

Chiropterology Part 1 with Dr. Merlin Tuttle

Ologies Podcast

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Oh heeey, it's your friend's new baby, who looks kinda like a turtle, but in the best way, Alie Ward, back with another episode of *Ologies*. We're rounding the corner to finishing Spooktober, and I meant for this to be the last Halloweeny episode, but guess what? I talked to this Ologist for three frickin' hours, and I'm making it a double! So, buckle up for bats because holy guano it's *bueno*.

I loved very second I spent with this expert; this episode, next week's episode, some of my favorites. Okay, but before we get into it, a few thank yous up top, including everyone on Patreon, Patreon.com/Ologies, who supports the podcast; y'all are the foundation of funding for it. Thank you to everyone wearing *Ologies* merch, from OlogiesMerch.com. Thank you to all who make sure they're subscribed, who rate the podcast and keep it up in the charts; of course, you folks who leave reviews for me to read like a weird lurking monkey, so I can pick a new one each week, such as [thenarngoddess](#), who says:

From disaster to perfection, from entropy to order, somehow this podcast encompasses the sacred, the profane, and the mundane in a way that makes us delight in every revelation. And finally, at the end of the day, we emerge from each episode icky and radiant, like a shiny penny barfed up by a hagfish. It's absolutely delightful.

As are you, [thenarngoddess](#), thank you for that. Also, Rory Watts who says imposter syndrome is super real, and that they love hearing stories of queer scientists. It makes their little bi heart so happy. So anyway, your reviews; I read them, and I love them and thank you.

Now. Chiropterology. Are you ready for the best etymology, maybe ever? As soon as I saw this word I was like, well, "I'm going to have to start a podcast." The word origin, I feel like it rivals Ferroequinology, which was iron horses, the study of trains, as like the best first date, awkward dinner party, stuck-in-an-elevator-for-a-few-hours-killing-time trivia ever. Okay, you ready? Probably not, but here we go.

So, *chiro* means hand, so think, a chiropractor, practices with their hands, so *chiro* hand, and *puh-ter*, like pterodactyl, which means wing! So *Chiroptera*, bats, have hand wings. They have hand-wings. Their wings are made of hands! So, as mammals, these little critters fly around on the floopy membranes of webbings between their long-ass bony fingers.

They've been haunting the night for as long as 60 million years. They make up 20% of all mammal species, there are over 1,400 recognized species of bats, and we will cover all of them. No, we won't. But we're gonna do our best.

I heard of this Ologist through a *CBS Innovation Nation*, story I did on bat houses called, "Bat BnBs," and as soon as I heard his name and saw a picture of him in the 1970s, with a push-broom mustache and a headlamp, feeding fruit to a megabat, I thought, "I need to meet this person, I need to befriend them at all costs," and I've been like a 13-year old girl on a mission to meet her K-pop idols. I would accept no other bat expert for this topic.

So, he's been working in this field for over five decades, has written several books for lay people about bats, including *The Secret Lives of Bats*, and *America's Neighborhood Bats*. I'll link those on my

website and in the show notes. He has published so many academic papers on bats, I wouldn't know where to begin listing them. He has lectured all over the world.

So in September, I got myself to Austin, Texas, and I headed to this Ologist's home office.

[rummaging in rental car, talking to herself] "Okay. I'm in front of Merlin's house. Ahhh! The Tuttle residence! This is so exciting. Okay. I have the hotel coffee, I'm sweating, it's a million degrees in Austin... I just... I look sweaty."

Soo nervous! I met his wonderful wife, Paula, in the driveway, she led me in.

"Hi! Mrs. Tuttle, how are you? Dr. Tuttle, it's lovely to meet you, I'm Alie Ward. This is a dream come true, to talk to you about bats. I can't even tell you."

This is far from his first media appearance. This dude is America's Chiropterology darling. The go-to for bat questions the world over. He's even appeared on David Letterman, in 1984, because of his bat knowledge.

[clip from Late Night with David Letterman. Merlin Tuttle sits beside David Letterman, a microbat peeping out of his loosely cuffed fist]

Merlin: This bat... and you see how small he is. This bat is the one that sends thousands of otherwise mature, grown, brave men cowering, running in terror every year. I know of two cases in the last few months in Wisconsin; one man broke his leg falling downstairs getting away from one of these guys. [audience laughs] One broke his arm swinging a tennis racket around a door jam.

David Letterman: [reaches tentatively towards the microbat] Can I... Do you mind?

Merlin: Sure, you can touch him.

David Letterman: I don't want to hold him. [audience laughs]

So, I winged it. Oh, I was nervous. We talked for three hours, so this episode is broken into two weeks. We cover: What is a bat? How big are they? How small are they? Will they attack you? Why are people so scared of them? How did they evolve to fly? How do they sleep upside down? How scary are caves? Which ones guzzle blood? How do they protect us from mosquitoes? Can you train a bat? Why are they so cute? What's the deal with guano? The latest on white-nose syndrome, which is *not* a drug problem. What is the best time and place to see bats? And how can you help bats by letting them crash in your place, kind of?

So, hang tight for Part 1 and get ready to have a new favorite bat expert, with conservationist, explorer, icon, national treasure, and Chiropterologist, Dr. Merlin Tuttle.

Alie: Ward: Do you make people address you as 'Dr. Bat' ever?

Dr. Merlin Tuttle: No, but there are a lot of people on this planet who know me only as The Bat Man. *[laughs]*

Alie: That's not a bad nickname to have.

Merlin: When I was working years ago, studying bats in the backwoods of Tennessee, the hillbilly moonshiners were always watching out for revenuers, and when I would drive in to the final hollow where they had their moonshine - which I pretended not to know where it

was – en route to my bat caves, I would hear them yell across the hollow to each other, “The bat man’s a comin’!” [*laughing*] And I don’t think they ever knew my real name.

Alie: Well, that’s pretty appropriate then!

Merlin: It was funny, you know, these guys, they had a code of ethics among themselves that was very strict. You turn in a fellow to the revenuers or something and you deserved to die on the spot. These were tough guys. But the moment I started studying bats in a cave near where they were making moonshine, they were down trying to figure out who I was and what I was doing, and I welcomed them, and showed them how I put bands on the bats, and explained that some of them were coming from Florida to the Virginia-Tennessee border to go hibernate in that cave. And they were so excited they ended up bringing their wives down to see me band bats the next night, and I ended up being really good friends with them.

And the next winter, as I was still coming every ten days to trap at the entrance, I was sleeping out in my car and they became very concerned, you know, I shouldn’t be out there in the snowy cold. And so they started inviting me to come inside. They’re very poor. The home that they had was so poor they said we couldn’t more than three of us go in the kitchen at the same time, or the floor might fall in.

And I stayed with them a few nights, but then I realized that HughKyle [phonetic], the primary moonshiner among them, slept with a sawed-off shotgun in his bed in case the revenuers came at night, and I decided I didn’t want to sleep in the middle of a possible battle!

Alie: Oh no! Oh my gosh! As the Batman, you weren’t about to do any crime fighting. [*both laughing*] Oh my gosh! And so, your work is probably primarily nocturnal? When you’re out doing fieldwork? Or how much of it is nocturnal, how much of it is...?

Merlin: A lot of it is nocturnal, more than I would like it, these days. [*landline rings*]

Alie: Someone calling the Batline. That’s the Batphone, huh?

Merlin: Well, [*landline rings again*] if it wasn’t probably considered unethical or illegal it would be fun for you to listen in on one of these calls from somebody that’s terrified, thinking that they’re about to die of rabies because a bat got near them last night.

Alie: Oh no!

Aside: So, he unplugged the Batphone and we continued.

Alie: Going back in your history, you were born in Hawaii, right? When did you make the move from the island to the mainland? And did you grow up around caves at all?

Merlin: I grew up going into lava tubes in Hawaii. My father was very interested in exploring the old lava tubes, but there aren’t any bats in caves in Hawaii. I didn’t discover bats until I was at least nine years old living in California. I really first discovered them when a classmate in the fourth grade brought a dead one to school. [*“Cool.”*]

We were all curious and looked at it, and I took it home and made a study skin out of it. At age nine, a mammologist came to my school to speak about his research on small mammals in the jungles of Central America, and I immediately – I’ll never forget - I

thought, "Wow, you mean a scientist actually gets paid to go have fun adventures in the jungle!?! That's what I want to do!"

Alie: *[laughs]* Oh, that's amazing! So, you were inspired from just being a wee one.

Merlin: So, from age nine, I got acquainted with the scientist who lectured at my school. He told me about a book I could get that would teach me how to be a mammologist, and I started preparing study skins and trading specimens with museums.

Alie: Oh my gosh, so even in high school you were starting to work on this in almost a professional sense, right?

Merlin: Well, actually I was only age nine when I started doing this!

Alie: *[shocked]* Oh my god!

Merlin: I started taking accurate field notes and really getting serious. Actually, I published my first two or three papers based on high school work.

Alie: You're like the Doogie Howser of bats. [*"Douglas 'Doogie' Howser is a whiz kid."*] You're like a wunderkind, like a baby bat genius. Did you ever waver in terms of what you wanted to do? Did you ever say, "Maybe I'll get into farming, or maybe I'll be a nurse?" Or was it bats from age nine?

Merlin: Well, it starts way back way before that. I mean, I was clearly a nature buff from the beginning. From the time I could talk, when I was less than two years old, I knew when a Monarch butterfly was about to hatch from its pupa. I'd rear the caterpillars on a plant stuck in water in the window, and when a pupa would be about to hatch, I'd run around the house telling my parents, "Come quick! Come quick! The butterfly's about to come out!"

Alie: *[laughing]* Oh my god.

