BAT RESEARCH NEWS

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BAT RESEARCH NEWS

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THE COVER

The cover photos are of a group of Artibeus lituratus in their diurnal roost, a mango tree. The upper photo is a close-up of the lower one. Note how the bats have cleared a space in the leaves with their teeth. The locality is Posadas, Misiones, Argentina, and the photos were supplied through the courtesy of Dr. Horacio Delpietro.

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HERE AND THERE

The Third North American Symposium on Bat Research, held at San Diego, California, on 24 and 25 November 1972 was the scene of much talk about what might be done to increase awareness for bat conservation measures in this country. CHARLES [illegible] noted the difficulty of building a favorable picture on bats when the rabies level is high in an area, as in Delaware and Virginia (see the December CDC Zoonosis Surveillance on Rabies, pages 7 & 8, article entitled "Epizootic Bat Rabies in Delaware and Virginia"). Although questions have been brought forth as to the validity of the results of testing for the virus in bats, the fact that people have a justified fear of rabies makes the role of "bat protector" a hard one to maintain. BROCK FENTON's comments regarding a certain politician's statements on "his" people coming before bats reflects the mentality we have to face. CLYDE JONES announced a new policy of the Bureau of Sport Fisheries and Wildlife, to be released later in detail. STEVE HUMPHREY provided a series of resolutions to various groups providing specific concrete suggestions as to actions to be taken by those groups, it is good to see specific recommendations made, as all too often we fall into the pattern of many well-meaning but poorly informed ecological crusaders and end up with a shotgun approach which helps nobody and antagonizes many. The one addressed to biologists is given in this issue, with a preface letter from Steve, as follows.

"Enclosed is a copy of a resolution passes unanimously by over one hundred United States and Canadian bat biologists at the Third North American Conference on Bat Research on 25 November 1972 in San Diego, California. In two previous conferences these biologists have reported a large number of serious bat population declines from all areas of the continent and have identified the major causes of the losses. Recognizing both the centrality of environmental management by humans in these events and the importance of bats (the nocturnal counterparts of many birds) as a natural resource, the biologists last month suggested a series of new or modified human practices designed to greatly reduce pressure on bat populations. The enclosed resolution is a formalization of one of those suggestions that was to be directed specifically to your office.

"The fact that this resolution is not intended to assess blame but rather to provide a constructive way to improve an undesirable situation is not intended to diminish the seriousness of the suggestion. I will appreciate your careful consideration of this matter."

RESOLUTION ON BAT DISTURBANCE BY BIOLOGISTS

Whereas bat populations of many species in the United States are declining, and

Whereas the activities of well-intentioned biologists are contributing significantly to these declines, and

Whereas the simple act of entering and examining a summer nursery colony may cause bats (depending on the species) to desert the roost immediately, to move their young, or to vacate the roost as soon as the young can fly, and

Whereas sampling at a nursery may cause disuse of the roost for several months or years, and

Whereas arousal during winter sampling of hibernating bats causes significant expenditure of stored energy that must last until spring, and

Whereas banding of bats may cause infection of the wing, tooth wear due to band chewing, or fatal snagging of bands on objects, and

Whereas all these disturbances may result in direct mortality, loss of natality, lowered survival rate, or selection of unsatisfactory roosts,

Therefore the participants in the Third North American Conference on Bat Research request you to urge your membership, by publication or by announcement at your annual meeting, to follow practices that will reduce the deleterious influence of biologists. These are:

1. Before disturbing a bat colony, consider whether your investigation is designed to yield some new and useful information. Be sure your research is directed by the frontier of ideas and information rather than by the easy conventions of banding, sampling, and specimen collecting.

2. Consider in your research plans that long-term studies of bat population trends are rare but can be conducted easily and without disturbance, with only a few trips in standard periods of the year. Summer populations can be counted visually or estimated photographically by watching the evening flights, and winter counts or estimates can be made by brief examination of hibernating bats.

3. If it is necessary to handle hibernating bats, avoid arousing a population more than once a winter.

4. Sampling of summer populations should be done by netting or trapping at the colony exit during evening flight, not be entering the roost.

5. If flightless young must be examined, visit the roost at night when the adults are gone.

The above is the entire resolution, unchanged. At the conference I heard many comments concerning past misdeeds by colleagues, and rather than cast stones at those we know to have been sinners (whether by accident or intent), it behooves all of us to examine our own current programs to see how they fit in with the above resolution. With the information we now have available I could not in good conscience carry out programs with which I have been associated in the past. I feel no pangs of guilt, as I was unaware along with everyone else that the activities were less than desirable for bat population survival rates. I sincerely hope that all biologists will heed this matter, and I personally thank Steve for drafting the resolution and bringing it to the attention of all concerned.

Resolutions were sent to the U.S. Bureau of Sport Fisheries and Wildlife, the National Speleological Society, the U.S. Army Corps of Engineers, a number of forest-related groups and associations, and the Division of Wildlife Services of the U.S. Bureau of Sport Fisheries and Wildlife. The latter is of special interest to me, as the National Pest Control Association has approved a proposal I made regarding bat research worker volunteers and bat complaints. Most of you whose work has placed you and bats in the public eye together have had the opportunity to see how the general public reacts in times of need; letters from all over the state asking what to do about the bats in the attic, barn, camp, town hall, etc. I spend too much time following up on such requests for help, but justify the time expenditure in each case by chalking up points in good public relations for bats, as in many cases the people are content to be reassured of the value of the bats and are not really outraged at their presence. I am welcome in one small town at any time for having spent several hours climbing rafters to determine the extent of a Myotis lucifugus nursery colony; by sealing up a few holes in the ceiling so that droppings no longer ended up on the town clerk's desk, I was rewarded with the information that the town officials agreed with me that the bats were really an asset to the town and that it was really rather nice to have a nursery in the town hall attic! Since many bat biologists at the San Diego meeting indicated a willingness to volunteer for such duties, I contacted Dr. C. D. Mampe, Technical Manager, National Pest Control Association, The Buettner Building, 250 West Jersey Street, Elizabeth, New Jersey 07202. His response was favorable and encouraging; if those of you who are willing to place your body in the arena where one usually only hears what "someone else" should be doing, then he is willing to take such a list of "bat experts" and present it to the members of the association (even to the extent of printing it if enough biologists throughout the country volunteer). Such a list, with names, addresses, telephone numbers, and times available (IMPORTANT point, as the list is only as useful as the availability of those whose names are on it) with perhaps indications of how far you would travel for consultation, etc. There is no safe, effective, registered control technique for bats at this time, and cooperation with pest control agencies would be the best possible way of making sure that the best means are used. Thus, if drastic means are indeed in order (in times of such problems as a rabies scare, it may be necessary to wipe out small colonies to alleviate the major problem of public reaction against bats - those of you who live in ivory towers may not have been "on the line" facing an enraged public, so think first before you get on the soapbox to save the world of bats), then one can minimize the damage to local bat populations and perhaps preserve all the bats killed for use by other bat biologists. The psychological effect of bringing in "experts" on bats may be enough in some situations to protect the bats and eliminate the need for control. This project can succeed only if enough interested bat biologists respond. To simplify things for Doug Mampe, it would be best if you send me the data on your availability so that I can give him a completed list.

This leads to another suggestion developed through the San Diego meeting: that of setting up a "Used Bat Parts" exchange. BOB STEBBINGS in England has built up quite a collection from that country by merely requesting all bat remains to be sent to him, no matter what the condition (bet he's regretted that at times!), so no bat materials go to waste. Rather than try to set up such a scheme in this country, I will suggest that it would be very desirable to have bat materials shared as much as possible; for example, PAT BROWN is sending me the male reproductive tracts from her Antrozous, leaving the remainder of the specimens available for standard museum mounts, etc. CHERRIE BRAMWELL of England is sending me the male tracts from Pteropus from her wing membrane studies, and if each specialist could get the parts desired from bats

used in other studies, there would be little waste. Such cooperation would also allow more peer approval of certain studies which involve the killing of bats. As KARL KOOPMAN has repeatedly noted, the number of specimens in the museums represent an extremely small percentage of the bats killed over the years, and I doubt that most collections represent much of a deleterious impact on bat populations, but mass killings, even for useful data, can be justified only if the data are important enough to outweigh the death of the bats. Since I do not expect to be available during the next year to handle such a "clearing house", and since my institution provides no support in time or money for such projects, I'll merely make the suggestion and hope that someone will rise to the occasion and set up a more definitive plan on how this may best be accomplished. In the meantime, anyone with special interests in obtaining specific parts of bats for study, write in and have such information listed in BRN - specific information as to what parts from what species, preserved in what manner. Because of my interest in the development of the baculum, I am interested, for example, in obtaining bat penes preserved in 70% alcohol with enough of the pelvic girdle or abdominal skin to facilitate anterior-posterior orientation; although I have enough of such materials at my disposal at this time, I will solicit donations in the future, and certainly do not wish to have such parts discarded - I will accept such materials at any time from anywhere rather than see them go to possible waste.

The changing attitude toward bats is exemplified by the following excerpt from the CDC report on the bat rabies epizootic in Delaware and Virginia, which I am including with high praise for the anonymous writer:

> "Bats are a biologically unique and increasingly rare group of animals. Campaigns involving the destruction of bats should be limited to specific districts where bat rabies is epizootic or to specific colonies that are located where they pose a significant health hazard. For example, a colony in a school building should be removed, preferably by sealing off entrances to the roost while the bats are absent"

This past year I had an interesting experience in dealing with some bats in the attic of a nursing home, the owner had been told by a public health authority that evidence of bats in the attic constituted evidence of a potential health problem, and unless the bats were exterminated, the home's license could be revoked. The number of droppings indicated that there were few bats at any time in the attic, and that there was no colony involved, so after locating some possible entrances to be sealed up, I wrote an appropriate letter "to whom it might concern" stating that I had found no bats during the nursery season time, that the evidence appeared to be that of a small number of transients, and that with the available openings sealed up, there should be little danger to humans. This was accepted readily by the official, and the owner donated 100 mouse traps to the Mammalogy class at the University as an indication of gratitude.

Any readers having hard data relating to the value of bats, please write such data up for inclusion either in BRN or make the references known so that the maximum number of biologists can utilize these data. Publish it in high prestige journals first, but get the information available. More and more non-game species are being included in impact statements, and more and more we need to have hard data to support our claims for bats as valuable parts of the environment. IYAD NADER writes from Saudi Arabia that bats are still considered pests in that arae of the world and are killed when encountered; with the fantastic media now available in most of the world (radio, movies, television, newspapers, etc.) we must first educate people as to the value of these animals, and in many cases only a direct show of evidence of value

of the animals will have any effect on the actions of people. Where rabies is persistent in a country, it is all the harder to offset the potential danger of the bats to humans with potential usefulness unless we can "prove" that they have value other than aesthetic.

The Study Group on Wildlife and Outdoor Recreation, North American Forestry Commission, meeting in Mexico City on 16 and 17 March 1972, adopted a number of recommendations, among which is the following pertinent one for bat biologists to note and quote:

> "Recommendation 7: The Study Group, recognizing that insectivorous, gregarious migratory bats are components of ecosystems of national and international ecological significance, and,
>
> Recognizing that populations of such bats are decreasing in numbers at an alarming rate because of indiscriminate slaughter by man; and
>
> Recognizing that such slaughter is often based on the lack of knowledge about the true role that bats play in the transmission of rabies,
>
> recommends that the North American Forestry Commission urge its member countries to:
>
> a) provide immediate protection to insectivorous, gregarious, migratory bats and to their roosting areas;
>
> b) initiate conservation programs, based on sound research, which will eliminate the problem of rabies transmission yet maintain populations of such bats for recreational and ecological benefits."

Although the above was printed in the May 1972 Recent Literature of Mammalogy supplement to the Journal of Mammalogy, I'm bringing it up again so that no-one will miss it. When you can quote many different groups in their strong resolutions and recommendations for bat protection, it lends weight to your request for consideration by officials. Bats are rather low in priority, and it takes constant pressure to penetrate the consciousness of those who are in a position to carry out protective action, especially when more dramatic and romantic animals are also in danger. In the list of priorities of the Office of Endangered Species, the bats are not a high priority item, to be sure.

In November, F. V. Schmidt, Deputy Director of the Bureau of Sport Fisheries and Wildlife of the Fish and Wildlife Service, stated that the major points of the recently adopted Bureau policy are:

> 1) Place a moratorium on issuing bat bands either to new banders or for new banding projects. The current supplies of bat bands will be issued to investigators for use in the completion of ongoing, pertinent projects that do not involve species of bats with declining populations. (Ed. note: with current evidence of declines in such bats as Tadarida and Myotis lucifugus, what species of bats do not fall in this category?) These restrictions on bat banding activities will be effected immediately, and will ease one of the major causes of disturbance to bat colonies.
>
> 2) We will begin to explore possibilities for developing an international treaty for the protection of North American bats. This action will be implemented as soon as possible. (Ed. note: with the small number of workers employed in the Office of Endangered Species, and the multiple higher priority items of business of other branches, who and where will this action come from, I wonder. If readers will excuse an overly cynical comment, my experience has been that in governmental language, "as soon as possible" means "as soon as somebody puts enough pressure on so we have to do it".)

For those who are interested, I have a large number of reprints of Charles E. Mohr's paper, "The status of threatened species of cave-dwelling bats." from the NSS Bulletin, available for distribution. It's the most up-to-date paper available on the subject and we need current data to back up our arguments for bat conservation.

The recommendations of the National Speleological Society's symposium on cave bats in 1971 have been copied from the NSS Bulletin of 1972 by such local NSS Grotto publications as the Chouteau Grotto's FORESIGHT, which I consider very good policy; one of the principles of advertising is repetition, so if you miss the ad in one place, you see it in another, or you see it enough times for it to sink in. Good bat conservation practices must be kept alive at the individual level, or all the recommendations and resolutions don't mean a thing. I suspect that many NSS members have a more professional attitude on bat conservation practices than some biologists (if you feel enraged at this statement, then perhaps I hit a target; "if the shoe fits, put it on").

At the Third International Bat Research Conference at Plitvice, Yugoslavia, in September 1972, a group of highly concerned individuals got together and in spite of the recurrent feeling that we had been this way before, set up a new group on bat conservation, hopefully to coordinate such activities throughout the world, or at least to facilitate such coordination. It was decided to keep the "official" group small so that it would be flexible, but all chiroptologists are encouraged to affiliate with the group. Named the " INTERNATIONAL COUNCIL FOR THE PROTECTION OF ENDANGERED BATS", the representative members are:

R. E. Stebbings - England - Chairman
S. Braaksma - The Netherlands
E. Hamilton-Smith - Australia
A. M. Greenhall - Trinidad
A. Krzanowski - Poland
R. L. Martin - United States of America
F. A. Mutere - Kenya
P. Rybar - Czechoslovakia
G. S. A. Perez - Guam

The aims of the group are as follows:

1. To obtain recognition by the I.U.C.N.
2. To obtain a representative in each country or region.
3. To obtain and disseminate information and to provide material for public education.
4. To serve as a consulting body to organizations and governments on matters relating to bats.
5. To obtain governmental support for programs sponsored by this council.
6. To publicize problems of world wide importance such as the effects of pollution.
7. To formulate codes of conduct for research.

The areas of responsibility of each council member are as follows: S. Braaksma - N.E. Europe (Belgium, Luxemburg, W. Germany, Denmark, Norway, Sweden); A. M. Greenhall - Central America and Caribbean; E. Hamilton-Smith - Australasia; A. Krzanowski - N.E. Europe & N. Asia (Finland, Poland, U.S.S.R.); R. L. Martin - N. & S. Americas; F. Mutere - Africa, Middle East; G. Perez - Pacific; P. Rybar - S.E. Europe (E. Germany, Czechoslovakia, Hungary, Yugoslavia, Albania, Greece, Roumania, Bulgaria), R. E. Stebbings - S.W. Europe (British Isles, France, Italy, Spain, Switzerland, Austria, Portugal) & S.E. Asia (India, China, Malasia)

For the council to have any effect, like the United Nations, it must have some cooperation; we solicit your support for this endeavor, and your suggestions.

As soon as the papers given at the Yugoslavian conference are published, I will list the titles and authors. It was a good conference, with sessions going on late into the night.

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

SHORT NOTES

NEW COMMERCIAL BAT DETECTORS

A new form of bat detector has been in use this summer and was demonstrated at the 3rd International Bat Research Conference in Plitvice, Yugoslavia. This instrument operates in two modes: in the tuned mode it has a ± 5 kHz passband tunable from 10 kHz to 180 kHz with a heterodyne oscillator to produce audible beats from constant or slowly changing frequencies. This performance resembles that of the superheterodyne detector (Pye and Flinn, 1964; Pye, 1968, and commercially available from Holgates Ltd.). In the untuned mode it responds to all signals rather like the wide-band detector (McCue and Bertolini, 1964) but it also produces beats from any constant or slowly changing frequencies, thus resembling a row of superheterodyne detectors tuned at intervals of 10 kHz. This mode has proved particularly useful for field-work on bats, detecting Rhinolophus at 83 kHz while listening to Pipistrellus at 45 kHz. It isalso ideal for work on the ultrasonic signals of redents which wander over wide frequency ranges and are less stereotyped than bat pulses. It is now hoped that a commercial version of this machine can be produced by a firm in U.K. Commercial development is only just starting but it is hoped that it will be available in 1973.

A smaller and simpler version has also been made, without any sacrifice in sensitivity, by eliminating the tuned mode and replacing the loudspeaker by an earphone (with a socket for a second earphone or a short cable to a separate loudspeaker unit). It may be possible to produce this instrument very much more cheaply, possibly in kit form. It is felt that a really cheap instrument, acting purely as a detector but giving no information about frequencies, would be adequate for many purposes and would greatly extend the ultrasonic fraternity.

The speed with which either or both instruments can be produced and the prices of each depend largely on the probable market, which is at present very difficult to assess. Any letters expressing a genuine interest in either machine or suggesting a compromise would be extremely helpful and much appreciated. There would, of course, be no commitment whatever, but every letter would ensure advance notice of availability and thus priority in satisfying subsequent firm orders.

Literature cited:

McCue, J. J. G. and A. Bertolini. 1964. A portable receiver for ultrasonic waves in air. I. E. E. E. Trans. Sonics & Ultrasonics, Su-11: 41-49.

Pye, J. D. 1968. Animal sonar in air. Ultrasonics, 6: 32-38.

---, and M. Flinn. 1964. Equipment for detecting animal ultrasound. Ultrasonics, 2: 23-28.

------ David Pye, Department of Zoology, University of London King's College, Strand, London WC2R 2LS, England.

THE TERM "FLEDGING" WITH REGARD TO BATS

In the evolution of technical jargon, words of general meaning and usage are not infrequently adopted with a much restricted, and often perverted definition to meet the semantic needs of a specialty. The words "reluctance" and "permeability" in the field of electro-magnetism, and "doctor" in medicine are examples that readily come to mind.

In the field of chiroptology there is needed a precise term referring to the time at which a young bat acquires the ability to fly. Ornithologists have long applied the term "fledging" to the acquisition of flight feathers by young birds. The Germanic root word "fliugan" and its Old English equivalent "floegan", from which the word is derived, both signify "to fly". The basic sense of the word therefore refers to the capability of flight, rather than to the acquisition of feathers. The latter, more restricted meaning possibly came into our language via the French, where the word "flèche" means "arrow", and has been used to mean attaching feather vanes to arrows. It persists in the archer's jargon as the word "fletch".

