

Bat Taxonomy and Echolocation Workshop for Researchers at M.K.U.

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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. Sripathi, our CCINSA Chair had requested an advanced taxonomy training for his graduate students at MKU, and our regular trainer for bat field techniques, Paul Racey had recently introduced us to his Ph.D. student specialising in bat taxonomy, Neil Furey, also from Aberdeen University, UK. It was a perfect match. Neil came over right after handing in his Ph.D.

In addition to Neil, demonstrations were conducted by R. Srinivasulu, Osmania University. The entire training was attended by 18 participants. The training programme was sponsored by Chester Zoo and Bat Conservation International.

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 of 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 into 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 sunrise 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 recording 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. Sripathi 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.



Participant Reports

Report on Bat Taxonomy and Echolocation workshop: By Kadambari V. Deshpande

The Bat Taxonomy and Echolocation workshop, held at Madurai Kamaraj University during 10th - 14th Aug 2009, was a good exposure to the supposedly untouched and relatively non-popular branch of biology. The organization, program schedule and mainly the content of the workshop were satisfactory.

Taxonomy and systematics of the largest order Chiroptera were efficiently dealt with in the workshop, while providing hands-on experience. Identification of bat species using character matrices and identification keys was the most useful part of the whole program. Systematic layout and practical experience with morphological, dental and cranial analyses of bats proved to be very effective in identification of species. Introduction to bat echolocation calls, their role in taxonomy and importance in identifying cryptic species were really helpful in exploring new avenues for research in the field of chiropteran biology.

Though it was a well organized workshop, previous arrangements with adequate number of specimens for practical sessions of, for example, echolocation call recording would have been helpful. Group discussion sessions could be conducted wherein participants would have been more interactive and informative. Voluntary talks by researchers attending the workshop with respect to their research experiences could be included. More of informal discussions in the evenings with researchers, regarding the scope of and problems in such research would be encouraging.

Overall, it was a very productive workshop in acquiring systematic knowledge in Bat taxonomy and getting familiar with its applications in conservation and management.

Bat Workshop Kritika M. Garg

My main objective to come to this workshop was to learn the key identifying variables for species identification. I have previously no formal training in taxonomy but with the help of this workshop I have learnt at least the basic classification of bats. The parts of the workshop dedicated to using external morphology for identification was good. Hands on training were an important goal of the workshop which was achieved. Neil made the discussions lively. The only issue was the key that was checked during the workshop. I did not personally find it an easy way to identify bats.

Report on Bat Taxonomy and Echolocation Training Malik Fasil, M. and Leonald, G. Melite, KAU, Kerala

It was the opening and introductory session of the workshop. Each participant introduced their background and interests. The next session was an introductory class on bat systematics, taxonomy and conservation which also discussed the identification characters of various species of bats. After that we had a theory class on the taxonomic overview of the bat fauna of India which also discussed the various bat families of Indian subcontinent. Both the classes were handled by Dr. Neil Furey.

Afternoon we had two lecture classes and a practical session. The first lecture was on specimen collection, preparation and measurement and the second was on character matrices and dichotomous keys for bat identification. Both the lectures were a preamble to the next practical session. In the practical session we were split into groups and identified various bat species based on external morphology. All the groups were also provided with a dichotomous key and the groups presented their findings. The specimens that our team worked were *Rhinolophus beddomei* and *Rhinopoma hardwickii*.

The second day started with a lecture class on bat skulls, including the procedures and methods for the skull preparation and curation. The skull extraction process was demonstrated by Dr. Neil Furey. This was followed by the skull extraction by each of the team. The next session was a lecture on bat bacula analysis and preparation. The lecture was then followed by the demonstration on the preparation of the bacula by Dr. Neil Furey. We could not do the practical on the bacula extraction due to the non-availability of male specimens.

The third day started with the practical session on the morphology and measurement on bat skulls and dentition. Cranio-dental analysis is very crucial in the identification of the bats. We could do the practical on cranio-dental analysis for species identification. Each of the group was made to present their findings along with the bat skull that their team has extracted. The next session was the lecture on bat echolocation. Neil Furey taught us the functional basis and taxonomic patterns of bat echolocation. He also explained to us about the bat detectors, and its functioning.

The fourth day started with a practical session on recording the bat calls. The session was early in the morning and we also did practical on flight tents, zip lines and light-tagging using captured bat species.

This was followed by lectures on bat specimen collections, curation / management, measurement of echolocation calls, acoustic identification, call scaling and variation.

We also had a session on taxonomy and echolocation with case studies from SE Asia. We also had some practical on bat bacula analysis using bacula prepared by Dr. Neil.

The final day started with a lecture on multivariate analysis of acoustic identification. The strength, weaknesses and considerations of acoustic sampling were also dealt with. The next lecture was on the development and management of echolocation call libraries.

