BOOKS: HUMAN EVOLUTION

Should It Be *Homo economicus*?

Alan Grafen

An interdisciplinary book, *Second Nature* offers an economist's perspective on the influence of economics on human biology. Haim Ofek discusses a variety of topics including symbiosis, anthropology, and game theory in biology, but he focuses on the sequence of events during the Middle to Late Stone Age through which agriculture came to dominate the human way of life. Written for the layperson and including a wide range of references and examples, the book provides an interesting series of interlinked speculations. As an evolutionary biologist, I caviled with some of the material I know about, and no doubt other experts would too. Nevertheless, the boldness, coherence, and sweep of the book are impressive.

Second Nature
Economic Origins of Human Evolution
by Haim Ofek
Cambridge University Press, Cambridge, 2001. 264 pp. $74.95, £45. ISBN 0-521-62399-5. Paper, $27.95, £17.95. ISBN 0-521-62534-3.

In a nutshell, Ofek argues that market trading has been a key factor in human evolution since the Middle Stone Age, and that this trading was important enough to be responsible for the famously large and sudden increase in brain size that occurred around that time. Market trading meant doing more than sharing food with relatives in hard times; it involved distinct commodities, relative prices, and a precise reckoning of relative values. Such trading affected many aspects of life. Division of labor allowed some individuals to specialize (for example, in tool-making) without starving. This specialization allowed new kinds of resources to be exploited, thereby increasing the numbers of individuals that can be supported in an area and extending our species' geographic range. Long-distance trade may have reduced the likelihood of speciation, by encouraging movement of people and contact among different populations. Trade in herded animals permitted cultivation of crops to extend geographically further than it otherwise could have, because the animals provided proteins that could not be obtained from the crops.

Economic analysis leads Ofek to interesting conclusions. He interprets collections of tools found from Upper Paleolithic times as the likely result of intertemporal arbitrage—that is, stockpiling with a view to making profits when prices have risen. He also argues that the current interglacial has a special property that permitted the development of agriculture: despite geographical variation in temperatures, temporal variability at particular locations is relatively low. This limited variability reduces the risks of agriculture, which pose the main economic drawback of that form of investment.

There are many highly speculative ideas here. One is an economic analysis that indicates the first traded commodity was likely to have been fire. When one's own domestic fire went out, one would go to the local keepers of the fire and trade for a re-light. When the keepers' fire went out, perhaps because of prolonged rain and cold, they may have had to go as far as the nearest cave-dwellers. Ofek imagines these troglodytes as specialists in keeping fire who compensated for what might otherwise have been a suboptimal dwelling place by selling fire. The invention of the matchstick has made banal what must have been a major concern of humans, and a major force in shaping their lives, since Stone Age times.

Ofek's central idea—that engagement in market trading, with its inherent competitiveness, led to the dramatic increase in brain size—has another implication. Economics stands in relation to the evolution of brain size as the physics of optics stands in relation to the evolution of the eye. This perfectly reasonable position denies the simple hierarchical view in which biology builds on more fundamental sciences but is itself a building block for the more human or social sciences. If economics is needed to explain anatomy, then biologists must abandon imperialist dreams of taking over the social sciences. In fact, even the logical coherence is enough to spoil any reverie, whether or not Ofek's argument is borne out by further study.

Another intriguing speculation is that money was invented for trade, and became "the first symbol." The argument from continuity is a very powerful one: we use symbols (dare I wonder in *Science* whether they use us?), whereas animals don't. We can, however, test this apparently discrete difference by pitting it against our evolutionary understanding that we are connected to chimpanzees by continuous generations of ancestors. Where and in what form, therefore, did symbols first arise? I can't pretend to answer this question, but Ofek's bold suggestion of a first symbol creates a dilemma. Most modern accounts of symbols propose an internally consistent system, which has (depending on the account) more or less connection with the non- or presymbolic world. So can one have a single first symbol? Or, like electron-positron pairs, must we imagine that at least two symbols arose simultaneously, providing a nascent system within which they could provide each other with broad and therefore very general meanings? But if Ofek is right and the first symbol was for money, then the classic dilemma "You cannot serve God and Mammon" looks rather curious. On Ofek's view, it seems to me, the first god was Mammon.

Detail from Diego Rivera's mural *The Great City of Tenochtitlan* (1945).

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Parts of the book are frustrating. The author accepts a touchingly naïve and 20 years–out-of-date version of the relation between haplodiploidy and eusociality, and he asserts that pollination is purely symbiotic and that naked mole rats have castes. But I found the second half of the book much more interesting. I think this is because Ofek has good and highly persuasive ideas about his main concern, which is the importance and centrality of economic analysis from an early point in human evolution. Quibbles aside, *Second Nature* is an exhilarating and interesting read that raises powerful questions about how humans got here and how we should be studied.

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