**): 19–39.
- Gagné,R.J. and Whaley O.Q. 2020. The larva of *Enallodiplosis discordis* (Diptera: Cecidomyiidae: Cecidomyiinae), a pest of *Prosopis* spp. (Fabaceae) in Peru and Chile. *Proceedings of the Entomological Society of Washington* **122**(**1**): 243–247. doi:10.4289/0013-8797.122.1.243
- Gaimari, S.D. 2020. Two new genera of Nearctic Chamaemyiidae (Diptera: Lauxanioidea) associated with *Cinara* aphids (Hemiptera: Aphididae) on *Pinus*. *Zootaxa* **4852**(**1**): 61–82.
- Gaimari, S.D. and Silva, V.C. 2020. A conspectus of Neotropical Lauxaniidae. *Zootaxa* **4862**(**1**): 1–217. doi: 10.11646/zootaxa.4862.1.1

- Galinskaya, T.V., Astakhov, D.M., Propistsova, E.A. and Gorin, V.A. 2020. Phylogenetic reconstruction of the subfamilies Asilinae and Stichopogoninae (Diptera, Asilidae) based on the mitochondrial genes 16S and 12S rDNA and nuclear 18S rDNA. *Russian Journal of Genetics* **56(8)**: 952–971. doi:10.1134/s1022795420080049.
- Garcia, C.D., Scareli-Santos, C., Oliveira, F.G.D., Da Silva, M.D. and Urso-Guimaraes, M.V. 2020. A new genus and two new species of Cecidomyiini (Diptera; Cecidomyiidae) from Brazil. *Annales Zoologici* **70(2)**: 263–271. doi:10.3161/00034541anz2020.70.2.006.
- Gisoni, S., Rognes, K., Badano, D., Pape, T. and Cerretti, P. 2020. The world Polleniidae (Diptera, Oestroidea): key to genera and checklist of species. *Zookeys* (**971**): 105–155. doi:10.3897/zookeys.971.51283.
- Gojkovic, N., Francuski, L., Ludoski, J. and Milankov, V. 2020. DNA barcode assessment and population structure of aphidophagous hoverfly *Sphaerophoria scripta*: Implications for conservation biological control. *Ecology and Evolution* **10(17)**: 9428–9443. doi:10.1002/ece3.6631.
- Gong, H. and Prieto-Godino, L. 2020. Shining a light on the origin of fly species. *eLife* **9**: e60600.
- Gonzalez, C.R. and Elgueta, M. 2020. A catalog of Pelecorhynchidae (Diptera: Tabanomorpha) from Chile. *Zootaxa* **4809(1)**: 156–164. doi:10.11646/zootaxa.4809.1.9.
- Grace, C.A. and Carr, M. 2020. The evolutionary history of marine elements in stalk-eyed flies reveals the horizontal transfer of transposons from insects into the genome of the cnidarian *Hydra vulgaris*. *Plos One* **15(7)**: 24. doi:10.1371/journal.pone.0235984.
- Grichanov I.Y. 2020. A new species of *Sybistroma* Meigen (Diptera: Dolichopodidae) from China. *Far Eastern Entomologist* **418**: 1–8.
- Grichanov I.Ya. 2020. Afrotropical Dolichopodidae (Diptera) catalogue: Changes and corrections. *Amurian Zoological Journal*, vol. 12, no. 4, pp. 406–411. doi: 10.33910/2686-9519-2020-12-4-406-411.
- Grichanov I.Ya. 2020. New species of *Hercostomus* Loew, 1857 from Afrotropics (Diptera: Dolichopodidae) and key to Afrotropical fauna. *European Journal of Taxonomy* **722**: 1–21.
- Grichanov I.Ya. 2020. Two new species of *Mascaromyia* Bickel (Diptera: Dolichopodidae) from Mauritius Island. *Caucasian Entomological Bulletin* **16(2)**: 201–205. doi: 10.23885/181433262020162-201205
- Grichanov I.Ya. and Khruleva O.A. 2020. New records of long-legged flies (Diptera, Dolichopodidae) from Wrangel Island Nature Reserve (Chukotka AD, Russia). *Acta Biologica Sibirica* **6**: 551–562.
- Grichanov, I.Ya. 2020. New species of *Condylostylus* Bigot (Diptera: Dolichopodidae) from Comoros, Madagascar, Tanzania and South Africa, with key to Afrotropical species. *Zootaxa* **4830(1)**: 62–74. doi:10.11646/zootaxa.4830.1.2.
- Grimaldi, D.A. and Jones, L.E. 2020. A revision of the *Drosophila spinipes* species group (Diptera: Drosophilidae). *Zootaxa* **4809(1)**: 1–28. doi:10.11646/zootaxa.4809.1.1.
- Hadrava, J., Nidergas, V., Dankova, K., Pecharova, M., Nel, A. and Prokop, J. 2020. *Blera miocenica*: a new species of Early Miocene hoverfly (Diptera: Syrphidae) from the Czech Republic and its palaeoenvironmental significance. *Insect Systematics & Evolution* **51(5)**: 811–819.
- Haines, L.R., Vale, G.A., Barreaux, A.M.G., Ellstrand, N.C., Hargrove, J.W. and English, S. 2020. Big baby, little mother: Tsetse flies are exceptions to the juvenile small size principle. *Bioessays* **42(11)**: 6. doi:10.1002/bies.202000049.
- Han, S.-k., Bian, S.-y., Wang, S.-l., Chen, J.-p., Liu, Y., Wang, P.-z., Deng, Y., Qian, W.-p. and Yu, Y.-x. 2020. A new species and a new record of midges in Sichuan province, China (Diptera: Ceratopogonidae). *Zhongguo Meijieshengwuxue Ji Kongzhi Zazhi* **31(4)**: 462–464.

- Harterreiten-Souza, E.S., Pujol-Luz, J.R., Capellari, R.S., Bickel, D. and Sujii, E.R. 2020. Diversity and spatial distribution of predacious Dolichopodidae (Insecta: Diptera) on organic vegetable fields and adjacent habitats in Brazil. *Florida Entomologist* **103(2)**: 197–205.
- Hasbenli, A., Ciftci, D. and Caglar, U. 2020. *Tanap*, a new robber fly genus from Turkey (Diptera: Asilidae: Dioctriinae). *Zootaxa* **4822(1)**: 113–120. doi:10.11646/zootaxa.4822.1.6.
- Hazra, M., Hazra, T., Spicer, R.A., Sarkar, S.K., Spicer, T.E.V., Bera, S. and Khan, M.A. 2020. In situ occurrence of a gall midge (Insecta, Diptera, Cecidomyiidae) on fossilized angiosperm leaf cuticle fragments from the Pliocene sediments of eastern India. *Journal of Asia-Pacific Entomology* **23(3)**: 762–771.
- Herrera, C.M. 2020. Flower traits, habitat, and phylogeny as predictors of pollinator service: a plant community perspective. *Ecological Monographs* **90(2)**: 27. doi:10.1002/ecm.1402.
- Hiller, T., Braendel, S.D., Honner, B., Page, R.A. and Tschapka, M. 2020. Parasitization of bats by bat flies (Streblidae) in fragmented habitats. *Biotropica* **52(3)**: 488–501.
- Horn, C.J., Mierzejewski, M.K., Elahi, M.E. and Luong, L.T. 2020. Extending the ecology of fear: Parasite-mediated sexual selection drives host response to parasites. *Physiology & Behavior* **224**: 113041.
- Hribar, L.J. 2020. Dataset for mosquitoes (Diptera: Culicidae) from Vaca Key, Monroe County, Florida USA. *Biodiversity Data Journal* **8**: 6. doi:10.3897/BDJ.8.e55059.
- Jankovic, M., Milicic, M., Acanski, J. and Vujic, A. 2020. Protected areas and prime hoverfly areas: Safe haven for hoverflies or not? *Entomological Science* **23(2)**: 173–182.
- January, B., Rwegasira, G.M. and Tefera, T. 2020. Rice stem borer species in Tanzania: a review. *Journal of Basic and Applied Zoology* **81**: 36.
- Janzen, D.H., Hallwachs, W., Pereira, G., Blanco, R., Masis, A., Chavarria, M.M., Chavarria, F., Guadamuz, A., Araya, M., Smith, M.A. and others. 2020. Using DNA-barcoded Malaise trap samples to measure impact of a geothermal energy project on the biodiversity of a Costa Rican old-growth rain forest. *Genome* **63(9)**: 407–436. doi:10.1139/gen-2020-0002.
