

Diversity and Division

Roy G. Burns

Mitosis: Molecules and Mechanisms. Edited by J.S. Hyams and B.R. Brinkley. Academic: 1989. Pp. 350. £45, \$89.50.

In the preface to this timely book, the editors comment that they have been told "that this ... will be the last book on mitosis ... before everything is understood". By contrast, Dick McIntosh notes that "Mitosis is a tough nut to crack. The people lucky enough to have found an interest in this subject will not soon be out of work." Ten chapters separate these comments and amply illustrate why they are not mutually exclusive.

The striking feature of this collection of reviews is the stress on summarizing the available evidence, rather than the work of the individual authors. For example, Kent McDonald draws attention to the diversity in structural organization, noting that the spindles of some 280 organisms have been examined. This message is reinforced in separate reviews of the centrosomes and the kinetochores, and is a reminder that any successful model must be compatible with the observed structural diversity. The concept of a single underlying mechanism, with specific variations in different organisms, is surely valid, a view which Fernando Cabral notes is supported by the genetic evidence.

Understandably, most of the discussion of this mechanism relates to anaphase, during which the chromosomes move towards the separating poles, with emphasis on the behaviour of specific classes of spindle microtubules. It is unfortunate, despite the clear efforts of the editors to cross-reference the separate contributions, that some topics, such as the polarity of the microtubules and microtubule capture by kinetochores, are duplicated in successive chapters.

The concentration on anaphase movement, both *in vivo* and using *in vitro* models, paradoxically shows how little is understood about the other stages of mitosis, such as the highly dynamic and erratic 'jiggling' of the chromosomes during pro-metaphase, or the mechanism for ensuring that the duplicated chromosomes segregate to opposite poles. The inclusion of Peter Hepler's contribution on the membranes present in spindles is a refreshing acknowledgement that microtubules may not be the only important structural component.

The book's subtitle, *Molecules and Mechanisms*, highlights how few spindle proteins have yet been characterized. For example, the centrosome of animal cells and its associated centrioles remain an

osmiophilic cloud, illuminated by immunofluorescence with a variety of adventitious antibodies, yet it regulates microtubule nucleation and possibly also modulates microtubule disassembly. Similarly, the co-localization of calmodulin with some spindle microtubules, together with the evidence for local and temporal fluctuations in the free-calcium concentration, point to a fascinating yet still elusive story, while the search for molecular motors and other microtubule-associated proteins has only just begun.

Mitosis will certainly be essential reading for Dick McIntosh's "lucky people", who may not want to be reminded of those half-forgotten observations which challenge a favoured model. It should also be

read by people looking for challenging problems, or who wish to be impressed by the sheer experimental inventiveness of successive generations of cell biologists.

The problem with studying mitosis is that it is a dynamic process, involving mechanisms which cannot be resolved by light microscopy. Yet electron microscopy requires the specimen to be fixed. This book is like a high-resolution electron micrograph of a mitotic spindle: although a lot of detail can be found in it, it is just a snapshot, *circa* 1989, of a dynamic process. □

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In the beginning

Beverly Halstead

Evolution and the Fossil Record. Edited by Keith Allen and Derek Briggs. *Belhaven*, London: 1989. Pp. 265. £25.

ON the door of my study there is a quotation from Heather Couper, borrowed in turn from *Woodstock*: "We are stardust". The magic of that phrase illuminates the consequences of the elements' evolution in the nuclear furnaces of the stars. In like manner David Attenborough conveyed the excitement of evolution and the fossil record in his television programmes *Life on Earth* and *Vanished Worlds*. John Fowles encapsulated it all: "fossils are the poetry of evolution".

With such an inherently fascinating subject how can anyone go wrong, even in a textbook? With *Evolution and the Fossil Record*, Allen and Briggs show how. Here is a book aimed primarily at advanced students of the earth and life sciences, but also at scientists in other disciplines. It is not intended to convert anyone, although there are a few snippets to treasure — Devonobiomorpha, it seems, are a new group of centipedes.

The scene is set with "Evolution of the Universe, Stars and Planets", a remarkably dense chapter which to me was incomprehensible: the diagrams, the abbreviations, the equations were quite meaningless. The table of the cosmic abundance of the elements, in which the elements are listed only by their abbreviations, is plain irritating — we should not have to remember what they all are.

"Pre-metazoan Life" is more digestible, although again densely packed (and with no discussion of the origin of eukaryotes and the pioneering contributions of Lynn Margulis). For me the pick of the bunch is "The Origins and Radiation of the Early Metazoa", which includes a few pictures of peculiar organisms. Here too, though,

there are gaps in that the account of biomineralization is disappointingly brief. The fall from the Garden of Ediacara, the Cambrian explosion, is unconvincingly described as "a geologically abrupt event of great biotic significance".

Patterns of evolution and extinction in invertebrates, vascular plants and vertebrates, and catastrophes in the history of life, are all the subjects of well-turned review articles. These would have been appropriate pieces for *Palaeontology*, the journal, but not to my mind for the book's intended audience.

Two topic chapters are included, dealing respectively with the colonization of land (plants and invertebrates) and vertebrate flight (pterosaurs, birds and bats). These are popular final-examination questions, one imagines — or at least they will be in the future. The book ends with a minor piece entitled "Evolution, Creationism and Science Education", which has the same level of incongruity as the opening chapter.

Each contribution is a summary of the state of the art aimed at experts or students already deeply embroiled in the subject. Highly technical language is used throughout. The book is very tough going, and it is in this respect that I feel that Allen and Briggs have failed. If one has the tenacity to persevere, there is a great deal of interest to be found here. But the editors have demanded an unreasonable level of commitment from their readers. □

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An older Babbage

In an editorial addition to Jack Meadows's review of *The Works of Charles Babbage* (*Nature* 340, 517; 1989), Babbage's date of birth was given as 1792, a date that is widely quoted in secondary sources. It is in fact only two years, not three, before bicentenary celebrations can begin of Babbage's birth on 26 December 1791.