has long been somewhat clouded by the celebrated controversy over the relative merits of his contribution and that of the French savant, Champollion. The whole problem is examined once again in dispassionate fashion by Wood, and Young emerges with his stature in this field rather heightened by the evidence presented. Actually it appears that there was ample credit to go around!

It is not generally recognized that Young contributed notably to the success of the early editions of the *Encyclopedia Britannica* by his authoritative articles on such varied subjects as "Cohesion," "Egypt," "Bridge," "Chromatics," "Weights and measures," "Tides," "Lagrange," and "Road making." By a singular irony, the biography of Young himself that appeared in the 11th edition of the *Britannica* (1911) was omitted in the 14th edition (1929). Fortunately it has been restored in the latest reprinting.

Unfortunately Alexander Wood did not live to complete his writing of Young's biography. Frank Oldham, whose interest in Young is attested by his own brief life of the natural philosopher (1933), has done a commendable job of finishing the work. A brief memoir on Wood, whose books on sound are recognized as of great value by all acousticians, prefaces the volume, which will undoubtedly be greatly cherished by all who are interested in the history of physics.

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***Energy Transfer in Hot Gases.*** Proceedings of NBS Symposium held 17–18 Sept., 1951 National Bureau of Standards, (Supt. of Documents), Washington, D. C., 1954. iv + 126 pp. Illus. $1.50.

This book contains 10 papers of a spectroscopic nature, two on reaction mechanisms, two on the flame mechanics, and two on flame temperatures.

Only a few interesting details, taken at random from these reports, can be mentioned here to give an idea of the scope of the symposium. One such detail, reported by Benedict and Plyler, is the discrepancy between temperatures measured in hydrocarbon flames, that is, 2400° to 2800°K obtained from resolved infrared spectra, and values of more than 3000°K obtained from the visible and ultraviolet spectra for the same flame regions. It is attributed to the difference in lifetime in transitions ($10^{-3}$ to $10^{-1}$ sec and $10^{-8}$ to $10^{-6}$ sec, respectively). This means that molecules that radiate vibration-rotation energy will have survived many collisions and, hence, will have a much greater chance of being near to thermodynamic equilibrium than molecules that emit electronic energy.

According to Sen's article on "Astrophysicist's concept of temperature," deviations from thermodynamic equilibrium also play a decisive role in solar and stellar thermometry and have led to the use of "operational concepts of temperature," such as "effective temperature," "color temperature," "excitation temperature," and "ionization temperature." Only in the relatively seldom occurring case of complete equilibrium are all these temperatures *one and the same,* and one can speak of *the* temperature of the stellar atmosphere. The author mentions that this is not a purely academic question:

> The solar chromosphere and corona, and the highly turbulent atmospheres of giant stars are Nature's gigantic laboratories for the testing of new physical theories of turbulence, shock waves, and departures from thermadynamic equilibrium.

For the time being, Penner, in his study on infrared emissivity of diatomic gases, has developed an equation which he claims is the only available relationship for estimating the equilibrium emissivities of diatomic gases under the conditions existing in rocket combustion chambers, our low-scale imitations of stellar fast-moving furnaces.

Persons not too familiar with the details of spectroscopy will find particular interest in Bernard Lewis' comprehensive paper on the theory of combustion waves in which suitably simplified models of the combustion wave are envisaged and explained, some considering only diffusion, others only the flow of heat, and so forth. Another paper, contributed by Karlovitz, describes in some detail how turbulent flames can generate additional turbulence.

Finally, it may be mentioned that a "Combustion colloquium" was held at Cambridge University, England, 2 years after the National Bureau of Standard's symposium. It comprised 18 contributions, mostly on flame propagation, only two on spectroscopy, which have been edited by W. R. Hawthorne and J. Fabri under the title *Selected Combustion Problems: Fundamental and Aeronautical Applications* (Cambridge Univ. Press, 1953, viii + 534 pp.).

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***Essays on the Social History of Science.*** S. Lilley, Ed. Munksgaard, Copenhagen, 1953. 182 pp. Paper, Kr. 30.

This book has been produced under the auspices of the Commission for the History of the Social Relations of Science, a group that was appointed by the International Union for the History of Science, which is the administrative organ of the International Academy for the History of Science. Financial assistance was provided by UNESCO, and this organization suggested the original idea for the preparation of this book.

We must be grateful to UNESCO, as well as to the editor and the authors, for producing a work of significance for all who are concerned with the social relationships of science, and this means almost everyone—scientist and nonscientist alike.

