BAT RESEARCH NEWS

VOLUME 18: NO. 1–4 1977

BAT RESEARCH NEWS

Volume 18: Numbers 1–4 **1977**

Original Issues Compiled by Drs. M. Brock Fenton and Roy Horst, Editors of *Bat Research News* (1977).

Bat Research News is ISSN # 0005-6227.

BAT RESEARCH NEWS

Table of Contents for Volume 18, 1977

Volume 18: Number 1, April 1977

Volume 18: Number 2/3, August 1977

Volume 18: Number 4, November 1977

Volume 18, number 1 April 1977

BAT RESEARCH NEWS

Editor

Dr. M.B. Fenton
Department of Biology
Carleton University
Ottawa, Canada
K1S 5B6

Managing Editor

Dr. Roy Horst
Department of Biology
State University College
at Potsdam
Potsdam, New York 13676

Here it goes again. Roy Horst has agreed to act as managing editor, meaning that he will see to the duplication and mailing of the issues as they are prepared. Preparation will be done here at Carleton University and hopefully to the following schedule: February, May, August and November. This is, in traditional form, the February issue, delayed in this instance by the logistics of transfer of information from Bob Martin.

I think it appropriate to start off another round of Bat Research News by thanking the former editor, Bob Martin, for his efforts which have kept BRN alive over the past few years. I hope that we can keep it going and that it will continue to be a valuable newsletter for people who are interested in bats.

Format

We will continue to follow the tried and true format of BRN, namely news, occasional short communications, and literature. The November issue each year will be devoted to reporting the happenings of the North American Symposium on bat research, for the benefit of those unable to attend that function.

The New Literature section will continue, but its coverage will not depend upon the search image of any one person. In short, that is an invitation to readers of BRN to pass along new citations as they encounter them. Usually people here at Carleton are able to scan a good number of journals for articles on bats, certainly basic journals including: Science, Journal of Mammalogy, Mammalia, Canadian Journal of Zoology, Evolution, American Naturalist, Ecology, Journal of Ecology, Journal of Applied Ecology, Journal of Wildlife Management, Journal of Physiology, Oecologia, Oikos, ... and a variety of others. However, when you encounter a 'new' citation, please jot it down and send it in.

We will try to subdivide the New Literature section by topic, and wherever possible include the mailing address of the senior author to facilitate getting in touch re reprints, etc.

I am planning to add a new section referring to Literature, namely a section which provides references to articles IN PRESS. Given the present lags between the time when an article is accepted for publication and when it actually appears, this section could be an excellent means of finding out about ongoing work. However, this will only be valuable if people send us appropriate citations. Please only provide data for articles which are accepted for publication, and provide us with the date when the article was accepted. We do not plan to include articles which

are 'in preparation' or 'submitted'.

How to Subscribe

From the records provided us by Bob Martin, it is evident that all subscriptions have now expired, if for no other reason than we have no money. If you wish to be added to, or kept on the mailing list for BRN, please complete the attached form and return it to me before 15 July 1977. Please indicate your area of interest on the form so that we can add it to a master list of subscribers and their interests. This list will form the basis for the next two issues of BRN which should appear in August 1977.

Cost

To cover the costs of duplicating and mailing each issue (we anticipate 10 printed pages per issue), we estimate a total cost of $3.00 per year So, if you want to be included, fill in the attached form and send a money order.

Meetings

Eighth Annual North American Symposium on Bat Research

This will be held in Ottawa at the Skyline Hotel on 14 and 15 October 1977. We anticipate space for 45 papers on the programme and plan to include a workshop on techniques for studying bats on the evening of 14 October. The meetings are being hosted by the Faculty of Graduate Studies at Carleton University. For more information contact either Roy Horst (programme) or Brock Fenton (local).

Fifth International Bat Research Conference

This will be held in conjunction with the Ninth Annual North American Symposium on Bat Research in Albuquerque, New Mexico in August 1978. For more details contact either:

J.S. Findley
Museum of Southwestern Biology
University of New Mexico
Albuquerque, New Mexico 87131

or

D.E. Wilson
National Fish and Wildlife Laboratory
National Museum of Natural History
Washington, D.C. 20560

News

Kim and Richard Thomas have recently moved to the Department of Biology at the University of Puerto Rico (Rio Piedras, Puerto Rico 00931), and they are currently working on various aspects of the biology of bats which occur in Puerto Rico. They would be glad to visit with bat biologists who might be passing through Puerto Rico.

Jim Simmons has prepared an information sheet for people who have observed bats feeding in the field (see attached). If you can provide him with any of the information requested on the form, please complete same and send it along to him (Department of Psychology, Washington University, St. Louis, Missouri 63130).

Science volume 195, p. 776 caries a review of THE SCIENCE OF SPELEOLOGY by Barry F. Beck in which the importance of conservation of biological features of caves is emphasized. The book, edited by T.D. Ford and C.H.D. Cullingford, is published by Academic Press and runs $29.50.

Most readers will probably have heard about the woman from northeast Maryland who was bitten on 10 May 1976 by an Eptesicus fuscus, and who died from rabies contracted via this bite, on 27 June 1976, in spite of treatment with the recommended doses of duck embryo vaccine. More details of this are presented in the Rabies Surveillance Report for April to June 1976 which was issued in December 1976 by the U.S. Department of Health Education and Welfare. This unfortunate incident certainly appears to have precipitated a great deal of concern about bats and public health, and I suspect that the incidence of bat control operations has been increased accordingly.

In this context, we are still without a good supply of data on effective means of controlling bats, but a forthcoming publication from Tom Kunz and his people at Boston University (see IN PRESS section) may help to provide some ammunition against the continued use of pesticides against bats. The main argument against use of pesticides to control bats is that they are not very effective, certainly not as effective as sealing out the bats, and probably not as effective as the use of light.

Short Communications

I am currently reconsidering the whole idea of 'publishing' short communications in BRN. Manuscripts in hand are double spaced typed and would have to be retyped to allow efficient use of space. This would considerably delay the appearance of this issue, so the whole matter is deferred.

New Literature

Behaviour

Turner, D., A. Shaughnessy and E. Gould. 1972. Individual recognition between mother and infant bats (Myotis). IN Animal Orientation and Navigation, S.R. Galler, K. Schmidt-Koenig, G.J. Jacobs and R.E. Belleville (eds). NASA SP-262: 365 - 371. (obviously not new, but perhaps missed by some readers).

Kolb, A. 1976. Funktion und Wirkungsweise der Riechlaute der Mausohrfledermaus, Myotis myotis. Z. Saugetierkunde 41(4): 226 - 236. (function and mode of action of the so-called olfactory sounds of the mouse-eared bat). Biologisches Institut, 86 Bamberg, Jesuitenstr. 2

Foster, M.S. and R.M. Timm. 1976. Tent-making by Artibeus jamaicensis (Chiroptera : Phyllostomatidae) with comments on plants used by bats for tents. Biotropica 8(4): 265 - 269. Museum of Vertebrate Zoology, University of California, Berkley, California 94720.

Cope, J.B. and S.B. Humphrey. 1977. Spring and autumn swarming behavior in the Indiana bat, Myotis sodalis. J. Mamm. 58(1): 93 - 95. Department of Biology, Earlham College, Richmond, Indiana.

Brosset, A. 1976. Social organization in the African bat, Myotis boccagei. Z. Tierpsychol. 42: 50 - 56. Laboratoire d'écologie géneral due Museum National d'Histoire Naturelle, 4Ae du Petit Chateau, 91.800 Brunoy, France.

Bradbury, J.W. and S.L. Vehrencamp. 1976. Social organization and foraging in emballonurid bats. I. Field studies. Behav. Ecol. Sociobiol. 1: 337 - 381.

Bradbury, J.W. and S.L. Vehrencamp. 1976. Social organization and foraging in emballonurid bats. II. A model for the determination of group size. Behav. Ecol. Sociobiol. 1: 383 - 404. Department of Biology C016, University of California at San Diego, La Jolla, California 92093.

Anatomy

Cooper, J.G. and K.P. Bhatnagar. 1976. Comparative anatomy of the vomeronasal organ complex in bats. J. Anat. 122(3): 571 - 601. Department of Anatomy, Health Sciences Center, University of Louisville, Louisville, Kentucky 40201

Distribution

Chakraborty, S. 1975. On a collection of mammals from Bhutan. Rec. Zool. Surv. India 68: 1 - 20 (chiropterans pp 2 - 3).

Long, C.A. 1976. The occurrence , status and importance of bats in Wisconsin with a key to the species. Wisconsin Acad. Sci., Arts & Letters. Trans., 64: 62 - 82.

Populations

Humphrey, S.R. and J.B. Cope. 1977. Survival rates of the endangered Indiana bat, Myotis sodalis. J. Mamm. 58(1): 32 - 36. Florida State Museum, University of Florida, Gainesville, Florida 32611

Tuttle, M.D. and D.E. Stevenson. 1977. An analysis of migration as a mortality factor in the gray bat based on public recoveries of banded bats. Am. midl. Nat. 97(1): 235 - 240. Milwaukee Public Museum, Milwaukee, Wisconsin.

Other

Foott, W.H. 1976. Use of fluorescent powders to monitor flight activities of adult Glischrochilus quadrisignatus (Coleoptera : Nitidulidae). Can. Ent. 108: 1041 - 1044. (actually about beetles, but the technique might be useful.

Gardner, A.L. 1977. Taxonomic implications of the karyotypes of Molossops and Cynomops (Mammalia : Chiroptera). Proc. Biol. Soc. Wash. 89(47): 545 - 550.

Stephens, R.J. and L.J. Cabral-Anderson. 1976. Erythropoiesis in the yolk sac of the bat, Tadarida brasiliensis cynocephala. Anat. Rec. 186(4): 525 - 552.

Suga, N. 1977. Amplitude spectrum representation in the doppler-shifted-CF processing area of the auditory cortex of the mustache bat. Science 196(4285): 64 - 67. Department of Biology Washington University St. Louis, Missouri 63130.

to make this longer (and a hell of a lot more tedious to prepare) send in citations. It will help us if you type the citations on 3X5 cards.

IN PRESS

(this time this is a highly biased sample derived from work here at Carleton and from information provided by Tom Kunz; to make it more representative send us information)

Kunz, T.H. and E.L.P. Anthony. in press. On the efficiency of the Tuttle bat trap. J. Mammalogy.

Kunz, T.H., E.L.P. Anthony and W.T. Rumage. in press. Mortality of little brown bats following multiple pesticide applications. Journal of Wildlife Management.

Anthony, E.L.P. and T.H. Kunz. in press. Feeding strategies of the little brown bat, Myotis lucifugus, in southern New Hampshire. Ecology.

Clark, D.R. Jr., T.H. Kunz and T.E. Kaiser. in press. Insecticides applied to a nursery colony of little brown bats (Myotis lucifugus): lethal concentration in brain tissue. J. Mammalogy.

Fenton, M.B., N.G.H. Boyle, T.M. Harrison and D.J. Oxley. in press. Activity patterns, habitat use and prey selection by some African insectivorous bats. Biotropica

Fenton, M.B., D.H.M. Cumming and D.J. Oxley. in press. Prey of Bat Hawks and availability of bats. Condor.

Fenton, M.B. in press. Variation in the social calls of little brown bats (Myotis lucifugus). Canadian Journal of Zoology.

Fullard, J.H. and M.B. Fenton. in press. Acoustic and behavioural analysis of the sounds produced by some species of Nearctic Arctiidae (Lepidoptera). Canadian Journal of Zoology.

Fullard, J.H. in press. Phenology of sound-producing arctiids and the activity of insectivorous bats. Nature.

To make Bat Research News a valuable and viable newsletter, we need contributions - news, new literature, articles which have been accepted. Send in the subscription form and your money and join in!

Did you hear that there is a rumour going round that Texas Tech University Press may actually publish the second part of the Phyllostomatid book in 1977? Perhaps you have heard some other worth-while gossip!

DATA SHEET FOR SURVEY OF FORAGING BEHAVIOR BY BATS

Please read all the items to become acquainted with them before beginning to fill out the sheet.

PLEASE RETURN THIS TO: JAMES A. SIMMONS
WASHINGTON UNIVERSITY
DEPARTMENT OF PSYCHOLOGY
SAINT LOUIS, MISSOURI 63130 U.S.A.

1). Species of bat _____.

2). Accuracy of identification: (Check one)

Definite _____ Probable _____ Possible _____

3). How was identification made? (Netting, Shooting, etc.).

_____

4). Was the bat hunting for prey? (Check one)

Definitely _____ Probably _____ Possibly _____

5). Was the bat (Please check the following appropriate statements)

a). flying in the open? _____

b). higher than 10 meters? _____

c). lower than 10 meters? _____

d). if not in the open, was it close to obstacles? _____

e). Were the obstacles trees _____, walls, _____, rocks, _____, or was the bat flying over water? _____

f). How far from the obstacles was the bat? _____meters.

g). Were the prey in flight also, or was the bat gleaning prey from surfaces?

_____

h). If possible, can you identify the prey? _____

i). If the bat was not in flight, was it walking or crawling on a substrate in search of prey? _____

(OVER)

j). Was the bat hanging in a fixed location and flying to get prey that moved near-by? _____

k). Was it before sunset? _____

Was it at dusk? _____

Was it at night? _____

l). Were you able to watch the behavior closely? _____

Was a night vision device in use? _____

m). If these items are not sufficient to describe the bat's behavior, please describe it here _____

_____

_____

n). Were tapes made of acoustical signals? _____

Are these tapes available? _____ from whom? _____

o). Were photographs taken? _____ Are these available? _____

From whom? _____

6). Approximate date of observations _____

7). Approximate date of report _____

Thank you for taking the time to complete the data sheet. As soon as enough have returned and patterns or surprises emerge from the collective responses, I will tell you the results. If you have any suggestions about this survey, please tell me.

