FLY TIMES

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April! Here in southern Canada it's a time of unexpected snowstorms with intermittent warm days, with emerging Diptera and the promise of new life. Our Diptera community is plugging along, and numbers of new projects have been initiated.

This issue contains our regular reports, announcements and selected literature (i.e. the publications we remembered to write down). In addition, we are including an English translation of a biography of Willi Hennig written by Dieter Schlee in 1978. Surprisingly, considering his huge impact in evolutionary thought, little has been written about Hennig's life and this translation will be of interest to many of you.

As indicated in other issues, this newsletter is also available through the ECORC website as follows: http://res.agr.ca/ecorc/program2/entomology/flytimes/flytime.htm

The *Directory of North American Dipterists* is on the web and can be accessed at the following address: http://res.agr.ca/ecorc/program2/entomology/diptera/dipteras.htm

Issue No. 27 of the *Fly Times* will appear next October as both hard copy (for those of you without Internet access) and on the Web. If possible, please send either editor your contributions by email, or on disc; electronic contributions make putting the *Fly Times* together much faster. Those of you with hard copy contributions (last possible choice) may fax, or mail your message to Art Borkent at the above listed address. **Please note the modified mailing address for Art**. All contributions for Issue No. 27 should be sent by the end of September, 2001.

NEWS

NADS Meetings for June 1-4, 2001 - Register NOW

by Frank E. French

The North American Dipterists' Society and the Biting Fly Workshop will meet jointly June 1-4, 2001, at Sul Ross University, Alpine, Texas. Collecting will be permitted in a large Nature Conservancy tract in the nearby Davis Mts. and elsewhere in the Chihuahuan Desert Region in Trans-Pecos Texas. For information and registration contact:

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Call for Papers for the NADS Meetings in San Diego, at ESA December 9-13, 2001

by Brian V. Brown

Greetings fellow Dipterists. I have been "volunteered" to organize the NADS informal conference for the ESA meeting this year. In order to have titles of talks placed in the ESA program, we need to have them by the end of this month. Therefore, anyone wishing to give a presentation please get in touch with me as soon as possible (I am going into the field on 29 March). Another alternative available to those unable or unwilling to come up with a title this early, but who still want to make a presentation, is that we list our meeting in the ESA program without titles. We could organize our session later, and distribute the list of speakers via Fly Times in October. Note that talks not be listed in the ESA program. Probably we will have to do a combination of these. For those of you who feel it is important to be listed in the program, please contact me as soon as possible. Others will still get a chance to speak.

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North American Dipterists' Society Informal Conference 2000, Montreal, Canada

by Scott E. Brooks and Jade Savage
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The 2000 NADS Informal Conference was held at Montreal's Palais des Congrès last December during the Annual Meeting of the Entomological Society of America. Overall the conference was a success. In contrast to past meetings, which have typically been held during the evening, December's meeting was scheduled (by the ESA organizing committee) in the afternoon. Although this was a break in a long standing NADS tradition, the earlier time slot turned out to be a good thing as it seemed to result a larger audience. Six talks were given dealing with dipteran systematics and the use of Diptera in biotic surveys. Jeff Cumming of the CNC, Ottawa presented a new cladistic classification of the Empidoidea based on his recent work with Brad Sinclair. Miranda Smith, a Master's student of Doug Currie at the Royal Ontario Museum, discussed the results of her molecular analysis of *Simulium* s.str. Brian Brown of the Natural History Museum of Los Angeles County, presented data from 3 years of Malaise trapping ant-decapitating phorids at La Selva Biological Station, Costa Rica, and provided comments on rarity and techniques for optimizing sampling. Fiona Hunter of Brock University, St. Catharines, discussed the results of a survey of the Niagara Escarpment, which indicates that several families of Diptera can be used as indicators of water quality. Steve Marshall of Guelph University discussed and contrasted several Canadian biodiversity projects with ongoing Neotropical surveys and explained the problems and opportunities presented by the Costa Rican Sphaeroceridae and Micropezidae. Brian Wiegmann discussed recent progress in the Diptera survey of the Great Smoky Mountains National Park and urged everyone to get involved. After the scheduled talks further discussions were held on a wide range of topics such as updates on the next NADS field meeting being held in the Davis Mountains of Texas, announcement of recent Diptera products fromWashington, and a report on the bizarre natural history of fergusoninid flies that are now in quarantine and set for release in Florida. Following the meeting, many dipterists gathered at Pub St. Paul in Old Montreal for refreshments and further discussion. Thanks to all the speakers and participants for making the 2000 meeting a great one! The 2001 NADS Informal Conference, in San Diego, California, is being organized by Brian Brown.

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News from Washington D.C.

by Norm Woodley and Chris Thompson
Systematic Entomology Lab., ARS, USDA, Smithsonian Institution, Washington, D.C.

The Department of Entomology, Smithsonian Institution, passed away peacefully in its sleep last month. It was only 38 years old. At the same time, the Department of Systematic Biology was born and is now under the acting leadership of Scott Miller. The Diptera program in Washington remains the same. The regulars are still here (Ray Gagne, Chris Thompson, Wayne Mathis, Norm Woodley, and Allen Norrbom, with Holly Williams, Nancy Adams and Lucrecia Rodriguez downtown; Sonja Scheffer at Beltsville; Rick Wilkerson, Dan Strickman, and Mark Potter, with Tom Gaffigan and Jim Pecor at the

Museum Support Center). Unfortunately Kyle Apigian left for graduate school at UC Berkeley and has not been replaced.

Downtown, we have two long-term associates this year: Amnon Freidberg from Tel Aviv is spending his sabbatical here studying various acalyptrates and Steve Gaimari got a 3 year NSF grant to study the higher phylogeny of Lauxanioidea. At the Walter Reed BioSystematics Unit, there are two post-doctoral fellows: Dina Fonseca, who is doing molecular systematics on mosquitoes, and Anice Mureb Sallum from Brazil, working on Anopheles systematics. Both Peter Hibbs and Alessandra Baptista are still struggling along with their PhD work. Isaac Winkler from Brigham Young will join the group as a new PhD student this Fall, working with Wayne and Sonja. Also Paul Arnaud and his wife, Madeline, are making extended visits now to Washington that his collection is here. Lloyd Knutson spent a few weeks in January working on Sciomyzidae. Ilam Yarom is coming in May and will stay until the Fall studying with Amnon and Steve. We are also expecting a stream of short term visitors, including Marc de Meyer, Marion Kotrba, et alia. But remember we always can find space for one more!

The NADS publication program is slow, but is progressing. MYIA 11, a World Catalog of the Stratiomyidae by Norm Woodley, will be out by the time this newsletter is released (publication date, 15 April). MYIA 6 which will be devoted to reviewing the life and accomplishments of Curt Sabrosky and Bill Wirth should be out soon, too. Volume 2 of the Diptera Data Dissemination Disk is being finalized and will be out by early Summer.

The BioSystematic Database of World Diptera is up and running at the Diptera WWW site. The Nomenclator has been online since last August. Various support pages were added last December, and version 2 of the Dataset for Nomenclator now includes more than 200,000 names. Coverage includes the data from the various regional Diptera catalogs for most families (the biggest, Tipulidae, Tachinidae, etc., are still unfinished) and all the names from the past twenty years. A grant from the Schlinger Foundation allowed us to purchase in digital format all the new species reported in the Zoological Record for the last 21 years (volumes 115-136). Still there are some 40,000 species group names to be entered. See the status page (www.diptera.org/names/bdwdss.htm) for details. Selected specialists are now being contacted about contributing family treatments for the next version of the database. We hope to have another MYIA containing these family treatments out by the end of the year. Steve and I have already finished the Eurychoromyiidae and Marc de Meyer and I are working on the Mormotomyidae, so expect a MAJOR contribution soon! In a related effort, the Walter Reed BioSystematics Unit has put online a new catalog of the mosquitoes of the World (wrbu.si.edu/www/cataloggeneraentry.html). A printed version is planned.

Under the leadership of Steve Gaimari, the Diptera group launched its first major expedition. In early March, Wayne Mathis, Amnon Freidberg, Frank Parker and Steve left for Bolivia to look for the World's rarest fly, *Eurychoromyia mallea* Hendel. They will remain until the end of the month. Allen Norrbom, Brian Brown and Steve Marshall will replace them and collect through April. At press time, the word from Bolivia was that collecting was good, but no *Eurychoromyia* were found.