There are no mammals other than bats that fly, and bats never wear feathers. Any term coined or adopted to describe flight in bats is therefore unlikely to spread in usage to an area where it would be misunderstood or cause confusion. I therefore propose that chiroptologists adopt without apology the term "fledging" to describe this critical point in the time in the development of young bats.

----- Bryan P. Glass, Museum of Natural and Cultural History, Oklahoma State University, Stillwater, Oklahoma 74074.

Aside from etymological discussion (where does the Anglo-Saxon flycge fit into this discussion of acquiring of feathers?), the use of the term fledging seems to fit a definite need, and the logical extension of this to include the use of the term fledgling for young bats which have just started flying, is appropriate. Unless there is some semantic problem in such use, you are now authorized to utilize this terminology from this day on.

With regard to the bat detectors, ANDREW WATSON indicated back in 1970 that tape recordings of converted ultrasounds of bats received by means of the Holgate Ultrasonic Receiver were being stored by the British Library of Wildlife Sounds, 29 Exhibition Road, London S.W.7, for ready reference. DONALD GRIFFIN writes that the Holgate unit of BEATRICA ĐULIĆ, our host in Yugoslavia, was incompletely wired, with another failure in a unit used by a psychologist at Rutgers; he notes the increased use by psychologists for rat ultrasonics study, which will help to increase the commercial market and lower prices.

Instead of listing new subscribers and changes of address in this issue, I think the July issue will have an up-dated listing of bat workers for ready reference.

JOHN FARNEY's portable bat traps have been established as a very desirable research tool, especially in cave areas, but the job of supplying them at little or no profit has been a burden to him, and he indicated that he might cease in their production. Those interested might still appeal to him at the Biology Department, Kearney State College, Kearney, Nebraska 68847. Good luck, John!

The research being carried out on vampire bats by a team from the Bureau of Sport Fisheries and Wildlife with funds provided by the Agency for International Development was unfortunately given the title: "Control of Vertebrate Pests: Rats, Bats, and Noxious Birds", and this lumping of bats in general as pests infuriated many participants at the San Diego meeting. Although it is too late to get such a title changed, the incident does show how easy it is to generate an unpleasant image for all bats by such lumping in a project title.

SOME RECENT LITERATURE

Schoenfuss, G. 1971. Former identification of Eptesicus nilssoni in the territory of East Germany. Milu, 3(2):200-203.

Schönenberger, N., and R. C. Lane. 1971. Quelques données sur le cordon nerveux digital alaire des Megachiroptères (Rousettus aegyptiacus et Pteropus giganteus). Rev. Suisse Zool., 78(3):650-654.

Shaw, C. R. 1971. The extent of genetic divergence in speciation. Rapp. P-V. Reun. Cons. Per. Int. Explor. Mer., 161:143-146.

Sixl, W., M. Daniel, and V. Cerny. 1972. Ecto-parasites of Pipistrellus pipistrellus from Austria. Angewandte Parasit., 13(1):51-52.

Smithers, R. H. N. 1966. A check list and atlas of the mammals of Botswana (Africa). Trustees Nat'l. Mus. Rhodesia (Salisbury), 169 pp.

Spackman, E. W. 1972. Control of bats. Wyoming Univ. Agri. Exper. Stat. Bull., 569:1-19.

Stephens, R. J., and L. J. Cabral. 1972. The diffuse labyrinthine endotheliodichorial placenta of the free-tail bat: a light microscopic and electron microscopic study. Anat. Rec., 172(2):221-252.

Štěrba, O. 1971. Pectoral muscles in some bats. Zool. Listy, 20(4):349-356.

Štěrba, O. 1971. The organogenesis of pectoral muscles in some bats. Zool. Listy, 20(3):259-263.

Strelkov, P. P. 1971. Sedentary and migratory species of bats (Chiroptera) in the European part of the USSR. Communicantion Biul. Moskovskoe Obsch. Ispytatelei Prirody, Otd. Biol., 76(5):5-21.

Studier, E. H. 1972. Some physical properties of the wing membranes of bats. J. Mamm., 53:623-625.

Suga, N. 1972. Analysis of information bearing elements in complex sounds by auditory neurons of bats. Audiology, 11(1/2):58-72.

Thompson, R. D., G. C. Mitchell, and R. J. Burns. 1972. Vampire bat control by systemic treatment of livestock with an anticoagulant. Science, 177(4051): 806-807.

Vasil'ev, A. G. 1972. Characteristics of electrical responses by cochlear nuclei in Vespertilionidae and Rhinolophidae to ultrasonic stimuli with various fill frequencies. Neurophysiology, 3(4):282-287.

Vaughn, T. A. 1972. Mammalogy. W. B. Saunders Co., Philadelphia, viii + 463 pp.

Volobuev, V. T., and P. P. Strelkov. 1971. Identity of karyotypes in the genus Myotis (Chiroptera, Vespertilionidae). Zool. Zhur., 50(12):1892.

Walley, H. D., and W. L. Jarvis. 1971. Longevity record for Pipistrellus subflavus. Illinois Acad. Sci. Trans., 64(3):305.

Wassif, K., and G. Hadkour. 1971. The structure of the sternum and ribs in Egyptian bats (Microchiroptera). Zool. Soc. Egypt Bull., 23:39-51.

Webb, J. P., Jr., and L. B. Loomis. 1971. Trombiculid mites of the genus Microtrombicula (Acarina) from Costa Rica. Los Angeles County Mus., Contri. Sci., 207:1-15.

Weber, R. M., and F. C. Kallen. 1971. The sympathetic trunk of bats. Acta Anat., 80(2):222-234.

Whitaker, J. O., Jr. 1972. Food habits of bats from Indiana. Canadian J. Zool., 50(6):877-883.

Wilson, N., and W. W. Baker. 1972. Ticks of Georgia (Acarina: Metastigmata). Bull. Tall Timbers Res. Sta., 10:1-29.

Zapfe, H. 1970. Paleptesicus nom. nov. für "Pareptesicus" (Chiroptera) aus der miozänen Spaltenfullung von Neudorf an der March (ČSSR). Anzieger (Vienna), 107(6):93-94.

Compiled by Larry C. Watkins, Museum of Natural History, The University of Kansas, Lawrence, 66044.

Please check the envelope this came in to see if your subscription has expired.

Epomophorus wahlbergi - Pteropidae

Rousettus aegyptiacus - Pteropidae

Taphozous hildegardeae - Emballonuridae

Cardioderma cor - Megadermatidae

Hipposideros commersoni - Hipposideridae

Otomops martiensseni - Molossidae

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THE COVER

David Pye promised me in Yugoslavia that he would provide some cover materials, and the collection of photos of heads of some of the more common bats of Kenya is the result. For those of us who intend to go to the Fourth International Bat Research Conference in Kenya, Dr. Pye notes that each of the species shown can be collected readily on a short visit. Since photography has been instrumental in increasing public interest in bats, obtaining his paper on photographing bats as well as the cover photos seems most timely, especially since I hope that it may inspire photographically inclined readers to send in their comments and suggestions on the subject.

HERE AND THERE

TOM ALEY writes in his newsletter of the Ozark Underground Laboratory: "Gray bats, Myotis grisescens, banded at the Laboratory were found last winter in a hibernation colony in a cave near Mountain Home, Arkansas, by Dr. Michael Harvey, Department of Biology, Memphis State University. The U.S. Forest Service is planning to gate this cave to protect the bats from disturbance. The Forest Service is also considering some type gating on Bat Cave in Ozark County, Missouri, to keep people out of a summer colony of Myotis grisescens. Bats banded in Bat Cave were also found by Dr. Harvey in the cave near Mountain Home, Arkansas. It appears that we may develop enough interest to get a few bat caves in the Ozarks protected."

ROBERT STEBBINGS writes: "In Britain I have been pushing stuff on radio, television and the press, and an appeal has been launched and money seems to be coming in reasonably well. We have the promise of several thousand pounds for conservation work which will involve grilling caves and purchasing land"

NIXON WILSON has sent an article from Science News [103(6):87] on Soviet-American environmental protection agreement work in which the statement is made that there have been successful Soviet experiments in controlling insects without chemicals, building artificial nests for birds and bats to encourage their habitation in selected areas where they feed on insects.

A March 1973 United Press International release printed in many newspapers is entitled, "Perky's Bat Tower Is Mosquito Fight Monument", and relates the story of a Campbell-type bat tower built in the now-defunct town of Perky, Florida in 1929 by R. C. Perky. As with Campbell's towers, the bats were not attracted, and in this case, none ever utilized the tower, which is still standing in an area destined for tourist development.

Having located a single horizontal shaft mine tunnel less than an hour's drive from the University here, harboring a small winter colony of Myotis keenii and being unsuited for future mining, I had wild dreams of attempting to set up a series of graded 1" x 3" slats in the back portion, extending from front to back to allow travel along the long axis for selection of the appropriate temperature area during the hibernation period. I now find that the owner, willing to sell to me, does not own the mineral rights, which are not available. Darn!

Even when old mines are worked-out, and it is obvious that there is nothing of value available through mining at this time, shortages in the future may make currently unacceptable mining practices economically acceptable, and there goes the bat habitat. Also, when the owners of the mining rights think there might be something of value, they have the right to test for it, and that in itself may destroy the bat habitat. Back to the search again!

CHRIS MASER writes that he and STEVE CROSS are planning to write up the Bats of Oregon within the next two years, and would appreciate any bibliographic materials available.

I am personally saddened by the death of Dr. S. E. Sulkin of the University of Texas Southwestern Medical School in Dallas; at a rabies conference in Lincoln, Nebraska in 1958 he gave me materials on bat rabies to support my current work on bat rabies, and even provided some visual aids to use in a paper I was to present at the Kansas Academy of Sciences meeting coming up soon after. That is also a somewhat bittersweet memory, as the paper was the last one on the agenda, added at the last minute, and the room could not be darkened enough so that the projected materials could be seen on the screen; giving geographic incidence figures and study results from memory was no problem, but must have bored the audience to tears while a set of blurry images appeared on the screen in front of them.

SJOERD BRAAKSMA writes from The Netherlands: "In our country we are making some progress in bat protection. So it is very likely now that the new nature conservancy bill, offering legal protection to bats, will be accepted by parliament within some months. - As a result of a lecture I gave to the architects in charge of restoring churches and other old buildings that have been declared as national monuments, I have already received several letters and phone-calls about the best way to avoid damage to bats and owls present in those buildings that are to be restored."

A listing of the papers given at the September 1972 meeting of the Mammal Society of the British Isles Bat Group may be of interest in letting everyone know how is working on what, so: D. Pye - Echolocation by constant frequency, L. H. Roberts - Sound production mechanisms in bats, J. R. Baker - Blood parasites of British bats, Lord Medway - The bats of New Hebrides, A. G. Marshall - Parasites of New Hebridean bats, Cherrie Bramwell - A captive colony of Pteropus, R. Ransome - Activity of horseshoe bat colonies, R. E. Stebbings - Clines in British bats, P. A. Racey - Reproduction in noctule bats, P. Howson - Bats in North Wales' caves, V. Veal - Bat boxes, Elizabeth Cameron - Bats in Mythology and Art.

CLYDE JONES, now the head of the Bird and Mammal Laboratories of the Fish & Wildlife Service (DON WILSON has moved up to take charge of the Mammal Section) at the USNM, has had the following policy approved, and since it is of interest to those not on the B&ML mailing list and those in other countries, it is worth giving here:

1) Becasue it has been demonstrated that bat banding and corresponding activities are a major cause of disturbance to bat colonies, a moratorium has been placed on the issuing of bat bands either to new bat banders or for new banding projects. The current supplies of bat bands will be issued to investigators for use in the completion of ongoing, pertinent projects that do not involve species of bats with greatly reduced populations.

2) A detailed evaluation will be made of the files of the bat-banding program. The purposes of this review are to determine the value and relevance of

of the biological data that have been accumulated in the files, and to study the feasibility of automated techniques for storage and retrieval of data if the program is to continue.

3) Appropriate steps will be taken to explore the possibility of developing an international treaty for the protection of North American bats. Every effort will be made to establish a conservation program based on what is best for bat populations, with detailed knowledge of bat biology utilized as the basis for decisions. Necessary actions will be implemented as soon as possible with regard to this part of the program.

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SHORT NOTE

PHOTOGRAPHING BATS

The cover of this issue shows some bats from Kenya and a few notes on the photographic methods may be of some interest. The author has concentrated on facial portraits for sonar studies since the natural appearance of the head and its appendages is distorted in wet preserved specimens.

Because of parallax a single lens reflex is essential; for some years an Exacta has been used, but other flexible systems would do. The lens is 135 mm f4 mounted on bellows for most specimens, or on extension rings for the larger ones. An earlier system with a 50 mm fixed lens and close-up meniscuses gave insufficient perspective and seldom allowed enough enlargement even with 5-6 diopteres added. The bellows system is very convenient, allowing one to zoom in on a nose-leaf or out to include the full body in seconds. An automatic iris (stopping down to a preset value when the shutter is released) is essential, focusing is done at full aperture so that the final picture always has a better depth of focus and no powerful focusing lights are needed. Bats are often restless subjects and a hand-held iris is frustrating and wasteful. For the same reason electronic flash is essential, with two tubes each giving 50J, earlier equipment was described by Pye (1964) but a more portable Multiblitz has been used recently. Bats' heads are usually complex so a round-the-lens ring flash is necessary to prevent shadows. This gives an illumination that is too flat, so another tube is placed a few inches to one side as a 'modeling lamp'. This set-up used with Kodachrome II or Panatomic-X needs f16 for the majority of pictures, stopping down to f 22 for enlarged details or up to f 11 for larger subjects. The depth of field is thus conveniently increased at higher magnifications.

The bats are hand-held and the holder's elbow is guided by the photographer who frames the subject and chooses the moment of exposure. Bats often close their eyes after a while, but clicking the camera by operating the iris (but not the shutter) usually makes them open up again. A black cloth such as a changing bag forms the best background except for very dark subjects.

Literature cited:

Pye, J. D. 1964. Simple electronic stroboscope: use of two flash-tubes for multiple exposure photography.

----- David Pye, Department of Zoology, University of London King's College, Strand, London WC2R 2LS, England.

MORE HERE AND THERE

The May/June issue of Caves and Karst, published by Cave Research Associates in California, there is a note on J. SCOTT ALTENBACH's search for caves in the Grand Canyon area which have guano deposits that have not been mined. Other than Tramway Cave, where mining has been carried out, locations would be appreciated. He and MICHAEL PETIT have described their search for such guano deposits at bat meetings, they are hoping to determine baseline levels of mercury in the environment using the guano deposits as an index.

My last communication from WILLIAM OVERAL was that he was working on the population biology and behavior of the bat fly Trichobius major, found on Myotis and then would get to the material he's collected from Central America.

DONALD GRIFFIN has made a tentative suggestion I think of merit for BRN: to invite informal discussions of general problems and research strategies. One of the advantages of an informal publication of this sort is that people can "let their hair down" among interested and specialized colleagues. For example I have often thought with some concern about the long lapse between the recording of banding recoveries and their publication in some form useful to the general scientific community. This same problem is present with the results of bird banding as with bat tagging. I am especially aware of this problem from my efforts to review data on bat homing and migration for Wimsatt's book. Had I not been able to call upon my "grape vine" of scientific friends, I would not have been able to collect even the rather inadequate sample of migration data included in that chapter. I am sure that many more recoveries of banded bats have been made that would have improved the overall picture had I been able to obtain them. The difficulty seems to be that as far as the individual bander is concerned only after many years of intensive effort has he accumulated enough data to warrant publication. Even then our scientific climate of opinion is such that ordinarily only rather specialized journals of small circulation will publish this sort of information. While in theory all recoveries are on record at the various national central offices which issue bands, it is difficult, and perhaps unethical for someone to write a paper based upon these data. At the very least he should obtain the permission of the individual banders, who in many cases are hoping eventually to publish their findings themselves and naturally do not relish the thought of having such publication anticipated. I do not know the solution to this problem, and therefore feel that it is an appropriate subject for informal discussion among readers of Bat Research News.

As a former bander with returns still dribbling in now and then from the northern part of New York where I banded (my data are not yet enough to warrant publication, but may eventually, though even then in some small journal), I feel part of the problem stated here, and it would be good to be part of the solution as well. Let me make the suggestion, for whatever it may be worth: in the review of the utility of band records by the Bat Banding Office, might it be possible to contact all banders and obtain "releases" for their records for future use in the case of those who are no longer professionally interested, statements of "no release" from those still acquiring data for use, and "default releases" from those who do not respond? The latter group I find to be pretty high, and personal letters have in many cases gotten the response that the former banders are just not interested in bats ("it was fun while it lasted?") and thus their data should not be forever lost or tied up, useless. BRN may be a good place to air the views on this, and Don and Clyde may want some kind of a "straw vote" to see what might be practical. Suggestions, anyone?

RECENT LITERATURE

Altenback, J. S., and M. G. Petit. 1972. Stratification of guano deposits of the free-tailed bat, Tadarida brasiliensis. J. Mamm., 53(4):890-893.

Althaus, B. 1972. The professor is netter of bats. Missourian, p. 6, Nov. 3.

Arrighi, F. E., W. Z. Lidicker, Jr., M. Mandel, and J. Bergendahl. 1972 Heterogeneity in cesium chloride buoyant densities of chiroteran DNA. Biochem. Genetics, 6:27-30.

Bachmayer, G., and R. W. Wilson. 1970. Small mammals (insectivora, Chiroptera, Lagomorpha, Rodentia) from the Kohnfidisch Fissures of Burgenland, Austria. Ann. Naturhist. Mus. Wien, 74:533-587.

Baker, R. J., A. L. Gardner, and J. L. Patton. 1972. Chromosomal polymorphism in the phyllosotomatid bat, Mimon crenulatum. Experientia, 28:696-970.

Bisseru, B. 1972. Rabies. Wm. Heinemann Medical Books, London. 480 pp.

Blankespoor, H. D., and M. J. Ulmer. 1972. Prosthodendrium volaticum sp. nov. (Trematoda, Lecithodendriidae) from two species of Iowa bats. Proc. Helminthol. Soc. Washington, 39:224-226.

Brebbia, D. R., and E. T. Pyne. 1972 Environmental hypothermia and cerebral electrical activity of the little brown bat, Myotis lucifugus. Psychophysiology, 9:122.

Brygoo, E. R., J-P Simond, and A. M. Mayoux. 1971. Les Entérobactéries pathogènes chez Pteropus rufus (Mégachiroptère) à Madagascar. Compt. Reud. Sèance Soc. Biol. Filiales, 165(7-8):1793-1795.

Campbell, R. W. 1972. Range extension of the big brown bat on Vancouver Island, British Columbia. Murrelet, 53:12.

Capanna, E., and M. G. M. Romanini. 1971. Nuclear DNA content and morphology of the karyotype in certain Palearctic Microchiroptera. Caryologia, 24:471-482

Capel, I. D., M. R. French, P. Millburn, and R. T. Williams. 1972. The fate of carbon-14 in various species. Xenobiotica, 2:25-34.

