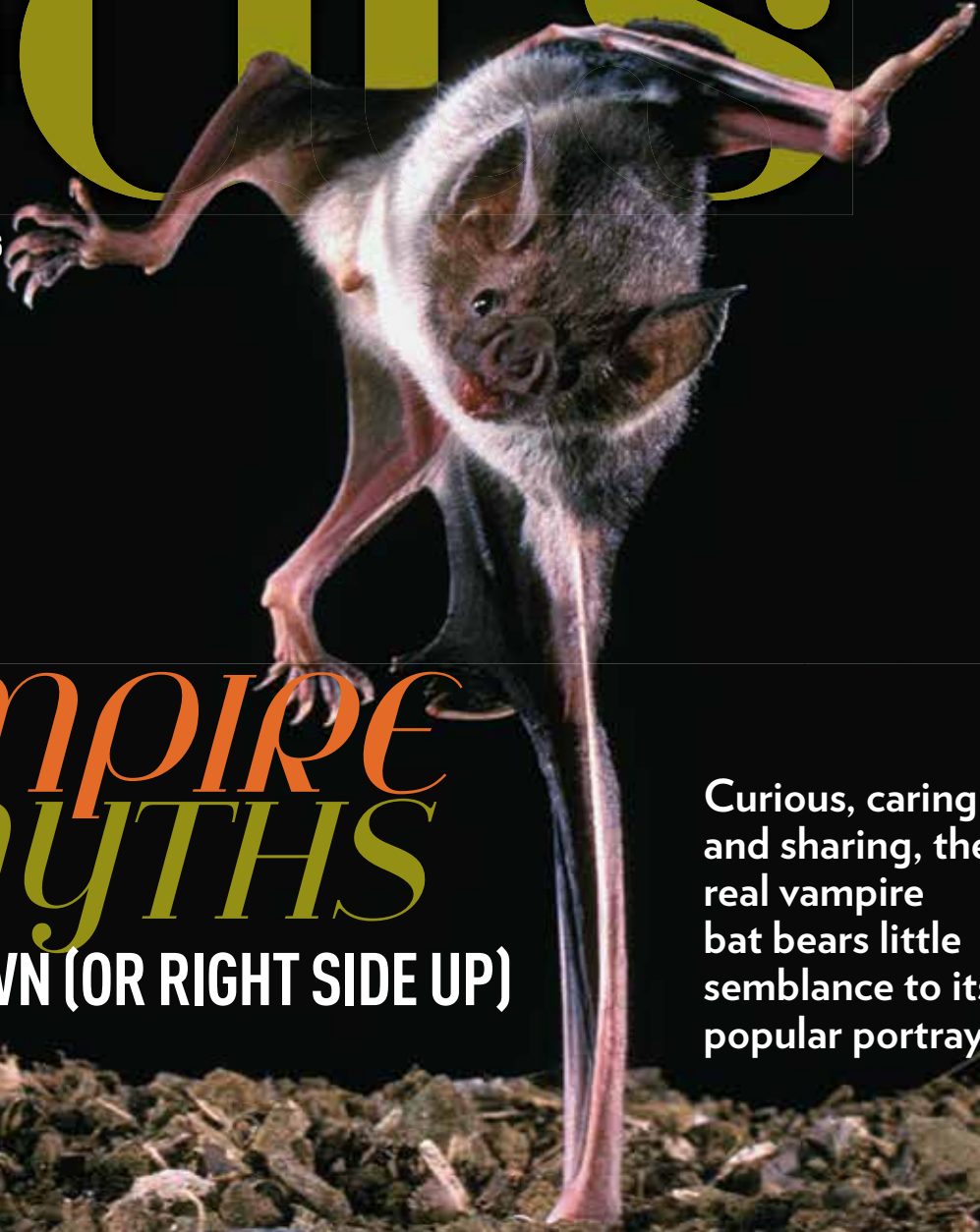




# bat

BAT CONSERVATION INTERNATIONAL

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TURNING  
*vampire*  
*myths*  
UPSIDE DOWN (OR RIGHT SIDE UP)

Curious, caring and sharing, the real vampire bat bears little semblance to its popular portrayals



HOLY SMOKES,  
IT'S THE BAT SQUAD!

THE MERLIN TUTTLE  
CONSERVATION AWARD

SPECIES SPOTLIGHT:  
THE GHOST-FACED BAT

# DON'T MISS OUT

*on our new benefits of membership!*



Photos: Michael Durham

## *Announcing new benefits for our Big Brown Bat (\$60) and Mexican free-tailed bat (\$100) membership levels!*

- Those who have a **Big Brown Bat membership (\$60)** or higher will now be able to bring up to five additional people to Bracken Cave. Six total! Perfect for larger families or those who like bringing their bat-inclined friends along.
- Those with a **Mexican free-tailed bat membership (\$100)** or higher will receive access to ProDeals with Experticity. Usually reserved for professionals in the field, this new benefit will allow you to take advantage of amazing discounts on bikes, camping gear and much, much more!



As a member of BCI at the Mexican free-tailed bat level and up, you've earned up to **70% off** retail pricing on hundreds of top brands at **Experticity.com**. Experticity is an exclusive network where brands like **Brooks, Goal Zero, Diamondback Bicycles, Skull Candy** and hundreds more reward you with insider content and experts-only discounts. Upgrade your BCI membership now to shop your favorite gear. Over 350 outstanding brands to choose from! To receive your access code, join BCI online now!



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Photo: Merlin Tuttle.org



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ON THE COVER  
The common vampire bat  
(Desmodus rotundus)  
Photo: MerlinTuttle.org

Photo: Michael Schirmacher

# The Season of the Bat

By CULLEN GEISELMAN

A handful of lucky plants and animals have come to signify the seasons. In northern latitudes, it's winter's reindeer and snow-covered fir trees; spring's fluffy bunnies and yellow daffodils; summer's blinking fireflies and juicy watermelons; and fall's ubiquitous pumpkins and...bats. Thanks to Halloween, there is a season of the bat!

Being a connoisseur of all things batty, I used to lament that October was the only time I could buy bat-shaped cookies, candies, stickers and bat-emblazoned apparel (available year-round now at [batgoods.com](http://batgoods.com)), but I have come to see the benefits of having bats so intertwined with our most ghoulish of holidays. For many people, it's easy to go through life without giving a thought to bats, their incredible adaptations, the benefits they provide at night while we sleep or their pressing conservation needs. Having a holiday—or really a season considering how many weeks Halloween candy and decorations are sold in stores—provides us the opportunity to make bats the topic of conversation and celebration. This year we will celebrate the third annual Bat Week (October 25–31) by highlighting the efforts of our young conservationists. We invite you to strike up a conversation about bats with your friends and neighbors. If you're looking for a place to start the discussion, check out the fun facts about the altruistic behavior of vampire bats and the incongruous history of how they became part of human vampire lore on page 8.

