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Welcome to the latest issue of *Fly Times*! Let me first thank everyone for sending in such interesting articles – I hope you all enjoy reading it as much as I enjoyed putting it together! This issue is not so large, only 38 pages! So please let me encourage all of you to consider contributing articles that may be of interest to the Diptera community. *Fly Times* offers a great forum to report on your research activities and to make requests for taxa being studied, as well as to report interesting observations about flies, to discuss new and improved methods, to advertise opportunities for dipterists, and to report on or announce meetings relevant to the community. This is also a great place to report on your interesting (and hopefully fruitful) collecting activities!

The electronic version of the *Fly Times* continues to be hosted on the North American Dipterists Society website at http://www.nadsdiptera.org/News/FlyTimes/Flyhome.htm. The Diptera community would greatly appreciate your independent contributions to this newsletter. For this issue, I want to again thank all the contributors for sending me so many great articles! That said, we need even more reports on trips, collections, methods, updates, etc., with all the associated digital images you wish to provide. Feel free to share your opinions or provide ideas on how to improve the newsletter.

The *Directory of North American Dipterists* is constantly being updated and is currently available at the above website. Please check your current entry and send all corrections to Jeff Cumming or Jim O'Hara. There is a form for this on the last page of the newsletter.

Issue No. 44 of the *Fly Times* will appear next April. If possible, please send your contributions by email, or disc, to the editor at sgaimari@cdfa.ca.gov. All contributions for the next *Fly Times* should be in by 10 April 2010.

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NEWS

Insect Mist- swarming of *Nymphomyia* species in Japan

by Toyohei Saigusa[1], Takeyuki Nakamura[2] & Seiji Sato[3]

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The family Nymphomyiidae was founded by Tokunaga (1932) based on a few specimens representing a new genus and species, *Nymphomyia alba* Tokunaga, 1932 collected at the Kibune Stream, Kyoto, central Honshu, Japan. This family had been considered to be endemic to Japan until F. P. Ide discovered the second species, *Nymphomyia walkeri* (Ide, 1965) in 1961 in the Eastern Nearctic Region (Ide, 1964). At present, this family consists of seven species (3 Eastern Palaearctic, 2 Eastern Nearctic, one each from Southern China and Sikkim) and one fossil species from Baltic and Bitterfeld ambers (Courtney, 1994; Wagner *et al*., 2000).

In Japan, *N. alba* was collected at two localities, Gifu and Okayama Pref. in Honshu in addition to the type locality before the end of World War II. However, since then this species had not been collected, and it was supposed that pollution of rivers caused by insecticides used in rice paddy fields resulted in the decline or even extinction of this species. However, it was rediscovered recently at some localities in Honshu, Nara Pref. (Takemon & Tanida, 1993), the Yura River in Kyoto Pref. (Takemon, 2005), and Tochigi Pref. (Makarchenko, 1996). Makarchenko (1996) also discovered it on Kunashiri Island in the Kuril Islands.

Tokunaga (1932) described *N. alba* based on a few specimens collected at the Kibune Stream, but it was known that this species gathers in large swarms. Kariya (1985) reported on the swarms of *N. alba* that he observed along the Nagara River in Gifu City from 1929 to 1934. He described a swarm as follows: on an early spring day, numerous minute winged insects were floating in the air above the river as if powder snow was floating in wind. The huge swarm was composed of enormous number of individuals, and was approximately 5-6 m in height and 500-600 m in length. When he stood on the left bank of the river and looked at the hotels and pedestrians along the right bank, they were dimly seen as if observed through mist. Numerous winged insects attached to his clothing and insect net when he walked through the swarm. According to Kariya the swarms were observed before noon in two or three calm sunny days in spring, and in the afternoon the swarm disappeared and only a few individuals were observed. When he found a large swarm in spring of 1934, he invited Prof. M. Tokunaga in Kyoto to Gifu City, but the swarm had already disappeared when Tokunaga arrived there in the afternoon. The large swarm did not appear in the morning of the next day, but they found some individuals floating on water or springing on it.

Fig. 1. The Kanna River, habitat of two *Nymphomyia* species, in Ueno Village.

In the evening of March 26, 2007, one of us, S. Sato who is a trout-fishing instructor and writer, observed a huge and dense swarm of minute insects above the Kanna River in Ueno Village (Fig. 1) in Gunma Pref., Honshu, about 100 km NW of Tokyo. He took some photographs of this insect, and when he later examined his photographs more closely, he realized that the insect belonged to Diptera, and named it “Ueno Powder Fly” (Sato, 2007). Two days after he watched the swarm, some acquaintances told him that the insect is *Nymphomyia*. Residents along the river have long known of these swarms, however, thought they were swarms of aphids.

Fig. 2. Swarm of *Nymphomyia* above the Kanna River.

In the following year (2008), Sato visited repeatedly the Kanna River on March 16 and 27, and April 2, 6, 19 and 30, and he observed nymphomyiids on all of these visits. The swarm on April 6 was extremely dense and it looked like mist (Figs, 2 & 3). Saigusa and Nakamura together with Sato (Fig. 4) visited the Kanna River on April 9 to 12. Nymphomyiids appeared even before noon, but they were rather few in number and did not form huge swarms, while towards evening large swarms appeared after about 4 o’clock to dusk. The swarms suddenly appeared above the river, and slowly moved along it forming a broad misty belt. The swarm seems to be confined to above the river, and was not attracted to the light along the bank.

Each individual in the swarm only floated in the air current under somewhat windy conditions as do winged aphids, while under calm conditions, individuals performed more active random flight. When two or more individuals came close (about several centimeters), they suddenly started to fly down together in a spiral manner gradually tightening the diameter of the flight circle. During this flight they seemed to mate, but we could not confirm the start of copulation. Pairs in copula were found not only on the stones or other substrata near the river (Fig. 5), but also flying in the swarms.

As far as we observed them in insect nets, they did not walk about or could walk only slowly for a short distance, and soon most of them quickly curved their abdomens ventrally (Fig. 6). As soon as the tip of the abdomen reached just under the head, bending the body almost in a circle, they suddenly sprung up into the air presumably snapping the substrata with the tips of their abdomens.

Fig. 3. Swarm of *Nymphomyia* close to the Kanna River.

Fig. 4. The authors, Sato (left), Saigusa (middle) and Nakamura (right).

It is supposed that the snout-like projection of the head hooks the tip of the abdomen just before nymphomyiids spring, and the elongated cylindrically swollen abdomen seems to have elasticity for an adaptation to springing. When the wind was very strong, they alighted on stones along the river (Figs. 7 & 8). Even though their wings were violently vibrated by wind, they tightly clung to the substrata with claws of relatively short legs and most of them endured not to be blown off. This strong power to cling to strata is another mechanism to spring behavior of this midge, and this power is an adaptation for clinging to rocks in fast river currents.

Sato observed numerous shed wings of nymphomyiids on the water surface near the riverbank of the Kanna River on April 7, the day following a huge swarm (Fig. 9). He often noticed a pair of wings was floating close to each other (Fig. 10), which suggests that the both wings would be shed simultaneously when a nymphomyiid alighted on water. Sato surveyed larvae in several different bottom conditions in the river, and found that larvae are most abundant at the middle section of rapidly running current.

Surprisingly the nymphomyiids in Kanna River are composed by two sympatric and synchronic species, *N. alba* (Fig. 11) and an undescribed species (Fig. 12) close to *N. rhodendorfi* Makarchenko, from Far East Russia. The latter is most abundant in late March, and *N. alba* appears in April. In early and middle April we observed adults of both species flying together, but as far as we confirmed the flies collected in large swarms are *N. alba*, so that it is uncertain that the swarms are either composed of both species or by *N. alba* alone.

Fig. 5 (left). A pair of *Nymphomyia alba* in copula.

Fig. 6 (above). A *Nymphomyia* just before springing; from a video image (left: the abdomen curved under the thorax. right: the tip of abdomen reached under head).

Fig. 7 (upper left). *Nymphomyia* under strong winds.

Fig. 8 (right). *Nymphomyia* tightly clinging to a stone under strong wind condition, with wings vibrating.

Fig. 9 (lower left). A pile of shed wings of *Nymphomyia* on water surface.

Fig. 10. A pair of *Nymphomyia* wings on water surface.

Fig. 11. *Nymphomyia alba*, male; wings always erected on the thorax in *Nymphomyia*.

Fig. 12. *Nymphomyia* sp. near *N. rhodendorfi*, male.

Fig. 13. Larvae of *Nymphomyia alba* (left) and n.sp. near *N. rhodendorfi* (right); note the position of anterior curvature of a Malpighian tubule, and color pattern of the head.