Denys, G. A. 1972. Hoary bat impaled on barbed-wire in Lake County (Michigan). Jack-Pine Warbler, 50:63.

Christian, F. A. 1972. Acanthatrium umbraculatum sp. nov. (Digenea: Lecithodendriidae) from the little brown bat, Myotis lucifugus. J. Parasit., 58:710-711.

Clyde, R. D., and S. Senger. 1972 Notes on the bat Plecotus townsendi in western Washington. Murrelet, 53:10.

Cockrum, E. L. 1972. Bats and man. Defend. Wildl. News, 47:364-367.

Dathe, H. 1971. The sparrow hawk, Falco sparverius, as bat hunter in Cuba. Milu, 3:195-197.

Davis, D. R. 1972. Tetrapalus trinidadensis: a new genus and species of cave moth from Trinidad (Lepidoptera: Tineidae). Proc. Entomol. Soc. Washington. 74:49-59.

Deblase, A. F. 1972. Rhinolophus euryale and Rhinolophus mehelyi (Chiroptera: Rhinolophidae) in Egypt and southwest Asia. Israel J. Zool., 21:1-12.

Dhanda, V., and P. K. Rajagopaln. 1971. Ornithodoros (Reticulinasus) chiropterphila sp. nov. (Acarina: Argasidae), a new bat ectoparasite from Mysore State, India. Oriental Insects, 5:135-144.

Donaldson, A. I. 1970. Bats as possible maintenance hosts for vesicular stomatitis virus. Amer. J. Epidemiol., 92:132-136.

Dusbabek, F., and F. Lukoschus. 1971. Mites of the genera Ewingana and Ugandobia (Acarina: Myobiidae) from Surinam bats. Folia Parasitol., 18:337-345.

Dusbabek, F., and L. M. Pinchuk. 1971. New species Macronyssus barbastellinus (Parasitiformes: Gamasoidea) from a bat. Parazitologiia, 5:401-404.

Fairley, J. S., and F. L. Clark. 1972. Notes on pipistrelle bats (Pipistrellus pipistrellus, Schreber) from a colony in County Galway (Ireland). J. Irish Natural., 17:190-193.

Fassler, D. 1972. An additional record of the hoary bat in Kentucky. Trans. Kentucky Acad. Sci., 33:36.

Fedyk, S., and A. Fedyk. 1971. Karyological analysis of representatives of the genus Plecotus (Mammalia: Chiroptera). Caryologia, 24:483-492.

Feider, Z., and M. Hutu. 1971. Two new species of Nenteria from bat droppings. Zoologischer Anzeiger, 187:327-345.

Fenton, M. B., and R. L. Peterson. 1972. Further notes on Tadarida aloysiisabaundiae and Tadarida russata (Chiroptera: Molossidae) in Aftica. Canadian J. Zool., 50:19-24.

Findley, J. S. 1972. Phenetic relationships among bats of the genus Myotis. Syst. Zool., 21:31-52.

Fleming, T. H., E. T. Hooper, and D. E. Wilson. 1972. Three Central American bat communities: structure, reproductive cycles, and movement patterns. Ecology. 53:555-569.

Fornes, A. 1972. Anoura geoffroyi Gray, neuvo genero para la Republica Argentina (Chiroptera, Phyllostomatidae, Glossophaginae). Physis, 31(82):51-53.

Fujita, H. 1971. Some observations on the fine structure of thyroids of hibernating and aroused bats. Zeits. Zellfor. Mikro. Anat., 121:301-318.

Genoways, H. H., and R. J. Baker. 1972. Stenoderma rufum. Mammalian Species, No. 18, 4 pp., 4 figs., 29 November.

Giesel, J. T. 1972. Sex ratio, rate of evolution, and environmental heterogeneity. Amer. Nat., 106:380-387. (Myotis austroriparius).

Gopalakrishna, A. 1971. Uterus-blastocyst relationship in Chirotera: Part I-Topographical relationship between the uterus and blastocyst in bats. J. Zool. Soc. India, 23:55-61.

Gopalakrishna, A., and K. B. Karim. 1972. The yolk-sac gland in the Indian fruit bat, Rousettus leschenaulti (Desmaret). Current Sci., 41:639640.

Gopalakrishna, A., and M. S. Khaparde. 1972. Variable orientation of the embryonic mass during the blastocyst in the Indian false vampire bat, Megaderma lyra lyra (Geoffroy). Current Sci., 41:738.

Gottschalk, C. 1971. The decrease of the bat population in East Thuringia, East Germany. Milu, 3:160-176. (In German).

Greenhall, A. M., U. Schmidt, and W. Lopez-Forment. 1971. Attacking behavior of the vampire bat, Desmodus rotundus, under field conditions in Mexico. Biotropica, 3:136-141.

Greenwald, E. K., D. E. Longnecker, P. D. Harris, and F. N. Miller. 1972. Small artery response to hypoxia. Fed. Proc., 31:365.

Groschaft, J. and F. Tenora. 1971. Acanthatrium bisutum sp. nov. (Trematoda), a parasite of bats (Chiroptera) in Afghanistan. Folia Parasitol., 18:206.

Gutierrez, M., and N. M. G. de Burgos. 1972. The sexual cycle of male bats: changes of testicular lactate dehydrogenase isoenzymes. Comp. Phys., 43:47-52.

Haensel, J. 1971. Some aspects of the migration problem of Pipistrellus pipistrellus pipistrellus in Brandenburg, East Germany. Milu. 3:186-192.

Hasenclever, H. F. 1972. Histoplasmosis in bats. Health Lab. Sci., 9:125-132.

Henshaw, R. E. (Moderator). 1972. Cave bats: their ecology, physiology, behavior, and future survival. Bull. Nat. Speleol. Soc., 34:31-76.

Henson, O. W., Jr., and G. D. Pollack. 1972. A technique for chronic implantation of electrodes in the cochleae of bats. Phys. Behav., 8(6):1185-1187.

Henson, D. W., Jr., and M. M. Henson. 1972. Middle ear muscle contractions and their relation to pulse-evoked and echo-evoked potentials in the bat, Chilonycteris parnellii. U. S. Nat. Aero. Space Admin. Spec. Publ., 262:355-363.

Horáček, I. 1971. Über eine ungewöhnliche Art der Überwinterung der Spätfliegenden Fledermaus (Eptesicus serotinus). Lynx, 12:33-36.

Horáček, I. 1971. K výskytu netopýra brvitého. Myotis emarginatus (Geoffroy, 1806) v Čechách. Lynx, 12:37-42.

Horst, R. 1972. Bats as primary producers in an ecosystem. Bull. Nat. Speleol. Soc., 34:49-54.

Horst, R., and M. Langworthy. 1972. Rabies in a colony of vampire bats. J. Mamm., 53:903-905.

Howell D. H. 1971. Physiological mutualism in the syndrome of chiropterophily. Amer. Assoc. Advance. Sci., 1971:78.

Hsu, T. C., and K. Benirschke. 1971. Mesophylla macconnelli. An Atlas of Mammalian Chromosomes, Springer-Verlag, New York, Vol. 6, Folio 260, 2 pp.

Hsu, T. C., and K. Benirschke. 1971. Myotis macrodactylus. An Atlas of Mammalian Chromosomes, Springer-Verlag, New York, Vol. 6, Folio 263, 2 pp.

Hsu, T. C., and K. Benirschke. 1971. Natalus tumidirosteus. An Atlas of Mammalian Chromosomes, Springer-Verlag, New York, Vol. 6, Folio 259, 2 pp.

Hsu, T. C., and K. Benirschke. 1971. Uroderma bilobatum. An Atlas of Mammalian Chromosomes, Springer-Verlag, New York, Vol. 6, Folio 261, 2 pp.

Hsu, T. C., and K. Benirschke. 1971. Uroderma magnirostrum. An Atlas of Mammalian Chromosomes, Springer-Verlag, New York, Vol. 6, Folio 262, 2 pp.

Huerka, K. 1971. On the knowledge of the Nycteribiidae (Diptera) of the German Fauna Area. Acta Faunist. Entomol., 14(159):65-71.

Hurka, L. 1971. Discoveries of some interesting species of bats in West Bohemia. Vertebratol. Zprávy, 1:33-35.

Hurka, L. 1971. Zur Verbreitung und Ökologie der Fledermäuse der Gattung Plecotus (Mammalia, Chiroptera) in West Bohmen. Folia, 1:1-24.

Jones, E. K., and C. M. Clifford. 1972. The systematics of the subfamily Orinthodorinae (Acarina:Argasidae). V: A revised key to larval Argasidae of the western hemisphere and description of seven new species of Ornithodoros. Annals Entomol. Soc. Amer., 65:730-740.

Kallen, F. C., and C. Gans. 1972. Mastication in the little brown bat, Myotis lucifugus. J. Morph., 136:385-420.

Kemp, G. E., O. R. Causey, D. L. Moore, A. Odelola, and A. Fabiyi. 1972. Mokola virus: further studies on IBAN-27377, a new rabies related etiolgic agent of zoonosis in Nigeria. Amer. J. Trop. Med. Hyg., 21:356-359.

Kennedy, M. L., and T. L. Best. 1972. Flight speed of the gray bat, Myotis grisescens. Amer. Midl. Nat., 88:254-255.

Khotenovskii, I. A. 1972. Evolution of trematodes from bats. Parazitologiia, 6(1):79-82. (In Russian).

Kirk, G. 1972. So retten wir die Fledermäuse. "Wohne im eigenen Heim", No. 3, p. 13.

Koenig, C. 1971. The long-winged bat. Miniopterus schreibersi. Jahreshefte, 126:280-283. (In German).

Kuajuria, H. 1972. Courtship and mating in Rhinopoma h. hardwickei Gray (Chiroptera: Rhinopomatidae). Mammalia, 36:(2):307-309.

McManus, J. J., and D. W. Nellis. 1972. Ontogeny of wing loading in the Jamaican fruit-eating bat, Artibeus jamaicensis. J. Mamm., 53:866-868.

Maddock, T. H. 1972. A note on Eptesicus pumilus in the Flinders Ranges, South Australia. Australina Bat Res., 11:2-3.

Mayoux, A., E. R. Brygoo, and J. P. Simond. 1971. Evaluation of one year of study of Pteropus rufus in Madagascar: its role as reservoir of enterobacteria. Arch. Inst. Pasteur Madagascar, 40:29-37.

Miller, N. L., J. K. Frenkel, and J. P. Dubey. 1972. Oral infections with toxoplasma cysts and oocysts in felines, other mammals and in birds. J. Parasitol., 58:928-937.

Miric, D. 1969. New records of Myotis nattereri Kuhi (1818) in Yugoslavia. Prirodnajacki Muz., 13(24):157-160.

Mohr, C. E. 1972. The status of threatened species of cave dwelling bats. Bull. Nat. Speleol. Soc., 34:3347.

Myer, E. 1971. Ecological observations in bat hibernating quarters in the Eifel Region (Germany). Decheniana, 18:115-120. (In German).

Niort, P. L. 1970. A contribution to the survey of bats of Burundi (Central Africa). Annales Soc. Roy. Zool. Belgique, 100:247-274.

Nunez, E.A., J. P. Whalen, and L. Krook. 1972. An ultrastructural study of the natural secretory cycle of the parathyroid gland of the bat. Amer. J. Anat., 134:459-465.

O'Farrell, M. J., and B. W. Miller. 1972. Pipistelle bats attracted to vocalizing females and to a blacklight insect trap. Amer. Midl. Nat., 88:462-463.

Patten, D. R. 1971. A review of the large species of Artibeus (Chiroptera: Phyllostomatidae) from western South America. Unpubl. PH.D. Thesis, Texas A & M University, College Station, Texas.

Patten, D. R. 1971. An evaluation of two methods of measuring metacarpal length in Artibeus lituratus (Chiroptera: Phyllostomatidae). Bull. S. California Acad. Sci., 79:51-52.

Peracchi, A. L., and S. T. de Albuquerque. 1971. Some bionomic data on Dasypterus ega argentinus (Mammalia: Chiroptera: Vespertilionidae). Rev. Bras. Biol., 31:447-451.

Peterson, B. V., and A. Ross. 1972. A new species of Paratrichobius Diptera: Streblidae) from Arizona. Canadian Entomol., 104:781-784.

Peterson, R. L. 1972. Systematic status of the African molossid bats, Tadarida congica, Tadarida niangarae, and Tadarida trevori. Life Sci. Contri. Royal Ontario Mus., No. 85, 32 pp.

Piccinini, R. S. 1971. Systematic and bionomic study of the Chiroptera of the state of Ceara (Brazil). Rev. Med. Vet. (San Paulo), 7(1):39-52.

Piccinini, R. S. 1971. Contribution to the control of blood-sucking bats. Rev. Bras. Biol., 31:291-298.

Pine, R. H. 1972. The bats of the genus Carollia. Texas A & M Univ. Tech. Monogr. No. 8, 125 pp.

Poczopko, P. 1971. Metabolic levels in adult homeotherms. Acta Theriol., 16:1-21.

Poulson, T. L. 1972. Bat guano ecosystems. Bull. Nat. Speleol. Soc., 34:55-59.

Pru, E. L. P., and R. V. Mendoza-B. 1972. An unusual relationship between glial cells and neuron dendrites in olfactory bulbs of Desmodus rotundus. Brain Res., 36:(2):404-408.

Radovsky, F. J., and A. J. Beck. 1971. A new Macronyssus species on the silver-haired bat in North America. Acarologia, 13:(1):30-35.

Rakhmatulina, I. K. 1971. Reproduction., growth, and development of the dwarf bat in Azerbaidzhan. Ekologiia, 2(2):54-61. (In Russian).

Rasweiler, J. J., IV. 1972. The basal or indifferent cell and the ciliary vacuole in the oviducal epithelium of the long-tongued bat, Glossophaga soricina. J. Repr. Fert., 30(2):191-200.

Roer, H. 1971. Zur Lebensweise einiger Microchiropteren der Namibwüste (Mammalia, Chiroptera). Zool. Abhandlungen, 32(4):43-55.

Rybár, P. 1971. Wintering quarters of Myotis emarginatus (Geoffroy, 1806) in Bohemia. Vertebratol. Zprávy, 1:36-38.

Sawada, I. 1971. Helminth fauna of bats in Japan, VII, Annotat. Zool. Japonenses, 44(3):175-178.

Sawada, I. 1971. Helminth fauna of bats in Japan, IX. Nara Kyoiku Daigaku, Hokoku. Kagaku, 20:1-5.

Scheibe, K. M. 1971. Observations on the raising of a Nyctalus noctula. Milu, 3(2):192-195. (In German).

Schmidt, U., and A. M. Greenhall. 1972. Preliminary studies of the interactions between feeding vampire bats, Desmodus rotundus, under natural and laboratory conditions. Mammalia, 36(2):241-246.

Senger, C., R. Senger, D. Senger, and S. Senger. 1972. Notes on the bat Plecotus townsendi in western Washington. Murrelet, 53:10-11.

Sidky, Y. A., and J. S. Hayward. 1972. Immunosuppression by extracts of brown fat. Fed. Proc., 31:800.

Stebbings, R. E. 1971. Bat protection and the establishment of a new cave reserve in the Netherlands. Stud. Speleol., 2:103-108.

Stebbings, R. E. 1972. Do not disturb: bats asleep. Animals, 14:101-104.

Steck, F. 1972. Recent results in rabies research. Path. Microbiol., 38(1):50-63. (In German).

Stewart, D. M., O. M. Sola, and A. W. Martin. 1972. Hypertrophy as a response to denervation in skeletal muscle. Zeits. Vergle. Physiol., 76(2):146-167.

Strydom, D. J., S. J. van der Walt, and D. P. Botes. 1972. The amino acid sequence of bat (Miniopterus schreibersi) cytochrome C. Comp. Biochem., 43:21-24.

Suga, N. 1972. Neurophysiological analysis of echolocation in bats. Spec. Publ. U. S. Nat. Aero. Space Administration, 262:341-353.

Suga, N., and P. Schlegel. 1972. Neural attenuation of responses to emitted sounds in echolocating bats. Science, 177(4043):82-84.

Suga, N. and P. Schlegel. 1972. Echolocating bats: vocalization evoked by electrical stimuli, and responses of inferior collicular neurons to emitted sounds. Fed. Proc., 31:359.

Swarup, B., D. Kumar, and B. N. Sinha. 1971. The historiological structure of stomach in the bat (Rhinopoma kinneari). Indian J. Med. Res., 59(2):259-264.

Tagil'tsev, A. A. 1971. Arthropods collected from Myotis mistacinus and Myotis oxygnathus in Zaisan Hollow (USSR). Parazitologiia, 5(4):382-384.

Thomas, M. E. 1972. Preliminary study of the annual breeding patterns and population fluctuations of bats in three ecologically distinct habitats in southwestern Colombia. Unpubl. PH. D. Thesis, Tulane Univ., New Orleans, Louisiana, 168 pp.

Valdez, R. 1970. Taxonomy and geographic variation of the bats of the genus Phyllostomus. Unpubl. PH. D. Thesis, Texas A & M Univ., College Station, Texas.

Vizotto, L. D., and V. A. Taddei. 1970. New observations of bats in the northwest state of Sao Paulo (Brazil). Proc. Soc. Brasil. Prog. Cienc., 22:296-297.

Vogel, V., and W. Vogel. 1972. On the concentrating ability of two bat kidneys (Rhinopoma hardwickei and Rhinolophus ferrumequinum) with papilla of unequal length. Zeits. Vergle. Physiol., 76:358-371.

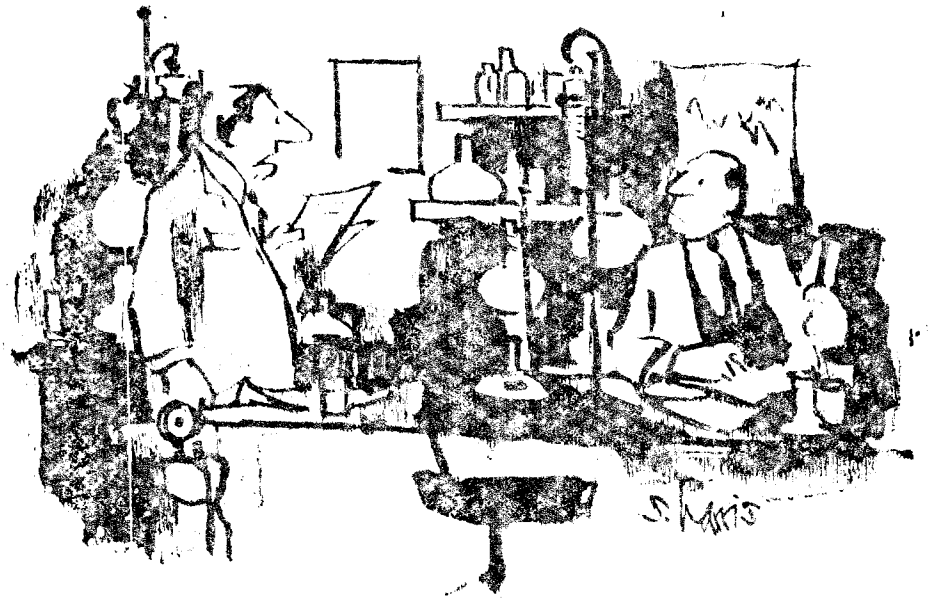
Watkins, L. C. 1972. Nycticeius humeralis. Mammalian Species, No. 23, pp. 1-4, 2 figs., 29 November.

