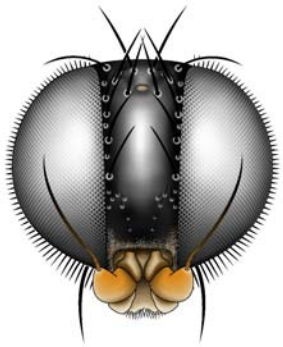
Phorid Newsletter



Brian V. Brown, editor Number 9
Drawing of *Melaloncha deinocerca* Borgmeier by Lai Shan Mui 27 November 2001
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Beginning to study the bee-killing flies, the parasitoid genus *Melaloncha* Brues
by Brian V. Brown

For the last several years, I have been working almost exclusively on ant-decapitating flies, genus *Apocephalus* Coquillett. Although I have treated over 250 species, including about 200 new to science, this project is still far from done. However, after such a sustained effort I felt I needed a change. In 1998, I started to gather the information to embark on a new project, a study of the bee-killing flies, genus *Melaloncha* Brues, and last year I obtained a National Science Foundation grant to support this project.

Melaloncha species are almost exclusively Neotropical (one specimen is known from the southern USA) and are represented by 32 described species. They are endoparasitoids, injecting their eggs inside their hosts- mostly stingless bees, but also the introduced honey bee (*Apis mellifera*) and on one recorded occasion, a bumble bee (*Bombus*). Other than this, almost nothing was known about these flies.

One problem that became quickly apparent was that these flies are rarely collected. The 32 described species were based on less than 100 specimens in total. Malaise traps collected them, but only in small numbers; for instance, in the same series of over 400 Malaise trap samples from Costa Rica that yielded 3,362 *Apocephalus* there were only 114 *Melaloncha* specimens. Otherwise, I had collected specimens only on rare occasions when they were present at the entrances to stingless bee nests; finding such nest entrances frequently yielded no flies. Clearly, a new technique was necessary.

My first thoughts of a bee screen were kindled by my collecting a *Melaloncha* specimen on an insect net upon which stingless bees were congregating at Las Alturas, Costa Rica in 1995. This reminded me of ant-parasitizing phorids that are often attracted to aggregations of their hosts (Brown, 1997; Feener 1981; Feener & Brown, 1992). I further collected a number of specimens of *M. furcata* Borgmeier

attracted to a swarming mass of stingless bees around a Malaise trap head near Leticia, Colombia in 1997. Still, the only reliable collecting method I had was to search for the nests of bees and hope that flies were present.

A much more impressive display of the attractiveness of aggregated hosts occurred at the Wilson Botanical Garden in Costa Rica in 1998, where we made the largest collection of *Melaloncha* flies up to that time. On the flowers of a number of Brazilian *Syagrus coronata* palms, Vladimir Berezovskiy and I collected 129 *Melaloncha* of 7 species, attacking at least 6 species of stingless bees that were present in large numbers on the flowers.

Obviously, it would be impossible to take flowering *S. coronata* palms with me into the field every time I wanted to collect *Melaloncha*. Therefore, I had to create an artificial flower display that would attract large numbers of bees, and hopefully many parasitic phorid flies. With the collaboration of my student assistant, Ms. Giar-Ann Kung, we came up with the bee screen, which consisted of a white pillow case with 8 plastic vials contained in small pockets. We used a white pillow case to provide a light-colored background to easily see the small, dark flies, but I also had in my mind that the flowers of the palms at the Wilson Botanical Garden were white, as were those of caobatá (*Cupania vernalis*) and calla lillies upon which Borgmeier reported *Melaloncha* specimens were collected in Brazil. We first tried this bee screen at Amacayacu National Park in Amazonian Colombia (elevation 150 m) on 9 March, 2000. After suspending it vertically from four grommetted holes in the corners of the pillow case and filling the vials partially with honey, we waited to see what would happen.

Amacayacu was perhaps the most forgiving place we could have tested such a trap. There are almost always swarms of stingless bees present, congregating on perspiring humans, sometimes becoming extremely annoying. It was a small step for the bees to fly from our bodies onto the bees screen where they quickly found the honey. At first, however, attraction to the bee screen was minimal, with the bees actually more attracted to Giar-Ann's sweaty watchband, which we also attached to the screen. Within a short period of time we collected our first *Melaloncha*, again *M. furcata*, attracted to the small black species of stingless bees swarming on us and the screen. Additionally, on this first day, we caught some specimens of *Styletta crocea* Borgmeier attacking these bees, providing the first recorded observation on the way of life of these flies (Brown, 2000). Actually, I saw the first attacks of these tiny, yellow flies on Giar-Ann's black watch band- they are unfortunately difficult to see against the white bee screen! Other than a few *M. furcata* and *S. crocea*, we got no other specimens that day, but it still was a great success. We noticed that the bees were falling into the vials of honey and drowning, so we put the honey into small, upside down lids on the vials, providing a shallow, easily accessed source of food. Also, we put some honey on white cards on the ground beneath the bee screen; this attracted numbers of another species of bee, but no flies. The bee activity picked up towards the end of the day, with more individuals and species coming to the screen, so we had hopes that the next day would be better.