The larvae, pupae and adults of the two species are easily distinguished by the position of the anterior curvature of the Malpighian tubules, that is located near the anterior part of the abdomen in *N. alba*, but ends at the 3rd abdominal segment in the undescribed species (Fig. 13).

In addition to the two species mentioned above, *N. rhodendorfi* was recorded from several localities in northern Hokkaido by Makarchenko (1996). This record was based only on the larvae, therefore there is a possibility that the Hokkaido population is identical with the species close to *rhodendorfi* from the Kanna River, and the record should be confirmed by collection of adults.

Recently two other species were discovered in Japan, one from Okinawa Island (under subtropical climate) in the Ryukyus and another from the Central Mountain Region (under cool-temperate climate) in Honshu. The former is closely related to *N. holoptica* from Hong Kong. Therefore five of ten species including the above-mentioned three occur on the Japanese Archipelago. The recent discoveries of these species strongly suggest that many more species of the genus *Nymphomyia* may occur not only in Japan but also in continental Eastern Asia ranging from Eastern Siberia to northern Indochina and the Himalayas. Inclusion of Shikoku in the distributional range of *N. alba* (Shima, 1992; Makarchenko, 1996) is erroneous. This species was correctly recorded only from Honshu and Kunashiri Island based on the adults.

Acknowledgements
We express our thanks to Dr. Bradley Sinclair for revising the original draft of this report. Seiji Sato took all the photographs except for figs. 6 and 13 in this report, and he has copyright of them.

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Epilogue

"Some enchanted evening you may see a stranger,
You may see a stranger above clear current
Of the River Kanna
In early spring"
from "West" Pacific.

Saigusa had longed to observe the huge nymphomyiid swarms, and his dream was finally realized in 2008 spring. Every dipterist who wishes to observe the swarm should visit Ueno-mura village in early spring around the first ten days of April. You may enjoy this place not only the swarm but also country life and spectacular cherry blossoms. There is a Japanese-style inn close to the Kanna River, and you will be served with meals including land-locked salmon, *Oncorhynchus masou*. The World Heritage "Nikko" represented by the most famous Japanese shrine, Tôshô-gû, and where Nakamura lives is only three hours drive from Ueno village.

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Observations of the snail-killing fly *Sepedon fuscipennis* (Sciomyzidae) consuming limpets in the laboratory

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We began to look at some feeding behavior of the common snail-killing fly *Sepedon fuscipennis* during summer 2009 because we became interested in the effects of drought on the maggot food source. *Sepedon* species have long been known to feed on aquatic snails, and this species is easy to rear. In the 1980's, a drought occurred in northeast Ohio and anecdotal observations by Ben Foote of Kent State University suggested that snail populations crashed. When we look at our museum records, a lot of sciomyzid species (e.g., *Pteromicra* spp., *Poecilographa decora*, *Tetanocera valida*) were abundant in collections prior to the 1980's. In recent years these species have been hard to come by. Lab observations indicated that more than one *S. fuscipennis* maggot will feed on a single snail, particularly in the early instars. We began a series of experiments that are currently examining the effects of low food density on maggot growth and development.

While we were out collecting physid snails for the maggot feeding trials, we stopped at a slow flowing section of the Cuyahoga River. Snails were in abundance on the stream rocks. Also present were limpets (Ancylidae). These little gastropods are common in lotic habitats, and adhere tightly to riffle rocks where they scrape biofilm. To our knowledge, there is no known sciomyzid tied to this potential gastropod food source. In many cases, a genus or species of snail-killer is tied to a narrow spectrum of gastropod taxa (the only North American exceptions being the genus *Renocera* that feeds on fingernail clams and some unpublished observations one of us made on *Atrichomelina pubera* scavenging on decaying freshwater mussels stranded on the shoreline).

Our curiosity got the best of us and we brought some limpets back to the lab. We placed a maggot and a limpet in a petri dish with a thin film of water. The limpet adhered tightly to the plastic petri dish bottom. Surprisingly, the maggot defeated the limpet's defense and squeezed its cephalic segments under the prey's shell. We then took a newly hatched maggot and raised it to maturity on a diet of limpets only.

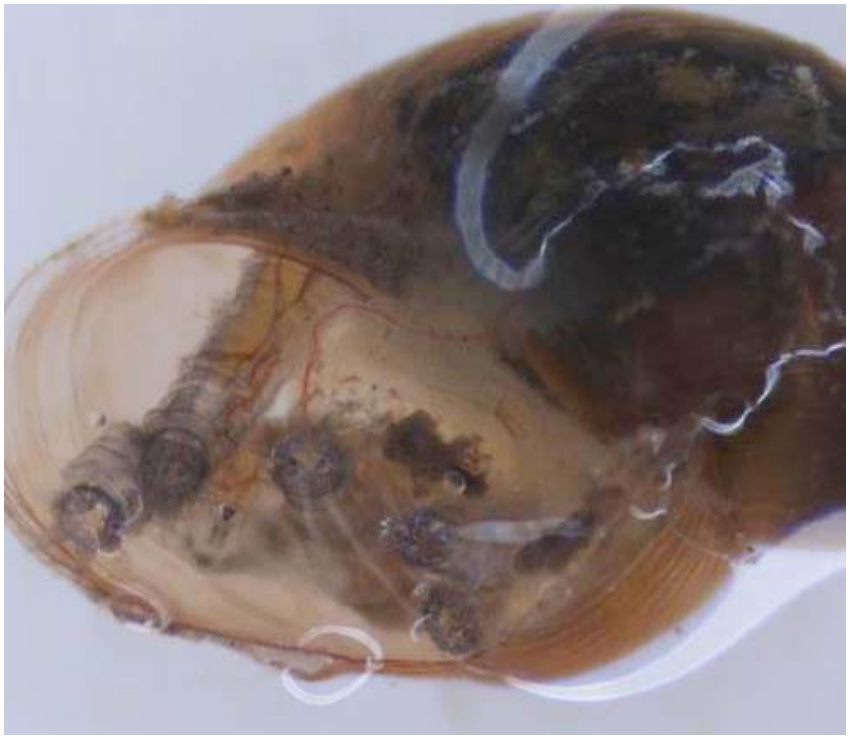

Fig. 1. Five maggots feeding on one snail. Note exposed posterior spiracles.

Fig. 2. *Sepedon fuscipennis* larva consuming the flesh of a limpet. The maggot had defeated the limpet's defense of tightly adhering to its substrate and has flipped the limpet over for feeding.

As far as we know, limpets and *Sepedon* do not overlap in their niches. *Sepedon* are found in standing water environments such as marshes, pond margins, vernal pools, road-side ditches, and similar habitats. Maggots appear to be best suited for shallow water environments. The limpets can occur in slow flowing rivers, but larval *Sepedon* do not have adaptations to cope with flowing water regardless of current speed.

What we learned is that *S. fuscipennis* was able to recognize the limpets as a food source and aggressively attacked. There is probably little if any limpet predation in nature, unless somehow a limpet population becomes stranded (say, in a recently formed oxbow lake). It was interesting to note that the maggots had the ability to squeeze between the limpet shell and the substrate to gain access to the prey animal. If nothing else, these observations only increased our curiosity in, and admiration of, this rather common fly.

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Monitoring species distribution of hearing diptera with sound traps

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Emblemasoma auditrix is one of the few dipteran species with true hearing capabilities - that is long range hearing based on tympanal organs. *E. auditrix* belongs to the Emblemasomatini (Sarcophagidae) which convergently evolved tympanal hearing to the Ormiini (Tachinidae). Ears of both groups are situated directly behind the head at the prothorax. All fly species with tympanal organs are parasitoids and use their hearing sense to locate suitable hosts. Emblemasomatini are distributed across America and are parasitoids of cicadas, but not much is known about their biology. One exception is *E. auditrix* which parasitizes the cicada *Okanagana rimosa* in North America. *E. auditrix* has been investigated in recent years in respect to auditory behavior, physiological mechanism and reproductive biology. These studies include data about the host and its distribution. Only one host is known and even the closely related cicada *O. canadensis* has not been reported as host species. Consequently, the distribution of host species and parasitoid largely overlaps. *E. auditrix* and *O. rimosa* occur in June and July in many counties of North Michigan (Figure 1). Both species have been monitored with sound traps. Additional acoustic records of sound producing males are used for mapping of the cicada. Not all host records are accompanied by a record of the parasitoid. These distribution data have been

