They describe the Halley Bay Station, which was located on a floating ice shelf. (This will shock the young seismologists who prate of "granite.") They also describe the Willmore seismographs that they used. The magnifications were obtained (as usual nowadays) by determining one point on the curve and accepting the maker's form for the curve. Copies of the records for two South American earthquakes are reproduced. With only the report of one station there was not much that could be done with the records except read them. Also, the position of the instruments on the ice shelf resulted in troublesome local disturbances. MacDowall and Lee note that usually the only clear phase on the records was *P*. Microseisms (contrasted with the effects of ice movements) which were observed in the summer months could be correlated with onshore winds.

The authors then present the readings from the seismograms, or the station bulletins, in two parts. The first bulletin, 1 July 1957 to 31 December 1958, presents and names all identifiable phases based on shocks for which epicenters had been located by the U.S. Coast and Geodetic Survey. The second bulletin covers 1 June 1957 to 31 December 1958 and gives readings of phases not given in the first bulletin. No effort was made to identify them.

Pages 49 to 381 are devoted to meteorological observations. The authors are MacDowall and J. A. Smith. The principal headings are: (i) Total Ozone Observations, (ii) Surface Ozone Observations, (iii) Ozone Soundings, (iv) Radiation Observations, (v) Upper Air Meteorological Observations. The data are presented in 436 tables.

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For Amateur Astronomers

Moon Atlas. V. A. Firsoff. Viking, New York, 1962. 32 pp. Illus. Maps. $10.
Moon Maps. H. P. Wilkins. Faber and Faber, London; Macmillan, New York, 1960. 38 pp. Maps. $6.

These two handsomely reproduced books are obviously the result of current interest in the moon that has been stimulated by the prospect of manned lunar landings sometime during the present decade, or shortly thereafter.

There are no photographs with the Wilkins maps; the other side of the moon is presented as a drawing based on the Lunik III photographs of the invisible side. The charts show altogether approximately 90,000 objects, and the accompanying gazetteer lists approximately 900 named objects, indicates the map section on which they are found, and provides notes concerning the principal features of interest. An enormous amount of labor was expended in the preparation of these maps. Unfortunately, this does not make them look like the moon in the same way that a good photograph looks like the moon. Similarly, a road map does not look like a good aerial photograph. Nevertheless, a road map does serve to show geometrical relationships and the like, and Wilkins's maps serve the same purpose. The maps are presented in an ingenious foldout arrangement, which makes it possible to place any map and any page of the text flat side by side. This makes the charts more convenient for use at the telescope than any other known to me.

Firsoff's *Moon Atlas* is beautifully printed, and it contains both photographs and charts. There are two very large foldout charts, a relief map, and a selenological map based on some of Firsoff's own work. The quadrant maps are hand drawn, but, unlike the Wilkins maps, they are not corrected to mean libration. The accompanying gazetteer lists the formations in each quadrant separately. The photographs include one page of standard Mount Wilson, Lick, and Greenwich photographs showing the moon at different phases. Seven pages are devoted to "spherical projection photographs," showing regions of the moon near the limb, without foreshortening. These were obtained by photographing a projection of a photograph of the moon on a white sphere. In the introduction Firsoff describes the difficulties of doing this, and the results bear out what he says. Kuiper is using this technique to produce an extensive series of photographs at the Lunar and Planetary Laboratory of the University of Arizona. It will be interesting to see how his results compare with those published by Firsoff. There is a full-page reproduction of the well-known Lick photograph of the full moon, and the Lunik III photograph is also included. Firsoff's *Atlas* is too large (12 by 14 inches) for convenient use at the telescope.

Wilkins's *Moon Maps* and Firsoff's *Moon Atlas* will doubtless be very useful to amateur astronomers, who may be unable to afford Kuiper's more expensive *Photographic Lunar Atlas*. The latter, however, will prove to be a much more valuable tool to those who are interested in the scientific study of the lunar surface.

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Marine Science

Ichthyology. Karl F. Lagler, John E. Bardach, and Robert R. Miller. Wiley, New York, 1962. xiii + 545 pp. Illus. $12.50.

Ichthyology has shared the growth that has marked so many fields of science during the past 50 years, particularly in the post-war period. Where one ichthyologist labored 25 years ago there are now four or five. Many schools now offer courses and advanced programs in ichthyology. Knowledge of fishes has increased rapidly in all areas, be it anatomy, physiology, behavior, or systematics.