- Jaschhof, M. and Jaschhof, C. 2020. Reevaluation of species richness in *Winnertzia* (Diptera, Cecidomyiidae, Winnertziinae), with descriptions of 37 new species from Sweden, Peru and Australia. *Zootaxa* **4829(1)**: 1–72. doi:10.11646/zootaxa.4829.1.1.
- Jaschhof, M. and Jaschhof, C. 2020. *Wheeleriola perplexa* gen. et sp. nov., the first member of Catotrichinae (Diptera: Cecidomyiidae) found in New Zealand. *Zootaxa* **4852(5)**: 565–570. doi:10.11646/zootaxa.4852.5.4.
- Jensen, A.R., Odgaard, F., Cerretti, P. and Pape, T. 2020. *Stylogaster* eggs on blow flies attracted to millipede defence secretions in Tanzania, with a stab at summarising their biology (Diptera: Conopidae & Calliphoridae). *Biodiversity Data Journal* **8**: 25. doi:10.3897/BDJ.8.e54808.
- Jiao, R.J., Bai, L.H. and Gao, J.J. 2020. Descriptions of two new species of the genus *Colocasiomyia* (Diptera, Drosophilidae) breeding on Rhabdiphora host plants in Yunnan, China. *Zookeys* **(968)**: 127–141. doi:10.3897/zookeys.968.56677.
- Johnston, N.P., Wallman, J.F., Pape, T. and Whitmore, D. 2020. *Macronychia* (Diptera: Sarcophagidae) goes cosmopolitan: description and molecular delineation of the first Australasian species. *Austral Entomology* **59(2)**: 292–301. doi:10.1111/aen.12447.
- Jonsell, M., Widenfalk, L.A. and Hellqvist, S. 2020. Substrate specificity among Diptera in decaying bioenergy wood: can they be conserved by the same measures as are currently applied to beetles? *Biodiversity and Conservation* **29(8)**: 2623–2662.
- Jorgensen, A., Otani, J. and Evenden, M.L. 2020. Assessment of available tools for monitoring wheat midge (Diptera: Cecidomyiidae). *Environmental Entomology* **49(3)**: 627–637.
- Kamel, M. 2020. Impact of hiking trails on the diversity of flower-visiting insects in Wadi Telah, St. Katherine protectorate, Egypt. *Journal of Basic and Applied Zoology* **81(1)**: 52.

- Kanavalova, L., Kubik, S. and Bartak, M. 2020. Two new West Palaearctic species of *Atelestus* Walker (Diptera, Atelestidae) and new distributional records of the family. *Zookeys*(**955**): 147–158. doi:10.3897/zookeys.955.53698.
- Kankaanpaa, T., Vesterinen, E., Hardwick, B., Schmidt, N.M., Andersson, T., Aspholm, P.E., Barrio, I.C., Beckers, N., Bety, J., Birkemoe, T. and others. 2020. Parasitoids indicate major climate-induced shifts in arctic communities. *Global Change Biology* **26(11)**: 6276–6295. doi:10.1111/gcb.15297.
- Karlsson, D., Forshage, M., Holston, K. and Ronquist, F. 2020. The data of the Swedish Malaise Trap Project, a countrywide inventory of Sweden's insect fauna. *Biodiversity Data Journal* **8**: 28. doi:10.3897/BDJ.8.e56286.
- Kaushik, P.K., Renz, M. and Olsson, S.B. 2020. Characterizing long-range search behavior in Diptera using complex 3D virtual environments. *Proceedings of the National Academy of Sciences of the United States of America* **117(22)**: 12201–12207. doi:10.1073/pnas.1912124117/-DCSupplemental.
- Kazerani, F., Mortelmans, J., Farashiani, M.E. and Thorn, S. 2020. A new species of *Pherbellia* (Diptera: Sciomyzidae) from Iran. *Zootaxa* **4772(2)**: 361–370. doi:10.11646/zootaxa.4772.2.7.
- Khan, S.U., Ogden, N.H., Fazil, A.A., Gachon, P.H., Dueymes, G.U., Greer, A.L. and Ng, V. 2020. Current and projected distributions of *Aedes aegypti* and *Ae. albopictus* in Canada and the US. *Environmental Health Perspectives* **128(5)**: 13. doi:10.1289/ehp5899.
- Khanzadeh, F., Khaghaninia, S., Maleki-Ravasan, N., Oshaghi, M.A. and Adler, P.H. 2020. Black flies (Diptera: Simuliidae) of the Aras River Basin: Species composition and floral visitation. *Acta Tropica* **209**: 8. doi:10.1016/j.actatropica.2020.105536.
- Kitano, D. and Takakura, K.I. 2020. Simple and on-site DNA purification for LAMP reaction applicable to non-adult tephritid fruit fly (Diptera: Tephritidae). *Journal of Applied Entomology* **144(9)**: 824–829. doi:10.1111/jen.12820.
- Kjaerandsen, J., Polevoi, A. and Salmela, J. 2020. *Coelosynapha*, a new genus of the subfamily Gnoristinae (Diptera: Mycetophilidae) with a circumpolar, Holarctic distribution. *Biodiversity Data Journal* **8**: 28. doi:10.3897/BDJ.8.e54834.
- Kolesik, P. and Gagne, R.J. 2020. A review of the gall midges (Diptera: Cecidomyiidae) of Indonesia: taxonomy, biology and adult key to genera. *Zootaxa* **4847(1)**: 1–82. doi:10.11646/zootaxa.4847.1.1.
- Kopec, K., Soszynska-Maj, A., Lukashevich, E. and Krzeminski, W. 2020. Revision of the Mesozoic genus *Mesotipula* Handlirsch (Limoniidae, Diptera) from Asia extending its evolutionary history up to the Cretaceous. *Cretaceous Research* **114**: 8. doi:10.1016/j.cretres.2020.104504.
- Koser, J.R., Barrios-Leal, D.Y., Menezes, R.S.T. and Manfrin, M.H. 2020. Independent evolutionary responses to quaternary landscape and climatic changes of two codistributed cCactophilic *Drosophila* species (*Drosophila repleta* group) in open areas of South America. *Annals of the Entomological Society of America* **113(5)**: 389–397. doi:10.1093/aesa/saaa011.
- Kotrba, M. 2020. The DNA barcoding project on German Diptera: An appreciative and critical analysis with four suggestions for improving the development and reliability of DNA-based identification. *European Journal of Entomology* **117**: 315–327. doi: 10.14411/eje.2020.037.
- Krasheninnikov, A.B., Makarchenko, E.A., Semenchenko, A.A., Gavriilo, M.V. and Vshivkova, K.A. 2020. Morphological description and DNA barcoding of some Diamesinae (Diptera, Chironomidae) from the Severnaya Zemlya Archipelago and the Vaigach Island (Russian Arctic). *Zootaxa* **4802(3)**: 587–600. doi:10.11646/zootaxa.4802.3.13.
- Krishna, S., Cho, M., Wehmann, H.-N., Engels, T. and Lehmann, F.-O. 2020. Wing design in flies: Properties and aerodynamic function. *Insects* **11(8)**: 466.

- Krolow, T.K., Henriques, A.L., Gonzalez, C.R. and Nihei, S.S. 2020. Comments on the classification of neotropical Scionini (Tabanidae) with a description of a new genus. *Neotropical Entomology* **49(3)**: 412–419. doi:10.1007/s13744-020-00767-w.
- Kunprom, C. and Pramual, P. 2020. Cryptic diversity in fruit fly, *Zeugodacus isolatus* (Hardy) (Diptera: Tephritidae). *International Journal of Tropical Insect Science* **40(4)**: 983–988. doi:10.1007/s42690-020-00156-1.
- Kurina, O. 2020. Three new species and new records of *Clastobasis* Skuse (Diptera: Mycetophilidae) from Japan and the Kuril Islands. *Zootaxa* **4810(3)**: 589–600. doi:10.11646/zootaxa.4810.3.13.
- Kutuk, M. and Yaran, M. 2020. A new species and a new record of *Tephritis* Latreille, 1804 (Diptera: Tephritidae) from Turkey. *Turkiye Entomoloji Dergisi* **44(2)**: 215–222.
- Legett, H.D., Hemingway, C.T. and Bernal, X.E. 2020. Prey exploits the auditory illusions of eavesdropping predators. *American Naturalist* **195(5)**: 927–933.
- Lessard, B.D., Yeates, D.K. and Woodley, N.E. 2020. Generic revision of the Chiromyzinae soldier flies of Australia (Diptera: Stratiomyidae), including the first record of *Boreoides* Hardy, 1920, from New Zealand. *Austral Entomology* **59(2)**: 302–322.
