After the 220 pages devoted to the small RNA viruses, most of the other viruses pass in rapid review. The two articles by Robinson and Duesberg on myxoviruses and RNA tumor viruses are good examples of pedagogical systematization combined with very recent data—what Fraenkel-Conrat refers to as hard and soft facts. Crawford's article on the adenoviruses, papilloma, and polyoma reflects his major interest in the physical properties of these viruses to the neglect of the important and exciting data on viral replication. Finally, the two articles on the T-even bacteriophages of *Escherichia coli* are both well written but are remarkable for their overlap. It is surprising to find the same diagram of the morphogenesis of T4 bacteriophage in both articles. Again, some editorial activity should have been evident here.

Both the expert and the student of virology should find some data and viewpoints of value in this monograph. It is definitely not a book for the beginner, however, or for those who wish to obtain a superficial overall view of molecular virology.

RICHARD M. FRANKLIN
Public Health Research Institute of the City of New York, New York

Ocean Travelers

Fish Migration. F. R. HARDEN JONES. Illustrated by H. E. Jenner. St. Martin's, New York, 1968. viii + 325 pp., illus. $21.

Harden Jones has set himself a formidable task. He describes the migrations of selected kinds of fishes and attempts to use animal behavior and the physical and chemical environment to explain these migrations.

Data are taken from the literature on salmon and trout, eel, herring, cod, and plaice and subjected to rigorous analysis as evidence for fitting the life histories of these species into the framework of a model of fish migration. The particular species chosen for inclusion are of commercial importance in the Northern Hemisphere, and a considerable quantity of data on them is available. The chapter on herring is of special interest. The literature on this fascinating and tasty animal is a veritable jungle, and Harden Jones has tried to hack a trail. The concise chapter on eels is delightful; Johannes Schmidt's long-accepted account of the life history of the common European eel has been challenged recently, and the controversy is nicely described. Considering that Harden Jones was a party to the fray, this chapter is a tour de force of English fair play.

In three chapters that review the literature on the reactions of fishes to stimuli and discuss homing and other movements, the author attempts to explain some of the migrations described earlier in the book. That the result of this study is not a general theory of fish migration is hardly surprising; indeed, the author remarks in the preface that his book is an interim report. Overall, however, it is a painstaking synthesis of data from fishery biology, animal behavior, and oceanography.

A brief but important part of the book is devoted to discussing the biological advantage to fishes of migration. The author favors the idea that the migratory habit, along with evolution of seasonal spawning races, aids a species to become abundant by insuring maximum use of biological and spatial resources and by allowing a wide field for selection in a changing environment. These are sensible conclusions for the species considered. Yet could there be other reasons for fish migration? Harden Jones's study is based chiefly on species from a region with a small fauna which is recent within its present geographic range; hence one would assume little competition. The region also has a relatively unstable long-term climate. Surely an adequate comprehension of fish migration will require information about tropical species and ideas from the field of historical zoogeography.

DANIEL M. COHEN
Systematics Laboratory, Bureau of Commercial Fisheries, Washington, D.C.

Magnon Theory

Spin Waves. A. I. AKHIEZER, V. G. BAR'YAKHTAR, and S. V. PELETMINSKII. Translated from the Russian by S. Chomet. S. Doniach, translation editor. North-Holland, Amsterdam; Interscience (Wiley), New York, 1968. viii + 369 pp., illus. $21.50. North-Holland Series in Low Temperature Physics, vol. 1.

In the past ten years there has been a steady stream of papers on spin waves from the Kharkov school. Now, in this excellent book, three of the main contributors have given a very readable and coherent account of magnon theory. This is, in fact, essentially the first textbook on the subject and, as such, complements an encyclopedic article such as Keffer's in the *Handbuch*.

Spin-wave theory may be developed macroscopically or microscopically. In the former method one characterizes the magnetic medium by suitable energy densities, determines equations of motion, and derives spin waves as small signal disturbances of a time-independent state. This is the approach used initially here. Within this framework a very adequate discussion of uniform and nonuniform resonance is given. Standing spin waves, parametric excitation, and the coupling of spin waves to elastic waves are also treated, the last in rather considerable detail.

The second half of the book develops the microscopic treatment, working from a spin Hamiltonian, through the Holstein-Primakoff representation, to a quadratic boson Hamiltonian and hence to magnons. There is inserted here an unusually detailed discussion of two-magnon bound states. Then thermodynamic problems are taken up and a Green's function treatment is given of the temperature dependence of magnetization and fluctuation phenomena. Magnon-magnon and magnon-phonon interactions, relaxation processes, and thermal conductivity are adequately treated. In the last chapter the so-called Dyson-Maleev representation of spin operators is introduced as a preliminary to a very complete exposition of Dyson's analysis of the low-temperature behavior of ferromagnets and a more sophisticated approach to the susceptibility of ferromagnets.

The treatment throughout is impeccably formal, and it is this which gives the book a flavor of its own. There are no comparisons with experiment, no order-of-magnitude estimates. When, for example, after 11 pages, an expression is found for the gain of a spin-wave amplifier driven by a charged-particle beam, the authors put no numbers into it. That is evidently the reader's affair. But the analysis generally is straightforward and not recondite; it should not discourage experimentalists. The scope of the book and its clarity of treatment make it very useful to have at hand. It is a great pity that it has been published at a price which makes ownership unlikely for most physicists.

L. R. WALKER
Bell Telephone Laboratories, Murray Hill, New Jersey