correspondence were published, and, more generally, that the entire Bohr correspondence were readily available. It also reminds one of one of the great desiderata of modern intellectual history: a biography of Niels Bohr. Perhaps the 1985 centennial celebration of his birth will be a stimulus for such an undertaking.

SILVAN S. SCHWEBER
Department of Physics,
Brandeis University,
Waltham, Massachusetts 02254

Geophysics

Nutation and the Earth's Rotation. Papers from a symposium, Kiev, U.S.S.R., May 1977. E. P. FEDOROV, M. L. SMITH, and P. L. BENDER, Eds. Reidel, Boston, 1980 (distributor, Kluwer Boston, Hingham, Mass.). xvi, 622 pp., illus. Cloth, $34; paper, $21. International Astronomical Union Symposium No. 78.

The earth's variable rotation has interested astronomers, mathematicians, and geophysicists for at least the last 200 years. That this interest has been maintained for so long follows from the planet's nonrigid behavior when subjected to external and internal forces. Thus the motion not only is unpredictable, it also provides some insight into the global nature of these forces and into the nature of the earth's response to them. Discussion of the earth's rotation is conveniently and traditionally focused on one of three aspects: the rotation in space, that is, the precession and nutation; the motion of the instantaneous rotation axis with respect to the earth's crust, that is, the polar motion; and the variations in the speed of rotation about this axis, that is, the changes in length of day. This subdivision is due partly to the different observational techniques employed in studying the different aspects and partly to the properties of the equations describing the motion.

This book of symposium proceedings is concerned mainly with the first component, and in particular with the forced nutations. The forced nutations are the small periodic oscillations superimposed upon the precessional motion of the rotation axis about the pole of the ecliptic. They are the consequence of periodic variations in the gravitational torques exerted by the moon and sun on the nonspherical earth. To an adequate approximation these motions can be described by rigid-body theory, but small discrepancies between observations and such a theory do exist, mainly owing to the earth's fluid core. That the observations of nutation terms contain information on the structure of the earth's interior was recognized by Kelvin in 1876, but in general the geophysical information to be gleaned from such observations is more limited than what may be deduced from the other rotation components. For that reason geophysicists, apart from some notable exceptions, particularly Jeffreys, have not given the nutations much attention.

The interest of astronomers in these rotational motions is largely a consequence of their efforts to establish a precise lunar and planetary ephemeris, an interest recently renewed by the possibility of measuring lunar and planetary motions with unprecedented accuracy by means of laser ranging and long-baseline radio interferometry. The volume under review reflects this interest in that many of the papers deal with the analysis of the astronomical observations and the estimation of the amplitudes of the principal nutation terms. It appears from some of the reported discussions that the emphasis at the meeting was largely on establishing a set of nutation parameters to be used in conjunction with theories so as to establish consistent ephemerides. If the resolutions passed at the meeting and published at the end of the book are an indication, a consensus on "best values" was indeed reached. But no error estimates are given, and these decisions are only of limited geophysical use.

In addition to the forced nutations, the earth has two free nutations, of which the Chandler wobble is the best known. The other free nutation is a nearly diurnal motion introduced by flow in the core past the mantle. These nutations, perhaps more properly grouped in the polar motion category, receive some attention in the book, particularly in papers by F. A. Dahlen and M. L. Smith, who discuss the increase in period compared to rigid body rotation due to the presence of the oceans and core and to the elastic yielding of the mantle. It has long been recognized but is not always remembered that these polar motions have a counterpart in the motion of the rotation axis in space and that the latter is much amplified if the polar motion is retrograde and nearly diurnal. This is the case for the free oscillation introduced by the fluid core, and the amplitude of the motion in space should be about 400 times that of the motion with respect to the crust. Several papers discuss the astronomical evidence for this oscillation, and the general conclusion appears to be that if it exists its amplitude relative to the crust must be small indeed, less than 5×10^{-4} arc second. Even the long-baseline radio interferometry methods discussed in a useful paper by W. H. Cannon and J. L. Yen will be taxed beyond their promise if this oscillation is observed.

The most complete geophysical discussion dealing with the nutation is a paper by T. Sasao, S. Okubo, and M. Saito, who have computed the nutation for a realistic earth model that takes into account the mantle elasticity, a stratified fluid core, and dissipative coupling of the core to the mantle motions. The paper clarifies and updates the important work published by M. S. Molodensky in 1961.

Taken together, the papers present in a summary way—many of them are really little more than abstracts—a status report on research in this field some three years ago. The papers are of variable quality, and many have a certain déja vu air about them, for the publication of the proceedings postdates the actual conference by three years, a number of the papers have already been published or updated in a more extensive form elsewhere, the papers present arguments that have been voiced on many similar occasions, and there has been a proliferation of conferences on similar subjects.

Specialists interested in aspects of the astronomical data may find useful contributions in this volume, but for a more general audience it is indeed of limited value. The latter will benefit more from studying relatively recent papers by Rochester, Jensen, and Smylie (*Geophys. J.* **38**, 349 [1974]) and Smith (*ibid.* **50**, 103 [1977]) and requesting reprints of the better papers in this volume.

KURT LAMBECK
Research School of Earth Sciences,
Australian National University,
Canberra 2600, Australia

Genetics in Russia

Animal Genetics and Evolution. Papers from a congress, Moscow, Aug. 1978. NIKOLAY N. VORONTSOV and JANNY M. VAN BRINK, Eds. Junk, The Hague, 1980 (U.S. distributor, Kluwer Boston, Hingham, Mass.). x, 384 pp., illus. $99.

The publication of this book is a signal event in the history of genetics. That its contents are scientifically rather unexciting is a detail that most geneticists will overlook. For these are papers that were presented at the 14th International Congress of Genetics held in Moscow in 1978. That such a congress was assembled in the Soviet Union at all is a remarkable example of the unsinkable spir-