- Lessard, B.D., Yeates, D.K. and Woodley, N.E. 2020. *Opaluma* Lessard & Woodley, gen. nov: a new genus of iridescent soldier flies (Diptera: Stratiomyidae) from Australia, including seven new species. *Austral Entomology* **59(3)**: 467–486. doi:10.1111/aen.12485.
- Lessard, B.D., Yeates, D.K. and Woodley, N.E. 2020. Review of Australian Sarginae soldier fly genera (Diptera: Stratiomyidae), with first records of *Cephalochrysa*, *Formosargus* and *Microchrysa*. *Records of the Australian Museum* **72(2)**: 23–43. doi:10.36542201-4349.72.2020.1683.
- Lessard, B.D., Yeates, D.K. and Woodley, N.E. 2020. Review of the Stratiomyinae soldier flies of Australia (Diptera: Stratiomyidae), with a new genus and first records of *Prosopochrysa* de Meijere, 1907. *Insect Systematics & Evolution* **51(4)**: 584–609. doi:10.1163/1876312x-00002307.
- Levesque-Beaudin, V., Sinclair, B.J., Marshall, S.A. and Lauff, R.F. 2020. Diptera communities of raptor (Aves) nests in Nova Scotia, Canada. *Canadian Entomologist* **152(3)**: 342–354. doi:10.4039/tce.2020.26.
- Li, H., Hu, K.K. and Li, B.G. 2020. A new species of the flower fly genus *Criorhina* Meigen (Diptera: Syrphidae) from mainland China. *Zootaxa* **4803(1)**: 169–176. doi:10.11646/zootaxa.4803.1.9.
- Li, W., Qi, L. and Yang, D. 2020. Four species of the genus *Lauxania* Latreille 1804 (Diptera, Lauxaniidae) from China. *Oriental Insects* **54(3)**: 417–432.
- Li, W.L., Chen, X.L. and Yang, D. 2020. Five new species of the genus *Noeetomima* Enderlein (Diptera: Lauxaniidae) from China, with a key to world species. *Zootaxa* **4768(4)**: 499–516. doi:10.11646/zootaxa.4768.4.3.
- Li, W.L., Chen, X.L. and Yang, D. 2020. Four new species of the subgenus *Minettiella* from China (Diptera, Lauxaniidae, Minettia). *Zookeys*(**932**): 93–111. doi:10.3897/zookeys.932.50763.
- Li, W.L., Qi, L. and Yang, D. 2020. Four new species of the subfamily Homoneurinae (Diptera, Lauxaniidae) from southwestern China. *Zookeys*(**953**): 119–136. doi:10.3897/zookeys.956.53976.
- Li, W.L., Qi, L. and Yang, D. 2020. Four new species of the subgenus *Frendelia* Collin, 1948 (Diptera: Lauxaniidae: *Minettia*) from China. *Annales Zoologici* **70(2)**: 273–284. doi:10.3161/00034541anz2020.70.2.007.
- Li, X.K. and Yeates, D.K. 2020. Revision of the Australian bee fly genus *Meomyia* Evenhuis, 1983, with description of three new species (Bombyliidae, Bombyliinae, Bombyliini). *Zootaxa* **4810(2)**: 201–243. doi:10.11646/zootaxa.4810.2.1.

- Liao, J., Xi, X., Bearup, D. and Sun, S. 2020. Metacommunity robustness of plant-fly-wasp tripartite networks with specialization to habitat loss. *Ecology (Washington D C)* **101(8)**: e03071.
- Limeira-de-Oliveira, F., Marques, D.W.A., Gaimari, S.D. and Rafael, J.A. 2020. A new genus and species of odiniids (Diptera: Odiniidae) from the canopy of the Brazilian Amazon rainforest. *Zootaxa* **4801(1)**: 164–170. doi:10.11646/zootaxa.4801.1.8.
- Lin, X.L., Yu, H.J., Wang, Q., Bu, W.J. and Wang, X.H. 2020. DNA barcodes and morphology confirm a new species of *Rheocricotopus (Psilocricotopus) orientalis* group (Diptera: Chironomidae). *Zootaxa* **4768(2)**: 282–290. doi:10.11646/zootaxa.4768.2.9.
- Lin, Y. and Chen, H.W. 2020. The genus *Scaptodrosophila* Duda (Diptera, Drosophilidae), part III: the *riverata* species group from China, with morphological and molecular evidence for five new species. *Zookeys*(**937**): 139–162. doi:10.3897/zookeys.937.49794.
- Liu, G.C. 2020. A new genus of the *Hypocera* group (Diptera, Phoridae), with descriptions of two new species from China. *Zookeys*(**932**): 113–127. doi:10.3897/zookeys.932.38970.
- Lo Giudice, G. and Woznica, A.J. 2020. Revision of the genus *Tephrochlaena*, with a key to genera of Palaearctic Heteromyzinae (Diptera: Heleomyzidae). *Zootaxa* **4820(1)**: 165–176. doi:10.11646/zootaxa.4820.1.8.
- Lopez-Ortega, M., Diaz-Fleischer, F., Pintero, J.C., Valdez-Lazalde, J.R., Hernandez-Ortiz, M. and Hernandez-Ortiz, V. 2020. The Mayan tropical rainforest: An uncharted reservoir of tritrophic host-fruit fly-parasitoid interactions. *Insects* **11(8)**: 15. doi:10.3390/insects11080495.
- Lourenco, E.C., Gomes, L.A.C., Viana, A.D. and Famadas, K.M. 2020. Co-occurrence of Ectoparasites (Insecta and Arachnida) on Bats (Chiroptera) in an Atlantic Forest Remnant, Southeastern Brazil. *Acta Parasitologica* **65(3)**: 750–759. doi:10.2478/s11686-020-00224-z.
- Lowenberg-Neto, P. and de Carvalho, C.J.B. 2020. Neotropical endemism and dispersal events between tropical and extra-tropical regions underlay the reticulate assemblages of muscid flies. *Journal of Biogeography* **47(7)**: 1574–1584. doi:10.1111/jbi.13835.
- Lu, X., Duan, C., Ning, Y., Jiang, X.H. and Hou, X.H. 2020. Morphology of the immature stages of *Dasyhelea silvatica* Wang, Zhang & Yu with redescriptions of adults (Diptera, Ceratopogonidae). *Zookeys* **961**: 119–127.
- Lunghi, E., Ficetola, G.F., Zhao, Y.H. and Manenti, R. 2020. Are the neglected Tipuloidea crane flies (Diptera) an important component for subterranean environments? *Diversity-Basel* **12(9)**: 11. doi:10.3390/d12090333.
- Makarchenko, E.A., Semenchenko, A.A. and Palatov, D.M. 2020. Taxonomy of some *Boreoheptagyini* Brundin (Diptera: Chironomidae: Diamesinae) from the mountains of Central Asia and the Middle East, with description and DNA barcoding of new taxa. *Zootaxa* **4790(1)**: 91–107. doi:10.11646/zootaxa.4790.1.5.
- Mantic, M., Sikora, T., Burdikova, N., Blagoderov, V., Kjaerandsen, J., Kurina, O. and Sevcik, J. 2020. Hidden in plain sight: Comprehensive molecular phylogeny of Keroplatidae and Lygistorrhinidae (Diptera) reveals parallel evolution and leads to a revised family classification. *Insects* **11(6)**: 16. doi:10.3390/insects11060348.
- Marcondes, C.B., Canale, A. and Benelli, G. 2020. Lysenko and the Screwworm Fly – When Politics Interferes with Science and Public Health. *International Journal of Environmental Research and Public Health* **17(18)**: 6. doi:10.3390/ijerph17186687.
- Maritano, U. 2020. Hoverfly (Diptera: Syrphidae) assemblage of an oak-hornbeam in the Merlino Wood Natural Reserve and implications for its conservation. *Biodiversity Data Journal* **8**: e54243.
- Massey, J.H., Rice, G.R., Firdaus, A.S., Chen, C.-Y., Yeh, S.-D., Stern, D.L. and Wittkopp, P.J. 2020. Co-evolving wing spots and mating displays are genetically separable traits in *Drosophila*. *Evolution* **74(6)**: 1098–1111.

- Mathieu, B., Garros, C., Balenghien, T., Candolfi, E., Delecolle, J.C. and Cetre-Sossah, C. 2020. A phylogenetic analysis of the biting midges belonging to *Culicoides* Latreille (Diptera: Ceratopogonidae) subgenus *Avaritia* using molecular data. *Parasites & Vectors* **13(1)**: 12. doi:10.1186/s13071-020-04111-4.
