Although many of the observations described here have already been published elsewhere and although several of the principal speakers have outlined their views in other recent symposia, the book remains fresh and valuable on the basis of the discussions alone. Provocative speculations are plentiful, but so are earnest and pertinent warnings about experimental procedures and hidden assumptions. The discussions emphasize further the diversity of current opinion as to the nature and sequence of molecular events that permit cells to maintain their ionic steady states or to function as secretory units.

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Biochemie der Ernährung. K. Lang. Steinkopff, Darmstadt, Germany, 1957. xv + 411 pp. Illus. DM. 54.

Many futile attempts have been made to expound the subject of nutrition with a minimum regard for chemistry. This volume certainly does not belong in this class. It is a worthy and very substantial book which treats in an excellent and thorough manner the chemistry of many food constituents. The treatment of carbohydrate chemistry (9 pages), the chemistry of fats (17 pages), and protein chemistry (50 pages) is less elementary than might be supposed but not, in general, as adequate as is the treatment of the vitamins, which occupies approximately one-half of the volume and has to do not only with the chemistry of the vitamins themselves but with their functional derivatives. The lack of attention to carbohydrate chemistry, for example, may be justified on the grounds that other books dealing with this subject are available and advances in the carbohydrate field do not impinge very directly on current advances in nutrition. There are about 650 excellent references cited in the volume, and it constitutes a sound piece of work.

In recent years it has become evident that nutrition cannot be treated in a thoroughgoing manner without reference to genetics. It is clear that genetic variations cause different species, strains, and individuals to have differing nutritional needs. This book has, from my standpoint, a serious fault in that the relationship of biochemical genetics to nutrition is not discussed. The time has already come, in my opinion, when the biochemistry of nutrition cannot be treated in a scholarly way with a disregard of the role that genetics plays.

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History and Philosophy of Science

Copernicus. The founder of modern astronomy. Angus Armitage. Yoseloff, New York, 1957. 236 pp. Illus. + plates. $5.

Many American readers already know Angus Armitage as the author of *Sun, Stand Thou Still,* a popular account of the life and work of Nicolaus Copernicus, first issued in 1947 and recently more widely circulated in paperback under the title *The World of Copernicus.* Fewer are aware that that elementary volume was itself the by-product of an earlier and more scholarly study, *Copernicus: The Founder of Modern Astronomy.* Since the earlier volume was and is the only serious and detailed study of Copernicus' astronomical research in English, this revised and expanded edition is very welcome.

Armitage begins his book with a condensed sketch of the development of planetary astronomy in antiquity and the Middle Ages. His second chapter recounts most of what is known of Copernicus' life, the progress of his astronomical research, and the composition of his *De Revolutionibus Orbium Coelestium.* Then follow four chapters dealing in detail with Copernicus' astronomical system. Two closing chapters and an epilog (all added for this edition) discuss the gradual acceptance of the new astronomy, its physical verification, and, very briefly, its subsequent fate. There are also three useful appendices and a brief index.

The five chapters dealing with Copernicus and his work are the heart of the book, and they are uniformly readable, reliable, and illuminating. But three of them—those that discuss Copernicus' treatment of the motion of the earth, the moon, and the planets—are also something more. Readers unwilling or unable to grapple with the complexities of the *De Revolutionibus* itself will find in these chapters the only reasonably full account of Copernicus' real contribution to modern astronomy: a sun-centered, mathematical planetary system able to compete with the earth-centered system of Ptolemy. In the 16th century the concept of a moving earth was not novel. It was the mathematical demonstration that a moving earth was compatible with existing standards for predictive planetary astronomy that gained for Copernicus enduring fame.

But Copernicus gave a strange demonstration. Armitage shows what others have mentioned—the *De Revolutionibus* was modeled, both in organization and in mathematical detail, upon Ptolemy's *Almagest.* To describe the earth's orbital motion about the sun, Copernicus compounded three perfect circular motions; three more were required to describe the moon's motion about the earth; two or more circles (epicycles and eccentrics) were used to trace the motions of each of the planets about the moving center of the earth's orbit. When he was through, Copernicus' system was quite as good as Ptolemy's, but it was neither more accurate nor appreciably simpler. Copernicus' single concrete improvement (one which attracted many later astronomers to his work) was in lunar theory, and to this, ironically enough, the concept of the earth's motion was irrelevant.

Armitage's account of Copernicus' life and of the acceptance of his theory are less unusual. But they are appropriate appendages to his central study, and they are admirably done. The same is not so clearly true of his opening and closing chapters. The first seems far too condensed and simplified to achieve its purpose. Readers can and must find elsewhere both the historical and the conceptual background of Copernicus' work. The last chapter, dealing with the physical verification of the Copernican theory, adds even less to the volume and will very probably mislead. The physical problems raised by Copernicanism are scarcely discussed in earlier parts of the volume. Collected in this summary form, without either historical or technical context, they become almost a parody of the sort of history to which other parts of the book make such notable contributions. But these criticisms are directed only to the frame of Armitage's study. They do not at all reflect on its central chapters. These remain an invaluable aid to all those wishing to learn more about Copernicus and about the astronomical system he designed.

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Science and Human Life. J. A. V. Butler. Basic Books, New York, 1957. 162 pp. $3.95.

The book under review is a work with a philosophical keynote, written by a British scientist whose special field is biophysical chemistry. The author starts from the questions, What are we? What is the basis of human life?, and tries to discover what science, which has revealed so much of the constitution of the universe, can contribute to the answer.

Human beings, who in the prescientific era thought of themselves as the dominant figures in the universe learned, first, that they were only the top members of the earthly animal kingdom, which, in its turn, is an infinitesimally small dwarf among the billions of islands of organic life that may exist on planets of the stars. Second, doubts were even