

EDITORIAL

Focus on RNA biology

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If DNA is the playbook of life, then RNA, in all its forms, is the company of actors that brings life into being. RNA is likely the original organic molecule that gave rise to DNA as well as enzymes and other proteins that create the flow of genetic information known as the central dogma (DNA → RNA → protein). Although the central dogma still holds true generally, our understanding has expanded the concept to encompass reverse transcription of RNA to DNA, regulatory functions of noncoding RNAs, and epigenetic modifications. In this focus issue, we highlight many of the forms and functions of RNA in plants.

The issue includes 10 reviews and 7 research articles (articles published within ~6 months of this issue will be added to an online collection in plant RNA biology). In a vignette-style review by Manavella et al. (2023) twelve experts present and discuss compelling open questions in plant RNA biology and future perspectives in the field. Assmann et al. (2023) review how RNA structure informs function, drawing the intriguing and informative analogy that RNA can be relatively static, like a rock, have catalytic functions of cutting bonds, like scissors, and can adopt myriad functional shapes, like paper. Marquardt et al. (2023) explore the crosstalk between transcription and RNA maturation in plants and its impact on genome integrity and gene expression. Mateo and Staiger (2023) discuss how recent technological achievements have enlarged our understanding of the function and mode of action of plant RNA-binding proteins (RBP) and enabled a genome-wide view of the plant RBPome. Small et al. (2023) take a look at RBPs with respect to plant organellar RNA processing and maturation in plant organelles (principally chloroplasts and mitochondria). In his “intron-centric” guide to alternative splicing, Petrillo (2023)

discusses fundamental aspects of splicing and alternative splicing with a focus on introns. Palos et al. (2023) provide perspectives on long-non-coding (lnc) RNAs, examining key discoveries made in plant lncRNA biology over the past two and a half decades as well as challenges and new molecular and computational approaches to lncRNA comparative and functional analyses. Chow and Mosher (2023) review small RNA-mediated DNA methylation during plant reproduction, focusing on the biosynthesis, transport, and function of reproductive short-interfering (si) RNAs. Prall et al. (2023) provide an overview of covalent nucleotide modifications within plant mRNAs, their methods of detection and analysis, and outstanding questions about their function. Heeney and Frank (2023) delve into the knowns and unknowns in the field of long-distance mRNA movement, discussing what defines a functional signaling molecule and how to decipher signals within the inherently noisy data of the mRNA “mobileome.”

In a breakthrough report, Hudzik et al. (2023) report on trans-species microRNAs (miRNAs) in the parasitic plant *Cuscuta campestris*, showing that they have a U6-like snRNA promoter that produces miRNAs with a mechanism distinct from canonical miRNAs, which they speculate may allow these miRNAs to be exported to host plants. Guo et al. (2023) present a large-scale biology study of the translational landscape of bread wheat during grain development, providing new insights into the translational control of gene expression during grain development. Five additional research articles report the discovery of a novel class of small RNAs up-regulated by nutrient deprivation in *Chlamydomonas* (Li et al. 2023), structural insights into the activation of an organellar C-to-U RNA editing enzyme in *Arabidopsis* (Toma-Fukai et al. 2023), the functional interdependence of subunits of the *Arabidopsis* m6A methyltransferase complex (Shen 2023), the requirement of DNE1 endoribonuclease for turnover of diverse mRNA substrates in *Arabidopsis* (Nagarajan et al. 2023), and the synergistic action of the *Arabidopsis* spliceosome components PRP39a and Smd1b in promoting post-transcriptional transgene silencing (Bazin et al. 2023). The cover of this issue features original artwork by Nicolas Cinquegrani (nicocinque.com).

We encourage authors to continue to submit their best work on plant RNA biology to *The Plant Cell*. Articles published in this area within 8-12 months of this focus issue will be added to an online collection on plant RNA biology, building on the articles presented in this focus issue.

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