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book reviews

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Outline of Crystallography for Biologists by David Blow. Oxford University Press, 2002. Price GBP 25 (paperback). ISBN-0-19-851051-9.

Crystallographic techniques provided the original definition for the term Structural Biology. They are now the pre-eminent tool for determining the structures of biological molecules with masses less than 500 00 Da, and are applicable up into the low millions. Biologists not only read the papers, but also are beginning to do the experimental work, with or without a license. David Blow's new book provides a beginner's Operator's Manual for the method.

Blow himself described the book as 'crystallography without maths', and that describes the outer layer well. However, because the method is so inherently mathematical, he couldn't resist adding mathematical details in grey boxes. There are copious warnings to the mathematically disinclined to stay away from the equations that lurk in these boxes, but promises to those who want the detail that there are riches to be found there. Both the warnings and the promises are well placed. In the first place, no apologies are made for writing the mathematics in the formal fashion that it deserves. The grey boxes are not for those who are uncomfortable with integral signs or complex exponentials. On the other hand, the great bulk of the necessary mathematics of crystallography is laid out, concisely and clearly.

Concise and clear really describes the bulk of the book too. Each topic is developed from a number of simple ideas in a logical development that is easy to follow, if one pays attention. There are copious illustrations, probably an average of one per page, that amplify the text. There are classical images: von Laue's original diffraction image, Taylor and Lipson's rubber ducky with its diffraction pattern, or Harrison's 1980 diagram showing the difference between the T = 1 and T = 3 icosahedral surface lattice of a virus. Blow uses numerous examples from the literature and his students' theses to amplify points, and some figures come from these. Then there are many diagrams created just for this volume.

The book is divided roughly in half to reveal Fundamentals first, then Practice. The subject matter nicely surveys the field. Images and X-rays, Crystals and symmetry, Waves, Diffraction, and Diffraction by crystals comprise the Fundamentals section. The Practice section includes Intensity measurement, Isomorphous replacement, Anomalous scattering, Molecular replacement, Density modification, Electron-density maps, Structural refinement and Accuracy of the model. Because Blow himself played such an important role in structure solving (the Rossmann/Blow rotation and translation functions, and the Blow/Crick method for finding the 'best' phase from isomorphous replacement), these sections of the book are especially powerful.

In summary, this is a book that can be read either by a practitioner who would like some entertainment, or by a novice who might benefit from illumination. Because the exposition is so logical, the thread can be picked up at any point and a naïve reader can get value on a particular topic and not need to start from the beginning. I believe it should be on the bookshelves of every practicing biological crystallographer for either of these eventualities.

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