Watkins, L. C. 1972. A technique for monitoring the nocturnal activity of bats, with comments on the activity patterns of the evening bat. Nycticeius humeralis. Trans. Kansas Acad. Sci., 74(3-4):261-268.

Watkins, L. C., J. K. Jones, Jr., and H. H. Genoways. 1972. Bats of Jalisco, Mexico. Spec. Publ. Mus. Texas Tech Univ., No. 1, 44 pp., 3 figs., 3 tables, 8 December.

Compiled by Larry C. Watkins, Museum of Natural History, The University of Kansas, Lawrence, Kansas 66044. (new address after 15 February 1973 is Larry C. Watkins, Beaversprite Sanctuary, R. D. 1, Dolgeville, New York 13329)

For those of you who have been amused by the cartoons of Sidney Harris in the American Scientist, the following cartoon is included with the permission of the editors of the American Scientist and Sidney Harris. It appeared in the September-October 1970 issue. The inclusion of such excellent cartoons in the American Scientist does not seem to have lowered its high prestige as a scientific journal, and may raise Bat Research News to new communication heights! STEVE HUMPHREY will take over BRN for two issues while I am on leave (former plans were for Yugoslavia, but most mammalogical projects there have been eliminated by reallocation of PL-480 funds, so now it appears that I will be in Paraguay if all goes well), and hopes to have the use of an offset press. The University here has promised the use of same for future issues of BRN, so we may have the advantages of greater legibility and even greater reliability in the future. We are not aspiring to journal status, as there are no referees on articles and so far only two of us do all the work (thanks for the Recent Literature coverage, Larry), but greater efficiency is most desirable. In the meantime, my thanks to Mr. Harris.



"The codeine is O.K., and the phenobarbital is O.K., but the Food and Drug Administration says no to the powdered bat's tooth."

BAT RESEARCH NEWS

Volume 14, No. 3 July 1973

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Bat Research News appears quarterly: January, April, July, and October. The subscription rate is $2.00 for two years.

THE COVER

The cover photo, like that on the book by NINA LEEN and ALVIN NOVICK, is upside down, thanks to my printer who ignored my marks on the photo; it does show the nose-leaf better, however, and since this is the most interesting part of the photograph, I forgave him and hope that those of you who are offended can turn the cover upside down to get the actual view. The photograph was taken in the Jasovská Cave, southern Slovakia, in February 1972 by JAN RYS, and was submitted on my request by JIŘÍ GAISLER. It was one of a series of beautiful bat photos displayed at the Third International Bat Research Conference at Plitvice, Yugoslavia, and I sincerely thank both Mr. Rys and Dr. Gaisler for its use here.

CHANGE IN EDITOR

Since I will be in the Chaco Region of Paraguay as part of an expedition headed by RALPH WETZEL from the end of July through to November, STEVE HUMPHREY has agreed to take over Bat Research News for the October and January issues, and possibly continue on if I cannot get more institutional support (time) to allow me to continue. This year's issues are all being sent together simply because of the time it takes to carry out the physical aspects of sending BRN to almost 500 subscribers while still answering some of the attendant mail it generates. Now that Steve has agreed to help out, the University here has made an offset press available, so there is some hope yet for more regular printing and mailing of BRN in the future. The fact that you subscribers move around so much has created many problems, as I get at least 20 address changes every month, and some of you have changed up to three times a year. The mail service has made severe problems, as up to one fourth of the mailed copies of one issue never arrived at their destination, and all had to be replaced with the attendant extra time and effort expended. TOM KUNZ has suggested that BRN might consider becoming bi-annual in order to conserve time and money, but if we can get the issues out in better time than I have so far, then we may be better off with four issues a year, with their beautiful covers, etc. All correspondence and subscription communications should be sent to Dr. Stephen R. Humphrey
Department of Natural Sciences
The Florida State Museum
University of Florida
Gainesville, Florida 32601.

HERE AND THERE

The cover photograph is of Rhinolophus ferrumequinum, for those of you who wondered.

PAT MORRIS writes from England that, "I regret to say that my most energetic work so far has been in the construction of grilles to protect bat caves..." As far as I'm concerned, this work is most important, although little noticed and little applauded by either the lay public or professional biologists. With the work on the bats of Ethiopia (with J. E. HILL) as a backdrop, I'd say he's doing

pretty well as both a professional biologist and a practical conservationist! He plans to visit the U.S.A. this summer and look at some Tadarida colonies.

HANS BERTSCH sent a newspaper clipping from the San Francisco Chronicle, an AP release, noting that a woman whose husband spent most of his free time studying the life of bats and decorating their home with stuffed bats was granted a divorce. I hope that this doesn't set a precedent.

Another Associated Press news release originating in Worcester, Massachusetts, notes that when a noted pianist performed at Worcester Polytechnic Institute, a bat accompanied him on a Beethoven sonata, but stopped chattering when he went on to Chopin. No comment.

RICHARD LAVAL writes: "I know of no cases recorded in the literature of Artibeus breeding in captivity, although I do know it has been accomplished in one or two labs, and possibly also at the Bronx Zoo. On 17 January 1973, an Artibeus jamaicensis from Puebla, Mexico, which I have had in captivity since January 1970, died due to an accidental injury. Autopsy showed that she was pregnant. This is of special interest because the only male of her species to which she had been exposed was from Barro Colorado Island, Panama. Due to the difference in physical size (owing to geographic variation), differences in climate at the respective sites of capture, and possible differences in breeding cycles, it is surprising that successful breeding occurred. It would have been most interesting to have found out if the pregnancy would have been carried to term and a baby raised by this bat, which was confined to a small cage."

CLYDE SENGER writes from Washington that the state fish and game department there is going to try to obtain funds for a non-game management program and that one of the items high on the list seems to be money for research on and the protection of bat populations, and that he may be pushed into assisting them. This is also happening in Maine, and Clyde would appreciate any information on the value of bats to man (hard data if possible) to support him. Bats are low on the priority list in Maine, so I'm not pushing here - yet. One district game biologist is already won over to bats and their value, so I have a start here. Please send any data you can provide to Clyde - address in subscriber list in this issue.

BRONISLAW WOLOSZYN will be spending some time in Cuba at the Academia de Ciencias de Cuba in Havana, then returning to a permanent position at the Polish Academy of Sciences in Krakow.

SCIENCE WORLD for March 5, 1973, had a cover of bats flying with the title, "Behold the beautiful bat!" to go with an article entitled, 'Where "Bats Is Beautiful"', on work in the Kline Laboratory at Yale University. The writer took the time to dispel a number of myths he had believed, and the article was excellent bat propaganda. The May 1973 National Geographic magazine has a nice article, "Bats Aren't All Bad", by ALVIN NOVICK with photographs by BRUCE DALE. It's a beautiful piece, but I hope that it doesn't stimulate too much exploratory interest in bat habitats.

The article by Novick reminded me of the last American Society of Mammalogists' meeting in Mexico City when my students and I stayed at the Apartment Hotel Pennsylvania and catered to the needs of three female Antrozous pallidus we had collected in Chihuahua and were now having to be midwives to. The births took place easily, and we wondered how many other mammalogists were carrying out undercover operations of that sort.

A former student of mine, WIN FORD, has two Pteropus vampyrus from India under his care, after clearing them through the appropriate agencies. They are certainly under strict control in this country, with good reason.

TOM ALEY in his Ozark Underground Laboratory newsletternotes that Missouri has enacted a state rare and endangered species act to be administered by the Missouri Department of Conservation. Myotis sodalis (also on the national list), Myotis grisescens, and Myotis keenii are included, which puts them ahead of the federal government in inclusion of new bat species. Since it is up to the states to carry out enforcement and protection, this is an excellent start. President Nixon's nationwide radio address on 14 February 1973 stated that while the Federal Government will play an active, positive role in problems of the environment, exercising leadership and providing financial support, he expected the state and local governments and the private sector to play the central role. In case you hadn't thought about it, YOU and I and all the chiroptologists are the "private sector" in this case, and it is up to us to push and pull the lower levels of government along this path.

The National Geographic Special, "Strange Creatures of the Night" was shown on television last January, and it was an excellent job. The shots of Noctilio fishing were especially pleasing to me, and I was also pleased to hear Mitchell and Burns on the vampire control project stress that the project's aim was not to exterminate the species, but to control to the wild condition only, and the final shot of one of Art Greenhall's vampire bats happily slaking its thirst had the comment made that it was only carrying out its role in nature, in spite of its gory appearance. Not that I'm a vampire bat lover (one once almost set me on my posterior in a road culvert in Mexico when it flew directly at me when I tried to drive it into a net at the end of the culvert), but it is good to see them placed in the proper perspective instead of the usual horrifying legendary role assigned them. As long as it's not my cattle they're feeding on, it makes it easy to be rational, too.

In a paper, "Scanning electron microscopy: low-magnification pictures of uncoated zoological specimens", by H. F. Howden and L. E. C. Ling, Science 179, 26 January 1973, pages 386-388, there is a beautiful photo of a bat skull by their method. It is from a Glauconycteris argentata, identified by DON SMITH.

DONNA HOWELL (see subscriber list for address) has the following request: She would like to trade live Carollia perspicillata or Phyllostomus hastatus for Myotis of any species except M. lucifugus and M. velifer or for Tadarida or Molossus or Lasiurus. She will trade bat-for-bat for Carollia and two-for-one for Phyllostomus. She may be called at 609-452-5292.

HEIDI HUGHES, Specialist in Environmental Education, Girl Scouts of the U.S.A., 830 Third Avenue, New York, New York 10022, writes: "The Program Department of the Girl Scouts of the U.S.A. is in the process of developing a Wildlife Values Project. There is a possibility that some of the monies allocated to this project may go towards the development of a Wildlife Center at the Delaware Water Gap in northwestern New Jersey. I would like to include the story of bats in our wildlife project..... Could you direct me to any bat banders in the New York, New Jersey, Connecticut, Pennsylvania, Delaware area?" I hope that someone in one of those areas will follow this up, as it is an excellent opportunity for properly oriented bat education.

Written on a city wall: "Dracula had an overbite." No comment.

Observations of Bats 1,000 Meters Below Ground Level

Bats have been observed flying at levels 1000 meters below ground level in the zinc mines of the St. Joe Minerals Corporation, at Edwards in northern New York. The mine consists of several vertical shafts and an inclined (about 30^{o}) shaft with horizontal galleries at intervals of 32 meters. Ground level at the mine entrance is 234 meters above sea level. C. M. Grout has made twice weekly observations from the 160 meter to the 1030 meter levels for the past 10 years; for the last 5 years he has noted the levels at which the bats were observed.

Table I presents the average numbers of bats found at all observed levels. During the summer months a relatively small number of bats use the mine as a summer roost and a few individuals have been seen as low as 310 meters below ground level. As is common in the northeastern United States, the mine is used as a winter roost for hibernation by about 1000 Myotis lucifugus, with a few bats roosting at levels below 360 meters. Bats, however, are seen flying at lower levels in the winter. Bats have been observed flying at all levels in the mine. One bat was seen in the deepest gallery at the 1160 meter level which had been excavated in 1971. To our knowledge this is the greatest depth at which bats have been seen in mines or caves. Conditions at these lower levels vary considerably from those at the surface, especially with regard to temperature. There is a very gradual warming down to the 1030 meter level, and then a sudden increase in temperature below this, due to reduced air circulation. These temperatures are given in Table I. Relative humidity is virtually constant at 90-100 percent throughout the mine.

The reasons for bats flying at the lower levels are not clear. The simplest explanation would be that the animals had spontaneously aroused from hibernation in the upper levels of the mines and lost their way. The mine, however, is not devoid of animal life. Men working any distance below the surface often leave scraps of food and fruit peels from their meals. These scraps provide sufficient

Table I

Level Depth below the surface	Approximate number of bats seen per year		Average temperature
Meters	R-Roosting F-Flying		°C
	Dec.-Feb.	June-Aug.	
160-300	ca. 1000 (R)	10-20 (R) ca. 50 (F)	5°
300-330	ca. 100 (R) 2-3 (F)	1-5 (R) 10 (F)	10°
330-500	2-3 (R) 2-3 (F)	1-2 (F)	12°
500-1030	1-3 (F)	0	13°
1160 (see text)	1 (F)	0	24°

material to support a small population of fruit flies. Thus, it is possible that the lower levels of the mines might represent a limited food source for some bats.

----- C. M. Grout, St. Joe Minerals Corp., Balmat, New York 13609 and T. C. Williams, State University of New York at Buffalo, Buffalo, New York 14200.

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

MORE HERE AND THERE

Anyone wishing to use bat specimen data from the collection of the National Museum of Natural History, Smithsonian Institution (the correct designation for what used to be called the U.S. National Museum, with the abbreviation reference USNM still used for stability) can be pleasantly surprised on asking what is available. CLYDE JONES has organized the North American bat collection so that not only are they all uniformly tagged with Flexowriter printing, but the data are now stored for ready retrieval. With the number of specimens from the old Biological Survey, the regular collection, and new arrivals, the collection would be a major challenge in logistics, but the new system reduces the task to simplicity itself. To say it is fantastic is to make a gross understatement, and if Clyde had no other accomplishments in life other than this, he'd have rated a place in bat heaven! If this system can be expanded to the entire mammal collection, which it is adapted to do, then museum work of the future will be more efficient with all the searching for data one now gets lost in.

CLYDE JONES has moved up to Director of the Bird and Mammal Laboratories, and DON WILSON up to head the Mammal Section. With all the trivia they have to put up with ("Dear Sirs: Please send all the information you have on bats for my school project which was due yesterday, with color pictures if possible."), including visiting firemen, it constantly amazes me at the research output of B&ML people. A well-deserved promotion to both Clyde and Don.

There were hopes that the Bat Banding Office could somehow take Bat Research News into an affiliation, but changing priorities have eliminated this as a possibility. While such an affiliation might have generated more institutional support for BRN, the red tape of having an informal newsletter might well defeat the purposes of the Bat Banding Office, if that office survives as an entity, and might require more strict controls on BRN. Any suggestions as to how BRN can best be supported (the financial situation is O.K., but trying to prove its value to the institution supporting its editor, whether myself or Steve or someone else, does constitute a problem, as time is needed to keep it going, especially now that the international coverage is growing and the subscriber list grows, too.) are always welcome. It might be better as a group project instead of a one-man operation here and one-man literature search there.

The March 1973 SCIENCE DIGEST has an article on vampire bats and the AID control project. Entitled "Vampire bat: Rabies on wings of night", it has a number of interesting anecdotes (pages 16-21).

STEVE HUMPHREY reports on responses to the resolutions approved at the San Diego bat symposium:

Resolution on Bat Disturbance by Biologists: Neither Bat Research News nor the American Society of Mammalogists has had time to respond vie publication. Presumably both media will welcome this self-policing effort with ample coverage.

Resolution on Bat Disturbance by Speleologists: This resolution has been considered by the National Speleological Society's Committee on Conservation and passed on to the Bat Conservation Task Force and the NSS News, the Society's monthly publication. During 1972 the NSS Board of Governors passed a far-reaching detailed, and well-considered resolution on bat conservation. Currently the Bat Conservation Task Force is preparing an article for the NSS News to present detailed recommendations to cavers.

Resolution on BSF&W DWS Responsibility for Pest Bat Exclusion: The Division of Wildlife Services is not engaged in any operational bat control work and already recommends exclusion over extermination for alleviating bat problems. DWS forwarded a copy of the resolution to the Extension Services, Department of Agriculture, for their information. The respondent pointed out that no chemicals may now be used for extermination because only DDT is registered by the Environmental Protection Agency for bat control, and its use for this purpose was halted in 1970. Comment by SRH: DO BRN readers know of recent cases of chemical extermination of bats? Presumably these are violations of Federal law and complaints on well-documented instances could be prosecuted.

Resolution on BSF&W Porgram for Bat Research and Protection: Response on this issue resulted from the same factors prompting formulation of the resolution. As a result, new policies of the Bureau of Sport Fisheries and Wildlife were announced almost simultaneously with passage of the resolution. Briefly, the policies are a moratorium in issuance of bands to new banders or for new projects, review of the value of the data accumulated by the bat banding program, and exploration of the possibility of an international treaty for the protection of North American bats.

Resolution on Refuge Strips in Managed Forests: A response was received from the U.S. Forest Service, American Forestry Institute, American Forestry Association, Southern Forest Institute, and Western Wood Products Association. No response has arrived from the Forest Industries Council, National Council of Forestry Association Executives, and Society of American Foresters. That some of these associations quickly disseminated information to their member industries is evident from responses received from two timber companies, Georgia-Pacific and Westvaco. A summary of the responses follows:

1. Forest managers will not adopt any practice that completely destroys profit (and reason for being). On the other hand, many forest managers recognize a responsibility to maintain the multiple values of forest resources and are willing to institute more broadly beneficial management practices that are reasonably compatible with their own purposes For this to happen, the manager needs to be convinced that the resource is an important one and that a need for improved management exists. (Ed. note: the systematic destruction and removal of the Osage Orange hedgerows currently taking place in Kansas provides a good example of this problem. Long considered an excellent wildlife cover, and an excellent windbreak to control wind erosion, the hedgerows take the land which could be used for crops and take moisture from crops planted too close to the hedge. If a farmer is getting from 80 to 140 bushels of corn per acre and the hedge takes up strips of land totalling even a few acres, then one can see why it would appear good economics to remove the hedge; to save the hedgerows for wildlife cover one has to come up with proof that their wildlife value is high enough to offset the loss of cropland. RLM)

2. Response on the importance of the bat resource ranged from not knowing that bats roost in trees to the candid statement that, at least on the basis of present knowledge, preservation of bat roosts alone probably could not justify the expense of changing management practices. Fortunately, considerable pressure exists to preserve riparian forests to protect forest wildlife and stream fish and water quality. Forest managers are happy to include bat protection as one more reason to be considered in determining their land use plans. Some progress has been made in response to the general importance of riparian forest. Guidelines for protection of streamside vegetation or implementation of such plans have been undertaken by some timber companies and most of the Forest Service's nine regional administrations. This trend is expected to continue.

3. Foresters are very interested in the possibility that bats might help them in their efforts to control forest insect pests. Demonstration of such a role would greatly increase their perception of the importance of bats as a forest resource.

4. Once a forester has decided to account for bat protection in his management plans, he needs to know detailed habitat requirements of each species involved. These would be included in a pool of information about other wildlife, fish, and water quality concerns, and a coordinated management plan would be developed to attempt to deal with the multiple needs in a way that can be carried out practically. An approved plan would be disseminated in the form of guidelines to be implemented by field personnel. This means that interested biologists can help by providing the needed data. Needed are sound

natural history and habitat description data on important species in the kind of forest relevant to the individual company operation. With such data in hand, regional discussions of possible solutions could be undertaken.

5. The American Forestry Association sent our resolution to the editor of American Forests.

6. One respondent wanted to know why bat biologists did not put letters on letterhead stationery upside down.

Resolution on Inclusion of Bat Roost Destruction in Impact Statements: The U.S. Army Corps of Engineers has not responded. Comment by SRH: I expect to be able to report more information about this at a later date.