NAME: _____

ADDRESS: _____

_____

_____

_____

Volume 18, number 2/3 August 1977

BAT RESEARCH NEWS

Editor

Dr. M.B. Fenton
Department of Biology
Carleton University
Ottawa, Canada
K1S 5B6

Managing Editor

Dr. Roy Horst
Department of Biology
State University College
at Potsdam
Potsdam, New York 13676

Upon my return from six weeks in Africa I was somewhat swamped by the pile of requests for subscriptions to BRN; the list of subscribers to date and their areas of interest is provided within. This can be updated as (if) more forms arrive here.

LIBRARIES AND OTHERS PLEASE NOTE I do not have a supply of back issues of BRN and therefore cannot provide them on request. If you feel that you have been short changed and are missing back issues, you should contact **Dr. R.L. Martin**, Department of Biology, University of Maine, Preble Hall, Farmington, Maine 04938. There is no volume 17 presently available.

We still need submissions for the Literature section, either for New Literature, or articles IN Press.

News

Y.D. Pendharkar (Department of Zoology, S.N. Govt. P.G. College, Khandwa M.P. INDIA) has written to indicate that he is working on the Biology of Tadarida plicata, and that he is interested in bats in general and in some of their parasites.

Dr. Wilfred Schober (Karl-Marx-Universität, Bereich Medizin, Paul-Flechsig-Institut fur Hirnforschung, Abteilung für Neuroanatomie DDR 701 Leipzig Emilienstrabe 14), the editor of the Newletter NYCTALUS, has written to say that he is working on a book on bats and would appreciate receiving pictures of bats which he might use (with appropriate credits). He is particularly interested in photographs of bats at Carlsbad Caverns - the clouds of emerging bats.

B. Dennis Sustare (Department of Biology, Clarkson College, Potsdam, New York 13676) wrote in to report two instances of Myotis lucifugus becoming tangled in plants. Both observations were made in the vicinity of Madison, Wisconsin. One involved common burdock (Arctium minus), the other water-milfoil (Myriophyllum spicatum); the former was fatal to the bat, the latter, because of Sustare's assistance, was not. For further details contact Dennis Sustare.

Dr. W. Harmata (Polska-Poland, 30-006 Krakow-Cracov, Krupnicza Str. 50 Institute of Zoology UJ, Dpt. of Zoo psychology and Ethology of Animals) has sent in some very attractive post cards with pictures of Plecotus auritus, Rhinolophus ferrum-equinum - one species to a card. They are very well done.

R. Michael Bourke (D.A.S.F. Kerawat, East New Britain, Papua New Guinea) has sent in Volume 3, number 4 of the Niugini Caver of which he is the Editor. According to the table of contents, the newsletter contains an interesting array of articles.

Denny Constantine has sent in a statement on 'Bat Rabies Control Policy' from the State of California Department of Health which is dated 9 March 1977. The objectives of the programme include:

"1. minimizing human exposure to rabid bats. (This may require exclusion of bat colonies from select buildings. Methods selected should be permanent in effect and safe in application.)
2. taking steps necessary to be certain that the public is informed regarding the risk of contact with bats without creating undue alarm or failing to recognize the important ecological role of bats in the control of insects. (Educational efforts may include leaflets, lectures, and the use of newspapers, radio, and television)."

The statement also provides information about the policy of the Department of Health, ranging from encouraging 'control' of bats in buildings by physically preventing reentry, through destruction of bats in a colony in which there is an active laboratory confirmed rabies eipzootic, to encouraging work on rare and endangered bats (with concurrence of the California Department of Fish and Game). For further details contact: State of California Department of Health, Infectious Disease Section, 2151 Berkeley Way, Berkeley CA 94704 - telephone 415-843-7900 ext. 555.

The May 1977 issue of the NSS (National Speleological Society) NEWS carried, on page 87, the following information about bats (under the heading Ft. Stanton Bats Killed): 'The Bureau of Land Management said the deaths of nearly a third of the bat population in Fort Stanton Cave near Capitan, N.M. were caused by vandals, not disease as originally throught. An investigation by the BLM and the State Environmental Improvement Agency found that the 355 bats had been knocked from the walls and ceiling of the cave and smashed. Following the discovery of the mutilated bats, the cave was closed. However, it has now been reopened to cavers obtaining permits from the Roswell NM, BLM headquarters.'

Tim Dooley (761 W. Cool Drive, Tucson Arizona 85704) has written to say that: "I am interested in conserving bats and mammals in general and I would like to hear from anyone interested in trading mammal study skins and skulls". I am sure that Tim can provide interested parties with a list of what he has to trade and what he needs.

Richard LaVal (2816 Mexico Gravel Rd., Columbia Missouri 65201) has written to say that he is going to be involved in preparing a new recovery plan for Myotis sodalis and would welcome input from interested parties.

Phoebe Wray (Endangered Species Productions Inc. 175 West Main Street, Ayer, MA 01432) has indicated that she could use a bat for an exhibit. She would prefer a small Myotis with wings spread so that the structure is visible. (A preserved bat is what she would prefer).

J.C. Rauch (Department of Zoology, University of Manitoba, Winnipeg, Canada R3T 2N2) has written to point out the availability of some publications on the comparative anatomy of mammalian brains:

Katalog der Säugetierghirne (Catalogue of mammalian brains), Catalogue 1 (1970) order number 5312147 Brauer Katalog 1, cost 173,00 Marks. Catalogue 2 (1976) order number 5324025, Brauer Katalog 2, cost 136,00 Marks. Authors Dr. Kurt Brauer and Dr. Wilfried Schober, publishers VEB Gustav Fisher Verlag, 69 Jena, Villengang 2, DDR

Jim Rowell (Chicago Zoological Park, Brookfield Illinois 60513) has written to say that they are keeping some species of bats in captivity there and that he would be interested in receiving information about the composition of bat milk - I presume that he has looked at Part 1 of the Phyllostomatidae book from Texas Tech.

James R. Bain (Department of Zoology, 223 Bartram Hall, University of Florida, Gainesville, Florida 32611) has written to say that he is doing some homing experiments with Nycticeius humeralis in Florida. He would be grateful if persons finding tagged N. humeralis would contact him.

Ralph A. Raschig (Route 2, Box 413 Eagle River, Wisconsin 54521) still has a supply of BATS NEED FRIENDS bumper stickers.

Bat Detectors

The most recent issue of the Journal of Mammalogy (volume 58, no. 2) has a paper by Anderson and Miller (see New Literature section for details) describing a portable ultrasonic detection system for recording bat cries in the field. This provides another alternative for persons wishing to tune in on the ultrasonic cries of bats.

I also recently received literature from an English Company (QMC Instruments LTD, 229 Mile End Road, London E1 4AA) describing a QMC Bat Detector for US$850.00. This is a versatile machine which operates as a broad band and as a 'selective frequency analysis' detector. The QMC machine arises from work by David Pye.

There is now quite an array of bat detectors available:(see also Griffin BRN 16 1976)

for under $1,000.00 US

QMC Bat Detector, sensitive from 10 - 180 kHz,combines broad band operation with selective frequency analysis

Lincoln Bat Detector, sensitive from 10 - 200 kHz, broad band operation (either of these machines is suitable for recording high frequency sounds directly on magnetic tape - for high frequency sounds tape speed must be 76 cm/sec - at least)

Holgate Bat Detector, sensitive from 10 - 180 kHz, a heterodyne system for selective frequency analysis

any of these machines is available commercially, QMC as indicated above, Lincoln Detectors from the Carleton University Science Workshop, Ottawa Canada K1S 5B6, and Holgates from Holgates of Totton, Commercial Road, Totton, Hants, England.

for under 300.00 U.S.

Leak Detectors, crystal microphones tuned to 40 kHz (usually) and sold commercially as leak detectors. A variety of companies sells these machines for a wide variety of prices. Our workshop here has been selling them for around $100.00 US.

Electret microphone and integrated electronic components which divide incoming ultrasonic signals by 10 (the frequencies are divided by 10). This is the system described by Anderson and Miller. It is inexpensive but, as far as I know, not available commercially.

For someone interested in the feeding behaviour of a bat which uses high intensity echolocation calls with 40 kHz components, the leak detectors are suitable and relatively cheap. I have found them excellent for introducing students to feeding bats.

When the high intensity echolocation signals do not include components at 40 kHz, a tuneable receiver (QMC or Holgate) or a broad band microphone is essential; the electret microphone would also function well in this context.

The QMC Bat Detector is probably the most versatile, but if you do not want the selective frequency analysis potential, the modified Lincoln Bat Detectors which our workshop has been building offer a less expensive alternative.

I do not guarantee any of the prices quoted above.

We hope to have most of these instruments on display at the North American Symposium on Bat Research (number 8) here in Ottawa on 14 and 15 October 1977.

Short Communications

None available for this issue.

14 and 15 October 1977 North American Symposium on Bat Research

Persons wishing to present papers at this meeting should complete the enclosed form and send it, with their abstract, to Roy Horst. See notice for date when abstracts must be received if papers are to be included on the programme.

The meetings will take place at the Skyline Hotel in Ottawa, but on Friday night (14 October) we have arranged to occupy a large room at Carleton University. At that time we would like to have a general workshop on techniques for studying bats (there will also be a cash bar to increase levels of perception).

Therefore, if you are working with bats and wish to contribute to a workshop on techniques, bring along your wares (so to speak) and participate. We will certainly have a variety of bat detectors and recording equipment on hand, and would hope that those working with radio telemetry, light tagging, ... etc., will participate. Other topics which could be covered include photography, techniques for observation ... etc.

We will have a movie projector on hand that evening if you have a good film about bats you would like to show.

For persons requiring inexpensive accommodation, we will do our very best to arrange this. Direct your inquiries to me and I will do what I can about them.

Hope to see a good crowd here in October...

New Literature

Anatomy

Mainoya, J.R. and K.M. Howell. 1977. Histology of the frontal sav in three species of leaf-nosed bats (Hipposderidae). E. Afr. Wildl. J. 15(2): 147 - 155.

Pevet, P., J.A. Kappers and A.M. Voûte. 1977. The pineal gland of nocturnal mammals. I. The pinealocytes of the bat (Nyctalus noctula, Schreber). J. Neural Transmission 40: 47 - 68. (Netherlands Central Institute for Brain Research, Ijdijk 28, Amsterdam-O, The Netherlands).

Perret, M.M., H. Huggel, and M. Millet. 1976. Histologie et histochemie due complexe neurovasculaire de l'aile de la chauve-souris. Rev. Suisse de Zoologie 83(4): 909 - 913.

Behaviour

Bradbury, J.W. and S.L. Vehrencamp. 1977. Social organization and foraging in emballonurid bats. III Mating systems. Behav. Ecol. Sociobiol. 2:1-17.

Bradbury, J.W. and S.L. Vehrencamp. 1977, Social organization and foraging in emballonurid bats. IV Parental investment patterns. Behav. Ecol. Sociobiol. 2: 19 - 29. (Department of Biology C-016, University of California at San Diego, La Jolla, California 92093).

Schuller, G. 1977. Echo delay and overlap with emitted orientation sounds and Doppler shift compensation in the bat, Rhinolophus ferrum-equinum. J. Comp. Physiol. A114(1): 103 - 114. (Arbeitsgruppe Neuro- und Rezeptorphysiologie Fachbereich Biologie, Universität Frankfurt D-6000, Frankfurt, Federal Republic of Germany).

Diet

Daniel, M.J. 1976. Feeding by the short-tailed bat (Mystacina tuperculata) on fruit and possibly nectar. New Zealand J. Zool. 3(4): 391 - 398. (Ecology Division, N.Z. Dept. of Science and Ind Res. P.O. Box 30466, Lower Hutt, New Zealand).

Vestjens, W.J.M. and L.S. Hall. 1977. Stomach contents of forty-two species of bats from the Australasian Region. Aust. Wildl. Rev. 4: 25 - 35. (Division of Wildlife Research CSIRO, P.O. Box 84, Lyneham A.C.T. 2603, Australia).

Distribution

Adam, F. and B. Hubert. 1976. Les Nycteridae (Chiroptera) du Sénégal: distribution, biométrie et dimorphism sexuel. Mammalia 40(4): 597 - 613.

Hanak, V. and J. Gaisler. 1976. Pipistrellus nathusii (Keyserling et Blasius, 1839) (Chiroptera : Vespertilionidae) in Czechoslovakia. Vest. Cs. spol. zool. 40: 7 - 23. (Department of Systematic Zoology, Charles University, Viniena 7, 128 44 Praha, CSSR.

Gardner, A.L. 1976. The distributional status of some Peruvian mammals. Occ. Pap. Mus. Zool. Louisiana State Univ. no. 48: 1 - 18. (National Fish and Wildlife Laboratory, Fish and Wildlife Service, National Museum of Natural History, Washington, D.C. 20560).

Buden, D.W. 1977. First records of the genus Brachyphylla from the Caicos Islands, with notes on geographic variation. J. Mamm. 58(2): 221 - 225 (Museum of Zoology, Louisiana State University, Baton Rouge, Louisiana 70893).

Farney, J.P. and J.K. Jones Jr. 1975. Noteworthy records of bats from Nebraska. Mammalia 39(2): 327 - 329 (Department of Biology, Kearney State College, Kearney, Nebraska.)

LaVal, R.K. 1977. Notes on some Costa Rican bats. Brenesia 10: 10 - 11 2816 Mexico Gravel Road, Columbia Mo. 65201)
Menzies, J.I. 1977. Fossil and subfossil fruit bats from the mountains of New Guinea. Aust. J. Zool.25(2): 329 - 336.
Pieper, Harald. 1977. Fledermäuse aus Schleiereulen-Gewöllen van der Insel Kreta. Z. Saugetierkunde 42(1): 7 - 12 (Geol. - Paläont. Institut und Museum, Olshausenstrasse 40-60, D-2300 Kiel, W. Germany).
Roer, H. 1975. Zur kenntnis der chiropterenfauna Südwestafrikas. Southwest Africa Scientific Soc. J. 29: 105 - 127.
Smithers, R.H.N. and J.L.P. Lobao Tello. 1976. Check List and atlas of the mammals of Moçambique. Museum Memoir no. 8, Trustees of the National Museums and Monuments of Rhodesia, Salisbury. (National Museum of Rhodesia, P. Box 8006, Causeway,Rhodesia).

