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On the First Day, God Said . . .

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In the Blink of an Eye. Andrew Parker. xviii + 316 pp. Perseus, 2003. $24.95.

Very good, and very bad, books are easy to review. Praise and censure come easily. But what of books that are basically muddled? Here the reviewer's task is interestingly ambiguous: Useful and thought-provoking observations need to be sifted from the misunderstood and simply silly, if not downright weird. Andrew Parker's book falls into just this category. His central argument certainly deserves careful attention, especially as it aims to provide a unique and hitherto unrecognized solution to one of evolution's most significant conundrums: What, if anything, triggered the dramatic adaptive radiations of metazoans (organisms having differentiated tissues such as muscle and nerves) about 540 million years ago, an event colloquially referred to as the Cambrian "explosion."

Parker's thesis is that with the invention of eyes and vision the world changed forever. Such an acute sense, dependent on the same sunlight that had powered photosynthesis for thousands of millions of years, opened the doors of animal perception and ushered in predation, protection, camouflage, pursuit, escape and, as a direct consequence, a set of radically new ecologies. At first sight it is an appealing hypothesis, but as presented it is in fact no more convincing than any of the other speculations that have been wheeled out to explain the Cambrian explosion.

To be sure, some of these earlier ideas have been so vague as to be untestable, but in this context it is important to understand that Parker makes some very specific arguments in support of what he calls his "light switch" hypothesis. Unfortunately, in a number of cases these arguments are simply incorrect. In particular, Parker puts specific emphasis on the evolution of the trilobites and their remarkable compound eyes. There is just one problem: Trilobites first appeared many millions of years *after* the beginning of the Cambrian explosion. Put simply, when trilobites first evolved, the Cambrian explosion was, if anything, subsiding.

On the basis of this major misunderstanding, however, Parker invokes a dramatic scene whereby in a geological instant the first trilobite saw, and the world was changed forever. His description is almost biblical in its juxtaposition of dark and light: "Let there be images! . . . the most powerful sense of all was unleashed with the birth of one individual proto-trilobite. . . . For the first time in the history of the Earth an animal had opened its eyes." Yet, even if the first eye evolved in some primitive arthropod (or some other animal) at the beginning of the Cambrian explosion, one is entitled to ask how likely it is that it evolved *de novo* with crystal-clear image-forming optics, as against being a culmination of gradual refinement from a preexisting series of eye spots that could only sense degrees of light and dark.

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A key element in this Darwinian argument is that any one of the optical intermediates is also functional. Indeed, many animals manage perfectly well with such eye spots, yet one suspects that even Parker would hesitate to invoke the blurred recognition of shades of gray as being a plausible trigger for the Cambrian explosion. To be sure, acute vision confers specific advantages, and it is hardly surprising that the two main designs, compound and camera eyes, have evolved independently many times. Given, therefore, that eyes have an enormous range of versatilities and must, in any event, have evolved gradually, it remains obscure why this evolutionary invention should be the unique trigger to explain the onset of the Cambrian explosion.

Having built an unsupportable hypothesis, Parker is then stuck with having to explain why eyes did not evolve considerably earlier. This, embarrassingly, leads him into a series of frankly fantastic speculations about solar luminosity being blocked by planetary fogs or interstellar clouds. Here we have an almost dreamlike narrative: first murk, then blinding light. The claims of importance for the light-switch hypothesis are, to put it gently, exaggerated. This is not to dismiss the likelihood that the evolution of eyes was a factor in the Cambrian explosion. Such is an entirely reasonable proposition, but so too must we include the evolution of nervous

systems, brains, skeletons and who knows what else. It is because of the constant confusion of cause and effect that the Cambrian explosion remains so difficult to explain. To argue, as Parker does, that on one day (a Tuesday?) one trilobite saw and so began a process that changed the world is hopelessly simplistic.

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Equally strained, unfortunately, are his ideas about the origin of the phyla, which is said to embody the Cambrian explosion. Thus, his hypothesis of the sudden emergence of a whole series of different body plans from an effectively identical worm invokes an almost homunculuslike effect, whereby each phylum has a latent form somehow concealed within the primitive worm. In fact, this peculiar view is based on a strange mishmash of supposed macroevolutionary and developmental processes. More seriously, Parker makes no attempt to engage in the continuing analysis, to be sure often controversial, of the Cambrian fossil record. Thus, it is increasingly clear that many of the supposedly "bizarre" animals that have been found at the famous Burgess Shale fossil site in Canada and equivalents elsewhere, especially Chengjiang in China, are actually representatives of phyla in the making. Such a view of the early animal record is, of course, revolutionizing our understanding of how body plans develop as functional entities in a historical context. Just as eyes certainly evolved in a series of steps, so too did the phyla. It is just this evidence for the relatively gradual assembly of organic complexity that fatally undermines Parker's hypothesis.

It would be misleading to suggest that the hypothesis hangs solely on the supposed evidence from trilobites. In fact, Parker makes a valiant attempt to marshal whatever support he can in favor of light and optical perception as being of overriding importance in evolution. In doing so he introduces a number of fascinating examples, not least the remarkable cases of adaptive coloration, such as that found in the marlin. Yet the argument creaks and strains as he continually attempts to sideline other factors that may be of equal importance.

Take one example, that of the seemingly lethargic rates of evolution in the deep sea. No doubt light (or its absence) does play a part in explaining the apparently glacial rates of evolutionary change in this environment. So too, however, do other factors, such as the dearth of nutrients (as Parker finally admits), as well as the low temperature and high pressure. Once again, although nobody should doubt that the utilization and perception of light are significant factors, to imagine that they are of overwhelming importance is highly questionable.

The net result is a curious book that rumbles uneasily to its final conclusion. With repeated asides, just-so stories, near irrelevancies and a fair sprinkling of howlers (the white cliffs at Dover are *not* made mostly of fossil ostracods, and any expedition that finds itself crossing glaciers on the way to the Burgess Shale needs a new leader), the jaunty style becomes increasingly irritating, and the claims for scientific originality increasingly questionable. Light still needs to be shed on the Cambrian explosion, but this book remains in the shadows.

Reviewer Information

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