On the next day, we had large numbers of bee species and individuals, but few phorids. We set up the screen in the same site, in a small clearing around a leaf-

cutter ant nest. Aside from one *M. furcata* and a few *S. crocea*, we got nothing.

We tried two bee screens the next day, one at the original site, and the other in an open, varzea (seasonally flooded) forest. At the original site the screen was immediately inundated with bees, which seemed to be waiting around for us to provide the bait. Giar-Ann got 6 *M. furcata* and a 5 *S. crocea*, all attacking the small, black bee (a species of *Plebeia*). At the varzea site, I got a male and female of another species of *Melaloncha*, but the bee recruitment was slow, and aside from a couple more *M. furcata*, we got nothing more. Near my bee screen, I noted that some bees were swarming on the mud, but were uninterested in the honey I drizzled on the ground near them. Clearly, we had some more to learn about attracting all of the local bees.

The next day I moved the original bee screen to a treefall gap farther up the trail, while Giar-Ann stayed at the varzea site. My screen attracted lots of bees as well as more *M. furcata* and a third species of *Melaloncha*. As she was getting only a couple of *S. crocea*, I urged Giar-Ann to come to the treefall site where there seemed to be more activity. The screen at the treefall was rapidly being overtaken by large, black bees that seemed not to be attacked by the flies, and that were excluding the smaller bees, so we placed some honey-baited cards underneath the screen. Almost instantly these cards attracted large numbers of small and large bees, and we quickly collected several more *Melaloncha*, including the second species I had found at the varzea site and two more new species. Some of the flies became stuck when they landed on the honey covered cards, but a quick dip in water cleaned them off before they were dropped into alcohol. In spite of this screen being in the intense sun and heat of the afternoon, we collected a total of 53 specimens of 6 species, our best results of the trip. Unfortunately, this was also our last day in the field, but it was clear that the bee screen was a success. In comparison, during our trip 1997 trip to Amacayacu, we had collected only 22 *Melaloncha* of 4 species: 6 specimens at a stingless bee nest entrance, 3 at an aggregation of stingless bees and 13 in Malaise traps. This trip we collected 85 *Melaloncha* of 9 species and learned about the previously unknown life history of *Styletta crocea*.

Since then we have used the bee screens in Costa Rica, Colombia (different sites), Peru and Brazil, mostly with great success. This year alone we collected over 300 specimens of these otherwise rarely collected flies. Many times we have observed host-parasitoid behaviors, as well as mating. On these trips we have learned a number of new things:

1) One of the keys to good *Melaloncha* collecting is to have the screens in the bright sunlight, which seems to stimulate their activity. Often, the flies are active only between about 9:00 AM and 3:00 PM, or as long as the sun is shining on the screen. Forest edges and treefall gaps are our favorite collecting sites.

2) Honey bees can be a real curse to this collecting method. If they are present, they will recruit in large numbers to the honey, creating a dangerous mass of hundreds of bees. After some experimentation, however, Giar-Ann and I have learned how to deal with these pests- limit the resource. If we mix 1 part honey with about 4 parts water, and then spray this mixture on the bee

screens, the stingless bee attraction is maintained, whereas the honey bees tend not to recruit so heavily.

3) Spraying the undergrowth close to the ground often is more productive than a bee screen at eye level. The flies seem to prefer to be close to the ground, and I am now setting the screens lower down in an attempt to take advantage of this.

4) Often, it takes a few days of baiting before the flies are attracted. This waiting period is apparently sometimes necessary for the stingless bees to recruit in sufficient numbers to attract flies.

For example, I collected at a site in the northern mountains of Costa Rica, called Albergue de Heliconia on Volcan Tenorio, near the town of Bijagua. I placed two bee screens near the forest edge, but got almost no bee recruitment for two days. Meanwhile, in the nearby flowering trees, high above the ground, there was the constant hum of bees, and in nearby flowering herbaceous plants there were plenty of bees as well. On day one I attracted only a few bees, perhaps 5-10 on the screen at a time; on day two I was up to about 20. By the third day, I finally started getting large numbers, 50 or so, as well as 6 *Melaloncha* of various species. I eagerly anticipated the next, and last, day that I would have to collect here, but was bitterly disappointed to find that it was cool, windy and rainy all day. Although my last day was hopeless, I was interested to find that it took three days for the bee attraction to occur at high enough levels to attract the flies. Clearly there were large bee populations nearby, but they weren t desperate for food and had to be coaxed in.