Parasites

Anciaux de Faveaux, M. 1976. Catalogue des acariens, parasites et commensaux des Chiroptères. Doc. de Travail Stud. no. 7, Brussels, Belgium, 637 pp. (Cité Sonatiba-bellevue, Bâtiment C., 1/App. 193, Constantine Algeria).
Guidal, J.A. 1976. Studies on intestinal parasites from a population of the noctule (Nyctalus noctula, Schreber 1774) taken in Denmark during the period of hibernation. Contributions to the Parasitic fauna of Denmark no. 4, K. Vet. Landbohojsk Arsskr, 1976: 165 - 172.
Holloway, B.A. 1976. A new bat-fly family from New Zealand (Diptera : Mystacinobiidae). New Zealand J. Zool. 3(4): 279 - 301 (Entomology Division, Dept. of Sci. and Ind. Resources, Private Bag, Aukland, New Zealand).
Mitchell, R. and F. Punzo. 1976. Ectoparasites of bats from Nepal. J. Bombay Nat. Hist. Soc. 73(1): 84 - 87 (Department of Zoology and Entomology, Iowa State University, Ames Iowa 50010).
Relsen, W.K., M.L. Kennedy, and N.T. Reisen. 1976. Winter ecology of ectoparasites collected from hibernating Myotis velifer (Allan) in southwestern Oklahoma (Chiroptera : Vespertilionidae). J. Parasitol. 62(4): 628 - 635 (Dept. of Zoology, Univ. Oklahoma, Norman OK 73069).

Physiology + Temperature Regulation

Anciaux de Faveaux, M. 1976. La léthargie chez les chiroptères d'Afrique centrale. Int. J. Speleol. 8: 291 - 303 (see above).
Collins, M.W., M.R. French, P.C. Hirom, J.R. Idle, O. Bassir and R.T. Williams. 1977. The conjugation of benzoic acid in the African bat, Epomops franqueti. Comp. Biochem. and Physiol. 56(2): 103 - 105. (St. Mary's Hospital, School of Medicine, Department of Biochemistry, London W2 1PG, England).
Heuser, M. 1977. The oculoauricular phenomenon and inspiratory innervation of the M. retroauricularis as a phylogenetic relict of the ultrasonic orientation of bats (Chiroptera). J. Neurol. 214: 225 - 227. (Neurologische Klinik, Ludwig-Maximilians-Universität, Klinikum Grosshadern, Marchioninistr. 15, D-8000, München 70, Fed. Rep. Germany)
Hurka, L. 1977. Chiropterozönosen einiger winterquartiere in Westböhmen. Vest. Cs. spol. zool. 41(1): 15 - 19. (Veleslavinova 6, 301 14 Pizen 1, CSSR).
Hirschfeld, J.R. and M.L. O'Farrell. 1976. Comparisons of differential warming rates and tissue temperatures in some species of desert bats. Comp. Biochem. Physiol. 55A(1): 83 - 87. (Dept. Biological Sciences, Univ. Nevada, Las Vagas, Nevada 89154).
Nelson, Z.C., J.R. Hirschfeld, D.O. Schreiweis and M.J. O'Farrell. 1976. Flight muscle contraction in relation to ambient temperatures in some species of desert bats. Comp. Biochem. Physiol. 56A: 31 - 36

Salathe, E.P. 1977. An analysis of interstitial fluid pressure in the web of the bat wing. Am. J. Physiol: 232(3): H297 - H303. (Department of Physiology, University of Arizona, Tucson, Arizona 85721).

Systematics

Barghoorn, S.F. 1977. New material of Vespertiliavus Schlosser (Mammalia Chiroptera) and suggested relationships of emballonurid bats based on cranial morphology. American Museum Novitates, 2618: 1 - 29.

Desmet, J.F. and J.F. Noblet. 1976. Données sur la pipistrelle de Nathusius Pipistrellus nathusii (Keyserling and Blasino), le molosse de Cestoni, Tadarida teniotis (Rafinesque), et la serotine bicolore, Vespertilio murinus (Linné) dans le departement de l'Isere. Mammalia 40(3): 521 - 523. (17, Avenue Jean Perrot, 38100, Grenoble).

Greenbaum, I.F., R.J. Baker, and D.E. Wilson. 1975. Evolutionary implications of the karyotypes of the stenodermine genera Ardops, Ariteus, Phyllops and Ectophylla. Bull. S. California Acad. Sci. 74(3): 156 - 159. (Department of Biology, Texas Tech University, Lubbock, Texas).

Taboada, S. 1976. Historia y actualizacion taxonomica de Algunas especies antillanas de murciélagos de los géneros Pteronotus, Brachyphylla, Lasiurus, y Antrozous (Mammalia: Chiroptera). Poeyana, 153, 1 - 24. (Laboratorio de Vertebrados, Instituto de Zoologia, Academia de Ciencias de Cuba, La Habana, Cuba).

Wilson, D.E. 1976. The subspecies of Thyroptera discifera (Lichtenstein and Peters). Proc. Biol. Soc. Wash. 89(24): 305 - 312. (National Fish and Wildlife Laboratories, National Museum of Natural History, Washington, D.C. 20560).

Techniques

Anderson, B.B. and L.A. Miller. 1977. A portable ultrasonic detection system for recording bat cries in the field. J. Mamm. 58(2): 226 - 229. (Institute of Biology, Odense University, DK-5000, Odense, Denmark).

Youngson, W.K. and N.L. McKenzie. 1977. An improved bat-collecting technique. Australian Mammal Society Bulletin 3(2): 20 - 21. (Western Australian Wildlife Research Center, Department of Fisheries and Wildlife, P.O. Box 51, Wanneroo, W.A. 6065, Australia). (a shot gun and a spot light).

Misc.

Clark, D.R. Jr. and R.M. Prouty. 1977. Experimental feeding of DDE and PCB to female big brown bats (Eptesicus fuscus). J. Toxicology and Env. Health 2: 917 - 928. (Patuxent Wildlife Research Center, Laurel Maryland).

Easterla, D.A. 1976. Notes on the second and third newborn of the spotted bat, Euderma maculatum, and comments on the species in Texas. Am. Midl. Nat. 96(2): 499 - 501.

LaVal, R.K., R.L. Clawson, W. Caire, L.R. Wingate and M. L. LaVal. 1976. An evaluation of the status of myotine bats in the proposed Meramec Park Lake and Union Lake project areas, Missouri. U.S. Army Engineer District, St. Louis, Missouri, 136 pp.

Myers, P. 1977. Patterns of reproduction of four species of vespertilionid bats in Paraguay. Univ. Calif. Pub. Zool. 107: 1 - 41 (Museum of Zoology, University of Michigan, Ann Arbor, Michigan. 48109.

Smith, J.D. 1977. On the nomenclatorial status of Chilonycteris gymnonotus Natterer, 1843. J. Mamm. 58(2): 245 - 246 (Department of Biology, California State University, Fullerton, California 92634).
Zejda, J. 1976. The small mammal community of a lowland forest. Acta Sc. Nat. Brno. 10(10): 1 - 39.

Texas Tech did come through with Part II of the book, Biology of bats of the New World family Phyllostomatidae, edited by R.J. Baker, J.K. Jones Jr., and D.C. Carter. I received my copy of Part II in June 1977 - it is Special Publication of the Museum, Texas Tech University, Lubbock, no. 13, and contains the following Chapters:

Webb, J.P. Jr. and R.B. Loomis. 1977. Ectoparasites. pp. 57 - 120
Ubelaker, J.E., R.D. Specian and D.W. Duszynski. 1977. Endoparasites. pp. 7 - 56
Phillips, C.J., G.W. Grimes and G.L. Forman. 1977. Oral Biology. pp. 121 - 246
McManus, J.J. 1977. Thermoregulation. pp. 281 - 292
Gould, E. 1977. Echolocation and communication. pp. 247 - 280
Gardner, A.L. Feeding habits. pp. 293 - 350
Fenton, M.B. and T.H. Kunz. Movements and behavior. pp. 351 - 364.

(someone shuffled my reference cards, hence the above are in no particular order)

This publication available from The Museum, Texas Tech University, Lubbock, Texas 79409 at a cost of $16.00

The latest batch of Mammalian Species also arrived recently and contained several write-ups on bats. The following species of bats have now been covered:

Cyttarops alecto (A. Starrett, 1972) no. 13 Mammalian Species
Macrotus waterhousii (S. Anderson, 1969) no. 1 Mammalian Species
Macrophyllum macrophyllum (D.L. Harrison, 1975) no. 62 Mammalian Species
Monophyllus redmani (J.A. Homan and J.K. Jones Jr., 1975) no. 57 Mammalian Species
Monophyllus plethodon (J.A. Homan and J.K. Jones Jr., 1975) no. 58 Mammalian Species
Hylonycteris underwoodi (J.K. Jones Jr. and J.A. Homan, 1974) no. 32 Mammalian Species
Stenoderma rufum (H.H. Genoways and R.J. Baker, 1972) no. 18 Mammalian Species
Sturnira thomasi (J.K. Jones Jr. and H.H. Genoways, 1975) no. 68 Mammalian Species
Ardops nichollsi (J.K. Jones Jr. and H.H. Genoways, 1973) no. 24, Mammalian Species
Thyroptera tricolor (D.E. Wilson and J.S. Findley, 1977) no. 71 Mammalian Species
Myotis nigricans (D.E. Wilson and R.K. LaVal, 1974) no. 39 Mammalian Species
Myotis planiceps (J.O. Matson, 1975) no. 60 Mammalian Species
Eudiscopus denticulus (K.F. Koopman, 1972) no. 19 Mammalian Species
Nycticeius humeralis (L.C. Watkins, 1972) no. 23 Mammalian Species
Rhogeessa gracilis (J.K. Jones Jr., 1977) no. 76 Mammalian Species
Plecotus rafinesquii (Clyde Jones, 1977) no. 69 Mammalian Species
Euderma maculuatum (L.C. Watkins, 1977) no. 77 Mammalian Species

IN PRESS

Altenbach, J.S., K.N. Geluso and D.E. Wilson. in press. Population size of Tadarida brasiliensis at Carlsbad Caverns in 1973. IN Biological investigations in the Guadalupe Mountains National Park, National Park Service, Washington, D.C.
Armstrong, R.B., C.D. Ianuzza and T.H. Kunz. in press. Histochemical and biochemical properties of flight muscle fibers in the little brown bat, Myotis lucifugus. J. Comp. Physiol.

Bogan, M.A., H.W. Setzer, J.S. Findley and D.E. Wilson. in press. Phenetics of Myotis blythi in Morocco. Proc. East African Acad. Sci.

Clark, D.R. Jr., T.H. Kunz and T.E. Kaiser. in press. Insecticides applied to a nursery colony of little brown bats (Myotis lucifugus): lethal concentrations in brain tissue. J. Mamm.

Hirschfeld, J.R., Z.C. Nelson and W.G. Bradley. in press. Night roosting behavior in four species of desert bats. Southwestern Naturalist.

LaVal, R.K., R.L. Clawson, W. Caire, and M.L. LaVal. in press. Foraging behavior and nocturnal activity patterns of the endangered bats Myotis grisescens and Myotis sodalis in Missouri. J. Mamm.

LaVal, R.K. and H.S. Fitch. in press. Structure, movement and reproduction in three Costa Rican bat communities. Misc. Pub., Mus. Nat. Hist., Univ. Kansas

LaVal, R.K. and M.L. LaVal. in press. Reproduction and behavior of the African banana bat, Pipistrellus nanus. J. Mamm.

McDonnell, T. and B. Banta. in press. Occurrence of the silver-haired bat in the Colorado desert, San Diego County, California. The Great Basin Naturalist.

Pine, R.H. in press. Keys to the bats of Jamaica, Hispaniola and Puerto Rico based on gross external characters. Caribbean J. Science.

Pine, R.H., S.D. Miller and M.L. Schamberger. in press. Contributions to the mammalogy of Chile. Mammalia.

Pine, R.H. and A. Ruschi. in press. Concerning certain bats described and recorded from Espirito Santo, Brazil. Anales del Instituto de Biologia, U.N.A.M.

Wilson, D.E. in press. Reproduction IN Biology of bats of the New World family Phyllostomatidae, Part III.

Wilson, D.E., K.N. Geluso and J.S. Altenbach. in press. The ontogeny of fat deposition in Tadarida brasiliensis. Proc. East African Acad. Sci.

PLEASE SEND US MORE CITATIONS, EITHER OF NEW LITERATURE, OR OF ARTICLES ACCEPTED FOR PUBLICATION. It will be a tremendous help if these are typed on 3 by 5 cards. Thanks.

Still haven't subscribed? Well ...

If your name was on the mailing list which we received from Bob Martin and if we have not yet heard from you (completed form and money), you will still receive this issue. However, unless you complete the form and send us some money ($3.00 US) then this is your last issue.

