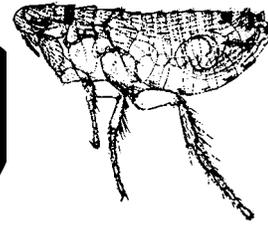


flea

NEWS

49



Department of Entomology

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FLEA NEWS is a biannual newsletter devoted to matters involving insects belonging to the order Siphonaptera (fleas) and related subjects. It is compiled and distributed free of charge by Robert E. Lewis (relewis@iastate.edu) with the support of the Department of Entomology at Iowa State University, Ames, IA, and a grant in aid from **Sandoz Animal Health**, based in Des Plaines, IL. It is mainly bibliographic in nature. Many of the sources are abstracting journals and title pages and not all citations have been checked for completeness or accuracy. Additional information will be provided upon written or e-mail request. Further, recipients are urged to contribute items of interest to the profession for inclusion herein.

This newsletter is now available in electronic format. The preferred method of accessing the electronic version is through the World-Wide Web at the following Universal Resource

Locator:

<<http://www.ent.iastate.edu/FleaNews/AboutFleaNews.html>> or through either Gopher or anonymous FTP: <gopher.ent.iastate.edu> in the "Publications" directory. Electronic versions are available for No. 46, July, 1993; No. 47, December, 1993; No. 48, July, 1994 and this number.

The opinions and assertions contained herein are the private ones of the authors and are not to be construed as official or as reflecting the views of the Department of Entomology, Iowa State University or Sandoz Animal Health.

MISCELLANEA

First, I wish to express my appreciation to all of you who responded to the announcement of the the death of Joanne with your condolences. It was most kind of you and I know that she would have appreciated the thoughts conveyed in your messages.

In response to my review of the Lane and Crosskey book on Medical Insects and Arachnids (FN 47: 518-519), John Lane of the London School of Hygiene and Tropical Medicine, University of London wrote to remind me of two

other volumes dealing with Medical and Veterinary Entomology. The first of these is Kettle, D.S., 1984, (reprinted with minor changes in 1990 and 1992), *Medical and veter-inary entomology*. C*A*B Internat-ional, Wallingford, Oxon, OX10 8DE, UK. 658 pp, ISBN 0-85198-701-X. The other, now out of print, is Service, M.W., 1980, *A guide to medical ento-mology*. The MacMillan Press Ltd., London. 226 pp. Both of these have evidently been used as texts, in con-junction with James and Harwood, 1979, in classes taught at the London School. My apologies for the omiss-ion.

The following persons have sent literature since the publication of FN 48: A. Azad, J. Beaucournu, D. Cyprich, M. Dryden, A. Dudich, L. Durden, E. Easton, T. Galloway, K. Larsen, A. Olsen, R. Pilgrim, J. Segerman, P. Sleeman, P. Smiddy & M. Stanko. Thank you very much for your continued cooperation.

A few new names have been added to the subscribers since Flea News 48. Their names and addresses follow.

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The Annual Report of the Danish Pest Infestation Laboratory (see Bille, N., 1994) lists the following studies on fleas conducted by Alice Olsen and Kim Søholt Larsen.

- 10.1 The cat flea *Ctenocephalides felis*. Four strains, two American and two Danish are in culture.
- 10.1.1 The pattern of emerging of the cat flea.
- 10.2 The squirrel flea *Ceratophyllus [(Monopsyllus)] sciurorum*.
- 10.3 Laboratory and field evaluation of Dimilin for control of

fleas on farmed mink. [*C. (M.) s. sciurorum*].

- 10.4 The hen flea *Ceratophyllus [(Ceratophyllus)] gallinae*.
- 10.5 Insecticidal effect of the plant *Cassiope tetragone*.

ITEMS OF GENERAL INTEREST

The Lacey Act

Those of you with access to the many electronic bulletin boards to be found on the INTERNET, and certainly those subscribers to Entomo-I, have doubtless noted the heavy traffic concerning the Lacey Act. Originally enacted to assist in controlling commerce in endangered species, mainly vertebrates, a reinterpretation of this statute by the Fish and Wildlife Service has placed practicing taxonomists in jeopardy. While the technicalities of the Act are beyond the scope of this newsletter, Kenelm W. Philip of the Institute of Arctic Biology, University of Alaska, Fairbanks, has crafted an explanation of the problem for the non-technical audience that is reproduced here with his permission.