Merlin: By the time I was five, my father was big time interested in seashells and collecting, and by that time I probably knew nearly all the scientific names of the seashells of Hawaii. And then later I got into snakes, and I could tell you stories endlessly about terrorizing my mother and all her friends with my snakes getting loose. *[laughing]* And then I published two papers on shrews before I did anything on bats.

Aside: So, people, it's okay to like a lot of things! Maybe over time you'll realize a common thread between your interests, or a way to link them, or do both, or you'll figure out which one you truly love the most.

Merlin: By the time I was nine there was no question I was gonna be a mammologist. This is an interesting part of my story; I barely graduated from college. In fact, I was terrified the last semester of college. I found out at the last minute that if I didn't have a C average in my minor I couldn't graduate, and I was taking biochemistry, and about to flunk it, and so I studied around the clock.

I'd study for an hour and then take a 20-minute nap, and then study for an hour and take a 20-minute nap. The reason I was terrified, I had a job I was going to go to directly from college to being co-director of a \$400,000 field project for the Smithsonian.

Alie: Oh my god. All you needed was just that piece of paper.

Merlin: This was based on the fact that while I was near flunking out of school, I was becoming a well-recognized mammologist, hanging out with leading mammologists in the field, learning from them and skipping classes while I did it. The funny thing was, I finally did graduate got my job at the Smithsonian, but I'd been warned that I'd never make it into graduate school on my lousy grades.

Aside: Merlin got a Bachelor's in Zoology at Andrews University in Michigan, but he was so focused on field studies of bats, that he said they had to twist some arms to get him admitted to graduate school at the University of Kansas. He was admitted on academic probation, and his admission was so conditional the school said they might not even keep him past his masters, even if he wanted to.

But he got his Master's, sure enough, in Systematics and Ecology, studying the Zoogeography of Peruvian bats, and then he stayed, for his Ph.D. in Ecology and Evolution. His dissertation was on gray bats. And, he graduated with honors, becoming Dr. Merlin Tuttle in 1974.

Merlin: I gave a commencement address this spring at a school where I pointed out: Don't sit around waiting for somebody to tell you how you're going to get the biggest job opportunities, the most pay, that kind of thing, because it's always going to change. Whatever everybody's telling the students today is the big job opportunity area will probably be glutted five years from now.

Pick what you're passionate about, and if you're passionate about what you've chosen, you're probably going to be in the top five percent of people doing it, and you'll get a job regardless of where the job market goes. *[crowd applause overlays speech]* If you're passionate about something, you're smart enough to be a success at it. It's not about IQ. It's about dedication, and endurance, and passion.

Aside: Oh, you thought this was just about bats? Oh, no way. Never. No. There's so much self-help in here. Ohhh, get your heart ready.

Merlin: And I've definitely got the passion!

Alie: And now, what is it about bats? What drew you to them, in terms of all the mammals that you could study?

Merlin: Well, I started out studying small mammals in general, particularly shrews. Shrews are very interesting.

Alie: Are they?

Merlin: Oh, very.

Aside: Don't worry; I have my eye on a Shrew expert. Dr. Leslie Carraway in Oregon? I'm coming' for ya! Anyway...

Alie: When it comes to mammals, how many really fly? We just have bats and sort of gliding squirrels, right?

Merlin: Only bats truly fly.

Alie: Okay. That's what I thought. Is that one thing you love about them?

Merlin: I think I could have studied almost anything that happened to get in my way long enough to keep me focused for a while. I went through periods where I loved snorkeling on coral reefs; I could have easily been a marine ecologist. I went through a phase where I collected and identified, I think, 160 species of mosses and liverworts. I love nature.

But I think one of the things that's really made me much more successful than I could have been otherwise, studying bats, is I first loved the whole picture, all living things, and had a fascination for them. So, it was much easier then for me to understand where my animals fit, and what their roles were in that system.

Alie: So, you understood the whole puzzle, and so every piece in a puzzle becomes really interesting and vital.

Merlin: Yeah, and I get - internally at least - rather upset at people who are just focused on *a* species, or *a* group, and, "You gotta save these and it doesn't matter how many others you trample. These have gotta be saved." And it's not that way. Bats aren't safe until all living things are safe. They're all interlocked, interdependent, and so are we; we don't get out of that.

Aside: [*sighing*] Ahh, Merlin; come for the bats, and stay for the poetic existentialism. He's the best. Speaking of existence, how do bats define themselves?

Alie: What is a bat? How do you define a bat? I know that's a stupid question.

Merlin: Well, they nurse their young. Linnaeus, the father of modern taxonomy, thought that bats were true primates because they had pectoral instead of inguinal breasts.

Aside: Primates?! Okay, this is the flying-primate hypothesis, and it relates to the flying fox, which is a fruit-eating megabat, as opposed to the smaller, insect-munching microbats.

So, side note: none of them are blind as a bat. These little winged fluff-muffins have pretty good eyesight. And microbats use incredible echolocation sonar to hunt for bugs.

The revered Australian neuroscientist and vision researcher, Jack Pettigrew who sadly passed away earlier this year, had made an interesting discovery about megabat brains and vision.

Merlin: He discovered that all flying foxes have crossing-over neurons between the eyes and the midbrain. You have thousands of neurons that go between your eyes and your midbrain, and in primates they cross over between the two sides, and in no other mammal do they.

So that was the diagnostic; if it has crossing-over it's a primate, and if it doesn't, it's not. That was the accepted for most of the history of paleontology. And then Jack found that all flying foxes had the crossing-over neurons like primates, and all of a sudden then threw out the rule. [*sad trombone wa-wa-wa-waaaah*]

I had the good fortune to speak with Jack about a month before he passed away, and he said, "Well Merlin, it's not gonna happen while you and I are still alive, but it will happen. There'll be a day when they finally decide that flying foxes are primates."

Alie: [*excited*] Oh my god, I had no idea that they were even up for consideration for it! [*clip from Friends: Phoebe, "It's just such an honor to just be nominated."*]

Merlin: Neuronal evolution... you don't evolve thousands of new neuronal pathways just overnight. Those are the slowest parts to evolve. Your fingers may get longer or shorter, things like that, but your neurons are pretty stable. So, when you find thousands of neurons that are doing the same things they do in primates, you should at least take a good look at what that might mean.

Alie: And now, when it comes to the evolution of bats, what are their ancestors? What are their relatives? Where do these beautiful, furry, fuzzy sky puppies, as they're called, come from?

Merlin: That's probably a pretty debatable subject! When I started studying bats, we recognized a little over 800 species. Now it's almost 1,400.

Alie: [*gasp*] Now, are more and more people going into areas that haven't been explored, or caves? Or do we have better technology? Why such a jump in the number of species?

Merlin: Well, for a very long time, bats weren't very studied. You could go through a whole major in biology and all you'd find out about bats was there was this order *Chiroptera*, and they flew. And everybody ignored them. And bats haven't always been the easiest thing to study, even if you wanted to study them. But with modern technology, we're coming up with a whole lot more ways of looking at bats.

Aside: Okay. So, a bat is a mammal, covered in fur, that gives birth to live young and makes milk, and each one has a little bellybutton, and it's the only mammal capable of true flight.

Also, you know how their wings are really just big webbed hands? So, imagine, if you had a stubby, clawed thumb, and then your fingers got longer and longer, until your pinky was long as your whole body, and webbed. And then you were like, "Later, losers," and flew away. How badass are you? Sooo badass.

Also, bats used to be classified by their coat color, which Merlin says was bunk because some bats are bright orange in the wild and brown in captivity; others change color after they're weaned. Speaking of, let's talk about teeny tiny bat babies, shall we? [*baby talking*] Squirmy, little smush-faced, seashell-eared fuzzy wrigglers.

Alie: Can you walk me through a little bit of a lifecycle of a bat?

Merlin: Well it's very different for different kinds of bats. Most bats produce just one pup a year, and that's part of why they're so easily threatened with extinction. They form the largest aggregations of any mammal except *Homo sapiens*.

Alie: Oh wow!

Merlin: And they not only form these huge aggregations in very vulnerable places like caves, but they only produce one pup a year per mom. They're programmed for long life spans. Forty-plus-year-old bats have been found.

Alie: WHAT?! That's crazy! I didn't know that they could live that long!

Merlin: They're the longest-lived mammals on the planet, for their size.

Alie: That's nuts! Because normally, isn't the metabolism of smaller mammals typically shorter, and they live less time? Do they have different heart rates?

Merlin: Rodents are lucky to get in two years.

Alie: Yeah! So how are they doing it, do you think?

Merlin: Well, bats are just totally different, and it largely centers around these long lifespans, and if you're going to be as sophisticated and live as long as they do, you'd better be sophisticated socially and have a lot of smarts.

In fact, when I first banded gray bats, I had big time suspicions that they were having friendships, like these four or five bats knew each other and would travel around together, because I had groups of up to several bats that I had caught all at the same time. Let's say I found a little cluster of them in a cave, and I put a hand net under them, and they dropped in, and I caught them, and I banded them. Well, I have caught some of those groups five or ten years later, sometimes hundreds of miles away, still together.

Alie: Noooo! They have bat packs?

Merlin: I could tell, because I banded my bats at known ages, when they're just learning to fly, coming out of certain caves. So, I know where they came from and I knew how old they were. And I knew that some of these bats weren't just mom-pup or brother-sister, and so that led me to a lot of wondering.

But it was only in the last few years that there was a paper done on some really good research that could document that kind of thing, concluding that bats have social systems strikingly similar to those of whales, dolphins, and primates.

Alie: Oh my gosh! Do you think they can communicate with their sonar to each other?

Merlin: Well, bats have a much bigger repertoire of communication ability than, certainly, we do.

Alie: Really? How are they communicating?

Merlin: They can hear our low frequencies, and they can hear extremely high frequencies. They have much broader range of hearing. In fact, years ago I studied frog-eating bats, and when I discovered that a bat ate frogs, the herpetologists all laughed, and they didn't believe it because they'd never seen a bat chasing a frog.