In the U.S., many youngsters first learn the bat basics in elementary

school during a Halloween-associated bat unit. Some become so inspired that they go on to do some amazing things both in and outside of school. On page 12, you'll learn about budding young scientists and conservationists who are making the world a better place for bats and people. You can meet them and five other inspiring kids online as part of the Bat Squad! webcast series and hear their stories firsthand. Each episode of this four-part series will be broadcast online at 1 p.m. EST during Bat Week starting on Tuesday the 26th through Friday the 28th. See [batweek.org](http://batweek.org) for more information.

Following the stories of these students reveals how a Halloween-time lesson in school can lead to an interest in bats that blossoms into a passion and then a career conserving them, essentially building a path to tomorrow's bat conservation scientists. Bat Conservation International has supported the early careers of hundreds of bat scientists by awarding scholarships to graduate students around the world to conduct conservation-relevant research projects. We hope that one day these teenage students will join the ranks of the many BCI scholarship recipients. And we may have Halloween and the season of the bat to thank for sparking their early interest.

Cullen Geiselman  
BCI Board Chair

→ **TALK TO US**  
Share your thoughts and feedback with *Bats* magazine at [pubs@batcon.org](mailto:pubs@batcon.org).



Bat Conservation International (BCI) is a 501(c)(3) organization dedicated to protecting bats and their essential habitats around the world. A copy of our current financial statement and registration filed by the organization may be obtained by contacting our office in Austin, below or by visiting [batcon.org](http://batcon.org).

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*Bats* welcomes queries from writers. Send your article proposal in a brief outline form and a description of any photos, charts or other graphics to the Editor at [pubs@batcon.org](mailto:pubs@batcon.org).

**Members:** We welcome your feedback. Please send letters to the Editor at [pubs@batcon.org](mailto:pubs@batcon.org). Changes of address may be sent to [members@batcon.org](mailto:members@batcon.org) or to BCI at our Austin, Texas, address above. Please allow four weeks for the change of address to take effect.

From time to time, BCI exchanges mailing lists with other like-minded conservation groups to make more people aware of the importance of bats. If you wish to opt-out of these exchanges, please let us know at [members@batcon.org](mailto:members@batcon.org).

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# bat signals

BCI UPDATES AND CONSERVATION NEWS



● CONSERVATION AWARD

Merlin Tuttle photographs a Gambian epauletted fruit bat (*Epomophorus gambianus*)



## Honoring a leader in bat conservation

### *Announcing the Merlin Tuttle Conservation Award*

Merlin Tuttle is a name synonymous with the magic and wonder of bats. His passion for these often maligned creatures along with his famous photography skills brought these animals out of the dark and to the forefront of the minds of millions. Founding Bat Conservation International (BCI) in the mid-1980s, Merlin has been and still is an avid advocate for bat conservation.

BCI's headquarters in Austin stands as a testament to one of his shining achievements—bringing BCI to Austin to lead a vigorous public education campaign to save the 1.5-million strong colony of Mexican free-tailed bats under Congress Avenue Bridge. After meeting with media, community groups, schoolchildren and city leaders, he, along with the BCI team, gradually convinced the people of Austin that they have little to fear and much to gain from their nocturnal neighbors. Now they have become a delight for visitors and locals alike, generating millions of tourism dollars each year for the local economy.

To honor his leadership, the BCI Board of Directors is proud to announce the establishment of the Merlin Tuttle Conservation Award, a funding opportunity for those wishing to strengthen bat conservation through research and community engagement.

Recipients of this distinguished award will be chosen from among the applications received by BCI during a given year in response to BCI's Requests for Proposals. The first awardee will be selected from the next RFP that will be announced in October. The Merlin Tuttle Conservation Award will inspire scientific research and community action to protect bats around the world and address critical conservation needs.

Since 1998, BCI has awarded more than \$1 million to more than 200 aspiring bat conservation leaders for projects in 40 countries. Many of those recipients are now recognized for their expertise at the highest levels in their home countries and within the international scientific and conservation communities.



### **SMALL GRANTS PROGRAM**

To learn more about BCI's Small Grants program, visit [batcon.org/grants](http://batcon.org/grants).

● CRITICAL HABITAT

# Establishing a new protected area for the endangered Fijian free-tailed bat

Very little is known about the habitat and ecology of the Fijian free-tailed bat.



Photo: Shawn Thomas



Photos: Joanne Malotaux

**B**CI and our partners in Fiji are one step closer to securing habitat critical for the survival of the endangered Fijian free-tailed bat (*Chaerephon bregullae*). The only known roost and maternity colony of the species is found at Nakanacagi Cave on the Fijian island of Vanua Levu. Development of the land around the cave has placed this important roosting site, where over 95 percent of the species' global population is believed to reside, at increasing risk.

To protect this critically important habitat, BCI, in partnership with the National Trust of Fiji, Birdlife International, the University of the South Pacific, and NatureFiji-MareqetiViti, hope to secure the two parcels (22 hectares) of privately owned land surrounding the cave.

After two years of stakeholder negotiations, the conservation team is pleased to announce that Mr. Amrit Sen, the owner of one of the private land parcels, has generously committed to donate his family's 13.5 ha to be held in trust

for Fiji. This generous donation is an inspiration to many around the world!

We have also confirmed that the Matasawalevu Land Purchase Co-op Society, who owns the other remaining parcel of land, is willing to sell their 8.5 ha. BCI is currently working with its partners to move this land purchase forward to protect the cave.

## WISH LIST

### Protect the cave

BCI needs your help to continue to search for and protect endangered Fijian free-tailed bat habitat. You can help us reach our initial goal of \$5,000 to protect Nakanacagi Cave and provide training and equipment to local conservationists so they can monitor and conserve the bats. Visit [batcon.org/Fijian\\_bats](http://batcon.org/Fijian_bats).



● INTERNATIONAL CONFERENCE

## Bat biologists unite in South Africa!

In August, bat researchers from around the globe convened for the 17th International Bat Research Conference in Durban, South Africa. This triennial conference not only provides an opportunity for researchers to share and showcase the latest in research on all things bats—from fossil bats to conservation needs—but also provides valuable time for researchers from far-flung corners of the world to connect and discuss the global status and needs for protecting bats.

Student presentations on the first day of the conference inspired attendees with a wide variety of studies advancing what we know about bats—from the discovery that migratory pollinating bats can fly really far in a single night, to the best ways to protect cave-roosting bats in the Philippines.

