

BAT RESEARCH NEWS

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1974

Original Issues Compiled by Dr. Stephen R. Humphrey (January–March 1974) and Dr. Robert L. Martin (April–December 1974), Editors of *Bat Research News*.

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Volume 15, No. 1

January 1974

THE COVER

The cover features bat traps in place to sample populations. Such traps are now used by many bat biologists, and the related article below provides some guidance in bat trap operation. The photos were contributed by MERLIN TUTTLE; the lower one was taken by LARRY WATKINS.

Bat Research News appears quarterly: January, April, July, and October. The subscription rate is \$1.00 per year. Address correspondence to the Editor, Robert L. Martin, Department of Biology, University of Maine, Farmington 04938.

EDITORIAL COMMENTS

I am committed to several months of field work during the next year and will be unable to give BRN the attention it deserves. Therefore BOB MARTIN will resume his capable editorship of BRN beginning next issue. (This is possible because he has returned from even more lengthy travels.) All correspondence should be sent to Bob at the above address. Overseeing this newsletter is an exciting business, and it has been enjoyable.

Costs of publishing BRN are near the break-even point, and we have decided to leave the subscription rate unchanged for 1974. However, because postage accounted for roughly half the cost of 14(4), it appears that the increase in postal rates this spring will force a subscription increase soon. Therefore 1974 subscriptions should be for one year only, rather than two as before.

NEWS

The Fourth Annual North American Symposium on Bat Research, in New Orleans on 23-24 November 1973, featured 40 papers on bat research. The group agreed to meet again next year and accepted an invitation from the Museum, Texas Tech University, Lubbock.

DOUG MORRISON and FRANK BONACCORSO recently returned to the U.S. from complementary field studies involving over a year each in Panama. Doug did a radiotracking study of foraging behavior and food supply of Artibeus jamaicensis. Frank examined food resource partitioning among 33 species of bats in two types of tropical forests.

A new subscriber, Prof. Lutsky of the Department of Laboratory Animal Science, Hebrew University, Jerusalem, has established a laboratory colony of Rousettus aegypticus. He is interested in using this species in various studies involving genetics, ophthalmology, and infectious diseases. He would welcome correspondence and information exchange with others maintaining bat colonies.

KAY FERRIS is studying captive and free-ranging Epomophorus wahlbergi at Pietermaritzburg, Natal. She plans a dissertation on the anatomy of this species.

Another new subscriber, Prof. L. Beverly Halstead, at the University of Ife, Nigeria, has been running a self-supporting fruit bat research project for the last two years. This work takes advantage of the poor biological information and the great popularity as food of the straw-coloured fruit bat, Eidolon helvum.

Bats from the weekly shoot are sold to student classes, extensive research projects, and the local food market. Resulting funds are used to pay for ammunition, research costs, reprints, and bat literature. Several papers are published, in press, or in preparation. The last category includes a dissection manual for this species. Prof. Halstead requests reprints of bat papers, as local bat literature is limited.

TIMOTHY McDONNELL is available as a field assistant for bat research in the Southwest this summer. He has had experience in banding numbers of Tadarida brasiliensis and Macrotus waterhousii and is adept in the use of mist nets. His address is 743 Poplar St., Ramona, California 92065.

TED BULTHAUP, 2508 Wolfe Dr., Woodridge, Illinois 60515 (phone 312-964-8786) offers up to \$7 for live Lasiurus borealis, Lasiurus cinereus, and Lasionycteris noctivagans. He is also looking into a legal service group in relation to bat conservation.

New subscriber TIM CARTMELL, 2 Hillhurst Blvd., Toronto, Ontario M4R 1K4, reports finding a lone male Myotis keenii under a large flat rock, aboveground.

The following are summarized from the September 1973 CDC Veterinary Public Health Notes:

A man in Kentucky was bitten on the ear by a bat in mid-August 1973. He became ill on 7 September and died on 22 September despite intensive treatment. No explanation of circumstances of the bite was given, except that the bat escaped.

Four children in Virginia were bitten repeatedly by three bats that they caught in a church and kept as pets last summer. One of the bats died of rabies. The other two were tested with negative results. The children and one other who had handled the bats were given a 14-day course of antirabies vaccine; the two most severely bitten received vaccine for 21 days plus hyperimmune serum for 14 days. "Bats should never be picked up or handled." (ED. NOTE: Probably the single most helpful caution bat biologists can provide in answer to questions about bat rabies is to urge parents to teach children to avoid touching bats that they find. A bat found lying on the ground, as often is the case, can be moved or taken to public health authorities by scooping it up in a coffee can or other container.)

A 27-page report, "Control of Rabies," has been published by the National Academy of Sciences. Copies are available for \$2.00 from the Printing and Publishing Office, National Academy of Science, 2101 Constitution Ave., Washington, D.C. 20418.

"BATS NEED FRIENDS" bumper stickers are now available at \$1.00 each postpaid. During this winter, orders should be sent to Ralph A. Raschig, C. O. General Delivery, Lutz, Florida 33549. Anticipating habitation of his new bat tower in Wisconsin, Ralph hopes to generate money from sales to tourists to contribute toward a bat research laboratory and museum.

MICK HARVEY and his students are visiting 50 caves on U.S. Forest Service land in Arkansas to find out what bats are present. This information will be included in an impact statement regarding a cave commercialization plan.

Mick points out that Myotis grisescens is on state endangered species lists in both Missouri and Kentucky.

The Illinois Nature Preserves Commission has published a report on their work, including a preliminary list of rare and endangered vertebrates of the state. Myotis grisescens and Myotis austroriparius are listed as rare, and Myotis sodalis is designated as endangered.

TIMOTHY J. MCCARTHY has sent a list of bats protected by the Missouri Department of Conservation as of September 1972. Bats listed as endangered are Myotis sodalis, Myotis leibii, Myotis grisescens, Plecotus townsendii, and Plecotus rafinesquii; Myotis keenii is listed as rare. As Tim points out, such lists are helpful to state planning agencies and others, and more states should be encouraged to follow Missouri's example.

Tim is compiling a file on bats collected or banded in Wisconsin, because the state's Department of Natural Resources is interested in ascertaining the status of its non-recreational mammal fauna. He would like BRN readers who know of Wisconsin bats in their collections to contact him at the Milwaukee Public Museum, 800 W. Wells St., Milwaukee, Wisconsin 53233.

The Florida Committee on Rare and Endangered Plants and Animals met in December 1973 to agree on provisional lists of species or populations in trouble in the state. The Committee is chaired by JAMES N. LAYNE and financially supported by the Florida Audubon Society. Biologists are now preparing species accounts that will be published by the FAS. Subsequently management and research recommendations will be developed for use by governmental agencies, legislative bodies, and others. Bats listed are as follows: endangered - Myotis grisescens; threatened - Myotis austroriparius; rare - Eumops glaucinus floridanus, Plecotus rafinesquii, Eptesicus fuscus osceola, E. f. fuscus, Lasiurus cinereus, Myotis keenii, Myotis sodalis. The last four forms are rare, having only peripheral portions of their ranges in Florida, and are more common elsewhere.

OWEN D. BUCK asks BRN subscribers with knowledge of Aeolus Cave (Vermont) as a bat hibernaculum to write the Vermont Natural Research Council about it. The address is 26 State St., Montpelier, Vermont 95602. The Council is considering protecting the cave area; presently rights are held by U.S. Gypsum Co.

HARLAN WALLEY has proposed to the Illinois Nature Conservancy and the Illinois Department of Conservation that Blackball Mine be obtained as a nature preserve. He points out that Blackball serves as a hibernaculum for 10,000 bats of five species--quite unusual in that region--and that populations have declined there since 1960. Biologists not already contacted who wish to contribute specific information or support of this effort should contact Harlan at the Department of Biology, Northern Illinois University, DeKalb 60115.

