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BOOK REVIEW

Atomic biology

Anatomy of Gene Regulation: A Three-Dimensional Structural Analysis

PA Tsonis

Cambridge University Press, Cambridge, UK; 2003. 282 pp. £29.95, paperback. ISBN 0-521-80474-4.

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Reviewed by DH Jones

'I often say that viewing the process of protein synthesis at the 3-D level is so beautiful that I would not mind living in a ribosome!', enthuses Professor Tsonis in his 'Primer' preceding Chapter 10. To reinforce the point, part of his 'ideal home', a.k.a. the small subunit of the prokaryotic ribosome, is illustrated on the cover of his book. However, it is not just through protein synthesis that he takes us on our near-atomic level tour: the whole central dogma and all its works – prokaryotic and eukaryotic – are exposed at high resolution. This is no mean undertaking in less than 300 pages, and the author's strategy for conciseness is a highly selective filtering of structural examples combined with minimal basic information on processes using simple line diagrams. Therefore, undergraduates in particular will want to have their copies of *Stryer* (or other favourite major textbook) to hand for brushing up on background while perusing this work. I freely confess now to peeping at mine more than once.

So this book presents a very wide-ranging coverage of three-dimensional structural aspects only in a concise and attractive format with very readable text. It is of necessity a series of mini-reviews of key structural papers rather than an exhaustive examination of all inter-related genetic and biochemical evidence for the mechanisms proposed. Tsonis has done the hard work for us of gathering together important figures and findings mainly from the last 5 to 10 years worth of literature: for a more critical appraisal of their significance you will have to delve into *Annual Reviews of . …* and the like yourself.

After a brief general introductory chapter, a further 10 chapters follow an expected logical order from nucleosome structure through DNA structure, telomeres and replication, transcription and all the variations in its control and the biochemistry of RNA in prokaryotes and eukaryotes. There is then a long chapter on translation followed by the final one on protein secretion, folding and degradation. These are all beautifully illustrated and enthusiastically described. The structural database filenames (PDB, NDB) are given in legends, except where figures have been reproduced directly from publications. It might have been an idea to include a few appropriate filenames for some of the latter to encourage readers to access and view the molecules, even though they would not then see them exactly as in the published pictures. I would also have found a list of abbreviations helpful: although these are of course explained on first use, it is sometimes not easy to find that expansion when browsing through later pages. It seemed to me that Chapter 9 (Compartmentalization of Transcription) with its FISH and confocal microscopy images was a bit out of step with surrounding chapters packed with crystallographic or NMR figures at submolecular resolution and their mechanistic interpretations. In this vein, I would have given a bit more room to aminoacyl-tRNA synthetases in Chapter 10, but everyone will have their own individual biases, especially regarding systems over which they have previously shed tears of experimental joy and/or frustration.

It may come as a surprise to those conditioned by conventional genetics textbooks to see the fine structural details for RNA polymerase (Chapter 5) from *Thermus aquaticus* being presented rather than giving primacy to the *Escherichia coli* enzyme. However, this should serve as a healthy reminder that the examples best characterised genetically have not always given up their structural secrets so readily – just as the Lac repressor was frustratingly the last and not the first repressor to be solved. I enjoyed this book as a handy source to dip into for structural insights and for the author's obvious pleasure in communicating these to his audience.

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