Many thanks to Steve for the above summary on the resolutions. I frankly had not expected such a relatively favorable response.

In a letter to ART GREENHALL, the Maryland Department of Natural Resources Wildlife Administration indicates that they have asked for a non-game specialist in their 1974 budget request who presumably would be involved with such programs as bat protection. WAYNE SANDFORT, Chief of Wildlife Management in the Colorado Division of Wildlife sent a nine-page questionnaire to the 50 State wildlife agencies and to other groups to at least attempt to standardize the definition of what "wildlife" really consists. In order for the states to carry out any kind of program of research and protection of bats, bats themselves must be somehow included in their jurisdiction by definition, as I noted in a paper presented to the Yugoslavian bat conference. The trend for states to seek non-game personnel is a hopeful sign that bats may be incorporated into the states' research and protection programs. Although there is no standardized definition at this time, most states are interested in expanding the definition to encompass non-game species, except in those states where they feel so overloaded that any additional coverage scares them.

The May 1973 NSS News has a note included by Bobbi Nagy, Chairwoman of the Germany Valley Karst Area Task Force of the NSS. Entitled "Respect the Bats", it brings to the attention of potential users of Hellhole Cave the grave problem of bat disturbance during the hibernating season. She has done a very effective job in protecting Hellhole Cave from the blasting operations, having mustered about 200 protests (Ed. note: thanks to her alert through Rob Stitt, I sent off my official protest as part of this pile, and thank her and Rob for the timely alert) to the state, which resulted in an on-site investigation. Those who can provide data on Myotis sodalis, Plecotus townsendii, and even Myotis lucifugus as possibly related to West Virginia and Hellhole Cave are urged to write to: Bobbi Nagy, The Germany Valley Karst Area Task Force of the NSS, Star Route #5, Franklin, West Virginia 26807.

Of the BRN issues I have produced since October 1970, I have spares of the following, all the other issues being depleted completely: 35 copies Vol. 12, No. 3; 32 copies Vol. 13, No. 1; 71 copies Vol. 13, No. 3; and 84 copies Vol. 14, No. 2. On a first come, first served basis, I will send these out to those requesting copies and providing a quarter (25¢) to cover postage and envelope, AFTER November. Since I will be gone until then, don't expect a response before then. Earlier BRN issues are not available, unfortunately. The demand has been too great, having more than doubled since I took on the job, and all other back issues are gone.

On the lighter side, there is a wealth of good propaganda for bats in the lay literature, as follows: A children's book by John Kaufmann, "Bats in the Dark", tells young readers about different kinds of bats and their habitats, and is published by Thomas Y. Crowell Company, 666 Fifth Avenue, New York, N.Y. 10019, and sells for $3.75. Another, by John Stewart, "Secret of the Bats: The Exploration of Carlsbad Caverns", is published by The Westminster Press, Witherspoon Building, Philadelphia, Pennsylvania 19107, and sells for $4.75. A Prentice-Hall book, "Mousekin's Woodland Sleepers", by Edna Miller, includes bats hibernating in a tree (no indication of a reference source on that situation, either!). Theodore Roethke (1908-1963) wrote a poem, "The Bat", included in a book, "The Collected Poems of Theodore Roethke", 1966, Doubleday & Co., Inc., Garden City, which is not one I care for (I have long been hung up on Ogden Nash's poem about the bat, anyway). For those who like the poetry of Sylvia Plath, her second posthumous book, "Crossing the Water", Harper & Row, New York, 1971, 56 pp., has in it one entitled, "Zoo Keeper's Wife" with the lines: "You wooed me with the wolf-headed fruit bats, Hanging from their scorched hooks in the moist, Fug of the Small Mammal House." "America Begins", a 1971 paperback edition edited by Richard M. Dorson and published by Indiana University Press, has a selection by John Lawson from his 1709 "A New Voyage to Carolina" which was published in London; "The Bat", which notes how one may break a child's habit of eating dirt by roasting and skinning a bat and feeding it to the child. (Aside from the role of eating bats as a cure, parasitologists may wonder if this dirt eating in that area might not have been a sign of nematode parasites in the children....). I have often wondered what ever happened to the unfinished work, "Why Bats Are", which Robert Lawson was working on at the time of his death in 1957; he was one of the great illustrators in this century, and even if the readers of BRN are not acquainted with children's literature, Lawson's "Rabbit Hill" may spring to memory, or "Ben and Me".

The Summer 1973 Horizon has an article by Gilbert Highet, "Go and Catch a Falling Remark" which includes a comment on people of strange appearance, such as Dr. Falke in Die Fledermaus who walked home from a ball in daylight dressed as a gigantic bat, delighting all the street urchins. This was rather appropriate, with the recent television special on "The Strauss Family", although Die Fledermaus was not performed in the show.

For those with a droll sense of humor, the piece entitled simply, "Bats" in the book by Barbara Ninde Byfield, "The Glass Harmonica", is quite whimsical.

Bats are defended in "Animals Nobody Loves", by Ronald Rood, a Bantam Book paperback of 1971, priced at 75¢, and covered in the book, "Creatures of the Night", edited by Roger Caras, 1972, selling at $3.95.

With regard to the African bat books by MICHEL ANCIAUX DE FAVEAUX noted on page 63 of the 1972 BRN, he is now accepting orders directed to him, as follows: Dr. Michel ANCIAUX de FAVEAUX, Institut des Sciences Biologiques, Centre Hospitalier Universitaire, CONSTANTINE, Algeria. Payment ($20 for the 2 volumes of biogeography and annual cycles, and $10 for the volume on bat parasitology) should be made to: account no. 603-4256619 - 12of Michel ANCIAUX de FAVEAUX, Banque Belgolaise, Cantersteen 1, B - 1000 BRUXELLES, Belgium.

Anyone having any suggestions as to how a work on Bats in Mythology and Art could be published in this country, please contact PAUL RACEY, as Mrs. Cameron's work seems to have delighted many in England. It would be a service to bats, too.

My last letter from S. WAYNE SPELLER of the Canadian Wildlife Service, in the Yukon Territory, states: "To be honest with you, I never thought too much about working with Yukon bats as this is the edge of their range and populations are low. However, I have recently found out that populations occur in Dawson City, Keno, Mayo and along the Haines Road. Your letter has stirred my interest and I will endeavor to investigate these locations prior to freeze-up. I am mostly interested in the interior populations and their adaptations to the long, cold winters and continuous light conditions in summer when they would be vulnerable to predation or harassment by birds."

For those of you who are interested in monthly literature searches in the world bat literature, at $5 per month, contact the Biological Information Service, 3050 West 7th Street (Wilshire Center), Los Angeles, California 90005. In case you wonder, these "advertisements" are provided for the possible benefit of the reader, not as a personal service to those advertising, and not for profit (no, Bacardi did not send me a case of 151 proof for sending you the booklet on the trade mark bat of Bacardi!). I'm quite happy to include any notice which might be of use to bat research workers, and provide equal time for all.

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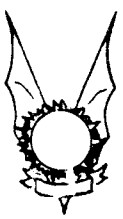
If your name or address is not correct or as you wish it to appear, please write as soon as possible to Steve Humphrey. If you write to me about it, the change will not appear until the April issue of 1974! Since the purpose of BRN is to provide an informal means of international communication regarding bat research, suggestions and ideas are always welcome. If you know of someone engaged in bat research, provide that person with information as to how BRN may be obtained, as the more comprehensive the coverage of bat workers, the better and more useful BRN can become. Best regards from your current editor! RLM

From the selection of National Speleological Society grotto publications, the bat is represented from the specific to the abstract in the mastheads below, and this points out how closely associated the bats are to the source of pleasure to speleologists, the caves themselves. May the bats not be destroyed by those who most enjoy them - all of us.

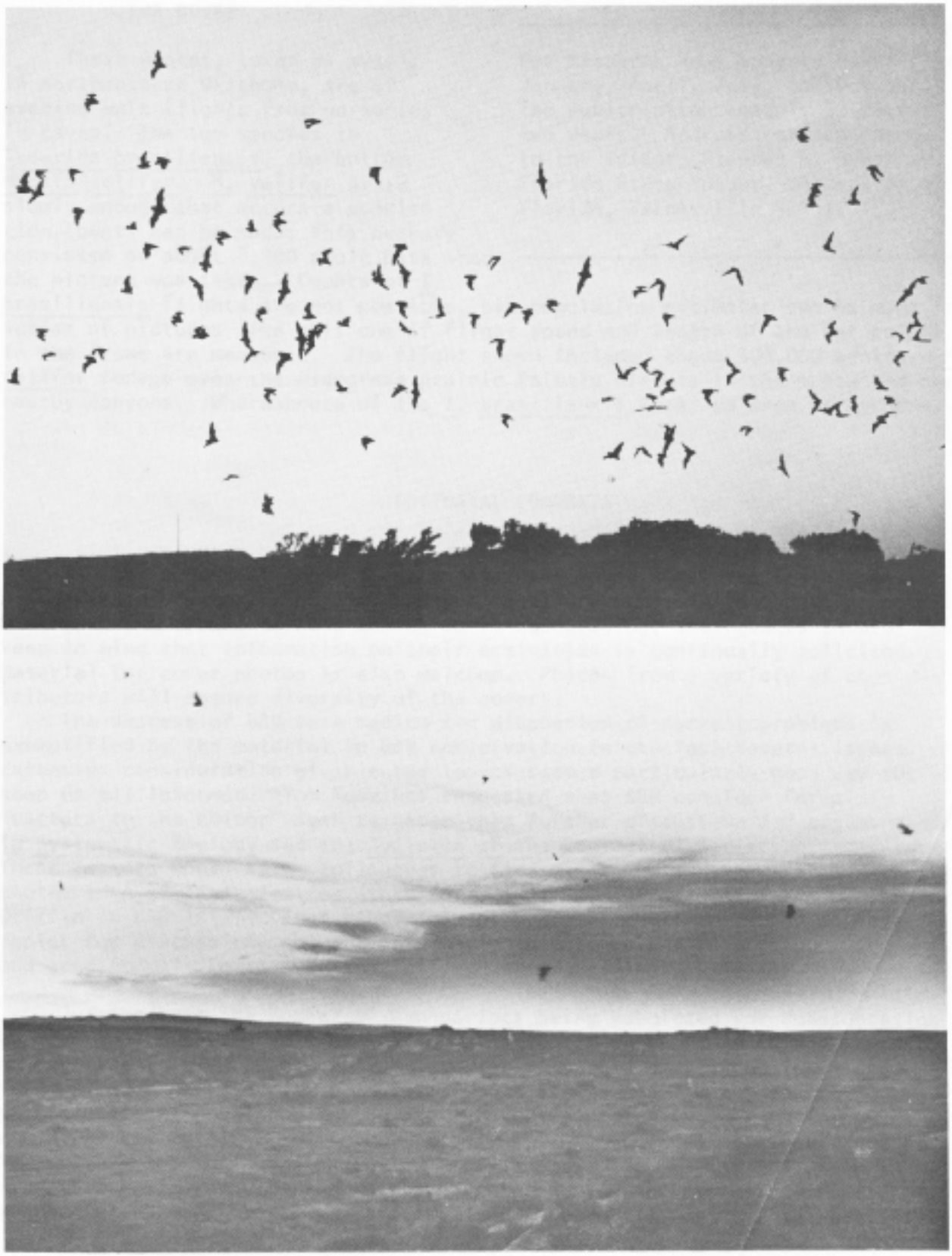
THE POTOMAC CAVER



CHOUTEAU GROTTO

BAT RESEARCH NEWS

Volume 14, No. 4 October 1973



BAT RESEARCH NEWS

Volume 14, No. 4 October 1973

THE COVER

Bat Research News appears quarterly: January, April, July, and October. The subscription rate is $2.00 for two years. Address correspondence to the Editor, Stephen R. Humphrey, Florida State Museum, University of Florida, Gainesville 32611.

These photos, taken by myself in northwestern Oklahoma, are of evening exit flights from nurseries in caves. The top species is Tadarida brasiliensis, the bottom Myotis velifer. M. velifer exits slowly enough that accurate population counts can be made; this nursery consisted of about 4,200 adult bats when the picture was taken. Counts of T. brasiliensis flights are not possible, but population estimates can be made from series of pictures like this one if flight speed and length of the bat column in the frame are measured. The flight shown included about 500,000 adults. M. velifer forage over the mid-grass prairie faintly visible in the photo and over nearby canyons. Whereabouts of the T. brasiliensis foraging area is unknown.

EDITORIAL COMMENTS

BRN has served at least three major functions: dissemination of news, discussion of current problems, and publication of scientific papers on bat biology. The amount of news coming in is encouraging, and readers should keep in mind that information on their activities is continually solicited. Material for cover photos is also welcome. Photos from a variety of contributors will ensure diversity of the covers.

The success of BRN as a medium for discussion of current problems is exemplified by the material on bat conservation in the last several issues. Extensive consideration of selected topics seem a particularly good way to keep us all informed. Tom Kunz has suggested that BRN consider formal "Letters to the Editor" such as those that further discussion and argument in Systematic Zoology and the Bulletin of the Ecological Society of America. These letters would allow colleagues to fire questions and answers at one another. A similar plea for (less formal) discussion was given by Donald Griffin in BRN 14(2). To further this approach, readers could suggest topics for discussion, comment informally on discussions already published, and send formal "Letters to the Editor," so identified.

Judging from the number of manuscripts being submitted for consideration by BRN, an increasing role of publishing scientific papers is ahead. This is no surprise in view of the volume of material turned away by national and regional journals faced with increased submissions and limited space. At present, papers published in BRN are rigorously edited but not reviewed. I would welcome opinions, either by letter or at the Bat Research Conference in New Orleans, as to whether a review process should be instituted. Keep in mind that reviewing will increase the cost and slow the process of handling manuscripts. Now manuscripts are published one to six months after receipt.

Also keep in mind that large numbers of accepted manuscripts will increase the size and thus the cost of BRN.

Contributors should observe the following guidelines to facilitate handling of their manuscripts. Send two copies, typed and double-spaced. For questions of style follow the CBE Style Manual, third edition, (AIBS), or approximately the style used in the Journal of Mammalogy. For format see examples in this issue. At present photographs accompanying manuscripts can be considered only as cover photos, so they should be of general interest independent of the ms. (When we can be sure of using an offset press for every issue, this restriction on photographs can be dropped.)

As indicated in BRN 14(3), back issues are available from Robert L. Martin, Department of Biology, University of Maine, Farmington, Maine 04938, after November. Requests that I have received will be deferred until then. Of course, inquiries about current issues that fail to arrive should be directed to me.

NEWS

WAYNE H. DAVIS invites anyone to use his data on recoveries of banded bats. He has banded well over a hundred thousand. "There are probably some unpublished records of interest although I have made a policy of noting interesting recoveries in BRN."

ALBERT O. BUSH, a graduate student now at the University of Alberta and I spent two months in southeastern Arizona studying predator-prey and space relationships of bat and insect communities in desert-to-montane habitats. We were surprised that few bats were present at the swimming pool at the Southwestern Research Station when many bats occurred at other sites. This is a famous netting spot and has been a favorite for collecting, worked nearly annually since at least 1958. Regular collecting may explain the small number present now.

On our way back toward Florida, we stopped at Carlsbad Cavern to see the freetail flight and collect some guano. The flight was disappointingly small, far below the 2 to 4.5 million adults that used to live in this cave. Immediately after the flight we were surprised to be greeted by KEN GELUSO. Ken is working with SCOTT ALTENBACH and DON WILSON, in cooperation with the National Park Service, to determine the magnitude and causes of the freetail decline. They are emphasizing Carlsbad but also studying other nurseries in the southwest. They are taking demographic data, coring guano to estimate past numbers, and monitoring levels of insecticides and heavy metals in bats that fall from the roosts. A laboratory study is planned to look for pollutant-induced loss of neuromotor coordination. They also hope to examine possible sub-lethal effects of pesticides such as decreasing ability to concentrate urine.

D. J. KEEGAN of the Department of General Physiology, University of the Witwatersrand, Johannesburg, South Africa, wrote to inquire about BRN. He is involved in research on absorption of sugars by Rousettas aegypticus.

DENNIS C. TURNER reports progress on his dissertation on vampire bat ecology. His new address is Zoology Institute, University of Zurich, Switzerland.

JAMES B. COPE, ANDREAS RICHTER, DICK MILLS, and GREGG GODSEY spent the summer studying natural history of Myotis sodalis. Last year they discovered a site where this species could be mist netted commonly, an unusual find for this endangered species. Preliminary data document phenology and activity patterns. Aside from gathering data, they have spent much time this summer perfecting sampling techniques. Cope hopes next year to find the dayroost used by these sodalis and to study food habits.

TIM DOOLEY, a new subscriber, is a graduate student at the University of Texas at El Paso. He is working with bats in El Paso County and is particularly interested in Myotis.

JOHN F. PARRISH III recently participated in a collecting trip led by Dr. W. W. Dalquest. The trip was to Aguascalientes with side excursions to San Blas, Nayarit, and San Luis Potosi. Bats caught included nine genera and eleven species. John also reports progress on his thesis on the bats of Val Verde Co., Texas.

THOMAS H. KUNZ and several students have been netting bats and taking data with ultrasonic sensors and temperature recorders near a Myotis lucifugus colony in New Hampshire.

Components of the automatic ultrasonic sensing system developed for monitoring bat activity by M. BROCK FENTON and others may be available by special arrangement. Characteristics and use of this system have been described in Can. J. Zool. 51:291-299. Inquiries or orders can be addressed to Mr. A. A. Raffler, Science Workshop, Carleton University, Ottawa K1S 5B6, Ontario. Brock notes the cost of the receiver-discriminator system as $ 303 CAN and the cost per unit of the sensors as $ 35 CAN. The receiver-discriminator operates four sensors, in conjunction with a 4-channel event recorder.

Another source of ultrasonic sensors is Techsonics, Inc., Santa Fe Road, Taos, New Mexico 87571. Several models are available. They perform well in the field (my observation) but are expensive ($ 174.50 for model 100).

While in Panama in January, BERNICE TANNENBAUM showed me a very good idea for mist net poles. She uses two-piece telescoping tent poles, available in camping stores or good hardware or sporting goods stores. These poles are aluminum, pointed on one end (to fit in tent grommets), and transport easily when telescoped. For those who cannot find these poles locally, they are available by mail from Diamond Brand Camping Center, Highway 25, Naples, North Carolina 28760, for $ 2.95 each (early 1973). They also have tent-material bags for carrying 20 or so poles, for $ 2.00. For use on hard ground where poles are tied to stakes (not simply stuck into the ground) the poles should be at least 4.5 feet long telescoped. For use in soft ground, ask for poles 5 or 5.5 feet long.

Readers wishing to look into rechargable electric headlamps can obtain information from Mine Safety Appliances Co., 400 Penn Center Blvd., Pittsburgh, Pa. 15235. Cost for one ML-1 lamp and battery, a single unit charger, and a helmet is roughly $ 75. One person working in the field for 30 nights will spend that much for dry cell batteries, so these offer a long-term economy as well as convenience.

G. CLAY MITCHELL reports that the U.S. Fish and Wildlife Service vampire

research station is phasing out of Mexico and will be transferred to Brazil next year. There personnel will help the government of Brazil plan and implement a control program for vampire bats.

