

BATS!

Compiled by Alyson Brokaw,
 Cornell University 2010



Credit: Bill Forbes,
www.hoothollow.com

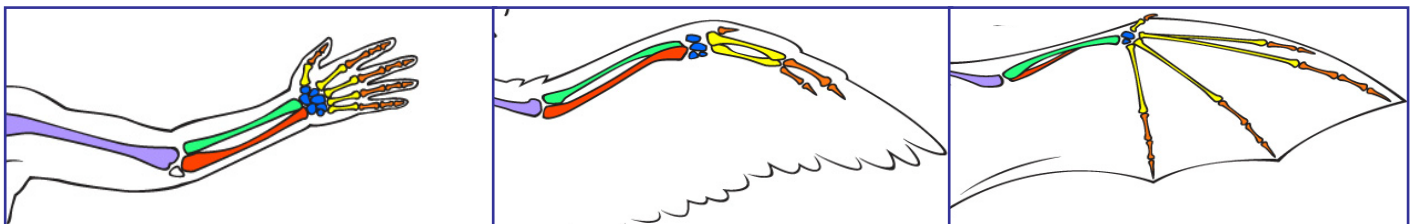
What traits characterize bats?

Bats are **MAMMALS**:

- Have fur, give birth to poorly developed young that nurse from breasts, only one offspring a year
- World's only true flying mammal (as opposed to gliders such as flying squirrels)
- Long lived: 15-20 years in wild, 30-35 years in captivity
- More closely related to primates and lemurs than to mice or other rodents

Wing Morphology:

- Their scientific name "*Chiroptera*" translates to "hand wing"
- Thumb like claw can be used to climb, crawl and groom
- Have sporadic and swooping flight
- Bird wings provide better lift, but hand pattern allows for better maneuverability in flight
 - Research on the mechanics of bat flight:
<http://microfluids.engin.brown.edu/research/batflight.html>



Body Morphology:

- Knees are turned around 180 degrees compared to humans
- Specialized tendons in feet that lock in place allow bats to hang upside down without expending large amounts of energy
 - **Why upside down?** Wings poorly designed for lift from ground, dropping from above easier and faster to escape predators

Where are bats found?

Bats are found all over the world!

- *Every continent except Antarctica*

Two Classifications of Bats:

- Microchiroptera and Megachiroptera



Credit: Brett Whitesell,
<http://www.bbfarmstay.com.au/wildlife/flyingfox.html>

Megachiroptera (Mega-bats):

- Tropical, Old World bat species: Africa, Asia, Australia
- Large wingspans and bodies
- Fox like faces: long nose, large eyes, small ears
- Feed primarily on fruit, flowers and nectar

Microchiroptera (Micro-bats):

- Found worldwide
- Smaller bodies and wingspans
- Diverse and distinct facial features
- Small eyes, large ears
- Feed primarily on insects, broad and diverse diet

Photo by Gareth Jones.

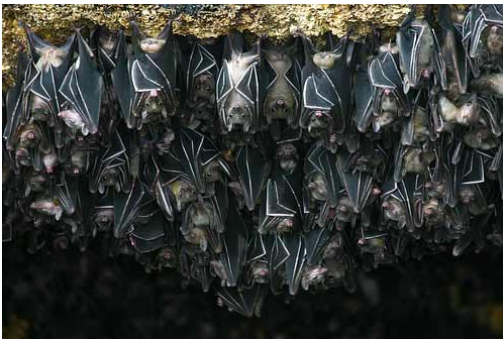
http://www.geneticarchaeology.com/research/Molecular_evolution_is_echoe



- Resource for identifying bats: [Bats of the World \(Golden Guide\), Gary L. Graham](#)

Habits and Habitats of North American Bats:

- **Nocturnal:** hunt/breed/active at night, sleep during the day
- **Colonies:** associate in large groups, emerge at dusk to go feed
 - Sleep upside down
 - Very large colonies of millions of Mexican Free Tailed Bats: Bracken Cave, Texas
 - Many bats are **solitary:** sleep in foliage, under bark



www.batsanctuary.org

Bats over the Seasons:

- **Hibernaculum:** location where bats hibernate in large colonies, same place every year
 - Some bats migrate to warm areas and then return to same roost to breed/have young
- Spring: form **nursery colonies:**
 - Large groups of adult females with young, mothers can distinguish their own babies among hundreds by smell and sound, and will only feed their own young

Hunting and Echolocation:

Primarily ***Insectivores:***

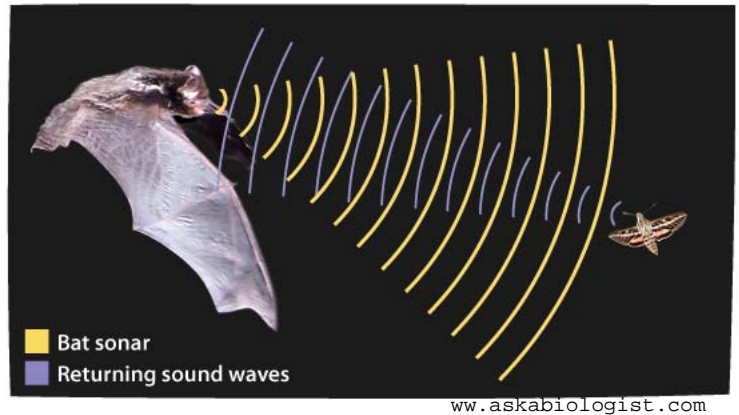
- Over 70% of all bat species eat insects, can eat up to 1200 insects/bat a night
- Only three species of vampire bats, for an overview of vampire bats see: <http://kids.nationalgeographic.com/kids/animals/creaturefeature/vampire-bat/>
- Other bats eat nectar, fruit, pollen, fish, and even frogs!
- Most bats hunt from the air, though some go down to the ground to catch insects

Night Hunting and Echolocation:

- Bats are NOT really blind: have excellent vision, fruit bats can even see in color (others in black and white)
 - Eyes have a tapetum lucidum which reflects light, helping nocturnal animals see better in the dark. The *tapetum lucidum* causes eyes to shine at night, like deers in headlights.