Information and references on the bat populations of Puerto Rico are needed by Sr. Salomon Rodriguez Nieto, Scientific Assessment Office, Environmental Quality Board, P.O. Box 11488, Santurce, Puerto Rico 00910. He is starting a count of bat populations on the island. This request was relayed by Robert R. Stitt, NSS Conservation Committee, 75 Lenox Ave., Albany, N.Y. 12203, who would appreciate being informed via copies of your letters.

M. BROCK FENTON reports that the legislative attempt to commercialize the Aguas Buenas caves of Puerto Rico has been recognized as ill-advised and stopped.

RICHARD K. LAVAL notes that bat traps have proved very useful in tropical forests because they catch small or rare bats that are difficult to net. Most of the bats caught are Carollia-sized or smaller, and large fruit bats like Artibeus jamaicensis are taken seldom in relation to their true abundance. Even though a trap so placed will produce few bats per night, he recommends trapping movement corridors as well as roost entrances.

EDITED, UNREFEREED PUBLICATIONS

BAT TRAPPING: RESULTS AND SUGGESTIONS

Many readers of Bat Research News have used the portable bat trap which I developed. I am publishing elsewhere a detailed description of the trap and instructions for construction (J. Mamm., in press). As with early use of mist nets, some who have tried this trap have obtained excellent results while others have not. Frequently this is due to differing experience in adjusting the tension and spacing of the vertical wires or in anticipating where bats will be most vulnerable to capture. I present the following results, suggestions, and cautions in hopes of helping other users and stimulating a continuing dialogue in the BRN regarding possible improvements developed from their experience.

Trapping Results

Double-framed bat traps were first tested in Venezuela over trails, streams, and a watering hole in lowland jungle. Small, extremely crude, traps, employing monofilament fish line caught 338 bats of the following

species in 118.5 hours: 12 Rhynconycteris naso, 1 Noctilio leporinus, 5 Pteronotus davyi, 1 Lonchorhina aurita, 1 Macrophyllum macrophyllum, 1 Phyllostomus elongatus, 1 Anoura caudifera, 1 Lionycteris spurrelli, 74 Carollia perspicillata, 7 Sturnira lilium, 14 Sturnira tildae, 71 Uroderma bilobatum, 4 Vampyrops helleri, 18 Vampyrodes caracciolo, 60 Vampyressa bidens, 6 Chiroderma villosum, 25 Chiroderma trinitatus, 4 Ectophyla macconelli, 1 Artibeus cinereus, 13 Artibeus jamaicensis, 9 Artibeus sp., 1 Furipterus horrens, 1 Thyroptera tricolor, and 7 Myotis albescens. More than 150 additional bats escaped from the bag due to faulty trap design. At the same time and in similar sites, mist nets 12: m long were set for a total of 567.5 net hours and caught 665 bats for an average of 1.2 bats per hour, as compared with 2.9 per hour in the traps.

Tropical bats are ingenious in their ability to fly in a tight space and escape from trap bags that easily contain most temperate species. For this reason, when traps are used in the tropics, heavy wires or additional plastic flaps should be hung from the base of the trap frame and reach nearly to the bottom of the bag. These are recommended for the smaller species of temperate bats as well.

During the summers of 1968, 1969, and 1970 one trap, strung with fine wire, was set for an average of 3 hours per night, mostly in or near cave entrances in Alabama, Florida, and Tennessee. Most trapping was intentionally restricted to sites where nearly all bats caught would be Myotis grisescens. The following bats were trapped: 7830 Myotis austroriparius, more than 100,000 M. grisescens, 328 M. keenii, 1 M. leibii, 303 M. lucifugus, 147 M. sodalis, 800 Pipistrellus subflavus, 196 Eptesicus fuscus, 48 Lasiurus borealis, 3 L. cinereus, 1 L. seminolus, 1 Nycticeius humeralis, and 2 Plecotus rafinesquii.

To illustrate results at sites other than cave entrances, the following examples are presented. On 21 June 1969 a trap was set all night under a large tree limb at the base of a cliff, 6 mi. SE LaFollette, Campbell Co., Tennessee, and the following bats were caught: seven M. grisescens, two M. lucifugus, two E. fuscus, and one L. cinereus. On 18 May 1970 a trap was set all night beside a small pool on an old logging road in the Central Peninsula Wildlife Management Area, Union Co., Tennessee, where it caught eight M. keenii. On 29 August 1970 I set a trap in a narrow place on the Nature Trail, Florida Caverns State Park, Jackson Co., Florida. That night the trap caught 432 M. austroriparius, 35 M. grisescens, and 7 P. subflavus. The trap was reset in the same place on 23 September 1970 and caught 540 M. austroriparius, 9 M. grisescens, and 1 P. subflavus. A trap hung under a foot bridge near the Blue Hole swimming area in the same park caught 39 M. austroriparius on 24 September 1970, and on 21 April 1971 a trap set in a nearby service road (sides blocked by brush) caught nine M. austroriparius, one M. grisescens, and seven L. borealis. A trap set at the edge of secondary deciduous forest in a 13-acre overgrown field 31 August 1970 6 mi. N Decatur, Meigs Co., Tennessee, failed to catch anything before midnight. No bats had been observed in the vicinity, and the probability of catching even one seemed remote. Then two bags containing live M. grisescens, M. keenii, M. lucifugus, and P. subflavus were hung from the sides of the trap. By morning 21 L. borealis, 1 L. seminolus (first record for Tennessee), and 1 N. humeralis had been trapped. Such "baiting," using previously caught bats, is very effective.

Thomas H. Kunz, trapping old barns, culverts, streams, water holes, and cave and mine entrances in Kansas from 1968 to 1971, caught 4000 M. grisescens, 200 M. keenii, 100 M. lucifugus, 20,000 M. velifer, 40 P. subflavus, 500 E. fuscus, 15 L. borealis, 4 P. townsendii, 200 Antrozous pallidus, and 500 Tadarida brasiliensis. He rated the trap as nearly perfect for catching E. fuscus and A. pallidus, excellent for M. keenii, M. lucifugus, and P. subflavus, good to excellent for M. velifer, good for M. grisescens and L. borealis, and poor for T. brasiliensis. Adequately tightened wire and/or perhaps narrower spacing between wires probably would have solved the problem of Tadarida passing completely through both frames.

John P. Farney trapped the following at Badlands National Monument, Jackson Co., South Dakota in the summer of 1969: 400 M. leibii, 1 M. thysanodes, and 25 M. volans. His trap was set at a water hole with one 12^m mist net attached to and extending outward from each side. A third net was set nearby. Almost continuous wind kept the nets blown too tight to be effective for Myotis, and they caught only three M. leibii, one M. thysanodes, and five M. volans. L. cinereus flew exceptionally fast in the wind and invariably passed completely through the trap, whereas 15 were caught in the nets. Again, narrower spaces between wires (not between frames) might have improved trapping success.

Larry C. Watkins trapped for 65 nights in Missouri during the summers of 1969 and 1970 and caught 7 M. grisescens, 2 M. keenii, 640 M. lucifugus, 24 M. sodalis, 781 E. fuscus, and 7341 N. humeralis. His trap was set in doorways to old barns or was suspended from a pulley in front of the eaves of a building (see cover photo).

Uses and Sampling Problems

Since 1968, Kunz and I have found this trap essential to our population studies of M. velifer and grisescens respectively. The trap is excellent for study of: 1) autumn swarming activity at cave entrances, 2) night roost utilization, 3) seasonal and nocturnal food consumption and foraging efficiency of different sex, age, and reproductive groups, 4) warm season weight dynamics (post-absorptive samples taken upon emergence), 5) sex, age, and reproductive ratios. Traps also were used for monitoring foraging and drinking activity over streams and for studying differential emergence activity among sex, age, and reproductive groups.

