A Viral Misfire

Protecting City Bats

Adventures with Bats

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Little brown myotis, found coast to coast and from Alaska to central Mexico, are among the most widely dispersed bats in North America. And they are endlessly fascinating creatures whose behaviors vary so much geographically that scientists suspect they may, in fact, include several species. (Story on Page 1.)

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The little brown myotis is one of North America’s most adaptable and far-ranging bats. It is the most abundant bat in many forested areas of the northern half of the United States, and its range spreads from Maine to California and from Alaska and Labrador south to central Mexico. Little browns thrive from sea level to elevations of at least 11,000 feet (3,355 meters).

Little brown myotis, especially those in the southeastern United States, often choose extremely humid locations for their hibernation roosts. When hibernating on damp walls, it is not uncommon for these bats to be completely covered with condensed-water droplets.
These bats (*Myotis lucifugus*) have been so frequently encountered for so long – little browns, for example, are the most common tenants of North American bat houses – that they are often taken for granted by today’s researchers. But this remains a fascinating species that’s still wrapped in scientific mystery.

Because little brown myotis are found in such extremely varied, often harsh environments and because eastern populations show sharp behavioral differences from those of the West, scientists have long suspected that these visually indistinguishable bats might, in fact, constitute more than one distinct species. And new tools of genetic analysis are beginning to offer strong hints that this is the case.

Northeastern little brown myotis prefer extremely warm nursery roosts, often over 100 degrees F (38 degrees C). Researchers in Kentucky measured little brown myotis’ body temperatures of up to 129 degrees F (53.9 degrees C), which is believed to be the highest body temperature survived by any mammal.

And yet, in a laboratory study in the West, ambient temperatures of 112 degrees F (44.5 degrees C) proved fatal to little brown myotis, supporting the idea that more than a single species may exist.

Throughout their range in eastern North America, they hibernate in caves, abandoned mines or unused railroad tunnels. Hibernating populations of 300,000 to 500,000 are well documented, and some very large, abandoned mines may contain a million or more. Such sites may accommodate most of the species population within an area of 200 miles (325 kilometers) or more in all directions.

In the West, winter roosting habitat of the little brown myotis remains a mystery. In broad areas that are filled with little browns in summer, the species simply disappears in winter. It remains possible that a few appropriate caves or mines could contain large groups of these bats, but if so, they remain undiscovered. I suspect little brown myotis may rely on deep crevices in this area.

Like other small bats, the little brown has a large surface area relative to its body size, which makes it highly susceptible to heat and evaporative water loss. Consequently, nursery colonies invest much of their time staying warm to reduce daily energy costs, especially in the northeastern United States and in Canada.

Little brown myotis typically cluster tightly when roosting,
take feeding breaks at night roosts and, except when rearing young, will slip into the energy-saving state known as torpor when temperatures fall. (Torpor is similar to hibernation, in that the animal’s pulse, respiration and overall metabolism are drastically reduced, with a corresponding reduction in energy needs.) Amazingly, they spend as much as eight months out of the year in hibernation.

Summertime

Little brown myotis colonies, especially nursery colonies, are found under loose bark and in tree hollows. But, faced with dwindling natural roosts, they also adapt well to buildings, especially those with hot and poorly ventilated attics.

Nursery colonies usually include several hundred mothers and young, but can total as many as 30,000 bats. Even in buildings, nursery roosts typically are found within a few hundred yards of a stream, pond or river over which the bats feed.

Males and nonreproductive females typically lead nomadic lives from spring to late summer. They travel alone or in groups (usually of no more than 20 bats) among a variety of cooler roosts: cavities in walls, behind shutters or loose shingles on buildings, bridge or rock crevices, spaces beneath loose bark, tree cavities, caves and mines.

Especially in the East, little browns usually emerge to feed when it is almost dark, apparently to reduce exposure to predators. In the West, they often emerge much earlier.

They typically feed for two to three hours after sundown, when favored insects are most abundant, then spend several hours at a night roost, rejoining the hunt before dawn. Nursing mothers, however, often feed most of the night and barely visit night roosts at all.

Although little brown myotis seem to prefer feeding over water, they have been recorded hunting along stream and forest borders, trails, cliff faces, meadows and farmland and in forests from ground to canopy level. They are highly opportunistic in their diet. Major prey, depending on season and location, include aquatic insects, especially midges, mayflies, caddisflies and mosquitoes, as well as a variety of moths, beetles and crane flies.

These bats often feed in groups of 5 to 30 when hunting concentrations of small, swarming insects. They apparently locate insects at a distance of only about three feet (one meter), but can hear each other from 165 feet (50 meters) away, so they can quickly locate insect concentrations by simply eavesdropping on other bats’ feeding buzzes (the very rapid burst of echolocation beeps that signal a bat’s final approach to its prey).

