is conveyed here. As John Bell remarked (*Speakable and Unspeakable in Quantum Mechanics*, Cambridge Univ. Press, 1987, p. 191), the de-Broglie–Bohm "idea seems . . . so natural and simple, to resolve the wave-particle dilemma in such a clear and ordinary way, that it is a great mystery . . . that it was so generally ignored."

Sheldon Goldstein
Department of Mathematics, Rutgers University, New Brunswick, NJ 08903, USA

■

Geomagnetism

Magnetic Stratigraphy. NEIL D. OPDYKE and JAMES E. T. CHANNELL. Academic Press, San Diego, 1996. xiv, 341 pp., illus. $95 or £75. ISBN 0-12-527470-x. International Geophysics, vol. 64.

Earth's internally generated magnetic field is a most unlikely geological clock. Its dial has only two readings: "N" (for normal, when the field vector everywhere points northward) and "R" (for reverse, when it points southward). What's more, there is only one hand, which remains stuck on either N or R for periods ranging from 10,000 to 40 million years. Then, with astonishing swiftness and essentially perfect global synchrony, the hand can change its setting and become stuck again. Fortunately for Earth scientists (and those interested in their findings), a wide variety of stratified rocks preserve remarkably robust and continuous records of these arrhythmic tickings of the main field. In *Magnetic Stratigraphy*, Opdyke and Channell have produced a comprehensive summary of the three-decade-old scientific enterprise that exploits these paleomagnetic fingerprints to infer very-high-precision, global-scale correlations of stratified rocks—the very framework of geological time.

This book has much to offer. First, it serves as a succinct and practical introduction to those aspects of geomagnetism and paleomagnetism that are relevant to magnetostratigraphy. Second, it provides an up-to-date discussion of the polarity-reversal history derived from remote sensing of the magnetization of the oceanic crust. This continuous record constitutes a master "template" with which the magnetization of deep-sea core samples or terrestrial rock sequences younger than 160 million years can be correlated. Third, the authors have produced a grand synthesis of existing magnetostratigraphic data. This compilation (certainly the most important contribution of the book) is summarized in a set of 15 tables and corresponding correlation charts that cover nine time intervals, from the Plio-Pleistocene (last 5 million years) to the Ordovician (which began about 510 million years ago). The quality of the data is roughly assessed with a "reliability index" (ranging from 0 to 10) that the authors have devised and that is likely to become widely used. In the discussions accompanying the tables, the authors are not shy about expressing their opinions: they rate as "classic" the papers describing the magnetostratigraphy of the famous deep-sea limestone sections exposed near Gubbio, Italy; they are clearly much less enthusiastic about some reports of short reverse-polarity intervals during the last 780,000 years or during the 40-million-year-long normal interval of the Cretaceous. And finally, they step back and see what can be learned about the behavior of the geomagnetic field from the long record they have reconstructed. They observe that the last 65 million years of field behavior closely resembles that in the interval 65 to 330 million years ago: the lengths of polarity intervals peak at 100,000 to 200,000 years, the average reversal rate is about two per million years, and the balance between normal and reverse polarity is indistinguishable from 50:50. This final observation, in particular, is one that has been hotly debated over the years. *Magnetic Stratigraphy* is handsome, very readable, and persuasive; most readers will wonder (as the authors do occasionally) why more boundaries in the geologic timescale are not tied directly to our planet's geomagnetic pulse.

Scott W. Bogue
Department of Geology, Occidental College, Los Angeles, CA 90041, USA

Vignettes: Human Fitness

Imagine two men competing with each other to be chosen by a mate. One has a naturally healthy complexion. The other is actually terminally ill but has recourse to bright ochers. He uses some belladonna to dilate his pupils and dabs oil of muskrat behind his ear. Through this clever sexual culture, it is possible that the ill man can outdo the healthy one in the display-and-attraction stakes and be chosen as the woman's mate. Of course, this may turn out to be bad news for the woman, as she may have to raise the child alone, but her consolation is that the child will have clever, culture-using genes on board.

—*Timothy Taylor*, in *The Prehistory of Sex* (Bantam)

In human social life quite different levels and criteria of success come to the fore; these cannot be represented by a single set of numbers in computer games. There is always variety, and seldom extinction. No doubt dominant members of a society have more chances to raise their children successfully; but it appears that again and again special elites rose to power who produced fewer children but, through an elaborate culture, kept control over their inferiors who produced more children. Should this be called a lack of fitness of the ruling class?

—*Walter Burkert*, in *Creation of the Sacred: Tracks of Biology in Early Religions* (Harvard University Press)

■

Browsings

How Writing Came About. Denise Schmandt-Besserat. University of Texas Press, Austin, 1997. xiv, 193 pp., illus. Paper, $19.95. ISBN 0-292-77704-3. Abridged edition of *Before Writing: Volume 1, From Counting to Cuneiform* (1992).

A work reviewed in *Science* **260**, 1670 (1993) adapted for a general audience.

Yerkes Observatory, 1892–1950. The Birth, Near Death, and Resurrection of a Scientific Research Institution. Donald E. Osterbrock. University of Chicago Press, Chicago, 1997. x, 384 pp., illus. $40 or £31.95. ISBN 0-226-63945-2.

The story of the University of Chicago's observatory, recounting its founding by the pioneering George Ellery Hale, its decline after Hale's departure, and its resurgence in the 1930s under the directorship of Otto Struve, with attention to the relations among the astronomers and others involved.