- Mayoke, A., Muya, S.M., Bateta, R., Mireji, P.O., Okoth, S.O., Onyoyo, S.G., Auma, J.E. and Ouma, J.O. 2020. Genetic diversity and phylogenetic relationships of tsetse flies of the *palpalis* group in Congo Brazzaville based on mitochondrial *cox1* gene sequences. *Parasites & Vectors* **13(1)**: 16. doi:10.1186/s13071-020-04120-3.
- McKnight, T.A. and Cannings, R.A. 2020. Molecular phylogeny of the genus *Lasiopogon* (Diptera: Asilidae) and a taxonomic revision of the *bivittatus* section. *Zootaxa* **4835(1)**: 1–115. doi:10.11646/zootaxa.4835.1.1.
- Men, Q.L., Hu, Z.K. and Xu, L.Y. 2020. The first representative of *Espanoderus* and one new species of *Similinannotanyderus* (Diptera: Tanyderidae) from mid-Cretaceous amber of northern Myanmar. *Cretaceous Research* **111**: 7. doi:10.1016/j.cretres.2020.104442.
- Menzel, F., Gammelmo, O., Olsen, K.M. and Kohler, A. 2020. The black fungus gnats (Diptera, Sciaridae) of Norway – Part I: species records published until December 2019, with an updated checklist. *Zookeys*(**957**): 17–104. doi:10.3897/zookeys.957.46528.
- Meyer, M.D., Goergen, G. and Jordaens, K. 2020. Taxonomic revision of the Afrotropical *Phytomia* Guerin-Meneville (Diptera: Syrphidae). *Zootaxa* **4803(2)**: 201–250.
- Meyers, P.J., Doellman, M.M., Ragland, G.J., Hood, G.R., Egan, S.P., Powell, T.H.Q., Nosil, P. and Feder, J.L. 2020. Can the genomics of ecological speciation be predicted across the divergence continuum from host races to species? A case study in *Rhagoletis*. *Royal Society Philosophical Transactions Biological Sciences* **375(1806)**: 20190534.
- Miao, X.Q., Huang, J.H., Menzel, F., Wang, Q.Y., Wei, Q.Y., Lin, X.L. and Wu, H. 2020. Five mitochondrial genomes of black fungus gnats (Sciaridae) and their phylogenetic implications. *International Journal of Biological Macromolecules* **150**: 200–205. doi:10.1016/j.ijbiomac.2020.01.271.
- Minakshi, M., Bharti, P., Bhuiyan, T., Kariev, S. and Chellappan, S. 2020. A framework based on deep neural networks to extract anatomy of mosquitoes from images. *Scientific Reports* **10(1)**: 13059.
- Miranda, G.F.G., Skevington, J.H. and Marshall, S.A. 2020. New generic concepts for orphaned lineages formerly treated as part of the genus *Ocyrtamus* Macquart, 1834 (Diptera, Syrphidae). *Zootaxa* **4822(2)**: 151–174. doi:10.11646/zootaxa.4822.2.1.
- Mohl, E.K., Stenoien, C.M. and Heimpel, G.E. 2020. The effects of host plant species on adult oviposition and larval performance of the aphid predator *Aphidoletes aphidimyza*. *Ecological Entomology* **45(3)**: 606–616.
- Mondal, D., Mukherjee, T. and Hazra, N. 2020. A new species of the genus *Larsia* Fittkau (Diptera: Chironomidae) from India, with cladistic analysis and a world key to the known males. *Zootaxa* **4859(3)**: 342–354. doi:10.11646/zootaxa.4859.3.2.
- Morgulis, E., Freidberg, A., Dor, R. and Dorchin, N. 2020. Molecular and morphological phylogeny of thistle fruit flies *Acanthiophilus* Becker 1908 and *Tephritomyia* Hendel 1927 (Diptera: Tephritidae). *Zoologischer Anzeiger* **287**: 67–76. doi:10.1016/j.jcz.2020.05.006.
- Mortelmans, J. and Hendrix, J. 2020. Review of *Euthycerina* Malloch (Diptera, Sciomyzidae), with description of a new species from Chile. *Zootaxa* **4786(3)**: 381–395. doi:10.11646/zootaxa.4786.3.4.
- Motamedinia, B., Skevington, J.H. and Kelso, S. 2020. Revision of *Clistoabdominalis* Skevington, 2001 (Diptera: Pipunculidae) in the Middle East with description of five new species. *Journal of Asia-Pacific Entomology* **23(2)**: 559–577. doi:10.1016/j.aspen.2020.04.002.

- Motamedinia, B., Skevington, J.H. and Kelso, S. 2020. Revision of *Eudorylas* Aczel, 1940 (Diptera, Pipunculidae) in the Middle East, with the description of four new species. *Biodiversity Data Journal* **8**: 46. doi:10.3897/BDJ.8.e53609.
- Moubayed-Breil, J. and Langton, P. 2020. *Polypedilum (Uresipedilum) tissoti* sp. n., a new species occurring in alkaline peat bogs and wet sedge meadows in north eastern France (Diptera, Chironomidae, Chironominae). *Ephemera* **21(1)**: 1–10.
- Moubayed-Breil, J. and Michailova, P. 2020. Description of the adult and larva of *Chunio balticus* Heimbach, 1978 (Diptera, Chironomidae) from the seashore of Bergen (Norway). *Zootaxa* **4822(2)**: 209–220. doi:10.11646/zootaxa.4822.2.4.
- Mukherjee, T., Mukherjee, B. and Hazra, N. 2020. Revision of the Oriental species of *Polypedilum* Kieffer (Diptera: Chironomidae) with their phylogenetic relationship. *Zootaxa* **4820(1)**: 31–69. doi:10.11646/zootaxa.4820.1.3.
- Munari, L., Kirk-Spriggs, A.H. and McGregor, G.K. 2020. The beach flies of the Mascarene Islands (Diptera: Canacidae: Tethininae). *Zootaxa* **4853(2)**: 183–198. doi:10.11646/zootaxa.4853.2.2.
- Munawar, K., Saleh, A., Afzal, M., Qasim, M., Khan, K.A., Zafar, M.I. and Khater, E.I. 2020. Molecular characterization and phylogenetic analysis of anopheline (Anophelinae: Culicidae) mosquitoes of the Oriental and Afrotropical Zoogeographic zones in Saudi Arabia. *Acta Tropica* **207**: 105494.
- Murray, R.L., Herridge, E.J., Ness, R.W., Wiberg, R.A.W. and Bussiere, L.F. 2020. Competition for access to mates predicts female-specific ornamentation and male investment in relative testis size. *Evolution* **74(8)**: 1741–1754. doi:10.1111/evo.13986.
- Negrobov, O.P. and Naglis, S. 2020. Two new species of *Thrypticus* Gerstaecker from Turkey (Diptera, Dolichopodidae), with checklist and key to Palearctic species. *Zootaxa* **4858(1)**: 111–125. doi:10.11646/zootaxa.4858.1.8.
- Negrobov, O.P., Maslova, O.O. and Selivanova, O.V. 2020. A new species of the genus *Rhaphium* (Diptera: Dolichopodidae) from Sakhalin Island. *Far Eastern Entomologist* **409**: 21–25.
- Negrobov O.P., Obona J., Manko P. and Maslova O.O. 2020. New faunistics notes on the fauna and variability of *Rhaphium albifrons* Zetterstedt, 1843 (Dolichopodidae: Diptera). In: Prostranstvenno-vremennye aspekty funktsionirovaniya biosistem Sbornik materialov XVI Mezhdunarodnoi nauchnoi ekologicheskoi konferentsii, posvyashchennoi pamyati Aleksandra Vladimirovicha Prisnogo, Belgorod, 24–26 noyabrya 2020, p. 89–90.
- Nelson, D., Benstead, J.P., Huryn, A.D., Cross, W.F., Hood, J.M., Johnson, P.W., Junker, J.R., Gislason, G.M. and Olafsson, J.S. 2020. Contrasting responses of black fly species (Diptera: Simuliidae) to experimental whole-stream warming. *Freshwater Biology* **65(10)**: 1793–1805. doi:10.1111/fwb.13583.
- Ngo-Muller, V., Jouault, C., Garrouste, R. and Nel, A. 2020. Potential new evidences of bee fly parasitoidism on ground-dwelling insects in mid-Cretaceous Burmese amber (Diptera: Bombyliidae). *Cretaceous Research* **114**: 7. doi:10.1016/j.cretres.2020.104524.
