

Scales, tails, and everything in between - recounting the Squamate Taxonomy Workshop

With a pleasant atmosphere around, often resonating with the croaks of the Common Indian Toads *Duttaphrynus melanostictus*, a three-day Workshop on the Squamata Taxonomy was held from 05–07 September 2023. The workshop was organized in the research collections Museum of NCBS (National Centre for Biological Sciences).

Day 1 of the workshop began with a quick introduction session with the participants, the resource persons including Dr. Ishan Agarwal and Dr. Harshil Patel, and the organizers including Dr. H.M. Yeshwanth and Dr. Tarun Karmakar introducing themselves to everyone. It was really astounding to meet and greet the participants from diverse backgrounds.

Following the introduction session, Ishan Agarwal began with the quick sessions on 'introduction to taxonomy' and 'ICZN' – International Code for Zoological Nomenclature. One of the 'never thought of that!' moments for me was when Ishan mentioned that 'species are hypotheses', which meant a species described today may be considered invalid tomorrow if sufficient evidence is provided. This session also gave important insights on the importance of 'collection-based research' and the need of integrative taxonomy which utilizes multiple and independent sources of morphological, genetic, and ecological data to delimit the species.



Dr. Tarun Karmakar showing the participants different collections in the NCBS Museum. © Harshil Patel.



Dr. Harshil Patel explaining how to morphologically identify different lizards. © Tarun Karmakar.



Harshil Patel explaining the dentition of snakes. © Tarun Karmakar.



Participants identifying different Lizard specimens using dichotomous keys. © Tarun Karmakar.

Following this, we were introduced to the Indian squamate diversity, which consists mainly of lizards and snakes. It was interesting to learn that the number of Indian lizard species described increased during 2010–2020, and more than 75 species have been described since 2020. Following this, we got to know the different lizard families in India.

Some of the genus names such as *Sitana* and *Sarada* sounded really catchy. It was also interesting to know that in the family Chamaeleonidae, a single species—*Chamaeleo zeylanicus*—distributed across arid and semi-arid parts of India, and also in Africa. Following the lizards, we got to know the different families of Indian snakes and their typical characters.

The afternoon session began with Ishan explaining to us on why and how to collect and preserve the specimens, the dos and don'ts, and the ethics to be followed. Following this, we were taken on a tour of the research collections guided by Tarun, who showed us around the dry, wet, and tissue sample storage. We were also told about the voucher number and its importance. An important tip Tarun gave us was to ensure that we distributedly depositing our collections in different museums, so that in case something happens, at least the other specimens in the other museums would be available. It was a treat for the eyes when Tarun showed us the entomological collections. I just can't appreciate enough the amount of care and effort that goes into making such collections.

Day 2 began with Ishan explaining us about the cryptic species, with different case studies of Indian lizards. One major example here was the species complex of The Kollegal Ground Gecko *Cyrtodactylus (Geckoella) collegalensis*, on how previously it was thought as to be a



Participants identifying different snake specimens using dichotomous keys. © Tarun Karmakar.

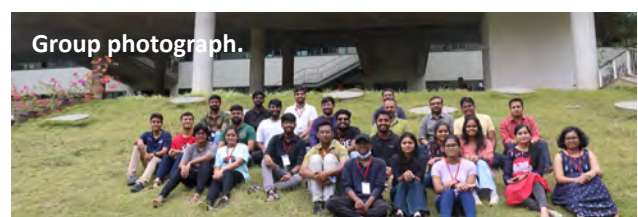
single species, and the work that Ishan and others have done in delimiting the species. The other two examples were about the species delimitation work carried on *Cnemaspis* in the Shevaroy landscapes of Tamil Nadu and the *Hemphyllodactylus* in the sky islands of peninsular India.

The afternoon session began with Harshil explaining us on how to morphologically identify the lizards by looking at different features such as scales, eyelids, lamellae, and femoral pores. Following this, we given the preserved specimens to handle, observe the characters using the dichotomous keys provided and identify the given lizards. I really enjoyed this moment of looking carefully and in depth into each character of the lizard to identify it. Every time we couldn't figure out something, Harshil would patiently explain us. We also learnt how to take different morphometric measurements. It felt amazing to hold the specimen and look in detail each of its character while trying to identify it.

Day 3 began with Harshil explaining us in detail on how to identify snakes morphologically through scalation, and looking other features such as hemipenis, and dentition when scalation is not enough. Following this, we were given preserved specimens of different snakes and were asked to identify them using the dichotomous keys. Being a person who has hardly touched or handled any snakes, it was an indescribable experience holding a snake in the hand while trying to observe different features.

In the afternoon, we had the final session with Ishan giving us an overview of the biogeography of the Indian herpetofauna. It's incredible how biogeography of groups such as *Cyrtodactylus* tracks mountain uplift, while that of the caecilian *Gegeneophis* reveals so much about the ancient wet zone fragmentation. Similarly, the studies on *Ophisops* from grassy biomes and the *Cnemaspis* from the Mysore Plateau makes anyone wonder on how much there is to uncover when it comes to the herpetofauna of India. After ensuring that everyone had adequately identified the snake specimens, the workshop was wrapped up.

These three days of the workshop were one of the best experiences I've ever had in my life, thanks to different factors such as meeting new people, and hands on experience with the morphological identification of lizards and snakes. Even now I recall how patiently Harshil would explain us things even after being asked a dozen times.



Group photograph.

Acknowledgements

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