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**F**ood, clothing and shelter — these are just a few of the provisions that plants can supply. As sources of energy and therapeutic drugs, and with a role in providing clean air, there are many other examples of the relevance of plants and plant science to our lives. This theme forms the basis of our collection of reviews on some of the most pertinent and exciting areas of plant research.

Plants interact closely with the surrounding community of microorganisms. Such associations can be mutually beneficial or may cause plant diseases with high economic costs. Cyril Zipfel and Giles Oldroyd review the commonalities and differences in signalling pathways that enable the establishment of favourable or pathogenic plant–microbe interactions.

The interactions of plants with the environment are not limited to those with microbes: many other biotic and abiotic factors affect plant growth and development. Analyses of morphological adaptations have helped to address the question of how plants respond to their environment. Ben Scheres and Wim van der Putten discuss why it is important to obtain detailed, molecular-level insights into specific plant responses to distinct external signals and to build up a picture of how molecular responses shape the evolution of ecological life histories.

Ultimately, a major goal of plant research is to improve crop production. Considerable advances in sequencing technologies have provided greater access to the large and complex genomes of crops. Michael Bevan and his colleagues examine these advances and their application to the characterization of diversity in the genomes of crops and their wild relatives. They also consider how this has facilitated the association of genetic variation with phenotypes of direct relevance to crop breeding.

Nature is incredibly efficient in its use of solar energy to power photosynthetic organisms, and duplicating the energy-conversion process is an important goal of bioengineering. Elisabet Romero, Vladimir Novoderezhkin and Rienk van Grondelle describe the quantum-mechanical principles underlying the ultrafast processes in photosynthesis that must be replicated to achieve energy conversion in human-made systems.

Through this collection, we hope not only to convey our enthusiasm about plant research, but also to highlight areas that merit further exploration.

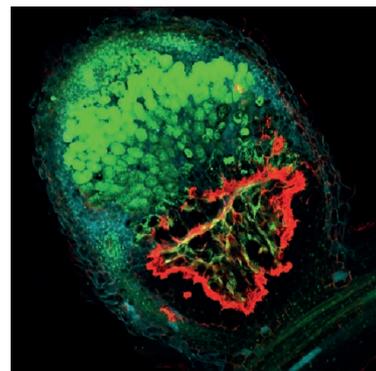
**Orli Bahcall, Angela K. Eggleston & Sadaf Shadan**  
*Senior Editors*

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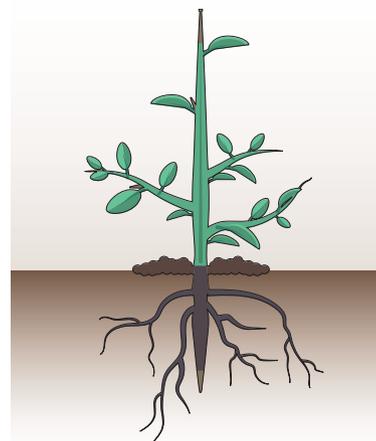
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