- Ngo-Muller, V. and Nel, A. 2020. A new *Symphoromyia* in the Middle Eocene Baltic amber (Diptera: Rhagionidae). *Zootaxa* **4820(2)**: 373–378.
- Nhiuane, O., Cuaranhua, C. and Bandeira, R.R. 2020. Altitudinal distribution and diversity of insects in miombo woodlands in Inhamacari, Manica Province, central Mozambique. *African Journal of Ecology* **58(3)**: 422–431.
- Ni, Z., Zhang, E., Herzsuh, U., Mischke, S., Chang, J., Sun, W. and Ning, D. 2020. Taxonomic and functional diversity differentiation of chironomid communities in northern Mongolian Plateau under complex environmental impacts. *Hydrobiologia* **847(9)**: 2155–2167.

- Ning, H., Freidberg, A., Zhu, C. and Chen, X. 2020. A new species of *Celidodacus* Hendel, with notes on *C. coloniarum* (Speiser) and *C. obnubilus* (Karsch). *Zoological Systematics* **45(3 A)**: 240–246.
- Noknoy, R., Sunantaraporn, S., Phumee, A., Siriyasatien, P. and Sanguansub, S. 2020. Parasitism of soldiers of the termite, *Macrotermes gilvus* (Hagen), by the scuttle fly, *Megaselia scalaris* (Loew) (Diptera: Phoridae). *Insects* **11(5)**: 10. doi:10.3390/insects11050318.
- Okuyama, T. 2020. Concurrently burrowing host fly larvae reciprocally enhance pupation depth to minimise parasitism risk. *Ecological Entomology* **45(3)**: 493–497.
- Orlandin, E., Santos, E.B., Schneeberger, A.H., Souza, V.O. and Favretto, M.A. 2020. Habitat use by Neotropical mosquitoes (Diptera: Culicidae): vegetation structure and edge effects. *Austral Entomology* **59(3)**: 541–548.
- Paajanen, M.P.T. and Cronk, Q. 2020. Moth versus fly: a preliminary study of the pollination mode of two species of endemic Asteraceae from St Helena (*Commidendrum robustum* and *C. rugosum*) and its conservation implications. *Biodiversity Data Journal* **8**: E52057.
- Paquette, C., Garant, D., Savage, J., Reale, D. and Bergeron, P. 2020. Individual and environmental determinants of *Cuterebra* bot fly parasitism in the eastern chipmunk (*Tamias striatus*). *Oecologia* (Berlin) **193(2)**: 359–370.
- Patitucci, L.D., Migale, S. and Mulieri, P.R. 2020. The killer flies *Coenosia* Meigen (Diptera: Muscidae) of southern South America: Resolving the taxonomic puzzle of *Coenosia inaequalis* Malloch, 1934. *Zoologischer Anzeiger* **288**: 66–73. doi:10.1016/j.jcz.2020.06.006.
- Peach, D.A.H. and Matthews, B.J. 2020. Modeling the putative ancient distribution of *Aedes togoi* (Diptera: Culicidae). *Journal of Insect Science* **20(3)**: 10. doi:10.1093/jisesa/ieaa035.
- Pekas, A., Craecker, I.D., Boonen, S., Wackers, F.L. and Moerkens, R. 2020. One stone; two birds: concurrent pest control and pollination services provided by aphidophagous hoverflies. *Biological Control* **149**: 104328.
- Pekbey, G. 2020. A new species of *Sarcophaga* (*Pandelleisca*) (Diptera, Sarcophagidae) from Turkey. *Zookeys*(**937**): 129–138. doi:10.3897/zookeys.937.50759.
- Penado, A., Smit, J., Aguiar, A.F., Cravo, D., Rego, C., Santos, R. and Boeiro, M. 2020. The fruit flies (Diptera, Tephritidae) of the Madeira archipelago with the description of a new *Oedosphenella* Frey. *Zootaxa* **4810(3)**: 559–575. doi:10.11646/zootaxa.4810.3.11.
- Perez, S., Fogaca, J.M., Wolff, M. and De Carvalho, C.J.B. 2020. Morphological phylogeny of *Reinwardtia* Brauer & Bergenstamm (Diptera, Muscidae), with the description of a new species from the Neotropical region. *Systematics and Biodiversity* **18(5)**: 485–495. doi:10.1080/14772000.2020.1776782.
- Pivar, R.J., Sinclair, B.J. and Moulton, J.K. 2020. Revision of the South American species of *Austrothaumalea* Tonnoir (Diptera: Thaumaleidae). *Zootaxa* **4853(4)**: 509–526. doi:10.11646/zootaxa.4853.4.2.
- Plant, A.R., Bickel, D.J., Chatelain, P., Daugeron, C. and Srisuka, W. 2020. Endemism, similarity and difference in montane evergreen forest biodiversity hotspots: comparing communities of Empidoidea (Insecta: Diptera) in the summit zones of Doi Inthanon and Doi Phahompok, Thailand. *Tropical Natural History*, **20(1)**, 16–27.
- Podenas, S., Park, S.J., Kim, A.Y. and Aukstikalniene, R. 2020. New species of *Lipsothrix* (Diptera: Limoniidae) from South Korea. *Zootaxa* **4802(3)**: 534–540. doi:10.11646/zootaxa.4802.3.8.
- Podenas, S., Podeniene, V., Kim, T.W., Kim, A.Y., Park, S.J. and Aukstikalniene, R. 2020. A new species of *Elephantomyia* crane fly (Diptera, Limoniidae) from Jeju Island, South Korea. *Zookeys*(**966**): 41–55. doi:10.3897/zookeys.966.48590.
- Poinar, G.O. and Currie, D.C. 2020. Mermithid nematode (Nematoda: Mermithidae) parasites of a fossil black fly (Diptera: Simuliidae) in Baltic amber. *Nematology* **22(6)**: 655–658. doi:10.1163/15685411-00003328.

- Powell, T.H.Q., Nguyen, A., Xia, Q.W., Feder, J.L., Ragland, G.J. and Hahn, D.A. 2020. A rapidly evolved shift in life-history timing during ecological speciation is driven by the transition between developmental phases. *Journal of Evolutionary Biology* **33(10)**: 1371–1386. doi:10.1111/jeb.13676.
- Powers, K.E., Mengak, M.T., Sheehy, R.R., Ford, W.M. and Reynolds, R.J. 2020. Bot fly parasitism of Allegheny woodrats (*Neotoma magister*) in Virginia. *American Midland Naturalist* **184(1)**: 62–72. doi:10.1637/0003-0031-184.1.62.
- Pusch, M.H.E., Stark, A. and Pollet, M. 2020. Description of a new *Eucoryphus* species from the island of Corsica, France (Diptera: Dolichopodidae, Hydrophorinae). *Zootaxa* **4816(4)**: 527–540. doi:10.11646/zootaxa.4816.4.5.
- Qian, X.Y. and Zhang, X. 2020. Two new *Geranomyia* Haliday (Diptera, Limoniidae) crane flies from Mount Jiulong in China, with an updated key to Chinese species. *Zookeys*(**953**): 105–118. doi:10.3897/zookeys.953.49557.
- Qilemoge, Zhang, L.L. and Yang, D. 2020. A key to species groups of the genus *Hercostomus* (Diptera: Dolichopodidae) from China, with description of one new species. *Transactions of the American Entomological Society* **146(2)**: 305–312. doi:10.3157/061.146.0202.
- Radenkovic, S., Likov, L., Stahls, G., Rojo, S., Perez-Banon, C., Smit, J., Petanidou, T., Van Steenis, W. and Vujic, A. 2020. Three new hoverfly species from Greece (Diptera: Syrphidae). *Zootaxa* **4830(1)**: 103–124. doi:10.11646/zootaxa.4830.1.4.
- Radenkovic, S., Vujic, A., Vidakovic, D.O., Djan, M., Milic, D., Veselic, S., Stahls, G. and Petanidou, T. 2020. Sky island diversification in the *Merodon rufus* group (Diptera, Syrphidae) – recent vicariance in south-east Europe. *Organisms Diversity & Evolution* **20(3)**: 345–368. doi:10.1007/s13127-020-00440-5.
- Rasool, B., Nabi, Z., Bodlah, M.A., Aizal, N., Samiullah, K., Rasool, A. and Rasool, R. 2020. Host food preference, screening and phylogenetic analysis of *Wolbachia* in *Myzus persicae* populations. *Asian Journal of Agriculture and Biology* **8(4)**: 447–456. doi:10.35495/ajab.2020.04.224.