SUBSCRIBERS TO BRN as of 22 July 1977, paid for one year, unless otherwise indicated (*)

Tom ALEY, Ozark Underground Laboratory, Protem, Missouri 65733
public education, conservation and ecology
J.C. ANDERSON 3655 Southern Apt. G, Memphis, TN 38111
behaviour, ecology, echolocation, reproduction
Ken ANDERSON Biology Department, Gannon College, Erie, PA 16501
public education, conservation, ecology and physiology
Edythe L.P. ANTHONY Department of Biology, Boston University, Boston, Mass 02215
ecology, reproduction, physiology
David M. ARMSTRONG Department of Integrated Studies, 128 Ketchum, University Boulder, Colorado 80309
conservation, ecology and taxonomy
David C. ASHLEY School of Life Sciences, University of Nebraska-Lincoln, Lincoln, Nebraska 68588
ecology, parasites

James R. BAIN Department of Zoology, University of Florida, Gainesville 32611
ecology, behaviour, natural history
Rollin H. BAKER Michigan State University Museum, East Lansing, Michigan 48824
public education, ecology, taxonomy
W.Wilson BAKER Tall Timbers Research Station, Route 1, Box 160, Tallahassee Florida 32303
conservation, behaviour and ecology
Kenneth H. BALCOM Nassau County Museum, Tackapausha Preserve, Seaford, N.Y. 11783
public education, behaviour and ecology - also maintaining vespertilionids in captivity
William R. BARBER Museum of Science and History, 1501 Montgomery Street, Fort Worth, Texas 76107
public education, behaviour, ecology and taxonomy
John E. BASSETT Department of Biological Sciences, Perdue University West Lafayette, Indiana 47907
public education, conservation, ecology, physiology and temperature regulation
Rollin BAUER Langmuir Laboratory, Cornell University, Ithaca, New York 14853
taxonomy
Barry BEAN Department of Biology Lehigh University, Bethlehem Pa 18015
behaviour and reproduction
David W. BEEBE 109 East Way, Camillus, New York 13031
public education, conservation, behaviour and echolocation
Jackie BELWOOD Department of Natural Sciences, Florida State Museum, University of Florida, Gainesville, Florida 32611
behaviour and ecology
Kunwar P. BHATNAGAR Department of Anatomy, University of Louisville School of Medicine, Health Sciences Center, Louisville, Kentucky 40201
public education, conservation, anatomy, behaviour, echolocation, and physiology
Hal L. BLACK 122A Brimhall, BYU, Provo Utah 84602
public education, conservation, behaviour, ecology, evolution, echolocation, reproduction
Vernon C. BLEICH California Department of Fish and Game, P.O. Box 1741 Hemet, California 92343
public education, conservation and ecology
Michael A. BOGAN National Fish and Wildlife Laboratory, National Museum of Natural History, Washington, D.C. 20560
conservation, ecology, evolution and taxonomy

John B. BOWLES Department of Biology, Central College, Pella, Iowa 50219
public education, conservation, behaviour, ecology, evolution echolocation, reproduction and taxonomy

Jack BRADBURY Department of Biology C016, University of California, San Diego La Jolla, California 92093
behaviour, ecology, evolution, echolocation, reproduction and dirty pictures.

Edith BRAGG San Diego State University, Imperial Valley Campus, 720 Heber Ave Calexico, California

Carl BRANDON Department of Zoology, University of Massachusetts, Amherst MA 01003
anatomy, echolocation and flight mechanics and aerodynamics

David S. BRUCE Biology Department, Wheaton College, Wheaton Illinois 60187
physiology and temperature regulation

Edward R. BUCHLER Department of Zoology, University of Maryland, College Park, Maryland 20742
conservation, behaviour, ecology and echolocation

Christopher D. BURNETT Department of Biology, Boston University, Boston MA 02215
conservation, ecology, evolution and reproduction

Bill BUTTEMER Division of Biological Sciences, University of Michigan Ann Arbor, Michigan 48109
physiology and temperature regulation

Anne CARTWRIGHT Department of Biology, Ball State University Muncie IN 47306
ecology and reproduction

Stephen B. CHILDS University of Maryland, Department of Zoology, College Park Maryland 20742
behaviour, ecology and temperature regulation and vision

Lee CHRISTIANSON Department of Biological Sciences, University of the Pacific Stockton, California 95211
ecology and evolution

Brian D. CLARK Division of Biological Sciences, University of Michigan Ann Arbor, Michigan 48109
Anatomy, evolution, physiology and temperature regulation

Donald CLARK Patuxent Wildlife Research Center, South Tract, Laurel, Maryland 20811
Conservation, and the effects of pesticides and other pollutants on bats.

Arthur G. CLEVELAND, Museum of Natural History, Texas Wesleyan College, Fort Worth, Texas 76105
ecology, evolution and taxonomy

E. Lendell COCKRUM Department of Ecology and Evolutionary Biology, University of Arizona, Tucson, Arizona 85721
biology of bats

John D. CORNELY Department of Biological Sciences, Northern Arizona University Flagstaff, Arizona 86011
conservation, behaviour and ecology

Stephen P. CROSS Department of Biology, Southern Oregon State College Ashland, Oregon 97520
conservation, behaviour and ecology

Louis D'AGROSA 7837 Lafon Pl., St. Louis, Missouri 63130
conservation, anatomy, behaviour, physiology, temperature regulation

Russell DAVIS Department of General Biology, University of Arizona, Tucson, Arizona 85721
behaviour

W.B. DAVIS Department of Wildlife and Fisheries Sciences, Texas A and M University, College Station, Texas 77843
behaviour, ecology, reproduction and taxonomy

W.H. DAVIS Biological Sciences, University of Kentucky, Lexington, KY 40506
ecology and taxonomy

William C. DIEBOLD 1243 Fischer Avenue, Louisville Kentucky 40204
anatomy, behaviour, ecology, evolution, echolocation and vision

Arthur F. DiSALVO Bureau of Laboratories, S.C. Dept. of Health and Environmental Control, 2600 Bull Stree, Columbia, SC 29201
ecology and the relation to infections diseases (histoplasmosis)

Jane A. DOWDY 815 Main St. no. 7, Laurel, Maryland 20810
public education, behaviour, ecology and taxonomy

Jay Dee DRUECKER Biology Department Chadron State College, Chadron Nebraska 69337
anatomy, reproduction and physiology

David A. EASTERLA Department of Biology, Northwest Mo. State College, Maryville, MO 64468
public education, conservation, ecology, evolution, echolocation taxonomy and distribution

Judy EGER Department of Mammalogy, Royal Ontario Museum, Toronto, Canada M5S 2C6
anatomy, behaviour, ecology, evolution, echolocation and taxonomy

Stuart ELLINS Department of Psychology, California State College, San Bernardino, CA 92407
conservation, behaviour, ecology, echolocation, physiology and vision

Carl H. ERNST Department of Biology George Mason University, Fairfax Virginia 22030
behaviour, ecology, reproduction and taxonomy

Brock FENTON Department of Biology, Carleton University, Ottawa, Canada K1S 5B6
biology of bats

G.L. FORMAN Department of Biology, Rockford College, Rockford Illinois 61101
anatomy, taxonomy, comparative microanatomy and comparative physiology

G.G. FORNEY P.O. Box 29, Williston, ND 58801

Alfred L. GARDNER National Fish and Wildlife Lab, National Museum of Natural History, Washington, D.C. 20560

Bryan P. GLASS The Museum, Oklahoma State University, Stillwater OK 74074
conservation, ecology, distribution, reproduction and taxonomy

Arthur M. GREENHALL 3103 - 75th Avenue Apt. 204, Landover, Maryland 20785
bat biology

John Keever GREER Stovall Museum, University of Oklahoma, Norman OK 73069
public education, conservation, ecology, evolution and taxonomy

Donald R. GRIFFIN The Rockefeller University, 1230 York Ave., New York N.Y. 10023
behaviour, ecology, echolocation, physiology, temperature regulation and What it's like to be a bat.

Thomas GRIFFITHS Department of Biological Sciences, State University of New York, College of Arts and Science, Plattsburgh, NY 12901
anatomy evolution, echolocation and taxonomy

Everett M. GRIGSBY Division of Natural Science and Mathematics, Northeastern Oklahoma State University, Tahlequah, Oklahoma 74464
public education and ecology

Wilbur J. GUNTER Division of Biological Science, Moberly Jr. College, Moberly, MO 65270
conservation, behaviour, ecology, evolution and taxonomy

Walter R. GUSCIORA Principal Biologist, Biological Services , New Jersey State Department of Health, 1911 Princeton Avenue, Trenton NJ 08648
public education, behaviour, ecology, temperature regulation and rabies.

A.W. GUSTAFSON Department of Anatomy, Tufts University School of Medicine 136 Harrison Ave, Boston, Mass. 02111
anatomy, reproduction and physiology

E. Raymond HALL Museum of Natural History, University of Kansas, Lawrence Kansas 66045
Biology of bats

James G. HALLETT Department of Biological Sciences, Texas Tech University Lubbock, Texas 79406
ecology

Mrs Edward J. HALLIGAN 36 Passaic Avenue, Roseland NJ 07068
public education and conservation

Dr. Theodor HALTENORTH Schlofz Nymphenburg, Zoologische Staatssammiung 8000 München 19, Federal Republic of Germany

Charles O. HANDLEY Jr. Division of Mammals, Smithsonian Institution, Washington, D.C. 20560 *
ecology, evolution, reproduction, taxonomy, movement, populations

Arthur H. HARRIS Laboratory for Environmental Biology, University of Texas at El Paso, El Paso, Texas 79968
taxonomy, palaeontology and palaeoecology

Ray HEITHAUS Department of Biological Sciences, Northwestern University Evanston, Illinois 60201
behaviour and ecology

John W. HERMANSON Department of Zoology, University of Vermont, Burlington Vermont 05401
anatomy, behaviour, and evolution

Philip HERSHKOVITZ Field Museum of Natural History, Roosevelt Rd at Lake Shore Drive, Chicago, Illinois 60605

Joseph R. HIRSHFELD 6434 Waterthrus Way, Las Vegas, Nevada 89103
public education, conservation, behaviour, ecology, echolocation physiology and temperature regulation

Harold B. HITCHCOCK 1 Locust Lane, Middlebury, Vermont 05753
conservation, behaviour and ecology

Reginald HOYT 23B State Street, Sanford Maine 04073
ecology, physiology and functional morphology

Robert JENNESS Department of Biochemistry, 140 Gortner Laboratory, University of Minnesota, St. Paul, Minnesota 55108
evolution and physiology

Murray L. JOHNSON 501 No Tacoma Ave, Tacoma Washington 98403

Frank C. KALLEN Department of Anatomical Sciences, Schools of Medicine and Dentistry, State University of New York at Buffalo, Buffalo NY 14214
anatomy and physiology

Gustav KIRK Hohenbuechen, Ludwig-Menge-Str. 1, D - 3223 Delligsen 1 West Germany **
public education and conservation

E.D. KITZKE 616 Aspen Street, South Milwaukee, WI 53172
conservation, behaviour, ecology and bat repellants.

Devra G. KELIMAN National Zoological Park, Smithsonian Institution, Washington, D.C. 20008
behaviour, ecology, evolution and reproduction

David KLINGENER Department of Zoology University of Massachusetts, Amherst, Mass. 01002
anatomy, evolution, reproduction and taxonomy

Thomas J. KLONOWSKI 2098 Delaware Ave Apt. 2, Buffalo, NY 14216
conservation, behaviour and ecology
Sandra KOENIG 228 Hillside Avenue, Cranford, New Jersey 07016
conservation, behaviour, ecology and evolution
Thomas H. KUNZ Department of Biology, Boston University, Boston Mass 02215
behaviour, ecology, evolution, reproduction, physiology and temperature regulation

Richard K. LaVAL 2816 Mexico Gravel Road, Columbia, Missouri 65207
conservation, behaviour, ecology, evolution, echolocation, reproduction, taxonomy and temperature regulation
Philip LEITNER Biology Department St. Mary's College, Moraga, California 94575
conservation, behaviour, ecology, physiology and temperature regulation
Robert E. LEWIS Department of Entomology, Iowa State University Ames Iowa, 50010
taxonomy and ectoparasites

Eugene McCAFFREY Wildlife Resources Center, Endangered Species Unit Delmar, New York 12054
conservation
C.J. McCOY Carnegie Museum of Natural History, 4400 Forbes Avenue, Pittsburgh, PA 15213
conservation, behaviour, ecology and zoogeography
R.H. McCOY Box 278 Crowell, Texas 79227
physiology, taxonomy and diseases
V. Rick McDANIEL Division of Biological Science, Arkansas State University State University, Arkansas 72467
ecology, evolution and taxonomy
Timothy McDONNELL 743 Poplar Street, Ramona, California 92065
behaviour, ecology, evolution and physiology
Lee W. McGEORGE Department of Zoology, Duke University, Durham, N.C. 27706
behaviour, ecology, evolution and echolocation
Robert MARTIN Department of Biology, Fairleigh Dickinson University Madison, New Jersey 07940
ecology, evolution and temperature regulation, as well as anatomy, physiology and echolocation
Bernardo MAZA UCLA Rock Valley Field Station., Box 495, Mercury, Nevada 89023
behaviour and ecology
Philip MYERS Museum of Zoology, University of Michigan, Ann Arbor, Michigan 48109
anatomy, behaviour, ecology, evolution, reproduction and taxonomy

Michael J. O'FARREL Zoological Society of Nevada, P.O. Box 4036, Las Vegas, Nevada 89106
behaviour, ecology, echolocation, reproduction, physiology and temperature regulation
Thomas J. O'SHEA 460 Kiowa, R.R.2, Flagstaff, Arizona 86001
behaviour and ecology

John F. PAGELS Department of Biology, Virginia Commonwealth University 901 W. Franklin St. Richmond Virginia 23284
conservation, ecology, reproduction, taxonomyc and temperature regulation.
Donald R. PATTEN Section of Mammalogy, Natural History Museum, 900 Exposition Blvd., Los Angeles, California 90007
conservation, anatomy, ecology, taxonomy

Ray PAWLEY 15 W506 W 63rd, Hinsdale, Illinois 60521
physiology

R.L. Peterson, Department of Mammalogy, Royal Ontario Museum, Toronto Canada M5S 2C6
anatomy, behaviour, ecology and taxonomy

Ronald H. Pine, Institute for Environmental awareness, Department of Leisure and Environmental Resources Administration, George Williams College, Downers Grove, Illinois 60515
ecology and taxonomy

Fran PORTER 220 No. Bemiston, Clayton, Missouri 63105
behaviour

W.B. Quay 1421 Harbor View Drive, Galveston, Texas 77550
anatomy, behaviour, ecology, evolution, reproduction, physiology and temperature regulation

Ralph A. RASCHIG Route 4, Box 88, Eagle River WI 54521
public education, conservation, ecology and man-made bat roosts

J.C. RAUCH Department of Zoology, University of Manitoba, Winnipeg Canada R3T 2N2
physiology and temperature regulation