Study of activity at emergence or during the night should be limited to large colonies in multiple entrance caverns, or should involve only a small fraction of the area in a large cave entrance. Otherwise, traffic jams and learning become serious problems. In both M. grisescens and M. velifer, learning normally became a problem as soon as a large fraction of a colony had been captured once, and some sampling problems--resulting from the bat's memory of capture--appeared to persist up to a year after initial capture (manuscript in preparation). With time, differential learning opportunity may render sex and age ratios unreliable. If a maternity

colony of M. grisescens is trapped heavily in June, many females learn about traps. Later, in July and August, large numbers of males return to join the females. At that time the naive males are easily trapped whereas the females are not. Young of the year are poor fliers for at least their first 14 days of flight (in addition to being naive) and are caught in large numbers even when most adults escape.

Suggested Modifications

It sometimes is difficult to trap large phyllostomatids, which escape either by bouncing off the wires or passing completely through both frames. I suspect that use of more elastic springs, combined with reduced space between the vertical wires on each frame, would correct this problem while still permitting capture of smaller vespertilionids and emballonurids. My first traps, used exclusively and successfully in the tropics, were strung with six or eight pound monofilament fish line rather than wire. These traps also differed from present models in that the vertical wires were spaced with alternating 3/4 and 1/2 inch intervals on both frames. Wire was later substituted for fish line, since the latter was very easily damaged by bat's teeth. For convenience, later traps used in temperate regions were wired with uniform 3/4 inch spacing without any apparent loss in efficiency. However, a trap accidentally drilled for 1 inch spacing, was found to be adequate for catching vespertilionids, so all subsequent traps have employed the 1 inch spacing. It is quite possible that testing of one of the two earlier spacing intervals will lead to improved versatility, especially in the tropics. Much more experimentation is needed.

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SOUTHERN EXTENSION IN THE KNOWN RANGE OF PLECOTUS RAFINESQUII

The geographical range of Plecotus rafinesquii extends throughout the southeastern United States with locality records as far south as the northern half of Florida (Jennings 1958). The southern-most locality previously known for the species is Zellwood, Orange County, Florida, which is located about 20 miles northwest of Orlando (Moore 1949). However, on 29-31 March, 1973, and again on 15 September 1973, single specimens of Plecotus rafinesquii were recorded at a locality on the Hillsborough River near Tampa Bay on the west coast of Florida. The bats were found roosting in an old wooden cabin located in a live-oak hammock, one-half mile west of the Morris Bridge over the Hillsborough River, just northeast of Tampa, Hillsborough County, Florida. This is a southwestward range extension of over 80 miles from the Zellwood locality, and the first record in the coastal plains portion of southwestern Florida.

The specimen observed in March roosted for three successive days at one spot in the rafters of the semi-dark cabin and then disappeared before collected. The cabin was checked periodically throughout the rest of the spring and summer of 1973, but no big-eared bats were found. However, on

15 September, a single adult male Plecotus rafinesquii was collected while roosting in the same location. This specimen was prepared as a museum skin and is preserved in the University of South Florida Zoological Collections. Mist nets placed across the cabin doors on several nights during the summer and fall of 1973 failed to produce further specimens.

The sporadic presence of Plecotus rafinesquii in the Tampa Bay area may represent seasonal wanderings of a few individuals from more northern localities, where the species is relatively common. It is also possible, however, that the species has a permanent colony in the Tampa Bay region and the cabin merely represents a peripheral roosting location. More intensive field work in suitable habitats throughout the area is required to explore these possibilities further.

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A COLORADO COLONY OF TADARIDA BRASILIENSIS

In August of 1967 I discovered a colony of Tadarida brasiliensis in the Orient Mine in the Sangre de Cristo Mountains of Saguache County, Colorado (Meacham 1971). This is apparently the only known colony of T. brasiliensis in the state of Colorado (W. H. Davis, pers. comm.).

I estimated the population to be 9,000 or more on the basis of air densities during the 30 plus minutes the main evening flight of bats took to clear the mine tunnels. I watched only the primary exit of the mine; there are other exits the bats could use. Two smaller flights that took place later could have been of other species. I have found up to seven Plecotus townsendii (10 August 1962) in the lower portion of the mine and two Myotis leibii (August 1967) in an old cabin nearby.

The Orient Mine, an abandoned iron mine, is located at an elevation between 8,500 to 9,000 feet. It belongs to the Colorado Fuel and Iron Corp. and was closed after a serious accident about 1932, following 50 years of operation (Stone 1934). The mine is composed of a series of tunnels intersecting natural cave passages in the Leadville Limestone, with large chambers produced by the "block and cave" mining technique. I judge it unlikely that the bats could have been residents of even the natural cave passages prior to the mine's closure due to Tadarida's intolerance of disturbances (Humphrey 1969). The mine is quite cold, with permanent ice in some areas, while the roost climate is extremely variable. The population may be exposed to sudden climatic changes during flights both early and late in the season.

Due to the proximity of this colony to extensive agricultural areas of the San Luis Valley it would be interesting to determine the effects of organochlorine pesticides in recent years.

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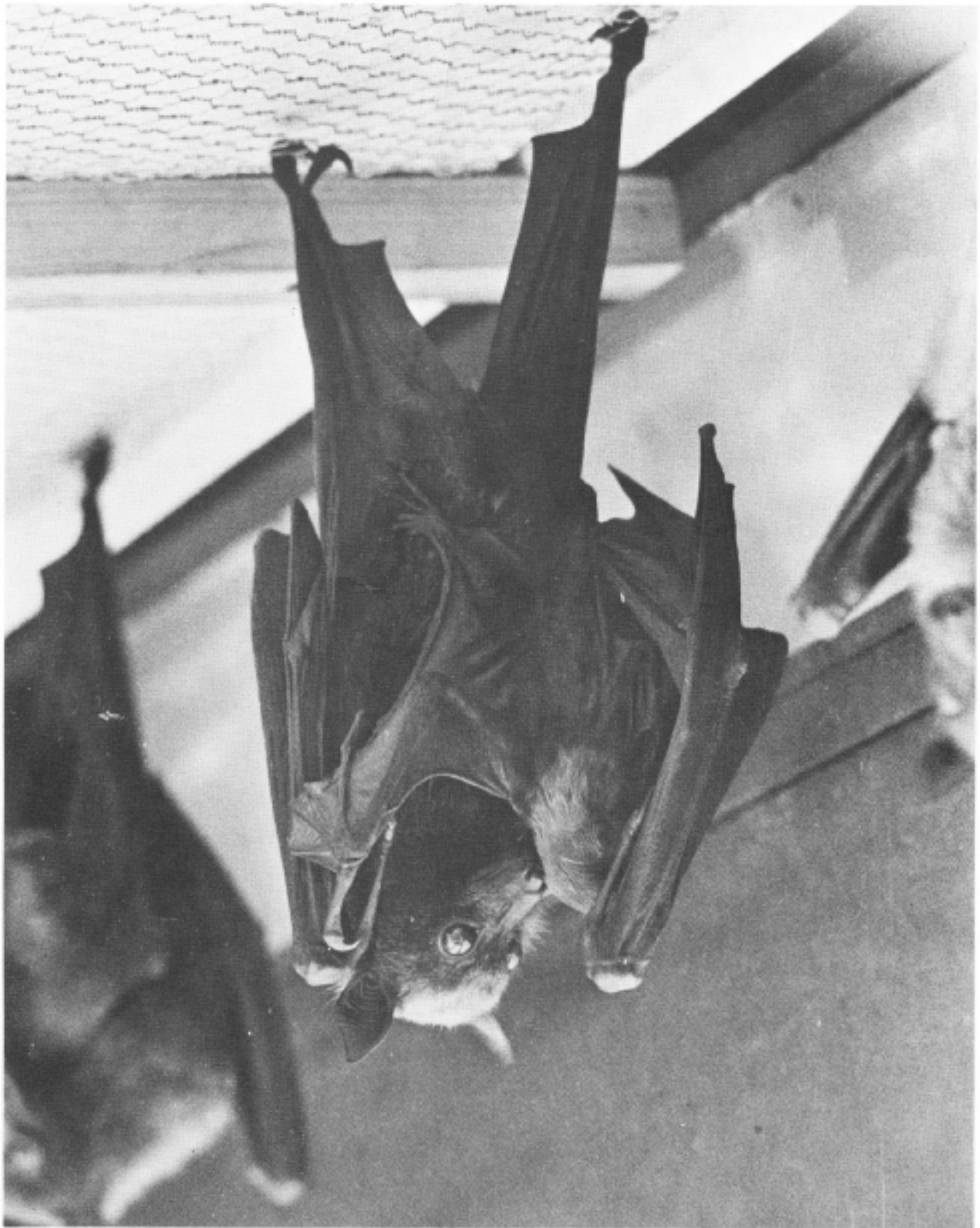
RECENT LITERATURE