And the hearing specialist, the foremost hearing physiologist in America, nixed my first grant proposal to study it because they said it's impossible for a bat to hear the low frequencies of the frog calls. [*I'm sorry sir, but you're wrong.*]

They ended up doing research on how they did it. [*laughs*]

Alie: Oh my god.

Aside: Okay, side note. A research institute called The Bat Lab in Tel Aviv has been analyzing 15,000 different noises that bats make. They made a recent discovery that a lot of the time they're nestled together in colonies, kind of a mix between a cuddle party and a rush hour commuter train from New Jersey. Those noises are bats bickering! [*thousands of bats chittering*]

Yep! Just bitching at each other, like, "Jesus, Eric! Move over! Who farted? Who ate a grasshopper and farted?"

So yes. Bat squeaking is sooo much drama, in a language you can't understand. Holy shit do I wish that nature had subtitles.

Alie: So, do you think that they are forming these social associations for survival and psychological wellbeing?

Merlin: Well, if you're going to live 40-some years, and you're going to have a complex lifestyle... The gray bats I studied, for example, you'll have a hibernation cave where maybe a half-million or even a million or more come to hibernate in one site. Some of the destination caves, one of them had an entrance so small and well concealed that after I'd been going there years, I would still sometimes park my car and spend 20 minutes looking for the cave entrance.

And you've got to understand that these bats probably can't detect much with their echolocation, more than, maybe, 30 feet or so in front. That's not a whole long ways. They're having to cross terrain that is changing constantly. We're cutting down forests, we're building cities; we're doing everything under the sun to change things on them. You've got to be pretty damned sophisticated to figure out just your travel routes.

There was a paper published a long time ago that showed that there's a species of bat that didn't eat frogs, that homed in on ponds where frogs were calling, just as an indicator of where they would find the most insects!

Alie: Oh god! *[laughing]* That's amazing!

Aside: Merlin says bats are important in controlling agricultural pests too, like the corn earworm moths. And on top of that, they are excellent meteorologists. So if you see a bat, kindly stop it and say, "Excuse me. Pardon me. Will I need an umbrella tomorrow?" I mean if you can stop them! Li'l speed demons.

Merlin: They can fly thousands of feet above ground, catch tailwinds and go close to 100 miles an hour. They can figure out where the storm disturbances or things are happening, they know where the insects are happening.

And we've probably got a lot more to learn about that, but just to illustrate how important the bats can be to crop protection, the bats just from Bracken Cave alone - the cave that I spent 20 years getting protected near San Antonio - just those bats, 10 to 20 million of them, eat between 100 and 200 tons of insects in a night.

Alie: A night?

Merlin: In a night.

Alie: Ohhh god!

Merlin: Now get this: *one* of those bats, just *one*, can eat enough corn earworm moths to prevent them from laying 20,000 or more eggs. That's enough to force a Texas farmer to spray multiple acres with pesticides, at a cost of \$74 an acre.

Alie: You said you weren't good at math, but I'm starting to doubt that. I think you're better at math than you say you are! That's amazing! So, the importance of them for pest control is huge.

Merlin: Nationally, it's been conservatively estimated to be worth \$23 billion a summer. But the sad thing is, we're just looking at the tip of the iceberg of what should be. Most of America's bats were probably lost before we were born.

Alie: Really? Now, what caused that decline? Was it loss of habitat?

Merlin: Loss of habitat's a big factor. Loss of habitat is what, of course, happens when people get scared and start burning their caves.

Aside: Merlin told me that two decades ago, in one part of Kentucky's Mammoth Cave National Park, he was able to convince park officials to remove a concrete door they'd put up at the entrance of a cave and make it friendlier to the bats who used to live there. And the bats were like, "Oh shit, wow! Okay. Thank you!"

Merlin: And the park staff were really proud this time to show me that in 20 years we'd gone from right at zero to 300,000 bats in that cave.

Alie: Oh, that's amazing!

Merlin: It's not too late to restore bats, but it's too late if we don't change our attitudes. It all gets down to attitudes. People fear most what they understand least. We all fear more taking off in a plane than riding to the airport in a taxi, and yet the taxi's far more dangerous.

It just seems to be the way we are. It's been very easy to scare people about rabies in bats, disease and bats. Did you know that you're actually almost twice as likely to die of a Coke vending machine falling on you as you are of bat rabies in America?

Alie: I believe it! Same with sharks. Sharks kill, like, five people a year.

Aside: Merlin says way more people die of food poisoning at picnics; from dog attacks; maybe even from falling coconuts. In America, your chance of dying by rabies is about two million times less likely than your death by diabetes. And, no lie, I ate leftover confetti cake for breakfast. I should've been terrified of it and thrown it at a wall and run screaming, based on those odds.

Merlin: If bats were even fractionally as dangerous disease-wise as they're purported to be, people like me would've been dead eons ago!

Alie: Yeah! Have you ever had a bat bite you?

Merlin: Ever had a bat *bite* me? I'm probably the world's foremost authority on bat bites.

Alie: What is it like when they bite you?

Merlin: Now, I'm not a guy to brag about being bit; I don't want to encourage people to be careless and get bit by any animal they don't know, or even one they do know. But here's the key: I've never been bitten by a bat that wasn't biting in self-defense because I was handling him and he was frightened. I've never been attacked by a bat. I've been surrounded by millions at a time, for days at a time, in their caves.

I've personally photographed more than 300 species, in every part of the world where they exist, and I have still not seen an aggressive bat. And yet, what you hear in these people wanting to scare us because there's big money in it, we hear that bats are sneaking around biting people in their sleep, without them knowing it.

Aside: Merlin and other bat researchers, like veterinarians, have gotten pre-exposure vaccination against rabies. That just protects them against defensive bites from some unfamiliar critters they handle. So, unprotected people bitten by any animal, of course, should get advice regarding a possible need to be vaccinated and to have the animal tested for rabies. Just, be safe.

Merlin: If I'm trying to scare you into taking your rabies shots, I'll tell you that almost every person in America who gets rabies, gets it from a bat. True. But did you know that's only one-and-a-half people a year out of the whole US and Canada combined?

Alie: One-and-a-half people a year.

Merlin: One-and-a-half people per year. You put your life at greater risk driving one mile in a motorized vehicle than your annual risk of rabies in America. And the good news is, that for anyone that simply doesn't handle bats, the odds of contracting rabies or *any* disease from a bat are right at zero.

Aside: So, we recorded this at Merlin's kitchen table in Austin, which is of course known for its caves. And bats. And attractive people in bands.

Merlin: Look at the Congress Avenue Bridge right here in Austin. When hundreds of thousands of bats started moving into that bridge, public health people warned that they were rabid, dangerous, would attack people. People signed petitions demanding that they be eradicated. They were right on the verge of doing it when I came here and convinced the city that they might be better off saving the bats.

Today, decades later, we're still waiting for the first person to be attacked, we're still waiting for the first person to contract a disease. The bats are simply eating tons of insects nightly and bringing in millions of tourist dollars every summer. You can't find a better, safer neighbor. [*Mr. Rogers singing: "Won't you be my neighbor?"*]

Alie: Now, what about people who want to put up bat boxes on their house?

Merlin: Well, it's a great idea. If you're going to go to all that trouble or expense though, just be sure you do it right. If you go to my website, there's a resource on my website, MerlinTuttle.org, that tells you how to recognize a good bat house from one that isn't good, and even lists several producers that make good ones that I have personally tested.

Aside: A bat house is a relatively flat, usually wooden, structure about the size of a suitcase, and you can mount it on your house or barn, about 12 to 20 feet off the ground, so little flying critters can nestle up and roost in it like little snuggly, furry sardines.

Merlin: I'm the one that first introduced bat houses to America.

Alie: You did? Was that a hard sell?

Merlin: The hard sell was with my colleagues! One of them even published a scientific paper claiming that bat houses didn't work, and it was unfortunate that - without naming me specifically - some people were promoting them to raise money, despite the fact they didn't work. And all of these people that made those kinds of claims ended up using them as research sites for their students when they worked.

Alie: [*laughs*] Did they ever issue a public, formal apology?

Merlin: *[laughing]* No!

Alie: They might still owe you one.

Aside: So, I didn't want to take up too much of Merlin's time, and I thought I would just move on to the Patreon questions. But as we have established, Merlin is the best, and he was in no hurry to wrap up the bat facts.

Merlin: But before we get there, let me point out that there's a lot of interest when people find out that they couldn't have margaritas without bats. Mexico's tequila and mezcal industries - those products sell for billions of dollars annually - could be lost without bats to pollinate the agaves which produce those products. The whole chewing gum industry might never have existed if it wasn't for the chicle tree that is bat seed dispersed.

Aside: There was a study done recently in Indonesia, which is one of the top three suppliers of cacao beans, and researchers found that bats saved farmers nearly \$800 million a year by eating bugs. So, every time you see chocolate, wink at it and say, "Hey, bats. Thanks. You did this. You did this to my mouth, and I'm grateful."

Merlin: The whole world price of chocolate could go up without bats!

Alie: *[laughing]* And now, what areas of the country tend to have more bats? You're here in Austin, where there are tons of caves. Bats and speleologists, I imagine, are friends.

Merlin: Yeah, we're lucky here in Texas, because clear back from the Civil War it was known that bats had some value. They mined the guano for saltpeter to make gun powder. In fact, one of the biggest declines ever in American bats came during the War of 1812, when extensive bat caves were mined for saltpeter for gunpowder.

Alie: Who's taking care of the guano in the caves? You've got, let's say, a million bats in a cave. There are some droppings. What's normally digesting that?

