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Book Reviews

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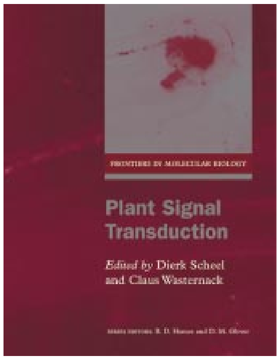

Plant Signal Transduction.
Scheel D, Wasternack C, eds. 2002.
Oxford: Oxford University Press. £72·50 (hardback), £35 (softback). 346 pp.

The recent whole-scale sequencing of several organisms has revealed two surprising facts to me. Firstly, I as a human with considerable pride in the genetic complexity controlling my differentiation, my immune response, my memory and my behaviour, really do not have so many more genes compared to plants. Secondly, when surveying the genomes of mammals, flies and worms, I found about 50 receptor kinase genes per genome, whereas plants possess about 400. What are all the receptors doing in an organism that does not talk, walk or even sing?

Upon mature reflection, I concluded that plants actually are immensely advanced, because (*a*) they have successfully populated this planet for so much longer than us animals, and (*b*) they are required to be so much more adaptive because of their inability to move and avoid, and because of their mode of differentiation to achieve a homeostatic body plan. Consider the tree that places its roots into a soil filled with billions and billions (one 'Sagan unit') of microbes per gram for 200 years and does not succumb to the invasive pressure of all these potential invaders. Consider the plant that wilts its leaves, then regains turgor upon watering, or the plant that uses simple metabolites such as amino acids or purine derivatives to provide systemic signals facilitating homeostatic adaptation to external stresses (Beveridge *et al*., 2003).

Additionally, development in plants is wired differently than in most animals, being post-embryonic. Thus cascades of gene expression are controlled by different external and internal triggers. Cell proliferation and cell fate are controlled from dividing cell division centres (called meristems) or latent pluripotent stem cells within the cambium or pericycle. Induced organs are in turn controlled for extension and development. An excellent example of the two-step nature of organ initiation and subsequent development is seen in the nodulation of legumes (Gresshoff *et al*., 2003) and the lateral branching of pea (cf. Beveridge *et al*., 2003).

This book provides a comprehensive summary of molecular genetic and biochemical processes underlying plants' ability to recognize their environment, adjust their development, and to thrive through growth and reproduction. The editors have brought together an impressive array of working biologists stemming from a range of interest areas to compile a book of significant reference value. The text is well-written, each chapter is thoroughly researched with extensive referencing, and gave me a wonderful insight into the field.

I have two problems with the book; one is solvable, the other must just be taken as a fact. The book has relatively poor graphics, both in number and sophistication. With more and more communication being electronic, and education so often relying on the electronic medium, one feels that the book just falls short. Perhaps the editors or publishers could have used a professional illustrator to produce a set of figures that would have had a lasting value in teaching and communication. The book would thus better aid the advanced teacher of plant biology.

The second shortcoming relates to currency. This is a perennial issue, as books just simply take too long to come out. Often this is caused by authors being over-committed; one or two missing chapters can slow a book for 6–12 months. This is particularly unfair to the 'punctual' author, as her/his contribution by definition contains older, and thus less up-to-date citations. Confounding this issue is the fact that the field of plant signalling analysis is moving extremely fast; thus the book lacks mention of key advances. We miss the phytosulfokines (Matsubayashi *et al*., 2002), the siRNA signal related to post-transcriptional gene silencing (Smith *et al*., 2000; Jorgensen, 2002; Tang *et al*., 2003), protein and peptide signalling (Ryan *et al*., 2002; Takayama and Sakagami, 2002), and receptor kinases involved in nodule initiation and autoregulation (Endré *et al*., 2002; Krusell *et al*., 2002; Nishimura *et al*., 2002; Radutoiu *et al*., 2003; Searle *et al*., 2003). The reader just has to accept that the book is a snapshot of the state-of-the-art in, perhaps, early 2002, thus being 2 years behind the front of research advances.

But despite these two shortcomings, the book is an excellent baseline and anchor point onto which to build one's knowledge of modern thinking on plant signal exchange and perception. It is clear that the next 5 years will provide paradigm-changing advances in the field of plant development and signal perception, perhaps even providing a computable model of fluxes and responses. No major publication has summarized the different plant signal processes as well in the last decade; thus this book is an essential for any plant developmental geneticist and physiologist.

P. M. Gresshoff

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