

## Tête-à-tête with Dr. Chandrasekharaswami Adiveyya Viraktamath

**GREAT TAXONOMIST, TEACHER  
AND ENTOMOLOGIST PAR  
EXCELLENCE WHO SERVED  
ENTOMOLOGY FOR 60 GLORIOUS  
YEARS**

Dr. Chandrasekharaswami Adiveyya Viraktamath, fondly called CAV and Chandra, was born on 31 January 1944 to Sri Adiveyya, an employee in the revenue department and Smt. Neelambika at Byadagi, in northern Karnataka. Dr. Viraktamath had his school education in different places due to his father's transfers and joined degree course, B. Sc. in Agriculture at the College of Agriculture, Dharwad in 1961. During the College, he won ASPEE Gold Medal in Plant Pathology for securing highest marks. After completion of B. Sc. (Ag) degree, Dr. Viraktamath joined M. Sc. (Ag) at the College of Agriculture, Hebbal, Bengaluru in 1966 with Entomology as specialization. During this time, Dr. Viraktamath got influenced by Drs. H. M. Harris and J. H. Lilly, visiting Professors under Ford Foundation Programme, who taught Insect systematics and Physiology, respectively. In due course, Dr. Harris impressed upon Dr. Viraktamath to take up insect taxonomic studies and he used to call Dr. Viraktamath as Vakma and also as Mutt by those who found difficult to pronounce his long name. Soon after M. Sc. (Ag) programme, Dr.



Viraktamath joined as Research Assistant at Hebballi farm, Dharwad and then as Instructor at College of Agriculture, Dharwad. Later he joined Ph. D in 1970 to pursue doctoral degree in Agricultural Entomology. Dr. Viraktamath visited Oregon State University, Corvallis during 1970-72 and took up leafhopper taxonomy as his research work under the mentorship of Dr. Paul W. Oman, a renowned leafhopper taxonomist at that time. There Dr. Viraktamath worked on Old World Agalliinae leafhoppers examining a large number of species present in Oman's laboratory and other Museums besides collections from fellow entomologists pooled from all over the world. He had also visited California Academy of Sciences, where he indulged in sorting the Old World collection of leafhoppers and borrowed the agalliine leafhopper specimens to work upon. After 18 months of his stay in Oregon State University, Dr. Viraktamath returned

to the College of Agriculture, Dharwad as a learned taxonomist and began search for the types of agalline leafhoppers of the Indian subcontinent deposited in various Museums in addition to his fresh collections from all over India.

Dr. Viraktamath moved to College of Agriculture, Bangalore in the rank of Assistant Professor during July 1973, where he intensified his research balancing the workload of teaching both at undergraduate and post graduate levels. He continued enriching his collections of leafhoppers with an oversized 5.5 ft long collection net designed by Dr. Oman, which was longer and heavier than the usual normal net. In all outdoor field collections and expeditions, Dr. Viraktamath's wife, Smt. Lalita too took part and had cheerfully cooperated and helped Dr. Viraktamath in sorting, pinning and mounting of the leafhopper collections.

Dr. Viraktamath's first paper on leafhopper taxonomy was published in 1972 with a description of a new species, *Austroagallia* from Galapagos Islands. Subsequently he published about 15 papers in leafhopper taxonomy before his final submission of Ph. D thesis entitled, "A generic revision of the Old World Agalliinae (Homoptera: Cicadellidae)" in 1982. Dr. Viraktamath, notably recognized by his work, was invited to present a paper and chair a session in the "First International Workshop on biotaxonomy, classification and biology of leafhoppers and planthoppers (Auchenorrhyncha) of economic importance" held at London by Commonwealth Institute of Entomology" during 4-7 October 1982. Later Dr. Viraktamath strengthened the leafhopper taxonomy in India with his vast collections and regular visits to Natural History

Museum, London and once to National Museum of Natural History, Washington DC.

Dr. Viraktamath had published 208 research papers in peer reviewed journals, which include 112 papers on Cicadellidae with 44 revisionary studies and 11 reviews of various taxa besides description of a new tribe and several new genera and species. In all, 56 new genera and 424 new species have been described by Dr. Viraktamath and his collaborators. He has contributed to six edited books and several book chapters.