Merlin: Well, now you've come to a whole new area we could've spent most of our time talking about! *[Alie laughs]* Bats are the primary producers of energy in a cave ecosystem, no less than plants are on the surface. There are thousands and thousands of different kinds of microorganisms. A study done in Bracken Cave, I think there was at least a thousand species and maybe a couple of hundred genera of bacteria in a tablespoon full of guano from there. And most of them weren't known from anyplace else. And among those, they found a whole bunch of them that had bio-technological significance.

See, when the dermestid insects in that cave feed on the bat droppings, their poop ends up creating a lot of ammonia, and they found enzymes that are breaking down ammonia, feeding on ammonia, and they could be used to detoxify some of the worst chemical waste of industry in America.

They also found bacteria that were feeding on chitin, which leads to a whole bunch of interesting possibilities. If you're feeding on chitin, you could be used to convert seafood waste byproducts - the shells of lobsters and shrimp and things like that - you could convert that, using these bacteria, to gasohol.

Alie: WHAT?!

Aside: P.S. What is gasohol? I had to look this up, and it's a blend of gasoline and ethanol. Boom. Kind of like if your gas tank took some shots of Everclear, that was made from, usually, leftover agricultural starches. And this fuel may offer lower levels of certain emissions.

Everclear, into your own personal gas tank of your stomach, does increase emissions of three a.m. pizza barf. So, watch out for that. But anyway. Bats, and caves, and science, and the future.

Merlin: But it wouldn't be terribly surprising if someday someone found that they had the billion-dollar bug from a cave system where it wasn't found anywhere else and wouldn't have been, if it hadn't been for the bats still being there.

Alie: Now, what is it like to do fieldwork in caves? And what does a night of fieldwork look like to you? And did you ever feel claustrophobic?

Merlin: [*bursting into laughter*] Are you kidding? Well, the day that I made a wrong turn and crawled down a real tight squeeze for a hundred feet, [*Alie gasps*] I felt very claustrophobic.

I'd been told that there were a hundred thousand bats in this place where they'd escaped notice by people, and to get there, oh it was horrible! There was a little passage so small you had to lie on your belly or your back, with your arms either going down along your sides, or up ahead, pinned, and squeeze through, and you had to siphon water out of the tunnel before you could go in.

Alie: Ohhh, god!

Merlin: And it was 43° temperature blowing through this, and back then we didn't have wet suits or anything. So, I'm going through just dressed with long johns and a jumpsuit on, and so I get good and soaking wet, I come out the other side, and the cavers have told me there's a real tight squeeze on the other side but don't worry; it opens up on the other side, where the bats are. [*"I'm going' in!"*]

So, I go into the real tight squeeze, 'don't worry it opens up on the other side where the bats are,' but I missed the tight squeeze that they found. [*Alie gasps*] I found another one, and *my* tight squeeze didn't have any end.

Alie: Oh, my god!

Merlin: And I ended up... I don't know how long I was in that thing, but back in those days we had 6-volt batteries that I would hang off a pistol belt on my side, and as I crawled down this with my arms pinned down in front of me, I couldn't even reach back to do anything about my battery. Once I got in there and realized that I wasn't gonna come out on the other side in a few feet, I caught my battery in a tight spot, and pulled it loose from my headlight, so I didn't even have a light. [*"It's very dark."*]

And then I'm squeezing through places so tight, I'm practically breaking ribs, and I know that there's no way I'm gonna come out alive if I don't find a place to turn around, so I have to keep going ahead. And I went ahead for like a hundred feet. It seemed like a mile, and finally found a place where, I swear, if I'd been one inch taller I wouldn't have been able to turn around.

Alie: Oh, my god. Oh man. [*I'm freaking out!*] I'm having an anxiety attack *listening* to this!

Merlin: That made me *much* more careful about what I crawl into!

Alie: When you got through, when you were able to, thank god, turn around and get through... because then you had to do the tight squeeze again!

Merlin: And I wasn't even sure I could get back through it all!

Alie: What was it like when you got out?

Merlin: And by the time I got out, remember, by that time I would've been hypothermic, absolutely teeth chattering.

Alie: Oh, man. What was that like when you got out? How did you celebrate that night? Did you just go straight home? I would've been like, "I'm done for the day." Or did you go through the *next* tight squeeze to where the bats were?

Merlin: I actually did go see where the bats were.

Alie: [*laughing*] Unstoppable!

Merlin: Well, I wasn't gonna go through all that misery and not find out the bats were actually there! [*laughing*]

Alie: Oh now, how was that tight squeeze? Was that easy?

Merlin: Well, it was a tight squeeze for about four feet like they said, and then it opened up.

Alie: Oh my god. So, you went through 25 times what you needed to. Really, 50 times what you needed to, because you had to come all the way back. How were the bats?

Merlin: Well, I have found a lot of undiscovered parts of caves by looking for bats, because a lot of bats nowadays only survive where people can't find them. And so, by sometimes following where you see bats disappearing, you can find caves that nobody knew about.

Alie: So, they're kind of like the tour guides into unknown caves? "Come, follow me."

Merlin: We started earlier to talk about what's happened to American bats, what the cause of the decline is. A major, major cause of decline is a loss of hibernation caves. The Mammoth Cave system alone had millions, probably tens of millions, of bats hibernating in it. Early visitors report that you could go for miles, and the walls were solidly covered with bats in the winter.

And they've lost those resources, and now they have to travel much farther to find a place to overwinter. When they get there, it's often too warm or too cold and it stresses them out, so they have to squander energy faster than they should. All this makes them vulnerable to what else may happen that's a threat. It's like you got a pie here, and every time you take a piece out of it, you got that much less energy left for survival. So, it's my opinion that many of the deaths that have occurred in recent years from the fungus that causes white-nose syndrome may very well not have occurred had the bats not lost key hibernation sites and were already suffering at the edge of their energy limits.

Alie: And that was the question I was going to get to, which I'm glad you brought it up, but what is, exactly, white-nose syndrome? This is a fungal infection?

Merlin: It's a fungal infection that appears to have been inadvertently introduced from Europe. It's found all across Europe and Asia. The bats in Europe and Asia rarely are harmed by it. They may have been harmed by it a long time ago, but they've evolved immunity.

It's been said that some human undoubtedly brought it, who went to a cave in Europe and then went to a cave in America, but truthfully, we don't know how it got here. I think it's more probable that a bat came across from Europe in a shipping container.

There are published records of quite a few bats that have ended up in the US or UK because they got in a crevice in a shipping container and next thing they knew, they were waking up out at sea where they couldn't get off, and then they ended in a new country. [woozy, disoriented voice: "Where is everybody?"]

Alie: Oh my gosh. And so, maybe one that was infected with it spread it to a cave? Do they know the actual area where they first identified it on this continent?

Merlin: Yes, it was a commercial cave in New York, and it's been said that that proved that it was human-borne. But if a new fungus came to a state, where would you expect it to be seen first? In a commercial cave, where people are going every day. It doesn't mean that people started there, it just means it was more likely to be found there.

Aside: Correlation, of course, is not causation, so more peepers on bat noseys could just have helped identify it faster. We don't know.

Merlin: There's been a huge focus on stopping its spread by telling people they couldn't go in caves anymore, and that hasn't even slowed the spread because bats are far more effective spreaders. Just bats that I've banded in one cave in Northern Alabama ended up being found almost all the way into the state of Kansas, into Missouri and into Oklahoma, into Arkansas, Mississippi, Florida, West Virginia, Virginia, Kentucky, and North Carolina.

Alie: They're like truckers! They really make the rounds!

Merlin: They get around!

Alie: Now are they finding a place to sleep, every night? Or rather, every day? Typically, are most bats nocturnal? Are they sleeping on a daily schedule?

Merlin: The only truly diurnal, or at least partially diurnal bats, are on remote islands where there are very few birds of prey. A bat in the daytime is pretty easy prey for a hawk.

Alie: When are they sleeping? Like, let's say that they are out and about, are they returning to the same cave unless it's a hibernation period, or a migration period?

Merlin: Bats are very loyal to specific areas. If you have four or five caves fairly close together, they may very well move among those. In my study, I banded forty-some thousand gray bats and tracked them for 20 years, so I got pretty good data on what the bats were doing.

They were very loyal what I'd call a home area. They'd have a nursery cave that was center focus. Then they'd usually have a few, what I call, bachelor caves within a few kilometers around that one.

Alie: Bachelor caves? Were they mostly dudes? [slowed down: Ohhh heeey]

Aside: Okay quick, before the dudes, let's divert to some lady bat facts. So, Merlin says that before a female gray bat can breed, for example, she has to have access to some

insect-rich territories. But those are usually guarded by the older females, who probably chatter at them things like, "Back off Mikayla, this is Denise's mosquito patch! She will CUT you!"

So, Mikayla will have to wait before breeding. But in populations that have declined, those turf wars don't happen, so lady bats can breed easier and earlier if they have access to food stores. Kind of like if you had a Sizzler all to yourself, you'd be like, "Look at all these croutons. Might as well have some kids."

Merlin: But most gray bats wait a year or so before they... They'll breed, they'll mate the first fall. But my belief is that, probably, if they don't get enough energy the next spring to produce a fetus, they resorb it, which is known to occur in bats. They have wonderful birth control methods; they don't waste anything. You know, they resorb the embryo.

Alie: Wow! They can recycle it if they're like, "Not a good time. Not now."?

Merlin: Well, I don't know whether gray bats resorb or not, but some bats do. I know that.

Aside: Oopsie daisy! Lemme just recycle those molecules.

Alie: I did not know that.

Merlin: But at any rate, I knew one place where a banded female owned the same territory for at least four consecutive years. And she probably was allowing her offspring special access to her territory.

Alie: So, it's almost like a dynasty, or a legacy territory?

Merlin: Well, they know each other.