Compiled by Larry C. 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*, and the Recent Literature Section of the *Journal of Mammalogy*. BRN subscribers are urged to send their reprints or reprint titles to the above address.

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12-7-74

THE COVER

The cover features mother and baby Pteropus giganteus from a colony established in Reading, England, in the Department of Applied Physical Sciences at the University of Reading by Cherrie D. Bramwell, who provided the photo. Information on the current status of the colony is given in the NEWS section.

Bat Research News appears quarterly: January, April, July, and October. The subscription rate for 1974 is \$1. Address correspondence to the Editor, Robert L. Martin, Department of Biology, University of Maine, Farmington, Maine 04938, U.S.A.

EDITORIAL COMMENTS

My sincere thanks to Steve Humphrey for handling the two issues of BRN while I was working in Paraguay and attempting to get re-established in this country afterward. Since I am returning to the Chaco Boreal area in July with a return date late in August, the July issue will appear early in the month of September. Please continue to send news, potential notes, and cover photographs to me, but don't expect to hear from me until September at the earliest.

Costs of producing and mailing BRN will force a subscription rate increase beginning with the January 1975 issue. Those of you who have already extended your subscriptions at the current rate are covered by the old rate, but all renewals and new subscribers will be faced with a rate of \$2.00 per year, to be paid at the minimum of \$4.00 for two years. Subscriptions for one year take more time than they can produce in revenue, so a two-year minimum is necessary.

NEWS

In the book, "Ascension", by Duff Hart-Davis (Doubleday & Co., 1973), concerning the South Atlantic island of that name, there is the report of an 1887 attempt to acquire bats (along with frogs and hedgehogs) for insect control on the island; it was unsuccessful, as the Curator of the South African Museum in Cape Town was unable to provide a supply of live bats. As readers may know, the island currently houses a space station for the Apollo moon program.

W. H. Freeman and Company in their Scientific American reprint readings book "Vertebrate Structures and Functions" have included the same paper by Donald R. Griffin that they included in their Scientific American reprint readings book "Vertebrate Adaptations", a five-page reprint of Griffin's 1958 paper entitled, "More About Bat Radar".

Bats get adequate coverage in Milton Hildebrand's new text, "Analysis of Vertebrate Structure" just put out by John Wiley & Sons. For a basic undergraduate introductory course, it is simple, lucid, and direct in its coverage.

Cherrie Bramwell writes, "We now have 22 bats, Pteropus giganteus, living in the Belfry in this Department. Nine were born this year between February and April - that is, each female had one. There were three female babies and six male. All have the same father, Balls, who was 'top bat' (dominant male) during 1972. He has now been replaced by another large male, Peter Atkinson, after a very nasty fight resulting in torn wings. We were able to watch the babies being born and note all details - the whole process takes about three to four hours. They stay close to the mothers for four months and are weaned at six months. After this all the babies form a sub-group, roosting together behind the bat curtain. After three weeks they emerge and fight for a place to hang in the main colony. One small bat, Tom Dooley, was picked on by the others and not allowed to feed. He is now housed separately and is very tame. Next summer he can help in flight experiments. All the females are now pregnant again (ed. note - this was in November 1973), ready to produce more bats next year."

The six-page article by Harold B. Hitchcock, "Reflections of a Batman", in the January-February 1974 Massachusetts Wildlife magazine, with photos by Jack Swedberg, includes a nice back cover color photo with a description of bats as "living insecticides". This popular yet technically accurate article does justice to Hal's 31 years of teaching in continuing to help educate the public as to the value of bats.

The report of the self-supporting fruit bat research project in Nigeria [BRN, 15(1): 2] elicited an outraged response from one reader who suggested that such action sets up an unstable system which could lead to the unfortunate demise of the research subjects themselves. Since the project has been running for two years in an area where bats are utilized as a source of protein anyway, I find the project quite acceptable as long as the management of the species (Eidolon helvum) results in a sustained yield and does not reduce the population below survival limits. Each year here in Maine we remove between 20,000 and 40,000 deer from the white-tailed deer population and from where I sit typing this issue of BRN I look out over fields where every year a small herd of deer browse and graze; the individuals change, but the herd size remains relatively constant. As long as the species is given the opportunity to prosper (deer herd depletion is now more the result of habitat destruction rather than from human killing), an annual harvest is acceptable and desirable. Deer have been provided this opportunity only through research and law enforcement provided by fees from hunting licenses in many states (the entire game programs for years having been derived entirely from such license fees) and the federal funding derived from the excise taxes on sporting arms and ammunition through the Pittman-Robertson Federal Aid in Wildlife Restoration Act of 1937. If bats were to be classed as game animals, they could then be protected by state game laws (even rare and endangered bats have no federal enforcement provisions for protection at this time), which is a current trend. Recognition of bats as "wildlife" (hence, desirable rather than verminous in the mind of the public) might also aid in public education as to the value of insectivorous bats. Since it is unlikely that we could harvest for economic purposes (although we have been harvesting bats for scientific purposes for many years), the question remains rather academic; in the conditions prevailing in Nigeria, however, utilization of fructivorous forms as food may possibly provide the impetus for proper management of their populations. I certainly hope that this is the case.

I note that James Dale Smith gave a paper on "trophic comparisons of the chiropteran faunas from islands off the northwestern coast of Venezuela" at the Southern California Academy of Sciences meeting on 4 May 1974.

The National Speleological Society, Cave Avenue, Huntsville, Alabama 35810, is selling the booklet, "What About Bats", by James K. Baker, for \$1.25 to NSS members. Published by the Carlsbad Caverns Natural History Association, Ken's booklet is an excellent example of what can be written to educate and interest the public. It is for sale at the Carlsbad Caverns National Park's sales counter at Carlsbad.

The book, "Rufus", by Tomi Ungerer (Harper & Row, N.Y., 1961), is a 32-page, large-format story about a bat. With full-page drawings, it is (I guess) for children of about 3rd or 4th grade level. While not overly informative, it is definitely not anti-bat; any childrens' literature that pictures bats in a favorable or sympathetic light is useful programming.

The cassette tape, "The Grizzly and the Gadgets", readings from James Thurber by Peter Ustinov, has one entitled, "The Bat Who Got The Hell Out", which is quite hilarious to one who is not put off by satire on some of our human idiosyncrasies.