Finally, in the last six months there has been a lot of activity concerning taxonomy and biodiversity. Last fall a new organization, ALL Species was established in California to speed up the complete enumeration of ALL (All Life List) organisms. See the fall issue of the Whole Earth magazine or go to their WWW site (www.all-species.org) for more details. Science magazine (29 September 2000) was

devoted to BioInformatics for Biodiversity, with E. O. Wilson calling for a Global Biodiversity Map. The Convention on Biodiversity has launched the Global Taxonomic Initiative (GTI) (www.biodiv.org/cross-cutting/taxonomy/default.asp). Last month in Montreal, the Global Biodiversity Information Facility (GBIF) (www.gbif.org) was established. So, with the smell of new and more money, the bird and butterfly people are racing to again be ahead of the pack. This time, however, I believe the Dipterists should stand tall and take their rightful place in front. And to do this we need only to educate people about flies. Flies are the among the least known groups of biodiversity, although we already know that they represent more than 10% of the known World Biota. They are of critical importance to Man, many being important pests of crops, others being vectors of disease. However, many are beneficial, pollinating flowers, serving as model systems for genetics and medicine, and as biological control agents of pests and weeds. Compared to the birds and butterflies, flies are more speciose, more important, and just as pretty! So spread the message!

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Long Distance Migrant or Vagrant?

by Jeff Skevington
Canadian National Collection of Insects, Ottawa, Ontario

After spending nearly four years at the University of Queensland in Australia I have landed back in Canada at the CNC. While in Australia I completed a Ph.D. program under the supervision of David Yeates. My work there had three focuses: 1) To investigate the utility of two mitochondrial genes (12s and 16s rDNA) for developing a phylogeny of the Syrphoidea (Skevington & Yeates, 2000). 2) To examine phylogenetic relationships of members of the tribe Eudorylini (Pipunculidae, Pipunculinae) using morphological characters. Two hundred and fifty-seven species of Eudorylini from all biogeographical regions and all known genera were examined. Sixty species were included in an exemplar-based phylogeny for the tribe (Skevington & Yeates, in press). 3) To revise the Australian species of Eudorylini within this phylogenetic context. Five genera including 81 species of Eudorylini are represented in the Australian fauna. Only 16 Australian species were previously described in this tribe. The largest publication resulting from this work should be out later this year (Skevington, in press), and manuscripts on the other genera are nearly complete. In the context of the above revisions, patterns of hilltopping and phenology were explored for genera and species of big-headed flies.

My work in Ottawa under the supervision of Jeff Cumming is supported by a Natural Sciences and Engineering Research Council of Canada Fellowship which is held through McGill University. Over the next two years I intend to: 1) Extend my research on relationships of lower Cyclorrhaphan flies using morphological and molecular characters. 2) Continue my work on systematics of Australian Pipunculidae while getting back into Nearctic pipunculid revisions. 3) Learn more about Conopidae while working on the Costa Rican Diptera project.

If you have any pipunculids or tales about great hilltop collecting sites, I am always interested in examining more material and finding out about new collecting areas. Also, if you are planning on going to Australia for the 5th International Congress of Dipterology and need some ideas for field trips let me

know and I may be able to give you some tips. Any general questions about the Congress may also be directed to me. The conference runs from the 30th of September to the 4th of October 2002 (more information is available from http://www.uq.edu.au/entomology/dipterol/diptconf.html). My contact details are: Dr. Jeff Skevington, Diptera Unit, Systematic Entomology Section, ECORC, Agriculture and Agri-Food Canada, Ottawa, Ontario, K1A 0C6, CANADA, Phone: 613-759-1178, Fax: 613-759-1927, e-mail: skevingtonj@em.agr.ca, web site: http://res2.agr.ca/ecorc/staff/skev-j.htm

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Skevington, J. H. (in press). Revision of Australian *Clistoabdominalis* (Diptera: Pipunculidae). *Invertebrate Taxonomy*.

Skevington, J. H. & Yeates, D. K. (2000). Phylogeny of the Syrphoidea (Diptera) inferred from mtDNA sequences and morphology with particular reference to classification of the Pipunculidae (Diptera). *Molecular Phylogenetics and Evolution* 16(2), 212-224.

Skevington, J. H. & Yeates, D. K. (in press). Phylogenetic classification of Eudorylini (Diptera, Pipunculidae). *Systematic Entomology*.

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Recent Publications by the Therevid Team

by Mike Irwin
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Here is a partial listing of the publications and other products our therevid team, sponsored by NSF and the Schlinger Foundation, has put out during the past two years.

In Referred Journals:

Gaimari, S.D., and M.E. Irwin. 2000. Phylogeny, classification, and biogeography of the cycloteline Therevinae (Diptera: Therevidae). Zool. J. Linnaean Soc. (London) 129: 129-240.

Gaimari, S.D., and M.E. Irwin. 2000. Revision of the mexicana-group of *Ozodiceromyia* Bigot (Diptera: Therevidae). Proc. Entomol. Soc. Wash. 102: 561-600.

Gaimari, S.D., and M.B. Mostovski. 2000. *Burmapsilocephala* cockerelli, a new genus and species of Asiloidea (Diptera) from Burmese amber. Bull. Nat. Hist. Mus. (London), Geology Series 56: 41-44.

Metz, M. A., and M. E. Irwin. 2000. A new therevid genus from Dominican amber, the revisions of *Lindneria* Kröber and *Insulatitan* Gen. Nov. and their phylogenetic relationships with closely related extant Therevinae (Diptera: Therevidae). Annals of the Entomological Society of America 93: 977-1018.

von Tschirnhaus, M. Irwin, M. Hauser, N. Evenhuis, and T. Pape. 2000. Provisional checklist of the Agromyzidae, Therevidae, Mythicomyiidae, Sarcophagidae and Stratiomyidae (Diptera) of the Brandberg Massif, Namibia. Cimbebasia Memoir 9: 383-384.

Webb, D. W., and M. E. Irwin. 1999. Revision of *Tabuda* Walker and *Tabudamima* Irwin & Lyneborg, with the description of a new genus *Incoxoverpa* Webb and Irwin (Diptera: Therevidae: Therevinae). Ann. Entomol. Soc. Am. 92: 644-674.

Wiegmann, B. M., S. C. Tsaur, D. W. Webb, D. K. Yeates, and B. K. Cassel. 2000. Monophyly and relationships of the Tabanomorpha (Diptera: Brachycera) based on 28S ribosomal gene sequences, Annals of the Entomological Society of America 93: 1031-1038.

Winterton, S.L. 2000. Phylogenetic revision of *Acupalpa* Kröber (Diptera: Therevidae: Agapophytinae). Insect Systematics and Evolution 31: 225-240.

Winterton, S.L. & Irwin, M.E. 1999. *Laxotela* - a new genus of Therevidae (Diptera) from Australia. Entomologica Scandinavica 30: 299-310.

Winterton, S.L., Irwin, M.E. & Yeates, D.K. 1999. Systematics of *Nanexila* gen. nov. (Diptera: Therevidae) from Australia. Invertebrate Taxonomy 13: 237-308.

Winterton S.L., Irwin, M.E. & Yeates, D.K. 1999. Phylogenetics of the *Taenogera* Kröber genus-group (Diptera: Therevidae), with descriptions of two new genera. Australian Journal of Entomology 38: 274-290.

Winterton, S.L., Merritt D., O'Toole, A., Irwin M.E. & Yeates D.K. 1999. Morphology and Histology of the spermathecal sac, a novel structure in the female reproductive system of Therevidae (Diptera: Asiloidea). International Journal of Insect Morphology and Embryology, 28(4): 273-279.

Winterton, S.L., Skevington, J.H., Irwin, M.E. & Yeates, D.K. 2000. Phylogenetic revision of *Bonjeania* Irwin & Lyneborg (Diptera: Therevidae). Systematic Entomology 25: 295-324.

Yang, L., B. M. Wiegmann, D. K. Yeates, and M. E. Irwin. 2000. Higher-level phylogeny of the Therevidae (Diptera: Insecta) based on 28S ribosomal and elongation factor 1a gene sequences. Molecular Phylogenetics and Evolution 15:440-451.

Yeates, D. K. and B. M. Wiegmann. 1999. Congruence and controversy: Toward a higher-level phylogeny of the Diptera. Annual Review of Entomology 44: 397-428.

Books, Theses, Dissertations & other one-time publications:

Winterton, S. L. 1997. Systematic revision of Nanexila gen. nov. (Diptera: Therevidae) from Australia. Masters thesis, University of Queensland.

Irwin, M. E. 1997. Therevidae. In: Solís, A. (ed.), Las Familias de insectos de Costa Rica. INBio. http://www.inbio.ac.cr/papers/insectoscr/Texto438.html.

Gaimari, S. D. 1998. Phylogeny, classification, and biogeography of the Cycloteline Therevinae (Diptera: Therevidae). Ph.D. Dissertation, University of Illinois at Urbana-Champaign.

Power, N. 1998. Spatial and temporal distribution of Therevidae in southeast Queensland. Honours Thesis, University of Queensland.

Holston, K. C. 1999. Answering the nomenclatural challenge with a systematic database of Thereva names (Diptera: Therevidae). Master's Thesis, University of Illinois at Urbana-Champaign.