Alie: That's so cool. I love that they think like, *"Hey, come here; four or five of us, we're friends!"*
"Come, come; check out my territory, some of my insects!" *"No, go for it! Go for it! We're good. We're friends!"*

Merlin: Now you asked, are these all dudes at the bachelors' caves? No. They're dudes and gals that haven't yet conceived far enough to produce an offspring.

Alie: Do they tend to have the same mate year after year?

Merlin: Not gray bats. Gray bats might offend a few people's tastes. *[laughing]* They have what appears to be a grand old orgy every fall. *[Monty Python: "Do please go on."]*

But there are bats that are monogamous, and apparently stick together for long periods of time. One will stay with the pup and babysit, and the other will go out and hunt and bring rats and things back for the one that's babysitting.

Alie: Oh my god. Now what is the biggest bat and the smallest bat?

Merlin: You've got everything from giant flying foxes with almost six-foot wingspans.

Alie: Six-foot wingspans?! That's bigger than this table! I had no idea they were that big. Oh my god. Wow. Okay, so they're huge.

Merlin: All the way down to tiny little bumblebee bats which actually, I'm leading a trip in November to show members of Merlin Tuttle's Bat Conservation these bats. We're going to look at the flying foxes and the bumblebee bats on the same trip.

Alie: What?! Where are they?!

Merlin: Thailand.

Alie: They're both in Thailand? That sounds like an amazing trip. Might just have to piggyback on that trip. *[both laugh]* Gonna look at that info!

Aside: In mid-November, Merlin is leading a group through Thailand to see painted bats, flying foxes, wee little bumblebee bats, and more. So, is this man living his dream or what? The answer is yes.

Also, it should be noted that Merlin is an incredible bat photographer, and his thousands of bat photos are kind of like if bats had a Glamour Shots studio set up in the jungle. He has photos of huge eared bats, and scrunch-faced bats, and dog-looking flying foxes, and bright orange fuzzy little pups.

By the by, why do some bats have long noses like an Irish Setter dog, and others have a face that looks like they pressed a vagina against glass, and it stayed that way? Well, in general, microbats, with the squish-face, eat bugs, and they rely on echolocation that comes from and bounces off their mouth and their nose leaf. Yeah, that thing's called a nose leaf.

Anyway, flying fox type megabats, by contrast, tend to eat fruit, which they don't have to hunt, because fruit tends not to fly around and evade them. So, they don't have all those nose-leaves. Also, is now an okay time to list off some of my favorite bat names? Okay good. Just listen to these: Little golden-mantled flying fox; Patrizi's trident leaf-nosed bat; Eastern small-footed myotis; Mountain tube-nosed fruit bat; Dragon tube-nosed fruit bat; Demonic tube-nosed fruit bat; St. Aignan's trumpet-eared bat; Hoary wattled bat; Pungent pipistrelle; White-bellied yellow bat; Wrinkle-lipped free-tailed bat; Cinnamon dog-faced bat; Naked-rumped pouched bat; Hammer-headed fruit bat.

By the way, the last of which, the hammer-headed, has a face like a warped horse. It looks like if you shrunk a moose tiny, and then gave it wings. If it were a *Star Wars* creature, people would be like, "Eh, this is too much," and that fills my heart with warm rays of golden sunshine.

Alie: One thing I find so interesting about bats that is that their head shapes vary so, so much. Like isn't there a hammer-headed bat that just looks like a balloon, kind of?

Merlin: Oh, I love those big male hammer-headed bats.

Alie: *[delighted]* Yes!!

Merlin: I never worked so hard in my life trying to get a picture of a bat. I caught dozens of hammer-headed bats, but I never got an alpha male.

Alie: And now, the alphas have bigger heads?

Merlin: They have bigger heads. Well, they're older and they're more developed. I definitely have the world's most nearly complete collection of bat photos.

Alie: Yeah, your bat photos are amazing.

Merlin: But I still don't have a fully... Now, I've got some pretty nice males, but not the gorgeous one that I want. *[laughing]*

Alie: So, you've seen ones that you just haven't been able to photograph?

Merlin: The reason I don't have the gorgeous one, those alpha males are usually the highest up in the safest place courting, and they're not coming down to feed where I can catch them very much. The people that are catching those are putting nets way up in the canopy of the forest. And back when I was trying to catch mine, we didn't yet have triple-high nets that we could raise up to where they are.

Alie: And so, there are probably unphotographed alpha male hammer-headed bats out there.

Merlin: Well, people looking for Ebola in them have photographed them. And that's another sore point with me. You'd think nowadays that it'd been documented clearly that bats are the source of Ebola. And yet that's not true at all. After all these years of speculating that it came from bats, and spending millions of dollars trying to prove it came from bats, still, in my opinion, the best evidence doesn't go to bats.

Alie: Really? Where do you think it came from?

Merlin: Well, we don't have any proof yet. The last time they said they had real good evidence that Ebola might come from bats, they found a piece of RNA virus in an insectivorous bat's mouth, in a mouth swab. They said this was related to Ebola. They couldn't prove it, but it was a genetic fragment that could be. But another virologist himself pointed out that that could just as easily come from the bat eating a mosquito or something that was carrying Ebola, making the bat a controller instead of a vector.

What I point out is that even sick bats rarely become aggressive. It is so rare that in 60 years of studying bats all over the world, hundreds of species, I have yet to see an aggressive bat, or to document one actually going out and attacking somebody. I mean, a vampire bat in Latin America, yes, may sneak up and try to get a nip at night. [*beseeching voice: "Can I please have a bite?"*] But that's not what we're talking about in the rest of the world.

If I saw a bat that looked aggressive, I would assume immediately that it had rabies. No joking about it, and I'd be treated or have somebody treated if it seemed to have bitten anybody. But even touching a rabid bat is not an exposure if you're not bitten or exposed to an open wound.

Aside: Rabies, side note, is a virus that can be transmitted from animals to humans, and it is potentially fatal if it's not treated. But Merlin says that a fear of rabies is very lucrative. Post-treatment for rabies - which people have been known to get needlessly, in a panic, without even being bitten by or touching a bat, just seeing one - that treatment will run you \$48,000 in some American emergency rooms. Dogs, coyotes, foxes, skunks, raccoons, can also all carry rabies, but bats are out there takin' the heat!

Merlin: Let me make one point abundantly clear. For anybody who simply doesn't handle bats, the odds of contracting any disease from any bat are very close to zero.

Alie: Yeah. Oh, I believe it.

Merlin: We hear so much about bats, but did you know that worldwide, dogs count for 99% of human rabies? About 60,000 a year as opposed to probably ten a year worldwide from bats. You know, we're naturally a little bit frightened of anything we don't know about.

We don't know much about bats. We only see a bat when he's in trouble, dying, or being defensive.

Alie: Oh my gosh. Can I ask you listener questions?

Merlin: Sure.

Alie: They have good questions.

Aside: Okay, before we get to your questions, there were almost 350 submitted; the most for any episode to date. But first, a word about some sponsors who make it possible to donate to a cause each week. This one was easy: The Merlin Tuttle Bat Conservation.

It's an organization that relies on a powerful combination of science, field knowledge, and photography, to help save millions of bats, to protect public health, economies, and worldwide ecosystems by teaching people to live harmoniously with bats. And the founder is a pretty dang cool guy. So, a donation went directly to that nonprofit, at MerlinTuttle.org. Now, you may hear from some words from sponsors who made that possible.

[Ad Break]

Okay, back to the first half of your questions; and next week, a follow up episode with the remainder of your questions, and more field adventures from Merlin. First up, Claire Meyer and Heather Densmore asked a similar question to this first one.

Alie: Sarah Iannucci wants to know: Can bats be trained?

Merlin: Absolutely.

Alie: Really?!

Merlin: Go to my website at MerlinTuttle.org, go to "Videos", and you will see a bat training *me*.

Alie: *[laughing]* Training you?

Merlin: This bat weighs just four grams. That's less than a US nickel. So small that I was convinced that there was no way you could have trained him; he couldn't be smart enough to be trained. And yet the first one I got, I put it in my walk-in studio because I was going to photograph it there, and I fed it mealworms, hand-fed it while I held it when I first took it in after I'd caught it, and then I left it over the night. Came back the next day to do some photography.

As soon as I walked into my studio, the bat flew down and start bumping me in the nose, flying up in bumping me in the nose! And I wouldn't tell this story if I didn't have proof recorded. This bat is bumping me in the nose, time after time. In fact, he did it so many times that my wife had time to go run, grab another camera and say, "Oh I gotta get this! Here, put your shirt on." You know, it was really hot, and I was without a shirt on. She said, "This is gonna be interesting. Put your shirt on." And the bat's still doing it. *[Alie laughing in delight]*

I finally realized that the bat was trying to get my attention. He wasn't attacking me. So, I got a mealworm, and as soon as I held the mealworm up to him, he flew right up and took the mealworm out of my hand. Now, here's an animal that weighs less than a nickel. Never

seen a human, only hours before. Never saw a mealworm, hours before; never caught a non-flying insect, probably in his life.

And now he all of a sudden remembers from the night before that I'm good for food, and that it's better for him to come bump me in the nose if he wants to get my attention! [*Alie laughing*] Why is he not bumping my shoulder or my knee or my hand? You know, someplace else? And if this seems almost unbelievable, three years later we went to Taiwan, and they caught a bat of that same genus, a woolly bat that hadn't been named yet. It was a new species.

Aside: Side note: woolly bats look like if you shrunk a buffalo, and washed and conditioned and blow dried its hair, and then stuck huge beige cone ears on it. Just the fuzziest.

Merlin: And they brought it to me to show them how to photograph a bat catching flying insects, which is a real challenge. It rained a lot and they didn't catch this bat until like two nights before I had to leave the country. And I figured, "God help me, I'll never be able to train this bat and do these things in that time."

