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BATS

Winged Maestros of the Night

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Most people are both revolted and fascinated by bats. Revolted because, like snakes, bats are assumed to be dangerous, and fascinated because they have bizarre faces and are rarely seen. Bats don't come in contact with humans often because we are active during the day and most bats are active only at night. Also, bats fly and would not be that easy to observe even if they did come out in the day.

But bats are mammals just as we are. They suckle their tiny young; they are warm-blooded; they have hair and four-chambered hearts. In contrast, bats have two dominant characteristics—their hands and their ears. Their hands have evolved so that the finger bones are elongate and support a thin webbing of skin that forms a wing, and their ears have evolved so they can hear sounds with frequencies six or more



Fig. 1. The spotted bat has very large ears and eats insects.

times higher than what we can hear. Their ears can be as long or longer than their bodies (fig. 1).

Bats also emit very high-pitched sounds. The emission of these sounds and the return of the echoes that bounce off obstacles or a flying moth is called sonar or echolocation. Echolocation (fig. 2) is how bats communicate, navigate, and find food while they are flying, although all bats can see well and are not blind as legend would have it. Submarines and dolphins navigate in the same way—sending out a sonar beam and listening for the echo. Bats do this instantaneously and are able not only to dodge branches but also to find insects as they fly through the air, sometimes at thirty to forty miles per hour. Their ma-

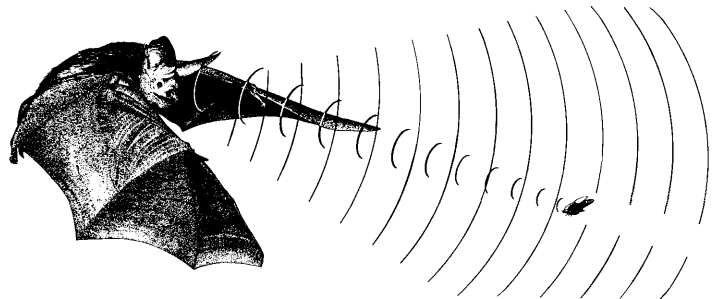


Fig. 2. Echolocation in bats. The bat emits a sonar beam and listens for the echo when it bounces off a target.

neuverability and flying skills, which I will discuss later, are superb. The bizarre appearance of many bats is caused by their elaborate noseleaves. It is through this structure that many bats emit their sonar impulse. Other bats without the noseleaf emit sounds through their mouths (figs. 1, 4, 6).

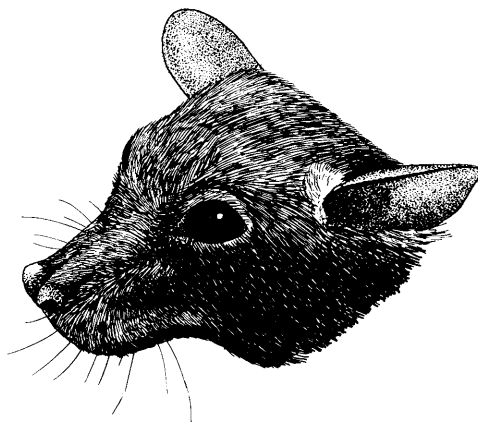


Fig. 3. A flying fox does not echolocate. It uses its eyes for locating its food, fruit.

There are nearly four thousand species of mammals on earth, and nearly one thousand of these are bats. Next to rodents, bats are the most abundant mammals. Contrary to legend, bats are not mice with wings; they are as different

from rodents as elephants are from armadillos. But there are two kinds of bats, the big bats (Megachiroptera, meaning big hand wing) and the little bats (Microchiroptera, meaning little hand wing). The big bats, or flying foxes, are

found only in Africa, Asia, and Australia (the Old World) and can have wing spans up to six feet wide. These bats have small fox-like ears and cannot echolocate (fig. 3). They find their food (fruit) with their large eyes. Flying foxes are observable in zoos, but they do not naturally occur in the New World (North America to South America). They also prefer warm tropical climates.