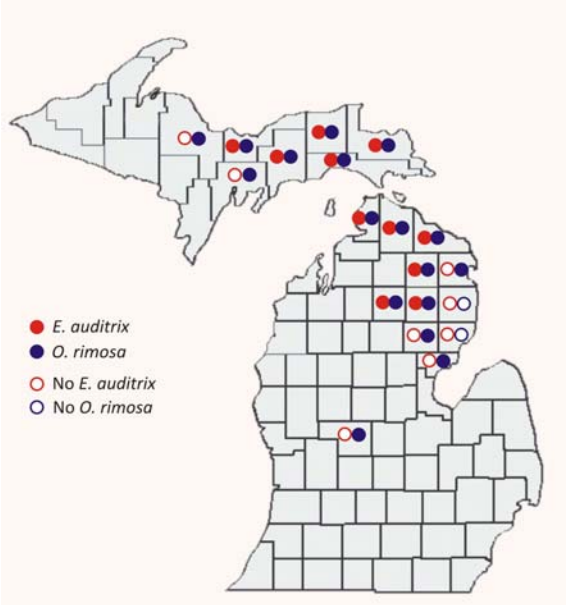

Figure 1. Distribution of *Emblemasoma auditrix* and its host cicada *Okanagana rimosa* in Michigan.

accumulated by sound trapping in suitable habitats (forest and bush land) and at suitable weather conditions (sunny, temperature over 22°C). The acoustic trapping is a reliable and relatively easy method to evaluate the population of *E. auditrix*. It remains to be shown whether this method works also for other Emblemasomatini. Acoustic attraction works also quite well with the tachinids *Ormia* spec. at night, but is less effective with the tachinids *Homotrixa* spec. and *Therobia* spec.. The reasons for the different attractiveness are unknown.

For acoustic trapping either a prerecorded calling song of the host can be used, or song models. Some song models are, at least for *E. auditrix* more effective than calling song itself. The effective models are composed of the basic temporal structure of the calling song and the carrier frequency from the peak of the calling song spectrum. When the song is recorded on a compact disc and replayed by a CD player, *E. auditrix* is often attracted within less than a minute to the loudspeaker. In years with small host populations, large numbers of parasitoids (up to 20 per minute) arrive at the loudspeaker (Figure 2). If the loudspeaker is directly connected to the stereo in a car, acoustic monitoring can even be done without leaving the car. The loudspeaker can be held out of the side window and the presence of flies can be noted, or their numbers can be counted. By this method a large area can be scanned relatively easy in a short time.

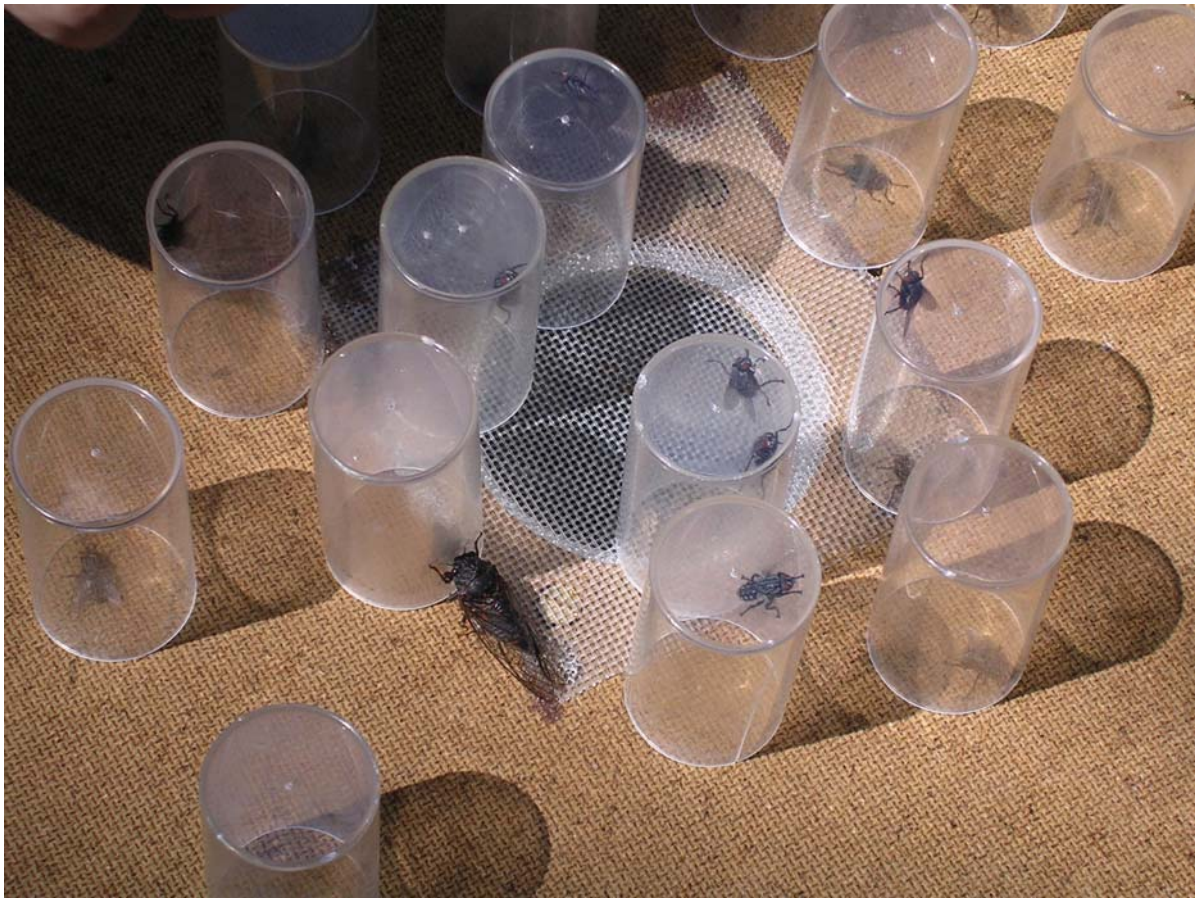

Figure 2. Success of sound trapping on a box with an internally mounted loudspeaker (covered with gaze). Acoustically attracted flies are easily caught with plastic vials. Female cicadas were also attracted by the song model of the (male) calling song.

As mentioned earlier, data on the distribution of other *Emblemasoma* species are missing, except for occasional (non-acoustic) trapping records. For example, *E. erro* is known to host in *Tibicen* species in Texas. Can it be acoustically attracted to song models of *Tibicen* species? Can *E. erro* be acoustically trapped in North Carolina with the same sound? Furthermore, it is not known whether *Emblemasoma* species can have more than one host species. Another aspect is related to the host distribution. *O. rimosa* is also reported from the Appalachian Mountains – does *E. auditrix* also occur in this area? Mapping with different sound models might help to understand distribution and host specificity.

In case somebody is interested in acoustic monitoring, I can provide song models in wav format. I would also appreciate any reports, unpublished records, references specimens or other information on the biology of Emblemasomatini.

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Drosophila suzukii new to North America

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In September of 2008 the CDFA lab in Sacramento received a sample of a drosophilid fly from Santa Cruz County, California, collected in a raspberry field. It was identified as *Drosophila* sp. But because drosophilids are not rare, especially in the Fall in association with rotting fruit, it was categorized as a harmless species which did not required any regulatory action by the state. What was not clear from the submitted specimen was that the fresh raspberries, and to a lesser degree fresh strawberries, were infested with drosophilid larvae, which caused serious damage to the crop in some areas. The farm advisor Mark Bolda, who submitted the specimen, was not satisfied with the genus identification because he thought that the flies were responsible for the damage to the crops. Therefore he searched the internet for *Drosophila* experts, but unfortunately ended up with

a geneticist and not a taxonomist (blame Google: When you search for *Drosophila* the first million hits or so are all about genetics), and the specimens he submitted reminded the geneticist of his cultures of *Drosophila biarmipes* because they also have a black spot on the wing tip in the males. Therefore this name was used in Bolda's blog (http://ucanr.org/blogs/strawberries_caneberries/index.cfm), who was trying to figure out ways to control the new pest.

In the spring of 2009 the CDFA lab received several records of maggots found in otherwise healthy cherries, and the western cherry fruit fly (*Rhagoletis indifferens*) was the main suspect. This was a great concern for the local farmers, because this pest was not known in the region. But the submitted larvae were clearly drosophilids and it was still assumed that they are only secondary invaders and that the primary damage had a different cause. But after more and more reports of massive infestations in cherries came into the lab and the only larvae submitted were *Drosophila*, the suspicion was raised that the normally harmless *Drosophila* might be the primary cause. It was clear that a species identification was needed. Unfortunately there were only larvae conserved in alcohol on hand and it is nearly impossible to identify larvae to species level. Therefore the barcode CO1 gene was sequenced in the lab. The comparison of the sequence with genbank and BOLD databases confirmed that it is a *Drosophila* species, but the results were inconclusive at the species level. As it turned out, there were no CO1 sequences available for this species, but this gap has now been closed by the submitted sequences from the CDFA lab.