On a good summer night, just one little brown myotis can capture more than 1,000 mosquito-sized insects in a single hour. And scientists have found that more than three-fourths of the little brown myotis they sampled (typically via droppings) had been eating mosquitoes, ranking these pests among the bats’ three most important prey groups. A nursing mother bat eats up to 125 percent of her total body weight nightly.
**Wintertime**

**Primarily in August and September**, large numbers of little brown myotis and several other species visit caves, especially those in which they will hibernate later in the year. They fly in and out of the cave from dusk till dawn. This is known as swarming. The first phase of swarming occurs in August and appears to be exploratory, while the second phase begins with mating in September. During this period, females begin to enter hibernation.

Both males and females arrive at hibernation sites together. In northern areas, females enter hibernation in September, followed by males in October, although a few bats may remain active as late as mid-November. They start emerging again in April and May. Hibernation season seems to begin about a month later in the South.

Once settled into hibernation, the bats typically remain in their caves until spring unless severely disturbed. They will, however, move about the cave in response to changing temperatures.

Most hibernation roosts range from 35 to 41 degrees F (2-5 degrees C) in the North and 41 to 50 degrees F (5-10 degrees C) in the South. The bats usually choose the most humid locations within that temperature range. Little brown myotis in the South will roost on cave walls that range from damp to wet, with bats sometimes completely covered with condensed-water droplets on their fur.

By selecting appropriately low temperatures, hibernating little brown bats can reduce their metabolic rate to about 1 percent of their resting rate at 95 degrees F (35 degrees C). Heart rates, which are around 210 beats per minute at 95 degrees F, fall to 20 beats per minute at 44.5 degrees F (7

With many of their natural cave roosts no longer available, little brown myotis mostly turn to abandoned mines, such as this one in Minnesota, for hibernation sites. Protected mine sanctuaries now shelter more than 90 percent of the known population of this species in winter.
degrees C). A little brown in flight might have a heart rate of 1,365 beats per minute. Researchers also find that little brown myotis in hibernation commonly go for 45 minutes or more without taking a single breath.

Arousals from hibernation are extremely costly. It takes a hibernating bat about 44 minutes to wake up, and each arousal and associated activity cycle cost the bat about 107.9 milligrams of fat – enough to last 67 days during hibernation. Canadian researchers found that little brown myotis in hibernation commonly go for 45 minutes or more without taking a single breath.

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The spring migration usually begins in April in the North and March in the South, with females and young bats leaving first, followed by adult males. Travel to summer nursery sites is rather direct and usually completed by the end of May. In contrast, late summer and fall movements to hibernacula appear to be more leisurely and far less direct.

Reproduction

Reproduction is less complicated among little brown myotis than in other bats. Most mate in caves or mines at the beginning of hibernation, and no evidence of courtship has been reported. Mating is believed to be random and promiscuous. Males, in fact, mate not only with active females, but also with those in torpor.

After mating, the female retains the viable sperm in her uterus for seven or eight months. Females ovulate within hours of emerging from hibernation in spring, and that’s when the egg is fertilized. Average gestation time is 50 to 60 days, but the timing is profoundly affected by feeding success and roost temperatures and may vary by as much as two to four weeks.

Just prior to giving birth, mothers reverse their normal roosting position to hang head-up, using their tail membrane to form a “basket” into which the baby emerges. Pups make their first flights 14 to 17 days after birth and are nursed for about 26 days.

It is clear that infants recognize and respond preferentially to their own mothers’ voices. Although pups will try to nurse from any available female, they are usually rebuffed by all but their own mothers.

Little brown myotis are among the mostly frequently encountered bats of North America, yet mysteries still linger around this fascinating species.

Conservation

Although this is one of the most abundant bats in North America, more than 90 percent of its known population relies on sanctuaries created in old mines for hibernation. Most have lost their original roosts in caves. Winter populations that numbered in the tens and even hundreds of thousands have been lost through careless disturbances of caves and closures of old mines.

More bats are lost each year through extermination by needlessly frightened homeowners who fear them as rabies carriers – although this species is not known to have transmitted a single case to humans or other animals in all of recorded history.

As consumers of countless yard and garden pests, including mosquitoes, the plight of the little brown myotis is our loss.

MERLIN D. TUTTLE is Founder and President of Bat Conservation International.
A recent wave of scientific literature on viral diseases finds some virologists – and then the mass media – suggesting that bats pose a serious health risk to people. Reality, however, rarely matches the sensational headlines: “Scientists have discovered an unexpected but potent threat to global health: bats.” When we carefully examine this issue, we find some surprising leaps from initial facts to sweeping suppositions. And those suppositions too often are presented as facts in newspapers and television newscasts.

While antibodies to several disease-related viruses have been found in bats, the critical question remains: What does it really mean? The answer is far from clear. Some researchers even believe that having natural antibodies makes bats less likely to transmit a disease. Antibodies for the Hendra virus, for example, were isolated from captive flying foxes that had been maintained in very close contact with their human caretakers for many years. Yet there have been no cases of disease transmission from these bats.

What about the highly publicized SARS-like virus found in some species of horseshoe bats in Asia? That virus is Bat CoV – not the SARS virus that infects humans. In fact, researchers have been unable to grow the Bat CoV virus in cultures that support the growth of the human SARS virus.