The Microchiropterans can be as small as bumblebees (Kitti's hog-nosed bat from Thailand), weighing as little as two grams (the weight of one dime). They are found world-wide and are quite diverse in what they eat. Most of them are insect eaters; but some eat fruit, some eat fish, some eat pollen and nectar, some eat flesh, and only three eat blood (figs. 4-9). Nearly all of the bats in the United States are insect eaters. Most of the non-insect eaters prefer warm tropical habitats where there is a constant supply of fruit and nectar. The carnivorous and blood-feeding species are found only in the tropics.

Most people do not realize how much insectivorous mammals have to eat to stay alive. A small insectivorous bat, the gray bat that weighs less than ten grams (less than the weight of five dimes), has been estimated to eat 3,000 insects in a night. There is a cave in Texas on the Edwards Plateau, Bracken Cave, where more than 20 million free-tailed bats converge every summer. This cave houses a



Fig. 4. The free-tailed bat eats insects.

nursery colony with only females and their young. The females fly north from Mexico and have their young in this cave, timing birth and subsequent weaning so that the young begin looking for their own food at the height of the insect season—usually in July. The estimated volume of insects the colony eats in a single night is a quarter of a million pounds—125 tons of insects per night!

Being around this many bats at one time is an experience to remember. I spent a wide-awake, insect-free night outside this cave one summer. It was a moonlit night, and I could see bats against the moon free-falling from hundreds of feet up until they were less than 100 feet from the cave entrance. They then opened their wings and whooshed into the cave. I was standing in the large entrance

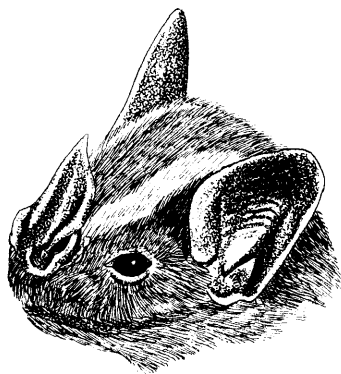


Fig. 5. A New World fruit bat eats fruit.

and bats rushed by me on either side. Not once did one fly into me. These bats, like most bats, are incredibly agile and maneuverable in flight.

These insectivorous bats will eat very small flies and mosquitoes as well as large moths and June beetles. The

bodies of some moths and ground beetles are as long as a finger; this is about four or five times the length of the skull on most of these bats. Many Europeans appreciate these beneficial insect eaters so much that they build bat boxes in an effort to attract a small colony to their property, much as they would build bird houses to attract song birds.



Fig. 6. The fishing bat eats fish.

Large colonies of bats produce large quantities of fecal material called guano. Bat guano is the most nitrogenous natural fertilizer on earth and is still mined for use in agriculture in many parts of the world. In the 1860s, guano was mined by the Southern states and used as a substitute for gunpowder, so high is its nitrogen content. The guano was about a foot deep in Bracken Cave when I visited there. It's similar to black powdery snow. The scientists who studied the colony were fearful that lightning might strike the cave and explode the guano, causing a fire that would last for days. If that happened in the summer, it would be detrimental for the bats.

Fruit- and nectar-eating bats are beneficial in a different way. Fruit-eating bats are important for dispersing seeds to other areas, and nectar eaters pollinate more than 160 genera of shrubs and trees. These nectar feeders visit the flowers of tropical and subtropical plants that are specially adapted for bats. They get pollen dust in the fur of their long noses and heads and then transfer the pollen to the next plant they visit (fig. 7). Once pollinated, a plant will produce its fruit. It is surprising the kinds of fruits, nuts, and spices that we get from such plants. These include peaches (from tropical places), plantain, bananas, bread fruit, mangoes, guavas, avocados, almonds, cashews, cloves, clove oil, eugenol, vanillin, carob, palm sugar, figs, dates, tequila, Javanese long pepper, chicle latex for chewing gum, manila and sisal fibers for rope, balsa wood and other timber, kapok for life preservers, surgical bandages, cooking oil, and livestock feed. Banana growers think bats are a mixed blessing: on the one hand, several kinds of bats pollinate the trees; but, on the other hand, there are other species that eat the bananas.