EDITH BRAGG sent a newspaper clipping (Idaho State Journal, 17 April 1973) about a trip by 50 Pocatello, Idaho, school children to go through a cave housing long-eared and little brown bats. This trip was organized by the local Community Education Program. The plan failed when one school bus became stuck on a muddy road. That was good for the bats, if the newspaper's quote is correct: "The bats were left for another day which was a great disappointment to some boys who said they wanted to douse bats in gasoline, just so they could see how they'd fly through fire." More trips are planned. The director of this program is Lucy Trost, and the trips are funded by the federal government, the city of Pocatello, the Citizens' Environmental Council, and individuals.

A similar program was established last year by the Alachua County (Florida) School Board. Before the program was implemented, involved school officials and teachers consulted with the Florida State Museum and Florida Speleological Society. This resulted in a decision to proceed by using a single cave, one not inhabited by bats or unusual populations of invertebrates, with strict observance of safety and conservation measures. This program may ultimately do as much good as harm, because the discussion among community members has led to serious concern for conservation in the participating school classes.

EVERETT M. GRIGSBY reports that several of the caves used as nurseries by Myotis grisescens in northeastern Oklahoma have been gated by members of the National Speleological Society. "Most of the gatings have been designed so that the Myotis grisescens are still using them successfully."

A Conservation Alert from the NSS Committee on Conservation dated 6 May 1973 states that a bill (P. del S. 385) before the senate of Puerto Rico proposes the development of the Aguas Buenas caves for tourism and recreation. Apparently many bats live there. One section of the bill would appropriate funds for "the eradication of bats, rats, or any other elements of the fauna and flora of these caves which may endanger the public health." Can any readers provide information about the bats there or the current status of this legislation?

RALPH RASCHIG sent a newspaper article about an artificial bat roost he is building in Wisconsin. The structure is patterned after the "bat towers" built in Texas and Florida by Charles Campbell during the 1920's. However, Raschig's roost is much smaller and therefore proportionately less expensive. He plans to finish building this fall and introduce bats no later than next spring. Ralph welcomes visitors (and donations). We will follow progress of this venture with interest.

In connection with discussion of bat control in BRN 14, Dr. C. D. MAMPE, Director of Technical Services, National Pest Control Association, Inc., sends the following:

"On page 3 of issue No. 1, NPCA's proposal for publishing a list of "Bat Experts" was issued. To date, I have received no response." (ED. NOTE: Because BOB MARTIN asked volunteers to write to him, his extended field trip may have complicated matters.)

"On page 28 of issue No. 3, a statement is made to the effect that there are no methods for exterminating bats. The USDA still uses Home and Garden

Bulletin No. 96, which says for bats "Fumigation may be necessary."

"Labels for most fumigants are so broad that the use of these materials for controlling bats in structures would be within the EPA registered label. Therefore, there are laws for exterminating bats. However, with the absence of DDT, there is no practical means. (ED. NOTE: In the rabies epizootic discussed below, special permission to use DDT to exterminate local bat colonies was obtained from the U.S. Environmental Protection Agency, as provided under federal regulations pertaining to persistent pesticides.)

"I would hope that our Association could continue to work with Bat Research workers to develop practical solutions to these problems while minimizing the effects on the bat population."

The Department of Conservation of Illinois is working to extend the state's new endangered species act to non-game vertebrates. A Non-Game Staff Biologist, VERNON M. KLEEN, has been hired to take this responsibility. He is particularly interested in information on the abundance and distribution of Myotis sodalis but also would welcome such information on other bats. His address is Division of Wildlife Resources, Department of Conservation, 601 State Office Bldg., Springfield, Illinois 62706.

ADAM KRZANOWSKI has finished the "Bibliography of Bats, 1958-1967," comprising 506 typewritten pages. He expressed curiosity about the Pteropus vampyrus from India noted in BRN 14:25, because Ellerman and Morrison-Scott (1951; Checklist of Palearctic and Indian mammals, 1758-1946) thought its nearest occurrence to be Tenasserim (p. 96-97). "While several bat species have been added to Indian fauna in recent years it is difficult to believe that such a gigantic species could have escaped the notice of naturalists for many years." Regarding breeding Artibeus in captivity (BRN 14:24), he reminds us of a paper entitled "Successful breeding in captive Artibeus," J. Mamm. 41:508-509.

LETTER TO THE EDITOR

A proposed Army Corps of Engineers' Dam on the Meramec River in east-central Missouri will adversely affect over 100 caves. A number of these caves will be permanently inundated if this dam is ever constructed. Several of the caves to be flooded by this project provide habitation sites for Myotis sodalis, Myotis grisescens and Myotis keenii as well as other "less critical" species of bats.

In September of 1972, the Sierra Club filed suit in federal court in Saint Louis seeking to halt this project. Currently the matter is still under litigation. It is quite obvious that the Environmental Impact which the construction of this dam will have needs to be stressed to legislators who are involved in the appropriation of funds for this project. Individuals desirous of obtaining more information on this project may do so by writing to:

Tom Cravens
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Meramec Community College
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TOPIC FOR DISCUSSION: BATS AND HUMAN DISEASE

JULIA CHASE has been dealing with citizens who have bat colonies in their

homes, and she asked what I knew about bat rabies, to verify the information she had been passing along. She suggested that we discuss bat rabies in BRN so others could have the same information available if needed. Some other matters relating to disease have arisen as well, so several items are presented below. I hasten to point out that I am not a public health biologist; my discussion is based largely on my understanding of data presented in the scientific literature. Any additions, corrections, or comments about the following are welcome.

Rabies in bats is far from fully understood. Whether bats constitute reservoirs of rabies for other wild animals is unknown. Certainly independent rabies cycles exist in bats. These cycles may not be closed, however, because they can result in deadend infections in man and livestock. Some evidence suggests that bat rabies contributes to rabies cycles in Carnivora, but more research is needed to make this clear. Rabies in vampire bats differs considerably in infection rate, method of transmission, and impact on livestock and man from rabies in insectivorous bats in temperate North America. The latter bats are not known to survive rabies infection after virus becomes shed in the saliva. This means that long survival of individuals capable of aggressive transmission is known to apply only to vampire bats. However, in temperate zone insectivorous bats rabies infections may be subclinical and virus may be available in the saliva for a lengthy period. Rabies infection rates of clinically asymptomatic bats in the United States are usually a fraction of 1%. Rates vary seasonally, being low early in the warm season but rising as high as 2 or 3% in autumn. Rates also vary among species, generally being highest in lasiurine bats. One rabies epizootic has been documented in Eptesicus fuscus in Delaware and Virginia during October and November 1972. Of 99 bats tested, 10 (10%) were positive for rabies. One entire E. fuscus colony was tested; 3 (18%) of 17 were infected. This case is reported in the December 1972 issue of CDC Veterinary Public Health Notes. Literature reports of massive bat dieoffs that were speculatively attributed to disease have not been accompanied by virology testing.

The following quotes are from the June 1973 CDC Veterinary Public Health Notes:

"In 1972, 4,427 laboratory confirmed cases of rabies occurred in the United States, 14% above the average for the preceding 5 years." "Cases in the major wildlife hosts, skunks (60%), foxes (19%), bats (15%), and raccoons (5%), accounted for over 98% of all wildlife cases." "In 1972, 47 states reported 504 cases of rabies in bats. The total is more than for any previous year and 41% above the average for the preceding 5-year period. The only states not reporting cases in bats were Alaska, Hawaii, and Wyoming. For the third consecutive year, California reported the largest number of cases (94) followed by Texas (63). The geographic distribution of reported cases in bats is largely independent of the apparent distribution of cases in other animals. However, cases in bats have a well defined temporal distribution, peaking in August and declining to a low level by December." (ED. NOTE: These peak and low case periods coincide with annual peak and low levels of bat numbers and activity.)

In reporting discovery of a rabid bat, the Florida Times-Union (Jacksonville, 29 March 1973) quoted both a state and a city public health official as saying that "a high percentage of all bats are rabid." These officials advised people to avoid touching bats found on the ground.

The advice given was sound, but the reason was not. I wrote the newspaper editor a temperate and informative letter that was not published. It seems

very difficult to counteract this kind of misinformation.

A preliminary report on the use of Suckling Mouse Brain (SMB) rabies vaccine in Latin America is in the June 1973 CDC Veterinary Public Health Notes. About 2 million people in Latin America have received SMB vaccine in the last decade, and this has become the most commonly used rabies vaccine there. Frequency of neuroparalytic accidents (e.g., anaphylactic shock, paralysis, death) is much lower than encountered with other vaccines such as the Semple vaccine. SMB vaccine contains more rabies antigen and less tissue contaminant than other vaccines.

I have heard a rumor that many individuals who have been taking duck embryo rabies vaccine shots for years have experienced bad reactions to booster shots and have discontinued prophylactic treatment. Can readers supply any information about this problem? I have been receiving annual boosters since 1963. Local medical people are using what is for me a new practice, checking my titer before administering a booster. Since overexposure to vaccine may have serious consequences, this is a wise precaution. A high titer indicates when I can avoid an unnecessary and possibly risky shot.

An AP story in the Gainesville Sun, Pensacola Journal, Florida Times-Union, and other newspapers reported that 11 teenagers contracted histoplasmosis after a Sunday church outing to a cave near Branford, Florida. This cave served as a year-round roost for a sizeable group of Myotis austroriparius. Apparently the group of 28 youngsters, led by their church minister, threw cave dirt and guano at the bats to see them fly. In the process, some of them inhaled enough spores of the fungus Histoplasma capsulatum to develop systematic illness. One youngster was under intensive care for two weeks. The May 1973 CDC Veterinary Public Health Notes, in their report of this incident, stated that this occurred in a "bat-infested limestone cave."

Needless to say, this cave was the bats' home, and one Sunday afternoon it became people-infested. After the incident there was discussion of either exterminating the bats or closing the cave by using a bulldozer to fill the entrance with dirt. The state public health department recommended that extermination was neither effective nor necessary and instead posted a public health danger notice at the cave. I recently visited the cave and found it open and occupied by numerous bats.

This case serves to remind bat researchers to be cautious about overexposure to bat guano dust. I contracted a serious case of histoplasmosis in 1967 after spending many hours catching banded freetailed bats in roosts, kicking up much guano dust in the process. Symptoms were an unpleasant combination of those associated with flu and pneumonia, and an X-ray taken last year shows many small calcium modules in my lungs. These resulted from lung tissue response to the spores and fortunately are not debilitating. Histoplasmosis can be fatal. For a detailed discussion of this disease, readers should refer to Constantine's chapter in volume 2 of Wimsatt's Biology of Bats.

Ken Geluso has found a supplier of excellent respirators, Binks Manufacturing Co., 9201 West Belmont Ave., Franklin Park, Illinois 60131. Model 40-29 sells for about $ 14 and filters not only dust but organic vapors as well.

EDITED, UNREFEREED PUBLICATIONS

RESOURCE PARTITIONING BY EPTESICUS FUSCUS AND LASIURUS CINEREUS

Recent studies reporting food habits of insectivorous bats (Ross 1967, Black 1972, Whitaker 1972) indicate that Eptesicus fuscus feeds primarily on beetles and Lasiurus cinereus takes mainly moths. Thus, resource partitioning based on differential prey selection may occur between these two species. Black (1972) suggested that these two species may differ in their preferences for moths, with L. cinereus pursuing and accepting moths and E. fuscus either not pursuing them or rejecting them after capture. The purpose of this note is to discuss these ideas in relation to taste preferences, temporal patterns of foraging, and flight patterns.

Since there are several reports of E. fuscus feeding on moths (Phillips 1960, Black 1972) and others of L. cinereus feeding on beetles (Ross 1967), there is little strong evidence for differences in taste preferences. Furthermore Coutts et al. (1973) observed no reluctance on the part of captive E. fuscus to eat moths except where the latter where chemically protected.

Kunz (1973) observed that feeding activity of E. fuscus occurred earlier than that of L. cinereus, which was usually active after E. fuscus had entered night roosts. Thus, although in some cases E. fuscus and L. cinereus are active at the same time (Jones 1965) and are exposed to similar insect species, evidently this is not always true. Beetles may be active earlier in the evening than moths (Williams 1935), and when this is considered with the data on timing of bat activity, it could account for the observed food habits of the two species. Obviously spatial distribution of predators and prey would also explain the observed differences, but no evidence is available on this subject.

Lasiurus cinereus is somewhat larger than E. fuscus (forearms 46-58 and 41-51, respectively; Barbour and Davis 1969) and might be expected to select slightly larger prey (McNab 1971). The wing morphologies of these species are quite different; the aspect ratio for E. fuscus is 7.06 and that for L. cinereus 8.25 (Farney and Fleharty 1969). Fenton (1972) used wing shape as one parameter for examining the structure of aerial-feeding bat faunas, and from his hypothesis concerning wing shape, different flight patterns and therefore different feeding habits would be expected for E. fuscus and L. cinereus. The narrower wings of L. cinereus may make it a more effective predator of Lepidoptera than E. fuscus and a less effective predator on Coleoptera, and vice versa.

In the final analysis we expect that the partitioning of food resources among different species of insectivorous bats will include factors such as prey size, taste preferences, flight characteristics, and temporal and spatial foraging patterns. Before a complete assessment of how these and other groups of sympatric species partition food resources can be made, concurrent studies of bat activity, food habits, and insect periodicity are required. However,

judging from the available evidence, differential use of beetles and moths by E. fuscus and L. cinereus may reflect different foraging times and different flight patterns.

Literature Cited:

Black, H. L. 1972. Differential exploitation of moths by the bats Eptesicus fuscus and Lasiurus cinereus. J. Mamm. 53:598-601.

Coutts, R. A., M. B. Fenton, and E. Glen. 1973. Food intake by captive Myotis lucifugus and Eptesicus fuscus (Chiroptera: Vespertilionidae). Unpublished manuscript.

Fenton, M. B. 1972. The structure of aerial-feeding bat faunas as indicated by ears and wing elements. Can. J. Zool. 50:287-296.

Jones, C. 1965. Ecological distribution and activity periods of bats of the Mogollon Mountains area of New Mexico and adjacent Arizona. Tulane Stud. Zool. 12:93-100.

Kunz, T. H. 1973. Resource utilization: temporal and spatial components of bat activity in central Iowa. J. Mamm. 54:14-32.

McNab, B. K. 1971. The structure of tropical bat faunas. Ecology 52:352-358.

Phillips, G. L. 1966. Ecology of the big brown bat (Chiroptera: Vespertilionidae) in northeastern Kansas. Amer. Midland Nat. 75:168-198.

Ross, A. 1967. Ecological aspects of the food habits of insectivorous bats. Proc. Western Found. Vert. Zool. 1:205-263.

Whitaker, J. O., Jr. 1972. Food habits of bats from Indiana. Can. J. Zool. 50:877-883.

Williams, C. B. 1935. The times of activity of certain nocturnal insects, chiefly Lepidoptera, as indicated by a light trap. Trans. Royal Ent. Soc. London 83:523-555.

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EXTERNAL CHARACTERISTICS DISTINGUISHING MYOTIS CALIFORNICUS FROM MYOTIS LEIBII

Some congeneric mammals are very difficult to distinguish on the basis of external features, and in many cases the most reliable characteristics known are internal ones. These cases pose a perplexing problem to the field biologist working with small samples, especially when the data of interest require replacement of sampled individuals. We encountered such a problem while studying bat communities in the Chiracahua Mountains and San Simon Valley, Cochise Co., Arizona, in June and July 1973.

We wished to avoid changing community structure by killing animals early in the study. Initially we were unable to distinguish live Myotis californicus and Myotis leibii, having had no previous experience with the former species. Later we learned that both species often appeared at the same sampling sites. Diagnostic characteristics, skull measurements, are presented by Hall and Kelson (1959), Barbour and Davis (1969), and Bogan (1971); all require killing

a specimen to identify it. These authors concluded that the species exhibit much geographic variation but are indeed separate species.

To find usable external features we compared live specimens visually, made 17 external measurements on each, and killed a very small number of measured animals to make positive identification with skull characteristics. Four of each species were so examined. Weights were taken with a balance accurate to 0.02 g and measurements were taken with calipers accurate to 0.001 mm or a millimeter ruler.

One external characteristic allowed complete separation of the species: intensity of pigmentation of the skin overlying the dorsal side of the humerus. In M. leibii this area is the same black color as the rest of the wing skin. In M. californicus the wing is black also, but the strip over the humerus is much lighter, appearing pinkish-black. Unfortunately this character cannot be seen in dry museum specimens. Other external features that provide partial separation are given in Table 1. Weights indicate that M. leibii is more robust than M. californicus. The wings of M. leibii are longer and narrower than those of M. californicus. The length of the third metacarpal, the external characteristic given in the key of Barbour and Davis (1969), did not separate satisfactorily the specimens in these samples.

Table 1. Average measurements of external features of two species of bats. Range and sample size are given in parentheses.

Species	Weight of adult males (g)	Wing length (mm)	Hand length (mm)	Fifth finger length (mm)	Third metacarpal length (mm)
Myotis leibii	4.41 (4.19-4.96) (3)	96 (94-99) (4)	54 (53-55) (4)	41 (41-42) (4)	28.4 (27.4-29.0) (3)
Myotis californicus	3.92 (3.91-3.92) (2)	99 (94-103) (4)	55 (53-56) (4)	43 (42-45) (4)	29.5 (28.5-30.7) (5)

Despite the small samples examined, wing skin color appeared distinctly black or pinkish-black in animals subsequently captured. It remains to be determined if this difference persists in larger samples and over a wider geographic area. In view of the adaptive significance of bat wing morphology (Findley et al. 1972, Fenton 1972), the differences in wing measurements suggest that careful study might reveal ecological or behavioral differences that would help us understand why these two forms are separate species.

This work was supported in part by the Florida State Museum and Grant No. 6590 from the Penrose Fund of the American Philosophical Society.

Literature Cited:

Barbour, R. W. and W. H. Davis. 1969. Bats of America. Univ. Press of Kentucky, Lexington. 286 p.

Bogan, M. A. 1971. Will the real californicus please stand up Second Southwest. Bat Res. Symp., Albuquerque.

Fenton, M. B. 1972. The structure of aerial-feeding bat faunas as indicated by ears and wing elements. Can. J. Zool. 50:287-296.

Findley, J. S., E. H. Studier, and D. E. Wilson. 1972. Morphologic properties of bat wings. J. Mamm. 53:429-444.
Hall, E. R. and K. R. Kelson. 1959. The mammals of North America. Vol. 1. Ronald Press, New York. 546 p.

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RECENT LITERATURE

Compiled by Larry C. Watkins and Rebecca Myers Watkins, Beaversprite Wildlife Sanctuary, R.D. 1, Dolgeville, New York 13329. Publications examined for bat literature routinely include the American Midland Naturalist, Kansas Academy of Science, Journal of Mammalogy, Southwestern Naturalist, American Naturalist, Ecology, Canadian Field-Naturalist, Wildlife Review, the Recent Literature Section of the Journal of Mammalogy, and the Chiroptera Profile of the Biological Information Service. BRN subscribers could assist by sending their reprints to the above address.