Relevant statistics are often lost in such discussions. How common are Ebola antibodies in bats? Ninety-six percent of the 679 African bats tested did not harbor the antibodies or related nucleotide sequences, but 27% of domestic dogs tested in one outbreak region did.

In general, virologists concede that it is unlikely these diseases are transmitted from bats to humans. In the case of the Nipah and Hendra viruses, they speculate that viruses present at relatively low levels in bats may be transmitted to intermediate hosts, such as pigs or horses, where the virus is amplified (concentrated) until it is capable of transmission to people.

Obviously, it is important for researchers to study relationships between animals and human diseases. But it is imperative that preliminary results do not lead to unsupported speculation that bats pose a serious health risk to people.

Bats are vital to the health of countless ecosystems and human economies around the world through their control of harmful insects and the pollination and seed-dispersal of a broad array of commercially valuable plants. Yet even today, bats and their roosting caves are intentionally destroyed because of baseless fears that grow out of myths and misinformation.

Contrary to common misconceptions, bats have an above-average record when it comes to living safely with humans. Just ask the people of Austin, Texas, who have benefited greatly from sharing their downtown area with 1.5 million bats for nearly 25 years without a single case of bat-related illness – despite initial public health warnings.
Here is a brief review of what we know about four recently publicized viruses and their relationship to bats:

**Ebola:** A viral infection that causes massive hemorrhaging of the internal organs. Once diagnosable symptoms are detected, it is often fatal in humans and other primates, although high death rates may be linked in part to limitations of medical care in the developing world. Naturally occurring antibodies to Ebola have been found in three species of monkeys, in baboons and in a few fruit bats. There are four recognized subtypes, in the Sudan, Zaire and Ivory Coast areas of Africa and in the Philippines. Three of these subtypes have been transmitted to humans from other primates. Transmission between humans appears to require direct contact with infected blood or other secretions.

Ebola has been accidentally imported into both the United States and Europe in shipments of monkeys destined for medical research and through a scientist who became ill after performing an autopsy on a wild chimpanzee. Humans exposed to infected lab monkeys developed antibodies without exhibiting symptoms. The scientist was successfully treated after returning home. In Ivory Coast, 37 humans contracted Ebola when 19 people participated in butchering and eating a chimpanzee found dead in the forest. At least three major airlines have already refused to carry primates destined for medical experiments, based on their stated fear of Ebola.

Recovered humans have continued to shed live virus for more than two months after recovery, and more than one-fourth of dogs from a human outbreak area were reported to serve as asymptomatic carriers for the virus. It is difficult to understand why bats, which are not known to have transmitted a single case, are presented as the prime suspects for an Ebola virus reservoir despite so much evidence that points elsewhere.

**SARS:** A coronavirus that causes acute respiratory syndrome, SARS was discovered in China in 2002. By 2003, it had killed 774 of more than 8,000 humans who had contracted diagnosable cases. Civets and raccoon dogs sold in local markets originally were the suspected reservoirs. Then virologists found antibodies to a coronavirus that is related to SARS in some horseshoe bats; they speculated that this virus from bats had infected civets and raccoon dogs, which then infected humans. This untested hypothesis was transformed into a ‘fact’ almost overnight as international newspaper headlines claimed bats were the source of SARS. The February 24, 2006, issue of Science carries a Letter to the Editor in which leading bat researchers objected to such speculation being presented in that journal.

Despite a long history of Chinese people eating bats, there is no evidence that SARS has ever been transmitted from bats to humans. In fact, there is no evidence of transmission from bats to any other animal.

**Hendra:** A virus that causes acute respiratory illness in horses and respiratory infection or encephalitis in humans. It was discovered in 1994 in Hendra, a suburb of Brisbane, Australia, where 21 horses and two humans became infected, killing 14 horses and one person. Additional cases have been reported, all in North Queensland. In 1995 and 1999, three horses contracted the disease, and one horse and one human died. In 2004, two more horses died; an associated person recovered fully.

The gray-headed flying fox (*Pteropus poliocephalus*) was, in some accounts, tied to the Hendra virus, although the suspect antibodies were originally isolated from captive flying foxes maintained for years by human handlers, none of whom was infected.
Based on finding Hendra antibodies in four species of flying foxes, virologists concluded that these bats serve as the reservoir for this disease. However, there is no clear evidence of how transmission to horses may have occurred, and alternative sources may exist. The original isolation of antibodies was from captive flying foxes that for years were maintained in very close contact with human handlers, none of whom was infected with the virus.

Nipah: A virus related to Hendra, Nipah is capable of causing fatal encephalitis in humans. It was discovered in Malaysia and Singapore in 1998 and 1999, first in pigs, then in pig farmers and butchers. Of 265 people with diagnosable symptoms, 108 died. No human-to-human transmission has been reported. The virus is also known from Cambodia, and antibodies were found in humans in Sarawak, Malaysia.

Again, because antibodies were also found in flying fox bats, virologists concluded that these animals were the disease reservoir. It has been speculated, but not demonstrated, that pigs get the virus by eating fruit dropped from trees by feeding bats. The fruit, in this hypothesis, is infected by bat saliva.

