

Bat Taxonomy and Echolocation Workshop for Researchers at Madurai Kamaraj University, Tamil Nadu



A five day hands-on training on echolocation and bat taxonomy workshop was organised by CCINSA/ZOO and WILD in collaboration with School of Biological Sciences, Madurai-Kamaraj University, Madurai, Tamil Nadu from 10-14th August 2009. Neil Furey, resource person from Aberdeen university, UK handled the sessions. In addition to it demonstrations were conducted by R. Srinivasulu, Osmania Univeristy. The entire training was attended by 18 participants. The training programme was sponsored by Bat Conservation International and Chester Zoo.

Lessons taught during the workshop:

- 1) Information on different techniques of Echolocation call recording from bats
- 2) Information of different varieties of Bat Detectors and their efficiency in echolocation call recording.
- 3) Bat Taxonomical identification
- 4) Bat Species identification on the basis of dental and morphological measurements
- 5) Identification of bats by using bacula
- 6) Basic to specific information on different aspects of bats, their characters, their shape and size, morphological structures, etc
- 7) Identifying species of bats with the help of keys developed by Dr. Srinivasulu.
- 8) Extracting skulls from preserved bats and processing them for species identification on the basis of measurements taken from skull.
- 9) Diversity of bats on Vietnam and different techniques used to identify bats in that region by Dr. Neil Furey.
- 10) The training offered a nice place to have interaction with different leading personalities of India and Abroad.



The training started with a presentation by Neil on basic taxonomic aspects of bats. He also talked about bat fauna of India highlighting more on taxonomic aspects. The basic anatomy of bats and measurements were covered using illustrations. As part it he introduced various keys used in bat identification particularly Character matrices and explained the differences between widely used Character matrices and dichotomous key. The dichotomous key developed by Srinivasulu was used to identify the preserved specimens brought by the participants from different parts of South India. In this exercise participants were divided in to five groups and each group was given two specimens one each of a fruit bat and an insectivorous bat. The groups, using the dichotomous keys, identified the given species and at the end they were asked to present the steps involved of identification using key. They felt that the key handy for identification.



The day two of the programme started with species identification methods using cranial and dental analysis. To begin with, skull extraction was demonstrated. Identification of bats using cranial and dental analysis was explained. The participants in groups practiced skull extraction of bats. This gave an opportunity for each participant to practice cranial and dental analysis individually by taking measurements and observation. As part of the species identification, preparations for Bacula analysis was carried out. Preparation and curation of Bacula was demonstrated.



To introduce bat identification using acoustic analysis the functional basis of echolocation was discussed. Neil gave a presentation on acoustic patterns in Indian bat families and genera. He also reviewed systems of bat detectors and the methods involved in bat sound analysis. Varieties of bat detectors used by bat researchers were displayed and explained the advantages and disadvantages of the tools and the methods to use it. In the afternoon of the third day the participants practiced bat skulling techniques and practiced species identification using cranial and dental analysis. Bacula analysis was showed. In the evening preparations for zipline recording was made and field assistants were employed to collect a few bat species from the wild.



Day four started with an early session before sun raise where participants gathered to watch the demonstration of zipline bat sound recording. Two bats collected from the field early in the morning were used for the demonstration of zipline bat sound recoding method. The participants recorded the sound and analysed in the laboratory. During day time Neil gave a detailed description of a variety of field record methods. The methodology involved in ziplines, hand release and light tagging using cyalume light capsules. During the course flight tents were erected and the field collected bats were released and the calls recorded. These recorded bat sound were used for analysis. Dr. Sripathy Kandula, Scientific Chair of CCINSA and host of this workshop gave a talk to share his experience in bat research with particular reference to echolocation and taxonomy.



On day five started with aspects on acoustic identification and multivariate analysis was discussed. Each method has its own strengths and weaknesses. The strengths and weaknesses of acoustic sampling were discussed in detail. Neil also gave a presentation to introduce bat call libraries. At the end Sanjay Molur, highlighted the activities of CCINSA and invited all the participants to become a member. He also thanked Chester Zoo and Bat Conservation International for providing funding support for the training. All the participants received a course certificate and a bound volume of lecture materials.

Participants feed back was collected daily.

