



Dr. Uma Ramakrishnan

The first Indian to receive
Parker Gentry Award

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We all know our natural habitats are shrinking, with the ever-increasing human population. News about climate change, global warming hit us every day. We try to understand how other species have been responding over the years to make ourselves sustain, predict our future and make amends with Nature. Evolutionary biologists work with ecologists, environmental scientists and other specialists work in tandem to achieve this.

These experts suggest conservation efforts and appropriate remedial measures based on genetic analysis. Dr. Uma Ramakrishnan, a molecular ecologist at the National Centre for Biological Sciences (NCBS, Bengaluru) leads a team of researchers chronicling of human populations in South Asia, as well on conservation of

threatened mammals of the Indian subcontinent. To achieve this, she has pioneered on "peering into the past" via ancient DNA. Her team is supporting conservation projects for tigers, Indian wild cats, leopards and macaque monkeys, a list that lengthens every day, thanks to her dedication and hard work.

Uma grew up in the IISc campus surrounded by academics and researchers, where her dad was a physicist. Flora and fauna around filled this little girl's mind with curiosity about Nature. Different species of snakes including pythons and nocturnal lorises were part of her environment. Keen on observation, jotting down the seasonal changes, variation in numbers, mating patterns, movements, young Uma was full of questions. Her parents, grandparents and a few others who understood her thirst for knowledge



allowed her to explore, which gave her confidence to trail into deep forests later. Among them, Prof. Madhav Gadgil, a great ecologist who was then teaching at IISc encouraged her and showed her the direction. She seized every opportunity to pursue her interest in animals, tagging along with his students on birding and herpetology surveys at his Centre for ecological studies. To hone her quantitative skills, she pursued her bachelor degree taking Mathematics along with Physics and Chemistry based on his suggestions. She fondly remembers how her grandfather, a great academician and institution builder Prof. VKRVRao suggested that she travel alone to Delhi by train to learn through experience.

Soon after completing her schooling, Uma took a break year to learn more about what she wanted to learn! Her father was then on a research sabbatical at Princeton University and she used the opportunity, taking up a variety of courses, including one on modern dance. She also assisted in a molecular ecology laboratory there and was part of a study that used DNA to investigate the relationships between lemur troops using samples obtained from field studies in Madagascar.

Blown away by the possibilities that DNA and the use of molecular methods offered, Uma felt, "I mean, the samples were collected across oceans, from the island of Madagascar. And here we were, sitting in a lab in the USA, figuring out the social lives of lemurs!" This gave her confidence to intern with Dr.Lalji Singh, one of the few scientists then working on DNA fingerprinting in our country at CCMB, Hyderabad. Her journey as a wildlife biologist started here in this lab probably, while studying buffalo dung from the nearby places to understand their behaviour. "No doubt those milkmen thought I was crazy, when I asked for cow dung. It didn't matter! What mattered was what the dung would reveal", recalls this molecular ecologist who uses faeces to decode wildlife mysteries through genetics.

Genetic materials, in addition to containing clues about the individual identity of a tiger, also help answer questions such as where that is animal from, what it eats, its health condition and so on. Data collection on rare, elusive species is a challenge, as wild animals lead secretive lives and are shy of people. At the same time, the key to all information lies in one of the most basic of nature's products – poop aka scat!

Why did she choose poop to peep into their past? "Unlike drawing blood which requires capture and immobilisation which could potentially be harmful, collecting scat does not stress or disturb the animal. It is available in plenty and has the added advantage of being non-invasive. Like blood, scat contains DNA that scientists decipher to understand tiger (and other wildlife) populations and estimate their number.





- **The Parker/Gentry Award**, established in 1996 and presented annually by the Field Museum of Natural History, honours an outstanding individual, team or organization in the field of conservation biology for contribution to preserving the world's natural heritage.

- **DST Ramanujam Fellowship** The fellowship is meant for brilliant Indian scientists and engineers from all over the world to take up scientific research positions in India, i.e. for those Indian scientists who want to return to India from abroad.

Fascinated by nature in general and animals in particular, this DST Ramanujan fellowship awardee returned to India after her PhD in the United States and focussed on estimating tiger populations. She is passionate about the need for tiger conservation in India, as it not only harbours the majority of the tiger population in the world, but it also has maximum genetic variation and hence maximum evolutionary potential. In her words, "tigers are very charismatic, and I think we all agree we cannot afford to let them go extinct."

A tiger's history, how far it travels, its society and mating patterns can also be inferred from its DNA without actually seeing the animal. Her team did not see a single tiger in two months of fieldwork in Similipal, Odisha in 2018, yet they

could collect a lot of information about them through samples left. In the world of wildlife biologists, turd is treasure "almost like gold", quips Dr.Uma. Sometimes they use hair scraped from scratch marks etched on trees or traces of saliva carefully retrieved from prey. Her studies have included census estimates from combined camera trap and genetic surveys, historical inferences from genetic data and museum specimens and demonstrations of gene flow impacting genomic variation and inbreeding depression.

Pursuing a career in conservation science requires determination! Dr.Uma has travelled thousands of kilometres to study the rich diversity of Western Ghats, Himalayas and other regions of our country. Understanding animals and knowing about their food preferences, genetic diversity, health and habitat are crucial to their conservation. She says, "There were no courses on ecology or evolution at that time in India. I knew I needed to develop quantitative methods, tools and techniques to find answers." Her research has led to valuable conservation of wildlife corridors during highway expansions. "I think we have witnessed recovery of tigers, for example, over the last decade. That's really cool and something to be happy about!" says Dr.Uma.

Recognising her research work on conservation of various species, she was awarded the coveted **Molecular Ecology Prize (2023)** and she is the first Indian to receive **Parker/Gentry award (2016)**.

Dr Uma's immense contribution through science communication and community service is exemplary and she is an important role model to aspiring scientists around the world.