An outbreak involving 16 people in Bangladesh was speculated to be associated with people who drank raw coconut sap from cans that may have been visited by flying foxes. However, transmission from flying foxes to humans was not confirmed and would have to be exceedingly rare, since people throughout Southeast Asia and Africa have a long tradition of eating flying foxes, and they do not appear to have been harmed.

Recent history demonstrates a clear pattern of blaming bats for disease transmission, even when evidence to the contrary is overwhelming. Skepticism is clearly justified, and vigilance in defending against such biases is essential.

Untested hypotheses implicate horseshoe bats, such as this Dobson’s horseshoe bat \((\textit{Rhinolophus yunanensis})\) with the transmission of SARS, although the Chinese have a long history of eating bats with no evidence of any disease transmission.

Media, the public and some virologists still often blame bats, like these lesser short-nosed fruit bats \((\textit{Cynopterus brachyotis})\), for diseases, even in the face of strong evidence to the contrary.
PROTECTING THE CITY BATS OF ROMANIA

Homegrown conservationists struggle against old prejudices

by Eliana Sevianu

City bats are under attack in Romania. At least 10 bat species roost in urban homes, buildings, stadiums and bridges nationwide. But they are detested by the humans with whom they share cities. In the absence of knowledge, ancient myths feed baseless fears, and bats are deliberately killed whenever possible. Roosting sites are demolished. As the economy improves, more and more buildings are being renovated – and bats trapped inside are usually left to die. Newspapers recently praised the killing of more than 200 bats when a stadium was remodeled.

But at least in the city of Cluj-Napoca, a local group is championing the cause of bats, with education as the key. Armed with a BCI Global Grassroots Conservation Fund grant and other funding, the Focal Centre for Biodiversity and Monitoring (FCBMC) has mounted an aggressive campaign, teaching people of all ages about the values of bats, offering free help in humane exclusions from buildings and even training youngsters who take to the streets in bat costumes to educate their elders.

The public-education drive still faces great challenges, but at least some city dwellers are beginning to get the message. And now local newspapers and television programs are noticing the children’s efforts and occasionally sharing their message with the public.

Situated 200 miles (400 kilometers) northwest of Bucharest, Cluj-Napoca is one of Romania’s most important cultural and industrial centers. Our research has identified eight species of bats within this city, including the particolored bat (Vespertilio murinus), serotine bats (Eptesicus serotinus), pond myotis (Myotis dasycneme), European greater myotis (Myotis myotis) and brown big-eared bat (Plecotus auritus). These bats forage within the city and along its streets, around the Somes River and area lakes and in the green areas that surround the city. These species, as their natural habitats disappeared, have adapted to life in Cluj-Napoca, and their survival now depends on the critical habitats they find in human-made structures. The destruction of roosting sites, deliberate or otherwise, leaves surviving bats homeless and forced to seek shelter elsewhere – often in residents’ homes.

That’s where a lack of knowledge becomes lethal. Like most other Romanians, Cluj-Napoca residents seem ignorant of even the most basic facts about bats. Our conversations indicate that adults and children alike are convinced that bats attack people and become tangled in their hair, leaving victims no option but to shave their heads. Most consider bats disgusting and favor killing them. Such myths endure because there has been no place in Cluj-Napoca where people can obtain accurate information about bats.

The FCBMC is working to provide the facts and pave the way for much broader conservation efforts.

As a first step, a team of scientific advisors and I established a bat-information center at the FCBMC headquarters in downtown Cluj-Napoca. The center’s knowledgeable staff welcomes anyone with questions and concerns relating to bats to drop by or telephone the center for brochures, answers to specific questions, and especially advice.
and help in humanely excluding bats from buildings. We publicized the center with fliers, posters at bus stops and other sites and through announcements on local radio and television stations.

Team members offer assistance to any person or business dealing with bat-related problems, whether it’s a single bat entering a home or a colony trapped inside a building. The service, even going to the site to handle the exclusion, is free. The team has been called to handle only a few cases involving individual bats in private homes, but that it was consulted at all is a big step forward. And in some cases, we convinced the flat owners to “cohabit” with their bats, leaving them to their roosts in exterior building cracks, while covering the windows with mosquito nets to avoid flying visitors indoors.

We have mostly aimed our education campaign at children, in whom attitudes are less firmly fixed. Using colorful visual aids and interactive presentations, we visited 12 classes at George Cosbuc National College, one of the best grade schools in Romania. The classes emphasized the positive roles bats play in the city and why and how we should protect them.

The children were divided into small groups, each named after a native bat species. Each group did independent work on its bat, making paper bats and posters and designing classroom presentations. Some helped make simple bat-exclusion devices. A priority in these classes was to build enthusiasm for bats among the children so they can become bat ambassadors among adults.