"The Bugs and the Bureaucrats

Aside from the dangers involved in field trips to remote parts of the world, the life of a museum entomologist used to be fairly tame. However, in 1981 all that changed. An obscure law called the Lacey Act was updated - and museum entomologists now lead complicated, and possibly dangerous, lives. What does the Lacey Act do? It makes it a federal crime, punishable by a \$150,000 fine, to import, export, or take across a state line, any wildlife which was originally obtained in violation of any foreign, U.S. federal, state or Indian tribal law that protects wildlife. In 1981, the definition of

'wildlife' was expanded to include the entire animal kingdom. (Wild plants indigenous to the U.S. which are listed under CITES [Convention on International Trade in Endangered Species of Wild Fauna and Flora] or protected under state law are also covered). For example, collecting an insect, even a mosquito or a cockroach in a National Park or National Wildlife Refuge without a permit, and then taking the specimen to another state, is a violation of the Lacey Act. Note as well that 'wildlife' includes any part of an organism (blood, DNA, etc.).

"Many foreign countries have requirements for permits to take scientific specimens out of the country. The Lacey Act means it is now a U.S. federal crime to fail to comply with these permit rules - and ignorance is no excuse. A number of Fish and Wildlife Service enforcement agents in the lower 48 [states] have stated that the Lacey Act is retro-active in the following sense: if a museum has a 100-year old insect specimen that was originally (for example) taken from a foreign country without the requisite permit, that specimen is now in violation of the Lacey Act. Most major museums in the country have numerous specimens that have suddenly become contraband.

"All this is bad enough - but then the Fish and Wildlife Service got into the act by promulgating its own regulations. In order to bring scientific insect specimens into the U.S., or take them out of the U.S., the researcher now has to fill out F&WS Form 3-177. This form was originally designed for use by commercial importers of wildlife materials and products. It requires the importer/exporter to list every species of animal in the shipment, and the number of individuals of each species. Museum entomologists may return from a field

trip with several thousand specimens, or even tens of thousands of specimens - and many, sometimes most, of these will probably be undetermined. You are allowed to bring in undetermined material - provided that you re-file Form 3-177 every 180 days until all the material has been determined to species! In many groups of insects it may take years, or even decades, to determine to species every specimen in even a small collection, so Form 3-177 amounts to a serious paperwork burden to any museum whose staff is actively working on foreign material. Failure to file the form makes you guilty of smuggling. Fortunately most F&WS enforcement agents will make exceptions to the Form 3-177 requirement in cases where the material cannot be enumerated (as for the millions of organisms present in soil samples). Travelers who have picked up diseases in foreign parts do not have to inventory their micro-organisms...

"Other consequences of these F&WS regulations are: entomologists are being told that imported/exported specimens may not be sent through the mail, and that all imports and exports of specimens must take place through a limited number (nine) of official Ports of Entry. Packages of insect specimens are being opened and 'inspected' by people with no entomological training and no appreciation of how fragile such specimens are. Some foreign museums are considering refusing to lend material (especially type specimens) until the rules change.

"Recently proposed changes in the F&WS regulations would add a provision that importing eight or more similar specimens would create the presumption of commercial use! A reported conversation with the author of this provision indicated that eight beetles would be considered 'similar'

regardless of how many species (or families) were involved.

"One of the major ways that the insect collection at the National Museum of Natural History grows is through donations of private collections. The NMNH has announced a new policy for donations: all specimens must be accompanied by copies of all relevant collecting permits or by written evidence that no such permits were required. The U.S. Department of Agriculture is requiring similar documentation on all specimens sent to them from foreign countries for determination.

"These laws and regulations are seriously impeding taxonomic and other work on insects and other 'lower' organisms, at the exact time that research on biodiversity is becoming of critical importance. The laws passed by well-meaning individuals, in a climate of opinion that has been affected by concern for the environment (and possibly by animal-rights groups) - with absolutely no understanding of the way insects and other lower organisms differ from vertebrates. Scientific collecting is no danger to insect populations! The fecundity of insects is so high that sheer destruction of habitat and competition from introduced species are the only factors of any importance for species survival.

