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### Linking environmental signals to epigenetics via TOR kinase controlling plant growth

Plants respond to a given environment controlling their growth and productivity. Accordingly, a variety of environmental signals affect translation and transcription machineries and adjust the plant growth allowing it to adapt to the new conditions. A central regulatory system composed of TOR Kinase is involved in multiplexing these signals and controlling the rate of translation and transcription (particularly rRNA). TOR sends signals to the ribosomal protein RPS6 via S6 Kinase. We demonstrated that RPS6 may have a novel function in plants via its interaction with histone deacetylase 2B (AtHD2B) that belongs to the plant-specific histone deacetylase (HD2 family). Both RPS6 and HD2B were localized in the nucleolus. We have shown that RPS6 directly interacts with the rRNA gene promoter. This suggests that the interaction between RPS6 and AtHD2B may play an important role in linking TOR signaling to rDNA transcription (which makes 98% of RNA) in plants. This is consistent with mutation in *rps6b* that results in decreased root growth and reduction in 18S rRNA transcription. Over expression of both AtHD2B and RPS6 exhibited down-regulation of pre-18S rRNA synthesis with concomitant decrease in some of the ribosomal proteins transcription. This study suggests a new paradigm for controlling rDNA transcription in plants, in which TOR may be involved in an epigenetic silencing of the rDNA transcription via its downstream signaling component S6K/RPS6, and this mechanism involves HD2B. Such an interaction can provide a direct link between stress signals and the regulation of translation and transcription machineries controlling plant growth under a given environment.

### Biography

Deshpal S Verma is a full Professor at the Ohio State University, USA. He obtained his BSc degree in Biology and Chemistry, MSc degree in Botany from Agra University, India, and PhD degree in Plant Physiology and Biochemistry from the University of Western Ontario, Canada. He is a Fellow of the Royal Society of Canada and a Fellow of the Third World Academy of Sciences, Italy. His pioneering research work includes the identification and characterization of nudulins and phragmoplastin, and genes responsible for proline and callose biosynthesis in plants. He has served on the editorial boards for several international journals, edited 11 scholarly books, and published over 160 original research papers.

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