Phorid Newsletter

Brian V. Brown, editor

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This newsletter is long overdue, and I apologize for my tardiness. Hopefully you will find something of interest herein that will make up for the long time since #6 appeared.

In late May of this year, I participated in a meeting of dipterists in Costa Rica to discuss possible projects on Costa Rican Diptera. In preparation for this meeting, I gathered some statistics and information that I would like to share with you.

Phoridae of Costa Rica

The phorid fauna of Costa Rica, like that of all neotropical countries, is characterized by being poorly known and diverse. Having said this, it is of interest to examine what we know of the Costa Rican fauna, based on both previous and recent work. My primary goal was to generate an estimate of the number of phorid species we could expect to find within this small, tropical country.

There are a number of ways to estimate the size of a fauna, all of them fraught with uncertainty and error. I decided to use two separate types of estimates, both based on "known" faunas.

In 1976, Borgmeier published a supplement to his previous phorid catalog. This date is my cutoff point for one "known" fauna- all phorids described before the efforts of the current generation of phorid specialists. The catalog and supplement listed a total of 1,002 species of phorids in the Neotropical Region. One third of these species were *Megaselia*.

My second "known" fauna is a much more restricted one- the ant-parasitizing phorids of La Selva Biological Station. Based on my studies there, I estimated that there might be as many as 160 or more species of *Apocephalus* alone (Brown & Feener, 1995), although so far we have collected "only" 94 species. Additionally, I found at least 34 species of other ant parasitoids by hand-collecting and by examining Malaise trap catches (Brown,in press).

My raw data for these estimates were generated by examining a large number of Malaise trap samples over the last 7 years, as well as from my own collecting trips to Costa Rica and from examining the collection of the Instituto Nacional de Biodiversidad. I identified all specimens of the following groups of phorids, usually to morphospecies (because there are so many undescribed taxa):

TABLE 1. Number of Neotropical species known up to 1976, number of species from Costa Rica and ratio of Costa Rica to pre-1976 totals.

Genus	pre-1976	#CR	CR/pre-1976 ratio
Phora	2	3	1.50
Stichillus	8	10	1.25
Neopleurophora	2	15	7.50
Diplonevra	15	4	0.27
Dohrniphora	84	36	0.43
Gymnophora	28	2	0.07
Physoptera	11	16	1.45
Melaloncha	32	53	1.66
Neodohrniphora	6	6	1.00
Apocephalus			
(*Mesophora*)	2	24	12.00
attophilus-gp	12	23	1.90
miricauda-gp	7	29	4.14
Totals	209	221	

Note: Ratio of #CR/#pre-1976= 214/207= 1.06

Therefore, our first estimate of Costa Rican diversity can be the ratio of Costa Rican species per described, pre-1976 species, 1.06, multiplied by the pre-1976 total, 1,002. This yields an estimate of 1,062 Costa Rican species.

Another estimate can be generated by looking at the fauna of La Selva more closely:

TABLE 2. Number of species known from La Selva and Costa Rica.

Taxon	# La Selva	#CR
Apocephalus		
attophilus-gp	16	26
miricauda-gp	12	29
Totals	28	55

These two groups make up about 30% of the total La Selva *Apocephalus* fauna (28/94). Therefore, the 55 species found in the entire country would be 30% of a total of 183 Costa Rican *Apocephalus* species. Of course, these are minimum numbers, as the number of species at La Selva is expected to continue to rise, but it at least gives us some minimum value. In the pre-1976 literature, *Apocephalus* consisted of 70 Neotropical species, or 7% of the entire fauna. If the Costa Rican *Apocephalus* fauna is indeed 183 species, then this represents 7% of a total of 2,614 phorids. Likely, the *Apocephalus* fauna is larger, and thus this estimate could increase sharply.

I realize that these estimates are full of inaccuracies and are subject to tremendous variation. For instance, some genera like *Dohrniphora* are represented by a small fraction of their entire Neotropical diversity (see Table 1). This is not a sampling bias; I have a relatively large number of *Dohrniphora* specimens (629) upon which to base this ratio. On the other hand, some genera, such as *Neopleurophora* are many times more diverse in Costa Rica than in the pre-1976 literature. In this instance, there are indeed a small number of specimens (68), so I expect the number of species in *Neopleurophora* to increase. Finally, a few genera, such as *Gymnophora*, are much more diverse in the cooler parts of the Neotropical Region, and will not be well-represented in Costa Rican samples. In terms of species numbers, some genera will be more like *Dohrniphora* or *Gymnophora*, others more like *Neopleurophora*.

Another problem is with one of our "known faunas," the Neotropical Region phorids described before 1976. Such a list obviously is idiosyncratic, with easily collected species (possibly like those in the genus *Dohrniphora*) dominating. Individual interests of the researcher can also skew the numbers; luckily for us, however, Borgmeier had a widespread interest in the family and treated all groups relatively equally.