Dr. Viraktamath has been a role model and inspiring, teacher and mentor to several students, researchers and scientists. Though he is very strict with respect to the learning and practicing taxonomy, he has very deep and sympathetic concern towards students and he is the most sought after teacher. Dr. Viraktamath had a greatest concern towards insect collections and his deep commitment and dedication has shaped up a well curated modern Museum at the Department of Entomology, University of Agricultural Sciences, Bengaluru, which houses more than 3,50,000 specimens. Dr. Viraktamath has given innumerable identification services to the students, researchers, farmers, scientists, amateurs, Institutions (around 275), etc., who benefited immensely. He has guided 29 M. Sc and 14 Ph. D students in Agricultural Entomology, of which majority (27) studied on the taxonomy of different groups of insects.

On reverence and contribution to leafhopper taxonomy, several insect genera and species are named after him by many of his students and researchers. Around 22 species of leafhoppers are named in his honour by leafhopper taxonomists across the world. His drawing techniques are mentioned as



and decided to take Agriculture as a career though there was a chance of opting for a medical course. That's my first turning point. After joining the Agricultural College, Dharwad, the best of its kind, the Principal of the College, Dr. S. W. Menasinakai motivated us to study well and the staff members taught us well, that helped me to develop deep interest in Agriculture.

***KS: What prompted you to zero-in on Agricultural Entomology as your specialization in M. Sc (Agri)?***

CAV: Ours was the first batch of postgraduate courses in the young University. When I graduated from College of Agriculture at Dharwad in 1966, 6-7 classmates from Dharwad campus decided to join the PG course together. During that time, there were only five seats in each discipline out of which, two were reserved for In-service candidates. So, left out with only three seats open for each discipline, we all decided to divide and take the different disciplines to avoid completion among ourselves and I was fortunate to get Entomology and joined the course at College of Agriculture, Hebbal, Bengaluru. This is another turning point of mine to get into M. Sc. (Agri.) in Entomology.

***KS: We would like to know the motivation behind pursuing taxonomy as your specialization?***

CAV: Since the University had just started the PG courses, the entire course curriculum was drafted by the University with active participation of foreign and Indian experts following Land-grant system and at that point of time, Ford Foundation played an important role by deploying experts from abroad to strengthen teaching and research in the young University. Dr. H. M. Harris, a

well-known Hemiptera taxonomist who worked on the American damsel bugs (Nabiidae) was helping Entomology department and offered a course in Insect Taxonomy in which I scored the highest marks. Dr. Harris identified my interest in Taxonomy and encouraged me to work on insect taxonomy and suggested to take up hemipterans for my study and in fact wanted me to work on aquatic hemipterans to begin with. This is another major turning point in my professional career to take up insect taxonomy as my specialized area of research.

***KS: Now, we are interested to know your inclination to leafhoppers among several groups of insects for taxonomic studies?***

CAV: When I was motivated to work on hemipteran taxonomy, there was wide spread occurrence of two diseases of ragi, Ragi streak virus and Ragi mottle streak virus both were suspected to be transmitted by leafhoppers, which attracted the attention of entomologists. However, there were no specialists available in India who could identify these leafhoppers and thus Dr. Harris suggested me to work on leafhopper taxonomy. That's the beginning of my interest in leafhoppers. Dr. Harris helped me in initial collection and curation of leafhoppers. I was fortunate as this period coincided with the publication of Z. P. Metcalf's "General Catalogue of the Homoptera", which drew more attention and interest. After my PG studies, I joined as Research Assistant at Hebballi farm, Dharwad and later as Instructor at the College of Agriculture, Dharwad. During this period I was selected for my doctoral programme under Ford Foundation Fellowship. This was a hybrid programme between University of Agricultural Sciences

and any of the Universities in the US. The programme included doing part of doctoral programme in the chosen American University (mostly course work) and completing the remaining requirements of the research in the University of Agricultural Sciences, Bangalore. I was selected to work on the taxonomy of leafhoppers at Oregon State University, Corvallis during 1970-72 to work under the guidance of Dr. Paul W. Oman, one of the world leaders of leafhopper taxonomy at that time. I learnt alphabets of leafhopper taxonomy under his able guidance. After returning to College of Agriculture, Bengaluru, it was Dr. G. P. Channabasavanna, who guided me to complete my doctoral programme at the University in Bangalore. I am deeply indebted to all three, Dr. Harris, Dr. Oman and Dr. Channabasavanna for motivating me to pursue insect taxonomy as a passion and career.

