rat, Evans, Schäfer, and Bergold consider the comparative chemistry of plant, bacterial, animal, and insect viruses, respectively. The volume closes with Luria's comparative survey of the interaction of host cell and infective particle in virus multiplication.

When the science of virology has progressed to a point where 13 different authorities are required to produce a single volume on general virology, the comments of a single reviewer on their efforts seem almost ridiculous. I will make myself no more ridiculous than necessary by simply observing that this encyclopedic treatise on viruses is the most ambitious yet attempted and will probably be without rival for many years. Its appearance at a time when the study of viruses is assuming a central role in biological research should stimulate both the initiation of new work and the critical reappraisal of present results and objectives.

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Science and Civilisation in China. vol. 3, *Mathematics and the Sciences of the Heavens and the Earth.* Joseph Needham and Wang Ling. Cambridge University Press, New York, 1959. xlvii + 877 pp. Illus. + plates. $27.50.

This third volume deals with the history of Chinese science in a number of particular fields—mathematics, astronomy, geography and cartography, geology, seismology, and mineralogy—and gives very profuse documentation from Chinese sources. Chinese developments are compared with those of Europe, India, and the Arab world during the same periods, and there is discussion of possible influences of one civilization on another.

In mathematics the concept of zero, in the sense of leaving a blank space on the counting board for some particular power of ten, is traced to at least the 4th century B.C., although the use of an actual symbol for zero came very much later. Negative numbers, which did not appear in Indian mathematics until the 7th century A.D., were used by Chinese mathematicians in the 1st century B.C. Compared with the Greeks, Chinese mathematicians were not so much interested in questions of rigorous proof and were interested in algebra rather than in geometry. However, a largely independent Chinese development of mathematics remained, in some respects, ahead of Western development until at least the 14th century. A value of π calculated in the 5th century was more accurate than any European calculation made before the end of the 16th century.

In China, astronomy was always officially supported because of the importance attached to the calendar and to astrology. Influences from India and the Arab world can be traced. There was a great deal of observation and star mapping, based on equatorial coordinates and the development of pretelescopic instruments, including elaborate water clocks, but comparatively little was done on the problem of planetary motion.

In both mathematics and astronomy there was a marked decline under the Ming dynasty (from 1368). The Jesuits, who reached China at the end of the 16th century, underestimated indigenous Chinese science because, by that time, a good deal had been forgotten.

Map making reached a high point in the 12th century, but most of the other sciences discussed do not seem to have got beyond the recording of observations and purely speculative theorizing.

There is a short section speculating on the failure of China to develop modern science. "Apparently a mercantile culture alone was able to do what agrarian bureaucratic civilisation could not—bring to fusion point the formerly separated disciplines of mathematics and nature knowledge" (page 168). The arguments for this conclusion seem cogent, and research on the reasons for the actual decline of science during the Ming dynasty might yield more and interesting evidence.

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New Books

The Alkaloids. vol. 6, *Chemistry and Physiology.* Supplement to vols. 1 and 2. R. H. F. Manske, Ed. Academic Press, New York, 1960. 454 pp. $14.

Biological Problems of Grafting. A symposium. P. B. Medawar, Chairman. Thomas, Springfield, Ill., 1959. 465 pp. $12.50. The symposium, sponsored jointly by the University of Liège and the Council for International Organizations of Medical Sciences, was held in Liège, Belgium, 18–21 March 1959.

Industrial Electronics and Control. Royce G. Kloeffler. Wiley, New York; Chapman and Hall, London, ed. 2, 1960. 549 pp. $10.

An Introduction to Animal Husbandry in the Tropics. G. Williamson and W. J. A. Payne. Longmans, Green, New York, 1959. 454 pp. 48s.

An Introduction to Social Biology. Alan Dale. Thomas, Springfield, Ill., ed. 3 (reprinted with revisions), 1959. 442 pp. $6.50.

Men and Moments in the History of Science. Herbert M. Evans, Ed. Univ. of Washington Press, Seattle, 1959. 234 pp. $4.50.

Standard Handbook for Telescope Making. N. E. Howard. Crowell, New York, 1959. 336 pp. $5.95.

Statistical Independence in Probability, Analysis and Number Theory. Mark Kac. Wiley, New York, 1959. 104 pp. $3.

Structural Methods for the Exploration Geologist. Peter C. Badgley. Harper, New York, 1959. 295 pp. $7.50.

Telemetering Systems. Perry A. Borden and Wilfrid J. Mayo-Wells. Reinhold, New York; Chapman and Hall, London, 1959. 358 pp. $8.50.

Thermodynamics. An introduction to the physical theories of equilibrium thermostatics and irreversible thermodynamics. Herbert B. Callen. Wiley, New York, 1960. 391 pp. $8.75.

Miscellaneous Publications

(Inquiries concerning these publications should be addressed not to Science, *but to the publisher or agency sponsoring the publication.)*

Antibiotics in Medicine. No. 1, vol. 16, *British Medical Bulletin.* Medical Dept., British Council, London, 1959. 88 pp. $3.25.

Carnegie Institution of Washington, Yearbook, 1958. 511 pp. $1.

Fishhooks. Special Publ. No. 47. Kenneth P. Emory, William J. Bonk, Yosihiko H. Sinoto. Bernice P. Bishop Museum Press, Honolulu, 1959. 45 pp. $2.50.

Gnotobiotic Technology, Proceedings of the Second Symposium. Held at the University of Notre Dame, 8–9 May 1959. Philip C. Trexler, Chairman. Univ. of Notre Dame Press, Notre Dame, Ind., 1960. 194 pp. $5.

Handbook of Pottery Types of Nayarit, Mexico. Misc. Papers, Archaeological Ser. No. 1. George E. Fay. Dept. of Sociology and Anthropology, Southern State College, Magnolia, Ark., 1960. 50 pp.

Heat Transfer, Chicago. Chemical Engineering Progress Symp. Ser. No. 29, vol. 55. American Institute of Chemical Engineers. New York, 1959. 216 pp.

Liberal Education and Nursing. Charles H. Russell. Teachers College, Columbia Univ., New York, 1959. 152 pp. $3.

Proceedings of the United States National Museum. vol. 109, *Marine Mollusca of Point Barrow, Alaska,* Nettie MacGinitie, 150 pp.; vol. 110, *A Revision of American Bats of the Genera* Euderma *and* Plecotus, Charles O. Handley, Jr., 142 pp. Smithsonian Institution, Washington, D.C., 1959.