Another example occurred in Amazonian Peru this summer, where we collected 2 *Melaloncha* on day one, 8 on day two, 10 on day three, and about 30 specimens each of the following 5 days.

This waiting period is not always necessary. In Bolivia this spring we got good bee and fly recruitment at sites within a single day, although better collecting would probably have resulted from longer collecting. Interestingly, we collected in Zona Protectora El Rodeo, Costa Rica, immediately after the Peru trip, and our dirty bee screens actually attracted *Melaloncha* before many bees were attracted. Possibly the flies were attracted to the marking pheromones left on the screens by the Peruvian bees, but much more study is needed to understand the mode of attraction for these flies.

On only one trip, to Belem, Brazil this October, was the bee screen completely unsuccessful. I waited for 3 days, watching a screen swarming with hundreds of bees, but didn t get a single fly. This was in the middle of the dry season, which could have affected my collecting, but I was able to collect two species of *Melaloncha* in other situations: 6 specimens of one species at palm flowers high in a tree and many specimens of another species at bee nest entrances 50m above the forest floor in the hollow pipes of a canopy tower! If I had more time, I would have tried bee screening up high in the canopy.

5) We have abandoned the vials, instead using troughs that we hang in front of the bee screens, to supply large amounts of honey. If there are honey bees present, we just spray the bee screen with honey and water, limiting the resource to stop them from recruiting.

Using the bee screen and

honey/water spraying we have collected over 420 *Melaloncha* specimens over the past two years. We are now up to over 140 species, with many still represented by only a single specimen. Every site yields new species, so there is a long way to go before we will be able to state that we have collected a good percentage of the true diversity. I wouldn t be surprised if we end up with 300 species in total, a ten-fold increase in the currently recognized fauna.

Hopefully this long discussion of a new, highly specialized collecting method will be of service to those studying biodiversity now or in the future. If we can establish an effective, standardized way of collecting these flies, they can be used relatively easily in biodiversity surveys, since the flies are large, colorful and have distinctively shaped ovipositors. Certainly the development of the bee screen represents hard-won knowledge that should be passed on to future generations of phorid workers, and demonstrates how difficult and important field research can be. This new collecting technique allows us to imagine a day in the future when *Melaloncha* will go from being a poorly known, undercollected taxon to one of the better known groups of Neotropical phorids.

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Feener, D. H. Jr. and B. V. Brown. 1992. Reduced foraging of *Solenopsis geminata* (Hymenoptera: Formicidae) in the presence of parasitic *Pseudacteon* spp. (Diptera: Phoridae). *Annals of the Entomological Society of America*. 85: 80-84.

Brian Brown with a bee screen in Costa Rica. Photo by Giar-Ann Kung.

Phoridologists' Directory

The following is a list of the names, addresses and interests of phorid workers on my mailing list. Any additions, corrections or updates would be greatly appreciated. Those wanting to discuss their projects and interests at even greater length are welcome to do so.

Forbes P. Benton, CEPLAC/CEPEC/SECEN, Caixa Postal 7, CEP 45600-000, Itabun, Bahia, Brazil. Telephone (073) 214 3250. FAX (073) 214 3204. Email maxmz@ax.apc.org. *Interests*: Natural history, identification and faunistic surveys of Brazilian Phoridae. Elucidation of phorid life cycles. Behavioral interactions between parasitic species and their hosts.

Marcos A. L. Bragança, Fundação Universidade do Tocantins, Instituto de Biologia, Rua Luiz Leite Ribeiro, s/n, 77500-000, Porto Nacional, TO, BRAZIL. Telephone: 55-63-363 1701. Fax: 55-63-363 1283. E-mail: malbr@uol.com.br. *Interests*: Interactions of phorids and leaf-cutting ants.

Brian V. Brown, Entomology Section, Natural History Museum of Los Angeles County, 900 Exposition Boulevard, Los Angeles, CA, 90007, U.S.A. Telephone (213) 763-3363. FAX (213) 746-2999. E-mail bbrown@nhm.org. *Interests*: Taxonomy, evolution, reconstructed phylogeny, biogeography and natural history of world Phoridae. I have a long-term project to revise the New World, ant-decapitating genus *Apocephalus*, but I am also working on a revision of the bee-parasitizing genus *Melaloncha*. I am interested in collecting methods for phorids, and in biodiversity surveys, especially those conducted in the tropics.