The February 1974 issue of National Parks & Conservation magazine has an article, "The Hawaiian Hoary Bat, Daredevil of the Volcanoes", by P. Quentin Tomich, which has a practical twist. Most popular papers merely hope to educate and inform, sometimes leaving readers with a "goodness, isn't that awful, someone should do something, tch, tch, tch" feeling, but this article has an insert with a practical suggestion. For those who are concerned about the survival of the Hawaiian hoary bat and interested in promoting the identification and preservation of sufficient natural habitat for it, the readers are asked to write to Mr. Keith M. Schredner, Office of Endangered Species, Bureau of Sport Fisheries and Wildlife, Department of the Interior, Washington, D.C. 20240.

Thomas B. Allen's "Vanishing Wildlife of North America", published by the National Geographic Society this year, has a brief write-up on the Indiana bat and the Ozark big-eared bat as endangered species; one paragraph and two pages of color photographs by Roger W. Barbour make up the entire bat coverage in the book. As the old saying goes, "It is the squeaking wheel that gets the grease." - bat biologists had better get squeaking. There are no bats pictured on the latest set of Endangered Species Stamps put out by the National Wildlife Federation; their preference for more obvious and popular species is most reasonable. It is up to us to make bats more popular; who ever heard of the dinosaurs before Cope and Marsh popularized them?

Robert E. Stebbings, the chairman of the International Council for the Protection of Endangered Bats, has sent a nice pamphlet, "Focus on Bats". A brief coverage of the 15 British species of bats followed by sections on control, conservation, and consultation and advice and a final page summarizing information on the bat species make up the pamphlet, published by the Society for the Promotion of Nature Reserves. It is a beautiful example of what we should do in the various parts of the U.S.

EDITED, UNREFEREED PUBLICATION

HEMATOCRIT AND HEMOGLOBIN LEVELS IN ADULT AND FETAL BIG BROWN BATS,
Eptesicus fuscus

Very little work has been previously undertaken on the hematological profiles in bats. Bruce (1971) reported that changes in hematocrit occurred during the summer activity and winter hibernation in the little brown bat, Myotis lucifugus. Davis, et al. (1967) reported the changes which occurred between winter dormancy and summer activity in little brown bats. Dunaway and Lewis (1965) correlated the RBC count, mean corpuscular volume, and body weight to the taxonomic relationship of the various mammalian groups. Mitchell (1966) reported the occurrence of various molecular weight hemoglobins in North American vespertilionids. It is understandable why so little work has taken place within the order Chiroptera; the problems of collecting the samples, storing the collected blood, preventing rapid coagulation, as well as collecting sufficient sample quantities all present logistic problems in technique.

During the week of 6-12 June 1973, ten pregnant big brown bats, Eptesicus fuscus, were collected from a maternal colony in Somerset, Pulaski County, Kentucky. The bats were all approaching the terminal date of pregnancy. The adults were decapitated and the blood collected for hematocrit and hemoglobin determinations by methods outlined by Bauer, et al. (1968). The fetuses were removed from the uteri and decapitated, with the blood from the fetuses collected in the same manner as for the adults.

Both adult and fetal hematocrits were determined by centrifuging the micro-hematocrit capillary tube for five minutes at 3100 rpm. The hematocrit was then read on a standard micro-hematocrit reader. The hemoglobin concentration was determined by the cyanmethyhemoglobin technique. The term fetal hemoglobin referred to herein is not synonymous with the hemoglobin "F" of Wintrobe (1967).

Hematocrit and hemoglobin values for adults and fetuses were as follows: adult hematocrit range 44-55%, mean 49.8%, S.D. 5.73; adult hemoglobin range 11.1-19.4 gm/100cc, mean 14.6 gm/100cc, S.D. 2.40; fetal hematocrit range 36-43%, mean 39.0%, S.D. 2.36; fetal hemoglobin range 8.3-12.4 gm/100cc, mean 9.3 gm/100cc, S.D. 1.84.

The exact meaning of the higher hematocrit and hemoglobin levels in the adults as compared to those of the fetuses is not understood at this time. The inflated adult to fetal comparisons are similar to those reported in goats and swine, but reversed from those found in humans, cats, cattle, rabbits, rats, and sheep (Dittmer, 1961). We suspect that the lower hemoglobin levels in the fetuses probably means that the fetuses have a higher level of Wintrobe's hemoglobin "F" to correct for the oxygen dissociation differences between mother and fetus which is not present in adult lung tissue. The corrected dissociations would probably be somewhat distorted from the curves of dissociation as reported for sheep (Meschia, et al., 1961). We are currently testing this hypothesis.

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MORE NEWS

The Associated Press got hold of Roy Horst's vampire bat kidney work and released a story and photo on the work. Aside from a few snide comments and incorrectly spelling Roy's name under the photo, it wasn't a bad write-up.

The Fourth International Bat Research Conference will be held from the 22-29 September 1975, in Nairobi, Kenya. I hope to have more details for a future BRN, but in the meantime, information may be obtained from Dr. K. W. Turgeon, Secretary, F.I.B.R.C., Department of Zoology, Kenyatta University College, P.O. Box 43844, Nairobi, Kenya.

Pablo Correa Girón has written to note that readers may be interested in the summary tables in his bulletin entitled "Encefalitis equina de Venezuela" published by the Instituto Nacional de Investigaciones Pecuarias, S.A.G., Mexico, 1972. Figure 6 lists the arboviruses isolated from bats captured in different parts of the world, with references. Figure 7 provides a summary of references on the presence of antibodies against arboviruses for the world, and Figure 8 summarizes the bats found susceptible to experimental inoculation to arboviruses. Figure 9 gives the results of his 1968 work in San Luis Potosi and Veracruz on H1 antibodies. Dr. Correa Giron and others found an epidemic strain of Venezuelan equine encephalomyelitis virus in a vampire bat in Oaxaca in 1970 (Science, 175(4021):546-547, 1972).

The October 1973 issue of Australian Bat Research News notes that histoplasmosis has been found in an Australian bat cave.

A 1963 Universal International movie film, "Kiss of Evil", is now appearing on the late evening television shows. A honeymoon couple lured to a Bavarian chateau by human vampires is saved by a veritable cloud of bats summoned up to destroy the human vampires; perhaps this might be considered to offset the current movie film "Chosen Survivors". The latter movie follows a group of thermonuclear disaster victims who have most of the pooled talent to recivilize the earth (except common sense), but who face a group of exceptionally intelligent vampire bats who share their cave. From my point of view, the vampire bats should have won for the good of human civilization (you don't have to be a eugeneticist to agree, either, if you watch these neurotics), but the bats are cast in the role of bad guys again - even Daphne DuMaurier chose birds (remember Alfred Hitchcock's movie, "The Birds", based on her book?).

Anthony Smith's book, "Mato Grosso", published in 1971 by E. P. Dutton and Company, Inc., N.Y., has a nice photograph of Ron Pine's hand holding an Artibeus.

American Caves and Caving, by Dr. William R. Halliday (Harper & Row, N.Y., 1974) treats bats quite sympathetically and rationally. His section on rabies is excellent and places the problem of rabies in bats in the proper perspective. Writers of caving books have frequently been pro-bat, as I note in re-reading Franklin Folsom's Exploring American Caves, a 1962 Collier Books paperback edition.

The Harrisburg, Pennsylvania, newspaper, The Patriot, reported on some of Carleton Phillips' work in an article entitled "Bats' Dentist Defends Patients Given Bad Press". The August 2, 1973, article sent on to me by a BRN reader not only gives some good publicity for bats, but even mentions BRN.

