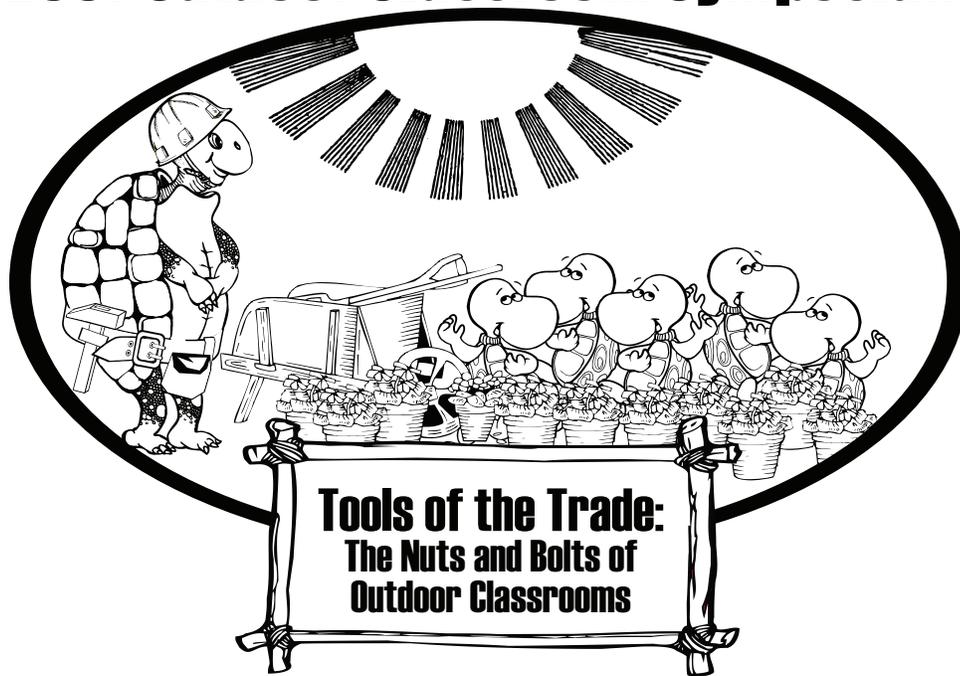


2007 Outdoor Classroom Symposium



3:00 - 3:45 PM • Short Sessions

Materials Provided by the Speakers from the Following Sessions:

Creation Stations

A Variety of Educators

Bat Houses: How to Build and Teach with Them

Stephen Burnett, Clayton State University

Building a Little Piece of Georgia

Beth Nathan, Georgia Native Plant Society

Tools of the Garden Classroom: The Trowel, Hoe, and Harvest Basket

Kyla Zora-Moore, Oakhurst Community Garden Project and Daniel Parson, Georgia Organics

Using Grants as Your Down Payment on Outdoor Classrooms

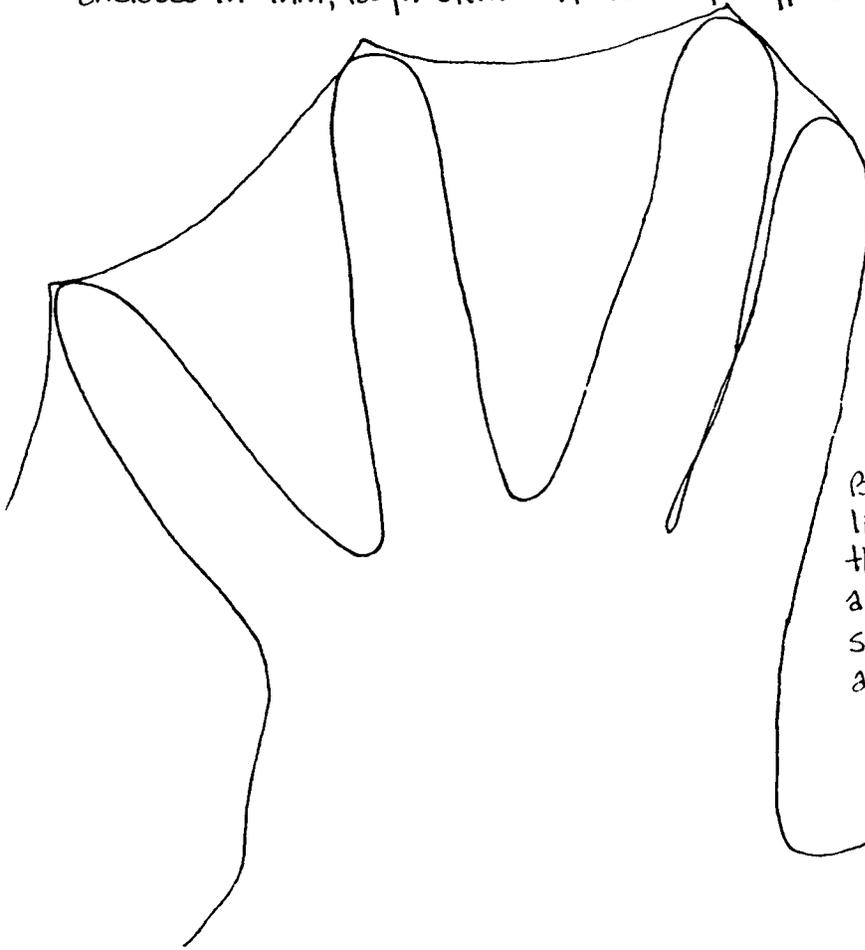
Sara Vissar, Keep Georgia Beautiful

Bat Fun Book



Understanding the Bat's Wing

A bat's wing is really just a hand with long, thin finger bones enclosed in thin, tough skin. It is very different from a bird's wing.



You can find out what it feels like to have a bat wing by placing your hand over this drawing.

Bats use their wings like flippers to "swim" through the air, as a catcher's mitt to snag bugs in flight, as a cradle for their babies, and as a heating and cooling system.

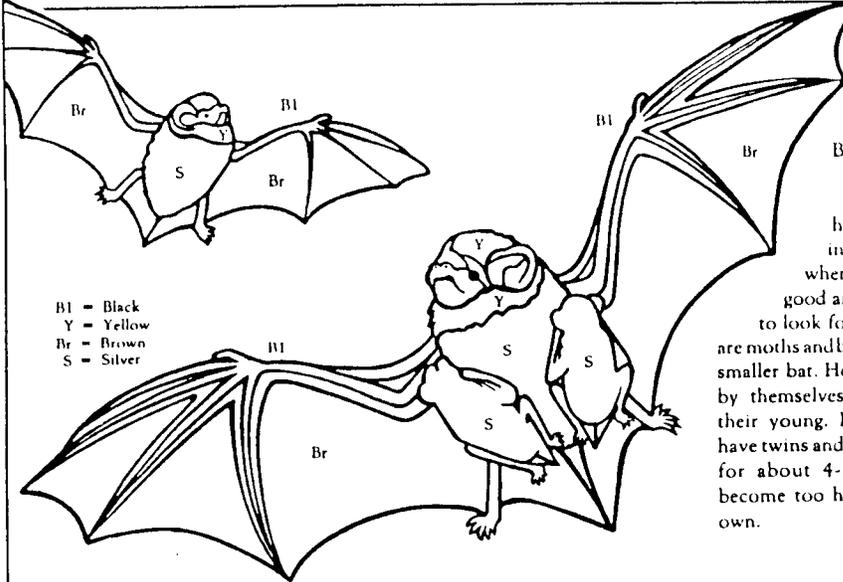


Bats are the only mammals in the world who can really fly.