Use sounds to find food: about 70% of bats use *echolocation* to hunt:

- High pitched, ultrasonic, most sounds out of human range
- Emit sounds that bounce off of objects and back to the bats ears over milliseconds of time. Bat uses time of return echo to triangulate location of objects to navigate.
 - Bat ears specially designed to trap echoes, usually very large
 - can reposition bones in their ears to receive echo
 - Some species have other facial features that help trap sound (noses)
 - Similar system found in dolphins and whales
- <http://www.howstuffworks.com/bat.htm> – Has a good section on echolocation and how it works



Why use echolocation?

- Allow navigation in low light conditions, useful for quickly moving prey.
- Also used for communication and courtship song between species and among individuals of a species.

Bats of New York:

Highly diverse: Bats make up about ¼ of all mammal species (approx. 1200 species, still discovering more)

- About 50 bat species found in US and North America, including several endangered species



Bats of New York: Colonial

- Most often seen by casual observers
 - **Little Brown Bat:** bat most likely to see in your backyard, like to hunt near rivers, lakes and wetlands, hibernate in caves as large groups, currently threatened by new disease, mouse eared appearance, brown and black
 - **Big Brown Bat:** slightly larger than Little Brown, similar coloring, widely distributed, most likely the colony of bats living in your attic or under roof, prefer feeding on beetles, readily move into bat boxes

Species of New York: Solitary

- Less likely to be seen, more secretive
 - o **Red Bat:** long, reddish/orange fur, roost in forests, among leaves, together only to mate and migrate, one of the fastest bats: timed at 40 mph
 - o **Hoary Bat:** most widespread of all bat species, only native mammal found on Hawaiian islands, heavy fur, dark with white tips, yellowish throat color, moths as food preference
 - o **Silver Haired Bat:** black or dark brown with silver tips, smaller than Hoary Bat, live under tree bark, in old woodpecker holes, eat a mix of flies, mosquitoes and moths



www.batconservancy.org

Websites for Information of North American Bats:

[America's Neighborhood Bats: Understanding and Learning to Live in Harmony with Them, Merlin D. Tuttle](http://nyfalls.com/wildlife/Wildlife-mammals-bats.html)
<http://nyfalls.com/wildlife/Wildlife-mammals-bats.html>
<http://www.dec.ny.gov/pubs/46905.html>

Bat Conservation and How to Help:

- Importance of Bat Conservation: ecological services provided by bats include pollination and seed distribution of commercial crops (bananas, mangoes), pest control of crops and diseases (corn borers, mosquitoes)
 - o About half of US bat species are endangered or declining

White Nose Syndrome

- o First discovered in Albany in 2006, has spread as far north as Ontario, as far south and western Tennessee
- o Named from white fungus that grows on nose, wings and ears.
- o Disruption of hibernation behavior causing loss of fat reserves: 73% death rate
- o Bat to bat contact only, setting up bat boxes as alternate locations for bats that survive a winter of exposure
- o Mainly affecting Little Brown Bat populations with the potential to affect half of US species that hibernate in colonies in North America



Photo © Al Hicks, NYSDEC

Citizen Science:

- Put bat boxes up in yard: encourage bats to stay around, but avoid damage to house/attic
- Ideal sun exposures, protection from predators dependent on region

Building Bat Boxes in Your Backyard:

[Bat Box Builders Handbook, Merlin D. Tuttle](#)

www.batcon.org — Good information on bat biology and conservation overall

http://www.eparks.org/wildlife_protection/wildlife_facts/bats/bat_house.asp

Good diagrams and proper placement of building bat boxes

- **Bat Counts:** local caves, known roost sites
- Push to put up bat boxes in areas hard hit by White Nose Syndrome as alternate roosts for surviving bats
- If find a bat on ground: don't pick it up, make sure its safe from predators, if it's a baby call a wildlife rehabilitator
- If find bat in house: trap carefully using tin can/container, release outside gently
 - DON'T handle bats without proper training: not aggressive creatures but will bite in self-defense.



Other Great Resources:

- <http://wings.avkids.com/Curriculum/Bats/index.html> – great website overall for bat information and classroom activities for different grades and learning levels
- <http://www.kidzone.ws/animals/bats/activities.htm> – another great overall resource on bats, good kids activities and information
- <http://www.wvu.edu/~agexten/wildlife/bats.pdf> – good overview of variety of bat related information and topics, especially conservation and rehabilitation.
- <http://42explore.com/bats.htm> – good site with a lot other links to different thematic learning units and topics for classroom learning.
- www.batconservancy.org – Lube Bat Conservancy, good site for information on bat rehabilitation and fruit bat biology.
- www.batconservation.org – Organization for Bat Conservation, large organization dedicated towards educating people about the importance of bat conservation.