In the meantime many samples came in from Santa Cruz County and the cherry growing areas in the Central Valley, like Merced Co, Stanislaus Co, and San Joaquin Co. Finally the lab received some adults from the Watsonville area and the species could be identified the old fashioned way, and turned out to be *Drosophila suzukii*. This species is very closely related with *D. biarmipes*, especially in that the males share a distinct dark spot at the wing apex (Fig. 1).

Figs. *Drosophila suzukii*.
Fig. 1 (upper). male
Fig. 2 (bottom), female.
Fig. 3 (right), female ovipositor

Although the females lack this dark wing spot (Fig. 2), they are characterized by an unusually large ovipositor (Fig. 3), with which they could penetrated thin skinned fruit. With a species name on hand,

several accounts of damage by this fly could be found in the literature, particularly Japanese. In Japan the flies seem to have a preference for cherries and blueberries (Kanzawa, 1936, 1939).

The species was described by Matsumura in 1931 from Japan, and a few years later reports of damage by this species were published (Kanzawa 1936, 1939). The earliest records of this species from Japan are from 1916 (Kanzawa 1936), and there is the possibility that the species was not endemic to Japan, but had been introduced at the turn of the century into Japan. The species is also recorded from Korea, Thailand and India (Kashmir region). It would be an interesting project to sample different populations all over Asia to examine the genetic diversity and to determine the center of origin as well as the possible ways the species has spread.

There is no doubt that this species has a high potential to be dispersed. In 1980 the species was collected for the first time from Oahu, Hawai'i (Kaneshiro, 1983) and it was subsequently reported from several Hawaiian Islands without any reports of it causing damage (Nishida 1997, Breadsley & Perreira 1999, O'Grady & Perreira 2002). The species spread in 2009 into more than 20 counties in California from San Diego Co in the south to Humboldt Co in the north. It was also found in Oregon, Washington, and British Columbia (Canada), as well as in Florida (Steck et al. 2009). It is very likely that the fly spread through shipments of infested crops, and that in 2010 many Midwestern and Eastern states will report this pest.

There are also reports from Europe, where *D. suzukii* was found in October 2008 in Spain (150km from Barcelona by G. Calabria). Unconfirmed reports have also been made from Montpellier in France and from the French Alps. So far no damage is reported from Europe. This could be because of the dry Mediterranean climate, which is not the preferred condition for *D. suzukii* according to ecological simulations run by Martin Damus. If the fly spread to the more humid central Europe it could develop into a serious agricultural pest there.

The main host in California is cherries (Fig. 4), but there have been confirmed reports from raspberries, strawberries, nectarines, boysenberries, Asian plums, plums, plumcots, Satsyma plums and blackberries. In the literature are reports of infestations in healthy blueberries, grapes, mulberries and Japanese apricots as well as in damaged or dropped fruits of apples, peaches, persimmons and tomatoes. Amy Dreves recently reported *D. suzukii* from wine grapes in Oregon (Dreves 2008).

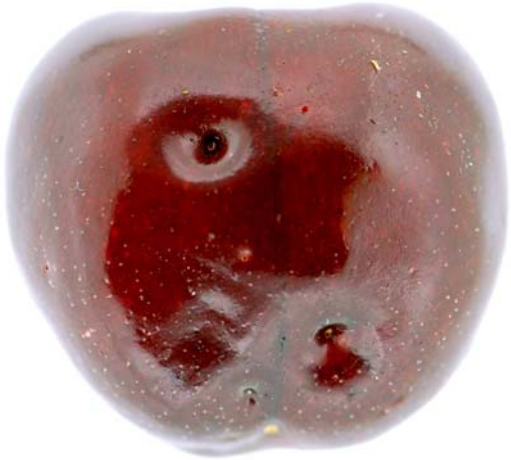

Fig 4. Cherry with oviposition scars.

The wide variety of host fruit as well as the ability to use fresh and healthy fruit and also decaying fruit, which is the more typical substrate for *Drosophila* species, combined with the typical high fecundity and short generation time, make this small fly a serious danger for (global) agriculture in the next years. All records of this fly are of great interest for future studies and are welcome

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Status of the *BioSystematic Database of World Diptera* (BDWD)

by Thomas Pape[1] & Chris Thompson[2]

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The *BioSystematic Database of World Diptera* (BDWD) has moved and now appears with a new public face. The Diptera site and online interface to the BDWD is now being served from the Natural History Museum of Denmark, but as always you will find us at http://www.diptera.org. A new version (11.9), which has been significantly improved over the prior version, mainly in details, will soon be uploaded. The previous version was highlighted last year in the *Systema Naturae* 250 years celebrations in Paris [see our chapter "Flying after Linnaeus: Diptera names since *Systema Naturae* (1758)" in the forth-coming book by Polaszek, A. (ed.): "Systema Naturae 250 – The Linnaean Ark." Taylor & Francis].

The number of included new species and names is now 269,297, an increase of 1%. The main improvement was an increase in the number of records edited to meet our standards. More name records were linked to their appropriate literature records (an increase of 47%) and the number of references is now 30,193, an increase of 17%. In the future, we plan to link the literature records to their digital versions in the Biodiversity Heritage Library (BHL) or other online depositories.

Preliminary editing on the type-locality information has now been done for 92% of the records. In our new database design, the type-locality information will be placed in its own table/file and the fields will conform to the Darwin Code standards for geographic information. So, when the type-localities are properly geo-referenced (geo-coded, that is, with longitude and latitude), then online information providers, like Discover Life (DL), Encyclopedia of Life (EoL) and Global Biodiversity Information Facility (GBIF) will be able to plot at least one spot on Earth for every named fly species.

Due to the continued lack of support, progress remains slow on our plans to build a new online species interface and to support online editing for specialists. However, using the old-fashioned print-out method, we have begun distributing information to specialists for review and revision. Knut Rognes has volunteered to be our first "guinea-pig" to test this approach out for the Calliphoridae and Rhiniidae. We hope when we finally work out the "bugs" in the process, to enlist more volunteers.

So, to repeat from the last issue: As the community continues to support the BDWD, we will continue to improve, enhance and provide a better and more comprehensive product for ALL. Remember Aesop and his fable about the rabbit and the turtle. Then smile: We will get there together and be first in the end!

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MIDGEPEET: A Collaborative Effort To Increase Taxonomic Expertise In Understudied Families Of Nematocerous Diptera

by J. Kevin Moulton

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PIs Moulton, Adler, Courtney, Cranston, and Sinclair were awarded an NSF-PEET grant (aka MIDGEPEET) during the Y2009 competition. We will conduct studies of seven families of nematoceran Diptera – Blephariceridae, Chironomidae, Ceratopogonidae, Dixidae, Psychodidae, Simuliidae, and Thaumaleidae – that historically have been understudied and taxonomically difficult, and have recently experienced significant losses in taxonomic expertise across the globe.

This project is a collaborative research and training project among laboratories at the University of Tennessee, Clemson University, Iowa State University, University of California-Davis, and Canadian Food Inspection Agency. We envision a synergistic process leading to the production of significant taxonomic treatments within the aforementioned, understudied families of Diptera. In addition trainees will gain extensive skill sets and expertise not only in their group of interest, but also in all groups studied through extensive interactions with all participants. This process will be facilitated by open lines of communication among laboratories, workshops, and annual meetings with accompanying presentations of results from individual projects. The proposed workshop will be a combined molecular and cytological workshop in Knoxville, TN, that will be offered to MIDGEPEET trainees plus a limited number of other NSF-sponsored trainees. Phylogenetic analyses will be conducted using morphological, molecular, and, where appropriate,

cytological data to form the basis for natural and stable classifications of the target groups. The project will provide new information on the biology, diversity, and ecology of these groups of flies, and results of phylogenetic analyses will provide an objective framework for testing hypotheses about aspects of morphological and behavioral character evolution, ecological transitions, and current biogeographical patterns. The combined use of morphology of all life stages, cytologenetic data in the form of polytene chromosomes, and DNA analysis, as well as the taxa selected for study, sets this proposal apart from the three previously awarded Diptera PEETs and also from the current Diptera ATOL.

This project will provide five trainees – one postdoctoral and four graduate students as well as undergraduates and top-ranked high school students, with an unsurpassed educational and research experience by taking advantage of the strengths of the PIs and their sponsoring institutions and by providing close interactions with expert taxonomic collaborators worldwide.