We were also informed on the further information on bat research such as, web resources and literature on bats. In the afternoon we repeated our practical on bat identification, skull extraction and cranio-dental analysis. After that we had the concluding session of the workshop and also had a photo session.

The workshop was a very interesting and great learning experience. It was the first kind that we were attending. It discussed many practical aspects of bats and their conservation. The class on echolocation was a unique experience. It was also a great experience to have classes of Dr. Neil Furey and Dr. C. Srinivasulu. The workshop also provided many topics for discussion and also the latest concerns in bat conservation which will help us in the future.

A report on Bat taxonomy and echolocation course Megha Budhwani

The 5-day workshop on 'Bat taxonomy and echolocation' was a new and learning experience for the students who have started working on bats very recently. It covered, very efficiently, the taxonomic aspects of bat studies. Species identification is kind of a pre-requisite for the study of a particular organism, which sadly enough, no regular coursework includes. So, the platforms like this workshop turn out to be really helpful as far as very basic aspects like taxonomy or even, morphology are concerned.

Although, I expected this workshop to be more interactive than it was, the lectures were really informative. However, group discussions or talks about different kinds of possibilities in bat biology or status of the work that is being done in/outside the country would have been really helpful and driving. Since the workshop was on taxonomy, not much field work was expected, but it would have been a great experience to get to handle bats individually.

'Learning by practicing' was very well followed in the workshop through the skull dissections, use of keys and matrices for species identification etc. Field work for echolocation using line trapping, flight cages and use of different detectors was again a great use of resources to learn and know more. Also, to know about how the samples in different institutes and/or museums are preserved was fascinating. Same applies to all the 'physics' involved in echolocation. These are the aspects one can hardly find any literature on, but are very important for a zoologist.

Such workshops should last at least for a fortnight so that more of fieldwork can be included, which is a necessary element of bat studies. All in all, the workshop was very well organized including the seating arrangement, meals, lectures and discussions. We look forward to attending more of such workshops and training programs in the near future.

Report on Workshop on "Bat taxonomy and echolocation" Pooja Muralidharan

The workshop held on "Bat taxonomy and echolocation" was a great opportunity for students planning to work, or already working in the field of bats. It gave us the insights of the various studies being carried out on bats along with a lot of information regarding its identification, classification and echolocation studies.

Being new to this field myself, I registered for the workshop keeping in mind the future work that I have to do on bats (handling) and echolocation. So I was definitely awaiting this workshop with the idea in mind that I would know more about the wide variety of bats present in nature, their classification and identification strategies.

All of these notions of mine were definitely catered to during the course of the workshop. The hands on experience in handling of bats, their identification and capture of echolocation signals etc. were well coordinated and organized. The experts from each of these fields were present and would contribute their thoughts and suggestions during each and every discussion. This really helped me in getting introduced to this field and understanding exactly what are the various aspects under study in bats.

The other things include interactions with all the experts in the field of taxonomy, echolocation and other students / scholars presently working in the area. It is extremely overwhelming to know the current work being carried out on bats and to share the experiences of other people currently working in this field. The experiments were mostly given for each of us to perform and were not mere demonstrations. This kept the interest levels high throughout. Also the instruments and softwares used in this field were introduced and their handling and use was encouraged.

Over all it was a wonderful experience. The organization and interest and time put in by the organizers were really appreciable.

Report regarding the Taxonomy Workshop Balaji Chattopadhyay

Expectation from the workshop was that it will prove useful for both basic and advanced level researchers working on various aspects of taxonomy and acoustics.

Satisfaction level after attending the workshop: I did feel unsatisfied.

Only the acoustics part was dealt with some necessary detail.

Taxonomy part was dealt in a very unprofessional manner. Our Indian resource persons were never convincing in their clarifications. Too much stress was given on their personal viewpoints. Materials supplied as identification matrices and dichotomous keys lacked necessary details and were replete with flaws. The entire exercise looked like an advertisement of a book that is yet to be printed. As workshop participants we should be taught with the help of established and well accepted matrices.

There was not much mention of ways of non lethal field identification techniques; some thing that is very essential in a country like India where rules and laws

makes it a near impossible task for us to collect specimens from protected areas. Personally, resource persons were quite approachable and friendly.

Taxonomy and Echolocation Workshop Review A.K.Vinoth Kumar

The workshop was well organized and planned. Basic aspects on classical zoology particularly on taxonomic identification based on skull, dentition, baculam and echolocation was taught well.

Resource person Neil's presentation and explanations on wet specimen preparation, reproductive status assessment, echolocation was nice and it still live in mind, particularly recording calls by zipline was very new to me. Also Dr.Sripathi talk on echolocation calls was very informative. Dr.Srinivasulu involvement in practical session with each group had helped a lot while dissection of the specimen.

Session on bat identification using dichotomous and character matrix key to identify a particular bat at their species level was interesting and the book provided was really useful for identification at species level. At the same time, the book also lacks some minute details (key) to differentiate at species level for some species. Overall the workshop was very informative and educative.

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