Winterton, S. L. 2000. Endemic radiation of a diverse clade: phylogenetic revision of Agapophytinae subfamily nov. (Diptera: Therevidae) from Australasia. Ph.D. Dissertation, University of Queensland

Yang, L. 2000. Molecular phylogenetics of the Therevidae and their position among the families of the Asiloidea (Insecta: Diptera). Ph.D Dissertation, North Carolina State University.

Websites or other internet sites reflecting this project: The family Therevidae has been on the WWW since April 1996 with periodic updates and additions. The site <http://www.inhs.uiuc.edu/cee/therevid/> details our PEET research, profiles therevid research team members, provides minutes of meetings, and recounts therevid collecting expeditions. Therevid MANDALA became searchable via the WWW in January 2000 at <http://pherocera.inhs.uiuc.edu/index.htm>. Users are guided to find information via

various groupings of queries. The site uses live databases for searching (except when site maintenance is underway) so current data may be reflected as it is updated or entered. The site also provides metadata information about Mandala and invites guests to sign in at our guestbook. ASC features therevid PEET project in gallery. In honor of the NSF's 50th anniversary, the Association of Systematics Collections sponsored a gallery of NSF funded projects. <http://www.ascoll.org/nsfwebgallery/index.htm> The projects have one page summaries and then links to websites for the projects. Ours includes the main home page, links to participants in the research, and to Mandala, our database for cataloging specimens, nomenclature, and literature. http://www.ascoll.org/nsfwebgallery/Inhs/finaldiperta.htm

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Delhi Sands Fly Update

by Rudi Mattoni, Jeremiah George and Ken Osborne
Department of Geography, UCLA, Los Angeles, California

Rhaphiomidas abdominalis terminatus (Delhi Sand giant flower-loving fly - DSF) is the only dipteran listed as an endangered species under the federal Endangered Species Act. The species is restricted to a few fragments of highly degraded habitat, but its future viability depends on a single ca 100 ha site that is the only site with sufficient size and overall diversity to offer any hope for carrying the species into the future. This core site supports the sole semblance of the Delhi dunes ecosystem that historically covered about 12,000 ha. In addition to the DSF there are a number of rare arthropods associated with the core site, a dense population of the restricted Los Angeles pocket mouse, and several plants and other vertebrates representing desert adapted species. The Delhi sands provide the sole cismontane habitat for the aggregate.

For your background information we have been running a standard ca 3 km transect sampling most of the site, starting in 1996. We scored the following numbers since then:

	N samples (present)	N males	N females
1996	7	53	2
1997	5	76	8
1998	4	42	4
1999	3	26	6
2000	5	42	1

Making reasonable assumptions of sighting efficiency (20%), equal sex ratio, life span (4 days), and interpolating time between samples, the total population size of this core habitat is >>1000. The methodology and calculations follow the Pollard transect walk technique. By comparison all other occupied sites, which now number about ten, have populations of <<100. The unequivocal message these results convey is that the only viable option to maintaining the DSF depends on conserving the entire core habitat.

No focused effort has been made to preserve the core habitat. If measures are not implemented prior to further development pressures, the only significant remaining piece of the Delhi sands ecosystem will

be history. Several of the smaller sites occupied by DSF, all less than 10 ha, deserve protection as well to assure potential higher DSF genetic diversity

From the long term evolutionary perspective the only other, and nominate, subspecies (*Rhaphiomidas abdominalis terminatus*) has been extinct for over three decades. It was found in sandy areas along the Los Angeles river and the El Segundo sand dunes. The sister taxon, *Rhaphiomidas trochilus*, which Rogers and Mattoni regard as a subspecies of *abdominalis*, was recently found by Ballmer on a small site in the San Joaquin valley. The (sub)species was thought extinct for over fifty years prior to Ballmerís discovery.

We urge all Dipterists to join us in urging the U. S. Fish and Wildlife Service to concentrate its efforts on preserving the umbrella DSF and its habitat.

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Hunting *Inseliellum* (Simuliidae) in French Polynesia, 2001

by Doug and Ruth Craig
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Why did we go?

Reconstructed phylogenies, based both on morphological and molecular information, are now available for the Polynesian black fly subgenus *Inseliellum*, and will provide the underpinnings for a biogeography of this important group of aquatic insects. However, there is lack of data for many species. For the molecular work, only 23 of 48 now known species were available. Of particular importance was lack of material from the Marquesas and Austral Islands that have basal species, and from Raiatea which has a minor species radiation in higher clades. The morphological reconstructed phylogeny, although including 32 of the then known 41 species, was based mainly on larval structures, because of lack of data from the pupae and male adult genitalia. Larval simuliids exhibit considerable homoplasy and obtaining male genitalia for which homoplasy is reduced, will strengthen further phylogenetic analysis. To remedy the inadequate taxon sampling of the molecular analyses and lack of information on simuliid male genitalia, Ruth and I spent five weeks (9th Oct. - 14th Nov., 2000) in Polynesia, with the main objective to obtain larvae from the above islands and to rear pupae to obtain male adults.

The trip was initiated by family business in New Zealand, September, 2000, and on the outward leg from Edmonton a few days were spent at the Bishop Museum, Honolulu. There the opportunity was taken to examine the large holdings of Pacific Simuliidae. One surprise was a single female specimen of *Inseliellum* from Tonga - quite the range extension, and a great excuse to eventually visit Tonga. Copies of hard-to-get maps of the Marquesas Islands were also obtained. Hospitality by Neal Evenhuis and

Ron England was up to the usual standard. On the return trip from New Zealand, we visited seven Polynesian islands.

A few days in Tahiti first of all to make contact with the Louis Malard Medical Research Institute and to renew old acquaintances, and obtain other maps. We began the collection of simuliids with a stiff eight hour hike up the Fautaua Valley behind Papeete. This is the 'Forbidden" Valley, since permission is needed to enter the valley which is a water catchment area for Papeete. Needless-to-say, being as unfit as we were at that time, the trip made for an interesting next few days. Collecting and the scenery were excellent.

From Tahiti we went directly to the Marquesas, flying into Nuku Hiva. Surprise! This place is not what one might expect of a tropical island. There was no greenery at all to be seen at the airport on the north-western corner. Indeed, there was a drought throughout Polynesia, serious enough that tourists were being denied access to Bora Bora. Collection of the seriously anthropophilic *S. buissoni* was difficult because we found it hard to find streams that had sufficient water. That did not stop the few females from finding us! However, they were not as bad as they might have been and application of repellent worked well. Kept the mosquitoes off too. But, it was not difficult to imagine what living on Nuku Hiva would be like when the biting rate is up as high as some 18,000 per day (estimated by Y Schan). Then, there are the ceratopogonids!

One point to be made about Nuku Hiva is that the drive from the airport to main town of Taiohae is not to be missed. It is only some 35 km long, but takes about 2 hours, even in a serious four-wheel-drive vehicle. Do it as a life experience, but under no circumstance consider doing it if it has rained! Take the helicopter and pay the $85US shot!

Hiva Oa, to the south, is in many ways similar to Nuku Hiva, but there is not the horrendous drive from the airport to the town of Atuona. Here, while very dry, there was more water and we hit the cascades looking for *S. adamsoni*. Not one larva of any black fly species was found on the cascades. Indeed, all the larvae were on leaves, not rocks. All of which does not help with the problem of why *S. adamsoni* shares derived characters with the larvae of rock loving, cascade-dwelling species in Tahiti?? Hiva Oa was pleasant and neither *S. adamsoni* nor S. *gallinum* bite humans. We did not get to Fatua Hiva, the southern-most island, because of the cost of hiring a boat and the lack of guarantee of getting anything once there.

So, back to Tahiti for a night to replenish the alcohol and glacial acetic acid and out west the next morning to Raiatea. Here we hoped to obtain a number of poorly known species. However, all the lower altitude streams yielded up were the common garden species of *S. malardei* and *S. lotii*. It was not until Ruth and I did some serious bush whacking to get to higher altitude that we managed to get some of the *oviceps*-group. A major hike up the Temahani Plateau got us up into the clouds and also some larvae of *S. castaneum* and *S. bogusium* - both basal to their individual clades. By this time we are beginning to feel that we have been working too hard and did actually spend a day swimming and lying around the place on the beach.

So, after being a bit refreshed, back via Tahiti and south to the Austral Islands, Rurutu first. This is an unusual island in that it is about 11 million year old and normally would have eroded to below sea level by now, but 4 mya there was renewed vulcanicity and it was uplifted and now has 30 metres plus high,

fossil coral (= makatea) cliffs surrounding it. This might account for the fact that absolutely no other aquatic invertebrates, or fish, were seen in the streams sampled. However, *Simulium rurutuense* larvae were there by the million. Because of some travel problems with Air Tahiti changing their flight schedules, we spent two more days than necessary in Rurutu and were only granted one full day on the next eastern-most island, Tubuai. Plenty of time to show that there were no Simuliidae in the very small streams on that very small island (twenty minutes to drive completely around!).