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Ottawa Dipterology (1937-1989): Festschrift commemorating the coordinators of the *Manual of Nearctic Diptera* and their contributions to building the Canadian National Collection of Insects

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Health finally forced Richard (Dick) Vockeroth to retire from research and curation in the Canadian National Collection of Insects (CNC) in 2008, and this has prompted us to consider how to celebrate his career and achievements. As we discussed this, it became clear that we could not celebrate his career alone. Other Diptera curators in Ottawa of his generation have not received such an honour despite their legacy of building the CNC fly collection to its present two million plus specimens and their global leadership as coordinators of the *Manual of Nearctic Diptera*. Each of the curators and coordinators of the Manual (Drs Frank McAlpine, Bob Peterson, Guy Shewell, Herb Teskey, Dick Vockeroth and Monty Wood) have left a lasting legacy, and it is time to celebrate them as a group.

The influence of the *Manual of Nearctic Diptera* on the dipterological community is enormous. The keys and illustrations have expanded the ability of biologists to identify specimens encountered in their projects and have been reproduced in numerous publications. The coordinators of this 25-year project spent considerable time not only writing chapters (sometimes outside of their focus groups), but also editing and proofing the contributions of other authors. The Manual has received many accolades, but the efforts of the entire editorial group have largely been overlooked.

The coordinators of the Manual also spent a great amount of their time amassing and curating an enormous collection of Diptera in Ottawa. These specimens continue to be used in revisions worldwide, often representing the only material available from certain regions. From a quick search of catalogues we have found some 145 species names dedicated to these curators, which is the ultimate statement of their influence on other dipterists and their contributions to the CNC Diptera collection.

We are planning a commemorative volume celebrating the careers of these six dipterists. The dates in the title of this announcement cover the period beginning with the arrival of the first of the Manual coordinators at the CNC (Guy Shewell) until the publication of the third volume of the Manual. This commemorative volume will celebrate the careers of these dipterists, their contributions as coordinators of the *Manual of Nearctic Diptera*, and their role in building the CNC. At this time we would like to solicit authors interested in contributing to this volume. The volume will appear as a special issue of the *Canadian Entomologist* (http://www.esc-sec.ca/journal.html), and all submissions will be peer reviewed. Papers in all fields of entomology are encouraged. The Festschrift is planned to appear in early 2011. Deadline for manuscripts is December 1, 2010. All enquiries and manuscripts should be directed to Bradley Sinclair (bradley.sinclair@inspection.gc.ca).

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Urban Diptera Study

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I'm writing a grant proposal for submission to the National Science Foundation in January. I am planning an urban, backyard Malaise trap transect (maybe two transects) from the Santa Monica Mountains through urban L.A. I want to study changes in the fauna over distance from natural areas, which I know occurs in phorids, but is poorly-known in general. Ideally, I'd like to learn about how far into the megalopolis various species ranges extend. This project also stems from some backyard biodiversity work I have done recently that has shown new species (of phorids and an asilid) and surprising new distributions in mundane suburban yards.

I am looking for collaborators to take on identification of some focal taxa. Currently, we have people working on tipulids, phorids, ceratopogonids, braconids, chalcidoids, and syrphids, so most groups are still available. We would provide mounted, labelled material for identification, and of course you could retain some of the specimens.

Although this is a very different project than the usual biodiversity survey, it has the potential to tell us much about how flies adapt to human impacts. Let me know, please, if this is something that might interest you. Contact me at bbrown@nhm.org.

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DNA taxonomy and systematics of scuttle flies (Diptera: Phoridae)

by Sibylle Noack

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I am happy to announce that a new phoridologist has started her career. I started my PhD project a year ago at the Swedish Museum of Natural History with Prof. Fredrik Ronquist and Dr. Kjell Arne Johansson as my supervisors and with Dr. Brian Brown at the Natural History Museum of Los Angeles County as an external advisor to my project. I take the opportunity here to present the project shortly and I will be glad to hear any ideas that you may have regarding my project, especially if you know of collections that I might be interested in studying.

The scuttle flies (Diptera: Phoridae) are perhaps the most abundant and ecologically diverse of all fly families and at the same time one of the least studied. Although often overlooked, phorids are extremely abundant in many habitats. They appear readily in Malaise traps and many other types of insect traps, often as one of the largest in numbers among Diptera families (Brown, 2005). In the Swedish Malaise Trap Project (SMTP), in which Malaise traps were run for three consecutive years at 70 localities across the country (Karlsson et al. 2005), phorid specimens amount to 5-6 % of the sampled Diptera specimens (D. Karlsson and S. Ulefors, pers. comm.). Phorids occur year round and are found in all habitats; in fact, virtually all of the 2,100 SMTP samples appear to contain at least some phorids. Current estimates, based on approximately 4 % of the SMTP samples, suggest that the SMTP material in total contains some 1.2 million phorid specimens.

The Phoridae are classified into approximately 240 genera with about 5,600 described species but the true number of species is clearly much higher given the high rate of discovery of new species. Disney (2003) estimated the total global species diversity to be between 30,000 and 50,000 species. In Sweden, about 300 described species of phorids were known in 2003 according to the active amateur phoridologist Sven-Olof Ulefors. In early 2009, Sven-Olof Ulefors reported that he had seen Swedish material of more than 850 species of phorids, more than half of which were undescribed. He estimated then that the total Swedish phorid fauna includes some 1,100 species.

The monophyly of Phoridae is not in doubt but phylogenetic relationships within Phoridae are poorly known. The genus *Megaselia,* in particular, is problematic. It is regarded as somewhat of a “Diptera enfant terrible” (Smith, 1984) due to the enormous amount of species placed in it. Currently about 1,400 species are recognized within *Megaselia* worldwide (Disney, 2006a; Disney, 2006b), however, possibly only about 10-20% of the species have been documented so far. The genus completely dominates the northern European phorid fauna. For instance, of the 319

Swedish phorids recorded from Sweden in 2003 (Sven-Olof Ulefors pers. comm.; James Bonet, pers. comm.), 236 are placed in *Megaselia* (74 %).

Schmitz (1965a, b) characterised a number of species groups and subgeneric lineages within *Megaselia*. Most phoridologists today are reluctant to use these groupings because Schmitz never completed his study of the genus and because of the lack of supporting molecular data. Nevertheless, some workers, like Sven-Olof Ulefors, believe that most of Schmitz' species groups are sound even though the genus as a whole may not be monophyletic.

Aims of this project

The aim of this project is to study the species diversity within the giant genus *Megaselia*. Since it is impossible to study the whole genus at the species level during a PhD project, it is necessary to focus on a monophyletic group of appropriate size. For this purpose, we have tentatively chosen the Kryophila species group. It was identified by Schmitz (1965a, b) based on two unique male characters: (1) the down-bent proctiger hair on the anal tube of the genitalia and (2) the distally enlarged front tarsi. No unique distinguishing characters are known for the females. A small, preliminary morphological study indicates that the Kryophila group is indeed monophyletic (Noack, unpublished data) but additional morphological and molecular study is needed to confirm this. In total, Schmitz included 31 species in the Kryophila group. They are primarily northern boreal species, now known from both the Palaearctic and the Nearctic regions (Brown, pers. comm.). Sven-Olof Ulefors has identified an additional 20 undescribed morphospecies in the SMTP samples matching the putative male autapomorphies of the group.

The group of Kryophila will be revised taxonomically and new species belonging to this group will be described. The data gathered in this project will be published online using online resources such as Zoobank, Genbank, Morphbank, and the online journal Zootaxa to make the results available to as many researchers as possible. The article of Pyle et al. (2008) will act as a model with respect to how to publish the results of this project.

An immediate research goal is to verify the specific status of some of the undescribed morphospecies of phorids identified by Sven-Olof Ulefors in the SMTP material. The finding of more than 500 new species to science in the few percent of the SMTP material that have been examined so far has caused a stir among biologists. To a large extent, however, these results are based on the phorid morphospecies that Ulefors claims to have identified in the material (they constitute about 80 % of the undescribed species discovered so far). The morphospecies identified by Ulefors are often characterized by minute morphological differences and even though other phorid experts asked to evaluate previous work by Ulefors have generally agreed with his conclusions, it is important to verify the species status of these morphospecies using molecular data. Preliminary sequencing trials have shown that standard extraction and sequencing protocols work well for the SMTP material, provided that it has not been stored in glycerol (Noack, unpublished data). Storage of SMTP specimens in glycerol used to be standard practice but has now been abandoned in favour of storage in alcohol based on these results.

Another important goal is to elucidate the higher-level relationships within the genus *Megaselia* and verify the monophyly and phylogenetic position of the Kryophila group with the help of molecular data. This part of the project will be coordinated with Dr. Brian Brown and his

colleague Dr. Paul Smith at the Los Angeles County Museum, who will focus on the major lineages in *Megaselia* and the relationships among *Megaselia* and related genera, while this project will focus on the Kryophila group and its closest relatives. We plan to sequence CAD (1000bp only), CO1 (850bp), 16S (450bp), 12S (400bp) and ND1 (400bp). This combination of molecular markers was useful in resolving relationships among species in the phorid genus *Melaloncha* (Brown, pers. comm.). This work should result in one or two collaborative papers on phylogenetic relationships and the goal is to split up the genus *Megaselia* into firmly supported monophyletic subclades. Depending on the robustness of these results, we may decide to formally propose some of these subclades as subgenera of *Megaselia* or separate genera.