In The Theater at Monmouth, Maine, in the summer of 1972, during a production of "An Evening with Harold Pinter", a bat swooped back and forth over the audience for over an hour while the play went on. Because of the epidemic of rabies in Maine that summer, the audience swayed and ducked like a field of wheat before a wind as the bat flew back and forth; the mosquito population was high and the bat was presumed to be feeding on engorged mosquitoes, which probably helped to quell the panic. This was reported in a Maine Sunday Telegram news article on the theater in Maine by William Steel on 7 April 1974. It does illustrate the conflicting picture of bats in the public mind; a dog walking through the audience would not have raised the spectre of rabies, and one wonders whether the bat was really feeding on the troublesome mosquitoes.

The Wildlife Society, leaders in wildlife management policy-making, have a number of position statements available (The Wildlife Society, Suite S176, 3900 Wisconsin Ave., N.W., Washington, D.C. 20016), but in their book entitled Wildlife Management Techniques, 1971, edited by R. H. Giles, Jr., DDT is suggested for bat control (p. 517) and gasses noted (p. 524) as well. Since bats come to the attention of wildlife management specialists usually in the form of pest problems, not as a game species to be managed, this treatment is not surprising, and provides further backing for my hopes of providing bats with state game law protection; many states have already done so, either for bats in general or by specific name. More on that in later issues of BRN.

RECENT LITERATURE

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BAT RESEARCH NEWS

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July 1974



THE COVER

The cover photographs are of a pallid bat, Atrozous pallidus, feeding on a scorpion, Vejovius sp. Tim Dooley, working on his master's at the University of Texas at El Paso on the bats of El Paso County, fed six scorpions to the same bat, which made no attempt to avoid being stung by them. The bat displayed a greater preference for scorpions than for meal worms and shorthorned grasshoppers. The legs and tail of the scorpions were left uneaten in every case. The photographs were taken by Dr. Seth Edwards of the Education Department of UTEP.

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EDITORIAL COMMENTS

Unless you, as a subscriber, actually submit information on what you are engaged in, I hesitate to write that information up for mention in BRN, and thus would like to request strongly that every active bat research worker submit such a brief write-up now and then. While it appears desirable now and then to arbitrarily insert such information, I am reluctant to include what some of you might wish to consider rather privileged information or what you might wish to pass on to only members of your own select circle of friends. A low profile does not guarantee that others will not be doing what you are, as many cannot attend annual meetings and would still like to be able to advise beginning graduate students, etc. Busy as you are, it is in the best interests of all bat biologists to know what other workers are doing in all parts of the world, rather than to find out accidentally now and then. Please also continue to send reprints of your papers to Larry Watkins; while I would like copies myself, it ensures that they will be noted in the Recent Literature section if you send copies to Larry.

NEWS

Histoplasmosis acquired from activities in bat-inhabited caves has been noted often enough to acquaint bat biologists and cavers of the danger from this disease, and enough of us have had the unpleasant experience of varying degrees of severity of infection to make us aware of the serious nature of the fungus. For the lay public, however, the presence of this fungus may generate hostility and danger to the bats (see Steve Humphrey's report on page 54 of Vol. 14, No. 4, of BRN), or it may have the desirable effect of keeping people away from the bat-inhabited caves, as may be the case in Australia. For general information of those of you who may have to combat an irate local citizenry, Warren C. Lewis' article entitled, "Histoplasmosis in Caves" in the February 1974 issue of the National Speleological Society's NSS News (Vol. 32, No. 2: 22-26) provides many case histories and is very interesting reading.

Ralph Wetzel and I returned to Paraguay in July for work in both the southeastern portion of the country where the jungles is being cleared and in the Chaco. Bat reports will be forthcoming, and BRN is thus guaranteed to be delayed for even longer time periods than usual, especially since no one has responded to my subtle hints for help in preparing sections of BRN, as for echolocation studies, ecological studies, taxonomic studies, parasite and disease studies, etc.

Although the distribution list for the publication indicates that most sonar specialists throughout the world may have received a copy, it seems worthwhile mentioning that K. Jerome Diercks' tome, A Collection of Translations of Foreign Language Papers on the Subject of Biological Sonar Systems, ARL-TR-74-9, published through the Applied Research Laboratories of the University of Texas at Austin, might be of interest to some subscribers. Published in February 1974 under a Naval Undersea Center Contract, it is a collection of 18 Russian and French papers which Jerry thought important and not readily available in translation in this country.

In the 1973 Norton Anthology of Modern Poetry, edited by R. Ellmann and R. O'Clair and published by W.W. Norton & Company, Inc., New York, there is a rather whimsical poem entitled, "Bats", although it refers in fact to passengers of the London Underground (subway). Written by George Macbeth, it could equally well refer to passengers of the subways of Paris or New York, and still delight the literary bat biologist.

The Family Bible Encyclopedia, published by Caryl Publishing Counsel, Inc., New York, in 1972, has a 1/3 page illustration of a long-eared bat and a paragraph on bats mentioned in the Bible (presumably the King James Version). I must admit that the charming person who brought this to my attention was overcome with mirth on my response to the sentence which notes, ".....but because of their general filth they are listed among the animals forbidden by the Levitical Code...". I doubt that this was the actual reason, any more than religious prohibitions against pork; perhaps histoplasmosis may have been involved, as trichinosis seems a logical and much accepted reason for the pork prohibitions. Dirty, maybe, but not filthy.....

The scanning electron microscope seems to have been put to good use again, this time on bacula, as illustrated in a paper by Hans Baagø; the microphotographs of bacula of Myotis mystacinus and Myotis brandtii are easily contrasted, much more so than by line drawings. The paper is: "Taxonomy of two sibling species of bats in Scandinavia Myotis mystacinus and Myotis brandtii (Chiroptera), 1973, Videnskabelige Meddelelsfer fra Dansk Naturhistorisk Forening, 136: 191-216.

The Potomac Caver, published by the Potomac Speleological Club of Virginia, in their May 1974 issue gave a "Virginia Region Bat Caves Critical Periods" listing of times during the year when caves in that region should not be entered due to effects on bat populations. The cavers of this group deserve a hearty round of applause and even more for their positive response to the problem.

One of the few papers on DDT and bats I have come across is: J.D. Dunsmore, L.S. Hall, and K.H. Kottek, 1974, DDT in the Bent-winged Bat in Australia, Search, 5(3): 110-111. To save time, I'll send Xerox copies to anyone in U.S. who wishes a copy.

Eddie Wells, sending a news clipping from the Fort Worth (Texas) Star-Telegram of August 23, writes: "I saw only one local TV news story dealing with this topic ('4 Reports of Rabid Bats Held No Cause for Alarm'). The newsman's introductory remarks to the story were rather inflammatory. However, the story itself gave the background to the problem and how the officials in Garland, Texas, were approaching the problem. Garland dog catchers were showing the local kids pictures of bats and telling them what to do if any animals that looked like the creatures in the pictures were seen. The one dog catcher who was interviewed on film emphasized that bats are beneficial to humans and that they should definitely not be killed or bothered....." The State Bureau of Veterinary Health spokesman, Dr. William R. Bilderback, reported to the news media that the rate of bat rabies was low in the state and that there was no reason to eradicate bat colonies.

Bob Stebbings is still collecting any and all dead bats available in the British Isles; the last report I had was that he has 874 British bats which would have been discarded and data from them lost to science if he had not had the initiative to request that bats found dead in any shape or form (he has strength of nose as well as character!) be shipped to him.

The March 1974 issue of BIOS has a paper, "Feeding Ecology of Insectivorous Bats", by Brock Fenton; his address to the Beta Beta Beta National Biological Society's Northeast District Convention at St. Lawrence University. A good 13 page coverage suitable for layman as well as biologist, it is the sort of address that should be encouraged.

The Wisconsin Speleologist, Vol 12, No. 1, for Winter 1973 has an article on Bat Cave in the Thunder Bay District of Ontario in which the presence of humans during the hibernating season is noted as being detrimental to the Eptesicus fuscus, Myotis lucifugus, and Myotis keenii there. The author of the article, Thomas W. King, suggests that both educational and legal means should be employed to protect and preserve the cave.