Scientists call the order of bats "Chiroptera" - which means "hand-winged."

Color
Me
Crittter

Hoary Bat

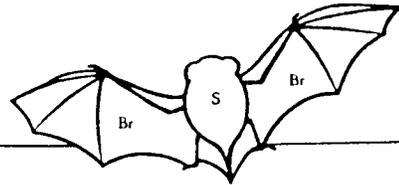


Bl = Black
Y = Yellow
Br = Brown
S = Silver

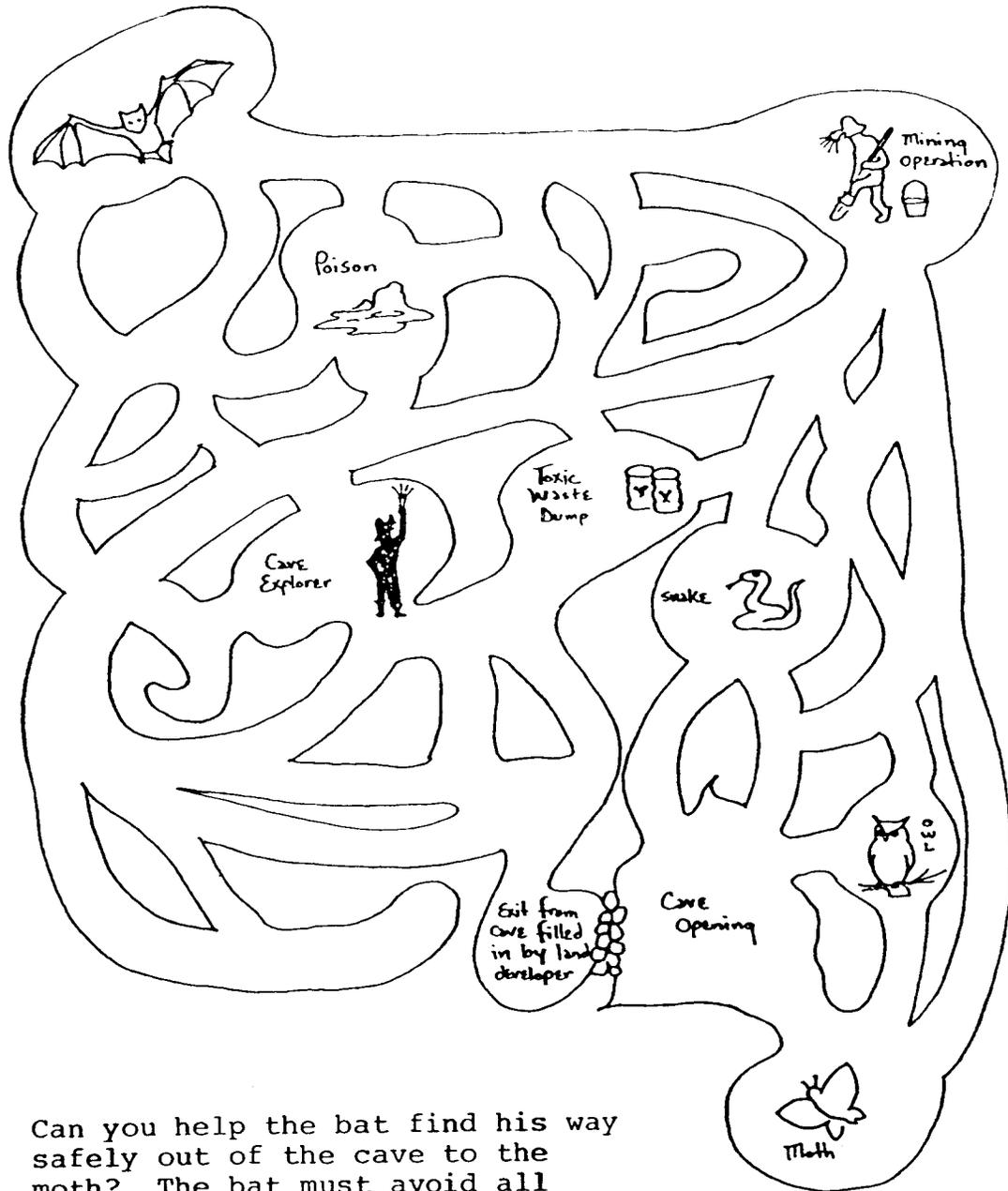
Bats are nocturnal creatures, and the hoary bat is no exception. During the day, hoary bats hang upside down in trees to rest and sleep. But, when the sun goes down and it's good and dark, they leave the trees to look for food. Their favorite foods are moths and beetles and even an occasional smaller bat. Hoary bats usually "hangout" by themselves, except for mothers with their young. Hoary bat mothers usually have twins and carry their young with them for about 4-5 weeks until the babies become too heavy and must fly on their own.

nocturnal - active at night

hoary - gray or white with age. The hoary bat gets its name from its "frosted" looking fur.



Bats are very clean and gentle animals and aren't scary at all! There are lots of myths about bats that just aren't true. Some people think bats will get into their hair - this is completely false. Also bats are not at all like mice. They are not rodents, but have their own order, "chiroptera" which means "hand-winged." As you can see, a bat's wing is just like a big hand!



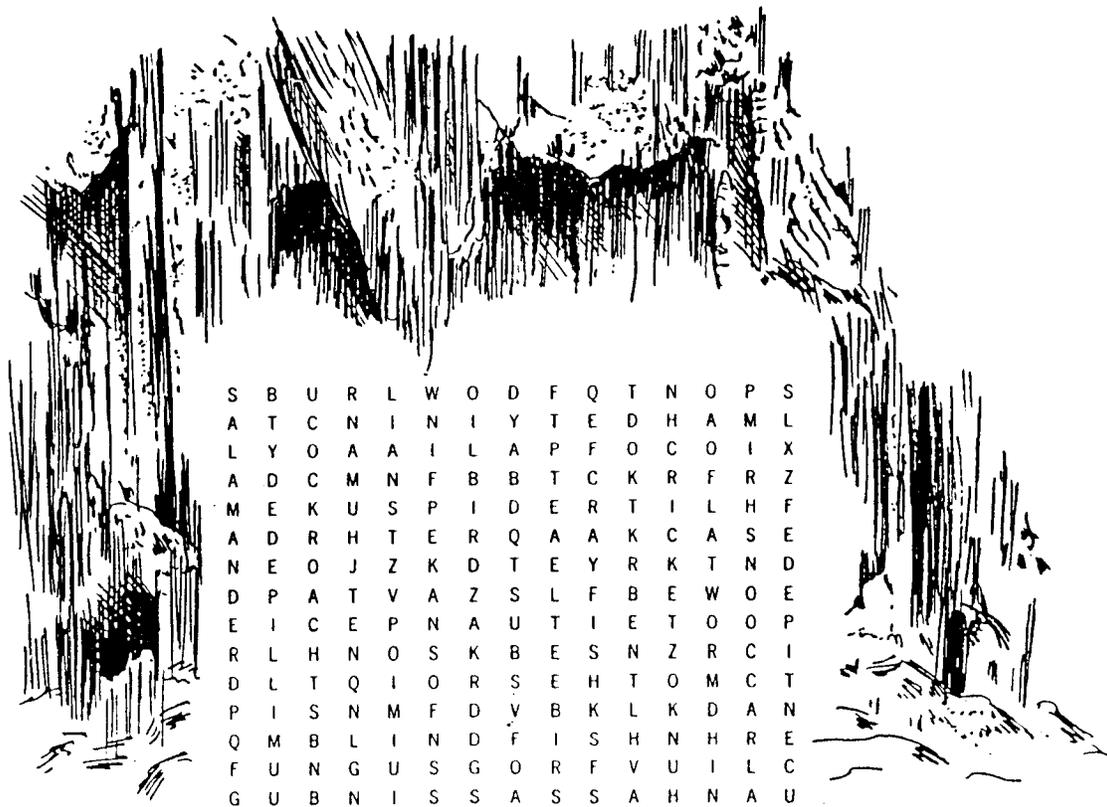
Can you help the bat find his way safely out of the cave to the moth? The bat must avoid all people, predators and poisons. As you can see, bats must work very hard for their dinners.