Conservation was a major theme throughout the conference, covering topics from how the bush meat market is threatening bat populations in many parts of Asia and Africa, to the effects of climate change on bats. BCI Director of Wind Energy Program Cris Hein led an intense discussion (it was standing room only!) on the growing threats and solutions to wind energy turbines killing bats; while BCI Senior Director of Conservation Science Winifred Frick along with

BCI Science Advisor Rodrigo Medellín helped run the session on the conservation needs of migratory bats. As our climate changes, water is becoming a precious resource for all animals, including bats. Scientists from around the world came together in sessions and workshops led by BCI Director of Public Lands Dan



Photo: Winifred Frick

BCI Senior Director of Conservation Science Winifred Frick (right) and Kristin Jonasson from the University of Western Ontario. Jonasson studies migratory ecology of silver-haired bats.

Taylor to explore the importance of water resources for bat conservation in arid landscapes.

The sharing of knowledge wasn't restricted to just the conference. BCI is proud to have co-funded a multi-day capacity building workshop led by Bat Conservation Africa to help train 12 African researchers from 10 African countries.

● FUNDING WNS RESEARCH

## Fighting fungus

For the third year, BCI and the Tennessee Chapter of The Nature Conservancy are pleased to award \$100,000 in funding to support critical research in the fight against White-nose Syndrome (WNS). WNS is a fungal disease that has killed millions of bats to date and is the primary threat to North America's hibernating bats.

Photo: Michael Schirmscher



Little brown bat (*Myotis lucifugus*) with White-nose Syndrome.

"We need to have many different tools in our tool box," says BCI Imperiled Species Director Katie Gillies. "With the recent jump of WNS to Washington state, more than 1,300 miles from the nearest confirmation of the disease in the east, it is important now more than ever to have a range of tools in our arsenal against the fungus."

The three newly funded projects take very different approaches to managing the fungus, *Pseudogymnoascus destructans* (Pd), that causes WNS. The first project, proposed by Dr. Jeff Foster at New Hampshire University, seeks to reduce fungal load in infected human-made bat hibernation sites (such as mines) by using an environmental cleaning agent, chlorine dioxide. This compound is already widely used to sanitize fruits, eggs and drinking water. By reducing the amount of Pd in infected mines, this research aims to decrease the number of bats developing WNS in areas where the fungus is already present. The second project, proposed by Dr. Maarten Vonhoff at Western Michigan University, will field test the efficacy of using chitosan—a natural biopolymer—to treat bats in the wild and increase the survival of bats exposed to Pd. The final project, proposed by Dr. Craig Willis at the University of Winnipeg in Canada, will test the safety and efficacy of two anti-microbial and enzyme inhibitor treatments for WNS. If these tests are successful, these treatments would provide new tools to help bats survive exposure to the deadly fungus.

### WISH LIST

#### You can help

Fighting WNS requires innovative approaches to understanding the disease and how to reduce its impacts on hibernating bats. You can help support critical WNS research by donating at [batcon.org/wns\\_donate](http://batcon.org/wns_donate).

Ghost-  
faced  
bat



**bat stats**

**BINOMIAL**  
*Mormoops megalophylla*

**FAMILY**  
*Mormoopidae*

**COLONY SIZE**  
up to 500,000

**WINGSPAN**  
14-15 inches

**DIET**  
*insectivorous*

**STATUS**  
*Least Concern*

**REGION**  
Southwestern  
US, Mexico,  
Central America





## Although fascinating to bat biologists, little is known about the ghost-faced bat

The bizarre-looking face of the ghost-faced bat (*Mormoops megalophylla*) is something you are unlikely to forget. The species' most striking features, its tiny eyes, appear to be located inside its large rounded ears that join at its forehead. With wart-like protuberances on its nose and leaf-like appendages on its chin, it is easy to see why it was given its ghoulish common name.

This medium-sized bat, often reddish or reddish-brown in color, is found from southwestern Texas and southern Arizona, southward through Baja California and mainland Mexico into Central America. With the species being considered uncommon in the United States, bat biologists consider it a thrilling find when captured.

"Imagine my excitement when I caught my first one at a remote tinaja in Big Bend National Park," says BCI's Imperiled Species Director Katie Gillies. "Lit in the light of my headlamp, I saw the large bat with short shiny fur caught in the net. Its muscular shoulders were fighting to escape. From behind, my mind raced; I knew it wasn't a species I had ever caught before. Then, he turned his head, facing me, looking at me—the bizarre folds and wrinkles around the eyes and nose. It was unmistakable—a ghost-faced bat! I squealed with delight as I removed the gentle giant. I've been catching bats throughout the Americas for 15 years, and I haven't been thrilled like that in a decade or more."

Although the ghost-faced bat is fascinating to most bat biologists,



Photo: Jose Martinez

The bizarre flaps and wrinkles on the face of the ghost-faced bat assist them with echolocation.



Photo: MerlinTuttle.org

very little is known about the species. Ghost-faced bats are thought to forage exclusively on large-bodied moths, although this is only based on the stomach contents of four individuals. This species appears to remain active year-round, neither hibernating nor migrating. They spend their days in deep caves in karst regions or abandoned mine shafts, and emerge soon after dark to fly to the arroyos and canyons where they forage. They are strong, fast fliers that travel at relatively high altitudes enroute to and from foraging sites.

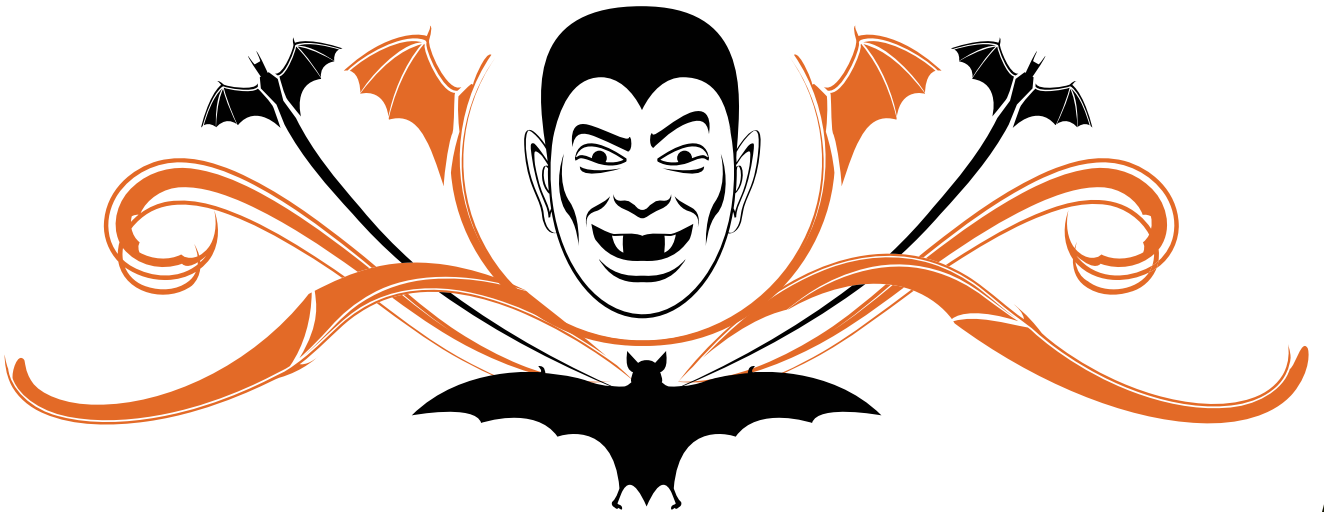
Ghost-faced bats give birth to a single pup and require hot steamy caves to raise their young. Without enough bats congregating in the deep cave to keep the temperatures toasty hot (around 104 F) the young may be less likely to survive.