So, back to Tahiti and now quite a bit fitter, we went on a major trip up the Vaitepiha River on the smaller part of Tahiti. A wonderful, completely unaltered river, but being very dry, few cascades of any use. In desperation then we collected on a seep and have perhaps found the elusive larva of *S. cheesmanae*. Or, if molecular studies don't confirm that, certainly a new species within the "*castaneum*" clade. Also, some more of the new species recently described in the "*hirticranium*" group. **Moral** - never turn your nose up at a seep!

Well, Ruth and I discovered we were not as fit as we had thought, but a day resting helped. Then for me it was off to deliver a seminar at the Malard Institute on the work I had done there over the last 20 years. No, not in French - almost without exception the scientists and technician there spoke English.

A day trip via ferry to Moorea was enough to collect from a couple of sites there for fresh material - nothing new. Indeed, apart from the maybe new material from the Vaitepiha River, nothing new turned up anywhere - bottom of the barrel perhaps??

Then home here to Edmonton. Not a bad trip all in all and if I had to rank it out of 10, I'd have no trouble assigning it a 9. Why not the full score? Well, that would have taken about another $10,000US to hire boats in the Marquesas to get to other islands. Maybe some other time. But, perhaps it should have a 9.5 - already Deirdre Joy and Mike Spironello are making good use of the chromosomes and DNA from the new material.

Visiting some 50 sites in Polynesia gave Ruth and I a broad over view of the condition of running water habitats on the islands. During the period of the trip there was a drought in Polynesia, sufficiently serious that water restrictions were in force on Bora Bora. It was noticeable that most streams and rivers were in their base flow mode. Indeed, in the Marquesas Islands and elsewhere it was often difficult to find streams with sufficient water to provide suitable habitats for simuliid larvae

One noticeable aspect of walking up streams and rivers in Polynesia is that, on the smaller islands, almost every stream has been altered by human activity. This is generally in the form of a small barrage (dam) and a pipe conducting water away. But in many instances it was the presence of the pipe that provided walking access to the higher reaches of the running water. In Tahiti-nui, such barrages are common even on larger rivers, and water use and draw-down are considerable. But, pristine rivers are still to be found on Tahiti-iti, in particular the Vaitepiha River.

In general the streams and rivers of Polynesia appear to be in reasonable health. On some islands running water will be a limiting factor in any economic expansion. Rurutu is a good example, where during the period visited, there was little running water and what there was, was fully utilized.

One site was of particular interest. High on the Temehani Plateau, Raiatea, a tributary of the Vaihuaru

River, this locality is truly unique. The altitude is such that vegetation is very unusual, as is the ground-water source of the river and cascade. Unfortunately, there is a considerable amount of human impact - mainly carving in the soft rock, with vegetation removed and garbage left. This area would be worthy to consider as a nature reserve, or "national park".

A formal report on this expedition, with maps, illustrations of sites sampled, lists of habitat characteristics and species taken, is deposited in the Bishop Museum. Tonga - here we come in 2002!

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A Word of Caution When Using Hexamethyldisilizane (HMDS)

by Bill Barr
56 Patricia Crescent, Edmonton, Alberta, Canada

Fly Times Issue 11 (October 1993) contains a note from Brian Brown recommending hexamethyldisilizane (HMDS) for drying small flies.

A few notes of caution follow. The Materials Safety Data Sheet (MSDS) for this chemical states that its flash point is 14 degrees C, well below room temperature, making it quite volatile. It is also highly flammable. "Vapor may travel considerable distance to source of ignition and flash back" and it is advised to "Use non-sparking tools" (wood, plastic), and "Store in a cool dry place." HMDS is incompatible with strong oxidizing agents and with strong acids. The MSDS does not mention: 1) best storage is probably in an explosion-proof refrigerator, 2) work with the chemical in a class A fume hood, 3) work with only small volumes of HMDS, 4) keep the chemical on ice when it is out of the refrigerator. HMDS is toxic, and the target organs are the nerves, so I wear goggles, respirator, and gloves.

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Deonier Collection of Ephydridae

by D.L. Deonier
P.O. Box 1625 Pittsburg, KS 66762, USA

With the vast majority of the Deonier Collection of Ephydridae deposited at the USNM several years ago, I have decided to apportion the remnant, including several paratypes, between the following collections: Academy of Natural Sciences of Philadelphia, California Academy of Sciences, University of Minnesota Insect Collection, and the Cleveland Museum of Natural History.

Latest Chironomus Newsletter Up and Flying

from Ian Walker
Department of Biology, Okanagan College, Kelowna, B.C., Canada

The most recent edition of the Chironomus newsletter may be downloaded from the Chironomid Home Page at: http://www.ouc.bc.ca/eesc/iwalker/intpanis/#CHIRONOMUS

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Internet Corethrellidae (Frog Biting Midges)

Sturgis McKeever and Frank E. French have put together a very nice webpage, showing beautiful pictures of these small flies, as well as interesting evidence that they transmit trypanosomes between male frogs. Check it out! http://www.vet.uga.edu/ivcvm/2000/McKeever/McKeever.htm

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In Memorial of Willi Hennig, 1913-1976 - A Biographical Sketch

by Dieter Schlee
Staatliches Museum für Naturkunde, Stuttgart, Germany

The following is a translation of "Schlee, D. 1978. In Memoriam Willi Hennig 1913-1976 Eine biographische Skizze. Entomologica Germanica 4:377-391" through the kind permission of the publishers, Dr. E. Naegele, E.Schweizerbart'sche Verlagsbuchhandlung, Science Publishers (http://www.schweizerbart.de). We have not included the bibliography or the three figures (see captions at the end) from the original paper.

Abstract. An outline of Professor Dr. Willi Hennig's life history and an abstract of his work on zoology and phylogenetic systematics, etc. are compiled, including some background information originating from his family and from the author's experience with him in his Department of Phylogenetic Research at Ludwigsburg.

> "At close scrutiny, the much-maligned systematics turns out to be a very important science of its own. While its sole role in zoology was formerly one of classification, in the course of time it was given the great task, supported by comparative anatomy, palaeontology, experimental studies, etc., of investigating the relationships of animals and their development based on the theory of evolution. The ultimate aim is a system which represents a 'natural history of creation' in the most succinct form possible."
>
> From a high school essay by the 18-year-old Willi Hennig.

1. Introduction

Professor Dr.-phil. Dr. rer.nat.h.c. Willi Hennig died during the night of November 4, 1976 in the 63rd year of his life. A sudden cardiac arrest took him without warning from a life that was rich in human terms and extremely productive in scientific terms. Until the evening he had worked on the new edition of his book "The larval forms of the Diptera" with his usual intensity and had then reminisced with his family about their last holiday in Crete.

He will be sorely missed by his family - his wife, his three sons and their families; by the Department of Phylogenetic Research at the State Museum of Natural History in Stuttgart and Ludwigsburg which he headed since 1963; by a wide circle of international scholars interested in phylogenetic systematics whose spokesman he was; by many dipterologists all over the world who have lost in him the expert with the most comprehensive knowledge; and by many researchers and students who received valuable suggestions from his wealth of knowledge: as co-editor[1] of the "Zeitschrift für Morphologie der Tiere", "Zoomorphologie", and "Das Tierreich", as consultant for "Entomologica Germanica" and "Systematic Zoology", and as author of the textbooks "Taschenbuch der Zoologie", "Stammesgeschichte der Insekten", the chapter "Diptera" in the "Handbuch der Zoologie", as reviser of 14 families (among them the Muscidae and Anthomyiidae) in the series "Die Fliegen der palaearktischen Region" edited by E. Lindner and as author of numerous publications on phylogenetic systematics and many specialized investigations. His published work[2] adds up to more than 9,000 pages and thousands of drawings he had made himself; but even these monumental figures cannot adequately express its scientific importance--we have to include the unusually broad spectrum and the deep exploration of his fields of study and to point to numerous other publications which were influenced by his suggestions in order to give some idea of the impact of his work.

2. Chronology 1913-1932 and the Principles of the Phylogenetic Approach

He was born in Dürrhennersdorf near Zittau in Saxony on 20 April 1913 as the eldest of three sons--his father was a railway official--and from his early years onwards his family encouraged him to be active and to develop perseverance. In addition to attending the village school, he was tutored in English, Latin, and French by a retired physician. His schooling was so effective that he was allowed to skip one grade when he transferred to grammar school in Dresden; it can be assumed that his later interests had their roots in his activities during these years. He not only collected beetles and butterflies and started a herbarium (his other favourite pastime was going for a ride in a locomotive, as he fondly recalled), but also visited regularly the Zoological Museum in Dresden during the years he attended grammar school (with emphasis on modern languages) in Dresden. There he also met Dr. W. Meise and Dr. Klaus Günther.