"What should we do about this situation? The only hope for the future of entomological research is to get the Lacey Act, and the requirements for Form 3-177, changed so that for insects and other lower organism only threatened and endangered species are covered. The original Lacey Act even had a sentence beginning: "Nothing in this subsection shall restrict the importation of dead natural-history specimens for museums or for

scientific collections ...", which seems to have been forgotten.

"Life on earth rests on lower organisms. We could vanish and life would go on - but if insects vanish we will all vanish with them. Research on insects needs to be untrammled, for our own good. As far as biodiversity research goes, the current regulations amount to shooting oneself in the foot .

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On an unrelated subject, Philip also sent the following description of a distribution map program that is now available.

"RangeMapper 2.1

This is a Macintosh program for generating species distribution maps of publishable quality that can be dropped into your own documents. It plots maps in seven projections, and include mapping data files for the world (low resolution) and for North America (higher resolution). There is considerable flexibility as to what is shown in a given map - even to the point of adding hydrologic features individually by name. Species data are plotted by reading ASCII files of lat/long data, which can be exported from data bases or spreadsheets. Data may be plotted as dots (squares /circles, open/filled), lines or 3-D bars whose heights are controlled by a third variable. A user-designed lat /long grid may be overlaid on any map and lat/long coordinates may be read off the screen. For a detailed brochure with many sample maps, write to:
Tundra Vole Software
1590 North Becker Ridge Road

Fairbanks, AK 99709-2705
[907 479 2689]"

Plague in India

Although Plague continues to be an endemic public health problem in many parts of the world, certainly the recent outbreak of the disease in central India has focused the attention of the media. Although now evidently on the wane, this outbreak received extensive coverage by the print media in Asia. Dr. Emmitt Easton, University of Macau, kindly forwarded copies of articles printed in the South China Morning Post, Hong Kong, tracing its early development. In the reconstruction by journalist Tim McGirk, it was postulated that the disease was contracted in Maharashtra's Beed District in west-central India following an earthquake in October of 1993. Doctors believe that the infected carrier returned to Surat, in Gujarat State, a coastal city about 150 miles north of Bombay, some time after September 18th of this year. He probably lived in the Ved Road area, or one of the other slums where fatalities have been the worst and in about a week he and probably other 'carriers' had infected at least 533 people. How the carriers contracted the disease is not known, but the epidemic that followed was certainly the pneumonic form according to epidemiologists. It has since spread through central India with cases reported from New Delhi and Bombay. While the veracity of such reports in the news media is always suspect, the evidence suggests that this outbreak is the worst reported in decades and may herald a recrudescence of the disease in Asia.

Meanwhile, at least 12 cases have been reported in western United

States. One of these in New Mexico resulted in a fatality. REL

E. O. Wilson writes again

The following review of a new book by E. O. Wilson was recently published in the New Scientist (October 1st, p. 43) and is repeated here, with permission, both from the journal and the author.

"The indefatigable E. O. Wilson has recently published yet another work, and this one, an autobiography titled NATURALIST, is not being promoted much by Island Press, the small outfit that published it. It is a very good read throughout, but the long-suffering taxonomists, in particular, ought to enjoy his account of the attempt, during the 60s, by the molecular biologists to exterminate the ecologists and systematists. At Harvard the cast included Jim Watson himself, [to]whom Wilson is not kind. His account of departmental politics, with not just Watson and Wilson, but Ernst Mayr and George Wald, is amusing if you can stomach it. Near the end of the chapter, Wilson, looking back on it all, comments that 'molecular biologists, as they promised, have taken up evolutionary studies, making important contributions whenever they can find systematists to tell them the names of organisms'". Jonathan D. Beard
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A word on IGRs

To those of you not directly concerned with the science of Entomology, the acronym IGR has probably been assigned to the dust-bin of alphabetical

nonsense so prevalent in American culture today. In fact, IGRs (=Insect Growth Regulators) have been around for some time, and in many instances represent the wave of the future in the control of certain insect pests. My first contact with one came in the days when I was still very much involved in raising orchids and found one of these compounds to be efficacious in controlling scale infestations and those of other homopterous insects. Today, at least one of these is used in controlling flea infestations in the home. Following is an excerpt from an article published in Pest Control Technology, February 22: 58, 62, 90 (1994) and reprinted in the Technical Information Bulletin of the Armed Forces Pest Management Board.