Cave Creatures

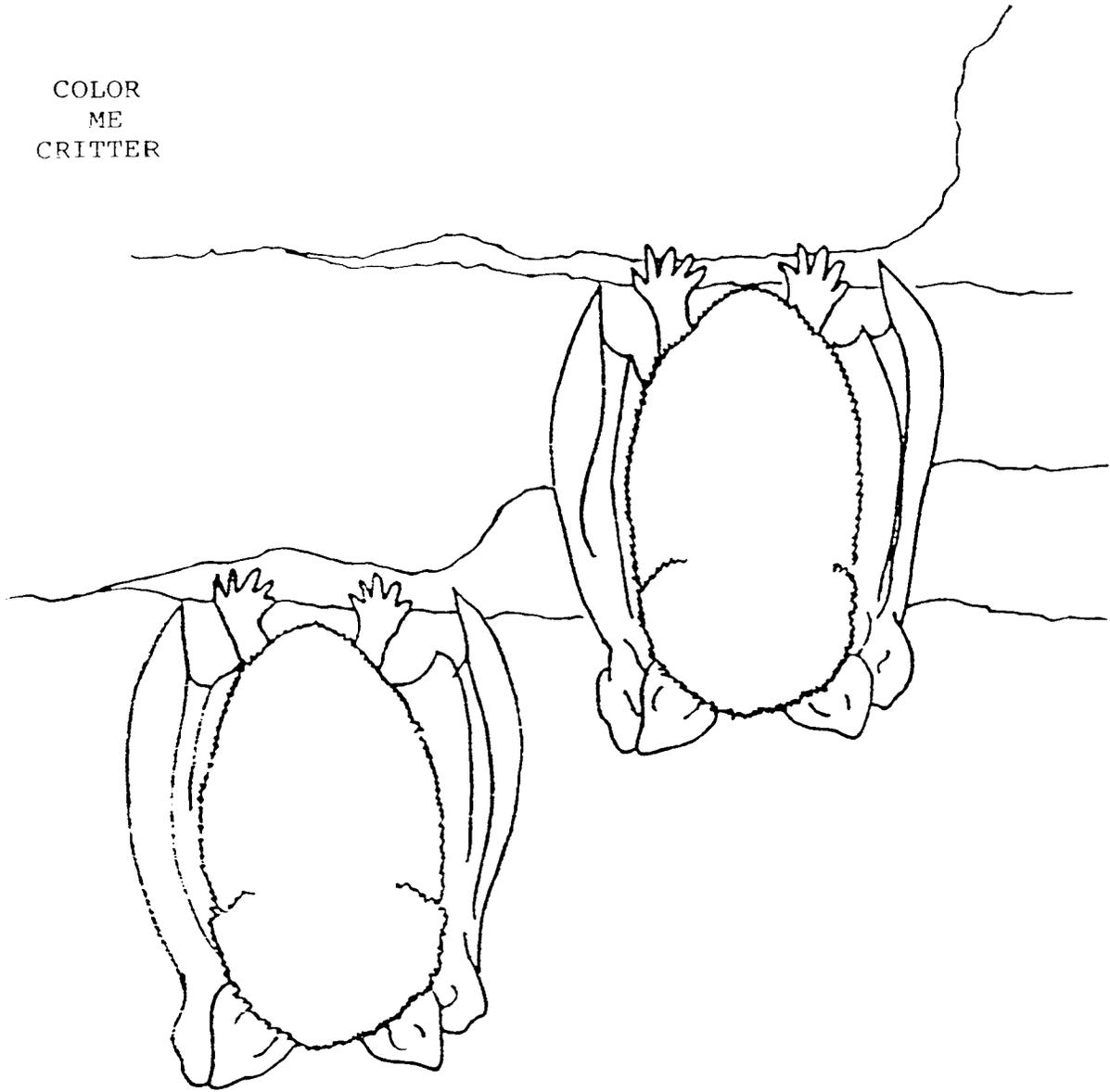
Caves throughout the world are home to a variety of animals. Some animals live in caves year-round and others visit just for shelter or to sleep. Permanent *Cave Dwellers*, such as the cave beetle, must be able to survive with little food and light—many are blind. *Cave Lovers*, such as crickets, could spend their entire lives in caves, but usually surface occasionally to feed or to breed. *Cave Visitors*, such as owls and bats, regularly enter caves, but could not survive underground.

The names of some kinds of animals that can be found in caves in various geographical areas are hidden in the word find puzzle.

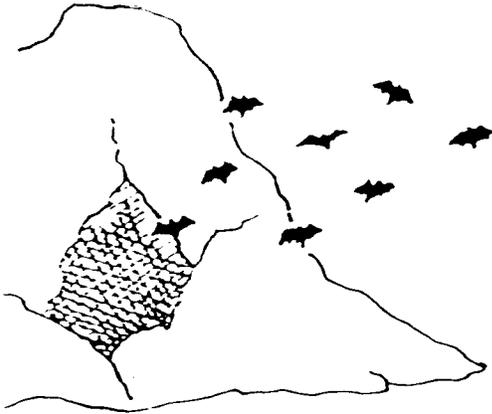
Cave Dwellers	shrimp	Cave Lovers	Cave Visitors	snake
salamander	millipede	cricket	oil bird	human
blindfish	spider	moth	pack rat	owl
snail	fungus	centipede	bear	frog
beetle	cockroach		bat	raccoon
flatworm	assassin bug			
	crayfish			



COLOR
ME
CRITTER



In the Winter, bats hibernate. Some bats travel great distances to caves or mines; others hibernate in houses, hollow trees or old barns.

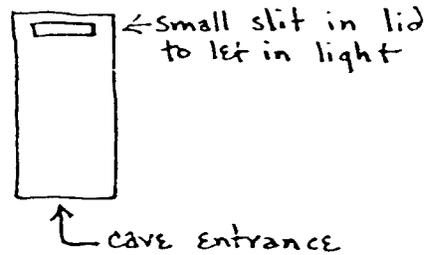
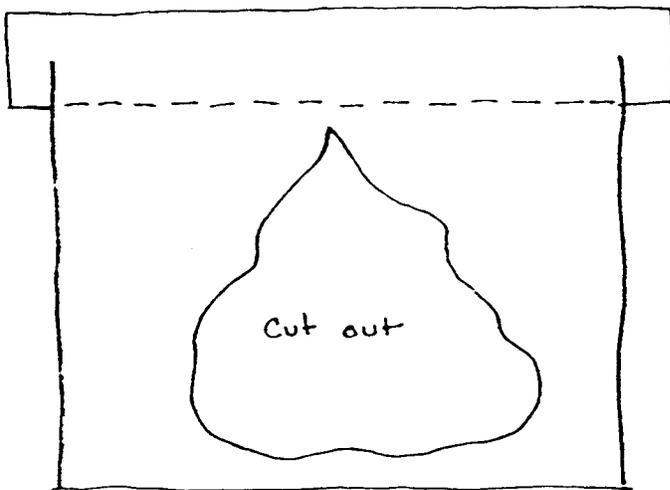
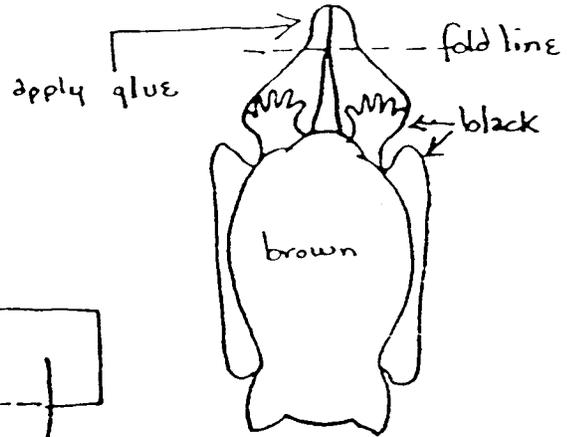