How deeply Willi Hennig had already adopted the phylogenetic approach and become familiar with the broad field of (comparative and analytical) zoology at that time can be seen with surprising clarity from an essay he wrote as assignment in the subject "German" and entitled "First essay. 4 May 1931. The position of systematics in zoology." Willi Hennig had just turned 18 at that time. Fortunately, the original of this essay--written in Gothic script in an exercise book--has survived the subsequent turmoil ,of the war and the postwar period and is still in possession of his family. It has been published posthumously: Hennig (1978).

In his essay he treats mammals, marsupials, birds, butterflies, bivalves, *Artemia*, etc., some of which accompanied by illustrations, provides comparisons of the systems of the entire higher zoological categories from Aristoteles to Siebold-Leuckart, and deals with comparative morphology, palaeontology, zoogeography, behaviour, etc., all of which reveals his wide interests and his occupation with zoological literature.

This essay shows his enthusiasm for systematics in terms of phylogeny, his almost impatient need to emphasize its general importance, -to fight against improper superficiality, to give reasons for various misinterpretations, etc.; and it also expresses his views that relationships and systematics are identical ("...clarification of relationships and thus systematic affinity ...."). He gives several examples of convergence (in a wider sense, of course, since he does not differentiate between convergence s-str. and parallelism) being responsible for false phylogenetic conclusions; and that this can be verified by testing is for him an important realization. Of course, we cannot expect to find, in this school essay, the definition of the term "synapomorphy" which he coined much later. However, its meaning, i.e. common possession of a unique character (which cannot be proved to have evolved several times, etc.) as evidence of relationship, is already foreshadowed in the following example.

> "Most recently, similarities in certain modes of behaviour have been used to clarify relationships and thus systematic affinities: Heinroth believes that he can infer a closer relationship between *Monticola saxatilis* L. and the redstarts because of the characteristic and unique tremor of the tail which is common to both."

The two words "characteristic" and "unique" were not emphasized in the original, but have been underlined here to indicate that he had searched for evidence of relationship even then in terms of the succinct criterion which he used later (e.g. Hennig in Hennig & Schlee, in press), namely "a particular character state shared by all members of the group" and "not present in any taxon outside the group."

Although he did not universally apply this kind of argumentation in the essay, it is nevertheless interesting to note that he was aware of it--and that he used the example as a kind of working hypothesis (in fact, he should have cited additional characters, "conflicting evidence", etc. both in support and in rejection of Heinroth's interpretation). Incidentally, Willi Hennig did not mention that the use of common primitive characters as evidence of relationship may be deceptive; instead he emphasized the dangers of convergent evolution.

The exercise book with the 29 page essay provides further clues: it reveals that his approach to writing, his style, his argumentation and presentation had already been developed during his school days: Like in his later manuscripts, the sentences must have poured forth in a rapid stream and without requiring any subsequent editing. Some features uncommon in a school essay [abbreviations, deletions, parts of words squeezed into a line] seem to suggest that a sentence had to be completed as fast as possible to make room for the next thought. His flowing style which casually juxtaposes different points of view or themes and his preference to disregard any formal structuring are already evident. The use of clear ink drawings for illustration was another practice dating back to that time. No doubt he wrote the text without prior draft (as he would do later when key words and index cards were often all he needed as aid to memory).

[This may explain why he left the deletions in the text, why he placed a table with explanations as a three-page insertion within a single sentence, separated by two commas, and why he wrote 'German essays" on the cover of his exercise book, with the title of the essay inside, although the exercise book accommodated only that one essay.] Incidentally, his essay was marked "very good" and received the following comments from his teacher (Schm = Schmidt?): "This essay is quite a creditable attempt at giving a critical treatment of the specific field of study of the author. It is not merely concerned with compiling facts but occasionally offers some original ideas as well."

The first paper by the 19-year-old W. Hennig, with W. Heise as co-author, on the snake genus *Dendrophis* appeared as early as 1932. A continuation of the paper, again written by these two authors, was published in 1935.

W. Hennig's interest in bird (e.g. in the above-mentioned school essay) and reptile taxa may very well be significant, all the more so since he was joined by M. Heise who is well known as an ornithologist. W. Hennig regarded birds as part of the group Reptilia and concluded that Crocodylia and Aves are sister groups--while, for example, E. Mayr considered this to be absolutely impossible [he called it "absurd" although he did not question the characters shared by Crocodylia and Aves and their interpretation as synapomorphy; see also Hennig's (1974: 289) reply to Mayr].

1932-1939: Student Days and First Positions and Publications

After graduating from grammar school (1932) with excellent grades (except for physical education), he started his studies in zoology, botany, and geology at the University of Leipzig. As in his school days, he was given special status: he did not have to meet the general requirement stipulated by the Director of the Zoological Institute, Mr. Meisenheimer, that the major laboratory could only be attended after completion of the two-semester basic course. He was permitted to attend the laboratory in his first year since he had already acquired the necessary background knowledge during his grammar school days. Intensive work enabled him to complete his thesis (Contributions to the study of the copulatory apparatus of the cyclorrhaphan Diptera) and his studies by April 1936, i.e. when he had reached age 23.

At that time he had already published eight more papers, mainly on Diptera, among them "Structure and relationship of the Kerguelen fly" (1934), but also, for example, a 68-page revision of the genus *Draco* (Agamidae); a total of 500 pages including his thesis.

After a brief period as a trainee at the State Museum of Zoology in Dresden, he joined the German Entomological Institute of the Kaiser-Wilhelm-Gesellschaft on I January 1937, initially under a grant from the German Research

Association and subsequently, as of 1939, as a staff assistant.

By 1939 the list of his publications comprised as many as 41 titles with a total of 1065 pages. These papers dealt mainly with taxonomy and the copulatory apparatus of widely different families of Diptera (among them the first seven families for E. Lindner's "Flies of the Palaearctic region"), but were also on subjects like "On some regularities of geographic variation in the reptile genus *Draco* L.: "parallel' and .. convergent" race formation", the "Problem of classifying higher categories", and "On the question of the systematic position of *Braula*...", on beetle larvae and the first fossils in amber (1938: Diptera: Rachiceridae; 1939: fleas).

1939-1945: Military Service and Draft of the "Principles of a Theory of Phylogenetic Systematics'

He received a shortened basic military training in the infantry starting in the winter of 1938 until the spring of 1939 and was conscripted when the war broke out. He served as an infantryman in Poland, France, Denmark, and Russia where he was wounded in 1942 and sent to several field hospitals. He was given a six month "working leave" in Berlin and later received instructions from the Medical Academy of the Army in Berlin to work in the field of malaria control in Greece and Northern Italy (specifically in Venice and environs). He continued this work not only until the end of the war but also during the time he was in [British) captivity.

He wrote the draft of his fundamental work on the "Principles of a theory of phylogenetic systematics" in the period between the end of the war and his return home. It was published in 1950 (see below) and the original manuscript is in possession of his family (Fig. 1). He wrote it in an Italian notebook, about 21 x 31 cm in size, with a heavy cardboard cover. Although it does not contain a title, it begins with a two-page table of contents (which was later edited only slightly for publication), followed by the flowing text which for the most part fills almost whole pages. It gives the impression that the manuscript was put on paper in an almost continuous, uniformly calm flow (barely interrupted by occasional splashes of his fountain pen). Chapter follows chapter almost without any space in between--it seems additions or changes were not contemplated. (Despite the fact that additional sheets were added, not all of the chapters listed in the table of contents could be accommodated in the 170-page notebook.)

This manuscript is not the only scientific work W. Hennig produced during the war. The list of publications indicates that 25 papers were published between 1940 and 1945, among them two on his work in epidemic control, some revisions of the Acalyptratae for E. Lindner's "Flies of the Palaearctic region", studies on the relationships of "The genera combined within the 'Phytalmiidae'" and of the Pupipara, the "Catalogue of the Diptera of Formosa", a "Contribution to the problem of the 'relationships between larval and imaginal systematics"', and several studies on larvae.

These publications are by no means manuscripts dating from the prewar years, but were indeed written during the war since he used to work continuously wherever he was and no matter where he was. He received the necessary background material from his wife through the army postal service. She managed to obtain the necessary material, to look after proof-reading, etc., despite the uncertain times and her care in bringing up their children. It seems amazing how much the two were able to accomplish in those times.--However, some material was lost, for example, the entire manuscript for "Bronn's Classes and Orders of the Animal Kingdom.' The original burned in a safe in Berlin. The carbon copy was lost later during the last weeks of the war. W. Hennig never started writing the manuscript anew.

