Editorial*

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The doyen of the Himalayan geology, Professor K S Valdiya, passed away on September 29, 2020. India has lost a great geologist. We had a long professional association with him that extended from NCESS in Thiruvanathapuram to IISc/JNCASR in Bengaluru. He has been a great support to both my co-worker and spouse, C P Rajendran and myself. Throughout our eventful interaction and association, he continued to shower his blessings and love on us, despite our disagreements on scientific issues. On some occasions, when we shared our professional frustrations, he would point to the image of Gandhi, prominently displayed in the study room of his Bangalore home and tell us, "walk alone". He always encouraged us to move on, disregarding the obstacles.

I got to know Prof. Valdiya more during a month-long field trip to the Uttarakhand Himalaya that C P Rajendran and myself took with him back in the late 90s. That was our first exposure to the Himalayan geology, and it was a great learning experience. A novice in Himalayan geology, I would ask him all my doubts, and as I listened to him standing by the majestic cliffs of the Himalaya, I thought he could almost talk to the rocks. He taught us how to pick up the traces of the Main Central Thrust and the Main Boundary Thrust, the major geological structures that appeared too complex in the textbooks. During this tour, we could witness his deep relationship with the people of the mountains, who used to follow our trails and cheer us up. The most exciting part of the day was the post-dinner evenings that we would eagerly wait for, to listen to Prof. Valdiya. A great storyteller, he would tell us his ghost stories from isolated old guest houses deep in the Himalayan hills. The tour with him was a launching pad for our research on the Himalayan tectonics, which also ignited

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our passion for the great mountain. A great teacher who inspired many students, Prof. Valdiya will continue to live in the minds of the geologists of India.

In the March issue of *Resonance*, we are provided with two informative accounts on the contributions of Valdiya. The article by Tandon and Divyadarshini mostly focuses on Valdiya's research on the geology of the Himalaya and elsewhere in India and the impact it had on generations of geologists. Jaishri Sanwal has written an account of the life journey of Valdiya starting from Burma (Myanmar), where he was born and spent his early childhood days. Her personalised remembrance of Valdiya, with whom she had a long association as a student as well as a fellow researcher, touches your heart. Her article brings out the most endearing personal qualities of this great geologist, who was also an exemplary communicator. Aside from two articles on Valdiya that deals with his life and contributions, this issue of *Resonance* contains many interesting pieces that satisfy your intellectual curiosity and enrich your understanding or fill the gaps in your knowledge.

The passing away of teachers like Valdiya also reminds us of the vanishing skill of teaching in our education centres. In an aptly titled article, 'Building Research Competence in Undergraduate Students', Smitha Hegde and Indrani Karunasagar explore ways of improving learning and teaching methods in Indian educational centres; especially at the undergraduate level. They present data collected through a series of personal interviews with students pertaining to research skill development, teacher preparedness, infrastructure, peer-support, research climate, and time management. Such studies assume importance in the backdrop of the new education policy (NEP 2019), which seeks pedagogic reforms in Indian classrooms. Aniruddha V. Deshmukh, under the section 'Classroom', introduces a pedagogical exercise by asking the readers to see the differences between the words "arbitrary" and "random". These words are somewhat interchangeable in the English language, but their usage assumes significance and connotes different conditions in mathematics.

In another general article, P S Pal and A M Jayannavar discuss

the important milestones in the development of the second law of thermodynamics—the rule that entropy always increases in a system and explains why hot coffee cools and why the universe finally will reach a state of uniform temperature. These milestones include the famous thought experiment called Maxwell's demon, Szilard engine and Landauer's principle. These concepts are now extended to the realm of quantum thermodynamics, unravelling the relationship between energy and information. Leaping from physics to mathematics, Ritesh Goenka and Gopala Krishna Srinivasan provide insights into the lesser-known properties of the gamma function, which is used in mathematical statistics, whose origins can be traced back to the Swiss mathematician Leonhard Euler (1707–1783), who attempted to generalize the factorial to non-integer values. This topic was studied by other eminent mathematicians like Adrien-Marie Legendre, Gauss, Oscar Schlömilch and several other 18th–19th-century mathematicians.

Yet another article on a quantitative method is also discussed in this issue. This article by Keshav Kumar highlights the applications of partial least square (PLS) analysis, a most favorite tool in chemometrics to develop calibration models. Chemometrics is a branch under analytical chemistry that performs calculations on measurements of chemical data. Essentially this sort of mathematical/statistical analyses help us understand if there are patterns or trends in data.

The advent of antibiotics was one major revolution in medical therapy, but later we also saw that their overuse has resulted in antibiotic resistance. Among the newer alternatives to conventional antibiotics, antimicrobial peptides called bacteriocins produced by lactic acid bacteria (LAB) show promise in antimicrobial therapy, which is also found to be useful in food preservation. Joyleen Fernandes, Rohit Kumbhar, and Ram Kulkarni inform us about the biochemical aspects of these peptides and their applications. Dastagiri Reddy and Anil J. Elias introduce a topic that has immediate relevance to the COVID times. Their article is about chlorine and the chemistry of disinfectants. The COVID-

19 pandemic has globally popularized the efficacy of the usage of disinfectants and consequently, their demand has reached an all-time high. In this somewhat long article, the history, development, and current status of the most widely used chlorine-based disinfectants are described. The authors also pose a question towards the end of the article: "Can we say that 'All is Well' with chlorine-based disinfectants?". The authors also warn about the harmful side effects and environmental compatibility issues for some of the chlorine-based compounds.

If you have ever wondered why the honeybees end up making those hexagons, as storage vessels of honey in their combs, then read Kishore Dutta's essay. The author, who is a physicist, teaching in a college in Guwahati, qualifies these hexagonal combs as a product of "honeybee's pursuit of perfection". As you keep reading the article, you will discover the science that also includes the heat equation underneath the mad pursuit of the bees. The holes, in fact, start out as 'circular' and the heat formed by the activity of bees softens the wax and hardens in the most energetically favorable configurations in rounded hexagonal shapes. The thermo-mechanical properties of the wax are the final arbitrator in the derivation of the hexagonal shapes, but the relentless activity of the bees is also equally important in generating the required heat.

The March issue of *Resonance* hosts a series of highly informative articles that will stimulate our curiosity and provide new insights for the learning minds.