"IGRs work because they mimic the flea's own growth-regulating hormones, thus interfering with the flea's ability to complete its development. Whole generations of flea larvae are unable to hatch from their eggs, and larvae that hatch prior to the application will be unable to pupate and mature to adults. With the flea life cycle interrupted, the population crashes in a few weeks.

"In addition to reducing the amount of time spent controlling severe flea infestations, preventive IGR flea treatment programs offer several benefits stemming from the growth regulators themselves.

- "Because they closely resemble the flea's own hormones, IGRs aren't metabolized rapidly and fleas are less likely to evolve resistance to them.
- "Some IGRs are very photostable - they remain effective in sunny back yards.
- "Flea IGRs are available in a wide variety of formulations: emulsifiable concentrates, aerosols, wettable powders and IGR/adulthood sprays

for direct application to pets (one has even been formulated specifically for puppies and kittens).

- "Flea IGRs remain active for 6-12 months after application.
- "IGRs provide a least-toxic chemical control alternative: even though IGRs have a long residual life, they are environmentally sound and safe for vertebrates when applied according to label instructions.

"Note that on occasion a flea may be brought into the home by a pet. Sighting a flea now and then shouldn't be taken as an indication of failure. IGRs won't relieve animals of all fleas, but they will prevent infestations in the home. Flea eggs that drop to the carpet will be affected since they or the larvae that hatch will never become a blood-feeding adult . . ."

[A similar level of euphoria was expressed by some with the development of chlorinated hydrocarbons, organophosphates, etc., now considered inefficacious controls and major environmental pollutants. REL]

FLEA LITERATURE AVAILABLE

Serious students of the order Siphonaptera are already aware of the major catalogues published during the last half century and dealing with the world fauna. The series by G.H.E. Hopkins and M. Rothschild, published in the years 1953, 1956, 1962, 1966 and 1971 deals with all of the families but the Pygiopsyllidae, later treated by D. Mardon in 1981, and the Malacopsyllidae and Rhopalopsyllidae, treated by F.G.A.M. Smit in his excellent monograph in 1987. I have long thought that at least the earlier volumes in this series were out of print since I was unable to locate a reference to them or to ascertain their cost if they were still

available. The latest E.W. Classey Ltd. catalogue, which arrived today, lists the first five volumes of this series at £250.00. Recently, Miss Theresa Howard, Medical and Veterinary Division, Department of Entomology, The Natural History Museum, Cromwell Road, London SW7 5BD, ENGLAND, informed me that a limited number of sets of these seven catalogues is available, on a first-come-first-serve basis for the cost of shipping and handling. Miss Howard may be contacted at the address given above or by the following means: Tel. +44 (0) 171 938 9503 9329, Fax. +44 (0) 171 938 9395 8937, or by E-mail at the following, <t.howard@nhm.ac.uk>.

The only remaining family, the Ceratophyllidae, was not included as a part of the catalogue series, but was the subject of the 1983 volume by R. Traub, M. Rothschild & J.F. Haddow. I have reason to believe that a limited number of copies of this volume may be available on a similar basis. Persons interested in obtaining a copy of this work should contact me personally and I will look into its availability. In addition to my mailing address, I may be contacted at any of the following: Tel. (515) 294 1815, (515) 232 7714, Fax. (515) 294 5957 or E-mail <relewis@iastate.edu>. REL

SPECIES NUMBERS

In keeping with the practice begun by Frans Smit in 1978 of assigning a 5-digit number to each name erected in the order, following are numbers assigned to those taxa described in 1992. Due to the difficulty in establishing the exact dates of publication the listing is alphabetical rather than chronological. Please inform me of any omissions that come to your attention.