One especially effective aspect of the program involved a class of 29 children who distributed brochures to Cluj-Napoca residents. Most were dressed in bat costumes (black tights, black T-shirts and caps with bat images and a black cloak). They became enthusiastic promoters of our “friendly bat” concept, not only handing out information, but politely introducing themselves to passersby, explaining why they were on the sidewalks and asking for help in protecting Cluj-Napoca’s bats. They clearly charmed most of the adults they encountered. And several newspapers and a television station that had been reluctant to publish FCBMC materials or even attend press conferences (since bats are not a “hot story”) began praising the children’s efforts.

Along with the education campaign, we are also monitoring the city’s bat populations, gathering data on urban species and their preferences for roosting and nursery sites and feeding habitat. We mapped the city’s green areas, watercourses and other bodies of water. We discovered one neighborhood that was particularly popular with roosting and feeding bats. It

BCI’s Global Grassroots Conservation Fund provides modest grants to support local bat-conservation programs like this one around the world. You can help. To donate to the Global Grassroots Conservation Fund, please contact the BCI Department of Development: (512) 327-9721 or development@batcon.org.
was located between a green hill and the river and consisted mostly of old, flat buildings with deep cracks in the walls that formed perfect roosts for bats. We will be giving special attention to this neighborhood in the future.

Since this project began three years ago, we have noticed some improvement in the attitudes of Cluj-Napoca residents towards bats. We did not expect miracles, and found none. But we find a definite increase in the number of citizens seeking our help with bats, rather than just killing them without a thought. More and more people are also turning to the center with general questions about bats and showing the awakening of a newfound interest in conservation.

We hope this will become the foundation on which we can eventually build vigorous bat conservation within the city. Much remains to be done. But we are beginning to do it.

ELIANA SEVIANU, of the Department of Biology at the Faculty of Biology and Geology, Babes-Bolyai University in Cluj-Napoca, is Coordinator of the Natural Patrimony Conservation Department of the Focal Centre for Biodiversity Monitoring and Conservation in Cluj-Napoca, Romania.

Creative classroom projects are a big hit in generating enthusiasm for bats. Romanian instructors working with a grant from BCI’s Global Grassroots Conservation Fund kept children interested with posters, drawings, crossword puzzles and other fun activities.

Kids in bat costumes charmed adults on the sidewalks of Cluj-Napoca, Romania. The children handed out bat-education fliers, talked about the values of bats and even won some newspaper headlines.
A

chance meeting with Merlin Tuttle 35 years ago drew me into an unforgettable series of adventures and provided a unique insight into the early philosophy, research and conservation work that culminated – 12 years later – in the birth of Bat Conservation International. It also taught me just how much work goes into studying bats.

At the time of our meeting, Merlin was conducting his doctoral research on gray myotis (Myotis grisescens) and had banded more than 40,000 of them over a good portion of the southeastern United States. His research provided the documentation needed to list these imperiled bats as a federal Endangered Species in 1976. And I am delighted to see that his unstinting efforts have now led to a dramatic recovery.

In the fall of 1970, I was a recent high school graduate and an avid caver helping a biology team survey caves in Florida. One evening, as we sat around our campfire, we were joined by a person introduced as Merlin. He knew one of our team’s biologists, and the conversation promptly shifted to – what else? – bats. As a caver, I had seen a lot of unique cave life but never really paid much attention to it, as I concentrated on the technical aspects of getting through the caves. Merlin mentioned that he was visiting a local cave the next day to capture and band bats, and I asked if I could tag along.

Fish Cave was filled with water that was often waist-deep and topped with cakes of floating guano. Carrying our nets, we waded in. We eventually reached the colony clinging to the ceiling, netted a number of them and made our soggy way back to the surface. This was my first close encounter with a lot of bats, and I was surprised at their complete lack of aggressiveness.

Having shown an interest in his work – and a willingness to risk disappearing into flooded, underground potholes – Merlin asked if I’d

Merlin Tuttle in 1984 demonstrated the photography skills that would produce thousands of unique photos of bats.
like to join him as he traveled around the Southeast conducting his research. I was waiting to enter the U.S. Navy and had no particular plans for the interim, so I accepted his invitation.

Returning home from Florida, I repacked my bags and climbed aboard a Greyhound bus bound for Rogersville, Tennessee, to meet up with Merlin. Our first stop of the day was at a Virginia cave that had once been an important roosting habitat for gray myotis. But by the time we arrived, the entrance to the cave had been demolished by a railroad to make room for additional tracks.

Crossing the tracks and scrambling through the debris, we found a narrow opening, all that remained of the original entrance. We climbed into the cave and, not surprisingly, soon discovered that no bats remained. Temperature readings confirmed that losing the natural entrance rendered the cave useless to bats. In 1970, of course, the notion of determining the presence of bats before altering a cave, much less taking them into consideration before demolition, was virtually unheard of.

Next we moved on to another Virginia cave, this one presenting some special challenges. The entrance was in the middle of a pasture dotted with limestone outcroppings and rocks, and the pasture was patrolled by a large and apparently grouchy bull. Reaching the entrance safely required stealth, nerves of steel and, as a last, desperate resort, very quick feet.

Bat field-research in those days was rather crude by modern standards. Both equipment and our understanding of the needs of bats have improved dramatically since 1970.