Comments on day 1 agenda:

- Dichotomous key is good to use.
- This training was an extremely intriguing and interesting exercise.
- The efforts gone into the making of the key was visible and appreciable.
- It was nice to get a completely unknown species for identifications.
- Afternoon session was much informative through the key is very tedious to use, I could understand more about the taxonomy and also technical terms using in Bat taxonomy.
- Morning theory and evening practical helps us in excellent way without boring.
- I would like to have a detailed look at the possible /available photographs of Bat species. It will give a broad idea about the bat diversity. I believe it will be very helpful to the beginners.
- The talks and discussions were very informative and understandable.
- Exposure to various important parts of bat and various key points, were first time introduced to me, throwing light on their significance in classification (e.g. Radio-meta tarsal pouch etc)
- I would like if we can get lecture materials so that we can refer to it later.
- Afternoon session was really interesting as we had a hands on experience on how to identify the bats and how to use the key. The key made was really easy to use and I learnt a lot today and I am looking forward to learn more during the workshop.
- The full day was very useful to me because the following reasons. First I am a new comer in the field of bats, morning lectures useful to the basics and bat taxonomy and sample collection like that. I know the basics of bat systematic, taxonomy. After that the afternoon practical session is very useful to identify the species.
- Specially the 'Key' is useful to find out the bat species. I am very happy to say Today is useful to all the participants including me.

Comments on day 2 agenda:

- Today I found the separation of the bat skulls and knowing about the structures quite interesting. Removing the muscles in the skull was tough but we were taught by live sessions that was wonderful
- It was excellent day with skull preparation.
- We got a very good personal experience, dissecting the bat skull & getting to know various significant parts.
- Real time demonstration for dissection was really helpful
- Today class of skull lecture and practical very useful to me, I have no drawbacks today's class. It will very useful for me today itself, I knew these things. Thank you.
- Today programmes also useful to me (us), the major reason is to prepare a bat skull, I was not already known these kinds of work.
- really very enjoyed today for you are given wonderful and inspiring speech. Today we did the practical on extraction and preparation of skull, and bat bacula isolation, which was very useful.

- Morning - Skull preparation and dentition formula are useful for us. Afternoon – Practical work (skull dissections) it is useful for us.
- Today all the sessions were interesting & it motivated me to involve more to know more about bats.
- First session on skull preparation and its morphology is very much informative. Bacular preparation is new to me and follow the same in future.
- The entire session for the day was very informative, especially taxonomy which is hard to learn from books. Also, the morphology was learnt without effort because of the 'skull' exercise.
- The last presentation by Mr. Furey had a list on immunological studies in bats. We would like to know the feasibility and the current status of the same.

Comments on day 3 agenda:

- Morning lecture by Dr. Neil provided more information about echolocation especially bat detectors. It is more useful for me.
- Afternoon: Skull identification useful for me how to take measure the skull and identify it. Presentation is useful for me and rectify the stage fear.
- It is an great experience in handling the bat skulls. Hoping to learn more.
- The identification of species by skull measurements key and practical was very useful.
- Today also wonderful lecture and got by you. Afternoon session practical of species identification based on skull characterization is very useful to me. I think it's may very helpful to me in future.
- Today all the sessions were wonderful especially echolocation – very informative, lots of the doubts / Questions cleared.
- Cranial and dental analysis for species level identification very helpful in identifying/knowing lots of species.
- Talks on echolocation were informative.
- Today also very useful to me because of knowing echolocation in the morning session.
- Today cranial analysis session was very useful for me and also for us. But in the morning session the echolocation course was full of theory any video clips of echolocation of bats it's easily understood of us.
- 1st session on bat detectors and echolocation is very much informative
- The skull morphometry and identification work/hands-on is too good for beginners. We learn more than expected.
- Using the matrix for finding out the family, genus and species was good today.
- The lectures on echolocation by Mr. Niel furey and Prof. Sripathi Kandula were fascinating obviously. We would get to hear more on that.

Comments on day 4 & 5 agenda:

- It was an amazing start early in the morning which gave us hands on experience in handling bat and bat detectors etc.
- Since I am planning to work on echolocation and its genetic aspects this exercise helped me a lot.
- Presenting your own work always helps in better explaining the stuff. The experiments presented were fascinating.
- Overall training workshop was best. Hope beginners follow the training which they taken.
- This is refresher course for me in the taxonomy part but new to Bacula preparation. Hope this will help in the future in the taxonomy.