99201 **aethiopica** Beaucournu & Morel, *Chiastopsylla*. Ann. Soc. Ent. Fr. (N.S.) 28(2): 125-131.

99202 **caecus** Beaucournu & Morel, *Ctenophthalmus* (*Ethioctenophthalmus*). Ann. Soc. Ent. Fr. (N.S.) 28(2): 125-131.

99203 **iae** Beaucournu & Kock, *Nycteridopsylla*. Senckenberg. Biol. 72(4/6): 329-334.

99204 **laxiprojectus** LI, *Ctenophthalmus* (*Sinoctenophthalmus*). In "The Anoplura and Siphonaptera of Guizhou" pp. 269-271.

99205 **lushuiensis** GONG & HUANG, *Ctenophthalmus* (*Sinoctenophthalmus*). Acta Ent. Sin. 35(1): 110-112.

99206 **nushanensis** GONG & LI, *Palaeopsylla*. Acta Zootax. Sin. 17(2): 235-237.

99207 **parthicus** Medvedev & Alifirenko, *Ctenophthalmus* (*Euctenophthalmus*). Parazitologiya 26(5): 409-417.

99208 **quadrata** GONG, *Geusibia*. Acta Zootax. Sin. 17(3): 363-365.

99209 **scalonae** Kotti, *Frontopsylla* (*Frontopsylla*). Zool. Zh. 71(11): 152-154.

99210 **weiningensis** LI, *Amphipsylla*. In "The Anoplura and Siphonaptera of Guizhou" pp. 314-316.

99211 **xiei** GONG & DUAN, *Ctenophthalmus* (*Sinoctenophthalmus*). Acta Zootax. Sin. 17(1): 97-99.

99212 **zii** GONG, *Hystrichopsylla*. Acta Ent. Sin. 35(2): 241-243.

Additional Taxa

1993

Leptopsylla algira atlantidis Beaucournu

Ctenophthalmus (*Sinoctenophthalmus*) *exiensis* WANG & LIU

Hechtiella lopesi Guimaraes & Linardi

Neopsylla sibo YE & YU

Chaetopsylla zhengi XIE, HE & CHAO

1994

Echidnophaga iberica Ribeiro, Lucientes, Osacar & Calvete ***n.b.**

Lagaropsylla malayana Beaucournu & Kock

Thrassis peninsularis Lewis

[***n.b.** There is absolutely **no** excuse for attributing a new name to more than a maximum of two authors, and editors should be encouraged to re-use multiple-authored descriptions.]

SIPHONAPTERA LITERATURE

Although it may not be obvious from the titles, citations included here pertain to fleas and the zoonoses associated with them. Additional information is available upon re-quest.

1988 (List 12)

CAO Li-ping & HE Lin. Comparative analysis of isoenzymes from three species of fleas. *Annual Bulletin of the Society of Parasitology, Guang-dong Province* 10: 219-220.

CAO Li-ping & HE Lin. Cytogenetic studies on fleas (Siphonaptera). IV. Comparative analysis of amino acids, DNA contents of three species of fleas.

Annual Bulletin of the Society of Parasitology, Guangdong Province 10: 221-222.

CAO Li-ping & HE Lin. Cytogenetic studies on fleas (Siphonaptera). I. Technique of chromosome, DNA content, amino acids and isoenzymes of fleas. *Annual Bulletin of the Society of Parasitology, Guangdong Province* 10: 223-224.

1990 (List 9)

Trotti, G.C., L. Corradini & S. Visconti. Indagine parassitologica in un rifugio per gatti a Ferrara. *Parassitologia* 32: 42-43.

1991 (List 8)

Dudich, A. To the knowledge of the fauna of fleas (Siphonaptera) living on small mammals in Oravské Beskydy Mts. *Prehl'ad odborných výsledkov XXVII. TOP - Oravská priehrada, 1991.* pp 55-60. (in Czech)

Joseph, S.A. & G. Karunamoorthy. Studies on the haematophagous arthropods of zoonotic importance in Tamil Nadu. In *Entomology for Defence Services*. Proceedings of the Symposium held on 12-14 September. [edited by P.K. Ramachandran, D. Sukumaran & S.S. Rao]. pp. 185-192.