Aellen, V. 1973. A new Rhinolophus of central Africa. Period. Biol. 75: 101-105. (In French).
Agrawal, V. C. and Y. P. Sinha. 1973. Studies on the bacula of some Oriental bats. Anat. Anzeig. 133:180-192.
Airapet'iants, E. Sh. and V. N. Zvorykin, and B. M. Savin. 1972. The effects of large G-forces on the spatial orientation of bats. Dok. Akad. Nauk SSSR 203:723-725.
Airapet'iants, E. Sh., N. V. Burikova, A. I. Konstantinov, L. M. Kotelenko, G. A. Kulikov, and N. N. Sokolova. 1973. Organization of the auditory cortex of the Chiroptera in the comparative series of mammals. Zh. Vysshei Deyatel'nosti Imeni I. P. Pavlova 23:392-402. (In Russian, Eng. Summary).
Alcasid, G. L. 1972. Checklist of Philippine mammals. Republic Philippines Dept. Educ. Nat. Mus., Manila. 51 pp.
Altenbach, J. S. 1972. The function of appendicular musculature during locomotion in the vampire bat. Colorado-Wyoming Acad. Sci. J. 7:110.
Altenbach, J. S. 1972. The locomotor morphology of the vampire bat. Diss. Abst. Int. B Sci. Eng. 32:4935.
Alvarez, T. 1972. Nuevo registro para el vampiro del Pleistoceno. Desmodus stoki de Tlapacoya, Mexico. An. Esc. Nac. Cienc. Biol., Mexico 19:163-165.
Alvarez, T. and J. Ramirez-Pulido. 1972. Notas acerca de murcielagos Mexicanos. An. Esc. Nac. Cienc. Biol. Mexico 19:167-173.
Anciaux de Favenaux, M. 1973. Essay of a synthesis on the reproduction of African bats (Ethiopian Fauna Region). Period. Biol. 75:195-199. (In French).
Anonymous. 1972. Help for endangered bats. Oryx 11:303-305.
Anonymous. 1972. Oklahoma mammals. Oklahoma Dept. Wildlife Conserv., Oklahoma City, Oklahoma. 10 pp.
Appley, M. B. 1972. Ultrastructural aspects of follicular growth and atresia in the ovary of the bat, Myotis grisescens. Diss. Abstr. Int. B Sci. Eng. 32:4359.

Arnold, J. R. and J. Schonewald. 1972. Notes on the distribution of some bats in southern Mexico. Wasmann J. Biol. 30:171-174.

Ayala, S. C. and A. D'Alessandro. 1973. Insect feeding behavior of some Colombian fruit-eating bats. J. Mamm. 54:266-267.

Baagoe, H. J. and B. Jensen. 1973. The spread and present occurrence of the serotine (Eptesicus serotinus) in Denmark. Period. Biol. 75:107-109.

Baier, J. H. 1973. Management of bat bites. New England J. Med. 288:1027.

Baker, J. R., S. M. Green, L. A. Chaloner, and M. Gaborak. 1972. Intracellular growth in-vitro of Trypanosoma schizotrypanum dionisii of bats, and preliminary work on cell-mediated immunity using this system. Roy. Soc. Trop. Med. Hyg. Trans. 66:340-341.

Baker, J. R., S. M. Green, L. A. Chaloner, and M. Gaborak. 1972. Trypanosoma dionisii (subgenus schizotrypanum) of Pipistrellus pipistrellus (Chiroptera), Intra and extracellular development in vitro. Parasitol 65:251-263.

Baker, R. J. 1973. Comparative cytogenetics of the New World leaf-nosed bats (Phyllostomatidae). Period. Biol. 75:37-45.

Baker, R. J. and V. R. McDaniel. 1972. A new subspecies of Uroderma bilobatum (Chiroptera: Phyllostomatidae) from middle America. Texas Tech. Univ. Mus. Occ. Paper No. 7, 4 pp.

Baker, R. J., W. R. Atchley, and V. R. McDaniel. 1972. Karyology and morphometrics of Peter's tent-making bat, Uroderma bilobatum Peters (Chiroptera, Phyllostomatidae). Syst. Zool. 21:414-429.

Baron, G. 1973. Volumetric comparison of the sensory base in the brain of bats. Period. Biol. 75:47-53. (In German).

Barus, V. and M. Daniel. 1972. The occurrence of some helminth species in birds and mammals from Yugoslavia. Folia Parasitol. 19:111-112.

Bay Schmith, E. 1972. A new genus and species of Lecithodendriidae (Trematoda) parasite of Lasiurus borealis bonaerensis (Lesson and Garnot, 1826) (Mammalia: Chiroptera). Bol. Chileno Parasitol. 27:36-39. (In Spanish, English summary).

Bergman, W. and P. J. H. Van Bree. 1972. The taxonomy of the African bat, Megaglossus woermanni, Pagenstecher 1885 (Megachiroptera: Macroglossinae). Biol. Gabonica 7:291-299.

Bhat, H. R. 1972. Records and observations on bats of Kumaon and Garhwal, Uttar Pradesh, India. Indian Sci. Congr. Proc. 59:407.

Bhat, H. R. and M. A. Sreenivasan. 1972. Occurrence of Rhinopoma hardwickei, Gray 1831, the lesser rat-tailed bat in a humid area of coastal Mysore. Bombay Nat. Hist. Soc. J. 69:172.

Bhatnagar, K. P. 1972. Olfaction in bats: behavioral, anatomical and electroencephalgraphic investigations. Unpubl. Ph.D. Diss., St. Univ. N.Y., Buffalo, New York. 206 pp.

Braaksma, S. 1973. Some details about the occurrence of bats in summer and winter resorts in the Netherlands and about the risks caused by wood preservation activities in buildings. Period. Biol. 75:125-128.

Braaksma, S. and J. W. P. T. Van der Drift. 1972. Bats pesticide conflicts. In J. H. Koeman (ed.), Side-effects of persistent pesticides and other chemicals on birds and mammals in the Netherlands. 579-583 pp.

Brennan, J. M. and J. T. Reed. 1972. Loomisia Gen. Nov., with descriptions of three new Venezuelan species (Acarina: Trombiculidae). J. Parasitol. 58:796-800.

Britton, P. and H. Britton. 1972. Rough-wing swallow attacking bat. East Africa Nat. Hist. Soc. Bull. 1972:25-26.

Brosset, A. 1972. The biology of bats. Masson et Cie, Paris, 240 pp. (In French).

Brown, A. M. 1973. An investigation of the cochlear microphonic response of two species of echolocating bats: Rousettus aegyptiacus (Geoffroy) and Pipistrellus pipistrellus (Schreber). J. Comp. Physiol. 83:407-414.

Buckland-Wright, J. C. 1972. Radiographic and histological examination of the femur of the fruit bat (Rousettus aegyptiacus). J. Zool. 168:424-426.

Bullard, R. W. and S. A. Shumake. 1973. Food temperature preference response of Desmodus rotundus. J. Mamm. 54:299-302.

Burikova, N. V. 1972. Efferent connections in the cerebral auditory cortex of the bat, Myotis oxygnathus. J. Evol. Biochem. Physiol. 7:450-455.

Campbell, R. W. 1972. Range extension of the big brown bat on Vancouver Island, British Columbia. Murrelet 53:12.

Capanna, E. and M. G. Manfredi Romanini. 1973. Volume of ADN of the new post-kinetics and evolution of karyotype among bats. Period. Biol. 75:55-60. (In French).

Capehart, J. 1972. Plasma thyroxine changes in the leaf-nose bat (Macrotis waterhousii) during pregnancy. Texas J. Sci. 23:600.

Capel, I. D., M. R. French, P. Millburn, R. L. Smith, and R. T. Williams. 1972. Species variations in the metabolism of phenol. Biochem. J. 127:25-26.

Cho, Y., J. M. Sidie, and P. P. H. Debruyn. 1972. Electron microscopic studies on a tubulo-filamentous fasciculus in the bat cricothyroid muscle. J. Ultrastructure Res. 41:344-357.

Cunningham-Von Someren, G. R. 1972. Pollination of Kligelia flowers by bats. East Africa Nat. Hist. Soc. Bull. 1972:9-12.

Daan, S. 1973. Activity during natural hibernation in three species of vespertilionid bats. Netherlands J. Zool. 23:1-71.

DeGraaff, G. and R. B. Martin. 1972. A survey of existing sound recordings of mammals and birds of southern Africa (during the period of December 1971-February 1972). Koedoe 15:107-125.

De Vree, F. 1972. Description of a new form of Pipistrellus from the Ivory Coast (Chiroptera). Rev. Zool. Bot. Africaines 85:412-416.

De Vree, F. 1973. A note on the occurrence of the dark brown serotine, Eptesicus brunneus (Thomas, 1880), on the Ivory Coast (Chiroptera). Rev. Zool. Bot. Africaines 87:142-145.

Dinale, G. 1972. Biometrical notes on a collection of Rhinolophus euryale from Corse (France). Mammal. 36:536-538.

Domrow, R. 1972. Acari (Spinturinicidae) from Australia and New Guinea. Acarologia 13:552-584.

Dorst, J. and J. Prevost. 1972. Notes on the bats collected in Ethiopia. Mammal. 36:395-399.

Dryness, C. T., J. F. Franklin, and C. Maser. 1973. Wheeler Creek Research Natural Area. Supplement No. 1 to: Federal research natural areas in Oregon and Washington, a guidebook for scientists and educators. Superint. Doc., U.S. Gov't. Printing Office, Washington, D.C.

Dulic, B. and F. A. Mutere. 1973. Comparative study of the chromosomes of some molossid bats from eastern Africa. Period. Biol. 75:61-65.

Dusbabek, F. 1972. The zone of bat Acarina in central Europe. Folia Parasitol. 19:139-154.

Dwyer, P. D. and J. A. Harris. 1972. Behavioral acclimatization to temperature by pregnant Miniopterus (Chiroptera). Physiol. Zool. 45:14-21.

Easterla, D. A. 1973. Additional record of the pocketed free-tailed bat for New Mexico. Texas J. Sci. 24:543.

Easterla, D. A. and J. Baccus. 1973. A collection of bats from the Fronteriza Mountains, Coahuila, Mexico. Southwestern Nat. 17:424-427.

Egsbaek, W., K. Kirk, and H. Roer. 1972. The great bearded bat, Myotis brandti, in Denmark. Flora og Fauna 78:40.

Ehinger, B. 1973. Ocular adrenergic neurons of the flying fox, Pteropus giganteus, Brunn (Megachiroptera). Z. Zellforsch. Mikroskop. 139:171-178.

Esher, R. J., A. I. Fleischman, and P. H. Lanz. 1973. Blood and liver lipids in torpid and aroused little brown bats, Myotis lucifugus. Comp. Biochem. Physiol. 45:933-938.

Esslinger, J. H. 1973. The genus Litomosoides, Chandler 1931, (Filarioidea: Onchocersidae) in Columbian bats and rats. J. Parasitol. 59:225-246.

Etemad, E. 1973. Occurrence of a rare bat, Eptesicus walli, Thomas 1919, in Iran. Period. Biol. 75:111-112.

Fain, A. 1972. Notes on the parasitic mites of bats of the Republic of Zaire, with description of two species and one new subspecies. Rev. Zool. Bot. Africaines 85:187-202. (In French).

Fenton, M. B., S. L. Jacobson, and R. N. Stone. 1973. An automatic ultrasonic sensing system for monitoring the activity of some bats. Can. J. Zool. 51:291-299.

Filippova, N. A. 1972. New data on ticks of the genus Ixodes (Ixodoidea: Ixodidae), specific parasites of bats. Entomol. Oboz. 51:463-475.

Firbas, V. M. and H. Sinzinger. 1972. On the spiral ganglion of bats. Z. Saeuget. 37:321-326.

Firbas, W. and B. Welleschik. 1973. A quantitative study on the spiral ganglion of the Chiroptera. Period. Biol. 75:67-70.

Fleet, R. R. 1972. Tadarida aurispinosa in Sonora, Mexico. Southwestern Nat. 17:308-309.

Gaisler, J. 1973. Nettings as a possible approach to study bat activity. Period. Biol. 75:129-134.

Gaisler, J., G. Madkour, and J. Pelikan. 1972. On the bats (Chiroptera) of Egypt. Acta Sci. Nat. Bohemoslovacae 6:1-40.

Genoways, H. H. and J. K. Jones, Jr. 1972. Mammals from southwestern North Dakota. Texas Tech. Univ. Mus. Occ. Paper No. 6., 36 pp.

Gopalakrishna, A. and M. S. Khaparde. 1972. Variable orientation of the embryonic mass during implantation of the blastocyst in the Indian false vampire bat, Megaderma lyra lyra (Geoffroy). Current Sci. 41:738-739.

Gopalakrishna, A. and S. R. Chitale. 1973. Observations on the normal cell counts in the blood of the Indian false vampire, Megaderma lyra lyra. Current Sci. 42:23-24.

Greenhall, A. M. 1972. The problem of bat rabies: migratory bats, livestock and wildlife. North Amer. Wildlife Nat. Resources Confer., 37th, Mexico City, Trans. 37:287-293.

Greenhall, A. M. 1972. The biting and feeding habits of the vampire bat, Desmodus rotundus. J. Zool. 168:451-461.

Griffin, D. R. and P. Hollander. 1973. Directional patterns of bats' orientation sounds. Period. Biol. 75:3-6.

Guilday, J. E. and H. W. Hamilton. 1973. The late Pleistocene small mammals of Eagle Cave, Pendleton County, West Virginia. Carnegie Mus. Annals 44:45-58.

Guimaraes, L. R. 1972. Nycteribiid batflies from Venezuela. Brigham Young Univ. Sci. Bull. Biol. Ser. 17:1-11.

Gunier, W. J. and W. H. Elder. 1973. New records of Myotis leibii from Missouri. Amer. Midl. Nat. 89:489-490.

Hackethal, H. 1973. Towards the comparative anatomy of the cerebellum of chiroptereans. Period. Biol. 75:71-76. (In German).

Haensel, J. 1973. Results of bat-banding in the north of the DDR, with special regard to their winter roosts in Rudersdorf. Period. Biol. 75:135-143. (In German).

Hagopian, M., M.D. Gershon, and E. A. Nunez. 1973. Accumulation of lipid droplets in ventricular cardiac muscle of the bat following administration of parachlorophenylalanine: the influence of hibernation. Anat. Rec. 175: 747-756.

Hamilton, A. 1973. Vampire bat: rabies on wings of night. Sci. Dig. 73:17-21.

Handley, C. O., Jr. 1972. Mammalogy in Panama. Bull. Biol. Soc. Washington 2:217-227.

Harrison, D. L. 1972. A note on the occurrence of the giant African free-tailed bat, Tadarida africana, in Tanzania, with some observations on the characters of the species. Arnoldia 5:1-5.

Henshaw, R. E. 1972. Niche specificity and adaptability in cave bats. Nat. Speleol. Soc. Bull. 34:61-70.

Herlant, M., F. Ectors, and C. Dessy. 1972. Detection of intermedin secreting cells in the anterior lobe of the mammalian hypophysis using an anti-corticotrop in immune serum. Paris Acad. Sci. Ser. D: Sci. Nat. 274: 1183-1186.

Hill, J. E. 1972. The Gunong Benom Expedition, 1967. Part IV: new records of Malayan bats, with taxonomic notes and the description of a new Pipstrellus. Brit. Mus. Nat. Hist. Bull. Zool. 23:21-42.

Hill, J. E. 1972. A note on Rhinolophus rex, Allen 1923, and Rhinomegalophus paradoxolophus, Bourret 1951 (Chiroptera: Rhinolophidae). Mamm. 36:428-434.

Hodoval, L. F. 1972. The microcirculation in the carotid sinus reflex, small vein responses with different anesthetics. Unpubl. Ph.D. Diss., Univ. Mo., Columbia, Missouri.

Howden, H. F., and L. E. C. Ling. 1973. Scanning electron microscopy: low-magnification pictures of uncoated zoological specimens. Sci. 179:386-388.

Howell, D. J. 1972. Physiological adaptations in the syndrome of chiropterophily with emphasis on the bat Leptonycteris lydekker. Diss. Abstr. Int. B Sci Eng. 33:1086-1087.

Hufnagl, E. and A. Craig-Bennett. 1972. Libyan mammals. Chapter V: Chiroptera. Oleander Press, Stoughton, Wisconsin. 95 pp.

Ianchev, I. and R. Stoikova. 1973. Study on the helminthofauna of the bats (Chiroptera) in Bulgaria. Bulg. Akad. Nauk., Sofia, Otdel. Biol. Medit. Nauk. Izvest. 37:145-146.

International Bat Research Conference, 3rd, Plitvice, Yugoslavia, 1972. 1973. Period. Biol. 75:1-225.

James, M. O., R. L. Smith, R. T. Williams, and M. Reidenberg. 1972. The conjugation of phynylacetic acid in man, subhuman primates, and some non-primate species. Roy Soc. London, Proc. Ser. B: Biol. Sci. 182:25-35.

Jones, C. and J. L. Paradiso. 1972. Mammals imported into the United States in 1969. U.S. Dept. Int. Fish Wildl. Serv., Bur. Sport Fish. Wildl. Spe. Sci. Rep. Wildl. 147:1-33.

Jones, J. K., Jr., D. C. Carter, and H. H. Genoways. 1973. Checklist of North American mammals north of Mexico. Occ. Papers Mus. Texas Tech. Univ. 12:5.

Jones, J. K., Jr. and H. H. Genoways. 1973. Ardops nichollsi. Mamm. Spec. No. 24. 24 pp.

Jones, J. K., Jr., R. P. Lampe, C. A. Spenrath, and T. H. Kunz. 1973. Notes on the distribution and natural history of bats in southeastern Montana. Occ. Papers Mus. Texas Tech Univ. 15:1-12.

