over the years. We now know a great deal about normal regulatory mechanisms in the genomes of higher eukaryotes and, so far, transposable elements figure only as occasional interfering interlopers.

In more recent years, and especially in her Nobel lecture, McClintock has placed more emphasis on transposable elements as one way, among others, of restructuring the genome in response to stress. There is evidence that the maize elements are sometimes activated by chromosome breakage induced by other means. They can then promote further breakage and segmental rearrangement. Does this make them a part of the problem or a part of the solution, or both? Is the restructuring just random

disruption, from which natural selection can, given rare good luck, fashion a new order? Or does the organism, as sometimes seems to be implied, have foresight, conjuring up just the kind of restructuring that the occasion demands? That would indeed seem to verge on mysticism.

I, for one, would celebrate Barbara McClintock not as a prophet but just as a supremely perceptive and individual scientist. If she has a message, it may be that we should always believe our observations, however bizarre they may seem. They may be trying to tell us something. □

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Ivan Roitt's introductory book *Essential Immunology* (Blackwell, 7th edn, 1991), can be annoying in an advanced text, even though here they are well used and plentiful. Despite the extra detail, the experimental basis of the findings is often not delved into. Rather, each chapter is a synthesis of 'current' work typical of well-edited reviews, with ample reference to original articles and helpful tables, including one of CD nomenclature.

Writing an advanced immunology text is certainly a daunting task, because the more detail one goes into the more likely it is that the book will be out of date before the ink is even dry on the pages, as occurs here in some sections on tolerance. Overall, though, Male and his co-authors have succeeded in providing a fine supplementary text for an advanced immunology course. □

Defending the immune system

David W. Scott

Immunology. By Janis Kuby. *W. H. Freeman*: 1992. Pp. 585. \$46.95, £19.95. **Advanced Immunology, Second Edition.** By David Male, Brian Champion, Anne Cooke and Michael Owen. *Gower Medical*: 1991. Pp. 304. \$69.95, £39.50 (hbk); \$45, £24.95 (pbk). (Distributed by Raven Press in the United States.)

AN immunology sage once remarked that you can't understand any immunology until you know all of immunology. As a teacher, I have uttered another version of the same maxim: "Don't worry, this will all fit together later." Part of this dilemma is reflected in the organization of most immunology courses and texts. Where should they begin? Some authors or teachers describe first the cells and organs of the immune system, whereas others introduce the uninitiated to the chemistry of the molecules (the nature of antigens, immunoglobulin structure and genetics) and to their interactions. Even the major histocompatibility complex, no longer relegated to the topic of transplantation, can be an orphan belonging to neither of these categories or to both. Typically, both of these books have different organizational styles aimed at overlapping audiences. Nonetheless, both avoid the ultimate dilemma of teaching immunology by providing an 'overview' of the immune system, taking the form of an introduction in Kuby's *Immunology* and a review in Male *et al.*'s *Advanced Immunology*.

Immunology is aimed at senior undergraduates and introductory graduate students. It abounds with experimental and historical examples, as well as clear illustrations. Each chapter has a good set of problems and answers to help students review important issues. Kuby

writes with warmth and a love of the field, placing emphasis on the main immunological principles and the molecular biology underlying current understanding. In the second chapter, for example, she discusses molecular techniques that provide a basis for understanding immunoglobulin rearrangements and the structure of T-cell receptors.

There are several minor errors, however, which may be bothersome to some teachers. Some of these are errors of omission, whereas others reflect the delay between writing and publication. For example, the importance of CD4 helper cells in cytotoxic T-cell responses is overemphasized — recent studies, such as those with mice harbouring knock-out mutations, demonstrate that helper cells are not needed for most cytotoxic responses. And several of the study questions emphasize minor points at the expense of more important ones. Nevertheless, the overall structure and approach of the book should make it a very useful and excellent introduction that will stand up strongly in comparison with other good texts, such as E. S. Golub and D. R. Green's *Immunology: A Synthesis* (Sinauer/Freeman, 2nd edn, 1991) and A. K. Abbas *et al.*'s *Cellular and Molecular Immunology* (Saunders, 1991), the last of which is aimed primarily at medical students. Although Kuby's text also includes several chapters on clinical immunology, it is geared more towards those students who enjoy learning about the experimental basis and the history of the field.

Advanced Immunology is less broad, focusing instead on a smaller part of the field. It is intended to be an advanced treatise, devoting more time and detail to each subject. There is particular emphasis on lymphocyte activation and immune regulation. The clear illustrations, which are influenced by those in

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New in paperback

- **Living Fossil: The Story of the Coelacanth** by Keith S. Thomson. Norton, \$9.95. For a review see *Nature* **353**, 29 (1991).
- **Food of the Gods: The Search for the Original Tree of Knowledge** by Terrance McKenna, a "radical history of plants, drugs and human evolution". Rider, £9.99. For a review see *Nature* **356**, 635 (1991).
- **Language and Species** by Derek Bickerton, a detailed account of the origins and evolution of language. University of Chicago Press, \$15.95, £11.25. Reviewed in *Nature* **348**, 372 (1990).
- **Morphogenesis: The Cellular and Molecular Processes of Developmental Anatomy** by Jonathan Bard. Cambridge University Press, £17.95, \$37.95.
- **The Concise Oxford Dictionary of Zoology** edited by Michael Allaby. Oxford University Press, £7.99. In his review in *Nature* (**354**, 325; 1991), Ralph A. Lewin described the dictionary as "a fine compendium of unquestionable use".
- **Engines of Creation: The Coming Era of Nanotechnology** by Eric K. Drexler. Oxford University Press, £7.99.
- **Changing Order: Replication and Induction in Scientific Practice** by H. M. Collins, now with a new afterword, is published by University of Chicago Press, \$14.95, £10.25.
- **Exons, Introns and Talking Genes: The Science Behind the Human Genome Project** by Christopher Wills. Oxford University Press, £8.99. Reviewed by J. S. Jones in *Nature* **354**, 323 (1991).