

UNDERSTANDING HOW BATS LIVE

CAMPING BAT STYLE!

This creative activity is suitable for almost anyone. It is an imaginative way of finding out how some bats make roosts from leaves.

Bats can live in a huge variety of places, from a single bat roosting in a tree hollow to a colony of millions in a cave.

The short-nosed fruit bat (*Cynopterus brachyotis*) makes tents out of leaves. They chew through the veins of the leaf so that part of the leaf collapses over and creates an enclosed space.

The tent both hides the bats from visual predators and protects them from rain. It is also thought that males make the tents to attract females.



Cynopterus brachyotis roosting under a banana leaf

Materials

- A large leaf such as a banana or palm leaf
- A metal ruler or similar object
- Cotton wool
- Glue
- Paper
- Black felt tip pen
- Scissors
- Watering can

Steps

1. Take a large leaf such as a banana or palm leaf, and a metal ruler or similar object.
2. Imitate a bat nibbling small holes in the leaf by scratching either side of the leaf vein, underneath the leaf. Make the 'nibbles' a few mm apart all the way down and on either side of the large middle vein.
3. You can then gently fold the leaf along the lines of holes, so that it creates a tent.
4. Try making a different kind of tent with another leaf - weaken the large middle vein about one third of the way from the top of the leaf and fold the end over.



Use a metal ruler to 'nibble'



Make a bat from cotton wool

Discussion points

How long did it take you? Was it easy? This is a very energy-consuming task for bats. How long do you think it would take a bat? How many different ways can you make a tent?

Test your tent

See if your tent would keep a bat dry. Make a bat from cotton wool, glue paper ears onto it, and then glue your bat underneath the leaf. Imitate rain by pouring water onto the top of the leaf. Is your cotton-wool bat still dry?

WHERE'S MY BABY?

This is a fun game that is suitable for anyone, adults and children alike. It is a great way of demonstrating how mothers find their babies in large roosts.

When it is time to give birth, the females of many bat species gather together in a maternity roost. The baby bats are called pups - they cling to their mothers and suckle milk from the nipple under her arm.

When the pup is very young, the mother may carry it with her when she is foraging. But after about 10 days the pups are too large, and have to be left behind when the mother searches for food.

When she returns, she finds her baby by recognising its voice and smell. She can manage this even if there are hundreds of pups to choose from. In fact, as the pups cluster together for warmth, there may be up to 5000 of them in a square meter.



A Kerivoula pellucida with her pup

Material

Cotton wool balls

Different scents (e.g. vinegar, cinnamon, garlic, vanilla, perfume or banana)

Blindfolds x 4

4 pairs of people (one as the mother and the other as the baby)

Lots of space

Steps

1. You are all bats in a maternity colony - most of you are pups, but you need to select 4 mothers, and their 4 pups.
2. Each of the four selected pups is given a cotton wool ball with a scent (e.g. vinegar, cinnamon, garlic, vanilla, perfume or banana).
3. The mother gets to know the scent of her pup. The baby is also assigned a voice (make up tongue clicking patterns), and the mother and pup need to practice a few times to be sure that the mother can recognize her baby's scent and sound. The mothers are then blindfolded.
4. All the other pups, and the 4 whose mothers will be looking for them, are now arranged in the 'roost'.
5. All the babies start clicking at random without a pattern, except the 4 bats who must use the pattern they practiced with the 4 mothers.
6. The blindfolded mothers must now try and find their own pups, based on the click patterns.
7. If a mother bumps into a designated 'baby' the baby is required to place the cotton ball near the nose of the mother.
8. The winner is the mother and baby who find each other first!



A mother finds her baby

Discussion points

How did the mothers first get near to their pups? Did the mothers randomly sniff all the pups or wait until they found one making the right clicking pattern?

Sound should be a better way to find the pups at first because it works over longer distances than smell does. In fact, in the wild the mother has a vague idea of where she left her pup and goes to that part of the roost first. Then she calls to and listens for her pup. Finally, she smells it to be sure it is definitely her youngster.

Why do you think it is so important for the mother to find the right pup? Baby bats are always hungry and it is a very demanding time for the mothers trying to get enough food to make milk for the young and to keep their own strength up.

The hungry pups are always on the look out for a free meal and will try and feed from any female that comes near. So its' up to the mother to make sure she is only feeding her own pup - otherwise she is wasting all her energy and milk on someone else's pup and her own could starve.