- Ren, J.L. and Yang, D. 2020. Two new species of *Limonia* Meigen, 1803 from Northwest China (Diptera, Limoniidae). *Zookeys*(**971**): 31–58. doi:10.3897/zookeys.971.35875.
- Ren, L.P., Zhang, X.Y., Li, Y., Shang, Y.J., Chen, S., Wang, S.W., Qu, Y.H., Cai, J.F. and Guo, Y.D. 2020. Comparative analysis of mitochondrial genomes among the subfamily Sarcophaginae (Diptera: Sarcophagidae) and phylogenetic implications. *International Journal of Biological Macromolecules* **161**: 214–222. doi:10.1016/j.ijbiomac.2020.06.043.
- Reyes, J.A. and Lira-Noriega, A. 2020. Current and future global potential distribution of the fruit fly *Drosophila suzukii* (Diptera: Drosophilidae). *Canadian Entomologist* **152(4)**: 587–599. doi:10.4039/tce.2020.3.
- Ribeiro, P.S., Galvao, C., Talaga, S., Carinci, R., Pavan, M.G., Lourenco-de-Oliveira, R. and Motta, M.D. 2020. Redescription and placement of *Wyeomyia rorotai* Senevet, Chabelard & Abonnenc (Diptera: Culicidae) in the subgenus *Decamyia* based on morphological and molecular analyses. *Zootaxa* **4830(2)**: 291–309. doi:10.11646/zootaxa.4830.2.4.
- Riccardi, P.R. 2020. Taxonomic revision of the genus *Chaethippus* Duda, 1930 (Diptera: Chloropidae) with the description of four species. *Zootaxa* **4802(1)**: 129–140. doi:10.11646/zootaxa.4802.1.8.
- Robertson, A.R., Finch, J.T.D., Young, A.D., Spooner-Hart, R.N., Outim, S.K.M. and Cook, J.M. 2020. Species diversity in bee flies and hover flies (Diptera: Bombyliidae and Syrphidae) in the horticultural environments of the Blue Mountains, Australia. *Austral Entomology* **59(3)**: 561–571.

- Robinson, I.J., Li, X.K. and Yeates, D.K. 2020. Revision of the endemic Australian robber fly genus *Daptolestes* Hull (Diptera: Asilidae) and description of *Humorolethalis* gen. nov. Austral Entomology **59(3)**: 487–504. doi:10.1111/aen.12465.
- Rodriguez Clavijo, P.A., Maria Miret, L., Norrbom, A.L., Carolina Garay, L., Coronel, B.E.L. and Arevalo Penaranda, E. 2020. New records of *Anastrepha* (Diptera: Tephritidae) from Paraguay. Zootaxa **4809(1)**: 141–155.
- Rohacek, J. 2020. *Protanthomyza grimaldii* sp. nov., a further member of the extinct subfamily Protanthomyzinae (Diptera, Anthomyzidae) from Baltic amber. Zookeys(**973**): 1–15. doi:10.3897/zookeys.973.51435.
- Rohner, P.T. 2020. Evolution of multivariate wing allometry in schizophoran flies (Diptera: Schizophora). Journal of Evolutionary Biology **33(6)**: 831–841. doi:10.1111/jeb.13613.
- Roosjen, P.P.J., Kellenberger, B., Kooistra, L., Green, D.R. and Fahrentrapp, J. 2020. Deep learning for automated detection of *Drosophila sukuzii*: potential for UAV-based monitoring. Pest Management Science **76(9)**: 2994–3002.
- Ropars, L., Affre, L., Aubert, M., Fernandez, C., Flacher, F., Genoud, D., Guiter, F., Jaworski, C., Lair, X., Mutillod, C. and others. 2020. Pollinator specific richness and their interactions with local plant species: 10 years of sampling in Mediterranean habitats. Environmental Entomology **49(4)**: 947–955. doi:10.1093/ee/nvaa061.
- Rose, A., Ross, D.W., Havill, N.P., Motley, K. and Wallin, K.F. 2020. Coexistence of three specialist predators of the hemlock woolly adelgid in the Pacific Northwest USA. Bulletin of Entomological Research **110(3)**: 303–308.
- Ruiz-Arce, R., Todd, T.N., Deleon, R., Barr, N.B., Virgilio, M., De Meyer, M. and McPherson, B.A. 2020. Worldwide phylogeography of *Ceratitis capitata* (Diptera: Tephritidae) using mitochondrial DNA. Journal of Economic Entomology **113(3)**: 1455–1470.
- Runyon, J.B. 2020. The Dolichopodidae (Diptera) of Montserrat, West Indies. Zookeys(**966**): 57–151. doi:10.3897/zookeys.966.55192.
- Safonkin, A.F., Yatsuk, A.A. and Triseleva, T.A. 2020. Variability of the key features and revision of a group of closely related species of grassflies (Diptera, Chloropidae, *Meromyza*). Zookeys(**942**): 65–75. doi:10.3897/zookeys.942.49644.
- Sakata, Y., Kobayashi, K. and Makita, A. 2020. Insect assemblages on flowering patches of 12 bamboo species. Journal of Asia-Pacific Entomology **23(3)**: 675–679.
- Sakhvon, V.V. 2020. Review of the genus *Saropogon* Loew, 1847 (Diptera: Asilidae) from Russia, Transcaucasia and Central Asia, with description of three new species. Zootaxa **4860(4)**: 577–591. doi:10.11646/zootaxa.4860.4.7.
- Sanchez-Restrepo, A.F., Chifflet, L., Confalonieri, V.A., Tsutsui, N.D., Pesquero, M.A. and Calcaterra, L.A. 2020. A species delimitation approach to uncover cryptic species in the South American fire ant decapitating flies (Diptera: Phoridae: *Pseudacteon*). Plos One **15(7)**: 23. doi:10.1371/journal.pone.0236086.
- Santos, E.B., Favretto, M.A. and Møller, G.A. 2020. When and what time? On the seasonal and daily patterns of mosquitoes (Diptera: Culicidae) in an Atlantic Forest remnant from Southern Brazil. Austral Entomology **59(2)**: 337–344. doi:10.1111/aen.12454.
- Sato, S., Harris, K.M., Collet, D.M., Kim, W.Y. and Yukawa, J. 2020. Genetic variation in intraspecific populations of *Rabdophaga rosaria* (Diptera: Cecidomyiidae) indicating possible diversification scenarios into sibling species along with host range expansion on willows (Salicaceae: Salix). Zoological Journal of the Linnean Society **189(4)**: 1426–1437. doi:10.1093/zoolinnean/zlz179.

- Sayers, T.D.J., Steinbauer, M.J., Farnier, K. and Miller, R.E. 2020. Dung mimicry in *Typhonium* (Araceae): explaining floral trait and pollinator divergence in a widespread species complex and a rare sister species. *Botanical Journal of the Linnean Society* **193(3)**: 375–401. doi:10.1093/botlinnean/boaa021.
- Scaramozzino, P.L., Di Giovanni, F., Loni, A., Gisondi, S., Lucchi, A. and Cerretti, P. 2020. Tachinid (Diptera, Tachinidae) parasitoids of *Lobesia botrana* (Denis & Schiffermuller, 1775) (Lepidoptera, Tortricidae) and other moths. *Zookeys*(**934**): 111–140. doi:10.3897/zookeys.934.50823.
- Scarparo, G., Wolton, R., Molfini, M., Pinna, L.C. and Di Giulio, A. 2020. Comparative morphology of myrmecophilous immature stages of European *Microdon* species (Diptera: Syrphidae): updated identification key and new diagnostic characters. *Zootaxa* **4789(2)**: 348–370. doi:10.11646/zootaxa.4789.2.2.
- Scharf, I., Silberklang, A., Avidov, B. and Subach, A. 2020. Do pit-building predators prefer or avoid barriers? Wormlions' preference for walls depends on light conditions. *Scientific Reports* **10(1)**: 10928.
- Sepulveda, T. and Souza, D. 2020. Taxonomy and phylogeny of the *Eoneria*-group (Diptera, Neriidae). *Insect Systematics & Evolution* **51(4)**: 637–671. doi:10.1163/1876312x-00002305.
- Sevcik, J., Krzeminski, W. and Skibinska, K. 2020. Intriguing and beautiful: *Adamacrocera adamigen*. et sp. nov. from the Upper Cretaceous amber of Myanmar represents a new subfamily of Keroplatidae (Diptera: Bibionomorpha). *Insects* **11(9)**: 9. doi:10.3390/insects11090552.
- Shamshev, I.V. 2020. First record of the subgenus *Planempis* Frey (Diptera, Empididae: *Empis* Linnaeus) from Vietnam, with descriptions of three new species and a key to species of the Oriental region. *Far Eastern Entomologist* **409**: 1–13.