PAN Xiao-jun. A study of the phallosome of two male fleas of the family Pygiopsyllidae. *Annual Bulletin of the Society of Parasitology, Guangdong Province* 11-13: 109.

1992 (List 6)

Carabeli, A., R. di Vincenzo, P. Vanotti & E. Bertani. La Tungose. *Nouvelles Dermatologiques* 11(10): 826.

Dudich, A. Qualitative structure of the synusia of ectoparasites on small mammals in the supramontane belt of the west Tatra. *Zborník Prác o Tatranskom Národnom Parku, 1992.* 32: 149-164. (in Czech)

Dudich, A. Introgressive hybridization of subspecies of *Ctenophthalmus agyrtes* (Heller, 1986) [sic!] (Siphonaptera, Ctenophthalmidae) in the Donau lowland. *Spravod-aj Podunajského Múzea Komárne Prírodné vedy* 10: 172-185. (in Czech)

Dudich, A. Contribution to the knowledge of the small mammals (Insectivora, Rodentia) and their ectoparasites (Acarina, Anoplura, Siphonaptera) in the forest-steppe of the Cenkov State Nature Reserve (Donau lowlands). *Spravodaj Podunajského Múzea Komárne Prírodné vedy* 10: 186-191. (in Czech)

Pegram, R.G & A.J. Higgins. Camel ectoparasites: a review. In *Proceedings of the First International Camel Conference, Dubai, 2nd-6th February 1992.* [edited by W.R. Allen, A.J. Higgins, I.G. Mayhew, D.H. Snow & J.F. Wade]. pp. 69-78.

Slodobyanyuk, O.V. Taxonomic significance of morphological characters of insect-parasitic females of *Tylenchida*. *Trudy Gel'mintologicheskoi Laboratorii* 39: 171-179.

Smiddy, P. & D.P. Sleeman. Records of the flea *Dasypsyllus gallinulae gallinulae* (Dale) from nests of Irish dippers (*Cinclus cinclus hibernicus* Hartert). *Irish Naturalist's Journal* 24(4): 169-170.

1993 (List 4)

- Bandyopadhyay, B. & J.S. Sarma.** Therapeutic evaluation of deltamethrin and amitraz against organophosphate resistant canine ticks and fleas. *Indian Veterinary Journal* 70(11): 1053-1054.
- Beaucournu, J.C.** *Leptopsylla algira atlantidis* n. ssp. (Insecta, Siphonaptera), endémique des îles Canaries. *Bulletin de la Société Française Parasitologie* 11(2): 259-263.
- Beaucournu, J.C. & J.A. Alcover.** XXV. Els Sifonàpters. In J.A. Alcover, E. Ballesteros & J.J. Fornós (Eds.), *Història Natural de l'Arxipèlag de Cabrera*, CSIC-Edit. Moll. Mon. Soc. Hist. Nat. Balears 2: 377-382.
- Beaucournu, J.C., C. Guiguen & B. Ehanno.** Les Siphonaptères du massif armoricain et du sud-ouest des îles Britanniques comparaison à partir de quelques groupes - hôtes. *Bulletin de la Société Scientifique, Bretagne* 64(1): 209-222.
- Beaucournu, J.C., M. le Piver & C. Guiguen.** Actualité de la conquête de l'Afrique intertropicale par *Pulex irritans* Linné, 1758. *Bulletin de la Société de Pathologie Exotique* 86: 290-294.
- Campbell, J., J. Lowe, S. Walz & J. Ezzell.** Rapid and specific identification of *Yersinia pestis* by using a nested polymerase chain reaction procedure. *Journal of Clinical Microbiology* 31(3): 758-759.
- Degeilh, B., B. Gilot, C. Guiguen & J.C. Beaucournu.** A propos de recoltés des puces (Siphonaptera) au drap-eau. *Bulletin de la Société Française Parasitologie* 11(2): 253-258.
- Dudich, A.** The siphonapterological bibliography of Slovakia. II. (1984-1986). *Správy Slovenskej Zoologickej Spoločnosti*, 1993. 15: 29-40. (in Czech)
- Dudich, A.** To the knowledge of micromammals and their ectoparasites in Ponitrie region. 1. Teriologic and parasitologic bibliography of Nitra district. *Rosalia (Nitra)* 9: 189-208. (in Czech)
- Dudich, A.** To the knowledge of micromammals and their ectoparasites in Ponitrie region. 3. Fleas /Siphonaptera/ of mammals /Mammalia/ living in Nitra district. *Rosalia (Nitra)* 9: 241-272. (in Czech)
- Dudich, A.** Fleas (Siphonaptera) of small mammals (Insectivora, Chiroptera & Rodentia) in the Bükk National Park. In *The fauna of the Bükk National Park*, 1993. pp. 401-406.
- El-Bahrawy, A.A. & M.A. Al-Dakhil.** Studies on the ectoparasites (fleas and lice) on rodents in Riyadh and its surroundings, Saudi Arabia. *Journal of the Egyptian Society of Parasitology* 23(3): 723-735.
- Fain, A. & J.C. Beaucournu.** Les hypopes des Astigmatés (Acari) phorétiques sur les Puces (Siphonaptera) de Mammifères et d'Oiseaux. *Bulletin de la Institut Royal des Sciences Naturelles de Belgique. Entomology* 63: 77-93.
- Fukase, T. & M. Hosaka.** Parasite life cycle diagrams. *Ctenocephalides canis* and *Ctenocephalides felis*. *Journal of Veterinary Medicine, Japan* 46(6): 500.
- Guiguen, C., P. Yésou & J.C. Beaucournu.** Notes sur *Ceratophyllus vagabundus vagabundus* (Boheman),