Colonies may contain up to half a million individuals, however males and non-reproducing females will use caves separate from the maternity caves used by nursing females. Unlike other bat species that huddle close together, ghost-faced bats tend to maintain a distance of approximately 6 inches from each other when roosting.

Like many cave-dwelling species, ghost-faced bats are at risk of localized extinctions from cave collapse, vandalism and other human disturbance. Cave tourism is causing some localized conservation issues in parts of Central America. With so little known about the species, efforts to protect these roosting caves provides the best method for conservation. **b**

**RESOURCE**  
Learn about other bats species at [batcon.org/species](http://batcon.org/species).

turning vampire  
*MYTHS*  
upside down  
*(or right side up)*



By MICHELLE Z. DONAHUE

CURIOS, CARING AND SHARING,  
THE REAL VAMPIRE BAT BEARS LITTLE  
SEMBLANCE TO ITS POPULAR PORTRAYALS



Vampire bats' thirst for blood has driven them to evolve an unexpected sprinting ability. Most bats are awkward on the ground, but the common vampire bat, *Desmodus rotundus*, can bound along at more than 1 meter per second.



Planning on seeing any horror movies this Halloween? You might just see some swarms of bats, holding true to a time-honored tradition of equating bats to agents of evil.

Pity especially the poor vampire bat, who's taken the brunt of it all.

Yes, it's true, vampire bats drink blood. There's no way around that knee-jerk ick factor, with their too-wrinkled faces and too-toothy smile. Let's face it: no one ever loved a jab from a mosquito or a syringe, let alone being bitten.

Out of the more than 1,330 species of bats that inhabit the Earth, there are only three that only drink blood: the common vampire bat (*Desmodus rotundus*), the type most people are familiar with; and the rarer hairy-legged (*Diphylla ecaudata*) and white-winged (*Diaemus youngi*) vampire bats. The latter two prefer birds, while the common is often seen snacking on livestock like horses, cows and pigs.

The reality of these unloved animals is that they have surprisingly strong social networks, don't mind sharing and need to be quite clever to survive.

A pair of white-winged vampire bats (*Diaemus youngi*) feed on the foot of a chicken.

Photo: J. Scott Altenbach

## FUN FACT: VAMPIRE BATS DON'T "SUCK" BLOOD!

The truth of how vampire bats drink blood is more analogous to a kitten lapping up milk than the sucking and slurping that horror movies would have us believe.

After locating a target and climbing aboard undetected, vampire bats make a tiny gouge with their razor-sharp front incisors. Their teeth are so sharp that they generally make a painless bite, not waking the often sleeping donor. Here they settle down to lap up about a tablespoon of blood.

### How bats became vampires and then just bats again

The idea of the man-shaped vampire long predates the European introduction to the bat variety. Cultures the world over have had their own vampire mythologies for centuries, but blood-drinking bats were unknown in Europe prior to the 16th century exploits of Spanish conquistadors in the New World.

Named "vampires" after their own tales of exsanguinary ghouls, the fact that the vampire bat also drank blood merely added another dimension to a well-established mascot of the night—like black cats and spiders, anything that conducts its business after sundown must necessarily be malevolent.

It took a couple hundred years, but eventually the vampire bat joined the popular horror canon.

Though we missed the premiere of Georges Méliès' *Le Manoir du Diable* by a century or so, his 1896 silent film has been called the first-ever vampire movie, thanks to its depiction of a large hovering bat transforming into a man. Méliès' film predates even Bram Stoker's famous novel, *Dracula*, which was published the following year.

Even before that, an 1847 Gothic "penny dreadful," *Varney the Vampire*, contained illustrations of its main antagonist sporting large bat wings. But Stoker gets the credit for explicitly bringing the two together in his text.

"Stoker was looking for words that had some connotation of evil, something to be afraid of," said Elizabeth Miller, a Bram Stoker scholar and professor emerita at Memorial University of Newfoundland. As a plot device to get the character of Lucy to awaken suddenly in the middle of the night, a large bat flapping at the window does the trick: "He just puts it in his story presumably only to make readers shudder," Miller added.

Stoker also either didn't know or chose to overlook the fact that vampire bats are really very small—just a couple of inches long. And as for vampires being particularly at home in the Romanian region of Transylvania, well, that's another thing that just leaked into the public consciousness after the release of *Dracula*.

"The connection between bats and blood is seen more as a touristy, external attraction than something that's really based in local folklore," said BCI Director of Communication and Public Engagement Micaela Jemison, who couldn't resist asking everyone she came across about bats and vampires while on a recent visit to Romania. "People there seem to have a relatively positive or neutral opinion about bats—in the farming districts we visited, the people there know that bats are part of the ecosystem. They're not necessarily afraid of them."

With ever-greater awareness of the benefits of having bats around, Miller said she has seen a dwindling of the bats-as-evil portrayal in literature and film. They can just be bats again.

"There's more of an appreciation of nature now," she noted. "People are looking at bats a little differently these days. I can't think of a recent popular vampire novel that uses bats. It turns a book into comedy once you do."



## Trick or treat, scratch my back

As any parent of young children will tell you, making sure the kids are well-fed and presentable is a high priority of the early years of their lives—sometimes requiring that they sacrifice some of their own food to fill a hungry belly.

A vampire bat mom would definitely relate: Stop by your local colony in Mexico, Central or South America, and chances are, any mom there might recently have shared some of her own hard-won food with others in her colony.

There's a lot at stake. If a vampire bat doesn't eat every two to three days, they'll starve, but getting a full meal with that kind of regularity is a tall order. So they share—and the gift is often reciprocated, though not necessarily just between family members, or even within a short time span. The payback seems to be casual and long-term, as between human friends.

"They have these cooperative relationships that I think are functionally analogous to friendships that you'd see in humans or primates," said Gerald Carter, who studies the social relationships vampire bats form with one another at the Smithsonian Tropical Research

Institute in Panama. "One trait of friendship is that there is reciprocity, but it's not immediate. The more you form a social bond, the less formal the reciprocity becomes."