Need for a textbook has grown apace. Jordan's *Guide to the Study of Fishes* long has been out of print and is outdated and cumbersome at best. Norman's *History of Fishes* is a popular natural history, and the two-volume anthology on fish physiology is a special reference work. To fill this void is the timely intent of authors Lagler, Bardach, and Miller—fishery biologist, physiologist, and systematist, if their wide interests permit classification.

Ichthyology fulfills well its role as a college textbook. It introduces the many facets of the field, it treats them concisely, and it should provide the starting point and stimulus needed by many students. Selected references are provided at the end of each chapter. All original illustrations are by the talented William Brudon.

With *Ichthyology* the lecturer can free himself from presentation of much introductory material and can emphasize recent findings and special topics. The student will readily find much information that, even though introductory, was previously widely scattered.

Criticism of *Ichthyology* likely will center not on what the authors have written but on what they have left unsaid. And these comments will reflect the pet interest of the critic. Yet the satisfaction of such critics means the conversion of an authoritative and read-

able introduction to ichthyology into a burdensome compendium. More and special books on the topic are merited, and perhaps they will be stimulated by this effort. Meanwhile, and by example, if the systematist finds little evidence in *Ichthyology* of the rumblings that are currently shaking some foundations laid by Gill, Jordan, and Regan, he must supply this story for the student himself.

What is provided in *Ichthyology* is good. The book will adapt well as a text.

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Foodstuff

Recent Advances in Food Sciences. Papers read at the Residential Summer Course (Glasgow, Scotland), 1960. vols. 1 and 2. vol. 1, *Commodities* (xxxii + 284 pp.); vol. 2, *Processing* (xxxii + 318 pp.). J. Hawthorn and J. Muil Leitch, Eds. Butterworth, Washington, D.C., 1962. Illus. $12.50 each.

A decade of accelerating progress in the field of food science followed the outstanding "short courses" arranged by the Low Temperature Research Station in 1948 and 1951; then a distinguished committee of food scientists organized a "reappraisal." The result was a series of classical lectures delivered at the Royal College of Science and Technology. Through the cooperation of the Office of the Science Advisers to the North Atlantic Treaty Organization, 15 countries in addition to Great Britain participated in the conference. The 50 contributors, whose papers constitute the present volumes, are numbered among today's outstanding food scientists. Because both space and time were limited, the committee was forced to exclude nutritional considerations from the program. With this regrettable exception, the gamut of food science is covered in the conference papers. The coverage is neither uniform nor systematic, and the volumes do not constitute a text or a reference work. Rather, they are a series of critical reviews, expertly designed to bring the reader an understanding of the state of the science in the fields covered and, in a good many cases, of the art as well. As scientific literature proliferates at an ever increasing rate, challenging considerations of this type assume an importance equivalent to that of research itself.

After what must have been an heroic struggle with material so diverse, the editors have divided the papers into volume 1 on commodities, and volume 2 on processing. Following several introductory papers, volume 1 is subdivided into section 2, which is concerned with animal foods and section 3, with vegetable foods. The structure as well as the chemistry of animal tissue is considered at length, with fish receiving the most generous page allotment and dairy affairs the least. The cereals, fruits and vegetables, and plant polyphenols are described under vegetable foods. Volume 2 consists of section 1, "Dehydration," section 2, "Sterilization and Refrigeration," and section 3, "Other Processes." These include cheese making, egg preservation, new milling and baking processes, the use of sugar for preservation, and the microbiology of meat curing brines. The work closes with section four, "Supplementary Papers."

Students of food science will find that these volumes are very helpful, authoritative summaries.

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New Books

Mathematics, Physical Sciences, and Engineering

Advances in Electronics and Electron Physics. L. Marton, Ed. vol. 16, *Photo-Electronic Image Devices.* J. D. McGee, W. L. Wilcock, and L. Mandel, Eds. Proceedings of the second symposium (London), 1961. Academic Press, New York, 1962. 670 pp. Illus. $18.50.

