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**Genetics of Original Sin.** By Christian de Duve and Neil Patterson. New Haven, Connecticut: Yale University Press; 2010. 256 pp. US $26.00 Hardcover. ISBN: 978-0300165074.

The continuous repetition of Christian de Duve’s primary thesis in *Genetics of Original Sin* ensures that however little the reader understands or is interested in biology, he will have no doubt as to the author’s primary concern: Natural selection has made humans poor prognosticators. As evolutionary adaptation is all about living (and reproducing) in the moment, humans have evolved some unfortunate traits and are headed toward a Very Bad End, unless drastic change is implemented. The reader is also certain to realize de Duve’s good news, namely that humans alone can (and must) change their nature. The particulars here, however, are vague and underdeveloped as de Duve loses the clarity and insight he brought to the first three-quarters of the book.

*Genetics of Original Sin* is divided into four parts. “The History of Life on Earth” provides proof of evolution; “The Mechanisms of Life” lays out the rudimentary biology needed to understand de Duve’s main objectives, and in “The Human Adventure,” human evolution, in particular, is described. Finally, “The Challenges of the Future” includes the author’s speculations and suggestions about ways to avert the coming apocalypse.

The book draws intriguing parallels to the Christian narrative of evil entering the world through original sin (here played by natural selection) and subsequent redemption (the role of redeemer now played by humankind). De Duve carries this comparison throughout the book and returns again to religion (including the major monotheistic and Eastern traditions) in the final section as a vehicle for changing human nature. The book is careful to distinguish between claims that can be proven by science (evolution) and those that cannot be refuted by science (the existence of God). This crucial distinction prevents de Duve from alienating religious readers. Such readers are important because a primary purpose of the book is to encourage religion as a means to carry the author’s message of human responsibility to the Earth — namely, to reduce the population and curb our more destructive impulses.

Overall, the book is a pleasure to read. While the author is certainly no Nathaniel Hawthorne, the prose is pleasantly poetic and the vocabulary extensive, indicative of a well-read individual. The science, as de Duve describes it, remains straightforward and simple, but the ideas he presents and parallels he draws are not, making the book a worthwhile read for biologists as well as politicians and religious leaders. Through the use of careful analogies and clear transitions, de Duve makes biology accessible to virtually any reader. In addition, *Genetics of Original Sin* often provides a historical context for scientific discovery, describing biological innovation as the work of individuals, thereby heightening the drama of science.

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**Wetware: A Computer in Every Living Cell.** By Dennis Bray. New Haven, Connecticut: Yale University Press; 2011. 280 pp. US $18.00 Paperback. ISBN: 978-0300167849.

A cell’s survival depends on how well it can detect and respond to environmental cues. In this sense, a cell is an organically derived computer — it takes input from its surroundings (there is no food!) and uses logic circuits (activate specific gene and pro-
tein pathways) to result in a specific output (break down glycogen). Comparing a cell to a computer, as Dennis Bray does in the book *Wetware: A Computer in Every Living Cell*, yields a fascinating exploration into the complexity of a cell, yet shortchanges the cell and biological systems in general.

The central argument of *Wetware* is that an individual cell contains thousands of enzymes, each performing reiterative, molecular processes. Enzymes act similarly to transistors, in which enzymatic allostery or competitive inhibition alters activity, much like a change in voltage over a transistor. Furthermore, these enzymes, like transistors, can be ordered in pathways, or electronic circuits, to perform logic operations. This design allows cells to sense a variety of environmental stimuli and take action necessary for survival. However, the similarities between the cell and electronics end there. Unlike electronic circuits, there are no wires connecting enzymes in a pathway. Instead, the cell relies on diffusion and compartmentalization in the form of organelles. Additionally, cellular circuitry is noisy due to its analog nature, and the outcome can be difficult to predict, even in the most well-characterized pathways.

Bray acknowledges the difficulties in comparing a cell to electronics. Specifically, his metaphor fails to represent the genetic component of a cell, which is vital and adds to the complexity of cellular function. Cells are not simply the sum of their protein components, or “hardware.” The number and type of enzymes available for molecular processes is the result of gene expression, which is also highly influenced by environmental stimuli and enzymatic pathways. Thus, the molecular circuits, or hardware, of a cell is malleable. Using Bray’s metaphor, this is akin to electronic devices adding and removing transistors depending on the environmental conditions. In this respect, no modern computer can compare to even the most basic of cells. Above all, the genetic material provides all necessary instructions to form another cell, thereby allowing cells to replicate, a unique property of life. Although Bray does touch on the idea of genetic circuits, he only examines them in isolation from all other cellular components.

Throughout the book, Bray expands the idea of a cellular computer by discussing computation in the context of multicellular organisms, the nervous system, and evolution. He often digresses with biological or electrical examples — the idea for first videogame, PacMan, is one — which do not necessarily appear to be connected to the central thread of the chapter. Nevertheless, these winding arguments make an entertaining read for the scientist and non-scientist alike. Bray does an admirable job explaining complex biological phenomena, such as the lac operon in *E. coli* or non-coding RNAs, to non-experts while keeping the attention of people already familiar with these ideas. In this way, *Wetware* is a complex, highly thought-provoking look at how cells are similar to computers. Or, perhaps more correctly, how computers should try to be like living cells.

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**The Art of Ecology, Writings of G. Evelyn Hutchinson.** By David K. Skelly, David M. Post, and Melinda D. Smith, editors. New Haven, Connecticut: Yale University Press; 2010. 356 pp. US $22.00 Paperback. ISBN: 978-0300154498.

G. Evelyn Hutchinson, former Sterling Professor of Zoology at Yale, is often called the “father of modern ecology.” His career spanned much of the 20th century and bore witness to the development of ecology into a rigorous mathematical discipline. *The Art of Ecology* is an eclectic collection of essays, book excerpts, and primary scientific literature by Hutchinson, complete with the original font, figures, and graphs from each excerpt. The selections, which are introduced by historians and scientists, reveal an intellectual breadth unusual in our era of specialization. I came to this book as experimental biologist knowing little of limnol-