John J. RASWEILER IV Department of Anatomy, Columbia University, 630 West 168th Street, New York, NY 10032
reproduction and keeping bats in captivity

M.L. RIEDESEL Department of Biology, University of New Mexico, Albuquerque NM 87131
behaviour, physiology and temperature regulation

Hubert ROER Zoologisches Forschungsinstitut un Museum Alexander Koenig, Adenauerallee 15[P] - 164, 53 Bonn 1, Deutschland

George C. ROGERS. Department of Biology, Mohawk Valley Community College 1101 Sherman Drive, Utica, New York 13501
ecology and evolution

Mark A. ROSENTHAL Lincoln Park Zoo, 2200 N. Cannon Drive, Chicago ILL 60614
behaviour, reproduction and keeping bats in captivity

Stanley D. ROTH Jr. Department of Science Lawrence High School, Lawrence Kansas 66044
public education, conservation and ecology

Tim RUMMAGE Department of Biology, Boston University, Boston, Mass. 02215
anatomy, ecology and echolocation

George SCHAEFFER III 112 Cortelyou Avenue, Montrose Manor, Reading PA 19607
behavior, temperature regulation

Uwe SCHMIDT Zoologisches Institut, Poppelsdorfer Schloss 53 Bonn, West Germany
anatomy, behaviour, ecology, echolocation, reproduction and physiology

W. SCHOBER Karl-Marx-Universität Bereich Medizin, Paul Flechsig Inst. Hirnforschung, Abteilung: Neuroanatomie, DDR 701 Emilienst. 14

J.F. SCUDDAY Box 6011 Sul Ross State University, Alpine, Texas 79830
behaviour, ecology, evolution and taxonomy

Clyde M. SENGER Department of Biology, Western Washington University, Bellingham, Washington, 98225
ecology

James A. SIMMONS Department of Psychology, Washington University, St. Louis Missouri 63130
biology of bats

Daniel SMILEY Mohonk Lake, New Paltz, New York 12561
ecology

Elizabeth SMITH Smithville, Ohio 44677

Dana P. SNYDER Department of Zoology, University of Mass. Amherst Mass 01003
behaviour and ecology

David H. SNYDER Department of Biology, Austin Peay St. University Clarksville, TN 37040
conservation, behaviour and ecology
John N. STALLONE 2749 Westgate Avenue, Los Angeles, California 90064
ecology, physiology and temperature regulation
Glenn R. STEWART Biological Sciences Department, Cal Poly University, 3801 W. Temple Ave., Pomona, California 91768
public education, conservation, behaviour, ecology, echolocation, physiology and temperature regulation
Chris STINSON Department of Zoology NJ-15, University of Washington Seattle, Washington 98195
ecology and evolution
Robert C. STONES Department of Biological Sciences, Michigan Technological University, Houghton, MI 49931
Sherry STOUT Box 1542 College Station, Texas 77840
public education, conservation, ecology, reproduction and taxonomy
J.R. TAMSITT Department of Mammalogy, Royal Ontario Museum, Toronto Canada M5S 2C6
evolution and taxonomy
Fred A. WEBSTER Box 35, So. Pomfret, Vermont 05067
behaviour, echolocation and evolution
Daniel F. WILLIAMS Department of Biological Sciences, California State College, Stanislaus, Turlock, California 95380
behaviour, ecology, evolution, taxonomy, temperature regulation and karyology
Don E. WILSON National Fish and Wildlife Lab, National Museum of Natural History, Washington, D.C. 20560
public education, ecology, evolution, reproduction, physiology, taxonomy, temperature regulation and teratism
W.A. WIMSATT Genetics Section, G45 Emerson Hall, Cornell University Ithaca, New York 14853
behaviour, reproduction, anatomy, and physiology
Nigel Keith WOOLF Neural Encoding Laboratory, Dept. Biomedical Engineering, Johns Hopkins Univ. Med. Sch., Baltimore, MD. 21205
anatomy, behaviour, echolocation and physiology and neurophysiology
Phoebe WRAY Endangered Species Prod. 175 W. Main St., Ayer, MA 01432
public education, conservation and behaviour

David B. YOUNG Route 1, Box 84, Green Ridge, Missouri 65332
conservation, behaviour and ecology

Libraries

Dayton Museum of Natural History, 2629 Ridge Avenue, Dayton Ohio 45414
Union Internationale de Spéléologie, Commission de bibliographie, Institut de geologie, Université de Neuchâtel, 11 Rue Emile-Argand CH 2000, Neuchâtel 7, Switzerland
Mantor Library, University of Maine at Farmington, Farmington Maine 04938
Intercollegiate Outing Club Association, c/o Lauren Lader, 3410-G Paul Ave., Bronx, New York 10468
Caving Library, Colorado State Outing Club, 411 Activities Center, Lory Colorado State University, Fort Collins, Colorado 80523
Library (Exchanges), National Museums of Canada, Ottawa, Canada K1A OM8
The Editor of The Ring, Museum of Natural History Sienkiewicza 21, 50-335 Wroclaw, POLAND

BRN 25

Volume 18, number 4 November 1977

BAT RESEARCH NEWS

Editor

Dr. M.B. Fenton
Department of Biology
Carleton University
Ottawa, Canada
K1S 5B6

Managing Editor

Dr. Roy Horst
Department of Biology
State University College
at Potsdam
Potsdam, New York 13676

Table of Contents for this Issue

NEWS

Arthur M. Greenhall (Division of Wildlife Research, Fish and Wildlife Service, Washington, D.C. 20240) has written to advise that he has a new position in the Fish and Wildlife Service, namely that of Staff Specialist - Bats. His new responsibilities include conducting studies on bats related to health, economic and nuisance problems, primarily in the United States.

Tony Oldham (Rhychydwr, Crymych, Dyfed SA41 3RB, United Kingdom) has indicated that he publishes 'Current Titles in Speleology' which is available for U.S. $7.20 per issue. The 1976 edition contains over 3,000 titles, including some references to bats. He also has a number of bat books and offprints for sale. Interested parties should contact him directly.

Mark A. Rosenthal (Lincoln Park Zoological Gardens, 2200 Cannon Drive, Chicago, Illinois 60614) reports that the Lincoln Park Zoo is maintaining and displaying a group of Artibeus jamaicensis and that some young have been born in this colony.

Timothy J. McCarthy (Vampire Bat Education and Control Program, Ministry of Agriculture, Central Farm, Cayo District, Belize) has prepared a number of t-shirt iron-on transfers (best on cotton t-shirts) which he will part with for $3.50 U.S. (no personal cheques). The money raised will be used to help finance some public information programmes dealing with bats in Belize. The transfers show a bat catching an insect in its interfemoral membrane; the lettering says 'Fly the friendly nights of Belize'. The bat is shown in a circle of light orange.

The Bleitz Wildlife Foundation (5334 Hollywood Boul. Hollywood, California 90027) has available a new listing of the more than 100 styles, sizes, colors and types of mist nets, portable poles, Pesola Scales, etc. which are available from the Foundation. Reprints of 'Mist nets and their use' are also available.

The Director of the University of Kentucky Press has written to indicate that the book Barbour and Davis 'Bats of America' is available from Xerox University Microfilms, 300 N. Zeeb Road, Ann Arbor, Michigan, 48106. The order number is 2,0003,347. Paper cover edition is U.S.$15.00, the hard cover edition U.S.$17.50. Illustrations can be reproduced in colour at an additional cost.

I. Horacek (Sidl. Michelska 1182 145 00 Praha 4, Czechoslovakia) has indicated that he and some of his colleagues will be providing BRN with information about bat research in Czechoslovakia, including the nature of some of their ongoing research programmes involving bats, a review of bat material in collections in Czechoslovakia, and, of course, new literature from there.

In the previous issue I reported some details of the Department of Health of California's policy concerning bats, rabies and public health. I neglected to add that their policy seems most prudent, encouraging control by killing of bats only when there is a confirmed outbreak of rabies. Denny Constantine has told me that since they (in California)

'have not seen an "outbreak" in bats in over 20 years, so none is anticipated'. I was particularly pleased to note that the statement of policy encouraged control of bats in buildings by prevention of re-entry into a structure, since this appears to be the only effective means of control (remembering that control is not synonomous with killing).

A POSSIBLE POSTDOCTORAL POSITION

I recently received the following notice from Dr. C.G. van Zyll de Jong at the National Museums of Canada:

"Recent Ph.D. Graduates interested in the possibility of a postdoctoral fellowship tenable at the National Museum of Natural Sciences in Ottawa, Canada to work on ecology and taxonomy of north temperate bats should direct requests for information and application forms as soon as possible to: Postdoctorate Fellowships Office, National Research Council of Canada, Ottawa, Canada K1A OR6. For information on facilities and research possibilities write to: Dr. C.G. van Zyll de Jong, Curator of Mammals, National Museum of Natural Sciences, Ottawa, Canada K1A OM8."

Stan van Zyll and I hope that if this position does become available the recipient of the fellowship would be able to work in collaboration with bat people here at Carleton.

MEETINGS

Fifth International Bat Research Conference, 6 - 11 August 1978 in Albuquerque, New Mexico. This will include field trips to local points of interest, the usual assortment of scientific papers, and will feature symposia on Environmental Physiology, Chiropteran Phylogeny, and Reproduction. For further information contact James S. Findley, Museum of Southwestern Biology, University of New Mexico, Albuquerque, New Mexico 87131, or Don E. Wilson, National Fish and Wildlife Laboratory, National Museum of Natural History, Washington, D.C. 20560.

The Second "Congressus Theriologicus Internationalis" to be held at the Brno Exhibitions and Fairs, Brno, Czechoslovakia between 20 and 27 June 1978. At this meeting there will be separate sessions on bat research and a postcongress excursion to several bat localities in Slovakia (lead by Dr. J. Gaisler). For more information contact: The Secretary, II. Congressus Theriologicus Internationalis, Institute of Vertebrate Zoology, Czechoslovak Academy of Sciences, Kvetna 8, 603 65 Brno, Czechoslovakia.

RECENT LITERATURE

Activity

Mumford, R.E. and J.O. Whitaker Jr. 1975. Seasonal activity of bats at an Indiana cave. Proc. Ind. Acad. Sci. 84: 500 - 507.
Perdue University, Lafayette, Indiana 47907

O'Shea, T.J. and T.A. Vaughan. 1977. Nocturnal and seasonal activities of the pallid bat. J. Mamm. 58: 269 - 284.
Dept. of Biol. Sci., Northern Arizona University, Flagstaff, AZ 86011

Anatomy

Caxton-Martins, A.E. 1977. Histochemistry of blood and bone marrow smears of the straw-coloured fruit-eating bat, Eidolon helvum.

Kämper, R. and U. Schmidt. 1977. Die Morphologie der Nasenhöle bei einigen neotropischen Chiropteren. Zoomorphologie 87: 3 - 19.
Zoologisches Inst. der Universität, Poppolsdorfer Schlob D 5300 Bonn, FDR.

Kock, D. 1977. Körper-Vibrissen bei Bulldogg-Fledermäusen - eine Anpassung an das Tagesquartier. Natur und Museum 107: 274 - 279.
Natur-Museum Senckenberg, Säugetier-Sektion, Forschungsintitut Senckenberg, 6 Frankfurt-M 1, West Germany.

Madkour, G. 1976. Cranial osteology of Rousettus aegyptiacus (Megachiroptera). Ann. Zool. (Agra) 12(1): 1 - 12
Tanta University, Tanta, Egypt

- 1976. External genitalia and mammary glands of Egyptian female bats. Zool. Anz. 197: 62 - 66.
- 1977. A comparative study of certain features of the alimentary canal and distribution of viscera in Egyptian bats. Ann. Zool. (Agra) 13(2): 63 - 81.

Sinha, Y.P. 1976. Bacula of Rajasthan bats. Mammalia 40: 97 - 103.
Desert Regional Station, Zoological Survey of India, Jodhpur, Rajasthan, India.

Wilder, B.D. 1977. Comparative histology and ultrastructure of the epithelial elements of the partoid glands of selected glossophagine bats with reference to evolution and systematics. Ph.D. Dissertation, St. Johns University, 151 pp.

Yamamoto, M. 1976. An electron microscopic study of the olfactory mucosa in the bat and rabbit. Archivum Histologicum Japonicum 38(5): 359 - 412.

- 1977. Electron microscopic studies on the innervation of the smooth muscle and the intersitial cell of Cajal in the small intestine of the mouse and bat. Archivum Histologicum Japonicum 40: 171 - 202
Teikyo Univ. School Medicine, Department of Anatomy, Itabashi Ku Tokyo 173, Japan.

Yamamoto, M. K. Uchida and T. Ito. 1976. Regeneration of olfactory bipolar neurons in the normal olfactory epithelium of the adult bat. Okajimas Fol. anat. jap. 53: 291 - 304.

Behaviour

Fenton, M.B. 1977. Variation in the social calls of little brown bats (Myotis lucifugus). Can. J. Zool. 55: 1151 - 1156.

Fullard, J.H. 1977. Phenology of sound-producing arctiid moths and the activity of insectivorous bats. Nature 267 (5606): 42 - 43.
Department of Biology, Carleton University, Ottawa, Canada K1S 5B6

Conservation, Bats and People

Anonymous. 1977. Bats, rabies and DDT 1977. Massachusetts Dept. of Public Health, New England J. Med. 297(7): 389.

Funmilayo, O. 1976. Diet and roosting damage and environmental pollution by the straw-coloured fruit bat in southwestern Nigeria. Nigerian Field 41(3): 136 - 142.

Gosnell, M. 1977. Carlsbad's famous bats are dying off and scientists still don't know why. National Wildlife 15(4): 29 - 33.

Krzanowski, A. 1976. Possible early reference to bat guano deposits in New Zealand. New Zealand J. Zool. 3: 159 - 160.

Mohr, C.E. 1976. The protection of threatened cave bats. IN Aley, T. and D. Rhodes (eds.), National Cave Management Symposium Proc., pp. 57 - 62.