The Tech Troglodyte, Vol. 12, No. 3, for Spring 1974, has an article entitled, "Good News is Bat News" by Bobbi Nagy. Next to the title is a figure of the Bat God of the Central American Indians. It is a good write-up of the National Speleological Society's resolution supporting a year-round moratorium on Hellhole Cave in West Virginia, and notes that John Hall is now working on the bat problem there. Congratulations to all those who honor the moratorium.

The August 25 issue of the Maine Sunday Telegram had an article on Ken Geluso, Scott Altenbach, and Don Wilson's work on Mexican free-tailed bats in Carlsbad Caverns, New Mexico. It quoted some of Ken's remarks on bats and gave some favorable propaganda for bats in general.

One of Maine's most influential outdoors writers, Gene Letourneau, in many Maine newspapers (mine was the August 22 issue of the Waterville Sentinel), had a column in which he related with apparent glee how he had "discovered" what others in the state who give answers on bat problems had overlooked as a method of getting rid of bats. By sealing openings in the window blinds of a summer camp and spraying two kinds of insect repellent into the cracks, he was able to kill 16 bats. Technically, this probably violates state pesticide use regulations, but I doubt that it would be applied. Then he went on to relate how the operator of a sporting camp with a bat problem in

his kitchen area solved the problem by getting the services of expert skeet shooters with .22 shot. "It was keen wing shooting, so the skeeters said." To justify all this Letourneau gave his statistical analysis of the bat rabies problem, noting the 1973 annual report of the U.S. Department of Health, Education, and Welfare listed bats as the third type of animal most frequently reported as having rabies. Considering that the chances of being killed by a drunken driver are over a million to one greater than being killed by bat-transmitted rabies, one might use his reasoning for going into the nearest bar with a shotgun in order to reduce your risk of being killed by a drunken driver. His advocacy of high bounties on predators and his desire to exterminate coyotes in the state continue to win him the high regard of many in the state. No comment.

SHORT NOTE

NOTES ON STENODERMA RUFUM DEMAREST

In May 1974 the authors obtained four specimens of Stenoderma rufum, now deposited in the Louisiana State Museum of Zoology. Three of these specimens, two females and one male, were the only bats taken in a mist net placed across a path for one night (10 May 1974) at Hacienda Roses, 17.5 road km NE Utuado, Puerto Rico, 340 m elevation. This area is mesic (though unusually dry at the time) and consists of patches of second growth "forest" and coffee groves, some in apparent disuse. In 1965 one of us, Richard Thomas, collected the first nonfossil specimens of this species from Puerto Rico, at the same locality although not at the precise spot (specimens in the Albert Schwartz collection). The 1965 bats were taken in a well-tended coffee grove within a kilometer to the east or southeast of the 1974 net placement, which was in cutover woods adjacent to the road leading to the hacienda buildings. A female S. rufum was collected on 13 May 1974, 1 km E, 4 km N Susa (airline distances), 150 m elevation, in southwestern Puerto Rico. The net was set for one night across the dry river bed of the Río Loco; also taken in the same net were one Artibeus jamaicensis and one Brachyphylla cavernarum. The river banks of the Río Loco in this area have a woods-like aspect, including introduced as well as native trees and bamboo; the surrounding hillsides are covered with a scrubber, more xerophytic vegetation.

Tamsitt and Valdivieso (1970) stated that Puerto Rican S. rufum might be relict in the Luquillo rain forest, although Hall and Tamsitt (1968) had described Stenoderma rufum darioi based on the 1965 specimens from Hacienda Roses in addition to specimens from the Luquillo forest (El Verde). Those are the only two localities from which nonfossil Puerto Rican S. rufum have been recorded heretofore. S. r. darioi was diagnosed as being darker in pelage and in ear color than nominate S. r. rufum in the Virgin Islands; no skull or mensural features were diagnostic. Some credence was given to supposed habitat differences between the two subspecies; S. r. darioi was stated to have been found "typically in dense rain forest" and S. r. rufum in a region of "dry arborescent vegetation".

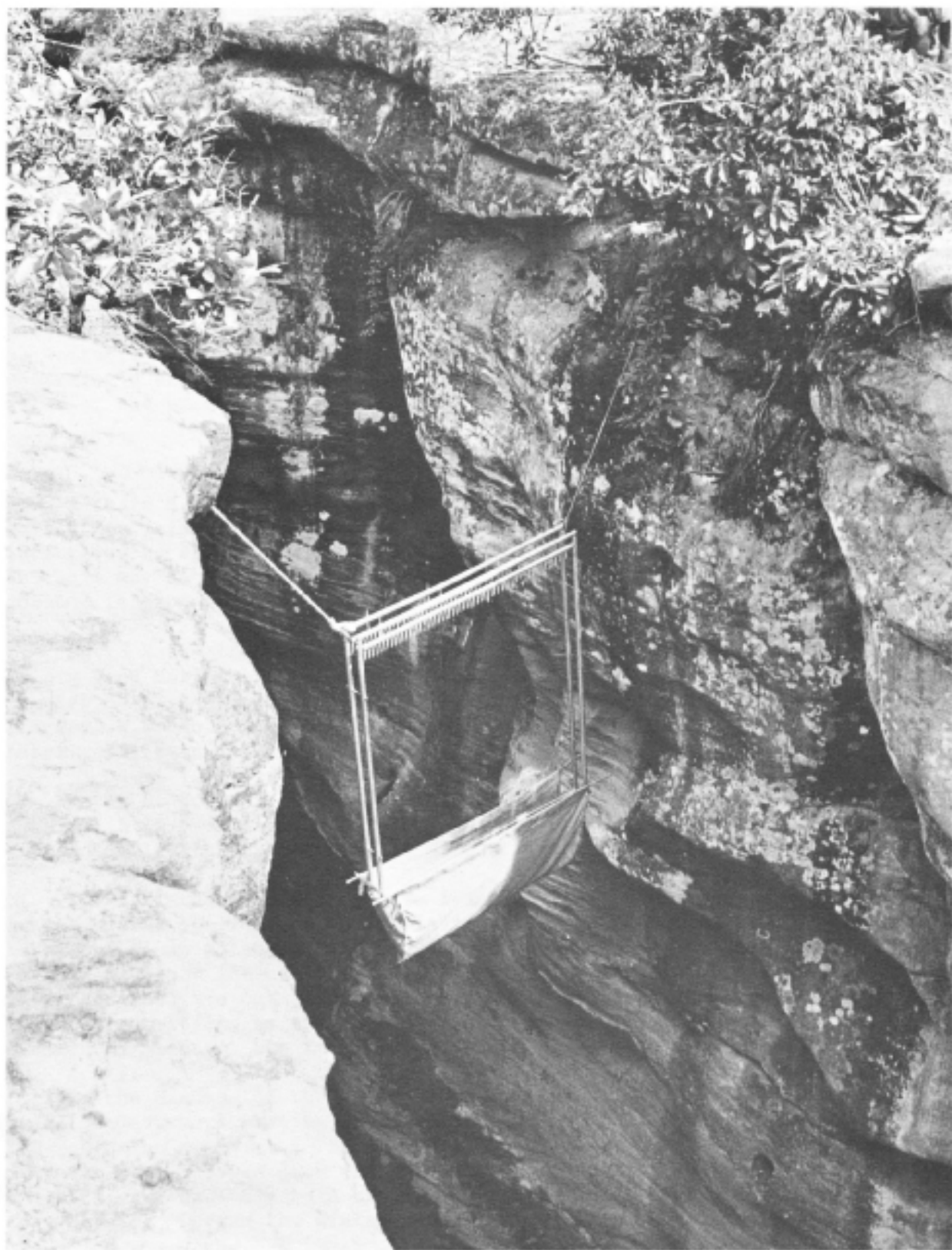
Our specimens are variable in pelage color, the Río Loco individual falling within the variation of the two skins from Hacienda Roses (an adult

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THE COVER

The cover photograph, provided by M. Brock Fenton, is of a bat trap slung in the gorge of the Sengwa River in the Sengwa Wildlife Research Area in Rhodesia. Bats caught in this location included Rhinolophus fumigatus, R. hildebrandti, and Scotophilus leucogaster. Outstanding photographs

such as this are needed for future issues of Bat Research News. Even if the subject matter has been printed elsewhere in another form, the photograph may be suitable for cover use; the presence of color photographs of an Antrozous devouring a scorpion in Leen & Novick's *The World of Bats* did not lessen the value of the photographs used for the July 1974 BRN cover.