UNDERSTANDING BAT BIOLOGY

THE BAT MOTH GAME

This exciting game can be played by anyone to demonstrate how insectivorous bats hunt for their prey and find their way.

To find their way around and to find food, insect-eating bats use a technique called echolocation. This is when they produce sounds and listen for the returning echo.



Material

A group of people to be trees

One person to be a bat

One to be a moth

A blindfold

Plenty of space

Steps

1. The bat is blindfolded, and all the rest of the players stand around the bat in a circle about 4 m across.
2. The moth joins the blindfolded bat in the circle; the objective is for the bat to catch the moth. To find the moth, the bat calls out "bat" and immediately the moth must reply with "moth". This is like a bat shouting out a call and getting an echo back from the moth, and then using that echo to work out the direction of the moth.
3. Every time the bat calls out, the moth must answer, and both the bat and moth can walk swiftly (don't run!) around the circle.
4. The bat will need to keep calling and to listen carefully for the moth's replies or "echoes", until it is close enough to catch and "eat" the moth.
5. Got the hang of it? Now have several bats and several moths at once.

6. Now add in some trees - trees stand still and call out "tree" every time the bat calls "bat". Any bat that bumps into a tree is out of the game!
7. Everyone should take a turn at being the bat and moth.



A bat catches a moth for dinner!

Discussion points

What happened when a bat started to close in on a moth? As real bats get nearer to their prey they start calling more and more often and the calls get shorter as they try to get as much information about the location of the insect as possible. During the final attack the bat will be producing up to 200 calls per second!

Did the moths actively avoid the bats or did they just fly around? You probably found that your moths did all they could to avoid the bats because they could both hear and see them. Real moths can't see the bat but some have developed a simple hearing system that is tuned to the frequencies that many of the bats use. When they hear a bat they change course to avoid it. If the bat is too close they take emergency action and stop flying immediately. They spiral downwards out of harms way!

Was it easier to find an insect when it was out in the open, away from the trees, or when it was near the trees? Many bats find it difficult to tell insect echoes from tree echoes when the insects are very close to the trees. To get around this problem, bats that hunt in dense vegetation often rely on their ability to pick out the fluttering of insect wings.

THE UTILITY OF BATS

BAT FRUIT SALAD

Making a bat fruit salad is a simple and effective way of proving the importance of bats to us. We can celebrate bats and enjoy these fruit at anytime; at parties or at home.

Bats are animals of extraordinary ecological and economic importance. We depend on bats to provide for us. Some plants depend directly on bats for pollination or seed dispersal. Amongst these are bananas, mangos, durian, rambutan and petai.



Eonycteris spelaea

Material

Bat pollinated fruit (e.g. bananas, mangoes, durian, papaya, jackfruit, guava, petai)
A large mixing bowl
A knife
Juice (e.g. mango)
Ice

Steps

Cut up a banana, jackfruit, mango, papaya, and guava into a bowl (or any of your favourite bat fruits) pour mango juice, add some ice and serve. Yum! If you will discuss the importance of bats it may be useful to keep one of each fruit uncut as an example.

Discussion points

Bat food is for our needs too! Fruit bats are vitally important as seed dispersers and pollinators in both forests and crops. They play a major role in forest regeneration by dispersing seeds. Ripe fruit is taken from the parent tree, and the seeds are spread through droppings or spat out. When they eat fruit they prefer to just suck the juices and spit out the seeds and other unwanted parts of the fruit. This leaves more room in their stomachs for the nutritious juices and pulp. The dry remains are called rejecta pellets, and seeds spread in rejecta pellets can germinate and grow into young trees.

Meanwhile, when the nectar-eating bats drink from flowers, they pollinate them - just like a bee does. When they visit a flower in search of nectar, they are brushed with pollen that they then take on to the next flower. This transfer of pollen from one flower to another is pollination, and is the first step in fertilizing the flower so that a fruit can be produced. So pollination is essential if the flower is to produce fruit.

At least 31 plant species in Malaysia alone rely on bats for pollination. Some of these plant species are important to people too. Trade in durian in South East Asia is worth about \$120 million per year (RM 455 million). In Malaysia, sales of petai just in the Klang Valley come to about \$2.8 million per year (RM 10.8 million) - all thanks to bats!



A bat fruit salad of fruit pollinated by bats