- 1977. Survival: a tale of two bats. IN B. Sloane (ed.), Cavers, caves and caving. Rutgers Univ. Press, pp. 349 - 366.

Tuttle, M.D. 1977. Gating as a means of protecting cave-dwelling bats. IN Aley, T. and D. Rhodes (Eds.) National Cave Management Symposium Proceedings, pp. 77 - 82.
Vertebrate Division, Milwaukee Public Museum, Milwaukee, Wisconsin 53233.

Distribution

Clark, M. 1976. The survey of mammals, reptiles and amphibia in Hertfordshire: additional records. Trans. Herts. nat. Hist. Soc. 27: 325 - 330 (pp. 325, 326, bats).

Graves, F.F. Jr., and M.J. Harvey. 1974. Distribution of Chiroptera in western Tennessee. J. Tenn. Acad. Sci. 49(3): 106 - 109.
Memphis State University, Memphis, Tenn. 38152.

Kostantinov, A.I., F.N. Vshivkov, and A.I. Dulitzky. 1976. (The modern state of the fauna of Chiroptera in the Crimea).
Zool. Zh. 55(6): 885 - 892.

Krzanowski, A. 1977. The easternmost occurrence of bats in Polynesia.
Acta Theriologica 22: 271 - 272.

- 1977. Contribution to the history of bats on Iceland.
Acta Theriologica 22: 272 - 273.

Massoia, E. 1976. Cuatro notas sobre murciélagos de la Républica Argentina (Molossidae y Vespertilionidae). Physis 35(91): 257-265.

Roer, H. 1976. Erstnachweis von Tadarida nigeriae spillmanni (Monard, 1932) Fuer Suedwestafrika. Saugetierk. Mitt. 24(2): 137-139.

Thompson, M.J.A. 1977. The pipistrelle (Pipistrellus pipistrellus) in and around York. Naturalist 102: 109 - 116.
56 Beaumont Road, Cambridge CB1 4PY England.

Ecology

Anthony, E.L.P. and T.H. Kunz. 1977. Feeding strategies of the little brown bat, Myotis lucifugus, in southern New Hampshire.
Ecology 58: 775 - 786. Department of Biology, Boston University Boston, Mass. 02215.

Fenton, M.B., N.G.H. Boyle, T.M. Harrison and D.J. Oxley. 1977.
Activity patterns, habitat use and prey selection by some African insectivorous bats. Biotropica 9: 73 - 85.

Fleming, T.H., E.R. Heithaus, and W.B. Sawyer. 1977. An experimental analysis of food location behavior of frugivorous bats. Ecology 58: 619 - 627. Dept. of Biology, University of Missouri, St. Louis Mo. 63121

Echolocation

Grinnell, A.D. and H.-U. Schnitzler. 1977. Directional sensitivity in the horseshoe bat, Rhinolophus ferrum-equinum. II. Behavioural directionality of hearing. J. Comp. Physiol. 116: 63 - 76.
Department of Biology UCLA California 90024.

Jen, P.H-S. and J. Ostwald. 1977. Responses of the cricothyroid muscles to frequency-modulated sounds in FM bats, Myotis lucifugus. Nature 265(5589): 77 - 78.
University of Missouri, Columbia, Missouri 65201.

Long, G.R. 1977. Masked auditory threshold from the bat Rhinolophus ferrum-equinum. J. comp. Physiol. A116: 247 - 255.
Polytechnic of Central London, Department of Life Sciences, 115 New Cavendish Street, London W1M 8JC England.

Pollak, G.D., R. Bodenhamer, D.S. Marsh and A. Souther. 1977. Recovery cycles of single neurons in the inferior colliculus of unanesthetized bats obtained with frequency-modulated and constant-frequency signals. J. comp. Physiol. A .....?

Pollak, G.D., D. Marsh, R. Bodenhamer and A. Souther. 1977. Echo-detecting characteristics of neurons in the inferior colliculus of unanesthetized bats. Science 196: 675 - 678.

- 1977.
Characteristics of phasic on neurons in inferior colliculus of unanesthetized bats with observations relating to mechanisms for echo ranging. J. Neurophysiology 40: 926 - 942.
Dept. of Zoology, University of Texas, Austin, Texas 78712

Schlegel, P. 1977. Directional coding by binaural brainstem units of the CF-FM bat, Rhinolophus ferrum-equinum. J. comp. Physiol. A118(3): 327 - 352.

- 1977. Calibrated earphones for the echolocating bat, Rhinolophus ferrum-equinum. J. comp. Physiol. A118(3): 352 - 356.
Arbeitsgruppe Neuro- un Rezeptophysiologie (Zoologie), Fachbereich Biology, J.W. Goethe Universität, D6000 Frankfurt/Main, Federal Republic of Germany.

Schnitzler, H.-U. and A.D. Grinnell. 1977. Directional sensitivity of echolocation in the horseshoe bat, Rhinolophus ferrum-equinum. I. Directionality of sound emission. J. comp. Physiol. 116: 51-61.
Fachbereich Biologie, Philipps-Universität Lahnberge, D-3550 Marburg, Federal Republic of Germany.

Flight

Kennedy, M.L., P.K. Price and O.S. Fuller. 1977. Flight speeds of five species of neotropical bats. Southwestern Nat. 22: 401 - 404.

- 1976. Flight speeds of five species of bats. J. Tenn. Acad. Sci. 51(4): 149.

Smith, J.D. 1977. Comments on flight and the evolution of bats. IN. Hecht, M. et al. (eds). Major patterns in vertebrate evolution, Nato Advanced Study Institute, Series A; Life Sciences, pp. 427 - 417.
Department of Biology, California State University, Fullerton California 92634.

Parasites

Overal, W.L. and L.R. Wingate. 1976. The biology of the batbug Stricticimex antennatus (Hemiptera : Cimicidae) in South Africa. Ann. Natal Mus. 22(3): 821 - 828.
Department of Zoology, University of Natal, Pietermaritzburg, S.A.

Stiller, D. 1976. Report of a new bat fly of the genus Ascodipteron Adensamer, 1896 (Diptera : Streblidae) parasitic on Hipposideros diadema (Geoffroy) in Malaysia. J. Med. Ent. 13(3): 374 - 375.

Physiology

Erkert, H.G. 1976. Der Einfluss Der Schwingungsbreite von Licht-Dunkel-Cyclen auf Phasenlage und Resynchronisation der Circadianen Aktivitaetsperiodik Dunkelaktiver Tiere. J. Interdisciplinary Cycle Res. 7: 71 - 91.
Univ. Tubingen, D7400 Tubingen 1, West Germany.

Haymovits, A., M.D. Gershon and E.A. Nunez. 1976. Calcitonin, serotonin and parafollicular cell granules during the hibernation activity cycle in the bat,(Myotis lucifugus). Proc. Soc. Exp. Biol. Med. 153: 383 - 387.
The Rockefeller University, New York, N.Y. 10021

Krook, L., W.A. Wimsatt, J.P. Whalen, I MacIntyre and E.A. Nunez. 1977. Calcitonin and hibernation bone loss in the bat (Myotis lucifugus). The Cornell Veterinarian 67(2): 265 - 271.

Lewis, J.H. 1977. Comparative hematology: studies on Chiroptera, Pteropus giganteus. Comp. Biochem, Physiol. 58A: 103 - 108.
Central Blood Bank, Pittsburgh, Pa. 15213.

O'Farrell, M. and W.G. Bradley. 1977. Comparative thermal relationships of flight for some bats in the southwestern United States. Comp. Biochem. Physiol. 58: 223 - 227.

Pevet, P., J.A. Kappers and A.M. Voûte. 1977. Morphologic evidence for differentiation of pinealocytes from photoreceptor cells in the adult noctule bat (Nyctalus noctula, Schreber). Cell and Tissue Res. 182: 99 - 110.
(Netherlands Institute of Brain Research, Amsterdam O, Netherlands)

Quay, W.B. 1976. Seasonal cycle and physiological correlates of pinealocyte nuclear and nucleolar diamters in the bats Myotis lucifigus and Myotis sodalis. Gen. and Comp. Endocrinology 29: 369 - 375.
Department of Zoology, University of Wisconsin, Madison, Wisconsin 53706.

Rybar, P. 1974. Nektere poznatky o zimovani netopyru rodu Eptesicus Rafinesque, 1820. Lynx (Praha) 16: 61 - 68.

Reproduction

Khaparde, M.S. 1976. Notes on the breeding habits of the Indian sheath-tailed bat, Taphozous melanopogon (Temminck). J. Bombay Nat. Hist. Soc. 73(2): 321 - 324.

LaVal, R.K. and M.L. LaVal. 1977. Reproduction and behavior of the African banana bat, Pipistrellus nanus. J. Mamm. 58: 403 - 410.
Missouri Department of Conservation, Fish and Wildlife Research Center, Columbia, Missouri. 65201

Sensory (vision, olfaction)

Baron, G. 1977. Signification éco-éthologique due développement allométrique des deux systèmes visuels chez les chiroptères. Rev. Can. Biol. 36: 1 - 16.

Manske, U. and U. Schmidt. 1976. Visual acuity of the vampire bat, Desmodus rotundus, and its dependence upon light intensity. Z. Tierpsychol. 42: 215 - 221.

Obst, Von. Ch. and U. Schmidt. 1976. Untersuchungen zum Riechvermögen von Myotis myotis (Chiroptera). Z. Saugetierk. 41: 101 - 108.

Schmidt, U. 1975. Vergleichende Riechschwellenbestimmungen bei neotropischen Chiropteren (Desmodus rotundus, Artibeus lituratus, Phyllostomus discolor). Z. Saugetierk. 40: 269-298
Zoologisches Institut D - 53 Bonn, Poppelsdorfer Schlob.

Systematics

Bergmans, W. 1977. Notes on new material of Rousettus madagascariensis Grandidier, 1929 (Mammalia, Megachiroptera). Mammalia 41:67-74.

Eger, J.L. 1977. Systematics of the genus Eumops (Chiroptera : Molossidae). Life Sci. Contr., R. Ont. Mus. no. 110: 1 - 69.
Department of Mammalogy, Royal Ontario Museum, Toronto Canada M5S 2C6

Freeman, P.W. 1977. A multivariate study of the family Molossidae (Mammalia : Chiroptera): morphology, ecology and evolution. Ph.D. Thesis, University of New Mexico, Albuquerque.

Hill, J.E. 1977. A review of the Rhinopomatidae (Mammalia: Chiroptera). Bull. Br. Mus. Nat. Hist. 32(2): 29 - 43.

Techniques

Kirkpatrick, R.D. and T.W. Landrum. 1975. Preliminary evaluation of a tooth wear aging technique for the big brown bat, Eptesicus fuscus. Proc. Indiana Acad. Sci. 84: 476 - 477.
Ball State University, Muncie, Indiana 47306

Kunz, T.H. and E.L.P. Anthony. 1977. On the efficiency of the Tuttle bat trap. J. Mamm. 58: 309 - 315.

Shumake, S.A., R.D. Thompson and C.J. Caudill. 1977. A technique for visual threshold measurement in vampire bats. Physiol. and Behav. 18: 325 - 328.
U.S. Fish and Wildlife Service, Wildlife Research Center, Denver, Colorado 80225.

Karyology

Horton, M.C., B. Anthony and R.M. Kitchin. 1974. A chromosomal survey of Wyoming vespertilionid bats. J. Colorado Wyoming Acad. Sci. 7: 75.

Dulic, B. and F.A. Mutere. 1977. Chromosomes of some east African bats. Saugetierkundliche mitteilungen 25: 231 - 233.

Bickham, J.W. and R.J. Baker. 1977. Implications of chromosomal variation in Rhogeessa (Chiroptera : Vespertilionidae). J. Mamm. 58: 448 - 453.
Department of Biological Sciences, Texas Tech Univ. Lubbock Texas 79409

Bickham, J.W. 1976. Chromosomal banding and phylogenetic relationships of vespertilionid bats. Ph.D. Dissertation, Texas Tech Univ., Lubbock, 77 pp.

Assorted

Barta, Z. 1975. K potrave netopyra usateho (Plecotus auritus L.) Lynx (Praha) 17: 5 - 6.

Danko, S. 1974. Raniak velky Nyctalus lasiopterus (Schreber, 1780) v Ceskoslovensku. Lynx (Praha) 15: 5 - 8.

Dobroruka, L.J. O. Fejfar, J. Gaisler, V. Hanak, J. Hanak, I Heran, V. Mazak, Z. Veselovsky, and J. Volf. 1975. Prehled Soutavy a Ceske Nazvy Savcu. An outline classification of mammals and their Czech names. Lynx (Praha) n.s. suppl. IV.

Hurka, L. 1977. Chiropterezönosen einiger winterquartiere in Westböhmen. Vestnik Ceskoslovoenske Spol. Zool. 41: 15 - 19.

Kepka, O. 1976. Eine Winterschlafgemeinschaft der Zwergfledermaus Pipistrellus pipistrellus Schreb. under des grossen Abendseglers, Nyctalus noctula Schreb. in Graz (Mamm. Chiroptera). Mitt. naturwiss. Ver. Steiermark, 106: 221 - 222.

Krzanowski, A. Bibliography of bats (Mammalia : Chiroptera), 1958 - 67. Institute of Systematic and Experimental Zoology, Polish Academy of Sciences, Krakow, Poland, 599 pp. no date.

Mohr, C.E. 1976. Tree bats. Delaware Conservationist. 20:(3): 17-21.

Mohr, C.E. 1976. The world of the bat. J.B. Lippencott Co., Philadelphia and New York, 162 pp.

Rasweiler, J.J. 1977. Diets for Chiroptera. IN CRC Handbook Series in Nutrition and Food, Section G., Diets, Volume 1, Diets for Mammals, pp. 493 - 533, M. Rechcigl Jr. (ed.) CRC Press, Cleveland, Ohio.
Department of Anatomy, Columbia University, 630 West 168th Street, New York, N.Y. 10032.

Wheat, B.E. 1975. Observations of coccidia from bats. J. Alabama Acad. Sci. 46: 97.