The traditional taxonomy of phorids in general and *Megaselia* in particular is based to a large extent on characters of the male genitalia, and many species descriptions are based solely on males. Females are often little studied and for the most part impossible to identify to species using existing keys. With the help of DNA barcoding, this study intends to find missing females of those species of the Kryophila group where only males are known. After identification and sequencing of the males of the Kryophila group in the SMTP samples, females from the same localities and similar dates will be sequenced and matched up to the males. As females of the Kryophila group are identified with the help of DNA barcoding, their morphology will be studied to identify species-specific female characters. On the basis of these results, the first key to the females of this group will be provided. In many phorids, there is pronounced sexual dimorphism, indicating that the sexes may have different lifestyles or behaviours. This study will provide one of the first detailed insights into the evolution of sexual differences in phorids.

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Owen Lonsdale – new Collections Manager at the CNC

by Stephen Gaimari

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Following nine years of postgraduate studies, Owen Lonsdale has finally achieved a permanent position at the Canadian National Collection of Insects, Arachnids & Nematodes (CNC) in Ottawa. Beginning November 2nd, Owen will serve as the Collections Manager of the CNC and the Manager of the National Identification Service.

As a masters and doctoral student under Steve Marshall at the University of Guelph, Owen revised much of the dipteran family Clusiidae, or as they are commonly known, the “druid flies”. This included a revision of the entire New World fauna, recognizing 220 undescribed species, and a molecular treatment of the entire family at the genus level. Following his time at the University of Guelph, Owen continued his research in two postdoctoral positions, the first being with Chris Thompson at the Smithsonian Institution’s National Museum of Natural History in Washington, DC. Here he further developed the Biosystematic Database of World Diptera (www.Diptera.org), continued work on the Clusiidae, and revised the New World Tanypezidae (the “stretched-foot flies”), within which he synonymized the family Strongylophthalmyiidae. Owen also began studies on the family Agromyzidae (the “leaf-mining flies”), and among other projects with collaborators Stephanie Boucher and Sonja Scheffer, is currently developing a manual to the North American fauna. This revisionary work in the Agromyzidae led into his second postdoctoral position with Steve Gaimari at the California Department of Food & Agriculture in Sacramento. Here Owen revised the agriculturally important genus *Liriomyza* in California, examining host associations and recognizing over 60 species, half of which are endemic to the state. This is all the more remarkable in that he only occupied this postdoc for 6 months!

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MEETING NEWS

Meeting of the North American Dipterists Society

Entomological Society of America Annual Meeting
Indianapolis, Indiana – December 15, 2009

by Gregory A. Dahlem

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What would an ESA and ECN meeting be without a special celebration of all things Diptera? I would like to invite all of you to the annual Diptera get-together in association with the Entomological Society of America's Annual Meeting in Indianapolis. The North American Dipterists Society Meeting is scheduled for Tuesday, December 15 from 7:30-9:30 in the Santa Fe Room on the second floor of the Marriott Hotel. We will have reports on the NADS field meeting that took place in California this summer and updates on the International Congress of Dipterology meeting in San José, Costa Rica next summer and the NADS field meeting for 2011. I am looking for people who would like to present Diptera related information at the Indianapolis meeting (interesting field trips, work on Diptera related web sites, research projects, grant possibilities, etc.). Please contact me if you would like to give a short presentation or, if you cannot make it to Indianapolis, with any information you would like me to pass along, or just to let me know that you plan on coming! I will look for some interesting places that might serve as an appropriate host for the fly group when we finish our official meeting and begin toasting all our favorite species.

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Announcing!

The Eighth Annual Meeting of the
North American Black Fly Association (NABFA)

by John Walz

President, NABFA

This meeting will take place on February 4-5, 2010 at the Archbold Biological Station in Lake Placid, Florida USA. Click on the following link for meeting details: http://www.mmcd.org/pdf/NABFAmeeting10.pdf

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7th International Congress of Dipterology
San José, Costa Rica
8-13 August, 2010

by the Organizing Committee

On behalf of the Council for International Congresses of Dipterology we wish to warmly encourage you to attend the 7th International Congress of Dipterology (ICD7) that will take place in San José, Costa Rica from Sunday the 8th to Friday the 13th of August 2010.

The First Announcement for the upcoming Congress was circulated early in October. Complete details, including costs, dates, accommodation options and preliminary scientific program is available at: http://www.inbio.ac.cr/icd7/.

Five renowned plenary and banquet speakers, eleven symposia and six workshops form the core of the Congress. Several other colleagues have also been invited in order to build a well-balanced and complete scientific program. Please refer to the scientific program available at the Congress website. If you are considering or willing to lead a workshop or symposium organization, please contact Jeff Skevington at: jhskevington@gmail.com

Important dates:

JANUARY 31 2010
Deadline for Early Registration

FEBRUARY 15 2010
Deadline for receipt of funding support applications

APRIL 15 2010
Deadline for receipt of abstracts

APRIL 30 2010
Notification of abstract acceptance

We encourage you to register early. Early registration fees and accommodation costs are significantly less expensive prior to February 2010. The secure on-line payment for registration is now available.

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2009 North American Dipterists' Society Field Meeting
Crescent City, California, June 1-4

by Peter H. Kerr

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The 2009 North American Dipterists Society Field Meeting was held June 1-4 in Crescent City, on California's north coast. There were forty registered participants, from various North American locales, many of whom arrived just in time for a hearty banquet meal at Northwoods, a local restaurant. College of the Redwoods, Del Norte campus provided laboratory and presentation space, with the support and guidance of Robert Mize, Professor of Life Sciences. On the first evening, Dr. Mize and Greg Courtney gave separate introductory talks on favorite nearby collecting areas, to initiate the proceedings. The north coast offers a number of unique and diverse habitats, from intertidals and beaches festooned with windrows of wrack, to open meadows, various streams, rivers, and sloughs, mixed evergreen forests, and of course, the famed redwood groves. There is also a notable elevational grade; as one goes inland, the Klamath Mountains feature prominently. Within a few miles from Crescent City, one may gain significant elevation, and pass through additional climatic regimes and associated habitats, reaching above 5000 ft. These high elevation perches offered a sunny respite, above the misty cloud bank, for those looking for warmer temperatures. While the last week in May was beautiful and warm, a rare, cool summer rainstorm hit most of California at the beginning of June, including Crescent City and its environs during our stay. This dampened some of the vegetation and ground afoot, but not the spirits of the attendees!

Popular collecting destinations were hilltopping areas along Bald Hills Rd., in Redwood National Park; various roads, trails, and picnic areas of Jedediah Smith Redwoods and Prairie Creek State Parks; Tolowa Dunes State Park and beaches near town; Grassy Flat and Panther Flat campgrounds, along Rte. 199; the network of forest roads in the Smith Rivers National Forest (Klamath Mountains); and various spots along the beautiful Smith River and its south fork.

Formal presentations were consistently of high quality and very stimulating, on a variety of topics:

- **Wayne Mathis and Chris Thompson**: Diptera of the Delmarva States
- **Gary Dodson**: Mating system of a hilltopping bombyliid in Australia
- **Gregory Curler**: The Psychodidae of Thailand
- **Paul Frandsen,** Riley Nelson, and Limb K. M. Hapairai: Distribution of flies (Diptera) on Maupiti, French Polynesia
- **Riley Nelson**: Flies in Mongolia: yellow pans and estimating ranges of species
- **Matthew Van Dam**: *Raphiomidas* systematics
- **Isaac Winkler**: Biology and diversity of balloon flies, *Empis* (*Enoplempis*), in North America
- **Torsten Dikow**: The Encyclopedia of Life & Diptera Research
- **Chris Thompson** and Tom Pape: Status of the BioSystematic Database of World Diptera (BDWD)

On Wednesday evening, a copy of Steve Marshall's recent book, "500 Insects: A Visual Reference" was presented to Bob Mize, on behalf of our group, for his critical help in hosting the meeting. Also Wednesday evening, we discussed potential locations for the next NADS field meeting. Riley Nelson kindly agreed to organize and help host the meeting in Utah for 2011, at least on a tentative basis. So we can look forward to that!

