*view of Physiology, Annual Review of Biochemistry*, and others? The answer is a qualified yes, since the *Recent Progress* series contains articles of relatively limited scope, derived from the deathless yearly Laurentian Hormone Conferences, and the *Annual Review of Physiology* must serve the entire field of physiology. Affirmation here must be qualified because much would depend upon whether the editors of *Current Topics in Experimental Endocrinology* are wise in the choice of topics, as well as in their choice of authors.

It would seem that in their first venture they have been quite successful, and we may hope that future volumes are as well executed.

The volume contains eight essays on widely diverse subjects. There is a highly useful discussion by R. P. Ekins of the principles underlying "saturation analysis techniques," which to the endocrinologist means the recently developed techniques for measurement of minute quantities of hormones at low concentrations in body fluids by radioimmunoassay or by various specific binding procedures. The fringe areas of endocrinology are served by a review (by A. L. Goldstein and A. White) of the thymic factor or factors involved in conferring immunological competence in lymphoid tissues, and by a discussion (by J. D. Flack, P. W. Ramwell, and J. E. Shaw) of the roles of prostaglandins in endocrine responses.

The five remaining reviews deal with more conventional topics, some of which have been adequately reviewed elsewhere recently but perhaps in a less conveniently available format. They include an article on steroid hormonal evoked differentiation of the nervous system (B. Flerkó) and one on the subcellular phenomena in which ovarian hormones engage at the target tissue level (E. V. Jensen and E. R. DeSombre). There are more conventional reviews on the "posterior pituitary" by T. Chard, on calcitonin by J. T. Potts, Jr., H. D. Niall, and L. J. Deftos, and on long-acting thyroid stimulator by D. S. Munro.

On the whole, this will probably become a useful series for the harried endocrinologist who cannot keep up with the impossibly abundant flow of endocrine literature, and for the student seeking a recent summary of a particular field.

AUBREY GORBMAN
*Department of Zoology,*
*University of Washington, Seattle*

## Histamine Research

**Biogenesis and Physiology of Histamine.** GEORG KAHLSON and ELSA ROSENGREN. Williams and Wilkins, Baltimore, 1971. vi, 318 pp., illus. $21. Monographs of the Physiological Society, No. 21.

This monograph is an account of experiments in histamine physiology carried out by Georg Kahlson's laboratory in Lund over a period of more than 20 years. This laboratory, together with that of R. W. Schayer, has dominated research into histamine physiology ever since Schayer and his colleagues developed specific and sensitive isotopic methods for quantitating various parameters of histamine metabolism in the early 1950's. This record, therefore, is valuable not only because it presents Kahlson's publications under one cover but also because it must reflect, regardless of the authors' intentions, the dominant patterns of histamine research over this period.

The number of original observations made by Kahlson's group is impressive by any standards. Prominent among these have been the demonstration of the astonishing changes in histamine metabolism which occur during pregnancy in rodents, the regulation of histidine decarboxylase in gastric mucosa by gastrin, and the occurrence of high levels of histamine formation in a variety of rapidly growing tissues. These are the main topics covered in the book.

Research into the role of histamine has suffered badly from isolation. An overview of the period covered by this volume would suggest that it has been one of first-class observation rather than insight. For too long histamine research has consisted of a series of monologues often unconnected with and largely uninfluenced by developments in associated fields. As M. A. Beaven once put it, "we need to appreciate biology more" if the biological role of histamine is to be unraveled. This is apparent in the section on the role of histamine in gastric acid secretion, and nearly a quarter of the book is devoted to this controversial topic.

In 1964, Kahlson and co-workers published their now classic paper demonstrating the release of mucosal histamine and stimulation of histidine decarboxylase when starved rats were refed or given an injection of gastrin. From this was developed a model defining the relationship between histamine and acid secretion. A temporal similarity between two events is not proof of a causal relationship, and the discussion is never pursued with the vigor demanded. Indeed, a comparison of this chapter with a recent review in *Gastroenterology* by L. R. Johnson on the same subject entitled "Control of gastric secretion: No room for histamine?" is illuminating in suggesting why so little real progress has been made following the initial observations. This book testifies, therefore, to a series of remarkable and sometimes brilliant discoveries even if, as a signpost to the future, it leaves one frustrated and intellectually dissatisfied.

YUTAKA KOBAYASHI
DAVID V. MAUDSLEY
*Worcester Foundation for Experimental Biology, Shrewsbury, Massachusetts*

## Protozoa

**The Biochemistry and Physiology of Tetrahymena.** DONALD L. HILL. Academic Press, New York, 1972. xii, 230 pp., illus. $12.95.

*Tetrahymena pyriformis* is undoubtedly the most studied of the 6000 named species of ciliated protozoa. Thousands of papers have been written about it, the majority in the last 20 years. Since the first report of its axenic cultivation by André Lwoff in 1923 and of its cultivation in a defined medium by George W. Kidder and Virginia C. Dewey in 1951, it has been an extremely popular subject for biochemical and genetic work. It occurs commonly in fresh water throughout the world, its generation time is short, and it multiplies readily in the laboratory. There are other species of *Tetrahymena*, a few of them even being parasitic, but they are not nearly as well known.

Hill has performed the tremendous task of pulling together all the literature on the biochemistry and physiology of *Tetrahymena*. He discusses carbohydrate, lipid, energy, amino acid, protein, purine, pyrimidine, and nucleic acid metabolism, biochemical genetics, vitamin and inorganic requirements, effects of radiation, drugs, and hydrostatic pressure, and evolution.