He also encountered difficulties in getting a rather long paper on Phlebotominae published: this manuscript could not be printed during the war because of paper supply problems despite the fact that he directed inquiries to several publishers, even in Austria. The manuscript was not considered "essential to the war effort" and printing of the manuscript was therefore not authorized. This manuscript, too, has never been published.

The terror of war continued to have a lasting effect on him even in his later years. He himself, seriously wounded, was one of five survivors of an entire company and one of his brothers did not return from Stalingrad. Even much later, particularly during the time of the annual siren testing, he used to remark how intensely his war experiences had made him aware of the limitations imposed on his creative output and how much he felt obliged to use the available time to the utmost.

1945-1950: Postwar Period, Completion of the "Principles ..." and of the "Larval Forms of the Diptera"

Although his family continued to live in Leipzig after they were bombed out during the war, W. Hennig was discharged from captivity to West Germany since there was concern that he might end up as a Soviet prisoner of war should he return to the "Eastern Zone" of Germany. So he stayed in Hamburg, Plön, and Göttingen--for six weeks at a time because this was the maximum period for which ration cards were issued in each municipality. In November 1945 he crossed the East German border illegally to join his family in Leipzig. Fortunately, the situation was already defused since it was well known within the Zoological Institute that he had never supported the Nazi regime either by being a member in any of its organizations or by any other activities.

On 1 December 1945, at the age of 32, he was appointed Acting Director of the Zoological Institute at the University of Leipzig. He resigned from this position in Leipzig on 1 April 1947 in order to be able to return to the German Entomological Institute which had been moved to Mecklenburg.

On his return to Berlin, he expanded the manuscript of the "Principles ... of phylogenetic systematics" which he had written while in captivity. He worked on it in a cold room and by candlelight during the 10 months of the Berlin blockade in 1948. (The family received a coal ration of 25 lbs. for the entire winter plus 75 lbs. extra for the three small children; they all collected horse chestnuts and acorns as additional fuel). Paper continued to be in short supply when the "Principles..." were ready for printing (which explains the absence of an index and the much too small edition).

Starting in April 1947 when he returned to Berlin, he also continued-to work on the "Larval forms of the Diptera" which he had begun before the war and which was published in 1948. The large card index had been moved to the German Entomological Institute in Mecklenburg where it was found after the war in disarray, yet still complete.

He was now also in charge of organizing the return of the museum holdings. The building in Berlin was intact but had not yet been released by the [U.S.] occupying power and so the mansion of a brewery owner in the east end of the city was used to accommodate the collections and the library which had fortunately survived the war without losses. W. Hennig had thus regained his old position at the German Entomological Institute.

In addition to the "Principles" and the "Larval forms", he published other papers on the morphology and systematics of Diptera during the period from 1945-1950 including short essays, i.e. "Problems of biological systematics" and 'Explanation of terms used in phylogenetic systematics" (the two essays were published in "Forschungen und Fortschritte" (Research and Progress] 21/23: 276-279, 25: 137-139).

1950-1963: Berlin

During this particularly productive period he published 35 papers in addition to the papers mentioned above. Among the 35 papers were such universally important works like the "Critical comments on the phylogenetic classification of the insects" (1953), "Diptera" in the "Handbook of plant diseases" (1953), "Wing venation and classification of the Diptera with special reference to the fossils described from the Mesozoic" (1954), "Systematics and phylogeny" (1957), the first edition of 'Invertebrates I and II" in the 'Textbook of zoology" (new editions followed later, the newest will be published shortly), "The dipterous fauna of New Zealand as systematic and zoogeographical problem" (1960), the important monograph of the "Muscidae" for "Lindner', etc. The revised edition of the "Principles..." was also completed in 1961 and sent to the United States for translation and printing (he did not see this work again until it was published in 1966 under the title "Phylogenetic Systematics").

Finally, the time approached for Dr. H. Sachtleben, the Director of the German Entomological Institute, to retire. W. Hennig, who until then was Deputy Director, was nominated as successor when the construction of the "Berlin Wall" on 13 August 1961 abruptly changed the situation. Until then W. Hennig had commuted daily from his home in West Berlin to the German Entomological Institute which is located in the Eastern Sector of Berlin in the belief that the division of the city was only temporary-- in the same way as his general attitude was governed by the hope that Germany would eventually be reunified. He resigned from his position with the German Entomological Institute after the Berlin Wall was built. He stayed on in West Berlin for almost two years and taught at the Technical University.

Until his death he regarded Berlin as his true home, not only because of his ties with the German Entomological Institute but also because of the entire cultural atmosphere.

1963: Move to Stuttgart/Ludwigsburg

The Smithsonian Institution in Washington and Prof. E. Hardy from the Department of Entomology of the University of Hawaii in Honolulu offered W. Hennig a new sphere of activity. However, he decided to stay in Germany because of his sons' education and also because he felt a need to remain close to the cultural heritage of the ancient Greco-Roman Europe, as he expressed it on several occasions. Prof. A. Kaestner, Munich, and Prof. E. Schüz, Director of the State Museum of Natural History in Stuttgart until 1969, used their influence to secure for him a department of phylogenetic research at the Stuttgart Museum (Ludwigsburg Branch). Thus he moved with his family to Ludwigsburg in April 1963.

Reports on the activities of his department are included in the annual reports of the Museum and are published in: Jh. Verein vaterl. Naturkunde Württemberg 120: 38-39, 121: 23, 122: 23-24, Jh. Gesellschaft Naturkunde Württemberg 124: 19-21, 33-34, 125: 30-31, 126: 16-17, 127: 19-21, 128: 16-17, 129: 21-22, 130: 405-406, 131: 223, etc.

1963-1976: The State Museum of Natural History in Stuttgart Ludwigsburg; Focus on Fossil Studies etc.; Teaching Activities

Fossil Studies

Cut off from his accustomed collections and libraries in Berlin with their vast holdings unique in Germany, he searched for, and found, a "new niche' for his future focus of activities: the study of fossils in amber. Among his many previous papers, he had published two papers on Diptera and Aphaniptera in Baltic amber as far back as 1938 and 1939 and since that time he had wanted to study these fossils in greater detail. He had learned that the Königsberg fossil collection had been moved to Göttingen where Prof. A. Seilacher assisted him in his search and arranged for the loan of the extensive material, as did Prof. O.H. Walliser.

In the period from 1964-1972, W. Hennig thus published 17 papers on various groups of Diptera from the Baltic amber (as well as three papers on fossils from the Lebanon amber, see below) which in theory and practice went far beyond everything previously published in this field.

His studies of the fossils in amber yielded several important results: The book "Phylogeny of the Insects" (1969, published by W. Kramer, Frankfurt) grew out of his extensive file cards which he always prepared, namely those dealing with "Localities of Palaeozoic and Mesozoic insects", "Phylogenetic evolution of the insects", and "Aims, methods and limitations of phylogeny." This book does not only provide a critical phylogenetic review of the described Palaeozoic and Mesozoic fossils of all insect groups but also an extremely important contribution to the development of his theory of phylogenetic systematics.

In his search for amber material with fossil inclusions he came upon amber from Lebanon (an amber which was then still considered to be non-fossiliferous). Thanks to the collaboration with his department on the one hand and with the members of the Geological-Palaeontological Institute in Tübingen[3] on the other, his search produced the greatest collection of fossils trapped in this resin from the Lower Cretaceous--the geologically oldest fossil-bearing "amber" known to date.

In 1966 he was invited to Canada by the Entomology Research Institute, Ottawa. Although he had suffered a mild heart attack a few months before his scheduled departure, he felt obliged to undertake the trip. He stayed in Canada from August to December 1967. This trip again culminated in extensive scientific studies and publications. He also visited scientific institutions in New York, Washington, Urbana, and Chicago during a one month stay in the U.S.A. Shortly before the end of his visit he suffered another heart attack. His doctors urged him to return home immediately--yet he insisted on keeping his promise and completing the scheduled two weeks of collecting. Fossils in amber were again at the centre of his investigations.

Monographs

Another focus of his work was the taxonomic-systematic revision of the dipterous families Muscidae (1955-1964) and Anthomyiidae (1966-1976) as his 13th and 14th contributions to "The flies of the Palaearctic region" edited by Professor E. Lindner (his friend and colleague from the State Museum of Natural History in Stuttgart/Ludwigsburg). Professor Hennig viewed this task, which he could have confined to taxonomy per se, as a challenge to conduct comparative-morphological analyses to verify not only the taxonomic, but also the phylogenetic relevance of characters and to provide extensive documentation in the form of drawings--always his own (more than 3,000 illustrations, often including several figures of the same form). After examining an enormous amount of material--which he obtained on loan on an individual basis or inspected on location in museums during his holidays abroad--he based his phylogenetic conclusions on broad comparisons which went far beyond the particular group he investigated.