- Shamshev, I.V. and Ivkovic, M. 2020. The Empididae (Diptera) of Serbia: faunistic survey and description of a new *Empis* species. *Zootaxa* **4853(1)**: 79–98. doi:10.11646/zootaxa.4853.1.4.
- Shamshev, I.V., Sinclair, B.J. and Khruleva, O.A. 2020. The empidoid flies (Diptera: Empidoidea, exclusive of Dolichopodidae) of the Russian Arctic islands and Svalbard Archipelago. *Zootaxa* **4848(1)**: 1–75. doi:10.11646/zootaxa.4848.1.1.
- Shima, H. 2020. The genus *Panzeria* Robineau-Desvoidy (Diptera: Tachinidae) from Japan. *Zootaxa* **4816(4)**: 541–575. doi:10.11646/zootaxa.4816.4.6.
- Shin, S., Lee, H., Menzel, F. and Lee, S. 2020. Taxonomic study on the *Phytosciara* genus group (Diptera: Sciaridae) in Korea, including the description of a new species. *Journal of Asia-Pacific Entomology* **23(2)**: 358–363. doi:10.1016/j.aspen.2020.01.005.
- Sikora, T., Jaschhof, M. and Kurina, O. 2020. Additions to the Estonian fauna of mycophagous Cecidomyiidae (Diptera), with a description of *Unicornella estonensis* gen. et sp. nov. *Zootaxa* **4851(2)**: 349–363. doi:10.11646/zootaxa.4851.2.8.
- Silva, V.C. and Pollet, M. 2020. The Sepsidae of the Mitaraka expedition, French Guiana (Diptera). *Zoosystema* **42(14)**: 195–205. doi:10.5252/zoosystema2020v42a14.
- Simpson, A., Fernandez-Dominguez, E., Panagiotakopulu, E. and Clapham, A. 2020. Ancient DNA preservation, genetic diversity and biogeography: A study of houseflies from Roman Qasr Ibrim, lower Nubia, Egypt. *Journal of Archaeological Science* **120**: 8. doi:10.1016/j.jas.2020.105180.
- Singh, P., Thakur, M., Sharma, K.C., Sharma, H.K. and Nayak, R.K. 2020. Larval feeding capacity and pollination efficiency of the aphidophagous syrphids, *Eupeodes frequens* (Matsmura) and *Episyrphus balteatus* (De Geer) (Diptera: Syrphidae) on the cabbage aphid (*Brevicoryne brassicae* L.) (Homoptera: Aphididae) on mustard crop. *Egyptian Journal of Biological Pest Control* **30(1)**: 105.

- Sinno, M., Bezier, A., Vinale, F., Giron, D., Laudonia, S., Garonna, A.P. and Pennacchio, F. 2020. Symbiosis disruption in the olive fruit fly, *Bactrocera oleae* (Rossi), as a potential tool for sustainable control. *Pest Management Science* **76(9)**: 3199–3207.
- Sisterson, M.S., Dwyer, D.P. and Uchima, S.Y. 2020. Insect diversity in vineyards, almond orchards, olive orchards, alfalfa fields, and pastures in the San Joaquin Valley of California. *Journal of Insect Conservation* **24(5)**: 765–777. doi:10.1007/s10841-020-00250-2.
- Snyman, L.P., Neves, L., Lempereur, L. and Bosman, A.C. 2020. Overview of the horseflies (Diptera: Tabanidae) of South Africa: assessment of major collections for spatiotemporal analysis. *Austral Entomology* **59(3)**: 549–560. doi:10.1111/aen.12466.
- Soares, M.M.M. and Ale-Rocha, R. 2020. New records of *Stenopygium* Becker (Diptera: Dolichopodidae) from the Neotropical Region, and a key to species. *Zootaxa* **4868(1)**: 129–134. doi:10.11646/zootaxa.4868.1.7.
- Soares Matheus, M.M. and Capellari Renato, S. 2020. Review of the Neotropical genus *Pseudosympycnus* (Diptera: Dolichopodidae), with description of six new species from Brazil and Peru. *Zootaxa* **4881** (2): 231–256.
- Sosa, M.A.R., Rueda, J., Rodriguez, R.J.P., Bautista, Y.E.V., Tiburcio, J.C.D., Fimia-Duarte, R. and Alarcon-Elbal, P.M. 2020. First record of *Culex interrogator* (Diptera: Culicidae) in Hispaniola and updated checklist of mosquitoes of Jarabacoa, Dominican Republic. *Novitates Caribaea* **16**: 110–121.
- Souba-Dols, G.J., Ricarte, A., Hauser, M., Speight, M. and Marcos-Garcia, M.A. 2020. What do *Eumerus* Meigen larvae feed on? New immature stages of three species (Diptera: Syrphidae) breeding in different plants. *Organisms Diversity & Evolution* **20(2)**: 267–284. doi:10.1007/s13127-020-00437-0.
- Stahls, G., Meier, R., Sandrock, C., Hauser, M., Zoric, L.S., Laiho, E., Aracil, A., Doderovic, J., Badenhorst, R., Unadirekkul, P. and others. 2020. The puzzling mitochondrial phylogeography of the black soldier fly (*Hermetia illucens*), the commercially most important insect protein species. *Bmc Evolutionary Biology* **20(1)**: 60.
- Stankovic, J., Milosevic, D., Savic-Zdrakovic, D., Yalcin, G., Yildiz, D., Beklioglu, M. and Jovanovic, B. 2020. Exposure to a microplastic mixture is altering the life traits and is causing deformities in the non-biting midge *Chironomus riparius* Meigen (1804). *Environmental Pollution* **262**: 114248.
- Starkevich, P., Podenas, S. and Gelhaus, J.K. 2020. Taxonomic review of *Tipula* (Vestiplex Bezzi) crane flies (Diptera: Tipulidae) in Mongolia. *Zootaxa* **4837(1)**: 1–88. doi:10.11646/zootaxa.4837.1.1.
- Stary, J. 2020. Two new *Idiocera* Dale from the Mediterranean (Diptera: Limoniidae). *Zootaxa* **4803(1)**: 177–182. doi:10.11646/zootaxa.4803.1.10.
- Stein, M., Bangher, D.N., Neves, M. and Alvarez, C.N. 2020. Redescription of the female, male, larva and pupa of *Sabethes* (*Sabethoides*) *glaucodaemon* (Dyar & Shannon) (Diptera: Culicidae) and description of the female genitalia. *Zootaxa* **4789(2)**: 589–600. doi:10.11646/zootaxa.4789.2.12.
- Stuke, J.-H. 2020. New records of *Zodiomyia sumbaensis* Camras (Diptera: Conopidae). *Oriental Insects* **54(3)**: 375–378.
- Suarez, D., Garcia, J., Santos, I., Ruiz, C., Pena, G., Perez, A.J., Lugo, D., Garcia, R. and Baez, M. 2020. Annotated check-list of the family Tachinidae (Diptera: Calyptratae: Oestroidea) in the Canary Islands. *Annales De La Societe Entomologique De France* **56(2)**: 135–152. doi:10.1080/00379271.2020.1753574.
- Szadziewski, R., Sontag, E. and Bojarski, B. 2020. First record of the relict Australian genus *Meunierohoelea* in Miocene Dominican amber (Diptera: Ceratopogonidae). *Annales Zoologici* **70(2)**: 285–288. doi:10.3161/00034541anz2020.70.2.008.

- Taber, S.W. 2020. A new Nearctic species of *Duretophragma* Borkent fungus gnat (Diptera: Mycetophilidae). *Southwestern Entomologist* **45(2)**: 483–490.
- Takaoka, H., Srisuka, W., Fukuda, M. and Saeung, A. 2020. Twenty-one new species of the *Simulium* (*Gomphostilbia*) *asakoae* species group (Diptera, Simuliidae) in Thailand, with their genetic relationships. *Zookeys*(**950**): 51–152. doi:10.3897/zookeys.950.51298.
- Tang, H. and Niitsuma, H. 2020. Revision of the Chinese *Macropelopia* (Diptera: Chironomidae: Tanypodinae with description of a new species. *Zootaxa* **4834(2)**: 207–218.
- Tantely, M.L., Randrianambinintsoa, F.J., Rakotonirina, A., Woog, F., Boyer, S. and Girod, R. 2020. Discrimination of *Uranotaenia* species (Diptera: Culicidae) from Madagascar based on morphology and wing morphometric traits. *Zootaxa* **4801(1)**: 171–178. doi:10.11646/zootaxa.4801.1.9.