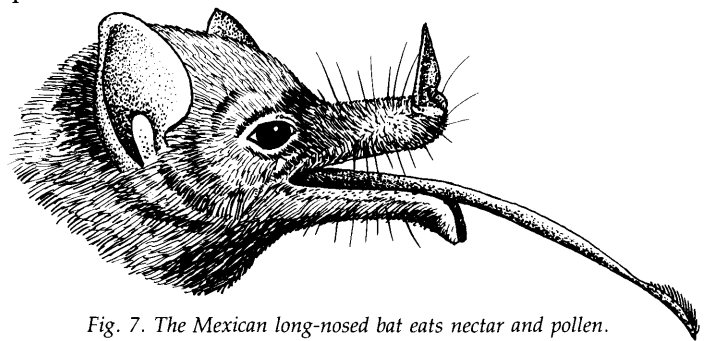


Fig. 7. The Mexican long-nosed bat eats nectar and pollen.

There are several myths about bats and public health that are false and need to be addressed. Many people think or are led to believe that nearly all bats are rabid. This is false. The incidence of rabies in bats is no higher than in other wild animals. Only ten people in the United States

and Canada in more than thirty years have contracted rabies from bats. Do you realize that more people are killed *every year* by bites from our *pet* dogs and cats? Not only do bats rarely have rabies, but they are not even important reservoirs for rabies. Bats cannot carry the rabies virus without dying themselves.

Another myth is that bats will attack people. Even rabid bats rarely attack people; but any animal, when it's trapped, will fight back. A bat trapped inside a house or barn is very frightened and will defend itself if possible. Gloves should be worn to handle any kind of frightened animal.

Usually, though, a bat can be shoed gently out an open window or door. Bats fly into caves, cave-like structures such as houses, or other "safe" places to spend the day. I have netted bats for many years, and I have friends who have done the same. In no case have I heard of a bat attacking nor has one ever attacked me. However, I avoid all sick and abnormally-behaving animals, not just bats, and I recommend that others do the same. Oftentimes in the fall bats will be found on the ground. They have been caught too far north by the first cold snap. Mostly, they are cold and frightened and cannot fly. These bats will usually warm up during the day and fly to safety; they aren't hurt, and they should be left alone so they can go about their business of flying to warmer parts of the country. Related to the myth that bats attack people is the myth that bats get tangled in women's hair. This is totally false.

A third myth is that bat guano harbors nasty diseases such as tuberculosis or histoplasmosis, both respiratory diseases. There is no evidence that bats transmit TB to man, and human contact with histoplasmosis, a fungus, comes most commonly from bird droppings. The fungus needs hot, humid places to live; thus, infection is more common in the humid southeastern states. Hot, dry attics are not the best environment for this fungus, and its survival in Nebraska is uncommon. Human fungal infection from bats stems from contact with them in caves, and that does not occur very often. More of a hazard would be contact with bird roosts, chicken coops in particular.

A related myth is that bats themselves are filthy and covered with parasites dangerous to man. This is patently false. Bats have to constantly groom themselves to keep every part of their bodies clean, especially their wings and flight membranes. There are no dirty bats in the wild—they would not be able to survive. Bats do have parasites (so do we, by the way), but these parasites are specialized for bats and cannot live on any other animal. They will die if they leave the bat. Not many years ago, a book was published and a movie made about man-shredding bats transmitting plague to humans. Bubonic plague, the black plague, is transmitted by fleas. There is still a pocket of



Fig. 8. The American false vampire bat is carnivorous.

plague in the southwestern United States, but these fleas are specific to some of the ground dwelling rodents. The plague cannot be transmitted by bats.

One final myth, and perhaps the most important because it is one that involves human contact, is that bats living in buildings should be poisoned as soon as possible. This is a deliberate falsehood, promoted by some unknowledgeable and perhaps unscrupulous pest control companies that may try to convince you that poison is the only sure way of eliminating the bats. The poison these dealers want to use is called Rozol, a poison banned in all but twenty states in the United States. It is legal, however, in Nebraska.