And I decided I'd go through the motions - had to - so I take the bat into my studio, and I can't get him to eat mealworms out of my hands. He will have nothing to do with cooperating at all. So, I finally let him go in there. But I knew I couldn't keep a small animal like that without him having food or he'd die on me. And it'd be very embarrassing to be a leading conservationist killing a new species before it got described! [*laughing*]

Alie: [*laughs*] Oh my god!

Merlin: So, I released the moths to fly around in there with him, came back a little while later to see if he had eaten any of them. I saw wings on the floor so I said, "Okay, I can keep him until tomorrow night, anyway." The next evening, I come walking in, knowing that there was no way I was going to photograph this bat, because he's a total non-cooperator. I unzipped the corner and start to come in. And then when I came in, he started bumping me in the nose just like the one in Borneo had done!

Alie: [*astounded*] Oh my god!

Merlin: Totally different locality, totally different species!

Alie: Oh! I wonder if that's how they nurse. Do you think that that's maybe how they get their mother's attention?

Merlin: I have no idea. But how would I relate to his mother? [*female voice: "Tell me about your mother."*]

Alie: He thinks, "Well, I'm getting food." [*giggling*]

Merlin: His mother wasn't as big as my nose! [*laughing*]

Alie: Oh my god! So, they can be trained, and they can train you.

Merlin: I have trained quite a few bats. I can train them to go where I point, and primatologists tell me that they hadn't even been able to train primates to do that. They've been able to train domestic dogs to go where you point, but not primates.

Alie: Wow!

Merlin: And so, when I was talking to a primatologist one time, she was really excited when I said that I could train bats to go where I pointed. In fact, I've trained them... I'd point where I want them to come catch prey, take my hand back, and then a film crew would start with a high-speed camera and the bat would wait and wouldn't come until he heard the high-speed camera. And then he would come.

Alie: Oh my gosh. That's better than most actors in LA. Can hit a mark, on time? I mean...

Merlin: I had one of those bats that a new field assistant over-tamed. I told him how important it was to get these bats over their fear of us and everything, and he just overdid it. So, the next night my colleague, Mike Ryan, and I went out to do experiments, and we couldn't do any experiments because the bat wanted to come sit on our shoulders and wait to be fed! I finally just gave up, didn't want to rough the bat up, just gave up and went and turned it loose. Our lab was in the jungle, so I just went and turned it loose back in the jungle. And at least half an hour, maybe 45 minutes later, I don't remember exactly, we had come out of the forest and walked back to where I was staying, and we're staying under a flood light talking. And this bat came back and started coming for my hand. I actually for a second thought I was seeing my first bat attack! I couldn't believe this thing had followed us back out of the jungle and was just wanting another handout.

Alie: Ohhh! Did you have anything to feed it?

Merlin: Yeah, we had some leftover minnows. My assistant had kind of become better acquainted with that bat, than I had. And the bat had had one - they have big ears, this species does - and one of his ears, half of it was missing. So, my assistant noticed that and said, "Oh, that's the bat we just turned loose!"

Alie: Do you ever miss bats when you have to leave a certain field site? Are you like, "I'm gonna miss that bat?"

Merlin: I have at times practically died of curiosity wondering what would've happened if I'd have had another week or another month or something to work with that bat. How smart would it have turned out to be? I mean, I normally don't work with the same bat. A week would be a long time for me to work with one bat.

Aside: So yes, bats can be trained. Boy howdy can they!

Alie: So Sarah Iannucci, who asked this question, had no idea... I thought that that was going to be a big *No*. I had no idea! Ah, that was a great question, then. Oh my gosh!

Merlin: And after all these years of studying bats, I am *still* discovering really cool, neat new things about their intelligence. I am amazed at their intelligence.

Aside: In the wild, bats can use echolocation at precise angles to detect insects hiding still in leaves. And also, they'll spy on other species to see where they get their food sources. Also, per our discussion earlier, they talk. They talk to each other. They're talking to each other. And they're bitches and I love it.

Alie: I have another question, from Katherine Hatcher, who herself is an Ologist. She's a first-time question-asker. She said: I wanna know all about bat babies. How are they born? What is bat birth like? Can they fly right away? Tell me all the bat baby facts.

Merlin: Depending on whether you're a species that bears twins or singletons - twins are born much smaller than singletons - but most bats produce just one pup a year. And that one pup is about a third its mother's weight. That'd be like a 30- or 40-pound baby born by a human mother. [*"That's a big one"*]

Where I've watched them in caves here in Texas... Normally I would be very upset if somebody told me they were going in watching mothers give birth in a cave because that would be very disturbing to the mothers and probably cause mortality. But our free-tailed bats here in Texas live in such a heavy-duty ammonia environment in the caves that most people wouldn't think of going in. When I went in for long periods and photographed them I had to wear an ammonia respirator, and at one point it leaked, and I was hospitalized for 11 days with 35% lung capacity left.

Alie: Oh my god! *Oof!*

Merlin: So, these bats are kind of like animals on the Galapagos Islands. They're not very frightened of people, because people don't usually come in and bug with 'em. So I, over a period of a week or so, would get bats along one wall accustomed to my presence, so I could walk back and forth and photograph them without them panicking and dropping their young or anything. It was really cool.

The pup when it's first born has what appears to be a safety line, like an astronaut getting out of a vehicle in space. The placenta acts as its anchor to its mother, and the umbilical cord is like a leash, so that if he falls, he can't really go very far. He stays attached for a fair while. I don't know exactly. It's probably not exactly the same for each bat, but they stay attached for a fair while. And then the mother and the young quickly learn each other's scent and voice. And after that, this pup joins a cluster of up to 500 pups in a square foot, and there are thousands of square feet covered by pups in a cave like Bracken Cave.

Alie: Oh my god!

Merlin: Now can you imagine being a mom trying to find your baby?

Alie: [*laughing*] This is like a music festival, like Coachella, but it's like 60,000 babies and you'd have to find your baby. That's a nightmare!

Merlin: And you got all these other pups calling their moms, and all these moms calling back to their pups. I mean, when I was watching these things happen, there would be thousands of adults flying by, and all of a sudden, you'd see one pup rear up and vocalize, and then you'd see one of the adults turn and come back to that one.

Alie: Wow!

Aside: I know you want to know what a free-tailed bat sounds like, so: [*clip from YouTube video, baby Mexican free-tailed bat crawling on a woman's hand. Not really squeaking; more like a light patter of sleet on against a windowpane*]

Also, Merlin says that they produce more milk for their size than a Jersey cow would, because the pups need to grow fast, and they're burning up so much energy clinging to a cold cave wall while their moms are out munching mosquitos.

Can you imagine having a 40-pound baby, and then the next day that baby was able to cling to a rockface while you maneuvered like a fighter pilot in the sky, using only your hands? Bats make humans look like earth-bound leaky bags of garbage.

Alie: How long does it take a bat to learn how to fly?

Merlin: Well, I know for gray bats, they can probably start flying within 19 days or so. But the free-tailed bats have longer, narrower wings. They're more like little jets. As I pointed out, they can cruise at nearly 100 miles an hour with tailwinds. So, with those jet-like, narrow wings, it undoubtedly takes longer to learn to fly.

But just imagine the problems faced by a young bat as it learns to fly. You're down in a pitch-dark cave. There are thousands, probably tens of thousands of other bats flying at the same time. Many of those are beginners like you. How would you like to go out to the airport and learn to fly with a whole bunch of other beginner pilots trying to practice takeoffs and landings?

Alie: *[laughing]* Is that why they say 'Bat out of hell?' Just like, "Get me outta there!"

Merlin: *[laughs]* And here's the thing: a pilot gets to practice on a nice long horizontal runway where even if he's a hundred yards off he's probably still okay. These bats, from the moment a pup first drops from the ceiling to practice its first flight, it's going to be moving at 10 to 30 feet per second. *["Gravity sucks."]* Then that first flight... the cave is only about 60 feet wide, so within a couple seconds he's on a direct collision course with the proverbial brick wall.

Alie: *[groaning]* Ohhh those poor little pups!

Merlin: And he has to make that flight while avoiding multiple, potentially fatal collisions per second. He has to do a perfectly timed barrel roll, and with millimeter-per-split-second precision, get his feet out front to grab the wall and not bash his head on the wall.

Alie: That brings me to a question a lot of listeners had: Do they sleep upside down? How do they sleep while clinging to things?

Aside: Jude Kenny, Juan Pedro Martinez, Amber Cooper, Heather Circle, and Laura Dusbabek all wanted to know about this hanging from the feet situation.

Merlin: They have a real cool system where the tendons lock. When you pull down on the claws hanging to the ceiling, that tends to lock the tendons so they don't use any energy hanging on.

Alie: Wow!

Aside: So, it takes energy for the bat to open its talons. So, it opens them, finds a spot to grip, and then when it relaxes, hanging by its own weight clamps those talons closed. And then it's upside down night-night for the sky fuzzies.

Alie: You remember those things you put on your car steering wheel, The Club? You just lock it on and there it is. I always wondered that, because it always seems like once you relaxed and slept, you just, go *shyooooo!*

Merlin: Well, and people also ask a lot, why doesn't the blood all rush to their heads?

Alie: Yeah! Why doesn't it?

Merlin: The better case is: Why doesn't the blood rush to our feet?

Alie: [*whispering*] That is a good question!

Merlin: What happens when all of a sudden you feel faint? Get your head down.

Alie: Right.

Merlin: So, *we're* the ones that ought to be explaining what the problem is!

Alie: Yeah!

Aside: And when you lose enough blood to your head, such as for example by being spun in a giant centrifuge, your noggin is like, "Yeah nope. I can't brain right now," and things go dark.

But bats are like, "Watch this! I have so much blood in my smushface right now, I'm headed to dream town to get some z's with 400,000 of my closest friends farting grasshoppers on me."