For all participants, for any collections made in the State and National Parks under the permits provided, please send to Steve Gaimari (sgaimari@cdfa.ca.gov) a list of identified taxa (for any identified to genus or species) you may have for each park by the end of February. This is part of the annual reporting for the State and National Parks collecting permit, and note that we received special permission to add the NADS members for this meeting, which will require a separate report! Of course, any lists of species for localities outside the parks would be welcome as well – with enough response, Steve may post a web page about the collections made during the meeting.

Wayne Mathis currently holds the record for diversity (taxon richness) on a NADS field meeting day, collecting 19 genera and 30 species of ephydrids on August 6, 2005, in SE Oregon. Did anyone do better than that this time? Whether you have new records to share or otherwise, please send species lists as they become available.

Thanks to all who attended the meeting!

Kneeling (left to right): Peter Kerr, Terry Wheeler, Ken Collins, Joel Gibson, Terry Whitworth, Riley Nelson, Vanessa Christensen, Margarita Chase, Julia Mlynarek, Adrienne Burke. Standing (l to r): Greg Curler, Jeff Cumming, Matthew Van Dam, Owen Lonsdale, Shelah Morita, Gary Dodson, Isaac Winkler, Brian Wiegmann, Torsten Dikow, Keith Bayless, Faye Whitworth, Martin Hauser, Brad Sinclair, Wayne Mathis, Scott Brooks, Dianne Mathis, Jim O'Hara, Marjolaine Giroux, Eric Fisher, Paul Frandsen, Stephanie Boucher, Steve Gaimari, Jim Hogue, Daniela Ramirez, Chris Thompson, Betty Thompson. Not pictured: Steve Marshall, Steve Marshall, Jr., Greg Courtney, Kevin Barber.

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The Fourth International Meeting on Taxonomy and Natural History of Tephritoidea
Great Smoky Mountains National Park, USA

by Xiaolin Chen[1] & Allen Norrbom[2]

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The Fourth International Meeting on Taxonomy and Natural History of Tephritoidea was held at the Great Smoky Mountains National Park, Gatlinburg, Tennessee from June 9-14, 2008. Twenty-four participants from 11 countries attended this meeting organized by Drs. Bruce Sutton, Gary Steck (Florida Dept. of Agriculture & Consumer Services, Gainesville, FL), and Allen Norrbom. The meeting was held in the beautiful new Twin Creeks Science Center of the National Park and included 28 presentations concerning the systematics, biology, evolution, or identification of various flies of five families of Tephritoidea. Several field trips were made to collect insects in various parts of the Park and contribute to the Park's All Taxon Biological Inventory. Below are a list of presentations and several photos of this meeting.

List of presentations

1. Overview of GSMNP: history, geologic history, general flora and fauna, diversity, geography, habitats - Keith Langdon/ Becky Nichols (NPS)
2. GSMNP Museum – Adriean Mayor, Museum curator
3. Tephritidae of GSMNP – Bruce D. Sutton
4. Discussion of Tephritidae host database, update to names database – Allen L. Norrbom
5. The Tephritid Barcode Initiative – Norman Barr
6. The Tephritid Barcode Initiative: A systematics perspective – Karen Armstrong
7. Mitochondrial phylogeny and higher classification of Tephritidae: current status and future perspective – Ho-Yeon Han & Kyung-Eui Ro

The Talk of Dick Drew (Griffith University, Brisbane, Australia)

The Talk of Bruce Sutton (Florida Dept. of Agriculture & Consumer Services, Gainesville, FL, USA)

8. Changes to Classification of Neotropical Tephritidae resulting from Manual of Central American Diptera – Allen L. Norrbom
9. Introduction to Carpomyina and taxonomy of *Goniglossum* – Amnon Freidberg
10. Evolution of host association in the endemic Hawaiian tephritids – Jackie Brown
11. Partial taxonomic organization of genus *Neosilba* McAlpine (Diptera: Lonchaeidae) based on males – Cheslavo A. Korytkowski
12. An ongoing systematic study on Chinese Platystomatidae, Ulidiidae and Tephritidae in recent years – Xiao-lin Chen
13. Ulidiidae – Amnon Freidberg
14. Phylogeny and taxonomy of the *Carpomya* clade – Amnon Freidberg
15. Progress on the molecular phylogenetics of the genus *Anastrepha* (Diptera: Tephritidae) – Peter H. Kerr, et al. (poster)
16. Revision of *Anastrepha robusta* and *speciosa* groups – Norrbom & Korytkowski
17. Diversity and geographic distribution of *Anastrepha* in Peru – Norma Nolazco
18. Pathway analysis of Medfly using mtDNA – Norman Barr

The Talk of Amnon Freidberg (Tel Aviv University, Tel-Aviv, Israel)

Gary Steck, Cheslavo Korytkowski and Wayne Mathis

Field work (Masahiro Sueyoshi) in the Great Smoky Mountains National Park

Valery Korneyev, Kenji Tsuruta, Ho-Yeon Han, Norma Nolazco, Kyung-Eui Ro, Xiao-lin Chen

19. A revision of the *ruficauda* subgroup of *Terellia* Robineau-Desvoidy s. str. (Diptera: Tephritidae) – Severin Korneyev & Valery A. Korneyev
20. *Paramyiolia* biology – Gary J. Steck
21. Taxonomy, phylogeny, and life history of new species of *Prochetostoma* (Diptera: Tephritidae) feeding on fruits of *Ilex* (Aquifoliaceae) of Japan – Masahiro Sueyoshi
22. Biology and ecology of *Goniglossum* – Amnon Freidberg
23. Generic classification of the Old World Pyrgotidae (Diptera: Tephritoidea) – Valery A. Korneyev
24. Phylogenetics of the subgenus *Ceratitis* (*Pterandrus*) based on mitochondrial and nuclear markers – Norman Barr
25. The status of knowledge of fruit fly species in South-East Asia and the Pacific Region - Dacinae: Dacini – Richard A. I. Drew
26. Four new and unusual dacine species from Papua New Guinea – Meredith Romig
27. Preliminary morphological study of male external genitalia in dacine fruit flies – Kenji Tsuruta
28. Larvae of bamboo infesting tephritids – Gary J. Steck