Finally, we have to face up to the problem of *Megaselia*. The pre-1976 diversity of this genus is "only" one third of the total neotropical fauna, whereas on a worldwide level, it is closer to 45%. Possibly this indicates that the neotropical *Megaselia* fauna is even more poorly known than that of other regions, and with further study its number of contained species will rise sharply.

In summary, two estimates of Costa Rican phorid species richness range from about 1,000 to

over 2,500 species; the larger number is over 80% of the entire world fauna as we currently know it (at about 3,140 species). It will be interesting to see which estimate will be supported by further studies in this country, or if a much lower or higher number will be found. Either way, it is clear that Costa Rica is a spectacularly diverse place and deserves continued intense study.

Literature cited

Brown, B.V. (in press) Differential host use by neotropical phorid flies (Diptera: Phoridae) that are parasitoids of ants (Hymenoptera: Formicidae). *Sociobiology*, **33**, 95-103.

Brown, B.V. & Feener, D.H., Jr. (1995) Efficiency of two mass sampling methods for sampling phorid flies (Diptera: Phoridae) in a tropical biodiversity survey. *Contributions in Science*, **459**, 1-10.

Phorid web page

My web page for phorid information has been given a new, less clunky address:

http://www.nhm.org/phorids.html

The old address will still work, also.

From Dr. Guangchun Liu

I made a list of my recent publications; reprints are available to all phoridologists:

1. Liu, G. 1996. *Chaetogodavaria sinica* gen. n., sp.n. (Diptera: Phoridae) from China. The Entomologist 115 (1): 14-16.

2. Liu, G. 1996. A new genus *Chouomyia* with two new species from China (Diptera: Phoridae). Studia Dipterologica (2):185-188. [Studia Dipterologica says it was published in Dec 1995]

3. Liu, G. 1996. *Ctenopleuriphora* gen. n.: a remarkable new genus of Phoridae (Diptera) from China. European Journal of Entomology 93: 641-644.

4. Liu, G. and Io Chou. 1996. The genus *Stichillus* Enderlein (Deptera: Phoridae) from China. Entomotaxonomia 18(1): 35-46. (in Chinese with English summary)

5. Liu, G. and Q. Zeng. 1995 A new species of the new-recorded genus *Borophaga* Enderlein (Diptera: Phoridae) from China. Entomotaxonomia 17(2): 125-128. (in Chinese with English summery)

6. Liu, G. and Q. Zeng. 1995. A further new species of Trophithauma Schmitz (Diptera: Phoridae) from China. Animal Research (4): 349-351.

7. Liu, G. 1995. A taxonomic study of *Diplonevra* (Diptera: Phoridae) from China. Journal of Shenyang Agricultural University 26(3): 254-259. (in Chinese with English summary)

8. Liu, G. and Io Chou. 1994. The genus *Phora* Latreille (Diptera: Phoridae) from China. Entomotaxonomia. 16 (1): 63-70.

9. Liu, G. and Io Chou. 1993. A new species of *Trophithauma* Schmitz (Diptera: Phoridae) from China. Entomotaxonomia 15 (3): 128-130.

10. Wolf, K. W. and G. Liu. 1996 Fine structure of the egg-shell in two humpbacked flies, *Megaselia scalaris* and *Megaselia spiracularis* (Phoridae, Diptera, Insecta). Int. J. Insect Morphol. & Embryol., 25(3): 289-294.

11. Wolf, K. W., A. Mitchell, and G. Liu. 1996. Centromere-like elements in *Megaselia spiracularis* (Diptera: Phoridae): A fine-structure and cytogenetic study. Hereditas 124: 203-209.

More literature from Matthias Buck:

Checking my literature database I became aware that there are several papers on Phoridae which I forgot to report to you. You may include these references in the next issue of the Phorid Newsletter:

1994:

Wells, J.D. and B. Greenberg. 1994. Resource use by an introduced and native carrion flies. Oecologia 99: 181-187. [Megaselia scalaris]

1995:

Belcari, A., Daccordi, M., Kozanek, M., Munari, L., Raspi, A. and L. Rivosecchi. 1995. Diptera

Platypezoidea, Syrphoidea. In Minelli, A., Ruffo, S. and S. La Posta (eds): Checklist delle specie della fauna italiana. Bologna: Edizioni Calderini. Fascicolo 70: 25 pp. [100 spp. in 13 gen.]

Buechner, S. 1995. Die Dipterenfauna unterschiedlich bewirtschafteterAckerflaechen. Untersuchung im Rahmen des interdisziplinaeren Projektes: OEkologische Auswirkungen von Extensivierungsmassnahmen im Ackerbau unter besonderer Beruecksichtigung der Entwicklung integrierter Anbausysteme am Beispiel einer Rapsfruchtfolge (IntEx-Projekt). Goettingen: Cuvillier-Verlag [ISBN 3-89588-182-1], V + 233 pp. [65 spp. in 9 gen.]

