

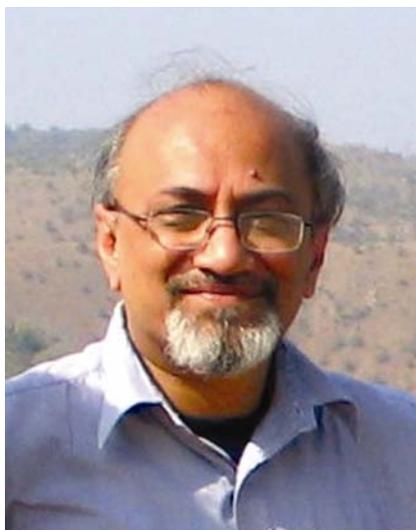
Parag P. Sadhale (1960–2012)

Parag P. Sadhale, fondly called Parag by his friends and PPS by his students, left us in the early hours of 20 January 2012. He was a gentle and sensitive person living in a fast-paced world in which it is increasingly difficult to distinguish music from noise.

Born on 16 June 1960, Parag attended the King George's School in Mumbai and subsequently secured his Bachelor's (Ruia College, Mumbai; 1980) and Master's (M.S. University of Baroda; 1982) degrees in science with microbiology as the main subject. After working in Hindustan Lever for a short while, Parag pursued his PhD on RNA processing with Terry Platt¹ at the University of Rochester, New York (1991). He did his post-doctoral work on RNA polymerase subunits with Nancy Woychik² at the Roche Institute of Molecular Biology, New Jersey. He joined the Department of Microbiology and Cell Biology, Indian Institute of Science (IISc), Bangalore as an Assistant Professor in March 1995 and became full Professor in March 2009. He was an elected fellow of the Indian Academy of Sciences, Bangalore.

Parag was initiated into research on baker's yeast (*Saccharomyces cerevisiae*) and until the end used the same system, primarily, to ask key questions in biology. In his laboratory, Parag dealt with two main aspects of yeast biology. The first one was on transcription, the process by which the genetic information encrypted in DNA is converted in the form of RNA. The key enzyme involved in this process is RNA polymerase II, which is composed of several subunits. Parag's laboratory studied the roles of Rpb4 and Rpb7, the two subunits associated with the RNA polymerase II complex. Rpb7 is essential for viability of *S. cerevisiae*, whereas Rpb4 is required for its growth, primarily during stress conditions. His laboratory demonstrated that overexpression of Rpb7 rescued some of the phenotypes displayed by *S. cerevisiae* lacking Rpb4 (ref. 3). Further, complementation studies showed that Rpb7 homologs from other lower eukaryotes, e.g. *Schizosaccharomyces pombe*, *Candida albicans* and *Dictyostelium discoideum* rescued the growth of *S. cerevisiae* lacking Rpb7, demonstrating functional conservation across a wide number of species⁴. His laboratory also

showed that the other subunit, Rpb4, affected the transcription of a subset of genes, e.g. galactose metabolism, under normal and stress conditions⁵. Further studies from his group revealed that the N-terminal regions of Rpb4 and Rpb7 are important in interacting with the core RNA polymerase II complex⁶. Interestingly, Rpb4 is recruited on the active transcription complexes of several genes and is important for transcriptional elongation⁷. In addition, Parag's group elucidated the role of Rpb4 in the slime mould, *D. discoideum*, during distinct developmental stages of its life cycle⁸. In



his own inimitable style, Parag used to quip that 4 and 7 were, perhaps, not as well known as other numbers, e.g. 5 and 3 (referring to tumour suppressor p53), which reflected his subtle sense of humour. A number of papers have appeared from several other groups in the recent past, vindicating his choice of the topic and the importance of the subject.

The other major area of interest in Parag's laboratory was *C. albicans*, which causes fungal infections in immunocompromised individuals. Initial studies revealed that *C. albicans* lacking a key enzyme in galactose metabolism (GAL10) showed several altered properties in cell-wall organization, colony morphology, response to oxidative stress, filamentation, etc.⁹. This study led to the identification of novel regulators of virulence. A seminal finding is the function of GAL102, a homolog of dTDP glucose 4.6 dehydratase, which was shown to

have important roles during stress and infection¹⁰. Further characterization of other novel genes is currently in progress by the students in his laboratory. In addition, using phage display technology, his laboratory identified peptides that may have potential diagnostic value, as they distinguished *C. albicans* from other closely related species¹¹.

There are several distinguishing features of Parag. He loved methodical work that resulted in a good study and was thrilled with his latest publication in *PLoS Pathogens* – quality was more important to him over quantity. He actively sought high-technology approaches to address biological problems. In fact, the first microarray studies from India were published by his laboratory^{5,12}. To improve the quality of work, he actively collaborated with several colleagues and was generous in sharing credit. Parag was a dedicated teacher who taught microbiology in a non-traditional manner that encouraged students to be more imaginative. He enjoyed the company of dedicated and eager students and actively mentored them. The students of REAP-Biology, an outreach programme of IISc for the benefit of undergraduate students in Bangalore colleges, greatly appreciated his lectures and teaching style. He also participated in the science education panel activities of the Indian Academy of Sciences and delivered lectures in various colleges. He was involved in several other activities, e.g. selection of students for the KVPY programme, organization of several meetings involving the Society of Biological Chemists, Yeast Biology, Transcription, etc.

In addition to his academic pursuits, Parag was closely associated with several companies. He actively encouraged the setting up and oversaw the growth of Genotypic Technologies, a company in Bangalore that offers advanced genomic solutions to researchers in biology. In addition, he collaborated with Piramal Life Sciences, Mumbai, in trying to identify drug targets against *C. albicans*.

Being a multifaceted personality, Parag was a key person in strengthening the cultural activities in the IISc campus. He had great interest in classical and light music. This interest was nurtured while he was in school and he got his ini-

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tial training in Hindustani classical music under Pandit Vasant Rao Kulkarni. He was an accomplished harmonium player and played with several well known artists. Consequently, he greatly enjoyed as well as encouraged musical outings. Parag was comfortable with family members and was fond of kids. He created a lasting impact on all who interacted with him.

His family members, teachers, colleagues, students and friends recall Parag's broad smile, rejoice in his accomplishments and multi-faceted life, and pray for his peace. All of us will greatly miss him.

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