HOW TO MAKE A "BAT CAVE"

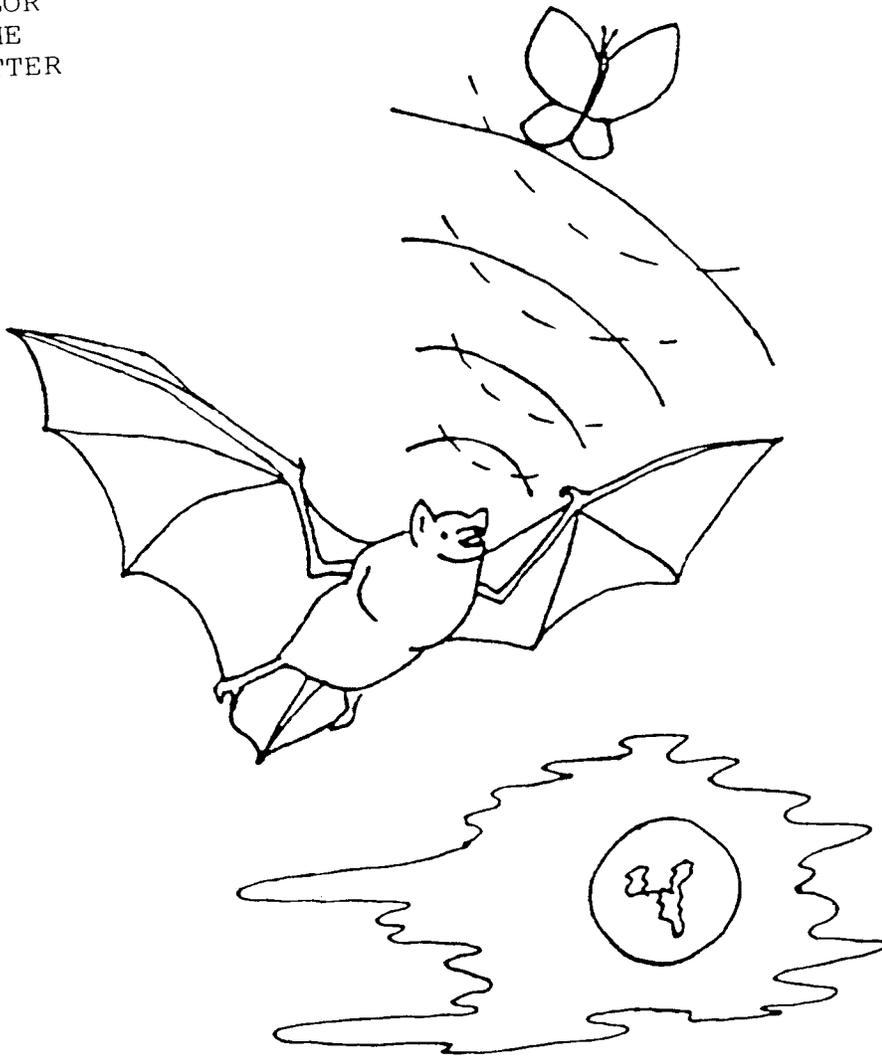
1. Cut out cave entrance on side of shoebox; cut slit on shoebox lid.
2. Paint insides of box and lid black; paint outsides brown.
3. Cut out several bats over pattern and color as indicated.
4. Fold bats' tails at dotted line and glue to shoebox lid.
5. Replace lid and view hanging bats through cave entrance.

Materials needed:

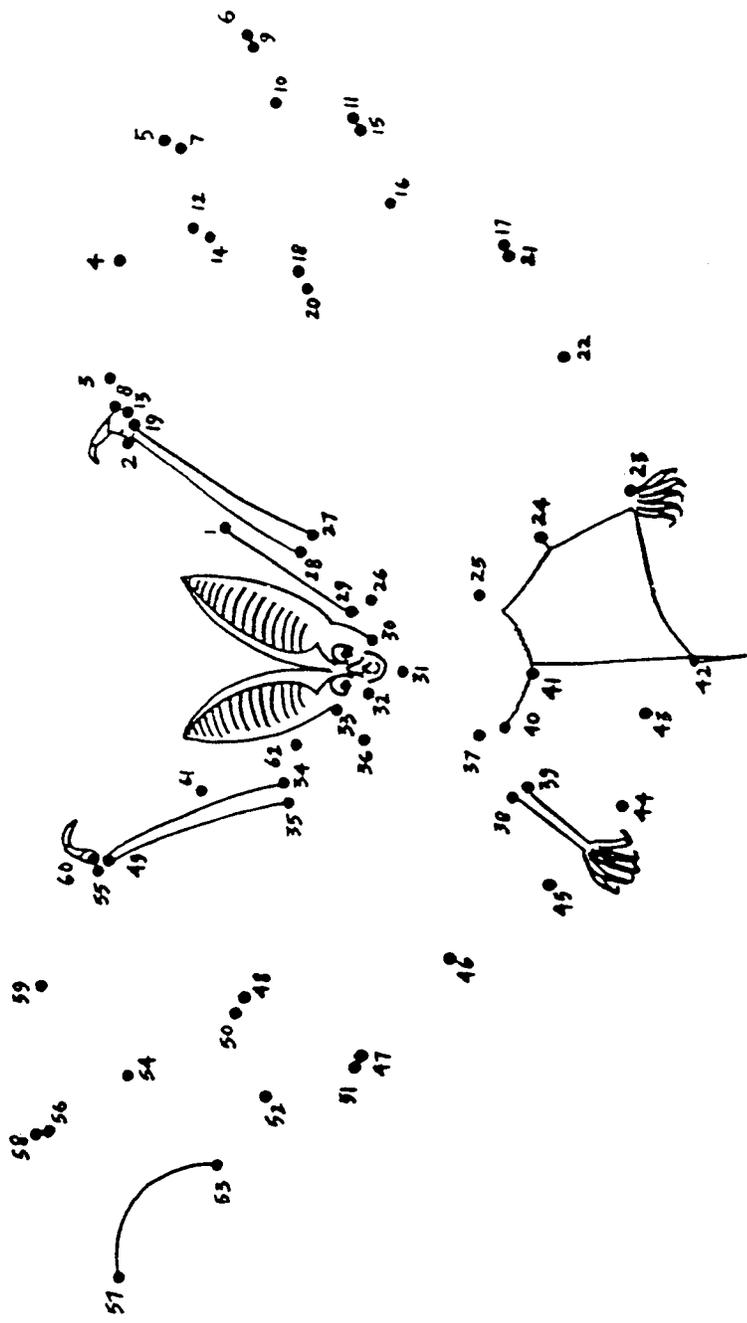
1. Shoebox.
2. Scissors.
3. Pencil for tracing bat pattern.
4. Glue.
5. Brown and black paint.
6. Brown and black crayons.