- Terra, W.R. and Ferreira, C. 2020. Evolutionary trends of digestion and absorption in the major insect orders. *Arthropod Structure & Development* **56**: 15. doi:10.1016/j.asd.2020.100931.
- Theischinger, G., Billingham, Z.D. and Orr, A.G. 2020. Australian species of *Dicranomyia* (*Idioglochina*) (Diptera: Tipuloidae/Limoniidae). *Australian Entomologist* **47(2)**: 53–72.
- Theron, G.L., Grenier, F.O., Anderson, B.C., Ellis, A.G., Johnson, S.D., Midgley, J.M. and Van der Niet, T. 2020. Key long-proboscid fly pollinator overlooked: morphological and molecular analyses reveal a new *Prosoeca* (Nemestrinidae) species. *Biological Journal of the Linnean Society* **131(1)**: 26–38. doi:10.1093/biolinnean/blaa075.
- Tonguç A. and Marlas M. 2020. Dolichopodidae (Diptera) Fauna of Inner West Anatolia (Turkey) with a new record. *Silva Balcanica* **21(2)**: 19–33.
- Tot, T., Radenkovic, S., Nedeljkovic, Z., Likov, L. and Vujic, A. 2020. Descriptions of two new species of the genus *Paragus* Latreille (Diptera: Syrphidae), with a key to males of all South African species. *Zootaxa* **4780(2)**: 341–355. doi:10.11646/zootaxa.4780.2.7.
- Troya, H., Norrbom, A.L. and Pineda, J.E.B. 2020. Two new species of *Anastrepha* (Diptera: Tephritidae) from Ecuador. *Zootaxa* **4820(2)**: 366–372. doi:10.11646/zootaxa.4820.2.9.
- van der Beek, J.G., Dijkstra, K.D.B., van der Hoorn, B.B., Boerlijst, S.P., Busscher, L., Kok, M.L., Braks, M.A.H., Schaffner, F., Davelaar, G.J., Henry, M. and others. 2020. Taxonomy, ecology and distribution of the mosquitoes (Diptera: Culicidae) of the Dutch Leeward Islands, with a key to the adults and fourth instar larvae. *Contributions to Zoology* **89(4)**: 373–392. doi:10.1163/18759866-bja10005.
- van Steenis, J., van Zuijen, M.P., Ricarte, A., Marcos-Garcia, M.A., Doczkals, D., Ssymank, A. and Mengual, X. 2020. First records of *Chrysotoxum volaticum* Seguy, 1961 from Europe and *Platycheirus marokkanus* Kassebeer, 1998 from Spain (Diptera: Syrphidae) together with additional records of Spanish *Chrysotoxum* Meigen, 1803. *Bonn Zoological Bulletin* **69(1)**: 141–155.
- van Steenis, J. and Wyatt, N.P. 2020. The first species of *Trichopsomyia* Williston, 1888 (Diptera: Syrphidae) described from the Oriental region, with a discussion on the character states of the pilosity of the katapisternum. *European Journal of Taxonomy* **687**: 1–12. doi:10.5852/ejt.2020.687.
- Veiga, J. and Valera, F. 2020. Aridity and avian ectoparasites: who, how many and where? *Ecosistemas* **29(2)**: 1986.
- Verves, Y. and Khrokalo, L. 2020. Review of subtribe Pterellinae Rohdendorf, 1967 (Diptera: Sarcophagidae) of Middle East with descriptions of twelve new species. *Annales De La Societe Entomologique De France* **56(3)**: 235–265. doi:10.1080/00379271.2020.1743755.
- Verves, Y., Khrokalo, L. and Naumovska, O. 2020. Review of the Middle Eastern species of *Sphecapatodes* Villeneuve, 1912 (Diptera: Sarcophagidae) with the description of a new species. *Zoology in the Middle East* **66(3)**: 253–261. doi:10.1080/09397140.2020.1781364.

- Verves, Y.G. and Khrokalo, L.A. 2020. Review of the genus *Sphenometopa* Townsend, 1908 (Diptera: Sarcophagidae) of the Middle East. *Biologia (Bratislava)* **75(10)**: 1643–1656.
- Vikhrev, N. 2020. *Diptera: An Introduction to Flies*. London: NHBS, 160 p.
- Vujic, A., Radenkovic, S., Likov, L., Andric, A., Jankovic, M., Acanski, J., Popov, G., Williams, M.D., Zoric, L.S. and Djan, M. 2020. Conflict and congruence between morphological and molecular data: revision of the *Merodon constans* group (Diptera : Syrphidae) (vol 34, pg 406, 2020). *Invertebrate Systematics* **34(4)**: 449–448. doi:10.1071/is19047.
- Wagner, R. and Rada, T. 2020. Moth flies (Diptera, Psychodidae) living in the dark of caves in the Dinaric Karst. *Zootaxa* **4845(2)**: 275–282.
- Wang, C., Xue, W.Q., Zhang, D. and Pape, T. 2020. A new species of *Sarcophaga* Meigen subgenus *Hoa* Rohdendorf (Diptera: Sarcophagidae). *Zootaxa* **4821(3)**: 585–593. doi:10.11646/zootaxa.4821.3.9.
- Wang, Y.L., Cao, H.L. and Chen, H.W. 2020. Molecular phylogeny and species delimitation of *Amiota alboguttata* and *Amiota basdeni* species groups (Diptera: Drosophilidae) from East Asia. *Zoological Journal of the Linnean Society* **189(4)**: 1370–1397. doi:10.1093/zoolinnean/zlz132.
- Wedmann, S. and Skartveit, J. 2020. First record of March flies (Insecta: Diptera: Bibionidae) from the Miocene Gracanica mine (Bugojno, Bosnia-Herzegovina). *Palaeobiodiversity and Palaeoenvironments* **100(2)**: 585–591.
- Winterton, S.L. 2020. A new bee-mimicking stiletto fly (Therevidae) from China discovered on iNaturalist. *Zootaxa* **4816(3)**: 361–369. doi:10.11646/zootaxa.4816.3.6.
- Wu, Z., Cui, Y., Ma, J., Qu, M. and Lin, J. 2020. Analyses of chemosensory genes provide insight into the evolution of behavioral differences to phytochemicals in *Bactrocera* species. *Molecular Phylogenetics and Evolution* **151**: 106858.
- Xi, Y.-Q., Yang, D. and Yin, X.-M. 2020. *Phyllomyza* Fallen newly recorded from Laos with descriptions of three new species (Diptera, Milichiidae). *Oriental Insects* **54(3)**: 379–388.
- Yang, Q.C., Liu, Q.F., Pan, Z.H., Liu, X.Y. and Yang, D. 2020. *Nephrotoma* Meigen (Diptera, Tipulidae) from Xizang Autonomous Region, China. *Zookeys*(**973**): 123–151. doi:10.3897/zookeys.973.46384.
- Yaran, M. and Gormez, V. 2020. A new species of *Tephritis* Latreille, 1804 (Diptera: Tephritidae) from Turkey. *Zootaxa* **4838(2)**: 283–288. doi:10.11646/zootaxa.4838.2.8.
- Zakrzewska, M., Singh, H., Wagner-Wysieckas, E. and Gilka, W. 2020. Minute and diverse in fossil sticky stuff: Tanytarsini (Diptera: Chironomidae) from early Eocene Indian Cambay amber. *Zoological Journal of the Linnean Society* **189(4)**: 1398–1425. doi:10.1093/zoolinnean/zlz159.
- Zhang, Q., Zhang, J. and Wang, B. 2020. New bizarre flies from mid-Cretaceous Burmese amber (Diptera, Rhagionemestriidae). *Cretaceous Research* **110**: 104347.
- Zhao, Z. and McBride, C.S. 2020. Evolution of olfactory circuits in insects. *Journal of Comparative Physiology A Sensory Neural and Behavioral Physiology* **206(3)**: 353–367.
- Zida, I., Nacro, S., Dabire, R. and Somda, I. 2020. Seasonal abundance and diversity of fruit flies (Diptera: Tephritidae) in three types of plant formations in western Burkina Faso, West Africa. *Annals of the Entomological Society of America* **113(5)**: 343–354. doi:10.1093/aesa/saaa004.
- Ziegler, J., Pohl, J. and N.L. Evenhuis. 2020. Die Reise des Entomologen Hermann Loew nach Kleinasien in den Jahren 1841–1842 [Entomologist Hermann Loew's trip to Asia Minor in the years 1841–1842]. *Beiträge zur Entomologie* **70(2)**: 203–271.