**KS: May we know the challenges you have faced in leafhopper taxonomic research at initial stages?**

CAV: My research work for my doctoral programme was Revision of the Old World Agaliinae, at that time a subfamily in the family Cicadellidae. There was hardly any collection at the College. I had to make my own collections and borrow material from various museums in the world. I had to either borrow or personally visit European museums including the British Museum of Natural History, London to examine types. All these were challenges at that time and I started touring extensively in India to build up leafhopper collection from different parts of India. I was very fortunate as most of the museums did cooperate to send the material and also help in the study of types as Dr. Oman introduced me to these museums and

all the leading leafhopper workers in the world at that time. Initially I used Dr. Coleman's old microscope to draw the habitus of the specimens and utilized prism or mirror type *camera lucida* to draw the characters. An ordinary student microscope was used to study the male genitalia of specimens. Later, the Leitz and Leica microscopes with *camera lucida* were procured and used, which made the microscopic studies much easier.

**KS: What's your piece of advice or direction or guidance to the young researchers in Entomology?**

CAV: Good training and mentorship is extremely important for any researcher, let it be any field of Entomology. Our batch was very well trained by Dr. Channabasavanna and Dr. M. Puttarudraiah with good grounding in basic aspects such as insect morphology, anatomy and physiology. I still remember the type of training we got from Dr. Channabasavanna. Having a passion for acarology in addition to different fields of entomology, he used to examine the mounted specimens under oil immersion spending hours examining the tiny eriophyid mites. He trained us how to look at various minute structural details, microsetae, macrosetae, sensilla etc, under the microscope and spot the characters. For my Masters programme, I worked on rice case worm. In addition to biology and ecological studies, I was encouraged to study morphology, anatomy, chaetotaxy of larvae, pupae and adult rice case worm. Dr. Channabasavanna personally used to sit with me and other postgraduate students and help us to identify different types of structures and setae. This personalised training and guidance helped us to imbibe the nuances of good teaching and research,

and pass it on to our students. I see now-a-days, the training is diluted, priorities are shifted and the present teaching and research system needs a major overhauling.

**KS: What is the specific advice to the taxonomists especially the budding taxonomists?**

CAV: First of all, passion, focus and dedication with lot of patience are very important to all taxonomists. For young taxonomists, my sincere advice is to break the barriers, correspond with all the leaders in the group, make good collection from diverse areas, develop cordial relations with the fellow taxonomists, discuss and cooperate. Insects do not recognize political boundaries. Therefore, world should be your playground not a restricted area of your state or country. One has to examine the type (especially primary types- holotype, syntypes, lectotype and neotype) or get help from those scientists who have examined the types. Indian Institutes lack good collection, unless and until collections representing world zoogeographical regions are made available, taxonomic studies will not progress much. I can sum up the three essential things for good taxonomic work:

1. Extensive literature
2. Good equipment like microscopes, for illustrations, camera for photography
3. Exhaustive collections and
4. Passion to work on taxonomy

To this list I would add a good molecular laboratory facility or a healthy collaboration with a molecular biologist.

**KS: You are admired both as an excellent teacher and acclaimed taxonomist. So, how did you balance both teaching and**

**research and which will you weigh more Sir?**

CAV: Both are important, one has to strike a balance between Teaching and Research. When I joined as an Instructor, more weightage was given to teaching as there were less staff members. Less time was devoted to research in a day. But I weighed both jobs equally and strived hard to carry



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**"Passion, focus and dedication with lot of patience are very important to all taxonomists"**

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them hand in hand. I enjoyed both and derived tremendous satisfaction from both the jobs. Teacher influences and inspires young minds, the future scientists, teachers as I have emphasized earlier, I was influenced by Dr. Harris to take up insect taxonomy and Dr. Oman to take up leafhopper taxonomy. Therefore, both teaching and research, are important in their own way.

**KS: Can you narrate one incidence where you could bring change in the teaching methodology for the youngsters or young teachers to think innovatively?**

CAV: The practical classes in Systematics course used to be dealt with earlier in a different way where the Instructor use to give the students, identified specimens and asks the students to examine them and draw the characters. When I took over as In-charge of the course, I changed this system. Maintenance of a record by the students was done away with. The students were given unidentified specimens of the group which

they have to study and identify the family by running through the identification keys independently. I helped them with understanding the characters whenever they had problem. By this technique, when the student identifies the specimen correctly to

a family he is satisfied and happy and remembers the characters better. This also makes the student self-confident in identifying the specimens at least to family level independently with the help of available keys.