COLOR
ME
CRITTER

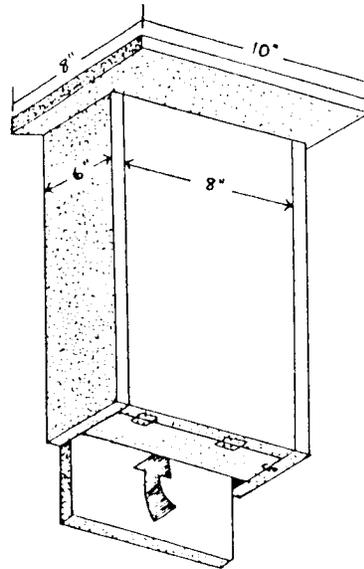
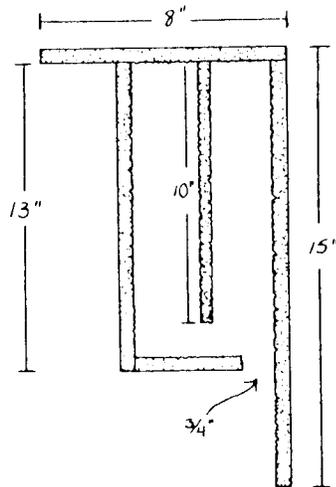


Bats use sonar, called "echolocation" to find their food (gnats, mosquitoes, moths), but bats are not blind. Bats can eat 600 mosquitoes in one hour!



Connect the dots!

Build a Bat House



Bats roost or seek shelter in a variety of places during the daytime.

These resting sites may be inside or outside. For example, hoary bats (see *Color-Me Critter*) roost outside in trees while many other bats roost inside caves, attics or similar places.

These days, it is not uncommon for bats to occupy bird nesting boxes. This interesting behavior has led many conservationists to build specially designed bat boxes.

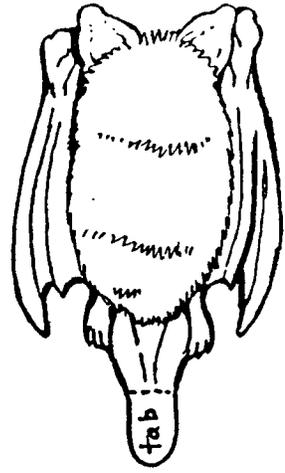
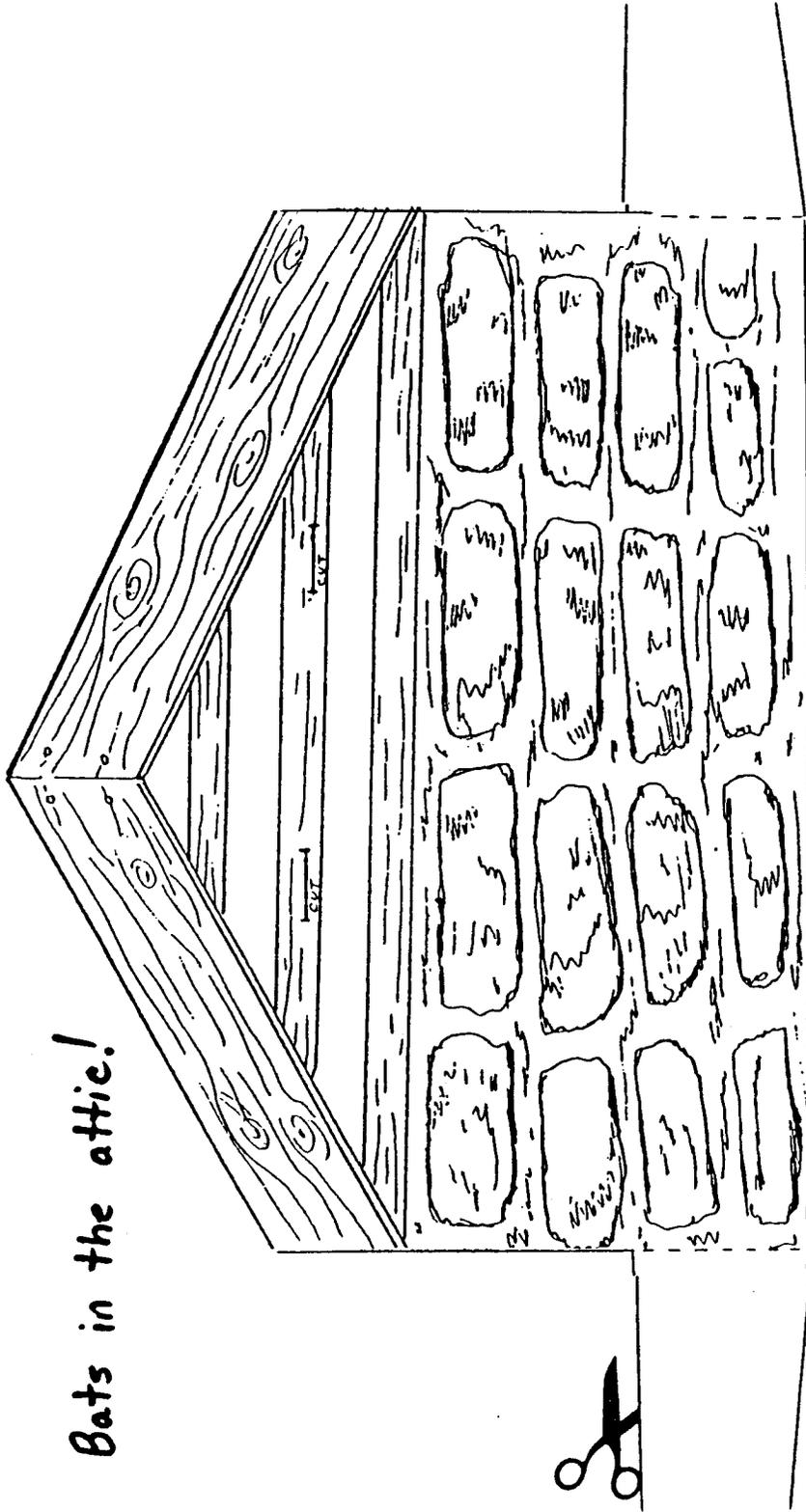
If you want to build a bat house, ask your parents or a friend to help you. Then just follow these simple diagrams.

The most important thing to remember while building your bat house is the width or size of the entry space. The ideal width is $\frac{3}{4}$ of an inch. It's best not to exceed one inch. Use wood with rough surfaces to allow the bats to climb easily in and out.

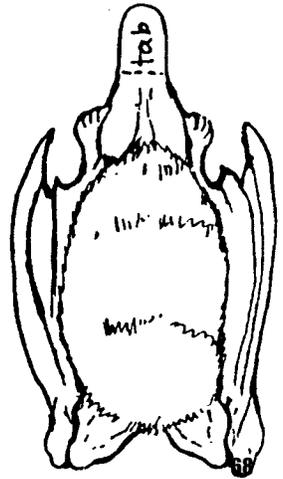
When complete, fasten your bat house securely to a tree trunk or the side of a building, about 12-15 feet above the ground. In Florida, bat houses should be placed in shady locations. Inside temperatures should never exceed 90°F. This is too hot for bats! It is very important to remember that bats can live only where local food supplies are good. Most bats live near rivers, lakes or swamps where insect numbers are high. The closer bat houses are to these places, the greater the chances your bat house will be used.

