salts; energy relations in chemical reactions, reduction and oxidations; production of iron and steel; slags and high-temperature chemistry; aluminum; magnesium; other applications of electrochemistry; the manufacture of chemicals; silicates, glass, and colloids; ceramic and cement; industrial water; fuels and combustion, organic chemistry (theory); plastics; rubber; and the refining of petroleum.

A first reading gives at once the impression that the authors are in earnest and are trying their best in the interest of their students, for whom they obviously feel a warm sympathy. It may be that this is the type of semiscientific information which is best suited for the purpose. The reviewer feels, however, that it is preferable to present the subject in the frankly untechnical manner of writing for the intelligent layman to be found in the *New York Times*, for example. The present method uses repeatedly oversimplified information, which is quite all right, but includes chemical terminology in sufficient quantity to disguise this fact, and the reviewer feels that this may give the students the impression that they know more, or understand more, than they actually do. The reviewer also looks askance at the kind of similes introducing Chapter II, which liken the desire of the atoms to live together in molecules to the fact that a man will be attracted by the earth if he walks off a roof, or to the difficulty of pulling apart two surfaces of polished metal. Since the book is to be used by novices, it would be well to use pictures of molecular models made of colored balls and pegs. The Hirschfelder models are admittedly more correct, but they do not speak to the imagination of the uninitiated.

ALBERT L. HENNE

Ohio State University

Physics of the twentieth century. **Pascual Jordan. (Translated by Eleanor Oshry.) New York: Philosophical Library, 1944. Pp. xii + 185.**

Those interested in the philosophy of science, whether they be professional scientists, philosophers, or intelligent laymen, will welcome this discussion of the epistemology of modern physics. Well written in nontechnical terms and apparently excellently translated (though the reviewer has not had access to the original) the book discusses first the assumptions of classical physics, followed by a lucid treatment of the simpler facts of modern physics and the revision in methodology which these facts, particularly quantum and wave mechanics, have made necessary.

The author, like some others, prefers the positivistic approach to the problems involved in attaining scientific knowledge. He considers metaphysical speculation concerning the *essence* of physical reality as unprofitable and dangerous to science, thus limiting the "philosophy of science" to a consideration of scientific epistemology or ways of knowing. "Up to our time," he writes, "the opinion has remained that it is the task of philosophy to clarify certain 'final' and most general questions of natural science; questions which concern perhaps the 'existence' of matter or the 'existence' of time and space or the 'existence' of force or the 'final' bases of 'ex-

istence.'" Hence, "the only possible modern philosophical work which will be useful and fruitful for natural investigators must concern the theory of the method of natural scientific thought—for example, the questions of the theory of knowledge."

The lay reader who is interested in the developments of modern physics, but who is at the same time philosophically naive, will be stimulated by this exposition of scientific positivism. While the professional scientist will find no new information, he might do well to examine the assumptions of his own thinking in the light of this treatment. The theologian who seeks a scientific basis for his religious faith will, of course, find scant comfort. Yet, the book is a "must" for this group, because positivism is the scientific credo (or lack of it!) for an ever-increasing number of scientists. For these groups the book is recommended.

WAYNE B. DENNY

Oberlin College

Check-list of birds of the world. **(Vol. 5.) James Lee Peters. Cambridge, Mass.: Harvard Univ. Press, 1945. Pp. xi + 306. $5.00.**

This is the most recent unit of the indispensable synopsis of avian taxonomy begun by this author in 1931. The plan in no way differs from that of the earlier segments. The usefulness of the work and the prevailingly high quality of Peters' taxonomic judgments are well known to every professional ornithologist. The accuracy and scholarship of the writing are of the first order. No treatise of this scope has been undertaken since completion of the now-outmoded *Handlist of the genera and species of birds* in 1909 by Sharpe.

Peters' Volume 5 deals with the following orders: Apodiformes (Trochilidae only), Coliiformes, Trogoniformes, and Coraciiformes. The hummingbirds, or Trochilidae, occupy over half the work and are a particularly difficult group. The genera of this family total 123, although there are only 327 species. One wishes for some organization of these genera into subfamilies. Basic revision of the hummingbirds is not feasible in the course of preparation of a world check-list. Peters largely follows Simon, the latest reviewer, but stresses the fact that generic differentiation has been overdone and offers a good point of advice for future students—construction of a system of generic classification based on the characters of the more conservatively differentiated female hummingbirds. The author records many worthwhile observations on hybrids, artifact trade skins and allocations of names and types such that substantial progress in the taxonomy of the group is made.

Probably no one will be able to offer a highly improved treatment of this peculiarly New World family who has not spent much time himself observing and collecting hummingbirds in the Neotropical region. The extreme mobility of these birds, the tendency toward vagrancy, the not infrequent differential migration and habitat preference of males and females, the elaborate and confusing aggressive and courtship displays, and the brief, merely essential, association of the sexes in the breeding season in many species are complicating aspects of hummingbird biology that require this direct experience. The prospect of a definitive revision from the indoor school of "trochilidists," dealing largely with hummingbird "curios" imported from unfamiliar regions, seems slight indeed.

ALDEN H. MILLER

University of California, Berkeley

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