Karim, K. B. 1972. Foetal membranes and placentation in the Indian leaf-nosed bat, Hipposideros fulvus fulvus (Gray). Indian Acad. Sci. Proc. Sec. B: 76:71-78.
Karim, K. B. 1973. Occurrence of a bicornuate vagina in the Indian leaf-nosed bat, Hipposideros fulvus fulvus (Gray). Current Sci. 42:62.
Karim, K. B. 1973. Giant cells in the placenta of two species of Indian bats. Current Sci. 42:282-284.
Khajuria, H. 1972. Courtship and mating in Rhinopoma hardwickei, Gray (Chiroptera: Rhinopomatidae). Mamm. 36:307-309.
Kock, D. 1972. Fruit bats and bat-flowers. East Africa Nat. Hist. Soc. Bull. 1972: 123-126.
Konstantinov, A. I. 1973. Development of echolocation in bats in postnatal ontogenesis. Period. Biol. 75:13-19.
Konstantinov, A. I. and I. M. Stosman. 1972. The electrical activity of the inferior colliculi during the effect of ultra-sonic tone signals in ontogenesis of the bat, Myotis oxygnathus. Z. Evol. Biok. Fiziol. 8:182-188. (In Russian).
Konstantinov, A. I., V. N. Movtschan, and A. K. Makarov. 1973. Influence of band limited noises on the efficiency of echolocation detection of targets by Rhinolophus ferrumequinum. Period. Biol. 75:7-11.
Koopman, K. F. 1972. Eudiscopus denticulus. Mammal. Spec. No. 19, 2 pp.
Koopman, K. F. 1973. Systematics of Indo-Australian Pipistrellus. Period. Biol. 75:113-116.
Krulin, G. S. and J. A. Sealander. 1972. Annual lipid cycle of the gray bat, Myotis grisescens. Comp. Biochem. Physiol. 42:537-549.
Kulikov, G. A. 1972. Neuron response in Rhinolophidae-ventral cochlear nucleus to ultrasonic stimuli after destruction of the ipsilateral cochlea. Neirofizoil. 4:32-40. (In Russian).
Kunz, T. H. 1973. Resource utilization: temporal and spatial components of bat activity in central Iowa. J. Mamm. 54:14-32.
Kunz, T. H. 1973. Population studies of the cave bat (Myotis velifer): reproduction, growth, and development. Occ. Papers Mus. Nat. Hist., Univ. Kansas 15:1-43.
Kuzyakin, A. P. 1973. Review of investigation of the order Chiroptera by zoologists of the Soviet Union for the last two decades. Period. Biol. 75: 117-123.
Langguth, A. and F. Achaval. 1972. Ecological notes on the vampire Desmodus rotundus rotundus (Geoffroy) in Uruguay. Neotrop. 18:45-53.
Laufens, G. 1973. Influence of external temperatures on the activity of little brown bats (Myotis nattereri, Kuhl 1818, and Myotis bechsteini, Leisler 1818). Period. Biol. 75:145-152.
LaVal, R. K. 1973. A revision of the Neotropical bats of the genus Myotis. Los Angeles County Nat. Hist. Mus. Sci. Bull. No. 15. 54 pp.
LaVal, R. K. 1973. Observations on the biology of Tadarida brasiliensis cynocephala in southwestern Louisiana. Amer. Midl. Nat. 89:112-120.
LaVal, R. K. 1973. Occurrence, ecological distribution, and relative abundance of bats in McKittrick Canyon, Culbertson County, Texas. Southwestern Nat. 17:357-364.
Lawlor, T. E. 1973. Aerodynamic characteristics of some Neotropical bats. J. Mamm. 54:71-78.
Linhart, S. B. 1973. Age determination and occurrence of incremental growth lines in the dental cementum of the common vampire bat (Desmodus rotundus). J. Mamm. 54:493-496.

Longnecker, D. E. and P. D. Harris. 1972. Dilation of small arteries and veins in the bat during halothane anesthesia. Anesthesiol. 37:423-429.
Longnecker, D. E., P. D. Harris, E. K. Greenwald, and F. N. Miller. 1972. Neural factors in small vessel response to carbon dioxide. Microvascular Res. 4:326-327.
McDaniel, B. 1972. Labidocarpid bat-mites of Venezuela (Listrophoroidea: Labidocarpidae). Brigham Young Univ. Sci. Bull. Biol. Ser. 17:15-32.
McNab, B. K. 1973. Energetics and the distribution of vampires. J. Mamm. 54: 131-144.
Maddock, T. H. 1972. A note on Eptesicus pumilus in the Flinders Ranges, South Australia. Australian Bat Res. News 11:2-3.
Maddock, T. H. 1972. The lesser long-eared bat, Nyctophilus geoffroyi: cave dweller or occasional visitor? South Australian Nat. 46 (4):63-64.
Maeda, K. 1972. Growth and development of large noctule, Nyctalus lasiopterus Schreber. Mamm. 36:269-278.
Manley, G., D. R. F. Irvine, and B. M. Johnstone. 1972. Frequency response of bat tympanic membrane. Nature 237:112-113.
Martin, C. O. 1973. The cover illustration, Euderma maculatum, (Chiroptera: Vespertilionidae). Southwestern Nat. 18:112-114.
Martin, R. L. 1973. The current status of bat protection in the United States of America. Period. Biol. 75:153-154.
Medway, G. G. 1972. The Gunong Benom Expedition. VI: the distribtuion and altitudinal zonation of birds and mammals on Gunong Benom. British Mus. Nat. Hist. Bull. Zool. 23:105-154.
Medway, G. G. 1973. The taxonomic status of Tylonycteris malayana, Chasen 1940. (Chiroptera). J. Nat. Hist. 7:125-131.
Medway, G. G. and A. G. Marshall. 1972. Roosting associations of flat-headed bats, Tylonycteris species (Chiroptera, Vespertilionidae) in Malaysia. J. Zool. 168:463-482.
Miller, F. N., P. D. Harris, D. E. Longnecker, and E. K. Greenwald. 1972. Evaluation of adrenergic receptors in the bat wing: topical application of noreprinephrine, epinephrine and isoproternol. Physiol. 15:217.
Miller, F. N., P. D. Harris, D. E. Longnecker, and E. K. Greenwald. 1972. Small vessel responses to hypercardia. Microvascular Res. 4:327.
Miller, F. N., E. K. Greenwald, D. E. Longnecker, and P. D. Harris. 1973. Alpha-adrenergic receptor blockade in small vessels of the bat wing. Fed. Proc. 32:412.
Mitchell, G. C. and R. J. Burns. 1972. Combate Quimico de los Murcielagos Vampiras. Centro Regional de Agudor Tecnica, Mexico, D. F., 40 pp.
Mollhagen, T. 1973. Distributional and taxonomic notes on some West Texas bats. Southwestern Nat. 17:427-430.
Mumford, R. W. 1973. Natural history of the red bat (Lasiurus borealis) in Indiana. Period. Biol. 75:155-159.
Murthy, K. V. R. 1972. Homologues of the ampulla of Henle in some Indian microchiropteran bats. Current Sci., Bangalore 41:530-531.
Mutere, F. A. 1973. On the food of the Egyptian fruit bat, Rousettus aegyptiacus, E. Geoffroy. Period. Biol. 75:159-162.
Newhauser, H. N. and A. F. Di Salvo. 1972. Some South Carolina bat records. Elisha Mitchell Sci. Soc. J. 88:239-240.
Nicoll, P. A. and R. Speden. 1972. Transmembrane and action potentials of spontaneously contracting smooth muscle cells of venules in unanesthetized bat wing microvessles. Physiol. 15:227.

Novick, A. 1973. Bats aren't all bad. Nat'l. Geog. Mag. 143:614-637.
O'Farrell, M. J. 1972. Notes on parturition and behavior in Pipistrellus hesperus in the laboratory. Biol. Soc. Nevada Occ. Papers 32:1-3.
O'Farrell, M. J. and B. W. Miller. 1972. Pipistrelle bats attracted to vocalizing females and to a blacklight insect trap. Amer. Midl. Nat. 88:462-463.
O'Farrell, M. J. and E. H. Studier. 1973. Reproduction, growth, and development in Myotis thysanodes and Myotis lucifugus (Chiroptera: Vespertilionidae). Ecol. 54:18-30.
Olterman, J. H. and B. J. Verts. 1972. Endangered plants and animals of Oregon. IV: mammals. Oregon Agric. Exper. Stat., Corvallis, Spec. Report 364. 47 pp.
Pagels, J. F. 1972. The effects of short and prolonged cold exposure on arousal in the free-tailed bat, Tadarida brasiliensis cynocephala. Comp. Biochem. Physiol. 42:559-567.
Pagels, J. F. and C. R. Blem. 1973. Metabolized energy of the big brown bat Eptesicus fuscus (Chiroptera). Comp. Biochem. Physiol. 45:497-502.
Pathak, S. 1972. Somatic chromosomes of the short-nosed fruit bat, Cynopterus sphinx (Vahl) (Pteropidae: Megachiroptera: Mammalia) collected from India. Mammal. Chromosomes Newsletter 13:10-11.
Peff, T. C. and J. A. Simmons. 1972. Horizontal angle resolution by echolocating bats. Acoust. Soc. America J. 51:2063-2065.
Pennycuick, C. J. 1973. Wing profile shape in a fruit-bat gliding in a wind tunnel determined by photogrammetry. Period. Biol. 75:77-82.
Perez, G. S. A. 1973. Notes on the ecology and life history of Pteropidae on Guam. Period. Biol. 75:163-168.
Pienaar, U. de V. 1972. A new bat record for the Kruger National Park. Koedoe 15:91-93.
Pollak, G., O. W. Henson, Jr., and A. Novick. 1972. Cochlear potentials from flying bats. Physiol. 15:239.
Pollak, G. and O. W. Henson, Jr. 1973. Specialized functional aspects of the middle ear muscles in the bat, Chilonycteris parnellii. J. Comp. Physiol. 84:167-174.
Power, D. M. and J. R. Tamsitt. 1973. Variation in Phyllostomus discolor (Chiroptera: Phyllostomatidae). Can. J. Zool. 51:461-468.
Pye, J. D. 1973. Echolocation by constant frequency in bats. Period. Biol. 75:21-26.
Pye, A. 1973. The structure of the cochlea in Chiroptera from Africa. Period. Biol. 75:83-87.
Racey, P. A. 1973. The viability of spermatozoa after prolonged storage by male and female European bats. Period. Biol. 75:201-205.
Rakhmatulina, I. K. 1972. The breeding growth and development of Pipistrellus in Azerbidzhan. Soviet J. Ecol. 2:131-136.
Ransome, R. D. 1973. Factors affecting the timing of births of the greater horse-shoe bat (Rhinolophus ferrumequinum). Period. Biol. 75:169-175.
Rasweiler, J. J., IV. 1972. Reproduction in the long-tongued bat, Glossophaga soricina. I: pre-implantation development and histology of the oviduct. J. Reprod. Fertil. 31:249-262.
Rasweiler, J. J., IV. 1973. Care and management of the long-tongued bat, Glossophaga soricina (Chiroptera: Phyllostomatidae), in the laboratory, with observations on estivation induced by food deprivation. J. Mamm. 54:391-404.
Rasweiler, J. J., IV. and H. De Bonilla. 1972. Laboratory maintenance methods for some nectarivorus and frugivorous phyllostomatid bats. Lab. Anim. Sci. 22:658-663.

Raswiler, J. J. IV and V. Ishiyama. 1973. Maintaining frugivorus phyllostomatid bats in the laboratory: Phyllostomus, Artibeus, and Sturnira. Lab. Anim. Sci. 23:56-61.
Reidinger, R. F., Jr. 1972. Factors influencing Arizona bat population levels. Unpubl. Ph.D. Diss., Univ. Arizona, Tucson. 186 pp.
Rems, L. E. 1972. Key for identification of bats of New York. The Northeastern Caver 3:44-45.
Rice, M. J., C. K. Kamugisha, and B. S. Sebugwawo. 1972. Bats' wing membrane for tsetse fly synthetic feeding. Roy. Soc. Trop. Med. Hyg. Trans. 66:328.
Roberts, L. H. 1972. Correlation of respiration and ultrasound production in rodents and bats. J. Zool. 168:439-449.
Roberts, L. H. 1973. Cavity resonances in the production of orientation cries. Period. Biol. 75:27-32.
Roer, H. 1972. Zur Bestandsentwicklung der Kleinen Hufeisennase (Chiroptera: Mammalia) im westlichen Mitteleuropa. Bonn. Zool. Beitr. 23:325-337.
Roth, E. L. 1972. Late Pleistocene mammals from Klein Cave, Kerr County, Texas. Texas J. Sci. 24:75-84.
Ruby, J. R. and R. M. Webster. 1972. Origin of the golgi complex in germ cells in the developing ovary of the bat. Z. Zellforsch. Mikroskop. Anat. 133: 1-12.
Rybar, P. 1973. Remarks on banding and protection of bats. Period. Biol. 75:177-179.
Saint Girons, M. C. 1973. Particulars of the annual cycle of bats in cold temperate regions. Period. Biol. 75:207-213. (In French).
Salem, J. B. 1972. A new species of trematode of bat found in Hyderabad, Andhra Pradesh (India). Zool. Anzeig. 189:393-395.
Sanides, F. and D. Sanides. 1972. The extraverted neurons of the mammalian cerebral cortex. Z. Anat. Entwick. 136:272-293.
Sawada, I. 1972. Helminth fauna of bats in Japan, X. Annot. Zool. Jap. 45: 22-28.
Sawada, I. 1972. Helminth fauna of bats in Japan, XI. Nara Gakugei Diagaku, Hokoku Kagaku 21:27-30.
Sawada, I. 1972. Helminth fauna of bats in Japan, XII. Annot. Zool. Jap. 45:245-249.
Scherer, W. F., J. V. Ordonez, P. B. Jahrling, B. A. Pancake, and R. W. Dickerman. 1972. Observations of equines, humans, and domestic and wild vertebrates during the 1969 equine epizootic and epidemic of Venezuelan encephalitis in Guatemala. American J. Epidemiol. 95:255-266.
Schierer, A., J. D. Mast, and R. Hess. 1972. Contribution to an eco-ethological study of the bat, Myotis myotis. La Terre et la Vie 26:38-53. (In French).
Schmidt, U. 1973. Olfactory threshold and odour discrimination of the vampire bat (Desmodus rotundus). Period. Biol. 75:89-92.
Schneider, R. 1972. Quantitative morphology and evolution of the brain of the bat. Anat. Anzeig. 130:332-346.
Schnitzler, H. U. 1972. The echolocation of bats and their auditory principles. Forsch. Zool. 21:137-189.
Schnitzler, H. U. 1973. Control of the doppler shift compensation in greater horeshoe bat, Rhinolophus ferrumequinum. J. Comp. Physiol. 82:79-92.
Schorger, A. W. 1973. The mammals of Dane County, Wisconsin. Wisconsin Acad. Sci., Arts & Letters, Trans. 61:75-95.

Schuller, G. 1972. Echolocation of Rhinolophus ferrumequinum with frequency modulated sounds evoked potentials in the colliculus inferior. J. Comp. Physiol. 77:306-331.

Sharma, B. D. 1973. Psammotettis striatus (Linn.), a rare hemipteran ectoparasite of the flying foxes of Poonch. Current Sci. 42:108.

Simmons, J. A. and D. J. Howell. 1973. Multiple sonar systems in bats. Period. Biol. 75:33-35.

Slutter, J., W., A. Voute, and P. F. Van Heerdt. 1973. Hibernation of Nyctalus noctula. Period. Biol. 75:181-188.

Smith, F. R. and W. Threlfall. 1973. Helminths of some mammals from Newfoundland. American Midl. Nat. 90:215-218.

Sokolov, B. V. 1972. Interaction of auditory perception and echolocation in bats (Rhinolophidae) during insect catching. Vest. Leningrad Univ., Biol. 3:96-104.

Stammer, A. 1972. Studies on the pineal organ of the great horseshoe bat, Rhinolophus ferrumequinum. Gen. Comp. Endocrinol. 18:624.

Start, A. N. 1972. Pollination of the baobab (Adansonia digitata L.) by the fruit bat Rousettus aegyptiacus E. Geoffroy.

Stebbings, R. E. 1973. Size clines in the bat, Pipistrellus pipistrellus. Period. Biol. 75:189-194.

Stordal, E., S. Hauge, T. Vedum. 1972. Long-eared bat (Plecotus auritus) found in South Trondelag County (Norway). Fauna 25:217.

Strelkov, P. P. 1973. Pipistrellus kuhli, Natterer 1819, in the Middle Asia. Vest. Zool. 1973:85.

Studier, E. H., V. L. Lysengen, and M. J. O'Farrell. 1972. Bioenergetics of pregnancy and lactation in little brown bats (Myotis lucifugus) and fringe-tailed bats (Myotis thysanodes). Colorado-Wyoming Acad. Sci. J. 7:72.

Studier, E. H., V. L. Lysengen, and M. J. O'Farrell. 1973. Biology of Myotis thysanodes and M. lucifugus (Chiroptera: Vespertilionidae). II. Bioenergetics of pregnancy and lactation. Comp. Biochem. Physiol. 44A:467-471.

Suthers, R. A., S. P. Thomas, and B. J. Suthers. 1972. Respiration, wing-beat and ultrasonic pulse emission in an echolocating bat. J. Exp. Biol. 56: 37-48.

Suthers, R. A. and J. M. Fattee. 1973. Fishing behavior and acoustic orientation by the bat (Noctilio labialis). Anim. Behav. 21:61-66.

Tatarinov, K. A. 1972. Distribution of Rhinolophus hipposideros Bechstein in the West of the Ukrainian SSR. Vest. Zool. 5:82-84.

Thomas, S. P. and R. A. Suthers. 1972. The physiology and energetics of bat flight. J. Exper. Biol. 57:317-336.

Thonglongya, K. 1972. A new genus and species of fruit bat from South India (Chiroptera: Pteropodidae). Bombay Nat. Hist. Soc. J. 69:151-158.

Trimarchi, C. V. and J. G. Debbie. 1972. Rabies in bats in New York state. Northeastern Caver III:119-120.

Tupinier, Y. 1973. Study of the morphology of the hair of west European bats by electron microscope scanning. Period. Biol. 75:93-95. (In French).

Turner, D., A. Shaughnessy, and E. Gould. 1972. Individual recognition between mother and infant bats (Myotis). U.S. Natl. Aeron. Space Admin. Spec. Publ. No. 262, pp. 365-371.

Turner, R. W. 1972. Mammals of the Black Hills of South Dakota and Wyoming. Diss. Abstr. Int. B. Sci. Eng. 32:5749-5750.

Vasil'ev, A. G. and N. G. Andreeva. 1972. Characteristics of electrical responses by the medial geniculate bodies in Vespertilionidae and Rhinolophidae to ultrasonic stimuli with different frequencies. Neurophysiol. 3:104-109.

Velicka, V. and J. Velicky. 1972. A study on the thyroid gland of bat in winter and early spring. II. Electron Microscopic Observations. Folia Morphol. 20:406:415.

Wassif, K., and G. Madkour. 1972. The structure of the os penis in Egyptian bats (Microchiroptera). Bull. Zool. Soc. Egypt 24:45-51.

Wassif, K. and G. Madkour. 1972. The structure of the palatal rugae in some Egyptian bats. Zool. Anz. (Leipzig) 188:29-36.

Wassif, K. and G. Madkour. 1972. The tongue papillae of Egyptian bats (Microchiroptera). Bull. Zool. Soc. Egypt. 24:1-4.

Welleschik, B. and W. Firbas. 1973. Quantitative investigations on the organ of corti of the Microchiroptera. Period. Biol. 75:97-100.

Whitaker, J. O., Jr. and R. E. Mumford. 1971. Notes on occurrence and reproduction of bats in Indiana. Indiana Acad. Sci. Proc. 81:376-383.

Williams, G. 1973. Where "bats is beautiful". Sci. World 26:16-18.

Wilson, D. E. 1973. Bat faunas: A trophic comparison. Sys. Zool. 22:14-29.

Wilson, D. E. 1973. Reproduction in Neotropical bats. Period. Biol. 75:215-217.

Wimsatt, W. A., A. Guerriere, and R. Horst. 1973. An improved cage design for maintaining vampires (Desmodus) and other bats for experimental purposes. J. Mamm. 54:251-254.

Worden, F. G. and R. Galambas. 1972. Auditory processing of biologically significant sounds: A report based on an NRP work session, Brookone, Mass., 1970. Neurosci. Res. Prog. Bull. 10:1-119.

Ximenez, A., A. Langguth, and R. Praderi. 1972. Lista Sistematica de los Mamiferos del Uruguay. An. Mus. Nac. Hist. Nat. Montevideo, 2 Ser. 7:1-49.