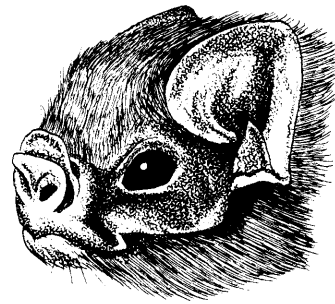


Fig. 9. The hairy-legged vampire bat eats blood.

There are some things you should know about Rozol. First, it is extremely hazardous to humans. Remember, you are not just poisoning an insect such as a roach; you are trying to eliminate a mammal. Humans are mammals, too; and a poison that can kill bats can kill us, although not as quickly. Second, Rozol has long-term effects: it remains potent for six or more years in the environment after application. Third, bats will get sick from Rozol and fall to the ground where they are more likely to be picked up by curious children and pets, causing the number of bat bites and anxiety about rabies to increase. So, by using Rozol, you will have actually *increased* the public health hazard.

Before you try Rozol, consider the following. First, if the bats aren't bothering you, then leave them alone. Many roosts are temporary, and the bats will go away.

Bats go into houses and barns because, as human populations have expanded, natural bat habitats (caves, trees, etc.) have disappeared. Two, if they must go, watch at twilight and see how they get out of your house, attic, or barn and how many there are. The next day,

get a ladder and some caulk or hard wire cloth and seal up all but the main exit hole. Three, that evening, watch and count to see that all bats fly out. When all are out, go up and seal the main exit hole; the bats cannot return and will go elsewhere. The best time to do this is in the fall or early spring. If you wait until summer, you may seal up some non-volant young (babies that can't fly yet). When they die inside (because they still need Mom's milk), they will smell to high heaven and make you feel guilty to boot. Sealing up your house to bats will also make it more energy efficient; and, finally, you won't be paying big money for a dangerous poison.

I doubt that I can impress upon you the fascination bats hold for many people. Our Western culture has trained us to believe that bats are neither lovable nor redeeming. But if you could be around live non-frightened bats with their

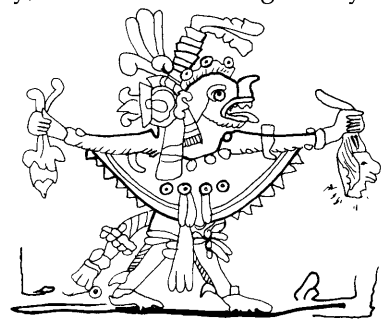


Fig. 10. The Bat God was sacred to the Mayas in Central America.

bright little faces and prominent ears, their quick intelligence and silky-soft fur, and their wonderfully thin and stretchy wing membranes, I think you could be won over.

Other cultures have appreciated bats. The Mayas in Central America had the Bat God as a powerful deity, and it figures in many of their drawings and sculptures (fig. 10; notice that the stylized noseleaf is similar to that of the bats in fig. 5 and fig. 8). But the bat is perhaps most revered in Chinese culture, where it represents all that is good.

There is a talisman of a circle of five bats with spread wings, facing in, enclosing the symbol of life (a tree with roots and branches). The bats represent the five great happinesses sought by all people: health, wealth, good luck, long life, and tranquility. This good-luck medallion (fig. 11) is called a *wu-fu*. It has become very stylized in Chinese design and art and can be seen in the decorations of many Chinese restaurants.

Hopefully, more of us can learn to appreciate these mysterious little mammals before it is too late. Bats, like many animals and plants, are being pushed out of their habitats by a larger, two-legged mammal. It's going to take a lot of *wu-fus* and education to save them from extinction.

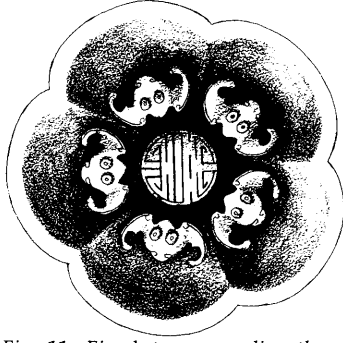


Fig. 11. Five bats surrounding the tree of life is a Chinese good luck piece called a *wu-fu*.

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