It's hard to say how soon you can expect your house to become occupied. Sometimes bats move in within a few weeks, but most often, bats require a year or two to find the new house. You can increase occupancy chances if the bat house is hung before early April.

Bats in the attic!



Cut along the solid lines. Fold on the dotted lines. Cut two slits in the rafters and hang your bats.



Cover by: Chris Myers
Activities by: Sue Ellis,
Fernbank Science Center, Zoogoer,
and The Emerging Naturalist



Fascinating Bat Facts...



- o Bats are the only mammals that are able to fly.
- o There are about 1100 different species of bats. Bats make up about $\frac{1}{4}$ of all mammals!
- o Bats feed on many different foods: most eat insects, but many eat fruit, and some eat fish, frogs, and even other bats.
- o There are three species of vampire bats that feed only on blood, but none of these species lives in the United States.
- o Bats can vary in size from the giant flying fox with its six-foot wingspan, to the bumblebee bat, which weighs about as much as a quarter.
- o Most bats use echolocation to avoid running into obstacles. They make loud sounds that humans cannot hear, and the echoes from those sounds allow them to catch insects in flight, and avoid a wire as thin as a human hair. Bats are not blind, and some bats have such good eyesight that they fly around at night using only their vision!
- o Under ideal conditions, a bat can catch 600 insects in an hour (one every six seconds)!
- o There are 45 different species of bats that are found in the United States, some of those species can live to be over 30 years old.
- o Bats generally only give birth to one or two pups per year – the young fly when they are about one month old.
- o All bats avoid people. Unless the bat is in torpor or hibernation (the deep sleep that bats experience during the day or during winter), any bat that allows you to handle it is likely to be sick. Such bats should **never** be touched! Bats do not attack people, but they will bite in self-defense. If you are bitten, try to capture the bat to have it tested, but in any case you should see a doctor immediately.
- o If a bat must be moved for some reason (to get it out of the house, perhaps), the safest way is to put a box or can over the bat, then slide a piece of cardboard under the container so that the bat is trapped safely inside.

For more information on bats you can contact:

Dr. Stephen Burnett
Associate Professor of Biology
Department of Natural Sciences
Clayton State University
2000 Clayton State Blvd.
Morrow, GA 30260
678-466-4774

email: sburnett@clayton.edu

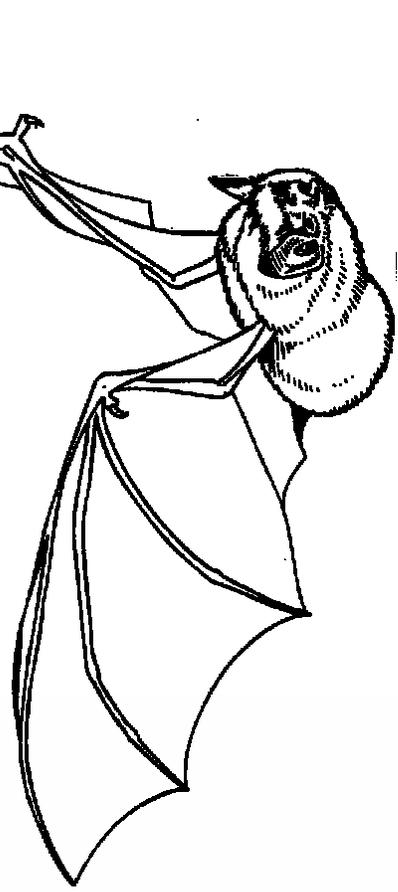
web: <http://a-s.clayton.edu/burnett>

Basically Bats
106 Spooner Rd.
Hawthorne, FL 32640
352-481-2913
<http://www.basicallybats.org>

Bat Conservation International
P.O. Box 162603
Austin, TX 78716
512-327-9721
Web: <http://www.batcon.org>

Zoe the Big brown bat
Eptesicus fuscus

Color me



W I N G S
F I H I B E R N A T E
D Z U L T R A S O N I C
A E O J H A H F A R A
L O M A M M A L S I E M
S E L I N A Y D E R E K
W P L K M I N S E C T
P S O N A R Q E C H O
V G N O C T U R N A L
V A M P I R E B A T S
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F R U I T B A T F U R
Q A R T

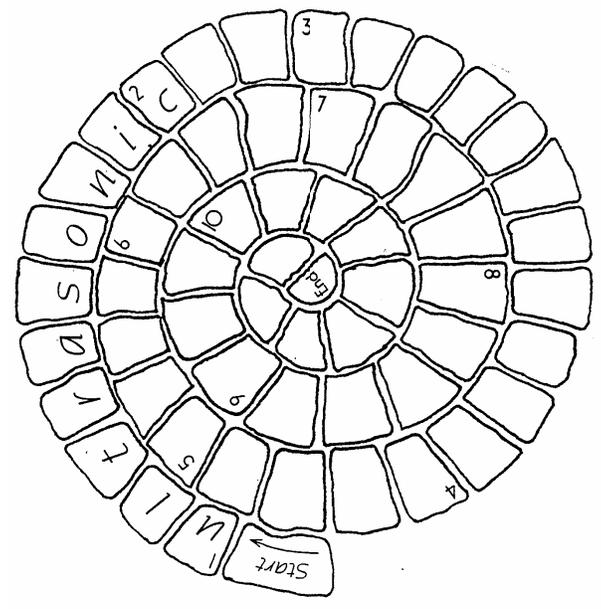
I B T D D E
H P W N E R O O S T P
F R U I T S A O C S P Z
F I G R A T E R P H
M I G F D O C C S K P
R H G L L I N A T E C S
Z P P O L L I N A T E S
R P P I C S W I W S O S
M I G F D O C C S K P
R H G L L I N A T E C S
Z P P O L L I N A T E S



Circle the 21 bat words in
this batty word search.
Words go up and down or
across.

BAT
CAVES
EARS
ECHOLOCATION
FRUIT BAT
FRUITS
FLYING
FUR
HIBERNATE
INSECT EATERS
INSECTS

MAMMALS
MIGRATE
NIGHT
NOCTURNAL
POLLINATE
ROOST
SONAR
ULTRASONIC
VAMPIRE BATS
WINGS



Can you bat around a few words to solve the puzzle on the right? Read the clues below and write each word in the spaces in the puzzle. Each numbered space will have the last letter from one word and the first letter from the next word. The first answer has been done for you. As you can see, the second word will begin with the letter C.

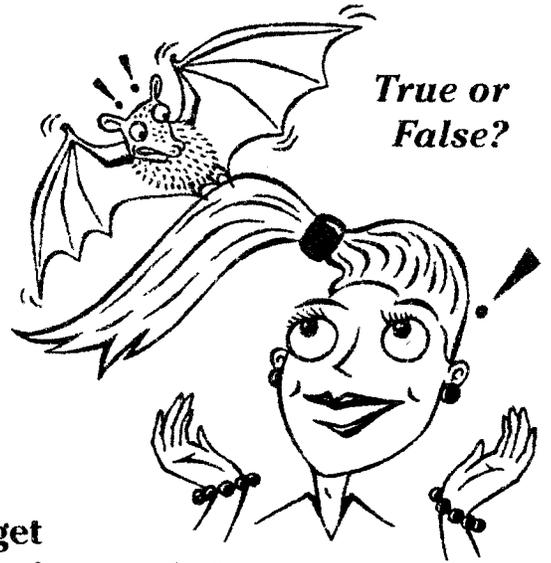
1. High-pitched
2. Millions of bats can live in one of these
3. A bat's sonar system
4. Time when bats hunt
5. Some bats live in these
6. This allows bats to "see" with their ears
7. To hang upside down
8. These are claw-like on a bat
9. A bat's wings are made of this
10. Because bats are awake at night, they are this kind of animal

True or False?