On this trip in late summer, we usually captured bats roosting where the ceiling was low enough for us to reach with hand nets. The nets resembled large basketball hoops stuck on the ends of eight-foot (2.4-meter) poles. The hoops held nets lined with plastic flaps to keep the bats from climbing out. Before we entered the cave, Merlin explained how to use the hand nets to sample the composition of the roost, while disturbing the bats as little as possible.

Wearing our caving coveralls and each of us loaded down with a hand net and backpack, we very carefully marked the bull’s position relative to the cave entrance, then struck out across the field. It was a lucky day: By the time the bull spotted us sneaking along an outcropping, we had covered most of the distance. A quick sprint got us into the cave entrance and out of harm’s way.

This was a vertical-fissure cave that required a great deal of free climbing to reach the area favored by bats. Negotiating the cave was a slow process of vertical climbs and passing equipment back and forth, all the while trying to be quiet so we could hear the bats and not spook them. In one section, we crossed a six-foot-wide (two-meter) clay bridge spanning a deep fissure. After we came down the other side, we noticed cracks...
Unsavory places and general discomfort were part and parcel of Dave Weaver's travels with Merlin. Here he somehow squeezes through a muddy crevice deep underground.

We finally reached our objective and, moving quickly, we captured about 600 bats. We recorded such crucial data as sex, age and the numbers of previously banded bats. When we finally left the cave, it was raining out and the bull was nowhere to be seen.

Not wanting to miss a prime opportunity to catch bats, we headed back to Rogersville and nearby Pearson Cave in Tennessee. We arrived in time to set up a harp trap at the mouth of the cave before the dusk emergence. That night I began realizing just how smart these bats really are.

Merlin had invented this still-useful type of trap to help fill the void in available equipment for safely capturing large numbers of bats. The harp trap consists of vertical frames, each strung with monofilament fish line spaced three-quarters of an inch (1.9 centimeters) apart. A bat passes through one side and, finding itself with too little room to fly, falls into the cloth basket below.

As the emergence got under way, bats started falling into the trap. But a sense that something wasn't quite right apparently made it back to those bats that had yet to emerge from the cave. The emergence soon slowed to a near halt as bats simply re-roosted inside the mouth of the cave or climbed around the trap.

We removed the captured bats from inside the trap and placed them in small, mesh bags. We began weighing and recording the captured bats. Soon, we were joined by a group of local moonshiners who were passing by, saw our light and decided to be neighborly. To my surprise, they all knew Merlin, a frequent visitor not only to the cave but also to the home of one of the moonshiners. As the gentlemen continued on down the road, we finished sorting and releasing the bats before we called it a night.

In those days, gray myotis populations were declining nearly everywhere, and their extinction was feared. Pearson Cave – and Merlin's attention to it – demonstrates the main reason this species is now recovering. Based on Merlin's early findings there, a bat-friendly gate was installed at the cave in 1989 through a combined effort by BCI, The Nature Conservancy and The American Cave Conservation Association. By 2002, its important gray myotis colony had tripled its size to some 366,000 bats.

Over the next few weeks, Merlin and I would travel through Virginia, Tennessee, Kentucky and Alabama, netting, trapping and banding bats. I was to learn a great deal, not only about bats, but also rural America. I would also learn that Merlin had little sense of time when it came to knowing how long we'd been working underground or when to eat.

He also sometimes seemed oblivious to potential dangers. As someone who had spent years camping and caving I had numerous unplanned – and invariably unpleasant – encounters with snakes. My deep unease regarding these creatures remains with me to this day.

Upon entering one particular cave, Merlin and I encountered a narrow entrance passage packed with rocky rubble and a few scrubby plants. It looked to me like an excellent rattlesnake den, but when I balked, Merlin insisted he'd never even seen a garter snake there. He badgered me into crawling on our bellies through the jumbled rocks. First, one small critter, then another flitted past. Merlin claimed they were just pack rats. As we were emerging, one stopped in some nearby ferns.

Wanting to reassure me, Merlin said “Look here. I’ll run him out so you can get a look.” He jiggled the ferns with his boot – and what immediately emerged was a very annoyed, venomous copperhead snake nearly three feet (one meter) long. The encounter ended without further incident, but I noted for future reference that Merlin apparently wasn't much of an expert on pack-rat identification.

Dave Weaver of Severna Park, Maryland, joined the Navy not long after his bat-chasing experiences with Merlin Tuttle. He retired as a lieutenant commander in the Navy's submarine force in 1995 and currently is Manager of Marine Projects for Ocean Engineering International, Inc. He is a member of Bat Conservation International’s Board of Trustees, where he serves as Treasurer.
Electric grids are a brutal and dangerously effective method of killing Australia's flying foxes. Their use to protect fruit orchards was banned in the state of Queensland more than four years ago – yet the giant electrified killing machines are still decimating these bats.

Australian conservationists, led by biologist Dr. Carol Booth, are asking members of Bat Conservation International to add their voices to demands that this illegal slaughter finally be brought to end.