1865, au Lac Baikal (Siphonaptera: Ceratophyllidae). *Bulletin de la Société Entomologique de France* 98(1): 28.

Hayasaki, M., Y. Akiyama, K. Konno & I. Ohishi. Immune treatment of flea allergy dermatitis of dogs with flea extract. *Journal of the Japanese Veterinary Medical Association* 46(10): 866-869.

Heath, A.W., A. Arfsten, M. Yamana, M. Dryden & B. Dale. Vaccination against the cat flea, *Ctenocephalides felis felis*. *Parasite Immunology* 16(4): 187-199.

Hickey, G.J., C.H. Chang, F. Marsilio, W. Trimboli & E.L. Rickes. Effects of prednisone on dermal responses in flea-allergen hypersensitized dogs. *Veterinary Dermatology* 4(2): 71-77.

Hinnebusch, J. & T.H. Schwan. New method for plague surveillance using polymerase chain reaction to detect *Yersinia pestis* in fleas. *Journal of Clinical Microbiology* 31(6): 1511-1514.

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COEXTINCTION

In an interesting letter to the British Journal NATURE (366: 307, 25 November) Nigel Stork and Christopher Lyal discuss the extinction of endo- and ectoparasites, along with the extinction of their hosts. The authors suggest that in at least one group of insects, the lice (Phthiraptera) and possibly another, fleas (Siphonaptera), the extinction rates approximate those of their avian and mammalian hosts. This is particularly the case in the lice because of their high degree of host specificity. Using the passenger pigeon and its extinction in 1914 as an example, they note that at least two species of chewing lice, *Columbicola extinctus* Malcomson and *Campanulotes defectus* Tendeiro, evidently became extinct at the same time as their host, relatively unnoted by the scientific community. They go on to point out that most people "consider the value of insects, either positive or negative (with perhaps the exception of butterflies), solely in terms of their contribution to ecosystems and their direct or indirect effect on humans." Whether its lice should be given the same value as their avian host raises ethical questions that should not be ignored when discussing conservation priorities and practices. If conservation needs require the extinction of their parasites while conserving the host

species, such practices should be pursued ". . . in the full knowledge of what is being lost."

This has long been a matter of lively discussion among pulicologists since many families of fleas show phylogenetic affinities within the order that suggest extinction patterns of certain of their mammalian hosts. It is seldom noted that while hemimetabolous parasites such as lice pass all of their life stages on the host, the holometabolous fleas differ drastically in their requirements between the larvae and the adults and the law of the minimum applies to both stages. While we can never accurately reconstruct the phylogenetic position of these extinct taxa in a current context, a hypothetical example taken from the North American fauna demonstrates the potential damage to our studies created by host extinctions.

