

**IN CONVERSATION WITH *CRÈME DE LA CRÈME* OF INDIAN SCIENCE:
PROF. RENEE MARIA BORGES**

Dr. Renee M. Borges, Professor at Centre for Ecological Sciences, Indian Institute of Science, Bengaluru, known for her significant contributions to ecology and evolutionary biology shares her experience with Dr. Ankita Gupta about her journey in the field of science.



Professor Renee M. Borges is an evolutionary biologist and professor at the Centre for Ecological Sciences, Indian Institute of Science, Bengaluru, India. Professor Borges holds a lushly illustrious career with an h-index of 31 and 2441 citations (as on May 2023) which one can set one's heart on! Her publications have a synergistic impact on the readers as, apart from the great scientific content, they possess a unique and a catchy title which adds to the insatiability and inquisitiveness of the readers. Possessing great oratorical skills in combination to a pleasing demeanour, it's unlikely for the audience to not get swayed by Dr Borges's scientific talks!

To start with her education, Professor Borges obtained her bachelor's degree in Zoology and Microbiology in 1979 from St. Xavier's College, Mumbai. Later she did her master's degree in animal physiology from the Institute of Science, University of Bombay in 1982. She received her doctorate degree from the University of Miami, Florida, with a thesis entitled "Resource heterogeneity and the foraging ecology of the Malabar Giant Squirrel, *Ratufa indica*".

Professor Borges has worked on the visual ecology of predation in flower-visiting crab spiders, chemically-

mediated mate location strategies in ant-mimicking spiders, the visual ecology of nocturnal carpenter bees and the nutritional ecology of herbivorous giant squirrels. She currently deals with figs and fig wasps, ant-plant mutualisms, fungus-growing termites and pollination systems in the Western Ghats, besides collaborating with engineers on animal architecture such as the mud nests of termites and potter wasps. Her research focusses on mutualistic, symbiotic, and parasitic interactions between species. She is instrumental in guiding an array of students on these research aspects.

Apart from being a scientist of international repute, Dr Borges attained many accomplishments and to name a few of them: Secretary General of the International Union of Biological Sciences; Fellow, Indian Academy of Sciences; J. C. Bose National Fellow; Fellow, Indian National Science Academy; Chairperson of the DST-Program Advisory Committee on Animal Sciences, and Organismal & Evolutionary Biology (2016–2021); Member, Western Ghat Ecology Expert Panel (WGEEP), Government of India, 2010–2011; and the list goes on.

Dr. Ankita Gupta (AG): Thank you for speaking to Indian Entomologist magazine. You are considered as the cream of the crop and an inspiration for thousands of budding researchers, so I would like to know whom do you consider as your inspiration or a driving force?

Prof. Renee M. Borges (RMB): I cannot think of one person as my inspiration. If I have to pick someone, I would say my father, who was a renowned cancer surgeon, whose biography I have just published. And my mother, who was a botanist and an amateur horticulturist. Both my parents were perfectionists, and I have strived to meet their expectations. I am inspired by the work of great scientists, especially polymaths, and often feel that I would have enjoyed the company of Erasmus Darwin, Charles Darwin's grandfather.

AG: *Which moment do you consider as “the turning point” of your life?*

RMB: I do not have a specific turning point; I have always known that I wanted to be a student of nature; this for me has been as normal as breathing.

AG: *You being an alumna of the University of Miami, Florida, what differences did you feel while starting and establishing your scientific career in India.*

RMB: I have been fortunate in that I was offered a job right away at the Wildlife Institute of India, at Dehradun, after my PhD. However, I did not accept the position and continued my work on giant squirrels after I returned from Florida with a project that I obtained through the United States Fish and Wildlife Service. I then joined the Bombay Natural History Society as Deputy Director (Research). I did not think much about differences between academia in Florida and in India. I just knew that to become a scientist one had to do research even in India that could compete with the rest of the world.

AG: *Did working on fundamental research ever put you down on any of the platforms? What were your challenges?*

RMB: Strangely enough, I have not felt put down on any research platform. I think it depends on how one presents one's work and one's passion. These are traits that are easily recognisable and what we look for in our potential students and collaborators. A commitment to excellence and passion are the two key ingredients that make for success.

AG: *Amongst all the scientific discoveries you have made, which ones you feel have made a big impact or have seen the light of day.*

RMB: I am proud of the work which demonstrated that the insect ovipositor is an olfactory organ, just like the insect antennae. We were able to demonstrate

this by rigging up an electroantennogram apparatus to take readings from the ovipositor; we refer to this as an ovipositogram (EOG). We found that the ovipositor of parasitoids was sensitive to volatiles of the fig (*Ficus*) inflorescence and it was also sensitive to carbon dioxide. We believe that this sensitivity to volatiles aids parasitoids in egg-laying decisions within the fig inflorescence which is guided solely by the sensilla at the tip of the ovipositor.