Fruit growers in Australia have been at war with flying foxes for generations, and the bats have been losing, despite some progress in recent years. Research finds that the perception of crop damage by flying foxes is greatly exaggerated and the growers' enmity seems largely a result of ancient misperceptions and prejudice against bats generally (see “Australia’s Flying Foxes at a Crossroad,” BATS, Summer 2000).

Yet the killing continues. Shooting remains a popular method, although need-based permits and limits are now generally imposed. Several years ago, the arrival of electric grids drastically increased the death toll among these bats that have been declining for decades. The grids send electric current through closely spaced horizontal wires strung between vertical posts. Hitting a wire is fatal for a flying fox – and many of the grids are several kilometers long.

"The major problem with grids is that they are large-scale killers," says Lawrence Pope of the Victorian Animal Welfare Association. "Shooting can't dispatch with anywhere near the efficiency of grids." He cites a four-mile (6.4-kilometer) grid that was killing 300-500 flying foxes each night, and 25-30 known grids are scattered across north Queensland.

The grids were banned in Queensland four years ago, but growers were required only to turn them off rather than dismantle them. Restoring their lethal potential, therefore, requires only flipping a switch. Evidence that grids are still being used intermittently (especially at night) is difficult to obtain in the rural region. But, conservationists note, some growers admit – indeed, they often boast – that they have killed flying foxes by the thousands.

Booth petitioned the Queensland Minister for Environment for removal of the grids, but was told that "stricter enforcement was an adequate response to the issue."

In this case, she says, that is not enough for the preservation of Australia's flying foxes. "We contend that the only way to significantly reduce the risks associated with electric grids it to require their dismantlement."

You can help save these dwindling populations of flying foxes, which, as seed-dispersers and pollinators, are vital to healthy ecosystems. Let Australian officials know that the world is watching. Write a letter urging that the electric killing grids be dismantled. We can make a difference.

Please write to:

Queensland Minister for Environment
The Hon. Desley Boyle, PO Box 15031
City East, Queensland, Australia 4002

OR

Federal Minister for Environment
The Hon. Ian Campbell,
Parliament House, Canberra, ACT 2600

Directing Development at BCI

Jonathan Friedman brings two decades of financial experience to his new post as Director of Development at Bat Conservation International.

A native of Denver, Colorado, he worked more than 10 years in development and fundraising in Palm Beach, Florida, before moving to Austin, Texas, BCI's home city, for a four-year stint with Any Baby Can, an Austin nonprofit that supports children with special needs and their families.

Jonathan's business career began 20 years ago with Chase Manhattan Bank in New York and Hong Kong and encompassed a variety of banking, financial and entrepreneurial activities.

"I'm looking forward to the challenges and rewards of working with the dedicated people at BCI and the wonderful members and friends who support us," he said. "BCI has exciting projects planned in North America and around the world, and the Bracken Bat Cave & Nature Reserve here in Texas will have an incredible impact on conservation. I'm eager to help bring those projects to fruition."
More Honors for a BCI Partner

The Magazine Mine in Illinois contained barely 100 endangered Indiana myotis a decade ago, when Unimin Corporation, offered to collaborate with BCI’s Bats & Mines Project to create a bat sanctuary there. That was the beginning of a long and fruitful partnership.

Unimin, BCI and other state and federal partners installed the first bat-friendly gate at the mine in 1996. A second, far more difficult and expensive gate was placed over a second entrance in 2001. By 2005, more than 33,000 Indiana myotis had moved in and were hibernating there, making it the largest winter hibernaculum of Indiana myotis ever documented in Illinois and one of the most rapidly growing populations anywhere.

Due to its location, ideal temperatures and sprawling passages, this one mine has the potential to someday shelter more Indiana myotis than are currently known in all of North America combined.

For this and other voluntary conservation efforts at its Tamms/Elco Plant in southern Illinois, Unimin recently won its second Corporate Habitat of the Year Award from the Wildlife Habitat Council. The company also won the award in 2002.

“Unimin shows that employing exemplary practices and approaches helps protect our natural resources and the environment while continuing to promote significant economic benefits,” the announcement said.

The 1,950-acre (789-hectare) Unimin property is part of the Corporate Lands for Learning program and regularly visited by undergraduate and graduate college students to conduct wildlife research. Employees also conduct educational tours for school and scout groups to teach children about bats and other wildlife at the site.

Merlin Tuttle: Guardian Angel of Bats

Let BCI Founder and pioneering bat conservationist lead you on a dramatic journey to explore the biology, value and needs of bats around the world. Produced by Public Television Group of France as part of its Heroes of Nature series, this English-language DVD is a fascinating look at bats and why their conservation is vital. Just $14.95. And don’t forget, BCI Members get 10 percent off all catalog purchases.

A gate at Magazine Mine
A Globe-trotting Youngster Works for Bats

Bat Beer

Shiner Beers, a popular brewery in the little Texas town of Shiner, has released a new ale that features a picture of Austin’s famous bats emerging from beneath the Congress Avenue Bridge. The brew is called Shiner Dunkelweizen (German for ‘dark wheat’).