The host is the mountain beaver, *Aplodontia rufa*, a primitive rodent with a restricted range from northern California to extreme southwestern British Columbia. According to the literature, ten species of fleas have been reported from this host. Five of these are obviously strays from other hosts, or at least accidental associations. Another, while found on this and other rodent hosts fairly frequently, is mainly a parasite of insectivores (shrews and moles). The remaining four are specific parasites of *A. rufa* and are almost never found on other hosts. Four genera are represented and three of these are monotypic. Depending on the family classification followed, either two or three separate families are represented.

The first of these is *Dolichopsyllus stylosus* (Baker, 1904) (Leptopsyllidae, Amphipsyllinae, Dolichopsyllini). The proper phylogenetic position of this taxon is very much a matter of speculation. According to current family definition it is a leptopsyllid but it is not in the mainstream of evolution in the family. That it is larger and hairier than other members of the family suggests its primitivity. However, the presence of a well developed pronotal ctenidium and the loss of eyes suggest some specialization as a parasite of a semifossorial host. In my view, its extinction would eliminate what I consider to be the most plesiomorphic member of the entire family.

The remaining three species are hystrichopsylloids, usually considered to be the most primitive superfamily in the order. The first of these, *Hystrichopsylla schefferi* Chapin, 1919 (Hystrichopsyllidae, Hystrichopsyllinae, Hystrichopsyllini), is a member of

an Holarctic genus containing 19 species and 32 named taxa. Only seven species occur in the Nearctic Region, and all except *H. schefferi* are associated with rodent and insectivore hosts. *Hystrichopsylla schefferi* has the distinction of being the largest, non-neosomic flea in the entire order, and females may exceed one centimeter in length. All members of the genus are considered primitive by most students of the order and the most plesiomorphic taxa seem mostly associated with insectivores, although host specificity is not particularly strong in this genus. That the largest and one of the most primitive species is associated with such a primitive host suggests a fascinating evolutionary complex of taxa that has been lost to us through extinction of their hosts. Lewis & Lewis (1994) discuss this species in more detail.

Both of the other two taxa are monotypic and both are assigned to the family Ctenophthalmidae, Rhadinopsyllinae, Rhadinopsyllini. The eighty odd taxa assigned to this tribe are all nest fleas in that they have lost the ability to jump well and are confined to the nest of the host during most or all of their existence, both as larvae and adults. Members of the Palearctic genus *Stenischia* are shrew fleas, while species of the Holarctic *Rhadinopsylla* parasitize rodents and/or insectivores, depending upon the subgenus to which they belong. *Paratyphloceras oregonensis* Ewing, 1940 and *Trichopsylloides oregonensis* Ewing, 1938, are exclusively parasites of *A. rufa* and are seldom taken on any other host species. It is apparent that *Stenischia* and *Rhadinopsylla* are closely related, in spite of the strong tergal and sternal incassations of the abdomen in the former genus, and *Stenischia rhadinopsylloides* Smit, 1975, connects the two genera quite obviously. While both of the *Aplodontia* parasites are distinct from this line of evolution in the tribe, they are both much more setose, and *P. oregonensis* is much larger than any other member of the tribe. The genal ctenidium is present in this species, which is normal in the tribe, but it is missing or vestigial in *T. oregonensis*. All males in this tribe normally lack antepygidial bristles, an apomorphic character in the order, but a pair of these bristles is present in males of *P. oregonensis*.

In summary, while neither of these fleas seem to be in the mainstream of evolution within the tribe, each shows traits that are thought to be ancestral. Consequently,

their loss could severely dampen phylogenetic studies in this large and important family of fleas. As pointed out by Lewis and Lewis (1994) these strongly host-specific species may become the first fleas to be placed on the Endangered Species list since at least two subspecies of *A. rufa* are seriously threatened by habitat reduction due to housing developments and other types of construction. REL

**We wish you the happiest of
holiday seasons and the best
of New Years!**