General Works and Supplementary Studies

He used the same approach in his general works, for example his treatment of the Diptera in the "Handbook of zoology." Here as well he went far beyond mere compilation and always considered all morphological and non-morphological criteria in terms of their suitability as phylogenetic evidence. His didactic efforts went to the point of redrawing all illustrations he wanted to include and providing detailed information in the captions in an attempt to achieve a uniform and optimally informative picture.

He also published detailed studies of specific queries whose scope would have exceeded the framework of handbook-oriented treatments. Here, too, he used a broad basis for comparison: His investigation of the wing base of Nematocera also includes information on Mecoptera; the paper on the phylogenetic implications of the hypopygium of *Lonchoptera* etc. (1976, the last paper he published) also includes information on many other groups of Diptera; he also included many details on musculature (based on sections he had made himself) to substantiate his comments on the views advanced by other authors.

In his last year he worked intensively on the new edition of the "Larval forms of the Diptera" (the publication of his working material is in preparation), on a revised edition of the 'Textbook of zoology" (the 4th completely revised edition is in press), as well as on a general phylogenetic manuscript (its publication is in preparation) and other papers (see list of publications).

Teaching Activities

He needed such multi-faceted work: thus he might work on dipterous larvae in the Museum during the day and in the evening he might, for example, get so involved in non-insect invertebrates that the only time he had left for writing comments on manuscripts he received from his various journals, for opinions requested from the German Research Association etc., were the weekends where he would write heaps of letters in an effort to complete all these tasks quickly and thoroughly.

The lectures which he gave as Associate Professor at the Tübingen University (since 1970) were for him a welcome change from his primarily entomological work at the Museum. In these lectures he discussed, for example, new theories on mollusc phylogeny or coelom evolution. His efforts to keep up and to continuously expand his knowledge in many fields of zoology and to discover phylogenetically relevant evidence were far-reaching and extended also to vertebrates (as is indicated by a manuscript for a book on which he was working). His informed and detailed arguments and questions would occasionally embarrass even experts in their fields.

While he undertook numerous speaking engagements and attended conferences, etc. in his earlier years (for example, in 1963/64 he traveled to Helsinki, London, Rome, Munich, Marburg, and Freiburg, and visited the museums in Helsinki, Copenhagen, Paris, London, Florence, Göttingen, Frankfurt, and Tübingen for study purposes), in his later years he concentrated his efforts on personal discussions on a particular issue to expand his theories and elaborate his methodology, on "filtering out" previous suggestions on phylogenetic evaluation (e.g. in his 'Phylogeny of the insects" and "Textbook of zoology"), and on his own work on specific extant and fossil groups. Insofar as his papers were not intended for publication in other journals, almost all of his papers which he wrote during the time he worked in Stuttgart/Ludwigsburg were published in the "Stuttgarter Beiträge zur Naturkunde", the Museum's own journal.

"Stuttgarter Beiträge zur Naturkunde" is a scientific journal which has been published by the State Museum of Natural History in Stuttgart since 1957 (editor: Dr. K.W. Harde); it has a circulation of 1,000 copies and at the present time copies are still available for purchase (through direct orders or through bookstores) or exchange for other journals.

W. Hennig regarded a discussion of phylogenetic principles among a small group of colleagues, particularly a written or oral discussion with an author on the basis of his manuscript (whose level of work appeared to him worth spending some time on) to be more important than general speaking engagements before a large audience. He perceived serious dangers in having to shorten his argumentations (which might entail misunderstandings) because of the time limitations imposed by lectures; and he regarded the elaboration of certain elements required for lecture purposes as (tedious) repetition of issues he had already discussed on several occasions before; and finally, he missed the personal contact and the stimulus provided by a personal discussion. If he felt that a person was truly interested in phylogenetic methodology, W. Hennig would untiringly answer specific questions, approach them from various angles, and cite numerous examples in support of his arguments without any regard for time or his own projects that may have been scheduled for that particular time.

He realized that many authors (unlike himself) evidently found it difficult to transpose the phylogenetic argumentation from a study on other animal groups used as a model to their own specific animal group, and he therefore made every effort to plant "germ cells' in as many animal groups as possible. This is also the reason why he enjoyed supervising post-graduate students working on a thesis since he expected to encounter here a combination of mental agility, openmindedness, and a wealth of facts.

In order to ensure adequate publication and dissemination of the findings of these theses, he used his influence as co-editor of the 'Zeitschrift für Morphologie der Tiere" / "Zoomorphologie", together with Prof. P. Ax who shared his views, to get even voluminous manuscripts printed and he strenuously (and successfully) opposed efforts to restrict the size of a manuscript. He repeatedly expressed the view that this journal should act as "a vessel for theses."

In his efforts to establish the "germ cells" he tried to increase the precision of the phylogenetic argumentation to a level which the author of a given manuscript could or still would reach; but when he realized that a certain limit was reached (or could not be reached from the very beginning), he would be satisfied with phylogenetically less relevant argumentation and still recommend publication (particularly in cases where the journals in question had less sophisticated phylogenetic ambitions than the ones he himself was involved in). He made this decision in order to preserve the documentary value of a paper dealing, for example, with investigations of rarely studied organs or animal groups. He would then express the hope that the author might perhaps progress and improve upon his phylogenetic conclusions at some later stage, or that others might take up this particular topic and bring it to a satisfactory conclusion.

He did not like to get involved in the flood of theoretical papers on phylogeny (of every possible shade); he considered many of the papers he had to read because he received them as manuscripts to be intolerable on account of the frequent superficiality in their argumentation which he could not understand, and on account of the constant repetition of "counter-arguments" which he had refuted before more than once on the basis of specific examples and well-founded reasoning (which the author had not read or had not understood for semantic or other reasons). Against this background, he would occasionally be pleased with papers which at least to some degree followed his approach--in hopes that the authors should not become discouraged and should try to improve.

In addition he was convinced (as he pointed out on several occasions) that in 10 or 20 years' time the wheat would separate from the chaff even without his doing. He wanted to write a new book on phylogeny after he had completed the revision of the "Larval forms"; he felt that this would be the time to deal with individual works.

The massive attack by E. Mayr however did elicit his immediate reaction; Mayr's remarks on monophyly in particular struck at the heart of his phylogenetic approach. W. Hennig strenuously objected to the dilution of this term (for example through the incorporation of groups which are characterized only by evident non-synapomorphies) in Mayr, as he did vis-a-vis visitors whenever he deemed it necessary. He was also extremely amazed to see that people could be satisfied with formulations of the type 'A, B, and C have a common ancestor and are therefore a monophyletic group" as evidence

of relationship and that even when they were given a detailed explanation (for example: man, snail and earthworm also have a common ancestor, but this is no proof that the three are related more closely to one another than to other forms), they did not understand that there was a difference between the above statement and the following formulation and meaning of "...having an ancestor which only they share."

Sometimes he felt that the time when his ideas would be generally understood was still in the distant future in view of the endless discussions of elements of phylogenetic methodology which he had explained before to the very limits of achievable clarity and which nevertheless gave rise to spectacular misinterpretations. He overcame his anger over such incidences or difficulties arising from other causes which he considered small-minded and parochial (as they must appear to him given his background, see above) by burying himself in work, a remedy he had already adopted during the war and the postwar period.

3. Honours

Fortunately, various honours were bestowed on him just in time--as one, might almost say with hindsight in view of his short life--to give him optimism and confidence regarding the impact of his work.

He was awarded the Fabricius Medal by the German Entomological Society in 1953 (i.e. when he was only 40 years old).

In 1955 he was named Associate Member of the Finnish Entomological Society, Helsinki, in 1959 he was named a Member of the German Academy of Natural Scientists 'Leopoldina Halle, and in 1963 Associate Member of the American Entomological Society, Philadelphia.

In 1968 he was awarded an honorary doctorate by the Faculty of Mathematics and Natural Sciences of the Free University of Berlin, an honour that had special meaning for him because of his close ties with Berlin where, one might almost say, he had left his heart and soul and because it was Professor Klaus Günther[4], a person he held in extremely high regard, who presented the honorary doctorate and delivered the eulogy (Fig. 2).

E. Schuz provides an outline of the text of the eulogy and a description of the ceremony held at the guesthouse of Dr. K.E. Scheufelen in Stuttgart in Jh. Ges. Naturkunde Württemberg 124:19-21.

In 1972 the Royal Swedish Academy of Sciences, Stockholm, named him Foreign Member.

Special honours were bestowed on him in the form of the Cold Medal of the Linnean Society, London (1974) and the Gold Medal of the American Museum of Natural History, New York (1975). W. Hennig received the latter medal in Stuttgart from the Director of the American Museum, Dr. Thomas D. Nicholson.

Finally, in 1976, he was named Honorary Member of the Society of Systematic Zoology, New York.