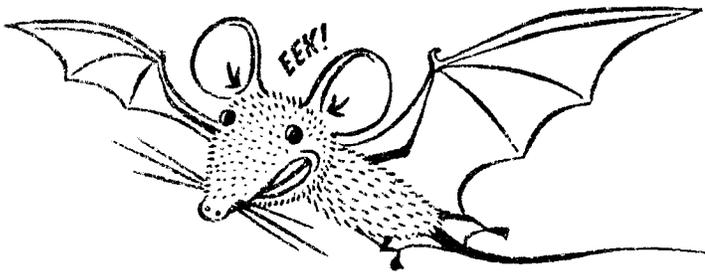
Bats are blind.

True or False?



Bats get caught in your hair.

True or False?



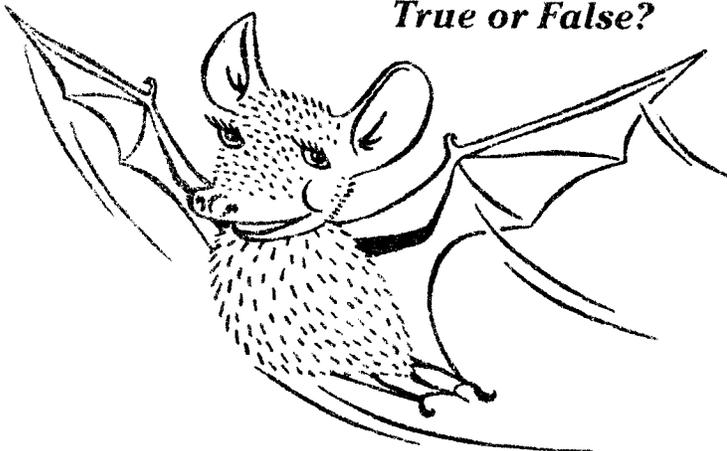
Bats are flying mice.

True or False?



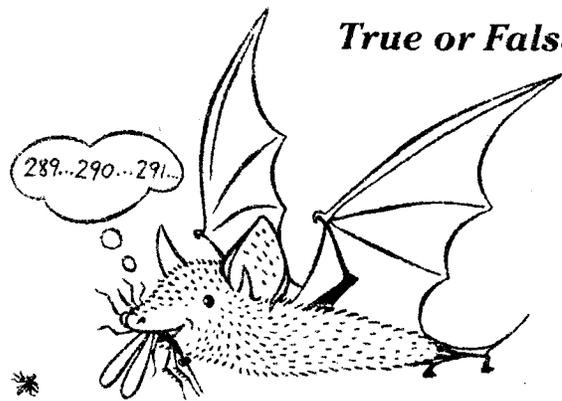
Bats are dirty and many carry rabies.

True or False?



Bats are the only mammals that truly fly.

True or False?



Some bats can catch up to 600 mosquitoes in one hour.

FALSE

Bats can find tiny insects in total darkness. They are much too smart to fly into people.

FALSE

No bats are blind and many can see very well. Insect-eating bats depend on sound and very good hearing to find food and get around in the dark.

FALSE

Bats are clean and groom themselves just like cats.

Bats can get rabies, like all mammals, but few do. Remember, bats are wild animals. You have nothing to fear if you never touch a bat.

FALSE

While both bats and mice are mammals, bats are not rodents and are more closely related to primates and people.

TRUE

Insect-eating bats can eat up to half their body weight in insects in one night. The record for mosquito catching is 600 in an hour!

TRUE

Some mammals, like flying squirrels, can glide. Bats are the only mammals that can really fly.

degrees Fahrenheit. Because bats are active at dawn and dusk, excluders should be installed during late morning to middle afternoon. If this simple rule is followed, it is unlikely that bats will attempt to leave the roost while an excluder is being placed.

Step 3 - Sealing the Roost

After all bats have left, permanently seal roost entrances. Before removing the exclusion device, cut a section of 1/4-inch hardware cloth large enough to cover the area. Remove the excluder and attach the hardware cloth with strong staples. FIG. 6 depicts a permanently sealed roost.

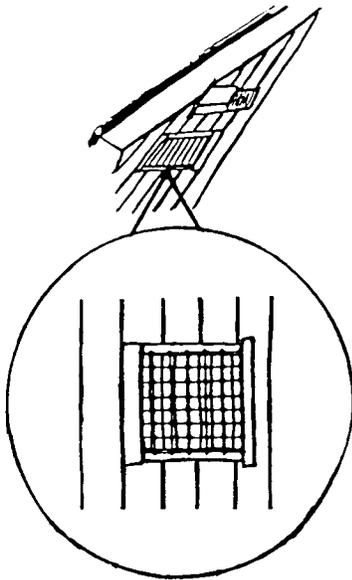


Fig. 6.
Permanently sealed entrance using 1/4-inch hardware cloth.

A WORD OF CAUTION

During spring and summer, young bats are unable to fly, if their mothers are evicted during this time, the young will be trapped inside the building. Besides the obvious odor problems from dead pups, those that survive may enter human living quarters in search of a way out. Females may frantically attempt to re-enter the building, even during daylight hours, to rejoin their young. **Avoid bat-proofing from May through August.**

REMOVING A SINGLE BAT

Occasionally, a single bat will enter a homeowner's living quarters. If this occurs, confine the bat to the room in which it was observed. Allow the bat to fly without intervention. **Never** try to catch a flying bat. When the bat tires, it will come to rest on a curtain, piece of furniture, or wall of the room. Allow it to rest for approximately 30 minutes. During this time the bat's body temperature will drop to the temperature of the room. The bat enters a state of inactivity called torpor. Typically, a torpid bat does not fly. To capture and remove it, follow these simple steps:

1. Put on a pair of leather gloves.
2. Place a plastic bowl or coffee can over the bat while it is resting. If the bat files, allow it to stop and rest again before removing it.
3. Slide a piece of rigid cardboard between the container and the bat's perch, trapping the bat inside the container (FIG. 7).

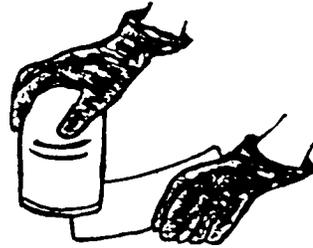


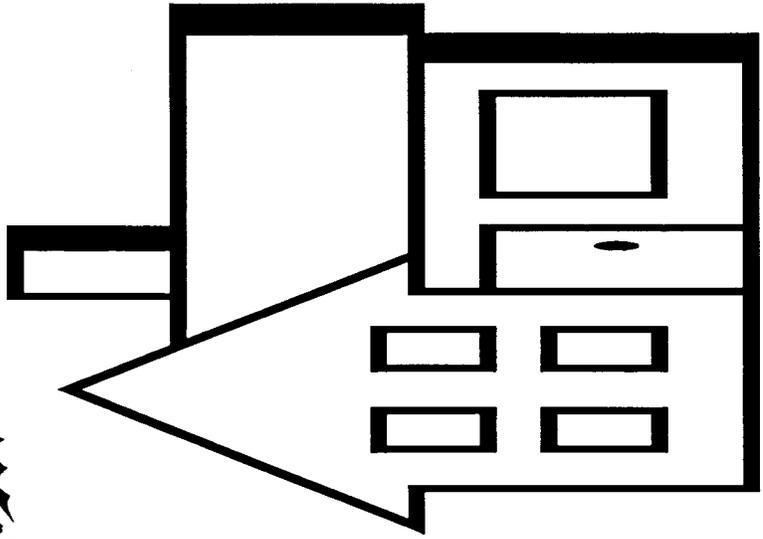
Fig. 7.
Safe method to capture a bat.