Carter seeks to explore the notion that vampire bats share food with non-family members partly as a way to hedge bets against direct family catastrophe: The better relationships one has with individuals outside their immediate circle means the better chance of assistance if the family falters.

He's also found that outside of direct family bonds, food-sharing relationships are strongest between unrelated bats that groom each other regularly.

## Scary smart

Behavioral adaptations aside, another aspect of vampire bats made clearer in recent years is just how very keen they are. In hindsight, perhaps it's obvious that they must be, since the simple act of eating requires great cleverness on their part—one remarkable eating strategy is to run up to their quarry along the ground,

A mother and juvenile common vampire bat, *Desmodus rotundus*.



Photo: Uwe Schmidt


which aids in remaining concealed from the target.

Susanne Sterbing D'Angelo, a neurology researcher who studies bats at the University of Maryland, spent some time as a young researcher in the lab of renowned German vampire bat expert Uwe Schmidt.

Schmidt's lab worked to train vampires to fly through obstacles for various experiments related to echolocation. For one experiment, D'Angelo put three trained bats into an obstacle maze for a blood reward. Despite being untrained for over six months, they all had an immediate 90 percent success rate.

"These guys are smart, and don't seem to forget quickly," D'Angelo said.

Carter believes that the work on vampire bats' intelligence and social structures makes them more agreeable characters, and that researchers have only begun to scratch the surface of understanding their full capabilities.

"People don't realize bats are socially complex and really intelligent," Carter said. "There are so many cool things going on with their social complexity. I hope that will give people more respect for them." 

*Bran Castle, located on the border between Transylvania and Wallachia in Romania, is commonly known as "Dracula's Castle" despite there being no evidence that Stoker knew anything about this fortress.*

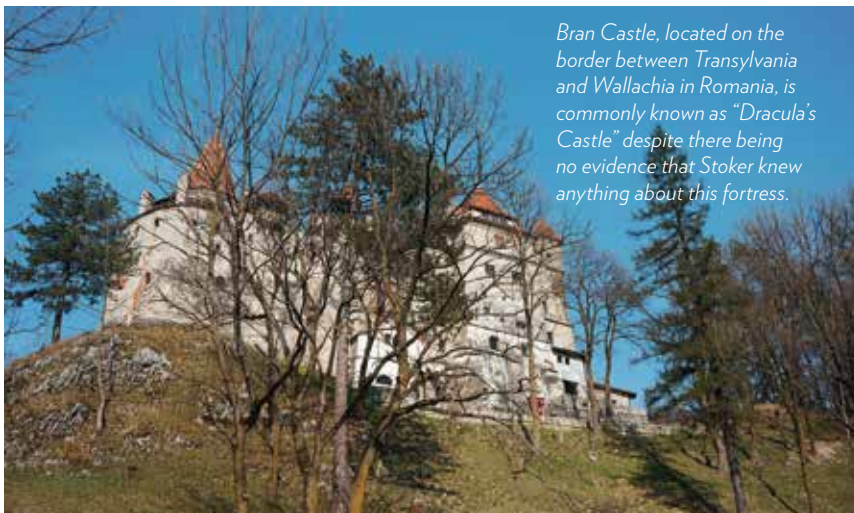


Photo: Micaela Jemison

# *Holy smokes,* it's the Bat





Camryn Pettenger-Willey was filmed at Milo McIver State Park near her hometown of Portland, Oregon. She stands in front of a barn housing a colony of Townsend's big-eared bats.

# Squad!

By MICHELLE Z. DONAHUE

PASSIONATE AND PRECOCIOUS, THE NEXT GENERATION OF BAT CONSERVATIONISTS BRING THEIR ENTHUSIASM TO THEIR PEERS VIA THE WEB.

“**T**here’s Shark Week. Bats deserve a week, too, that’s just all about them!” Rachael Block laughed and shrugged when asked why she loves bats enough to write about them every week for the Save Lucy Campaign’s bat rehabilitation blog.

“Their wings. How they hang upside down and you see their faces staring down at you when you look up at them. Everything, really.”

But Rachael isn’t a professional blogger; in fact, she relies on her parents to drive her anywhere. Now 14 and just beginning high school in Burke, Virginia, she began writing for the Save Lucy blog in 2013, as a sixth grader.

Alexis Valentine, 14, of Gatlinburg, Tennessee, agreed. Bats don’t deserve their bad rap, and this is the sentiment that drives her as she has helped university professors work with bats and research White-nose Syndrome (WNS) in the Great Smoky Mountains National Park since the third grade.

Rachael and Alexis aren’t alone in their motivation to seek out and share knowledge about bats with their friends, families and peers. They are part of a group of young people who will be introduced to middle schools across the country during the third annual Bat Week, held this year from October 24–31. An initiative of a growing number of partners including BCI, the U.S. Fish and Wildlife Service, the U.S. Forest Service and other government and conservation groups, Bat Week seeks to raise greater awareness of bat conservation efforts worldwide.

“The key thing for conservation is for people to feel invested,” said BCI’s Director of Communications and Public Engagement Micaela Jemison, who spearheads BCI’s leading role in organizing Bat Week. “It’s not a coincidence that Bat Week is the week of Halloween and targeted at kids old enough to understand the issues that bats face, but young enough for bats to still be cool. We want to inspire the next generation of bat conservationists.”

Photo: Micaela Jemison

One major highlight of this year's event is Bat Squad!, a series of four, 15-minute webcasts that will dive into the efforts of nine young people to educate others on the benefits of bats, their habitats, the threats they face and how they're getting more people involved in conservation. Each video is also accompanied by educational materials for teachers and parents to continue the batty fun offline. The videos aim not only to teach, but also to inspire even more kids to get involved themselves.

"We're presenting them as movie stars, and the fact is, they really are," said Cynthia Sandeno, a partner with the Bat Squad! initiative and a U.S. Forest Service specialist in threatened, endangered and sensitive species. "It's absolutely incredible that you have these kids doing work that professional wildlife biologists are out there doing."

Calvin got to meet a live Mexican free-tailed bat when he came to Austin to film with the Bat Squad! team.



Photos: Micaela Jemison



unlikely to overlap with the Mexican free-tails of Texas.

"Bats migrate," Calvin said. "Even though White-nose only grows in cold weather, I'm afraid that it could somehow become adapted to warmer temperatures and wipe out all bats down here, too."

Lindsey Hefernan, a wildlife biologist for the Pennsylvania Game Commission who maintains maps of WNS spread, furnished Calvin with the maps he needed.

"It gives me hope when I see a young person like Calvin thinking about such a complicated topic," Hefernan wrote via e-mail. "It's also important that he's thinking ahead and preparing for when the disease hits home."

**CAMRYN PETTENGER-WILLEY, 13**  
**MITIGATING WIND TURBINE IMPACTS**

After a conversation with her parents Tonja Willey and Mary Pettenger about wind turbines and bat mortality, Camryn Pettenger-Willey got the bug to know if anything could be done about it.