Speaking of large populations, a few of you, including Aubs7.0 [ph.] wanted to know how big these pajama parties get.

Alie: Bailey Good wants to know: Where in the world is the largest population of bats?

Merlin: The largest remaining known population is at Bracken Cave, just 20 miles from the center of San Antonio.

Alie: Whoo! So, Texas.

Merlin: And I'm very proud to report that after some 20 years of working with many others to do it, I managed to lead the charge that got that cave protected with several thousand acres around it as a nature reserve. [*DJ airhorn!*]

Alie: That is amazing to think that there are so many bats in existence that wouldn't be here without you.

Merlin: It's still one of my all-time favorite places on the planet. It is just an incredible experience to see that many bats come out of anything.

Aside: How many bats? Some estimates are around 15 million bats. That's like the population of humans in Los Angeles, all in one cave system. And when they emerge at night to feed, it's like a winged commute hour on the 405, but flappier, and way more beautiful. And no honking. Speaking of, what about urban bats?

OJ Carrasco, Brynn Bell, Joyce Gee, Aly V, and Michelle L. Pegram all asked about how bats live in cities, and a bunch of Austin-based or at least Austin-loving folks such as Anna Thompson, Nathan Wilgeroth, Jonathan Hardin, Ruby Oestreich, Chelsey Kraft, Courtney Ross, Breann Wharton, Jacky & Ian, friend to bats Derrick Allen (Hi!), first-time question-submitter Gail Rosen, Michelle Lee, and Sara Hewett wanted to know about the Congress Bridge and why it's so great for bat watching, particularly in the spring and the late summer.

Merlin: It's really spectacular just to come to our bridge, the Congress Avenue Bridge.

Alie: Julie Noble said: OMG. Talk about the bat bridge, please. That is all.

Merlin: If you go to my website again, MerlingTuttle.org, go to my photo gallery. It's divided into 'Catching Prey', 'Rearing Young', all those kinds of things. Go to the subsection called 'Emergences' and you'll see some of my pictures of the huge numbers coming out of the Congress Avenue Bridge, and how close they are to people without anybody ever being harmed.

Aside: One of the reasons Austin is known as the largest urban bat colony is because of Merlin Tuttle! Because of Merlin. So, when the Congress Avenue Bridge was reconstructed in 1980, the underside happened to be perfect for roosting, but the city was not into having millions of bats in its midst. And Merlin, who was a founder of Bat Conservation International until his retirement, thought that Austin was perfect for a perceptual makeover of the beleaguered bat.

Now, over a million, maybe up to a million and a half, Mexican free-tailed bats emerge from the bridge during peak bat season; they eat 10-30,000 insects a day, they bring in millions of dollars a year from bat tourism! Merlin Tuttle, ladies and gents! Merlin. Tuttle. One kid brings a dead bat to school and the world is forever changed. This next question was asked by my pal Dr. Joe Hanson, of PBS fame.

Alie: Dr. Joe Hanson wanted to know about the Chiroptorium?

Merlin: Yes. David Bamberger built that, out towards Johnson City in Texas. He was a rancher who joined my board of directors years ago when I first got involved in bat conservation, and he worked helping us protect Bracken Cave.

And one day he said, "Merlin, you know, I don't have any caves on my ranch, but I'd sure like to have something where I could show people bats on my ranch. You think we could build a cave or something that bats would come to?"

And I said, "Yeah. There are abandoned mines, and railroad tunnels, and things all across America that big bat colonies have moved into. If we build it right, to come up with the proper range of temperature, the bats will probably come." [*clip from Field of Dreams: "If you build it, he will come."*]

So, he hired a really good engineer, architect, whatever the combo should be. And I designed what it should be like to get the right temperature and darkness for the bats. And the engineer-architect designed something that wouldn't fall down. [*Alie giggles*]

So, then he named it the Chiroptorium. I told him to watch out that when the bats first came, don't go running in to see them because they might give you a bad report and not come back for a while, because those first ones would be scouts. Well he ran in to see them, and they left and didn't come back for a while.

Aside: Don't be sad don't be sad don't be sad! It turned out okay.

Merlin: But he now has between half a million and a million bats there in that totally artificial cave.

Alie: Wow. Does he get to claim them as dependence on his taxes? Or pets? [*both laughing*]

Merlin: I'll tell you what he does do now. He goes in - last time I talked to him, he was going to start this - going in once a year with a front-end loader on a small tractor and harvesting the guano and using it on his ranch.

Alie: Oh yeah! A ton of people had questions about that.

Aside: So, when it came to bats, a lot of folks on Patreon wanted to talk shit, and by that I mean they had guano questions. Such as juliebear, who brought it to my attention that bat guano is used as a sculptural medium. Thank you, juliebear, wow. Okay. Wow.

And also, there were other questions about guano's safety and uses asked by: SQuark, Theresa Bossenova, Anna Vallery, Taaren Haak, Devon Robertson, Erin Ryan, Morgan Schulte, aaaannd:

Alie: Emmanuel Sanchez wants to know: How dirty and unsafe is guano really? And is that a myth that guano is unsafe?

Merlin: Well, I don't know that anything can be said to be safe. For example, when people tell me how dangerous bats are, because one and a half people a year in the US and Canada combined die of bat rabies, I point out that 20 to 40 times that number die of dog attacks every year. And then I say: but before anybody thinks I'm prejudiced and advocating against dogs, let me just point out that we still love our wives and spouses, but our spouses kill us off at the rate of over a thousand times what die of bat rabies.

Alie: Oh man, that's a good point.

Merlin: So I mean, anything we do has some risk. Probably the biggest risk we all take every day is getting in our car and driving to work. But we don't think of it as a risk because we do it every day. And so, if you ask if something has any risk, I have a hard time with that because there's nothing that doesn't have a risk. What I can say is I personally have more than once sat and eaten lunch on old dried up guano pile in a cave. In a winter cave, that's the warmest place to seat yourself because it insulates you from the hard rock that's colder.

Aside: Would Indiana Jones be tough enough to sit on a guano pile? No frickin' way!

Merlin: I rarely think about needing to take extra precautions to sterilize my hands when I come out of a bat cave. But I can tell you, I'm almost religious about coming home and washing my hands carefully after I've been to see a doctor in a hospital. I mean, the most dangerous animal on this planet for you to meet and get a disease from is another human.

Alie: Going on a date is probably way more dangerous than sitting on a pile of dried guano. *[laughing]* What kind of boots do you need if you're muckin' through caves? What kind of boots? You must have a favorite kind.

Merlin: No. Just any sturdy hiking boot.

Alie: No? All right. I figured you'd need some kind of knee-high rubber waders.

Merlin: Now, if I'm going in Bracken Cave or one like that, that has millions of free-tailed bats living near the entrance where they attract dermestid beetles, then I'll wear rubber, almost knee-high boots to keep the dermestid insects from climbing up and biting me.

Aside: Okay, let's talk about bats inside your house, which was on a lot of your minds. Lauren Kelly, first-time question-asker Evan Jude, Dona Sue, Oregonian Westley Winks, Enrique I. C. Sarmiento, and Julie Noble who, side note, Julie Noble dressed as me for

Halloween week at her office and carried a #1 Dad mug, and I saw a picture and it made my whole damn day. Anyway, this is a hot topic: bats inside your house.

Alie: Michelle Lee and a few other people had this question, which was so great: Recently a bat found its way into a friend's living room and a lot of time was spent trying to chase it out of a door or window. What is the best way to guide a bat outside without hurting it? [*clip from YouTube video 'Bat Invades Irish Family Home': anxious male voice, "Did you see? Catch him Denny! Catch him! There's TWO bats!"*]

Merlin: I guess the first thing I'd suggest, if it's not too difficult, would be to open the doors and windows to the outside and shut off all doors to the rest of the house. Lower the lights to a level where it's not real bright, but don't turn 'em out to where you can't see the bat.

One of the worst mistakes people make... I can't tell you how many times I've had this call, where somebody calls me, and they saw a bat, and they fled the house to go get help. They come back and nobody can find the bat, so they have no idea if it left on its own. They have no idea if it's still there, and I've seen people move out of their house for a week, because they didn't know if the bat was still there.

Alie: Oh no!

Merlin: The bat is *not going to attack you*. If you're in the room with a bat, you *will* have the feeling that it might be trying to attack you because here's why:

Aside: Aeronautics nerds, open your big bat ears, because this is some good stuff.

Merlin: Picture yourself as piloting a small aircraft, and you fly up to a dead-end corner. You have to turn around, do a U-turn, to get out of it. When you do that, you drop your airspeed to just about zero, and you start falling. So, you have to swoop down at a fairly sharp angle to regain flight speed and be able to continue flying. So, if you're in the middle of that room, and the bat's going back and forth to the corners trying to find a way out, and he's swooping down each time to regain flight speed...

This happens in a room like that, it happens with mosquitoes and things. Let's say you're outside, here in Austin people used to report all the time about being attacked and barely escaping a bat. My first question: "Did he actually get ya?" "No, no. I was really lucky." "Well, how do you know he wasn't chasing a mosquito and you ran away before you found out that he wasn't after you?" "Oh, could that be possible?" [*Alie laughing*]

And I've even investigated cases where they got scratched on a rosebush on the way to their house, fleeing the bat, and then went and got the rabies shots because the bat actually 'got them'. I've investigated *maulings*.

Aside: Oooh, get ready for this story. Oh, my word. Oh, my word.

Merlin: A Tennessee Valley Authority dam in Alabama shut down one time because the workers wouldn't go to work because a guy had been mauled by a bat in the dam.

Alie: Mauled?

Merlin: *Mauled!*

Alie: They're tiny!

Merlin: I had a consulting contract with them at the time. They insisted on me coming down and settling problems and I said, "There's no need for me to come down. It's inconceivable that this guy got mauled by a bat." [*clip from Princess Bride: Vizzini, "Inconceivable!"*] "There's another explanation. You don't need me to come up with that." "Oh no, no, nobody's going to believe this until we get an expert down here."

