Guisseppe Moruzzi, C. S. Sherrington, K. S. Lashley, W. R. Hess, E. D. Adrian, W. McCulloch, W. Pitts, D. McKay, and Percival Bailey, among others); "How are we fixed for water?" (a survey of water resources; the per capita consumption of fresh water is estimated at 1500 tons annually in the United States); "Tomorrow's weather" (short-range and long-range forecasting; cloud seeding: "For some curious reason most meteorologists have refused to be optimistic"); "Farming's chemical age" (insecticides, herbicides, fertilizers); "Power from the sun" (photosynthesis, solar engines and heating); "The peaceful atom" (atomic power plants, private and governmental); "The new metals age" (light metals and new alloys); "The transistor"; "The automatic factory"; "The information theory" (a clearly developed exposition of the elements of information theory).

There is an index, but no bibliography, which is regrettable inasmuch as the general reader for whom the book is intended might well want guidance to some of the sources for the articles.

In summary, this is a good journalistic job. The dominant note is perhaps more hopeful for the future than it would be in a similar book written by scientists.—G. DuS.

What Is Science? Twelve eminent scientists and philosophers explain their various fields to the layman. James R. Newman, Ed. Simon and Schuster, New York, 1955. vii + 493 pp. $4.95.

Einstein once wrote, "If you want to find out anything from the theoretical physicists about the methods they use, don't listen to their words, fix your attention on their deeds." In *What Is Science?* this advice is taken seriously, not only with respect to physics, but for a variety of fields of knowledge from astronomy through biology to psychoanalysis. This is a wide-ranging collection of essays by distinguished practitioners of the arts of securing their respective kinds of positive knowledge.

A brief review can do no better than to list the contributors: E. T. Whittaker on "Mathematics and logic," Herman Bondi on "Astronomy and cosmology," E. U. Condon on "Physics," John Read on "Chemistry," Ernest Baldwin on "Biochemistry," W. C. Allee on "Biology," Julian Huxley on "Evolution and genetics," E. G. Boring on "Psychology," Clyde Kluckhohn on "Anthropology," and Erich Fromm on "Psychoanalysis." Bertrand Russell, in a prefatory essay, points to the disparity in progress between man's knowledge of the physical world and his values, habits, and beliefs —a disparity that has brought the human race to the brink of possible self-destruction—while Jacob Bronowski supplies a postlude called "Science as foresight," an account of those electronic marvels, the modern calculating machines, that can reason deductively and also explore numerous alternative possibilities within a given logical frame, but, so far at least, cannot trespass on the distinctively human activity of creating new ideas.

What must strike the lay cover-to-cover reader (and what scientist will not be a layman in some of the fields covered?) is the variety of basic concepts in the several sciences and, frequently, their specification to a given subject matter. The "mass-luminosity diagram" identifies astrophysics as definitely as the "subconscious" marks psychoanalysis or "Grimm's law" marks linguistics. The biochemist has his "enzymes," the geneticist his "genes" (of course), the physicist his "particle-wave dualism."

If science has a unity, it seems to lie only in the insistence that theory have observable consequences, that it be susceptible, to quote Bondi, of "empirical disproof." This is not intended to gainsay the remarkable degree of reduction, for example, of astronomy and chemistry to physics, or of some parts of biology to chemistry. Nevertheless, if a new and unique concept or relationship will correlate or explain phenomena, scientists will adopt it in order to carry forward their search for understanding. "Intuitive reactions (such as would cause people to reject implausible conceptions) are of secondary importance," writes Bondi. The testimony for this lies in the voluminous deeds of scientific achievement that are so ably recorded in these essays.

An appended bibliography enables the interested reader to pursue the question, What is science? more broadly and deeply.

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Atomic Power. 180 pp. **Automatic Control.** 148 pp. **First Book of Animals.** 240 pp. **The New Astronomy.** 243 pp. **The Physics and Chemistry of Life.** 270 pp. Editors of *Scientific American.* Simon and Schuster, New York, 1956. Paper, $1 each. (Reprints from *Scientific American.*)

Science, like music, has its skilled performers and its audience. With the growing power and importance of science, an increasing number of magazines and books, as well as college courses, are offering the general reader instruction in what might be called science appreciation. The latest venture in this subject is a paper-back series of five books, each on a different field of science, put together by the editors of the *Scientific American* from articles they have published in their magazine since 1948. The result is an account of many recent discoveries that manages to convey something of the method by which scientists find things out, and something of the delight they experience in doing so.

Interpreting research findings to the general public is not the only problem of communication in science today. The rapid appearance of new specialties has made it more and more difficult for one scientist to talk to the next. This series is sufficiently authoritative and detailed to interest scientists who want to know what is happening on preserves other than their own.

The authors of the 90 articles are scientists who can write, many describing their own investigations, and journalists who understand science. Since each article is complete in itself, there is some repetition. But when a topic is new to the reader, explanation in different contexts by different writers may provide understanding where fuller development by one author fails. Of course, browsing is no substitute for systematic study, but the first may lead to the second. Each book has an introduction, some notes about the authors, suggestions for further reading, and a few illustrations—not the original ones, unfortunately.—J.T.

The Biology of the Spirit. Edmund W. Sinnott. Viking Press, New York, 1955. ix + 180 pp. $3.50.

Both author and publisher regard this as an unusual book. And so, in a way, it is. For Sinnott, with his wide knowledge of professional biology, has looked at life and its reasons and justifications, and has concluded that "all problems of life are ultimately biological problems." All living matter, all protoplasm, shows a biological goal seeking, without an appreciation of which it cannot be understood. Now, if once we admit that "life" is the striving of protoplasm to fulfill its goal, we may soon be led to agree that even the mind itself, although it may be "the highest of biological phenomena . . . is a biological process nevertheless"; and then to conclude that "if a man's mind has a biological basis, his spirit must have one also." Protoplasm becomes the place where spirit and matter meet, and "soul is the highest level of that goal-seeking, integrating process that is life."

It is all very nice to find a unifying principle in biology that will help poor human man to relate the tumultuous ex-