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NEWS

Richard K. LaVal is doing some teaching in evolution at the University of Natal, but mainly working with a CSIR grant to study the seasonal cycles of insectivorous and frugivorous bats in Natal. Jack Bradbury and wife visited on their way to the bird meetings in Canberra; they have been studying Hypsignathus in Gabon.

David Easterla notes that his 1973 "Ecology of the 18 species of chiroptera at Big Bend National Park, Texas" paper in the N.W. Missouri State University Studies 34 (2 & 3): 165 pp. is available through either: Publ. Dept., Wells Library, N.W. Mo. State Univ., Maryville, Mo. 64468 or Big Bend Natural History Asspc., Big Bend Nat. Park, Tex. 79834.

Peter B. Eccles, at the University of the Pacific, Stockton, California, received a 1975-75 Sigma Xi Grant-in-Aid of Research for a study of the vertical distribution of bats in the Sierra Nevada of California.

The 7 Eleven Food Stores have featured the Indiana Bat, Myotis sodalis, an endangered species, on their plastic "slurpee" drinking cups. My sincere congratulations to them! The big Friends of Animals poster on Endangered Species does not include the Indiana Bat, which is merely indicative of the fact that bats are not as dramatic or cuddly as other forms on the list; this is not a complaint, as they couldn't picture more than 22 of the more than 100 endangered species, but it illustrates our problem in "selling" bats.

In the Minutes of the National Speleological Society's 12 August 1974 Board of Governors Meeting is a section on cave conservation which includes the following statement: "Bats and all other forms of cave life must never be disturbed nor removed from the cave for any purpose. Many species of cave life are very rare and have been brought to the verge of extinction by collectors and vandals. During the winter months, hibernating bats should be left strictly

alone. Awakened too often, they will use up their winter's store of fuel and die of starvation before summer. Most bats are extremely beneficial as insect-eaters and should never be harmed. Some caves have been designated as special bat habitats and are closed for exploration for all or part of each year." As a member of the NSS, which is facing the problem of whether to expand or restrict recruitment of membership, I am pleased to think that if non-member cavers are recruited, they will then fall under the influence of dedicated and concerned speleologists. Introducing people to caving can only aggravate an already serious situation, but I would prefer to see existing cavers brought into a group which has many conservation-oriented leaders.

Andrea Worden and her husband have had an Eptesicus fuscus for over a year. Captured in a barn near Santa Barbara, California, it has been their pet since that time. She writes that she is setting up a pro-bat bulletin board at the library where she works to help offset the bad press that bats have had.

In a letter to the editor of the Maine Sunday Telegram, published on 29 September 1974, Mrs. Thomas S. Maxwell of Oradell, New Jersey 07649, representing The Humane Society of the U.S., made some comments which I feel should be examined. The Humane Society of the U.S. is against the use of the leg-hold trap, and letters to the editors of Maine newspapers argue the matter frequently, and the main portion of Mrs. Maxwell's letter deals with the issue of leg-hold traps. Assuming for some reason that trapping is carried out for rabies control, as it may be in some areas, she notes that there were no cases of rabies in New Jersey in 1972 except in bats; "The single exception in New Jersey is bat rabies, of which there is a high incidence throughout the country. If trappers are sincerely motivated by concern for public welfare, they would pursue bat trapping." Aside from all the interesting ramifications of public welfare motivation in trapping mammals, it is interesting to note that she seems to feel that it would be acceptable to inflict the pain of leg-hold traps on bats that should not be inflicted on other animals. If trappers are going to hurt animals, why not hurt those nasty rabid bats? I'm sure that she did not mean that she would approve of injuring bats (on second thought, I'm not so sure), but whatever she did mean, she certainly was not thinking of bats in a humane sense. If you have the time, a short note to her might help educate The Humane Society of the U.S. Kind and well-meaning people sometimes have blind spots as a result of their upbringing, and bats have had a bad press. Polite, informative letters to governmental and private society officials help in this process of offsetting that poor upbringing. On the other hand, violent and vindictive letters tend to confirm the suspicions of such people that the opposition is composed of unreasonable and intemperate boors. Please write; it may help.

The Winter 1974 issue of the Eastern Tree Farm News has an item on the National Forest Products Association Wildlife Task Force; while concerned about the possible modification or curtailment of timber management activities on federal lands identified as being critical habitat for threatened or endangered species, the task force feels that the Endangered Species Act of 1973 could also result in the reduction or curtailment of federal assistance in support of forestry programs on private lands within these identified critical habitat areas. This certainly could be important for many bats, as the summer habitat of Myotis sodalis.

SHORT NOTE

PUNCH-MARK RENEWAL IN BATS OF THE GENUS CAROLLIA

Bonnacorso and Smythe (J. Mamm., 53:389-390, 1972) recommend the use of punch-marking bats as an alternative to banding, especially for the genera Carollia, Artibeus, and Desmodus, in which individuals are likely to injure themselves and destroy the identification numbers on the aluminum bands by chewing. They suggested the development of a national program of punch-marking. Based on our experience with Carollia perspicillata, we suggest caution in the use of this method since the marks do fade.

At the National Zoological Park, we have been using this method for over a year to identify individuals of a captive colony of Carollia perspicillata. Animals have been marked with a one or two digit number on both wing membranes between the body and the fifth digit of the hand. A Stony Standard Tattoo Outfit (C1366, Nasco Corp., Fort Atkinson, Wisconsin) with 3/8-inch numbers has been used. Prior to punch-marking, we had put bands on two animals, but removed them after three days since both animals had infections around the bands and holes in the wing membranes from chewing. The entire colony was punch-marked in January 1973; infants born into the group since then have also been marked, usually before ten days of age.

We examine the entire colony on a weekly basis and have found that we must re-mark individuals since the mark does fade. We have occasionally misidentified individuals whose marks were indistinct, but have always been able to correct the mistake once the remaining animals were captured. Comparing forearm lengths has been helpful in final identification. No injuries have ever resulted from punch-marking.

The average frequency of re-marking in our original group of adults has been 53.2 days (6 males: 10 females; 102 renewals). However, individuals vary in the length of time that marks remain visible on the wing membrane. One female had to be re-marked on average every 37.4 days while another averaged 64.6 days. The cause of this individual variability is unclear, but confusion in identification more often occurred with animals that had white scar marks from minor injuries or discoloration of the wing membrane.

Juveniles had to be re-marked more frequently than adults until they were about three months of age. The average intervals among the first three mark renewals in juveniles was 38.6 (n = 16), 46.4 (n = 16), and 50.7 (n = 15) days. In juveniles, the fading of the mark was clearly hastened by the growth of the wing membrane during the first six weeks of life.

We have found punch-marking to be an excellent method of identification in our captive colony and expect that it would be valuable in short-term field studies of species in which the majority of a colony can be captured