So, I get down there, and the guy has very little real skin left from about his elbow halfway to his wrist, down his arm. I mean, it's just almost raw flesh; it's really a mess. It's obvious something did a hell of a job on him. But at a glance, I knew there was no bat in the world could or would've done that.

So, I wanted to get somebody to take me down to show me the scene of the crime and, oh god, it was terrible trying to get somebody to volunteer to go with even me. But finally, we went down. What happened, they had lockers and when they come to work, they'd put their private things in a locker. Well, this guy had left his locker open while he didn't hang in it during the night. The bat ended up finding the locker and going to sleep in there. The guy comes in the morning, reaches in to do something. The bat panics and tries to fly out. The guy thinks he's being attacked. Yanks his arm out, and the top of that locker, look like a damned saw blade. It hadn't been finished properly, and you could still see his skin hanging on the top of the locker.

Alie: [*groan-cringing*] Ohhh my god! Noooo!

Merlin: And the funny thing was, after all that... At first, they had to practically restrain him. He was so mad, he was gonna attack me for denying his story. And *then*, when it was even clear to *him* what had happened, then he was really blankety-blanked off at his medical doctor for being so stupid as to believe his story and give him rabies shots. [*both laughing*]

Alie: Did they finish his locker properly? Put some duct tape on it or something?

Merlin: Well, I left at that point. I'd solved the immediate problem. [*laughing*]

Alie: My work here is done. Batman out. [*laughing*]

Aside: One question was understandably echoed over and over by folks such as Heather Circle, Elizabeth Ilean, Elizabeth McLachlan, Amanda Rivera, D.B. Narveson, RJ Doidge, Haile Hullings, Bob Clark, Georgia, Heidi Stooshnoff, Karina Peterson, Gwen Bode, Melissa Cowan, tangygnat, Erica Smith, and Kate Throneburg, who asked variations of: Why on earth are they so darned cute? Why are bats so stinkin' cute? Are bats not the cutest? Why are bats so darned cute? Why are they so danged cute? And Kate's question: Why do they look so cute in diapers/little blanket burritos?

Bats. You wanna know why they're cute. It's a great question.

Alie: A few people asked why they look so cute when they're wearing little blanket burritos, and just why in general bats are so cute?

Merlin: Well, the bats they're thinking look so cute, those are baby flying foxes. And remember, we talked about whether some bats might be primates or not? Flying foxes have faces that look just like lemurs, that are primates. In fact, leading experts have before mistaken flying fox skulls for lemur skulls.

Alie: Oh my gosh. So, we're seeing baby primates and we're identifying with them?

Merlin: And they've got big eyes and foxlike faces. Most flying fox pups, they're just about as cute as... Anybody that thinks they're not cute just has a hard time seeing cuteness. I mean they're as cute as any panda. Gotta be.

But they wrap those in little towels because they're more comfortable that way. Their momma normally keeps them wrapped in her wing, and they actually feel more comfortable when they're wrapped in a towel like that. And so that's the way they keep them.

Alie: Bat-baby burritos! Paul D. Simmons had a great question: Is there any evidence that our modern technological environment, with its noise, electromagnetism, radar, is messing with the bats' ability to navigate?

Merlin: *[long pause]* We don't know. There are so many things we don't know that it's just absolutely terrifying, and some of them are pertinent equally or more to us. One thing that hasn't come up here is what we don't know about what's happening with all the pesticides we're spraying on the world, because we're losing bats and other insectivorous animals that once kept insects in check.

In the United States alone, we now use approximately a billion tons of pesticides annually. That's all coming back into our food and water. And I tell people, start paying a lot more attention to natural controls like bats if you don't want to spend a whole lot more risk on pesticides killing you.

Alie: Will people having bat boxes in their backyard or at the top of their house, will that help the bat population at all?

Merlin: Yes, it will. In fact, we mentioned the fungus that causes white-nose syndrome. Where that has already passed through and killed off a large number of bats, several states are relying on people's backyard bat houses to monitor recovery of the species.

Alie: Oh wow. And so, if you have that as a hospitable measure, then researchers can come and take a look and see how many little bats are nesting in there?

Merlin: I personally help monitor a site in New York where we know that for five or ten years at least, this family had at least 1,200 bats every year in their bat houses. And then, after white-nose syndrome passed, they only had 40. But now they're rebuilding, and I believe this year they're up toward 200.

Alie: And now what about someone who wanted to go see a bat or go bat-scoping? What's the best time to see a bat, and just enjoy a bat? What kind of good binoculars, or night vision? Where should you sit?

My mom and dad have some bats. They've named them Vlad. They call them all Vlad. They come out at dusk, and they wait and watch on the porch, and they're so excited to see them when they come out. But if maybe you don't even realize your neighborhood has bats because you think they're night sparrows? How do you see a bat?

Merlin: I have spoken to so many people who will tell me with amazement, "You know, I've lived in my neighborhood for 20 years and I've never seen a bat. And then I heard you speak the other night and now I see bats!" *[both laughing]* Sometimes it's just a matter of looking at the right time.

Alie: Thank you so much for taking the time. I love this.

Okay, so at this point, two hours in, we both needed a little intermission, bathroom break, a sip of water. So I figured this is a good time to stop and make you wait a week for more Merlin. In the meanwhile, ask the smartest people the stupidest questions. Not only will you know more about what's snoozing in crevices and fluttering overhead, you'll also come away with some pretty boss life advice.

Now, this conversation was so great it warranted a follow up, and so next week we will continue Part 2 of Chiropterology with Merlin Tuttle. I swear he has more stories from the field that will boggle you and dazzle you. Meanwhile you can find him at MerlinTuttle.org.

He is on [Instagram](#); he is on [Twitter](#). The links will be in the show notes. Follow him immediately. He is one of my favorite presences on social media. Bats for days, and literally the best pictures that anyone has ever captured of them. Links in the show notes.

Now, if you need any [Ologies merch](#), you can find it at AlieWard.com Thank you Shannon Feltus and Boni Dutch for helping to manage that, and do check out their comedy podcast *You Are That*. I am their guest this week talking all things Halloween and making some confessions I'll probably regret. So that is *You Are That*.

Also, another wonderful podcast started by an Ologist, is Sports and Performance Psychologist Dr. Sari Shepphird's brand new, *Manage the Moment* podcast, which you can find anywhere you get podcasts. I'll be her guest on November 25th, so subscribe to that now!

Thank you to Erin Talbert and Hannah Lipow, who admin the [Facebook Ologies Podcast Group](#). Hello to the non-Facebook folk SubRedditors out there. Thank you to Emily White and all the Ologies Transcribers in that Facebook group helping to make transcripts available. Those are at AlieWard.com/Ologies-Extras. Thank you to Jarrett Sleeper for all the assistant editing, and of course to the human equivalent of a bat burrito, Steven Ray Morris, who puts all the pieces together each week. Nick Thorburn wrote and performed the theme music.

Stay tuned next week for more adventures in bats with Dr. Merlin Tuttle. You know if you stick around to the end of the episode I tell you a secret, and this week the secret is: I was once dating this musician who had long musician hair, and we were hanging out at dusk near a lake just admiring the view. All of a sudden, this huge butterfly flew close to his long musician hair and he was like, "Whoa! That was a big-ass butterfly." And I was like, "Bro, that was a bat," and he did not like that information. But bats in general are not trying to eat anyone's hair. There was probably just a bug over his head.

But anyway, later on, this boyfriend didn't like that at parties I would bounce around and say hello to various friends, and so once we were in a fight and he wrote a scathing song about me called, "Social Bat," because I was like a social butterfly, but larger, because I talked to too many people at parties. Anyway, I think he wanted me to be offended, but you know, joke's on him because bats are cool as hell.

Anyway, we're still buddies, he's a wonderful person, and maybe I'll work on getting you a clip for next week's Part 2 of Chiropterology with Merlin Tuttle. Maybe I can throw a little "Social Bat" in there.

I will also be in Austin again this coming week, on Sunday and Monday, shooting a story for CBS for *Innovation Nation*. I don't know where we're staying, but perhaps I could meet y'all on a bridge. I have no idea. Maybe? Stay tuned.

You can follow along at [Instagram.com/Ologies](https://www.instagram.com/Ologies) and I will probably post something there, or on the *Ologies* [Twitter](#). Alright. Okay. Stay tuned for next week! It's so good!

Alright, berbye.

Transcribed by Agnieszka Stachura, who is totally investing in a bat house and whose faith in humanity has grown 3 sizes after listening to this podcast

Edits by Kaydee Coast who has listened to every Ologies episode and worked on almost 20 transcripts now and has not found another topic that Alie has been so in love with. Alie says OMG 43 times and I can feel her wonder and awe and DadWard, I hearts you for your passion!

Some links which may be of use:

[Merlin's CV](#)

[Merlin on David Letterman](#)

[Egyptian fruit bat vocalizations](#)

[Bat chattering](#)

[A wooly bat trains Merlin](#)

[Merlin in a tight squeeze](#)

[Bats eating corn earworm pests](#)

[Bickering bats](#)

[Thailand trip](#)

[Gasahol](#)

["Bat B N B" houses](#)

[Ways you can die that aren't rabies](#)

[Echolocation around leaves](#)

[A Glorious Wiki List of Bats](#)

[Weird bat noses](#)

[Hammer-headed fruit bat](#)

[The bats of Mammoth Cave National Parks](#)

[13 Awesome Bat Facts](#)

[Bracken Cave bats](#)

[WHO's rabies info](#)

[The cost of rabies treatment](#)

[Bats spy on each other](#)

[The Chiroptorium](#)

[Upside down bat hanging](#)

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