Camryn researched wind turbine technology with Willey's help, an

**WISH LIST**

*Help support online learning*

The Bat Squad! webcasts are just the beginning. BCI is investing in live interactive lessons with BCI educators for schools across North America via the web. Help us by donating toward our goal of \$10,000 to provide education staff and develop online lesson plans and materials for teachers. Visit [batcon.org/onlinelearning](http://batcon.org/onlinelearning).

*Here's a peek at a few of the webcast stars ahead of their national Bat Week debut.*

**CALVIN CARPENTER, 10**  
**GIS MAPPING**

First introduced to live bats in 2015 as a fourth-grader, Calvin Carpenter began to wonder if WNS had any chance of reaching the as-yet-unaffected populations of bats near his home in Lubbock, Texas.

With some digging, he learned that the nearest affected population was in Franklin County, Ark. With the help of his mother Penny, an instructor of geospatial technology, Calvin created a map that charted the maximum summer habitat ranges of the Texas bat populations around Bracken Bat Cave and the counties in Arkansas where WNS was known to occur. His maps—which translated to a first prize in a regional science competition—showed that even if both populations of bats strayed well beyond the extent of their known summer ranges, the fungus-carrying tri-color bats in Arkansas are

Photo: Micaela Jemison



Camryn feels a responsibility to let others know what complex interesting creatures bats are.



employee of Avangrid Renewables (formerly Iberdrola) in Portland, Oregon. Pettenger helped their daughter reach out to a group of wind industry and conservation experts, including Cris Hein, BCI's wind energy program director, as well as Kevin Kinzie at General Electric, Tim Hayes at Duke Energy and Stu Webster at Iberdrola.

Knowing that scientists, like BCI's Cris Hein, are developing sound deterrents for bats, Camryn sought to find the best placement for them on wind turbines. Using deer whistles as a substitute, Camryn experimented with acoustic analysis on smaller fans to see where an emitter would be most effective. Surprisingly, she found that emitters produced the most consistent sound when mounted on a fan's central nacelle rather than on its blades.

Not only did her project win her "best of show" in her category at the regional level, she was invited to present at the Oregon state science fair and selected as a semifinalist in the national Broadcom MASTERS science competition.

"The science fair helped spread my ideas, and it went pretty far," Camryn said. "But anyone can start with a small idea about how they can get involved in helping bats."

#### OSCAR SCHOLIN, 14 TEAM CHIROPTERA

From the time he was 5 years old and his mother, Edie Rue, was tucking him into bed with yet another rendition of *Stellaluna*, Oscar Scholin has loved bats. In seventh grade, his science teacher Terry Kelly asked him if he'd be interested in joining Team Chiroptera. The new school club would be studying bats in and around Monterey Bay, California.

Oscar's answer, naturally, was yes.

The team of seven or eight kids that meet during lunch and after school devised their first research project



Photos: Alex Porpora

*Oscar and his fellow Team Chiroptera members like to study bats in the classroom and get outside to find answers to their own questions.*

with guidance from Kelly and local bat ecologist Dave Johnston. Seeking to learn whether the activity of bats in a given area differed depending on the size of the available habitat, they used audio recorders to collect bat call data at more than a dozen pine woodlands around the area. They expected that larger habitats would yield evidence of more bat activity, while smaller-sized areas would produce fewer recorded calls.

Team Chiroptera found the exact opposite: the activity numbers were more or less the same no matter the size of the habitat. The students realized that with only one detector per habitat, they probably weren't picking up on all the bats that could be lurking throughout the larger areas.

"What's neat about Terry [Kelly] and Dr. Johnston is that they let the kids come up with their hypothesis all on their own," Rue said. "It isn't a preconceived idea they inserted the kids into. It's a sign of good science that it led them to more questions."

Their work ultimately brought them to the 2015 symposium of the North American Society for Bat Research, where they presented a poster on their findings.

Oscar helped recruit new students into the club the following year, but now, as a new high school freshman, he'll only be able to help out after school hours. It doesn't seem to be slowing him down. This past July, he was out in the field with Kelly and the other Team Chiroptera members, using bat detectors to find where bats liked to hang out the most around a local park. The sight of a group of kids and adults all staring up into the night sky attracted the interest of a random passer-by, who expressed surprised delight when informed they were looking for bats.



**THE BAT SQUAD!**  
**Team**

The Bat Squad! webcast initiative is led by BCI and the U.S. Forest Service in partnership with National Geographic's Animal Jam and the National Conservation Training Center.

Called “Bat Girl” by her friends, Alexis is happy to assume the moniker for herself but also as an homage to bat champion Merlin Tuttle, whom she deeply admires and who has personally encouraged her in her pursuits.



Photo: Doug Canfield

“It’s an awesome opportunity to go out and do real science,” Oscar said. “And you don’t always need fancy equipment—just genuine interest and determination. There just are some things you can’t learn in the classroom.”

### ALEXIS VALENTINE, 14 NETTING AND ACOUSTICAL RESEARCH

From the breezeway of her home near Gatlinburg, Tenn., Alexis Valentine has a front-row seat to the natural riches of the forests surrounding her. And seeing no sense in waiting until she was older to get out and explore it—since the third grade, Alexis has

been helping to track and research bats in and around the Great Smoky Mountains National Park.

Accompanying her mother, Amy Emja, on a mist-netting expedition to look for evidence of WNS with Joy O’Keefe, a researcher from Indiana State University, Alexis said, “It was love at first catch.”

“If you’re one of my friends and I start talking about this, they go, ‘Oh lord, she’s going off on one of her bat rants again,’” Alexis laughed. “But it needs to be addressed, multiple times.”

Her science fair projects and presentations on bats and WNS have won her multiple accolades, including fifth place overall in the Tennessee science fair, and just this spring, grand champion in her division for the Sevier County science fair. Alexis said that the process of researching bats—or any science—can be slow and frustrating, but encouraged aspiring bat conservationists to be patient and persistent.

“Guano happens,” Alexis said. “You can have seven months of research, and sometimes it blows up and you have to accept that. I’m just glad it’s not my 20-year quota that’s all falling to the floor. You’ll have to overcome roadblocks through any project. Not even just in animal science—but in anything and everything.”

### Meet the rest of the Bat Squad!

#### EOWYN FUSHIELLE, 11

Eowyn is a Girl Scout from Austin, Texas, who likes soccer and horseback riding. She first got interested in bats through her biologist father. Eowyn and her fellow Girl Scouts share their love of bats whenever they visit local Bracken Cave, the largest bat colony in the world.



#### RACHAEL BLOCK, 14

Rachael from Fairfax, Virginia, likes to read, draw, kayak and tell everyone she can about her favorite animal—bats! For the past few years, Rachael has been working with the Save Lucy bat rehabilitation center to help injured and abandoned bats as well as writing her weekly blog—the Baturday News!



