vations on captive juvenile western scrub jays. Young scrub jays in a large outdoor aviary along with juvenile gray-breasted (Mexican) and pinon jays matured more rapidly than the other two species and sometimes responded to the gaping and vocalizations of members of those species by feeding them. Helping behavior is unknown in western scrub jays; thus these observations do suggest a basic sort of stimulus-response interaction in this species.

To conclude, I strongly recommend this monograph. The data and analyses are excellent, as are the layout and appearance of the book. Here is a wealth of information that should be of great interest to students of behavior, demography, and sociobiology and in fact to all biologists interested in any aspect of vertebrate life history strategies.

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Geomagnetism

The Earth's Magnetic Field. Its History, Origin and Planetary Perspective. RONALD T. MERRILL and MICHAEL W. MCELHINNY. Academic Press, Orlando, Fla., 1983. xii, 404 pp., illus. $67.50; paper $30. International Geophysics Series, vol. 32.

This volume records the measure of its authors' success in bridging the gap between theories of the mechanism of generation of the earth's magnetic field (dynamo theory) and the study of paleomagnetism. By insisting that there had been continental drift and by recognizing a historical sequence of reversals of the geomagnetic field, the paleomagnetists of the 1950's set in motion a revolution in the earth sciences that is now essentially complete. This was accomplished by an entirely empirical study of the magnetism of rocks and the inferred behavior of the magnetic field on a geological time scale. It is most unlikely that plate tectonics, sea-floor spreading, and all that follows would yet be widely recognized without paleomagnetism. But nearly four decades of study of the earth's magnetic history have had rather little impact on our understanding of the processes that generate the field.

It is the contention of Merrill and McElhinny that the massive quantity of paleomagnetic data now available contains sufficient information to provide important constraints on dynamo theories. They have therefore set about the daunting task of writing a monograph that will simultaneously make dynamo theory comprehensible to paleomagnetists and inform dynamo theorists of the possibilities and limitations of paleomagnetism.

Some of the inferences concerning the dynamo that derive from paleomagnetism are widely known and accepted, but it is important not to overlook their significance. Averaged over a period of order 10^5 years, the earth's magnetic field closely approximates a dipole at the center of the earth, with its axis aligned with the rotation axis. On a shorter time scale there is a secular variation that appears as non-dipole features that grow and decay, as well as a wandering of the dipole about the geographic axis and fluctuations in its strength. For the past few centuries of direct observation the non-dipole field has drifted westward at about 0.2° of longitude per year, but the paleomagnetic record indicates that this drift is not a permanent feature. Reversals of the field have occurred irregularly at intervals of order 10^5 years, but there have been some very prolonged periods of constant polarity. During a reversal the dipole field is weakened for a period of about 5000 years (which is comparable to the free decay time for an unmaintained field). The average intensity of the field 2.5 billion years ago was no more than marginally stronger than at present, but for an extended period in Cambrian time (roughly 500 to 300 million years ago) the field was very weak.

Merrill and McElhinny draw attention to some more sophisticated observations that one hopes will suggest means of discriminating between rival dynamo theories. One is that the time-averaged field is not perfectly dipolar. There are systematic higher multipole (especially quadrupole) components that account for the "far-sidedness" of paleomagnetic poles that was first reported by R. L. Wilson. Another concerns the randomness in time of reversals; for periods of order 10^8 years the intervals between reversals appear random and the average frequency is constant (in spectral terms the time series is stationary) but there are sudden changes in frequency. It is not clear what other geophysical effects may be related to these switches between apparently different regimes, but they may coincide with changes in the mantle convection pattern.

It is difficult to imagine that more than a very few highly selected practitioners of paleomagnetism will be able to digest the principles of magnetohydrodynamic dynamo theory, and still less that they will identify details of the alternative theories that their data may allow them to test. As Merrill and McElhinny recognize, the gap between disciplines must be bridged the other way, by making clear to dynamo theoreticians what paleomagnetism can do and has done. Progress is perceptible, but it is still appropriate to echo the words of W. M. Elsasser more than 20 years ago: "There are too many ways in which the core can be made to convect to permit an unambiguous interpretation."

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Soviet Psychology

Psychology in Utopia. Toward a Social History of Soviet Psychology. ALEX KOZULIN. MIT Press, Cambridge, Mass., 1984. xii, 179 pp. $17.50.

Although this is not the first treatment in English of the history of psychology in the Soviet Union, it does provide a new approach. Soviet writers on the subject have focused on the relationship of psychology to Marxist-Leninist ideology, and Western scholars have discussed it as part of a general analysis of science in the Soviet Union or have concentrated on psychological theory to the exclusion of historical analysis. Kozulin's book, though not claiming to be definitive, is a broad examination of the major currents in Soviet psychology since 1917 in which the evolution of the field of knowledge is placed in its cultural and political context. As Kozulin succinctly puts it, he has written "a socially informed study of Soviet psychology that [distinguishes] between the actual conditions of its development and those secondary interpretations that are invented in order to present these conditions in ideologically coherent form" (p. 2).

Kozulin approaches his subject by first drawing a portrait of the four generations of Soviet psychologists. He then investigates in greater depth the activities of the leading figures in the field. In particular, a good deal of attention is devoted to the work of Vladimir Bekhterev, Nikolai Bernstein, Lev Vygotsky, Ivan Pavlov, Alexander Luria, and Pavel Blonsky.

Russian psychology was founded prior to the Revolution by a generation of individuals strongly influenced by developments in Europe and America, especially those associated with Wilhelm Wundt, Pierre Janet, William James, and