I am also proud of the collaborative work that I have done with a granular physicist on the structure and stability of the soil nest mounds of fungus-farming termites. Through this collaboration, I have learned to think like an engineer and have enjoyed making fundamental discoveries about how termites are able to achieve strength in their architecture by exploiting the properties of soil in the presence of adequate amounts of water. Our findings have important implications for heat dissipation and ventilation in human architecture.

AG: *Considering feminism in practical sense, did you ever experience hurdles in accomplishing your milestones? Being a woman, was it difficult for you to achieve your goals? Do you feel that woman have to go the extra mile to prove their worth at work place?*

RMB: I have never thought about my gender during my career. This is perhaps because of an upbringing in which high achievements were expected irrespective of one's gender. In this I have been fortunate. I have been spared the anxiety that many budding female researchers have experienced. Having said this, I have also made a conscious decision to ignore gender in my lab; males or females are treated as equals and there is no task that is considered male- or female-biased. Every researcher is unique, with their own strengths and weaknesses, and we must celebrate this diversity. As I have mentioned earlier, for me there has always been a striving towards excellence. Whether I have reached excellence is immaterial; what is important is the effort towards it. In that sense, my greatest critic is myself, and therefore it doesn't matter if I am male or female.

AG: *You have served as a Chairperson of the DST-Program Advisory Committee on Animal Sciences in that context what advise you would like to give to the Indian researchers to keep in mind while formulating the projects for competitive grants.*

RMB: As Chairperson of several funding committees, I have sometimes despaired when I see that young researchers fall into the trap of jumping onto current research bandwagons rather than following their own interests and passions. Some of the bandwagons in recent years have been the obsession with nanoparticles, bioprospecting or biodiversity surveys. Most of these projects get rejected right away and do not even get sent for review. A project must have a good and focussed question, must make some predictions, must have a thorough literature review, and a comprehensive and doable work plan. Above all, the project must indicate the sincerity and commitment of the researcher. A good proposal must also be candid about its weaknesses, or areas of uncertainties, and must show how if Plan A does not work, what will Plan B deliver. By writing a good proposal, the researcher is showing her/his philosophy and approach towards science. It is not a mere exercise that ticks some boxes. Writing a good proposal is like performing on the stage, except that the stage is a piece of paper, and the words are in the proposal writer's mind and in the reviewer's eye.

AG: *In the course of time, what changes you expect/suggest for the Indian Scientific Organizations or major scientific funding bodies for attaining higher standards in Indian research.*

RMB: Indian research needs adequate funding. For Indian research to be globally competitive, the funding for research must increase to at least 3% of GDP from its current value of about 0.7%. Failing this, Indian research, except in some favoured sectors such as space research, will always remain at a low level. Even in the so-called Institutes of Excellence (IoEs) with my institute falling in that category, funding for research is woefully inadequate. There is money for sophisticated equipment but no money to maintain such equipment and no cadre of trained technical personnel. Therefore, most often, equipment stops working after its warranty period is over. This is a great loss to science. Mission-mode research must be discontinued; *i.e.* as when a few scientists decide what subjects will be given priority over the next few years. While it is important for research to have a focus, allowing just a few scientists to take decisions on where and how the limited money will be spent is improper. The newly announced National Research Foundation which is supposedly modelled on the National Science Foundation of the USA will hopefully use the best global practices in place

to prioritise research and also to reward maverick science, since it is sometimes from harebrained ideas and seemingly impossible dreams that great discoveries are made.

AG: *You have guided many scholars but some would have aspired to seek your mentorship but somehow would have missed the chance. So, I wish to know what road map you suggest for the researchers to follow?*

RMB: The best roadmap is to follow one's heart. Research is a vocation; it is a calling; just as becoming a doctor or a healer is a vocation with the goal to cure the sick and soothe the afflicted. Doing research in a mechanical way is merely engaging with technology; it is not doing science. The quest for answers to scientific questions is the goal. The moment research loses its meaning and the ultimate goal is not in sight, that is the point to stop and ask oneself: Am I in the right profession?



*The interview was conducted by Dr. Ankita Gupta. She is working as Senior Scientist at Division of Germplasm Collection and Characterisation, ICAR-NBAIR, Bengaluru. Her field of specialization is insect biodiversity, systematics, host-parasitic wasps association/interactions and molecular characterization.
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