4. Release the bat outdoors in a place away from animals that will prey on it. The bat may not fly away immediately. If it is still present the following day, call your local wildlife agency.

5. If a bat bite is suspected, **keep** the bat and call the local health authorities to test it for rabies.

6. If recurring problems with bats entering the home occur, inspect the home for a colony of bats.

A HOMEOWNER'S GUIDE TO BAT REMOVAL



For assistance with bat-proofing buildings, contact **Basically Bats Wildlife Conservation Society, Inc.** at 770-961-4127, or e-mail us at batcons@mindspring.com



Basically Bats Wildlife Conservation Society, Inc.

BATS IN THE HOUSE

Although approximately 40 bat species live in the United States, only a few are dependent on buildings for roosting. These bats once roosted in hollow trees until early settlers eliminated large expanses of forests. Whether living in a tree or a building, bats are loyal to their roosting sites. If the bats leave for part of the year, they will return annually to the same roost as long as the site remains available to them.

In many buildings, there is little chance for contact between people and bats, thus there may be no reason to evict them. Because these beneficial animals have only one or two pups a year, the protection of their maternity colonies is important to their survival. Therefore, extermination of any colony should be avoided. The only safe eviction method, for both bats and humans, is a three-step procedure called *bat-proofing*.

BAT-PROOFING MATERNITY COLONIES

Step 1 - Providing an Alternate Roost

Bats evicted from their roost may move into someone else's home where they risk being exterminated. Furthermore, colonies with babies will not allow newcomers. If a displaced colony cannot find a new home, they may leave the area resulting in a decline of local bat populations. Well-placed bat boxes provide bats sanctuary outside of the home, while the homeowner still benefits from the bats' control of insects.

Bat boxes should be placed on or very near the building in which bats roost. This can be next to the current roost site (FIG. 1), on the chimney (FIG. 2), or on a wooden pole (FIG. 3) within 10-20 feet from the roost. When placing a bat box on the chimney, allow at least 3 feet of open space between the box and roof. When placing the box on a pole, the box should be at least 10-15 feet above the ground.

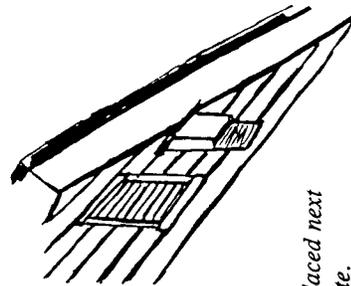


Fig. 1.
Bat box placed next to roost site.

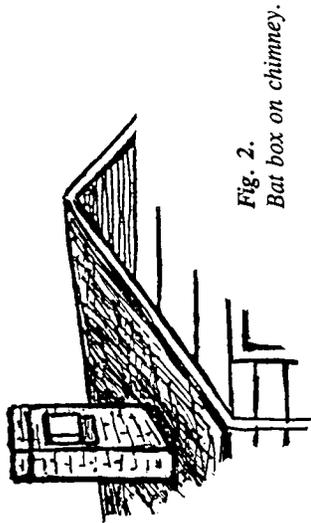


Fig. 2.
Bat box on chimney.

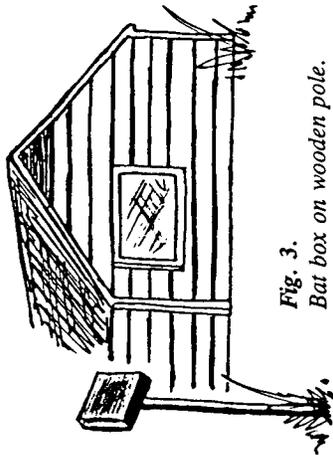


Fig. 3.
Bat box on wooden pole.

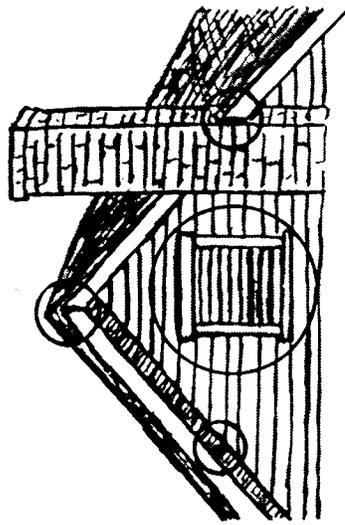


Fig. 4.
Typical areas where bats roost.

Exclusion devices are handmade, one-way valves. Excluders can be made from clear plastic sheeting, fiberglass screen, or bird netting. Cut enough material to cover the entire emergence area, and extend approximately 2 feet below it (FIG. 5). With strong tape or staples, secure the cut piece of sheeting to the building along the top and side edges. Leave the bottom edge open for the bats to escape (FIG. 5). The sheeting should be loose enough to slide a hand under the bottom. When properly installed, the sheeting allows bats to escape easily out the bottom, but when they return to roost, they are unable to find the entrance. Not all bats leave their roost every night. To ensure that all bats have left, leave the exclusion device in place for at least 3-4 days in warm weather, and longer in cool or cold weather: bats do not hunt when temperatures are below 60-65

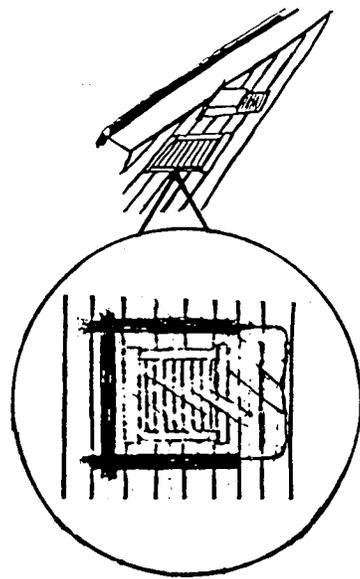


Fig. 5
Correct installation of handmade bat excluder.

Bat boxes should be at least 7 inches deep, 25 inches wide, and either 12 or 24 inches tall. Baffles divide the interior of the box into crevices which measure from 3/4 inch to 1 inch wide. Baffles and interior surfaces should be roughened with saw cuts, or covered with plastic mesh to provide bats with footholds. Position bat boxes so they receive the **first** 7 hours of morning sunlight. Paint boxes dark brown to absorb more heat from the sun. However, avoid positioning boxes where they will overheat in the afternoon sun. With a bat box in place, the exclusion of bats from the building can begin, and the bats will have time to become familiar with their new roost.

Step 2 - Fashioning an Exclusion Device

Homeowners who wish to bat-proof their homes should begin by locating the bats' exit points (FIG. 4). This must be done at dusk while the bats are emerging. Examine the rest of the dwelling, inside and outside, for holes that might allow bats entry. Entry points larger than 1/4 inch by 1/2 inch should be caulked. Windows should be screened, chimneys capped, draft-guards placed under doors leading to the attic and outdoors, and plumbing fixture holes should be filled with steel wool or caulk.