Antarctic Research. The Matthew Fontaine Maury Memorial Symposium. Papers presented at the Tenth Pacific Science Congress (Honolulu), 1961. H. Wexler, M. J. Rubin, and J. E. Caskey, Jr., Eds. American Geophysical Union, Washington, D.C., 1962. 238 pp. Illus. $10.

Compound Semiconductors. vol. 1, *Preparation of III–V Compounds.* Robert K. Willardson and Harvey L. Goering, Eds. Reinhold, New York; Chapman and Hall, London, 1962. 575 pp. Illus. $25.

Digest of Literature on Dielectrics. vol. 25, 1961. Ann M. Parks, Ed. Natl. Acad. of Sciences—Natl. Research Council, Washington, D.C., 1962. 428 pp. Paper, $15.

Elementary Particles and Cosmic Rays. Alladi Ramakrishnan. Pergamon, London; Macmillan, New York, 1962. 583 pp. Illus. $15.

Fluid Dynamics. An introductory account of certain theoretical aspects involving low velocities and small amplitudes. G. H. A. Cole. Methuen, London; Wiley, New York, 1962. 252 pp. Illus. $4.95.

Introduction to Nonlinear Differential and Integral Equations. Harold T. Davis. Dover, New York (© 1960), 1962. 582 pp. Illus. Paper, $2.

An Introduction to Vector Analysis. F. Max Stein. Harper and Row, New York, 1963. 223 pp. Illus. $6.25.

Ion Association. C. W. Davies. Butterworth, Washington, D.C., 1962. 198 pp. Illus. $7.50.

Linear Algebra and Matrix Theory. Evar D. Nering. Wiley, New York, 1963. 301 pp. Illus. $6.95.

Mathematical Theory of Elastic Equilibrium, Recent Results. Guiseppe Grioli. Springer, Berlin; Academic Press, New York, 1962. 176 pp. Illus. Paper, $7.25.

Mathematics: The Man-made Universe. An introduction to the spirit of mathematics. Sherman K. Stein. Freeman, San Francisco, Calif., 1963. 330 pp. $6.50.

The Measure of the Moon. Ralph B. Baldwin. Univ. of Chicago Press, 1963. 508 pp. Illus. Map. $13.50.

Modern Operational Calculus. With applications in technical mathematics. N. W. McLachlan. Dover, New York (© 1948), 1962. 232 pp. Illus. Paper, $1.75.

Progress in Control Engineering. vol. 1. R. H. Macmillan, T. J. Higgins, and P. Naslin. Academic Press, New York, 1962. 268 pp. Illus. $10.

Progress in Elementary Particle and Cosmic Ray Physics. vol. 6. J. G. Wilson and S. A. Wouthuysen, Eds. North-Holland, Amsterdam, 1962. 354 pp. Illus. $13.75.

Radiation Effects on Organic Materials. Robert O. Bolt and James G. Carroll, Eds. Academic Press, New York, 1963. 592 pp. Illus. $13.50.

Real Gases. Ali Bulent Cambel. Donald P. Duclos, and Thomas P. Anderson. Academic Press, New York, 1963. 176 pp. Illus. $6.50.

Selected Topics in Nuclear Theory. Lectures (Low Tatra Mountains, Czechoslovakia), 1962. F. Janouch, Ed. International Atomic Energy Agency, Vienna, 1963. 462 pp. Illus. Paper, $10.

Solid State Physics. Advances in research and applications. vol. 14. Frederick Seitz and David Turnbull, Eds. Academic Press, New York, 1963. 535 pp. Illus. $16.

Theory and Application of Liapunov's Direct Method. Wolfgang Hahn. Translated from the German (1959) by Hans H. Hosenthien and Siegfried H. Lehnigk. Prentice-Hall, Englewood Cliffs, N.J., 1963. 192 pp. Illus. $9.

Theory of Ship Motions. vols. 1 and 2. S. N. Blagoveshchensky. Translated from the first Russian edition (*Kachka Korablia*, Leningrad, 1954) by Theodor and Leonilla Strelkoff. Dover, New York, 1962. vol. 1, 369 pp.; vol. 2, 294 pp. Illus. Paper, $2 each.

Titanium Metal Powder. Alfred R. Globus. Vantage Press, New York, 1963. 64 pp. Illus. $2.

Understanding Chemistry. Lawrence P. Lessing. New American Library, New York (© 1959), 1963, 192 pp. Illus. Paper, 60¢.