Allen Norrbom, Severin Korneyev, Norman Barr, Gary Steck

Group Dinner

View from The Purchase

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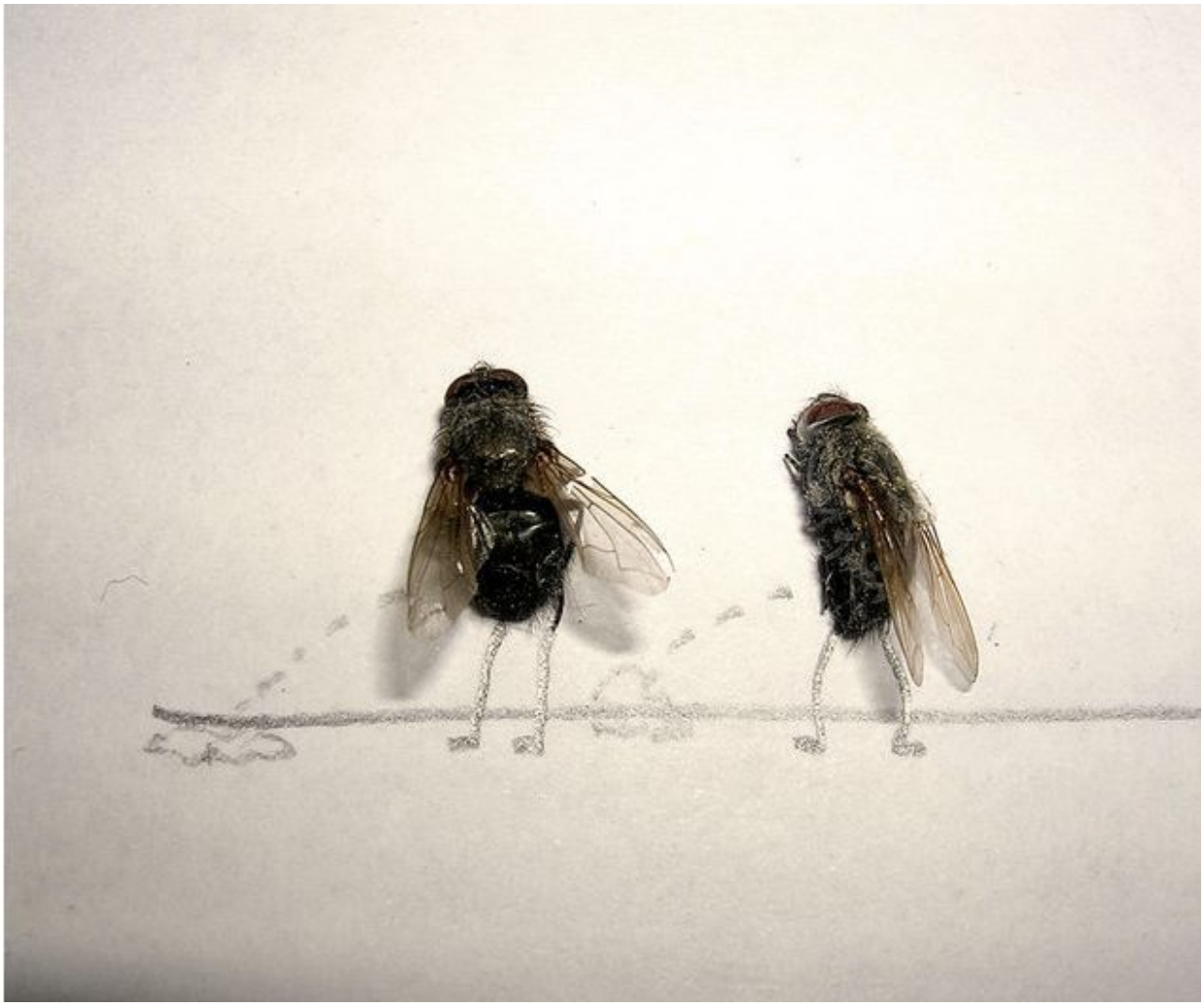
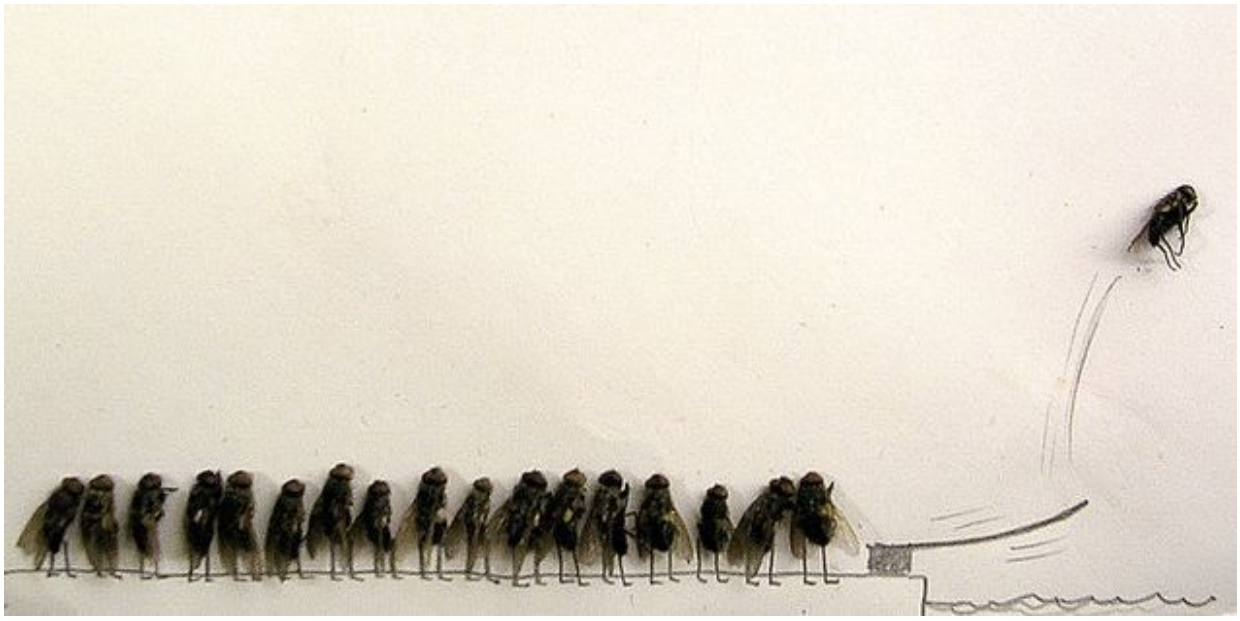
And to think, we want to put them on pins!!





Thanks to the several people who sent me copies of these and other images, by photographer Magnus Mur (http://www.muhrfoto.se/). More of these are found in the following gallery on his website: http://muhrgalleri.area81.se/#11.0, and can also be seen at http://acidcow.com/pics/4553-dead-flies-art-15-pics.html.

BOOKS AND PUBLICATIONS

Note from the editor: I usually accumulate the various citations to list here by scanning through the Zoological Record. Note, many of the papers in the list are from Zootaxa – this is reflection of the fact that the majority of papers on Diptera taxonomy seem to be published in Zootaxa – not due to my own biases! Also, by inclusion, I am not attesting to quality (of course I haven't read all of them)! In any case, I am bound to miss some of the things you might want to see, so by all means, please send me citations for papers (your own or those of others) that you would like to see here! I am happy to include them! As a generality, I try to keep the focus either broad-based (e.g., large treatises), of general interest, or specific to the Nearctic (or at least New World) fauna. Many more papers would be included if revisions of Old World groups were included.

As a special recognition, the Manual of Central American Diptera, Volume 1, has been published, with the reference as follows:

Brown, B.V., A. Borkent, J.M. Cumming, D.M. Wood, N.E. Woodley & M. Zumbado (eds.), Manual of Central American Diptera, Volume 1. National Research Council Press, Ottawa, 714 pp. (see http://pubs.nrc-cnrc.gc.ca/eng/books/books/9780660198330.html)

Other books and publications:

Aluja, M., J. Rull, D. Perez-Staples, F. Diaz-Fleischer & J. Sivinski. 2009. Random mating among *Anastrepha ludens* (Diptera: Tephritidae) adults of geographically distant and ecologically distinct populations in Mexico. Bulletin of Entomological Research 99: 207-214.

Arillo, A., E. Penalver & V. Garcia-Gimeno. 2009. First fossil *Litoleptis* (Diptera: Spaniidae) from the Lower Cretaceous amber of San Just (Teruel Province, Spain). Zootaxa 2026: 33-39.

Arnold, S.E.J., V. Savolainen & L. Chittka. 2009. Flower colours along an alpine altitude gradient, seen through the eyes of fly and bee pollinators. Arthropod-Plant Interactions 3: 27-43.

Azar, D., A. Waller & A. Nel. 2009. A phantom midge from Lower Cretaceous Lebanese amber (Diptera, Chaoboridae). Denisia 26: 29-34.

Barnes, J.K., M.E. Slay & S.J. Taylor. 2009. Adult Diptera from Ozark caves. Proceedings of the Entomological Society of Washington 111: 335-353.

Boesi, R., C. Polidori & F. Andrietti. 2009. Searching for the right target: oviposition and feeding behavior in *Bombylius* bee flies (Diptera: Bombyliidae). Zoological Studies 48: 141-150.

Borges, Z.M., & M.S. Couri. 2009. Revision of *Toxomerus* Macquart, 1855 (Diptera: Syrphidae) from Brazil with synonymic notes, identification key to the species and description of three new species. Zootaxa 2179: 1-72.

Borkent, A., & W.L. Grogan, Jr. 2009. Catalog of the New World biting midges north of Mexico (Diptera: Ceratopogonidae). Zootaxa 2273: 1-48.

Brake, I. 2009. Revision of *Milichiella* Giglio-Tos (Diptera, Milichiidae). Zootaxa 2188: 1-166.

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Brochu, K., & T.A. Wheeler. 2009. Systematics and ecology of the Nearctic species of *Neophyllomyza* (Diptera: Milichiidae). Canadian Entomologist 141: 103-111.

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Chua, T.H., Y.L. Tan, J. Harikrishna & S.H. Lim. 2009. Phylogenetic relationships of Malaysian *Bactrocera* species based on mitochondrial cytochrome oxidase I sequences and morphological characters (Tephritidae: Diptera). Malayan Nature Journal 61: 34-47.

Curler, G.R. 2009. A revision of the genus *Gondwanoscurus* Jezek (Diptera: Psychodidae). Zootaxa 2169: 21-34.

Dennis, D.S., R.J. Lavigne & J.G. Dennis. 2009. Lepidoptera as prey of robber flies (Diptera: Asilidae) with unpublished records. Journal of the Entomological Research Society 11: 71-84.

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SUBMISSION FORM
DIRECTORY OF NORTH AMERICAN DIPTERISTS

For those who have not yet sent in a synopsis of their interests for the *Directory of North America Dipterists*, the following form is provided. Please restrict yourselves to no more than 20 words when listing the titles of your major projects and the animals you work with. Should any of you like to expand or modify your entries from the last list, use the form to indicate the changes.

The information can be emailed, or the form completed and faxed or sent to the following address:

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Invertebrate Biodiversity
Agriculture & Agri-Food Canada,
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Full name: _____

Address: _____

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_____ **Telephone**: _____

FAX: _____ **Email**: _____

Projects and taxa studied: _____

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