BCI Member Snapshots

The Wish List

Your help with any of these special needs will directly improve BCI’s ability to protect bats and bat habitats. To contribute or for more information, please contact BCI’s Department of Development at (512) 327-9721 or development@batcon.org.

Keeping BCI Photos Up-to-Date

Merlin Tuttle’s dazzling photographs have an enormous impact on bat conservation. They have introduced millions of people around the world to the unexpected gentle faces and graceful activities of these fascinating mammals. Our founder’s photographs have appeared on everything from postage stamps and museum displays to newspapers, television programs and leading magazines, such as National Geographic, Smithsonian and Time. The Tuttle collection of some 70,000 images covers all North American bat species and a large percentage of others worldwide. And the collection keeps growing. On a recent Founder’s Circle Trip to Madagascar, Merlin photographed nearly one-third of all bat species. But to keep pace with changing times, he needs more technologically advanced equipment: a 12.8-megapixel Canon EOS 5D digital camera, lenses, a weatherproof case and mobile lighting. The total cost is $7,667.

Battling Lethal Myths in Kenya

A tiny band of conservationists is struggling against the tide in Kenya, trying to reverse generations-old myths that lead to the deaths of countless bats, often by poisoning in caves, homes, schools and even airport control towers. The Mammals Committee Nature Kenya has been saving a few bats at a time from fumigation in private homes, but only changing local attitudes can make a real difference. They are planning an educational campaign in areas where bats are at severe risk. Through programs aimed at schools, a college, tour guides and local organizations, the team hopes to identify dangerous myths and systematically set the record straight about the values of bats to local economies and farmers. National Museums of Kenya is contributing a computer, camera and slide projector. The Mammals Committee Nature Kenya needs $2,700 from BCI’s Global Grassroots Conservation Fund to launch the program.

Decoding Bat Talk

BCI Science Officer Barbara French has been eavesdropping on her colony of rescued Mexican free-tailed bats for years, analyzing specific calls and the responses they elicit. That research, with University of Texas communications experts, produced strong evidence that “bat talk” looks incredibly similar to what humans call language (BATS, Fall 2004). This exciting research continues at French’s Bat Barn. But more sophisticated analysis of bats’ syntax requires that acoustic signals be recorded at much higher quality than her equipment allows. To take this study to the next level, she needs a high-speed sound card: National Instruments DAQCARD 6062E, with the NI RC68-68 connecting cable and NI BNC-2111 box. The cost is $1,500.
Bat Conservation International Student Research Scholarships have improved bat science and conservation on every continent but Antarctica. Since the program began in 1990, 198 BCI scholars have studied hundreds of bat species in 48 countries, from Belgium and Bolivia to Uganda and the United States. Their research explores the vital roles of bats in pollination, seed dispersal, pest control, and biodiversity, as well as their critical habitat and roosting requirements. And this much-needed support helps prepare young scientists to expand bat conservation far into the future.

Thanks to the generous support of BCI partners and members, another 18 BCI Scholars are taking to the field this year for important work in 14 countries. We are especially grateful to the U.S. Forest Service for joining with BCI in a powerful new partnership that lets us expand this vital program with the new Bats in International Forestry Scholarships.

Bat Conservation International is proud to announce its Student Research Scholarships for 2006:

**U.S. Forest Service**

**Bats in International Forestry Scholarships**

- Daudet Andriafidison (University of Antananarivo, Madagascar), Madagascar
- Laura Bambini, (Exeter University, United Kingdom), Madagascar
- Marian Cabrera, (University of Nariño, Colombia), Colombia
- Richard Cadenillas (San Marcos University, Peru), Peru
- Cullen Geiselman (Columbia University, United States), French Guiana
- Margareta Kalka (University of Ulm, Germany), Panama
- Kevin Olival (Columbia University, United States), Malaysia, Thailand, Cambodia, Vietnam
- Monik Oprea (Federal University of Espírito Santo, Brazil), Brazil
- Sandra Peters (University of Western Ontario, Canada), Brazil
- Matthew Stroeve (University of London, United Kingdom), Malaysia
- Kessarin Utthammachai (Kasetsart University, Thailand), Thailand

**Frank Cross Scholarships**

- Leslie Corning (Saint Mary’s University, Canada), Nova Scotia
- Lynne Henderson (Saint Mary’s University, Canada), Nova Scotia
- Anton Vlaschenko (Kharkov National University, Ukraine), Ukraine

**Verne & Marion Read Scholarships**

- Kerry Borkin (University of Auckland, New Zealand), New Zealand
- Joy O’Keefe (Clemson University, United States), North Carolina

**T.W. Ammerman Scholarship**

Erin Baerwald (University of Calgary, Canada), Alberta

**Tommy Angell Scholarship**

Kara McClanahan (Washington State University, United States), Washington

The need for scholarships always outstrips our financial resources. This year alone, BCI was unable to support 29 proposals that passed our scientific review panel. Your help is vital in developing tomorrow’s leaders for bat research and conservation. Please contact BCI’s Department of Development at development@batcon.org or (512) 327-9721.