

THE CHARM OF BAT CHAT: THE SRINIVASULUS AT ZOOREACH

On the 11th and 12th of November, the Srinivasulu family—Aditya, Bhargavi, and Chelmala visited Zooreach to take two days of classes for us as part of the Ram Hattikudur Advanced Training in Conservation. Chelmala (affectionately called Srini) is a professor of zoology at Osmania University, and heads the Wildlife Biology and Taxonomy Lab there. He's also the director of their Centre for Biodiversity and Conservation Studies (CBCS). Bhargavi is a post-doctoral scientist at CBCS as well as a PhD research guide at Zooreach, and their son Aditya has just finished his PhD at the University of Reading. All three research a very underappreciated group of animals – bats!

For our first class, Srini took us through the bats of southern Asia, their diversity, taxonomy, and ecology. We learned that India has an amazing 137 bat species, representing all bat families, and they all have unique ways of adapting to their habitats. Despite the popular belief that all bats echolocate, only the ones that eat insects do; the others, like flying foxes, which are frugivores, are actually much more visual animals. Each bat has a specific sonotype, or type of call, and none of their calling frequencies overlap! That means that evolution has allowed them to neatly partition the frequencies they use, just like radio stations do. Their call patterns are so unique that they can be identified just from the shape of the recorded sonogram.



Aditya introducing us to his PhD research. © G. Pannagasri.



Sanjay introducing Chelmala. © G. Pannagasri.

We also learned that bats that hunt fast flying insects have a membrane called the uropatagium that connects the hind legs, which increases their manoeuvrability in the air, letting them make quick turns to catch their prey. Most bats are K selected, meaning that they breed slowly, live for a long time, and have only one or two pups at a time; unlike R selected species like rats, which breed frequently and have many offspring. This means that bats can't easily recover from population loss, and with a lot of negative prejudice against them, they are becoming increasingly threatened.

In the afternoon, Bhargavi took us through bat taxonomy and systematics. We got to see and handle bat skulls. Some were small enough to cap a fingertip, while some were comparable to cat skulls. We learned about the different identifying measurements that you need to record from specimens to make a positive ID, such as forearm length, canine tooth length, and condylobasal length (the length from the tip of the snout to the back of the skull); and what the teeth can tell you about the animal's feeding ecology. We also learned



Bhargavi and Aditya explaining how to measure bat skulls.
 © K. Gokul.

about general principles of systematics, such as the difference between a holotype (the type specimen of a species, which defines what the species is supposed to look like) versus a paratype (all other preserved specimens of a species). Reliable, well-preserved specimens are extremely important to accurately identify the species you study, and to build a solid foundation for the discovery of new species in the future.

Later that evening, Aditya taught us about bat communication and echolocation, including what different sonotypes look like, how nose leaves guide sound to the bats' ears to help them hear better, and the difference between short, specific echolocation calls and longer, more complicated communication calls. An interesting point was that bats click more and more frequently as they zero in on their prey, ending in a continuous rush called a feeding buzz. Lastly, we learned about how the atmosphere, prey, and environment affect how bats call. For example, bats that call at high frequencies need to be closer to their targets because the calls attenuate faster in the atmosphere. Therefore, they're usually low flying and hunt slower, heavier insects. Bats also need to compensate for the Doppler effect and for sound reflected off of habitat features like bushes, trees, or buildings, which they do instinctually. Afterwards, we went out with a couple of different kinds of ultrasound detectors to see what we could find; and we recorded seven different species right around us in the middle of Coimbatore! It was incredible to realise that these nocturnal animals were so close to us every day, just hidden because we didn't know how to look for them. That single day opened up a window into a world none of us had ever known existed.

The next morning, Aditya took us through his doctoral research. He looked at how climate change and abiotic factors (especially anthropogenic ones like light) are projected to affect bats in southern Asia in the future, using ecological niche modelling techniques. A very interesting finding was that not only do different species have different levels of sensitivity to these different factors, but about a third would actually benefit from them, a third would not be much affected either way, and a third would be detrimentally affected. It was a nice example of the kind of work that can be done by exploring secondary data that has already been recorded; you just need to know where to find the knowledge gap.

In the afternoon, Bhargavi talked about the conservation story of the Kolar Leaf-nosed Bat.



Searching for bats with ultrasound detectors.
 © G. Pannagasri.

A rare and elusive species, she and her team discovered a single colony while exploring a cave in a granite hill in the village of Hanumanahalli in Karnataka. While they were thrilled to find it, the hill was under immediate threat from granite mining, which was taking place on all the surrounding hills as well. They immediately started talking to the community, mining department, and local forest department, telling them about this wonderful little bat and how it can only be found in this one cave in the whole country. Bhargavi stressed that what worked for them was always keeping local representatives in the loop about their work. They also always visited with the attitude that they were only there to study the bat with the community's cooperation, as it was their bat to take care of.

After years of effort, they first managed to get a mining restriction passed on that hill, and then got the community to rally and give away their rights to the granite hill so it could be protected as a conservation reserve. Currently, the Kolar leaf-nosed bat is under Schedule 1 of the Wildlife Protection Act; definitely a triumph to be proud of. We ended the day by watching a nice short film about Bhargavi, Chelmala, and the Kolar Leaf-nosed Bat by Scientific American. It was very inspiring to hear about how years of committed effort led to such a successful conservation story.

The family also accompanied us on our field trip to Coorg in the Western Ghats. Throughout the four days they were with us, they were endlessly patient



Close - up of bat skull specimens of two different species.
© G. Pannagasri.

with all our questions, showed us how to set up ultrasound recorders for overnight bat monitoring, helped us identify species of all taxa, accompanied us on early morning bird walks, and sat down with us for interesting conversations about bat conservation in wild and urban spaces in India. We had a ton of fun hanging out with them, and deeply appreciate the time they took to spend with us that let us learn so much about so many interesting topics. We sincerely hope all future RHATC batches also get the chance to learn about bats — and a bunch of other creatures — with the bat family!

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Citation: Sanjana, V.K. (2026). The Charm of Bat chat: The Srinivasulus at Zooreach. RHATC 2025–26 Special Issue, In: Zoo's Print XLI(1): 100–102.



Examining bat skulls.
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Discussing restoration.
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Early morning birding.
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In Coorg together.
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Examining a spiderweb on the trail.
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