#### LOGAN CARTER, 12

Logan travels with his biologist father teaching kids in an exhibit called Be a Bat Biologist. Logan loves animals and when he leaves the bats to go home in Muncie, Indiana, he likes to take care of his two dogs, lizard, frog, turtles and fish.



#### MADISON MIES, 14

Madison has always loved bats. She is an accomplished bat educator, often traveling with her father, the founder of Michigan’s Organization for Bat Conservation, to libraries, schools and museums to talk about how amazing bats are. She recently gave a TEDx talk at her school in Detroit, Michigan, where she promoted bat conservation. [b](#)



### Get your school or kids group involved with Bat Squad!

During Bat Week watch the live Bat Squad! webcasts airing on [BatWeek.org](http://BatWeek.org). Continue the fun afterwards with the educational activities supplied on the website!

**Amazing Bats** Tues., October 25 at 1 p.m. ET

**Hey Bat, What’s Your Habitat?** Wed., October 26 at 1 p.m. ET

**Bats Need Friends** Thurs., October 27 at 1 p.m. ET

**Bat Chat! Join the Bat Squad!** Fri., October 28 at 11 p.m. EST

*Tigga originally wanted to be a zoo vet before becoming a bat scientist.*



Photo: Tigga Kingston

# Career Advice

*The importance of volunteerism for aspiring conservationists*

**W**hat advice would an esteemed bat scientist have for aspiring students? To celebrate the 46th Annual Symposium on Bat Research hosted by BCI in San Antonio for the North American Society for Bat Research, we decided to ask Dr. Tigga Kingston!

**Bats:** How did you get your start as a bat scientist?

**Kingston:** I was a member of an undergraduate-led expedition to Colombia to study biodiversity. I was supposed to be studying small mammals, but the traps got stuck in customs and never made it out. As a plan B, the small mammal team (myself and the late Kate Barlow)

borrowed bird nets and started catching bats. It only took a couple of bats to realize that plan B was going to be PLAN A from there on out, and it's been bats ever since!

**Bats:** What is the main research theme you've tried to answer in your career?

**Kingston:** Ever since my first trip to Colombia, I've been blown

away by the extraordinary diversity of bats that can coexist in tropical habitats. So in essence, I ask the age-old question, why are there so many species? More specifically, I am interested in the processes that facilitate coexistence in species-rich bat assemblages and how these influence which species survive in human-modified landscapes.

**Bats:** Besides a biology degree, what skills would you encourage students to develop to help them in a conservation career?

**Kingston:** It is really important to gain practical research experience during your time as an undergraduate. Ideally, this should be work on bats, but potential advisors are looking for evidence that you can or will be able to design, implement, analyze and present original research. There are excellent opportunities through study abroad programs, field courses and summer internships, or you can contact researchers at other universities or organizations that focus on bat conservation and research. Be prepared to volunteer until you have the field skills that make you employable!


**Bats:** What is your favorite memory of being a student?

**Kingston:** Sitting alone in the rainforest in the dark, having all the traps set up and ready, and just waiting for the first bats to start flying. It was always so magical listening to the rainforest dayshift give way to the creatures of

the night, and anticipating a good night's batting.

**Bats:** Do you have any advice for non-scientists who want to get involved in bat conservation?

**Kingston:** There are many ways to get involved that are responsive to your availability and expertise. The key is to connect up and network with others concerned with bat conservation. There might be a specific local bat conservation issue you can help with, or you might think more broadly about educating the public about bats (giving bat talks to kids, leading bat walks at local parks), or join a citizen science initiative monitoring bat populations. If you have a bit more time, see if local universities or not-for-profit groups have any programs you can volunteer with—there are a lot of us out there and a lot of work to do!

**Bats:** That's a great idea! For example, in Austin, BCI is always looking for volunteers for our Congress Avenue Bridge education program! Find out more at [batcon.org/CABdocents](http://batcon.org/CABdocents). 

**THANK YOU!**  
 We offer our deepest gratitude to all BCI members and contributors who support the conservation of the world's bats.

*We thank these donors whose gifts were received in the 12 months between August 1, 2015 and July 31, 2016.*

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*Grace Smarsh is studying the singing habits of heart-nosed bats, *Cardioderma cor*. "This species is rather birdlike in some ways. When you walk around at night, you can hear them singing from trees around you like you're listening to birds in a forest," says Smarsh.*

## Studying abroad

By MICHELLE Z. DONAHUE

*BCI grants make it possible for graduate students to gain a foothold in research*

**F**rom investigating the interactions between island flying foxes with plants and people on the island of Tioman in Malaysia, to learning Swahili to better study the hows and whys of singing in the heart-nosed bats of Tanzania, the study of bats can involve spending many weeks and months in isolated, inhospitable locales. And though the study of any animal has its own

unique challenges, the study of these elusive, nocturnal and often rare creatures requires special creativity and patience from scientists in order to collect useful data and observations.

And then there's the work required to keep it all afloat. Even established researchers must spend considerable amounts of time ensuring they can continue their work

Photo: Grace Smarsh

Photos: Grace Smarsh



Field work is more than just catching bats! Grace learned Swahili to effectively work with her team and villagers in Tanzania.

by securing funding and support. For the next generation of scientists, it is this aspect of science that can be most daunting for new entrants to the field.

BCI's Small Grants and Scholarships help, in part, by making it easier for graduate students and conservationists to focus on their work.

"Students working on bat conservation have not selected the easy path," said Winifred Frick, BCI's Senior Director of Conservation Science. "They have not chosen a path for minimizing risk and maximizing academic success, but instead a challenge to make a difference in often very complex environmental problems. Without student researchers willing to tackle these challenges, without their grit and ingenuity to answer questions about bat ecology and conservation, we'd be in the dark on how to protect bats."

For Texas A&M graduate researcher Grace Smarsh, who spent 17 months over three years in Tanzania studying the songs of heart-nosed bats (*Cardioderma cor*), BCI's support translated directly into funding for equipment essential to understanding the bats' movements throughout their habitat.

"BCI was extremely important for the success of this project," Smarsh said. With funding from the National Science Foundation, she was able to establish several field sites in the vicinity of the village of Kikavu Chini, within sight of Mount Kilimanjaro in Tanzania's northeastern Hai district. But only with additional support by BCI was Smarsh able to purchase VHF telemetry equipment to track the bats' movements throughout the study areas, a critical element for understanding the context of the bats' song repertoire and the ability to test hypotheses about their behavior.

"Singing has been heavily studied in only a few bat species, but there are notes of singing in quite a few," Smarsh said. "We don't know much about the purpose of singing and repertoire diversity of bats in general, and even less for bats outside

of the roost. My work is showing that singing in this species is used to create and maintain foraging territories."