Newly Arrived

Humphrey, S.R. 1977. Keep 'em flying. Animal Kingdom 80(5): 30 - 34. Florida State Museum, University of Florida, Gainesville, Florida 32611.

McCracken, G.F. and J.W. Bradbury. 1977. Paternity and genetic heterogeneity in the polygynous bat, Phyllostomus hastatus. Science 198: 303 - 306. Department of Biology C-016, University of California at San Diego, La Jolla, California 92093

Rasweiler, J.J. IV. 1977. Preimplantation development, fate of the zona pellucida, and observations on the glycogen-rich oviduct of the little bulldog bat, Noctilio albiventris. Am. J. Anat. 150: 269-300.

IN PRESS (or accepted for publication)

Although a number of people has indicated that they find this idea useful, and some have even sent us citations, the length of this current section suggests that most readers are not particularly interested in retaining it. Without your help we cannot continue to provide these references.

DeBlase, A.F. The bats of Iran, distribution, systematics, ecology. Fieldiana, Zoology, in press.

Elder, W.H., and W.J. Ganier. Sex ratios and seasonal movements of gray bats (Myotis grisescens) in southwestern Missouri and adjacent states. American Midland Naturalist.

Gould, E. Foraging behaviour of Pteropus vampyrus on the flowers of Durio zibethinus. Malayan Nature Journal.

- Opportunistic feeding by tropical bats. Biotropica.
- Rediscovery of Hipposideros ridleyi (Robinson and Kloss) with some comments on seasonal reproduction in Malaysian insectivorous bats. Biotropica
- Foraging behavior of Malaysian nectar-feeding bats. Biotropica.

Mainoya, J.R. and K.M. Howell. Histology of the frontal sac in three species of leaf-nosed bats (Hipposideridae). East African Wildlife Journal.

Pevet, P., J. Ariens Kappers and A.M. Voûte. The rudimentary photoreceptor cells of the noctule (Nyctalus noctula,Schreber). Cell and Tissue Research.

Schmidt, U. and C. Schmidt. Echolocation performance of the vampire bat (Desmodus rotundus). Z. Tierpsychol.

Simmons, J.A. and M.J. O'Farrell. Echolocation by the long-eared bat, Plecotus phyllotis. Journal of Comparative Physiology. A.

QUICKIES

After some reflection, I decided to continue including short manuscripts in the Bat Research News. I have purposely refrained from saying 'publish' with respect to BRN, and have avoided calling the contributions 'notes' or 'papers' ... etc.

In some instances, the material included in this section will have been solicited by me for BRN, in other cases the manuscripts will have been submitted by the author(s). I will identify the solicited material.

If you are incubating some information which might be appropriately included as a Quickie in BRN, please send it along. The copy you send should be double-spaced and typewritten. I will go over the submitted material and perhaps make some suggestions about wording, etc. (not to mention a decision about whether or not to include the material in BRN), and return it to you. The final copy (which includes suggested changes) should be single-spaced typewritten with 4 cm margins (top, bottom and sides). The title should be in full capitals with the author(s) name(s) underneath. Addresses should appear at the end of the Literature Cited.

By following these suggestions you will make the operation at this end much more pleasant.

and so ...

CHITINOLYTIC ENZYMES IN VERTEBRATES

Hal L. Black

I have recently become aware of a paper dealing with digestive adaptations of vertebrates that seems to have been overlooked by biologists interested in food habits of insectivores. Jeuniaux (1961) found chitinase in the digestive tracts of sex vertebrates. Of special interest to mamalogists is the discovery of considerable chitinase synthetic activity in the gastric mucosa of Rhinolophus ferrum-equinum. It has generally been assumed that chitin, a major constituent of insect cuticle, was not digestible by vertebrates (Snodgrass, 1935). Recently, chiroptologists have used fecal material to study food habits of insectivorous bats, assuming that the insect skeleton, while fragmented, was otherwise intact after its passage through the digestive tract. The extent to which the cuticle is altered or digested by chitinase is at present not known, but the potential for differential digestion of the various hard- and soft-bodied insects cannot be ignored. Since 6 of the 8 vertebrates tested by Jeuniaux (1961) were positive for chitinolytic enzymes, it seems likely that future work will reveal more vertebrates possessing these enzymes.

Jeuniaux, C. 1961. Chitinase: an addition to the list of hydrolases in digestive tract of vertebrates. Nature, 192: 135-136.

Snodgrass, R.E. 1935. Principles in insect morphology. McGraw-Hill Co., New York, 667 pp.

Department of Indian Education, Brigham Young University, Provo, Utah 84601

BAT PREDATION BY THE AMERICAN KESTREL, FALCO SPARVERIUS (AVES: FALCONIFORMES)

Steven D. Garber

At sundown (1800 h) on 19 April 1972, I watched an American Kestrel (Falco sparverius) momentarily hover above and behind a bat in a straight level flight. The bird then dove, seized the bat in its talons, and then carried its prey some 100 m to a perch on a foliated tree where the bat was eaten. There are five similar reports in the literature (Wright, 1932; Bent, 1938; Orr, 1954; Baker, 1962; James and Hayse, 1963). Those species taken have included Antrozous pallidus, Myotis velifer, T. brasiliensis, and what Wright believed to be either Pipistrellus hesperus or A. pallidus. Dr. William Wimsatt has informed me that one of several Myotis lucifugus he released from a second story window of a building in Princeton, New Jersey on 12 March 1957 was caught in flight by an American Kestrel that had been perched on the roof of an adjacent building.

Black (1976), Twente (1954), Mueller (1968), and Wimsatt observed bat captures by American Kestrels during the day when the bats were released from captivity. Releases such as these are no doubt uncommon, so it may be inferred that American Kestrels can and will capture bats, should bats be flying during the day. From Balgooyen's (1976) data we know the size of the insectivorous bats falls within that range given for American Kestrel prey.

American Kestrels hunt only by morning and evening in xeric environments and throughout the day elsewhere (Bartholomew and Cade, 1957). However, the peak flights of most insectivorous bats occur just after sundown with a lesser peak just preceding sunrise, events which are correlated both with the abundance of insects during these periods and with the relative inactivity of falconiforms at night. This pattern may also explain the infrequent observations of avian predation on bats in the field. That bats have remained nocturnal to avoid predation by falconiforms is indicated by the fact that in situations where bats greatly outnumber their avian predators, as at Ney Cave and Bracken Cave in south-central Texas, and Carlesbad Caverns in New Mexico, the bats appear as early as one hour before dusk (Stager, 1941; Baker, 1962; Novick, 1969). Predators often converge on such concentrations of prey, and where early departing bat numbers are staggering, it is common to find hawks, falcons, and owls harvesting bats from the swarms. In these situations the number of bats captured is relatively insignificant, suggesting early evening flights have benefits outweighing those negative aspects. Likewise, on islands of the Puerto Rican Bank where avian predators are not common, I have seen great numbers of bats feeding shortly before dusk.

In addition to owls, at least two falconiforms, the Bat Hawk (Macheiramphus alcinus) (Eccles et al., 1969) of parts of the Old World Tropics and the Bat Falcon (Falco rufigularis) of the Neotropics are adapted to exploit an extended foraging period, when they commonly feed on bats. Mueller (1968) has suggested selection for retention of vision in bats has been related to predation by falconiforms.

I thank Dr. William Wimsatt and Dr. Thomas Cade who assisted me in the preparation of this note, and I am grateful to Jone Sampson and Dr. Robert Hoffmann for their careful criticisms of the final manuscript.

LITERATURE CITED

Baker, J.E. 1962. The manner and efficiency of raptor depredations on bats. Condor. 64:500-504.

Balgooyen, T.G. 1976. Behavior and ecology of the American Kestrel (Falco sparverius L.) in the Sierra Nevada of California. Univ. Calif. Publ. Zoo. Vol. 103. 83 p.

Bartholomew, G.A. and T.J. Cade. 1957. The body temperature of the American Kestrel, Falco sparverius. Wilson Bull.69:149-154.
Bent, A.C. 1938. Life histories of North American birds of prey. Bull. U.S. Nat. Mus.170. pt.2.
Black, H.L. 1976. American Kestrel predation on the bats Eptesicus fuscus, Euderma maculatum, and Tadarida brasiliensis. Southwestern Naturalist 21:251-252.
Eccles, D.H., R.A.C. Jensen, and M.K. Jensen. 1969. Feeding behavious of the Bat Hawk. Ostrich 40:26-27.
James, P. and A. Hayse. 1963. Sparrow Hawk preys on Mexican Free-tailed Bat at Falcon Reservoir. J. Mamm. 44:574.
Mueller, H.C. 1968. The role of vision in vespertilionid bats. Amer. Mid. Nat. 79:524-25.
Novick, A. 1969. The world of bats. New York. Holt, Rinehart, and Winston.
Orr, R.T. 1954. Natural history of the Pallid Bat, Antrozous pallidus. Proc. Calif. Acad. Sci.28:165-246.
Stager, K.E. 1941. A group of bat-eating Duck Hawks. Condor 43: 137-139.
Twente, J.W., Jr. 1954. Predation on bats by hawks and owls. Wilson Bull.66: 135-136.
Wright, G.M. 1932. A bat-eating Sparrow Hawk. Condor 34:43.

Cornell University, Ithaca, New York 14850.
present address: Museum of Natural History and Department of Systematics and Ecology, The University of Kansas, Lawrence, Kansas 66045 U.S.A.

A SIMPLE, INEXPENSIVE, BROADBAND BAT DETECTOR

James A. Simmons

The Knowles Electronics Co. (Franklin Park, Illinois) Model BT-1759 electret condenser microphone is ideal for use in ultrasonic bat detectors. It will respond to signals stronger than about 60 to 70 dB SPL at frequencies from 10 to over 100 kHz, the range used by many bats for echolocation. The microphone requires no special high-voltage polarizing supply and no high-impedance preamplifier, just a simple amplifier circuit using one integrated circuit and one transistor. With these components, one can build a bat detector for less than $50.00 U.S., and the output from this detector can be rendered audible by using a REALISTIC micro-sonic speaker-amplifier. Power for the bat detector is from a 9 volt transistor radio battery.

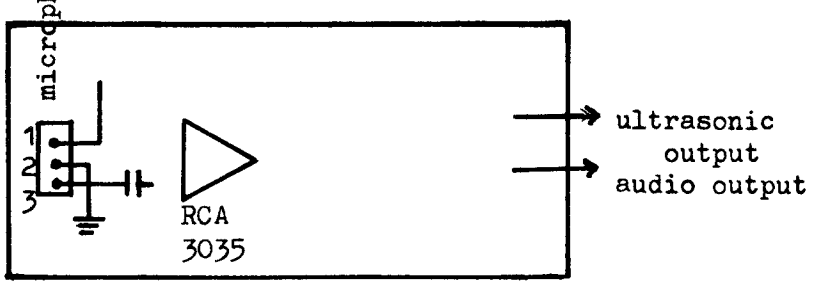
The Knowles Electronics Co. only sells the microphones in minimum lots of 100 units, so we shall have to co-ordinate a joint order of microphones for as many people as possible. On an order of 100 units, each microphone will cost about U.S. $8.00. I recommend ordering at least five units to avoid the necessity of another large order should replacement be necessary.

(These broadband bat detectors are suitable for ultrasonic sounds in general, whether from bats, rodents, or insects. The detector is not suitable for those interested in recording ultrasonic sounds.)

If you want any of these microphones please contact me indicating your mailing address, how many microphones you will need, and please also include $8.00 U.S. for each microphone. As soon as I receive a substantial fraction of the order of at least 100, I will issue a purchase order from Washington University. (At the bat conference in Ottawa it was clear that at least 50 microphones were required.

I hope to hear from those who plan to purchase microphones within one month.

circuit diagram



Department of Psychology, Washington University, St. Louis, Missouri 63130.

OXYGEN CONSUMPTION OF THE MALAYSIAN CAVE FRUIT BAT (Eonycteris spelaea).

G.C. Whittow[1] and E. Gould[2]

On the basis of information for New World tropical bats, McNab (1969) postulated that nectar-feeding bats have relatively high metabolic rates. The present note was prompted by the opportunity to obtain data for an Old World tropical nectarivorous bat, the Malaysian Cave Fruit Bat, which roosts during the day in limestone caves in central West Malaysia. At night, the Cave Fruit Bats may fly considerable distances in order to feed on nectar and pollen of bat-pollinated flowering trees in lowland forest and coastal mangrove (Start and Marshall, 1975).

The oxygen consumption of six bats was measured individually by a technique described in a previous note (Whittow and Gould, 1976). The total oxygen consumption of four additional bats, housed together, was measured using a larger respirometer chamber (Whittow et al. 1977) and an air flow rate through the chamber of 895 ml./min. The oxygen consumption of the same four bats was measured also when they were prevented from clustering, by insertion of partitions inside the chamber.

The data are presented in Table 1. The air temperatures at which the measurements were made are within the range of air temperatures in their natural cave habitat. The lowest oxygen consumption (0.78 ml./g.hr) was recorded from a bat which felt cold to the touch, and it may have been torpid. However, even when the data from this animal were included, the mean oxygen consumption (1.32 ml./g.hr.) was 23% greater than the value predicted from their body weight, according to Kleiber (1961). Although three of the four bats were huddled together in the respirometer chamber, the combined oxygen consumption (1.32 ml./g.hr.) of the four bats was very similar to that obtained when the same bats were prevented from clustering. This may have been related to the short time period (1 hour) over which measurements were made, as a metabolic effect of clustering has been demonstrated in species of New World bats (Trune and Slobodchikoff, 1976).

At first sight, the results of these measurements are in accord with McNab's (1969) hypothesis that nectarivorous bats have relatively high metabolic rates. However, it is possible that the air temperatures at which the measurements were made, and in the caves, are below the lower critical temperature of the bats (Bartholomew et al., 1970). In this event, further studies are needed to determine to what extent Cave Fruit Bats become torpid, and to assess the bioenergetic consequences of clustering, in more detail.

