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► **COVER:** 'Out of this whirled' by Patrick Morgan, inspired by the Review on p540.



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**B**iology is gradually turning into an 'exact' science. Genetics hints at the mechanisms underlying phenotypes, and molecular genetics documents how components interact; but now, an even deeper understanding of biological phenomena is being obtained by a mathematical description of the underlying principles. Take developmental biology, for example. How many morphogen molecules does a cell 'see'? And how many surface receptors are active at any one time? These and other questions are being addressed by increasingly sophisticated microscopy and image processing tools, coupled to mathematical modelling.

The fruitful steps towards obtaining a quantitative view of developmental biology are described by Oates and colleagues (p517), who — using examples from planar cell polarity to gene oscillations — emphasize the merit of this framework in enabling the interplay between theory and experiment. The authors also offer guidelines for conducting research in this young area, from making friends with theorists (see also an [editorial](#) in *Nature Cell Biol.* **11**, 667; 2009) to selecting the most appropriate model.

Other challenging areas of genetics are being subjected to unprecedented scrutiny by new tools, from high-throughput genomic technologies to better analytical methods. Examples include a deeper understanding of quantitative traits (see the Review by Mackay and colleagues on p565) and of the subtleties underlying [traditional concepts](#) such as fitness (described by Orr on p531), and a dynamic description of [viral sequence evolution](#) (as covered by Pybus and Rambaut on p540).

A quantitative mindset not only brings biology closer to being a numerical science but is also hugely valuable in allowing knowledge to be integrated across many scales — temporal, geographical and across levels of biological organization.

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