In Malaysia, Ph.D. candidate Sheema Abdul Aziz is piecing together a better picture of the role the island flying fox (*Pteropus hypomelanus*) plays in Tioman Island's ecology, and how to use the information she gathers to promote a more peaceful coexistence between the bats and the island's residents, who generally perceive them as crop-damaging pests.

Additionally, as the co-founder of Rimba, a non-profit conservation research group,

***"We don't know much about the purpose of singing and repertoire diversity of bats in general, and even less for bats outside of the roost."***

— Grace Smarsh, Texas A&M graduate researcher

## WISH LIST

*Small grants fuel big results*

You can help fund the next generation of promising students and conservationists by supporting BCI's Small Grants Program. To donate, visit [batcon.org/smallgrants](https://batcon.org/smallgrants).

Aziz plans to extend her work for Malaysian bat conservation even after the completion of her doctorate degree.

“There’s really very little effort or motivation to protect and conserve [bats] here—they aren’t really perceived as being charismatic animals,” Aziz said. “Most Malaysians don’t see bats as being important in any

***“Most Malaysians don’t see bats as being important in any way. So we really urgently need data to show people that having bats around is actually beneficial.”***

—Sheema Abdul Aziz, Ph.D., the French National Museum of Natural History (Muséum National d’Histoire Naturelle) and the University of Nottingham Malaysia Campus

*Sheema Abdul Aziz is piecing together a better picture of the role the island flying fox (*Pteropus hypomelanus*) plays in Tioman Island’s ecology.*



Photo: Conrad Wotho

way. So we really urgently need data to show people that having bats around is actually beneficial.”

After designing an entire study from scratch, one of Aziz’s major findings was that the island flying foxes probably help, rather than hurt, economically valuable durian trees. In Southeast Asia, this “king of fruits” is a critical cash crop, driving a thriving export market and even attracting tourists to regions where they are grown to take advantage of fresh, ripe fruit. By wrangling camera traps into the crowns of tall trees, Aziz found that while the bats did feed on durian flower nectar, they didn’t eat or even damage the flowers, as had long been assumed.

She is hopeful that findings like these will help cast the bats in a new light as critical ecosystem partners, and bolster efforts to protect bats from hunting and persecution throughout the country and region.

“The funding from BCI was quite literally a lifeline for my research,” Aziz said. “The first year of my Ph.D. was really tough because I hardly had any funding to do my work; [it was] demoralizing, and made me feel like giving up. So BCI not only injected new life into my project, but also into my own personal confidence, enthusiasm and passion for bat conservation. I’m hugely grateful.” **b**





# 5 Weird facts about Bats



Eastern tube-nosed bat, *Nyctimene robinsoni*

Photo: MerlinTurtle.org

With over 1,330 species of bats around the world, you just know there have to be some weird and wonderful creatures out there. Check out these five amazing facts about bats!

## 1. SOME BATS HAVE LONG TUBES FOR NOSES

Tube-nosed bats are some of the strangest looking bats you might find, but in a weird way they are also some of the most endearing. The Queensland or Eastern tube-nosed bat, *Nyctimene robinsoni* as its name suggests, has long tubular nostrils. Scientists are not really

sure why these tubes evolved—can you guess?

## 2. ALL BATS HAVE BELLY BUTTONS

Bats are the second largest group of mammals in the world. With a few exceptions like monotremes (mammals that lay eggs, like the platypus), nearly all mammals get their belly-buttons the same way we do—from their moms' umbilical cords.

## 3. BABY BATS ARE HEAVY

Most bats' moms give birth to a single pup at a time, for good reason. Baby bats can weigh up to

one-third of their mother's body weight. To put that into perspective, just imagine birthing a two-year-old (40-pound) human baby! Could you imagine having twins (which some bat species do)?



### MORE

You can hear these calls by visiting [batcon.org/weirdbatfacts](http://batcon.org/weirdbatfacts).

## 4. SOME BATS HONK

Male hammer-headed fruit bats, *Hypsignathus monstrosus*, produce large honking calls to attract females during mating season. The males have a large head with an enlarged rostrum, larynx and lips that allows them to make these weird calls.

## 5. A STICKY SITUATION

Some species don't have the thumbs that other bats have on their wings. Instead, species like the Spix's disk-winged bat (*Thyroptera tricolor*) have evolved suction cups that let them cling to and climb up smooth surfaces. With these suction cups on their wings and ankles, the bats are able to cling to the inside of smooth leaves where they can hide while they sleep. Since they don't have to hang by their toes, they are the only bats that sleep right side up!

Image: G H Ford—Proceedings of the Zoological Society of London 1862



Male Hammer-headed bats make honking noises to attract the females.


**BATIVITY: DRAWING 101**

## HOW TO DRAW a LITTLE BROWN BAT

The little brown bat (*Myotis lucifugus*) is usually seen flying around the nights in North America, from central Alaska and southern Canada into the southwestern and southeastern United States. They love to eat insects and can be found in all kinds of habitats like deserts, tundra, forests and maybe even your backyard. To draw one of these little guys for your house takes just a few steps.

**STEP 1**

**STEP 2**

**STEP 3**

**STEP 4**

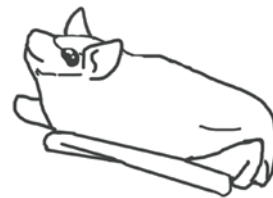
**STEP 5**


## HOW TO DRAW a BIG BROWN BAT

The big brown bat (*Eptesicus fuscus*) lives all over North America and can even be found in Cuba, Puerto Rico and parts of South America. Farmers love these bats as they eat up the insects that would otherwise destroy important crops like corn. Just one pregnant female bat will eat as much as her own body weight in destructive insects every night!

**STEP 1**

**STEP 2**

**STEP 3**

**STEP 4**

**STEP 5**


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### The Echo Meter Touch App featuring Kaleidoscope Pro classifiers

Available for free on the Apple App Store, the Echo Meter Touch app lets you listen to bats in real-time while you view them on a full-color spectrogram with waveform plots. Built-in Kaleidoscope Pro classifiers suggest the top bat species match in real-time\*.

Wildlife Acoustics' patented Real-Time Expansion (RTE) lets you listen to echolocations in real-time while maintaining the timing and tonality of the bat echolocation. You can also listen to prior echolocations using RTE or traditional time expansion. In new Heterodyne mode, you can manually tune the frequency or activate auto-tune to let the app continually tune to the loudest frequency.

### Easily transfer and share recordings

The app can transfer full spectrum .wav recordings to your computer over a wireless network, via email or cabled through iTunes.

### Log recording location and path

If you have a GPS enabled iPhone or iPad, Echo Meter Touch will tag your recordings with the recording location and log your path while recording. Transfer to a computer to view in Google Earth.



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