- This Bat taxonomy & echolocation course was very useful to me as well as for us. From the beginning of this class I completely don't know about the bat taxonomy. But now I have a knowledge about bat taxonomy, and also I realized the how taxonomy studies useful for our professional.
- First of all I would like to thank the organizers of this workshop for giving me this opportunity to attend the programme. Since, I am a beginner in the field of 'Bats', I could learn the A to Z of Bats to some extent. The lectures delivered by Neil Sir was really appreciable.
- Some of the negative feed backs I would like to put forwards is, the workshop didn't tell anything about the conservation point of view.
- The entire workshop was astonishing and it was for the first time that I am attending a workshop of it's kind.
- A field visit to one of the major roosts of TN would have been more attractive.
- Workshops also provided a lots of new information that was not familiar to me and I hope to attend more workshops like this in the near future.
- The whole day workshop is very useful and informative to me. I hoped that the taxonomy key will be published very soon and it may reached to us.
- Practical session was more benefit to me.
- Workshop was a great experience for the participants who have just started understanding or developing interest in 'bat' world. Besides, interest in taxonomy was enhanced as there is absolutely no exposure towards taxonomy for any 'science' student in so called syllabus'. I would have loved to know more about the behavioural aspects in bat biology. But, this was possible only if it was a fortnight workshop. We look forward to get an opportunity to attend more of such courses and know more and more about chiropteran. Thanks to all the experts for introducing us to this 'new' field (for us)!!!
- It was great to have hands on experience with bat taxonomy tools.
- It would have been helpful to have 1 or 2 extra days in the workshop to have practical training in acoustic sampling.
- Personally, as mentioned earlier, I feel that we would have like to hear about personal research experience, difficulties, scope and necessity of research in this field as evening sessions. (informal).
- The workshop was quite informative and the hands on session was good. It was a good experience to come to the workshop since it caters to beginners and experts.
- I would like thanks to organizing committee to this wonderful workshop conducted and selected me. Definitely I hoped that this 5 days programme will be held to carry my project work. From this programme I learned lot of things like taxonomy, skull preparation and echolocation recording etc.
- First up all I thank to you because to select me the workshop. I was really enjoyed the whole day specially in the afternoon practical session. Before this workshop, I was known only a few bats name and few things. After that I know something better than others. This workshop gave to lot do experiences like taxonomy and echolocation. Now I am also enter into the Bat field.
- Skull and species identification practical was very useful to me. After this workshop, I will confident to say, I know something about bats taxonomy and skull,..etc.
- Echolocation field works also new to one and learn same techniques.
- Generally your organization as well as food also very good.
- Totally I was enjoyed and learn about bats taxonomy and echolocation. I think totally 'it is great to me'.
- Many thanks for giving us this great opportunity. The lectures and the practical sessions were very helpful in knowing the very real basics of bat studies. Hoping to have more of this kind in near future.

- Echolocation related lectures were really informative.
- I do believe that we need more and better lecture series from resource persons, especially from India, as their lectures can provide valuable insight in Chiropteran biology of our immediate vicinity.
- Notwithstanding such a criticism, I believe we all agree that we do need loads of the taxonomic workshops as this one for entry level and intermediate level researchers.
- Overall, this workshop is nice and very educative. I never had experience of this kind of workshop in my career. This is the only workshop I had theory as well as live practical demo and individual experience on handling.
- Suggestions: If you could allowed individually to do some echolocation analysis it would really help us to do independently in future.
- Fourth day's sessions with bat specimen collection, curation and management was really knowledgeable along with the ziplines and flight turts.
- Today session about taxonomy and echolocation was an eye opener for me.
- This course was unique in its own and made me know various information on bats. I ensure that I now can work intensively on taxonomy of bats and will collect voucher specimen from all part of Nepal and will start to establish a bat museum for Nepal.

List of participants:

1. J. MaruthuPandian, Project Fellow, Madurai Kamaraj University
2. P. Kaliraj, Senior Research Fellow, Madurai Kamaraj University
3. S. Baskaran, Junior Research Fellow, Madurai Kamaraj University
4. K. Senthil Kumar, Senior Research Fellow, Madurai Kamaraj University
M. Malik Fasil, College of Forestry, Kerala Agricultural University
5. Leonald G. Melite, College of Forestry, Kerala Agricultural University
6. S.S. Talmale, Zoological Survey of India, Pune - 411 044
7. T. Selvarathinam, Dept. of Animal Behaviour
Kritika M Garg, Bangalore.
8. Arindaru Chatterjee, Madurai Kamaraj University
9. Sanjay Molur, Zoo Outreach Organisation
10. Balaji Chattopadhejay, Madurai Kamaraj University
A.K. Vinoth Kumar, Madurai Kamaraj University
Kadambari Deshpande, Madurai Kamaraj University
11. Megha Budhwani, Madurai Kamaraj University
12. Pooja Muralidharan, Madurai Kamaraj University
13. Hari Adhikari, Nepal
Joseph Reginald. L, SACON, Coimbatore
14. C. Srinivasulu, Osmania University
15. Neil Furey, Cambodia
16. Sripathi Kandula, Madurai Kamaraj University
17. B.A. Daniel, Zoo Outreach Organisation