Matthias Buck, Dept. Environmental Biology, University of Guelph, Guelph, ON, Canada, NIG 2W1. Email mbuck@evbhort.uoguelph.ca *Interests*: Ecology and biology of Phoridae; community structure; ecology and biology of small saprophagous (especially necrophagous) Diptera breeding in small-sized and buried vertebrate and invertebrate carrion. Other interests are anatomy of the reproductive organs, larval morphology, phylogeny and hymenopterous parasitoids of small, necrophagous Diptera. So far, I have only worked in the Palaearctic Region.

R. Henry L. Disney, Dept. Zoology, University of Cambridge, Downing Street, Cambridge, CB2 3EJ, United Kingdom. Telephone 0223 336654. FAX 0223 336676. Email rhld2@cam.ac.uk. *Interests*: Biology, taxonomy, phylogenetic reconstruction of world Phoridae. Currently revising Termitoxeniinae, including *Alamira* and *Perissa*.

Ewa Durska, Museum and Institute of Zoology, PAS, Wilcza 64, 00-679 Warszawa, Poland.Email edurska@robal.miiz.waw.pl. *Interests*: Biology, taxonomy, faunistic surveys of Phoridae; behavioral interactions between parasitic species and their hosts; species of *Phalacrotophora* as parasitoids of Coccinellidae.

Donald H. Feener, Jr., Department of Biology, University of Utah, Salt Lake City, UT, 84112, U.S.A. Telephone (801) 581-6444. FAX (801) 581-4668. Email: feener@bioscience.utah.edu. *Interests*: Ant-phorid interactions in general. Specific projects include: 1) chemical ecology of host location in phorid parasitoids of ants; 2) phorid parasitoids as biological control agents of pest ants; 3) evolution of host specificity of phorid parasitoids; 4) behavioral ecology of ant defenses against phorid parasitoids. I work mostly in the New World temperate and tropical regions, especially the southwestern U.S.A. and Central America (Costa Rica, Panama).

Patricia J. Folgarait, Unidad de Investigación en Interacciones Biológicas, Centro de Estudios e Investigaciones, Universidad Nacional de Quilmes, Roque Saenz Peña 180, 1876 Bernal, Buenos Aires, Argentina. Telephone: 54-1 365-7100, ext. 225. FAX 54-1 365-7101. Email

pfolgarait@unq.edu.ar. *Interests*: 1) Ant- parasitoid interactions, in particular for ant pests, 2) biological control of ant pests, and 3) effects of phorids in structuring ant communities. I am currently doing research on phorids of *Solenopsis* and *Camponotus* but I am also interested in phorids of leaf-cutter ants.

Mauro Gori, Via Del Cronaca 19, 50142 Firenze, Italy. Telephone 055/700588. *Interests*: Italian phorid fauna; life histories.

Tadao Gotô, Tohoku Research Center, Forestry and Forest Products Research Institute, 92-25 Nabeyashiki, Aza-Shimokuriyagawa, Morioka, 020-0123 Japan. Telephone +81-19-648-3962. FAX: +81-19-641-6747. Email: tgotoh@ffpri.affrc.go.jp

David H. Kistner, California State University, Chico, CA, 95929-0515, U.S.A. Telephone (916) 898-5116. FAX (916) 898-6804. *Interests*: Mostly interested in Phoridae inhabiting the nests of social insects or preying on social insects. I am interested in all biogeographic regions, but have minimal taxonomic interests. I am currently working in collaboration with Henry Disney on Termitoxeniinae and a study of Phoridae of the upper Sacramento River, based on cantara spill collections.

Victor A. Kolyada, Department of Entomology, Zoological Museum of the Moscow State University, 6 Herzen Str. Moscow 103009, Russia. *Interests*: Taxonomy of the genus *Megaselia* and its fauna in the Palaearctic Region. Interested in exchanging for determined specimens from other biogeographical regions. Also interested in collecting methods.

Ed LeBrun, Department of Biology, University of Utah, Salt Lake City, UT, 84112, U.S.A. Telephone (801) 581-6444. FAX (801) 581-4668. Email: lebrun@biology.utah.edu. *Interests*: Interactions of phorids and ant communities.

Guangchun Liu, Ecological Laboratory, Department of Biology, College of Natural Science, Pusan National University, Pusan 609-735, South Korea. Telephone (051) 510-2261. FAX (051) 581-2962. Email liu@bugs.bio.pusan.ac.kr. *Interests*: Taxonomy of phorids; Chinese phorid fauna; phorids associated with mushrooms in China.