Dr. Kolla Sreedevi (KS) in conversation with Dr. Chandrashekharaswami Adivayya Viraktamath (CAV)

***KS: Apart from taxonomy, have you worked on any other areas Sir?***

CAV: Yes, I have worked on Economic Entomology also. A few projects to name are a) management of red headed hairy caterpillar in Pavagada, Karnataka; b) Mexican beetle, *Zygogramma bicolorata*, where we established that it's not a pest of sunflower; c) management of Gherkin pests, where we provided a schedule of operations for the management of its pests and diseases. I have also guided students on studies on insect biology and pest management, etc.

***KS: Taxonomists often fear of late publications, your view on this?***

CAV: Initially taxonomists fear for the work and the publications. Often, it's a starting problem and once it's initiated, it will be carried out with ease. I can say it's like going for a swim; initially one will fear to enter water, once he/she jumps, he/she enjoys the swimming.

***KS: You are emphasizing the insect collections as one of the important requirements, can you please elaborate?***

CAV: In India, insect collections are very poor and the existing collections are also poorly maintained, whether types or non-types. There is hardly any financial support for upkeep of specimens. Institutions where



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"Insect collections are Property of the Nation"

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insect collections are there should know that the insect collections are the property of science; they are the heritage of the nation throwing light on the biology, ecology and evolution of organisms. Insect collections are built up by the passionate individuals often risking their own life during collections in the field, forest and unhygienic conditions and from inaccessible terrains, infested with vectors of diseases, etc. When I started my work on leafhoppers, there was hardly a box of collection, where the specimens were not in proper condition and most of them were wrongly identified. I, then started collecting the specimens from all over the country to rebuild the collection. My collection now comprises of about 70-80% of known Indian fauna of leafhoppers, which is properly maintained at UAS, GKVK campus, Bengaluru. In the Museums, the insect collections should show good representation from various geographical regions of the country and also the World. I deem that the collections are 'Property of the Nation' that depicts the diversity. In this era of rapid extinction of the species, the species should be first preserved before it goes extinct, the species may go extinct any time. The documentation derived from the collections will help in

identifying and establishing the pest free areas from the international trade perspective. In fact, the collections are more valuable than the libraries. It has multiple benefits to the individuals, Institutions and the Nation. So, the collections are of utmost importance.

***KS: It is generally felt that the taxonomists have become a rare or scarce taxa, what can be the measures to attract more people to this field?***

CAV: Good foundation on basic aspects of science to be taught in the Universities as part of curriculum is very essential. Teachers' influence will be more in attracting the students towards a particular discipline. Administration should give more attention. Exclusive funding towards the taxonomic research is essential as the surveys and collections are involved. Networking and collaborative projects need to be enhanced. All these should be addressed to produce more taxonomists. In many areas of economic entomology there is a need for a specialized taxonomist, for example biological control, pest management, vector control, ecological studies, behavioral studies, quarantine, etc. and this necessity is often not realized and as a result the project outcome is not as good and sustainable as it would have been otherwise. Therefore, there is a necessity of creating job opportunities for taxonomists in these areas which will definitely attract young and innovative minds to insect taxonomy.

***KS: What are the ways and means to make taxonomy attractive and also to see the growth of taxonomic field?***

CAV: Most importantly, the job opportunities have to be provided. As there are more encounters of invasive species in India in recent times, the taxonomists to be trained on each specific groups and have to

be deployed to address the issues with proper identification. Proper recognition has to be given to taxonomists and encourage more people to take up taxonomy and become specialists in each group of insects. Also, more attention and focus to be given on the development of second line of taxonomists.

