

Book Review

Betsey Dexter Dyer and Robert Alan Obar. *Tracing the History of Eukaryotic Cells, The Enigmatic Smile*. Columbia University Press, New York, 1994.

I enjoy workers studying the origin of eukaryotes because they tend to be bright and brash, imaginative and infuriating, and always intellectually stimulating. Hypothesizing that Drs. Dyer and Obar were of this mold, I was eager to read *Tracing the History of Eukaryotic Cells, The Enigmatic Smile*. Minutes ago I completed the work, and I am now left with similarly conflicting emotions – exhausted, exhilarated, enlightened and infuriated. Let me explain.

The book is not an easy read for a 200+ page paperback. The subject is cell evolution, but the supporting data are taken from fields as diverse as bacterial taxonomy and ecology to paleontology to microscopy to molecular biology, believe it or not, to name a few. The book bears the unmistakable mark of the authors' former Ph.D. adviser, Lynn Margulis, in scope, approach and terminology. The acknowledgement at the beginning to Dr. Margulis came as no surprise.

The nine chapters cover the relevant topics, including horizontal (interspecific) gene transfer and the evolution of meiotic sex. Much of the work focuses on the acquisition of organelles, especially mitochondria and plastids. I found these to be the best chapters in terms of clarity and strength of argument. For example, I was surprised (and perhaps even persuaded) by the argument that oxygen detoxification and respiration were not the primary motivating forces for the origin of mitochondria, but rather that the pre-mitochondrial symbiosis arose in relationship to moving acidic waste products. But beware of the occasional factual error. For example, ribulose-1,5-bisphosphate carboxylase does not catalyse the conversion of glyceraldehyde-3-phosphate to glycolate during photorespiration.

Dyer and Obar take a very clever approach to the obligatory final, "what is the future of the field?" chapter. Apparently they surveyed workers in the field with diverse interests. Other than quibbles about the membership of the list of those polled, the questions they present *are* interesting and important. The responses are carefully attributed, and arranged in a fashion that mimics the overall layout of the book. This is a wonderful place for students as well as established workers to look for inspiration.

There are three aspects of the book that I found annoying, all of which could be easily corrected in a future edition. Most obvious is the quality of some of the figures. There is an electron micrograph meant to illustrate mitochondria in which it is difficult to locate said organelle, and no comparable micrographs

at all for plastids. Many figures, such as metabolic pathways, are hand drawn and would be dramatically improved with the judicious use of a computer drawing program. Second, the breadth of the work means that few readers will be well-versed in all fields that are touched upon. For this reason, more explanatory material, especially figures, would make this work more accessible. In other cases, the explanatory material (such as definitions) would be better located in a glossary. Basic definitions in the midst of a sophisticated argument are insulting for those in the know, and are probably not going to bring those who are not knowledgeable sufficiently up-to-speed to follow the argument. Third, I am of the contingent that finds the use of certain terminology, shall I say, "off-putting". I refer, of course, to the word "protocist" instead of the more common, and arguably more appropriate, "protist". Likewise, while sympathetic to the argument for calling eukaryotic flagella "undulapodia" or "eukaryotic motility organelles" in order to distinguish them from the phylogenetically distinct prokaryotic flagella, it is unnecessary. "Wings" serves the butterflies, birds and bats as a functional and structural term; a similar approach is equally acceptable for "flagella".

So, is this a book worth reading? Certainly, it fills a void in the literature – a book-length discussion of one of the most important evolutionary events of all time. It is stimulating with a capital "S" (I got an idea for a new research program in the first chapter, and was overwhelmed with ideas by the end). No, the arguments are not always strong, well-argued, or well-referenced. However, to have such an eclectic set of references woven into such a fascinating story makes this book, in the end, invaluable.

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