REFERENCES

Bartholomew, G.A., W.R. Dawson and R.C. Lasiewski. 1970. Thermoregulation and heterothermy in some of the smaller Flying Foxes (Megachiroptera) of New Guinea. Z. vergl. Physiologie 70: 196-209.

Kleiber, M. 1961. The Fire of Life. Wiley, New York. 454 pp.

McNab, B.K. 1969. The economics of temperature regulation in neotropical bats. Comp. Biochem. Physiol. 31: 227-268.

Start, A. and A.G. Marshall. 1975. Nectarivorous bats as pollinators of trees in West Malaysia. In Tropical Trees: Variation, Breeding and Conservation. (J. Burley and B.T. Styles, eds.) Academic Press, London, pp. 141-150.

Trune, D.R. and C.N. Slobodchikoff. 1976. Social effects of roosting on the metabolism of the Pallid Bat (Antrozous pallidus). J. Mammal. 57: 656-663.

Whittow, G.C. and E. Gould. 1976. Body temperature and oxygen consumption of the Pentail Tree Shrew (Ptilocercus lowii). J. Mammal. 57: 754-756.

Whittow, G.C. and C.A. Scammell, J. Kamala Manuel, D. Rand and Margaret Leong. 1977. Temperature regulation in a hypometabolic primate, the Slow Loris (Nycticebus coucang). Arch. Int. Physiol. Biochem. 85: 139-151.

Table 1. Oxygen consumption ($\dot{V}O_{2STPD}$) of 10 Cave Fruit Bats. T_a = air temperature. STPD = standard temperature, pressure, dry.

Sex	Body weight (g)	Ta (°C)	$\dot{V}O_{2STPD}$ (ml/hr.g.)
Female	55.7	24.7	0.78
"	42.5	24.8	1.67
"	45.8	24.9	1.79
Male	56.3	26.7	1.09
"	69.8	26.7	1.43
"	70.7	26.7	1.15
Female	44.3		
"	38.9	27.2	1.35*
"	40.3		
"	36.0		
	50.0		1.32

*Total oxygen consumption of 4 bats, in separate compartments within the respirometer, divided by total body weight of bats.

Departments of Physiology and Zoology
University of Malaya
Kuala Lumpur
Malaysia

1,2
Present address:

G.C. Whittow, Department of Physiology, School of Medicine, University of Hawaii, Honolulu, Hawaii 96822

E. Gould, Laboratory of Comparative Behavior, School of Hygiene and Public Health, The Johns Hopkins University, Baltimore, Maryland 21205

ADDITIONAL SUBSCRIBERS

Michel ANCIAUX DE FAVEAUX Recette Principale B.P. 228, Constantine Algeria. Ecology, reproduction and parasites

Robert BARCLAY Department of Biology, Carleton University, Ottawa Canada K1S 5B6. behaviour and ecology

BAT RESEARCH GROUP 11 Hall Road, Anstey Lane, Alton, Hampshire, England. (director R. Goodall).

Albert J. BECK P.O. Box 1187, Chico, California 95927. ecology, reproduction and parasites.

BLEITZ WILDLIFE FOUNDATION 5334 Hollywood Blvd., Hollywood, California 90027.

Patricia BROWN Department of Biology, UCLA, Los Angeles, California 90024. Conservation, behaviour, ecology, evolution, echolocation, reproduction, physiology and temperature regulation.

Charles BUFALINO Department of Biology, California State University, Northridge, California 91330. anatomy, behaviour, evolution and taxonomy.

William CAIRE Department of Biology, Central State University, Edmond, Oklahoma 73034. public education, conservation, ecology and taxonomy.

Donald L. CHORZEMPA P.O. Box 713, Newhall, California 91322. behaviour, ecology, physiology and taxonomy.

James B. COPE Earlham College, Richmond Indiana 47374. behaviour, ecology and temperature regulation and life history.

Tom CRAVENS St. Louis Community College, 11333 Big Bend Blvd., St. Louis, Missouri 63122.

Robert L. CRAWFORD 575-62-9215, HHD, 227th Maint. Bn (S2/3), APO San Francisco 96301. conservation, physiology and taxonomy. (currently stationed in Korea, seeks contacts for research there).

Peter L. DALBY Biology Department, Clarion State College, Clarion, Pa 16219. conservation, ecology and evolution.

Anthony F. DeBLASE Field Museum of Natural History, Roosevelt Rd at Lake Shore Drive, Chicago, Illinois 60605 Ecology, taxonomy, evolution and zoogeography.

D. COVALT-DUNNING Department of Biology, West Virginia University, Morgantown, West Virginia 26506. behaviour, ecology and echolocation.

Emmett R. EASTON Entomology-Zoology Department, South Dakota State University, Brookings, South Dakota 57007. ectoparasites.

H. ENGLANDER Zoologisches Institut, Wyertal 119, D 5000 Köln - 41 (Lindenthal) Germany. conservation, behaviour, ecology and temperature regulation.

James S. FINLEY. Biology Department, University of New Mexico, Albuquerque, New Mexico 87131. ecology and evolution.

Patricia W. FREEMAN. Mammal Division, Field Museum of Natural History Roosevelt Road at Lake Shore Drive, Chicago, Illinois 60605 anatomy, ecology, evolution and functional morphology.

John B. FUNDERBURG 102 N. Salisbury St., 166 Agriculture Bldg, Raleigh, North Carolina. 27611.

Jiri GAISLER Department of Biology of Animals and Man, Faculty of Science, J.E. Purkyne University, Kotlarska 2, 611 37 Brno Czechoslovakia. conservation, behaviour, ecology, reproduction and taxonomy.

Kenneth N. GELUSO Department of Biology, University of Nebraska at Omaha, Box 688, Omaha, Nebraska 68101. conservation, ecology, evolution, and physiology.

Edwin GOULD 615 N. Wolfe St., Baltimore, Maryland 21205. behaviour, ecology, echolocation and bat flowers.

Theodor HALTENNORTH 8 München 60, Veldener Str. 67, West Germany. taxonomy.

Vladimir HANAK Institute of Systematic Zoology, Charles University, Vinicna 7, 128 44 Praha 2, Czechoslovakia. taxonomy and ecology.

James W. HARDIN Coop. Wildlife Research Lab, Southern Illinois University, Carbondale, Illinois 62901. behaviour and ecology

Don HARKER 6th Floor, Capital Plaza Tower, Frankfort, Kentucky, 40601.

Michael HARRISON 1701 Kilborn Ave, Apt. 1314, Ottawa, Canada. Ecology

Michael J. HARVEY Ecological Research Center, Department of Biology Memphis State University, Memphis, TN 38152. conservation, behaviour and ecology.

Ivan HORACEK Sidl. Michelska 1182 145 00 Praha 4, Czechoslovakia CSSR behaviour, ecology, evolution and taxonomy.

K.M. HOWELL Box 35064 Department of Zoology, University of Dar es Salaam, Tanzania.

Birger JENSEN Game Biology Station Kalo, 8410 Ronde Ryomgard, Denmark.

Phil KRUTZSCH Department of Anatomy, Health Sciences Center, University of Arizona, Tucson, Arizona 85724. reproductive biology.

Knox JONES Research and Graduate Studies, Texas Tech University, Lubbock, Texas 79409.

Gordon L. KIRKLAND Jr. The Vertebrate Museum, Shippensburg State College, Shippensbirg, PA 17257

Ralph D. KIRKPATRICK Department of Biology, Ball State University Muncie, Indiana 47306.

Karl F. KOOPMAN Department of Mammalogy, American Museum of Natural History, New York, N.Y. 10024. ecology, evolution and taxonomy.

Margaret LANGWORTHY 1519 E. Edison, Tucson, Arizona. 85719. anatomy behaviour and physiology and evolution.

Pamela A. LAYCOCK Zoology Department, Natal University, Pietermaritzburg 3200, South Africa.

John LEFFLER Institute of Ecology , University of Georgia, Athens Georgia 30602

Anthony W. LEWIS Department of Biology, Loma Linda University, La Sierra Campus, Riverside, California 92505.

Warren C. LEWIS 119 Church St., Rockford Illinois 61101. cave exploration and diseases shared with humans.

Richard B. LOOMIS Department of Biology, California State University, Long Beach, California 90840.

William LOPEZ-FORMENT Depto. Zoologia, Insituto de Biologia, A.P. Postal 70-153, Mexico 20, D.F. Mexico. conservation, behaviour, ecology, echolocation, reproduction and physiology.

J.A. MACKINTOSH 55 Avon Road, Invercargill, New Zealand.

Timothy J. McCARTHY. Central Farm, Cayo District, Belize. public education, conservation, behaviour, ecology, evolution, reproduction physiology, taxonomy and temperature regulation.

David N. McMURRAY Department of Medical Microbiology and Immunology, College of Medicine-2, Texas A and M. University, College Station, Texas 77843. cell-mediated immune response in bats.

J. MEESTER Zoology Department, Natal University, Pietermaritzburg 3200, South Africa. behaviour, ecology, evolution, reproduction and taxonomy, particularly, African bats.

Russell E. MUMFORD Department of Forestry and Natural Resources, Perdue University, West Lafayette, Indiana 47907. behaviour and ecology.

Museum of Zoology, Department of Biology, Carleton University, Ottawa, Canada K1S 5B6

National Speleological Society Library, Cave Avenue, Huntsville, Alabama 35810.

David W. NELLIS #86 Frydenhoj, St. Thomas, Virgin Islands 00801 behaviour and ecology.

Tony OLDHAM Rhychydwr, Crymych, Dyfed SA41 3RB United Kingdom. bibliography of bats.

Brett A. OXBERRY Department of Anatomy, College of Medicine, University of Arizona, Tucson, Arizona 85724

George POLLAK Department of Zoology, The University of Texas, Austin, Texas 78712. public education, anatomy, behaviour, ecology, evolution, echolocation, reproduction, physiology, taxonomy and temperature regulation.

Paul A. RACEY Department of Zoology, University of Aberdeen, Aberdeen AB92 TN United Kingdom. conservation, behaviour, ecology, reproduction and physiology.

David Alan SAUGEY P.O. Box 7, Fifty-Six, Arkansas 72533. public education, conservation, behaviour, ecology, reproduction, taxonomy and geographical distribution.

Tom A. SAUNDERS U.S. Fish and Wildlife Service, Federal Building, 17th floor, 601 East 12th Street, Kansas City, Missouri 64106.

Karl A. SHUMP Department of Biological Sciences, State University College at Brockport, Brockport, New York 14420.

Donald A. SMITH Department of Biology, Carleton University, Ottawa, Canada K1S 5B6. public education, conservation, behaviour, ecology, reproduction and taxonomy.

Kenneth E. STAGER Rt. 1, 280 Columbine Drive, Bishop, California 93514 public education, conservation, behaviour, ecology and taxonomy.

Edward STASHKO Department of Biological Sciences, Northwestern University, Evanston, Illinois 60201. ecology and foraging behaviour.

Kim R. THOMAS Department of Biology, University of Puerto Rico, Rio Piedras, Puerto Rico 00931. ecology, behaviour and taxonomy.

Gordon B. THOMPSON 56 Beaumont Road, Cambridge CB1 4PY England. ecology and ectoparasites.

Chris TIDEMANN Zoology Department, Australian National University, P.O. Box 4, Canberra, A.C.T. Australia 2600. conservation, behaviour, ecology and echolocation.

Robert M. TIMM Bell Museum of Natural History, University of Minnesota, Minneapolis, Minnesota 55455

Charles V. TRIMARCHI N.Y. State Department of Health, Division of Labs and Research, Empire State Plaza, Albany, New York 12201 conservation, behaviour, ecology, physiology and bat rabies.

Y. TURPINIER 18 A rue de l'Oratoire, 69300 Caluire France. behaviour, echolocation, taxonomy and palaeontology.

Merlin D. TUTTLE Vertebrate Division, Milwaukee Public Museum, 800 W. Wells St., Milwaukee, Wisconsin 53202. behaviour, ecology and temperature regulation.

U.S. Army Engineer District, St. Louis, Corps of Engineers, 210 North 12th Street, St. Louis, Missouri 63101

A.M. VOÛTE Laboratory for Animal Ecology and Taxonomy, State University Plompetorengracht 9, Utrecht, The Netherlands. conservation, behaviour and ecology.
John O. WHITAKER Jr. Department of Life Sciences, Indiana State University, Terre Haute, Indiana 47809. behaviour, ecology food and parasites.
Nixon WILSON Department of Biology, University of Northern Iowa, Cedar Falls, Iowa 50613. ecology and ectoparasites.
John R. WINKELMANN Department of Biology, Gettysburg College, Gettysburg, Pennsylvania 17325. anatomy, behaviour, ecology and evolution.
Dedee WOODSIDE Zoology Department, Australian National University, P.O. Box 4, Canberra, A.C.T. 2600, Australia . public education, conservation, behaviour, ecology, echolocation and trapping techniques.

Last minute additions ...

Carol CONROY 3030 O'Neal Parkway Apt. P-10, Boulder, Colorado 80301 public education, conservation, behaviour and ecology.
James C. HALFPENNY E.P.O. Biology Department, University of Colorado Boulder, Colorado 80309
Steve HUMPHREY Florida State Museum, University of Florida, Gainesville, Florida 32611 nimgimmers.

and ....

Allen H. BENTON 40 Norton Place, Fredonia, New York 14063
Mike BISHOP 3581 Pate Avenue, Cincinnati, Ohio 45208
Ceil Anne HERMAN Division of Biological Sciences, University of Missouri, Columbia, Missouri 65201
Helmut C. MUELLER Department of Zoology, University of North Carolina, Chapel Hill, North Carolina 27514
Andrew STARRETT Department of Biology, California State University, Northridge, California 91330
R.E. STEBBINGS Monks Wood Experimental Station, Abbots Ripton, Huntingdon, England.

It is possible that if you sent your money directly to Roy sometime in the last few months, that your name does not appear on either this list, or the list included in the previous issue. If this is the case, please let either of us know as soon as possible.