Like other protozoa, *Tetrahymena* is an animal, but it has many plant-like characteristics. It is motile, it ingests food, it has no chloroplasts, it has the same amino acid requirements as man and rats and has similar vitamin requirements, it synthesizes and stores glycogen, and it has hemoglobin. These

are all animal-like characteristics. But it also requires lipoate, which other animals can synthesize; it makes a vitamin $B_{12}$-like compound whereas other animals need $B_{12}$; it has a bacteria-type cytochrome c and an operative glyoxalate cycle like plants; it contains a pentacyclic triterpenoid which has not been found in other animals; and it lacks all urea cycle enzymes.

Hill summarizes what we know about the biochemistry of *Tetrahymena*, but many biochemical questions remain to be answered about it and other protozoa. Perhaps when biochemists tire of vertebrate breis and bacteria they will come to realize that these organisms can be used to good advantage and that much can be learned from them.

NORMAN D. LEVINE
*College of Veterinary Medicine, University of Illinois, Urbana*

## The Submillimeter Region

**Far-Infrared Spectroscopy.** KARL DIETER MÖLLER and WALTER G. ROTHSCHILD. Wiley-Interscience, New York, 1971. xx, 798 pp., illus. $29.95. Wiley Series in Pure and Applied Optics.

**Far-Infrared Properties of Solids.** Proceedings of a NATO Advanced Study Institute, Delft, The Netherlands, Aug. 1968. S. S. MITRA and S. NUDELMAN, Eds. Plenum, New York, 1970. viii, 606 pp., illus. $25. Optical Physics and Engineering.

The far-infrared or submillimeter region of the electromagnetic spectrum, extending over the wavelength range from roughly 10 microns to 1000 microns, continues to be a uniquely challenging frontier of spectroscopy. Although richly endowed with phenomena of fundamental and analytical importance in physics, chemistry, and life sciences, it has historically attracted fewer workers owing to the lack of sources and detectors of quality comparable to those available at either longer microwave or shorter optical wavelengths. Despite recent vast improvements in instrumentation, as well as significant fundamental experimental results, the far infrared is still largely unexplored.

*Far-Infrared Spectroscopy* represents an admirable attempt by the authors to compile in one volume a summary of both instrumentation and fundamental phenomena associated with this spectral region. Within the context of classical spectroscopy they have succeeded in their attempt. The reader will find many useful tutorial details concerning grating and Fourier transform instruments and their accessories, as well as an overview of the theory of far-infrared spectra of vapors and liquids. In these areas the text is augmented by an extensive bibliography.

The main body of the book, however, seems to lack a unifying sense of direction, or any clear statement summarizing and relating the abundant details. Far-infrared spectroscopy as it existed in 1969 when the book was finished is not the final chapter, but in reality the setting of the stage. The authors miss the opportunity to place their work in this historical perspective and to convey the excitement and challenge of opening up the far-infrared frontier with the use of improved laser sources, detectors, and techniques whose development was already reported at that time.

This oversight is partially remedied by the inclusion of a number of appendices written by other researchers dealing with topics of current interest in solid-state spectroscopy including impurity effects, ferroelectrics, magnetism, superconductivity, and semiconductors.

The thrust into new frontiers is the main emphasis of *Far-Infrared Properties of Solids*, which is a collection of graduate-level lectures from a 1968 advanced study institute. In a sense the title is a misnomer, for many of the lectures deal with instrumentation and techniques not restricted to the study of solids. The inclusion of these, however, gives the book balance and extends its usefulness as a reference source, although some of this advantage is negated by rapid technological developments since 1968 and the unfortunate fact that the volume was not published until two years later. The coverage of research areas parallels to a great extent that of the appendices in the Möller-Rothschild book, but individual problems are treated in somewhat greater depth.

When viewed in proper perspective the two books together provide useful introductory and reference material for the serious adventurer into far-infrared spectroscopy, combining the classical with the new.

WILLIAM B. TIFFANY
*Molectron Corporation, Sunnyvale, California*

## Astronomical Objects

**The Physics of Pulsars.** ALLEN M. LENCHEK, Ed. Gordon and Breach, New York, 1972. x, 174 pp., illus. $14.50. Topics in Astrophysics and Space Physics.

Allen Lenchek has made a great effort to provide a much-needed compilation of pulsar observations and theories. The result is a rather rich pulsar stew, but the kind that is mixed up for better or worse from nothing but leftovers. In this case, the ingredients are recordings of a series of colloquia given at the University of Maryland in late 1969; most of these are surprisingly unspoiled, but are not those of a proper recipe but rather what was available. Some very important elements are missing entirely, others reappear almost as reliably as pulsar pulses.

Since the contributors in most cases were giving talks describing their own work, few of them attempt to give a balanced view of work in the areas discussed. The list of contributors is distinguished, and the result is very, very good when it is good, and when bad it is horrid.

Following a brief introduction, the book is divided about evenly between observational and theoretical material. There is but one colloquium, by G. R. Huguenin, on the radio properties of pulsars, so important omissions are inevitable. One can find almost nothing on the pulse shapes of pulsars; in a later chapter a few poor-quality pulse shapes are given. There is no mention of the strong microsecond time-scale modulation of pulsars, a matter of crucial importance to the theory. And none of the recent superb work on systematic effects in pulsar pulse sequences by such people as D. C. Backer is mentioned. The chapter by G. S. Downs on pulsar timing is quite good, except that because Downs cannot measure the timing of the most revealing Crab Nebula pulsar, this crucial object does not appear in his discussion. The chapters on optical and x-ray observations are both complete and still up-to-date. There are two chapters, by R. M. Hjellming and Y. Terzian, on dispersion measures, interstellar clouds, and distances, which are both very good but of course greatly overlapping.

The best part of the book is the theoretical chapters. All the leading protagonists of pulsar theory appear on stage and succeed in giving articulate and still timely descriptions of their theories. These include T. Gold, H. Y.