Marina Michailovskaya, Laboratory of Insects, Gornotaezhnaya Station, AN RAN, Ussurijsk District, Primorye Territory, 692533, Russia. Email root@ssursk.vladpost.marine.su. *Interests*: Taxonomy of phorids; Far East phorid fauna, including Primorskiy kraiy, Chabarovskiy kraiy, Sachalin, Kamchatka; phorids associated with dead animals.

Lloyd Morrison, Center for Medical, Agricultural and Veterinary Entomology, USDA-ARS, P.O. Box 14565, Gainesville, FL, 32604, USA. E-mail lmorrison@gainesville.usda.ufl.edu. *Interests*: Effects of phorid parasitoids (genus *Pseudacteon*) on ant foraging and interspecific competition (genus *Solenopsis*); ant host species-specificity of *Pseudacteon* phorids; introduction of South American *Pseudacteon* species to the U.S. (Texas) as biological control agents against the imported fire ant, *S. invicta*.

Mikhail B. Mostovski, Dept. Zoology, University of Cambridge, Downing Street, Cambridge, CB2 3EJ, United Kingdom. Telephone (095) 467-2340. FAX (095) 339-0622. E-mail rasna@glas.apc.org. *Interests*: Phorid fauna of former USSR.

E. Hugh A. Oliver, 172 Upper Dinsdale Road, Hamilton, New Zealand. Telephone 84 79541. FAX 64 7 838 5085. *Interests*: New Zealand phorid taxonomy and natural history.

Matt Orr, Department of Biology, San Francisco State University, San Francisco, CA, 94132, U.S.A. E-

mail morr@sfsu.edu *Interests*: Influences of phorids on ant foraging ecology, especially pest ants. Ant taxa of interest include *Atta*, *Solenopsis*, and *Linepithema*.

Sanford D. Porter, USDA-ARS, CMAVE, 1600 SW 23rd Drive, P.O. Box 14565, Gainesville, FL, 32604, U.S.A. Telephone (352) 374-5914. FAX (352) 374-5818. E-mail sdp@nervm.nerdc.ufl.edu. *Interests*: Ant-parasitizing phorids, especially *Pseudacteon*: oviposition behavior, growth and development of larvae and pupae, host specificity, responses of ant hosts, biocontrol.

Sabine Prescher, Hinter der Masch 26, 38114 Braunschweig, Germany. Telephone 05 31 - 57 90 92. *Interests*: Palaearctic Phoridae, especially ecology of various species. At present I am investigating 1) the Phoridae of agricultural land with oilseed rape and peas; 2) of caverns in Germany and 3) of a forest after fire in Switzerland.

Garnet Suck, Institut für Biologie, Medizinische Universität zu Lübeck, Ratzeburger Allee 160, 23538 Lübeck, Germany. Telephone (+49) 0451-500-4110. Fax (+49) 0451-500-4034. Email suck@molbio.mu-luebeck.de. *Interests*: Anything about phorid flies, especially *Megaselia scalaris*.

Athayde Tonhasca, Universidade Estadual do Norte Fluminense, Centro de Ciências e Tecnologias Agropecuarias, Avenida Alberto Lamego, 2000, Campos dos Goytacazes, RJ, Brazil. *Interests*: Phorids attacking leaf-cutting ants.

Walther Traut, Institut für Biologie, Medizinische Universität zu Lübeck, Ratzeburger Allee 160, 23538 Lübeck, Germany. Telephone (+49) 0451-500-4100. Fax (+49) 0451-500-4034. Email traut@physik.mu-luebeck.de. *Interests*: *Megaselia scalaris*, predominantly with respect to the genetics of sex determination and the evolution of chromosomes.

Holger Triltsch, Federal Biological Research Center for Agriculture and Forestry, Institute for Integrated Plant Protection, Stahnsdorfer Damm 81, D-14532, Kleinmachnow, Germany. Telephone 033 203/22423-5, /48 300. FAX 033 203/22278. *Interests*: Species of *Phalacrotophora* Enderlein as parasites of Coccinellidae, especially *Coccinella septempunctata* L.; factors which determine the degree of parasitization; distribution in cereal fields and farmland.

Sven-Olof Ulefors, Färgerivägen 9, 380 44 Alsterbro, Sweden. Telephone 46-481-50462. Email so.ulefors@swipnet.se. *Interests*: Palaearctic species of *Megaselia*; separation of *M. pulicaria*-group species.