Engel, M. 1995. Die Fliegen und Muecken (Diptera) eines sauren Fichtenforstes in der Eifel und ihre Reaktionen auf Kalkungsmassnahmen. Pollichia-Buch 32: 283 pp. [29 spp. in 7 gen.]

Franzen, J. and W. Buechs. 1995. Kulturspezifische Auspraegung der Fliegenzoenose (Diptera: Brachycera) einer Zuckerruebenfruchtfolge unter dem Einfluss eines unterschiedlich intensiven Produktionsmitteleinsatzes. Mitteilungen der Deutschen Gesellschaft fuer Allgemeine und Angewandte Entomologie 10: 573-578. [4 spp. in 3 gen.]

Franzen, J. and W. Buechs. 1995. Fliegen (Diptera: Brachycera) auf langfristig unterschiedlich intensiv bewirtschafteten Ackerflaechen. Mitteilungen der Deutschen Gesellschaft fuer Allgemeine und Angewandte Entomologie 9: 641-648. [26 spp. in 7 gen.]

Weber, D. 1995. Die Hoehlenfauna und -flora des Hoehlenkatastergebietes Rheinland-Pfalz/Saarland, 3. Teil. Abhandlungen zur Karst- und Hoehlenkunde 29: 322 pp. [11 spp. in 3 gen.]

1996:

Franzen, J. Buechs, W. and D. Teschner. 1996. Neu- und Wiederfunde von Sphaeroceridae, Phoridae, Anthomyiidae und Hybotidae (Diptera Brachycera) in Deutschland. Studia Dipterologica 3: 373-376. [Megaselia abdita]

1997:

Werner, D. 1997. Die Dipterenfauna verschiedener Muelldeponien und Kompostierungsanlagen in der Umgebung von Berlin unter besonderer Beruecksichtigung ihrer OEkologie und Bionomie. Studia Dipterologica, Supplement 1: 176 pp. [25 spp. in 8 gen.]

The numbers of mentioned phorid genera and species are given in brackets. Most papers deal with Phoridae (and other Diptera) collected by emergence traps ("Photoeklektoren") in various habitats (arable fields: Buechner and Franzen; spruce stands: Engel; refuse dumps: Werner). Weber reports Phoridae from extensive studies in caves of southwest Germany.

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.

Jeffery K. Barnes, Biological Survey, Rm.3132, Cultural Education Center, Albany, NY, 12230, U.S.A. Telephone (518) 486-2004. Email jbarnes2@museum.nysed.gov.

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.

Brian V. Brown, Entomology Section, Natural History Museum of Los Angeles County, 900 Exposition Boulevard, Los Angeles, CA, 90007, U.S.A. Telephone (213) 744-3363. FAX (213) 746-2999. E-mail brianb@bcf.usc.edu. *Interests*: Taxonomy, evolution, reconstructed phylogeny, biogeography and natural history of world Phoridae. Currently I have a long-term project to revise the New World, ant-decapitating genus *Apocephalus*. I am interested in collecting methods for phorids, and in biodiversity surveys, especially those conducted in the tropics.

Matthias Buck, Dept. Ecology and Morphology of Animals, University of Ulm, Albert-Einstein-Allee 11, 89069 Ulm, GERMANY. E-mail buck@BIOFS1.biologie.uni-ulm.de. *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. Future aspirations include a postdoctoral fellowship, or curatorship of Diptera at some natural history museum.

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, Polska Akademia Nauk, Muzeum i Instytut Zoologii, 00-679 Warszawa ul Wilcza 64, Poland. *Interests*: Phoridae of Poland

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, Central Forest Research Lab and Training Center, Royal Forest Department, Bangken, Bangkok, 10900 Thailand.

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.

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, Zoology Department, University of Texas, Austin, TX, 78712, U.S.A. Telephone (512) 471-2825. FAX same as telephone. E-mail lmorrison@mail.utexas.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, Arthropod Laboratory, Palaeontological Institute, 123, Profsoyuznaya Str., Moscow, 117647, Russia. 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. Current projects include determination of specimens and evaluation of the results of Phoridae collected in: 1) the nature preserve area "Apfelstedter Ried" in Thuringia (Germany) with moist meadows; 2) moist meadows, dry meadows, wheat fields and maize fields at the village Limpach near Zürich, Switzerland; 3) caverns in Rhineland-Pfalz, Germany.

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, Ringvägen 14, 4tr, 737 41 Fagersta, Sweden. Telephone 46-223-19541. *Interests*: Canadian species of *Megaselia*; separation of *M. pulicaria*-group species.

Axel Froese and Bill Robinson have both informed me that they no longer work on phorids.

Next issue!

If anyone would like to contribute an article, or any other information of phoridological interest, please let me know.