The essays cover a wide range in time and in subject matter. Several of the titles will indicate the rich content of this thought-provoking volume: "The rise of abstract science among the Greeks" by B. Farring-

ton; "Thoughts on the social relations of science and technology in China" by J. Needham; "Metallurgy and technology in the Middle Ages" by R. J. Forbes; "Cause and effect in the history of science" by S. Lilley; "The French Revolution and the progress of science" by R. Taton; "The idea of progress and theories of evolution in science" by S. F. Mason; "Science, industry and society in the nineteenth century" by J. D. Bernal; "Science and confidence in the rational mind" by Dorothy Waley Singer.

This is a noteworthy collection of essays and it will repay careful reading. Not all readers will agree with all the points of view advanced, but it is this very heterodoxy that makes this book important.

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***Elements of Statistical Mechanics.*** D. ter Haar. Rhinehart, New York, 1954. xix + 468 pp. Illus. $8.50.

The author's preface says

> The reason for writing another textbook on statistical mechanics was the feeling that there should be a textbook which combined in not too large a volume an outline of the main elements . . . with an account of a number of successful applications . . . the book is meant to be a textbook . . . for graduate lectures in the United States or for postgraduate lectures in the United Kingdom.

Part A, 97 pages, discusses the elements of the statistics of independent particles (perfect gases), with little mention of applications; part B, 73 pages, gives ensemble theory; part C, 159 pages, discusses applications in eight chapters, equation of state, condensation, metals, semiconductors, cooperative phenomena (order-disorder), nuclear physics, the origin of elements, and rubber elasticity; part D, 145 pages, is labeled "Appendices." It gives a more detailed discussion of some of the topics considered in parts A and B and a few fundamental topics not explicitly discussed in the text. Most chapters are followed by a page or more of bibliography.

The chemist will be struck by the omission of any mention of the very real success of statistical mechanical theory in computing, from spectroscopic data, the thermodynamic properties of many substances in the gaseous state, and also by the omission of any discussion of applications to liquids, ionic solutions, or magnetic or electric susceptibility measurements. Since just these subjects constitute the main interest of physical chemists in statistical mechanics, the book will be of more interest to physicists than to chemists. With this limitation the book adequately covers its intended purpose. Rather than attempting a single unified approach, the author, in different chapters, tends to discuss most of the important approaches used by different investigators. Insofar as a single approach carries the thread, it is that of Kramers, to whom the author makes due acknowledgment. Of necessity, since so much is mentioned, parts of the discussion are scanty and end with "we refer the reader to the original publication for a more detailed discussion." The extensive bibliography will be valuable to the serious student.

The book seems to suffer from some defects. Classical and quantum statistics are rigidly separated in different chapters. Since statistical mechanics offers the easiest field for unifying and merging quantum and classical behavior, this seems highly unfortunate. The author does not appear to have written all parts for students of the same level of sophistication. For instance, in chapter III quantum mechanics is introduced to a reader who had not yet heard of $h$, but in chapter VII the density matrix operator is used with the assumption that the student is fully familiar with operator theory. Occasionally rather simple but important principles are either omitted or quite inadequately stressed. For instance, that Bose rather than Fermo statistics apply to atoms or molecules containing an even number of neutrons appears not to be stated, and the reader of chapters IV or VIII, in which the behavior of helium is discussed at length, might have the impression that it is still very uncertain which statistics to use for $He_4$, and no reason for choice in the case of $He_3$.

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***Histology.*** Roy O. Greep, Ed. Blakiston, New York, 1954. xi + 953 pp. Illus. + color plates. $15.

This textbook is the result of the combined efforts of 13 contributors who are able teachers and investigators. Each of the authors is presently or has been associated with Harvard University. Under the editorship of Roy O. Greep, an excellent textbook has resulted. The subject is well covered and presented, although the inevitable change in style from one author to the next detracts somewhat from continuity.

The embryologic approach to an understanding of histology is not as complete as appeared in the Bremer-Weatherford *Textbook of Histology* (which this text was originally meant to revise), yet the presentation of this subject is sufficient where necessary, without overdoing it. The inclusion of a chapter describing some basic histochemical methods is very apropos the type of histologic investigation now holding the interest of workers in the field.

The book is well illustrated; the color plates are of exceptional quality. The labeled photomicrographs of the testes, endometrium, and kidney, to cite a few examples, are of the type that are most helpful to and most appreciated by the student of histology. In this connection, more photographs of this type, rather than line drawings of tissues and cells, would add much to this book's usefulness in the laboratory. Its high cost will probably be an important consideration in its adoption.

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