4. W. Hennig, The Man

In view of his enormous activities one might be inclined to assume that he did not have any interests outside zoology--but that was far from true. He was a music enthusiast and loved Mozart and Handel in particular. For many years he would listen to every Mozart opera broadcast from Salzburg, using a libretto to follow the music. He also attended many concerts and opera performances in Berlin. Later he traveled extensively with his wife, in particular to southern Europe with its beautiful scenery and cultural heritage, and in the course of these travels he became something of an authority on ancient art history. When he learned that someone from his department or from administration intended to go on a trip, for example, to Rome or Florence, he would provide detailed impromptu descriptions and useful suggestions which were greeted with much enthusiasm; he often brought with him stacks of travel books on art history and lent them to colleagues who expressed interest in them. He seemed to know everything there is to know about the cultural treasures, particularly Romanesque and Byzantine art up to 15th century art, of all of Italy (his favourite country--he was also able to converse in Italian), but also of Sicily, Yugoslavia, Greece, France, and Spain, and he acquired this knowledge thanks to his phenomenal memory and his remarkable grasp of major concepts through

intensive study.

He developed a particularly efficient method of getting to see all that he deemed worthwhile on a trip. While he left the organization of a trip entirely to his wife, he would study every available source to learn about the cultural treasures he was interested in; he would copy these items and note down particulars and would then show these sketches to a tourist guide who could then guide him promptly and without wasting any time to the places he wanted to see (Fig. 3).

He also had an opportunity to briefly visit Australia and New Guinea as well as Thailand, the northern part of India and Nepal, and finally Java, Bali, and Burma (where he, of course, searched for Burmese amber).

He would not always tell the destination of his trips, mainly where trips to distant countries were concerned. Sometimes it required many skillful questions to wheedle his secret out of him, and Professor E. Lindner was particularly successful in this. On one occasion Professor Hennig returned to the office after a holiday and showed his unsuspecting audience a photo of himself, in "tiger tops", riding on an elephant in south Nepal. He was pleased as punch when the ladies asked him, despite his holiday suntan, whether the photo had been taken in the Berlin Zoo.

He liked original humour, especially humour with a Berlin flavour, and an equally matched partner like Professor Klaus Günther could inspire him to sparkling and witty repartees. He would recite passages from classical literature in a spontaneous contest with Dr. Gerd von Wahlert-- in Greek, Latin and in German, if necessary. His immense library at home did not only contain books on zoology and the classics, or Humboldt's accounts of his travels (a man he admired and whose portrait on the Orinoco always hung above his desk in the Museum), but he also had books by Karl May, for example 'Winnetou", or the "Leatherstocking Tales" within easy reach. Who would have expected that? -- W. Hennig also liked our dog and used to remark to others with some pride that it had accepted him immediately and liked to accompany us to his office in the Museum, while it would bark at all other members of the Museum staff although it had encountered them before.

During occasional visits to the Museum his grandchildren (he had five) treated him with cheerful and warm affection, which was obviously mutual.

Nobody expected that his life would end so soon and so abruptly, he himself included judging from his remarks regarding his plans for the future. The only indication to the contrary was an entry ("to be transferred to Schlee, if necessary") in his personal copy of the Diptera treatise of the "Handbook of zoology" he was using for revision purposes.

In keeping with his wishes (he was averse to any form of personality cult and even disliked the use of his name in connection with the phylogenetic methodology--he felt that 'phylogenetic systematics' should suffice), no official representatives attended his funeral. He was buried in the mountain cemetery in Tübingen with only his close friends and relatives present. His brother, a minister from their home district in Saxony and, like Willi Hennig, a remarkable person of great determination, deep commitment to his work, and profound understanding, conducted the funeral service and found the right words to pay true tribute to the man even without emphasizing the role that zoology had played in his life.

Although Willi Hennig was unable to realize many of his plans, what he had achieved is nevertheless many times more than a scientist could dream of accomplishing in a lifetime. We can assume that the unlimited support and absolute harmony he found in his family were essential for his work. The role of his family, and particularly that of Mrs. Irma Hennig, in this monumental achievement cannot be overestimated.

Mrs. Hennig's mathematics and biology studies, her continued interest in these subjects and her active support, in addition to the example set by the father, may well have had a guiding influence in the career development of their sons since all three attended university, two studied biology and chemistry and are now engaged in research work at the Max Planck Institute, while the third son has completed his studies as a secondary school teacher of German and history.

5. Postscript and Acknowledgment

Although I had an opportunity to catch a glimpse of some of the aspects of Willi Hennig's life in the course of the almost ten years of working with him and talking to him on a daily basis, it was not sufficient, of course, to gain an overall picture of his life. I am therefore grateful to Mrs. Hennig and her sons for their kind cooperation in answering all my questions in preparation of this paper and for review of the manuscript. In particular, I am indebted to Mrs. Hennig for making available W. Hennig's handwritten texts (the draft of the "Principles...", and the high school essay), the list of publications and the photographs. Permission to make the significant text of the high school essay known to the general public is also greatly appreciated (see: Ent. Germ. 4 (3/4): 193-199; Stuttgart 1978).

6. Bibliography

The complete list of Willi Hennig's publications appeared in: Beitrage zur Entomologie [Contributions to Entomology) 28: (00): 000-000; Berlin 1978. Only a few selected works and relevant papers are listed below.

Footnotes:

1. Obituary by P. Ax (1977).
2. List of publications in: Beiträge zur Entomologie 28 (1); Berlin, 1978.
3. For details see SCHLEE & DIETRICH in: Neues Jahrb. Geol. Paleontol., Monatshefte, 1970: 40-50; SCHLEE in: Stuttgarter Beitr. Naturkunde 213: 1-72, 1970; Kosmos (Stuttgart) 1972: 460-463.
4. W. Hennig also expressed this in his obituary for K. Günther, Hennig's last publication in 1976.

Figures:

Fig. 1. Page from W. Hennig's manuscript (1950): "Principles of a theory of phylogenetic systematics", chapter entitled "The palaeontological method".

Fig. 2. Willi Hennig with Professor Klaus Günther (left) who presented the honorary doctorate of the Free University of Berlin at the guesthouse of Dr. K.E. Scheufelen, Stuttgart, 1968.

Fig. 3. Willi Hennig and his wife in Hong Kong on January 26, 1976.

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Books and Publications

Amorim, D. S. 2000. A new phylogeny and phylogenetic classification for the Canthyloscelidae (Diptera: Psychodomorpha). Canadian Journal of Zoology 78:1067-1077.

Goff, M.L. 2000. A fly for the prosecution. How insect evidence helps solve crimes. Harvard University Press. Cambridge, Massachusetts. 223 pp.
$22.95 US. This is a fun read and will make you feel more important as a Dipterist.

Goldblatt, P. and J.C. Manning. 2000. The long-proboscid fly pollination system in southern Africa. Annals of the Missouri Botanical Garden 87:146-170.

Griffiths, G.C.D. 2001. Flies of the Nearctic Region: Anthomyiidae. Issue Number 13.
This issue contains revisions of the genera *Paregle*, *Adia*, *Acridomyia*, *Hylemya* and *Anthomyia*.

Grimaldi, D. (ed.), Studies on Fossils in Amber, with Particular Reference to the Cretaceous of New Jersey. Backhuys Publishers, Leiden, The Netherlands, viii + 498 pp.
Aside from an interesting overview of this fascinating amber deposit, 90-94 million years old, this volume has three papers (*) dealing with Diptera. The Ceratopogonidae are now one of the best known families of Insecta with regards to combining cladistic analysis and a detailed fossil record.
*Borkent, A. Biting midges (Ceratopogonidae: Diptera) from Lower Cretaceous Lebanese amber

with a discussion of the diversity and patterns found in other ambers. pp. 355-452.

*Borkent, A. Further Biting Midges (Diptera: Ceratopogonidae) from Upper Cretaceous New Jersey amber. pp. 453-472.

*Currie, D.C. and D. Grimaldi. 2000. A new black fly (Diptera: Simuliidae) genus from mid Cretaceous (Turonian) amber of New Jersey. pp. 473-485.

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Palmer, C.M. and D.K. Yeates. 2000. Phylogenetic importance of immature stages: Solving the riddle of *Exeretonevra* Macquart (Diptera: Xylophagidae). Annals of the Entomological Society of America 93:15-27.

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Sherman, R.A. , M.J.R. Hall and S. Thomas. 2000. Medicinal Maggots: an ancient remedy for some contemporary afflictions. Ann. Rev. Entomol. 45:55-81.

Skevington, J.H. and D.K. Yeates. 2000. Phylogeny of the Syrphoidea (Diptera) inferred from mtDNA sequences and morphology with particular reference to classification of the Pipunculidae (Diptera). Molecular Phylogenetics & Evolution 16:212-224.

Submission Form for Directory of North American Dipterists

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