***KS: The taxonomic studies and research now-a-days is advancing faster, the literature is accessible, requirements are specified and set, equipments are procured, in this context, may I have your opinion on the quality of research, whether improved or deteriorated?***

CAV: I feel it's improving with the digital imaging and line drawings with the help of software like Adobe photoshop, etc., and also improvised image capturing systems. The descriptions are full pledged and detailed, but these are all with the serious taxonomists. Those taxonomists, who are serious, working with passion and dedication are enumerating the morphological characters with a deeper insight into the taxonomic characters and illustrating the same, which can form a good foundation for the new generation or beginners to understand and start their work. On the other side, with non-taxonomists, who depend heavily on internet and proceed to document without proper research on the validity of information available, are coming out with wrong identifications, descriptions and poor quality illustrations. Often they end up in reporting species that are not present in the country, which poses a major threat for the international trade and un-necessary precautions at the port entry against pests or vector species (misidentified) that do not occur in the country.

***KS: May I have your views on molecular taxonomy, its benefits and the limitations?***

CAV: Molecular taxonomy is most important as it provides an additional set of characters to be used in the classification of organisms. The taxonomy is all about judicious use and analysis of inheritable characters to arrive at a classification hypothesis. Characters may be behavioral, chemical, morphological and molecular. The species concepts and higher classification (subtribes, tribes, subfamilies, families, etc.) will be improved by making them monophyletic based on molecular characters. In addition, one will be able to unravel the problems of sibling species, which are of utmost importance in vector species of human and plant diseases and in search of proper biological control agents of pest species especially the invasive organisms.

More importantly we can relate different stages of insects with molecular taxonomy where early detection of the occurrence of the pest helps in developing a suitable pest management strategies. It's of utmost importance in quarantine too, where most of the invasive species enter into new territories in cryptic form (in egg and larval stages), which can be easily detected by molecular tools. It helps in redefining species concepts. But there is a problem of estimation of extent of homoplasy even in the molecular characters. In conventional taxonomy, the homologous, non-homoplasious characters are considered for phylogenetic analysis and hence the technologies have to be developed even in molecular characters to address the problem of homoplasies.

***KS: In India, most taxonomists are carrying their studies at alpha level, in this context what are the ways and means to improve or take taxonomic studies to next level?***

CAV: As I have emphasized earlier, the collections are more important. Lack of collections from various zoo-geographical regions of the world in addition to emphasis on the study of local fauna (we know probably only about 30% of our fauna) are the reasons for most of our taxonomic work being at alpha level. For Beta level taxonomy, representation of major taxa from most zoogeographical regions of the world is required. Even our National Institutes like Zoological Survey of India (ZSI), Forest Research Institute (FRI), Indian Agricultural Research Institute (IARI) do not have taxa representing

different zoogeographical regions of the world. Most of these museums also do not have good representation of taxa described from the Indian region also. It is very important to have an Institute that can house most of the taxa if not all, known arthropods from India with facilities for curation and preservation of international standards and provide an authentic identification service for persons who need such a help. It should also be accessible for all students (both national and international) of Arthropods to utilize these specimens for their research work.



***KS: May we know the other activities off the taxonomic research and teaching that relaxes you?***

CAV: I relax only when I work on leafhoppers especially some groups like Idiocerinae and Opsiini as leafhopper taxonomy is my passion. When I am back at home, I watch TV and would like to watch mostly detective movies. I like James Bond

movies, Sherlock homes series, etc. I feel that the taxonomic research is also like detective work only, to find out it's origin, dig out the literature and find the location of types and come out with new outcomes, new findings, new discoveries....and nodded his head with a sweet smile on face indicating 'that's it'

### **Concluding remarks by KS:**

I was spellbound by the passion infused in every word of the legendary taxonomist, Dr. Chandrashekhara Swami A. Viraktamath. **Even at the age nearing 79, Dr. CAV is energetic to work with the minute leafhoppers and other insects and expressed the happiness in catering identification services and guiding students and researchers. Dr. CAV expressed that his post retirement work on leafhopper taxonomy was more voluminous than that was accomplished during 35 years of active service. This speaks his untiring efforts, commitment, dedication and contribution towards insect taxonomy.** It was a sheer delight and privilege interviewing legendary CAV Sir, which was an enlightening experience listening to his rich and decades of vast and varied experiences interspersed with interesting anecdotes.

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*The interview was conducted by Dr. Kolla Sreedevi. She is working as Pr. Scientist at Division of Germplasm Collection and Characterisation, ICAR- NBAIR, Bengaluru. She is working in the field of Insect Biodiversity and Systematics especially Coleoptera; Insect Ecology, biogeography and molecular characterisation. She is also an Associate Editor of IE.*

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