Book Reviews

Infrared Absorption Spectra of Steroids. An Atlas. Konrad Dobriner, E. R. Katzenellenbogen, and R. Norman Jones. Interscience, New York–London, 1953. xlv + 308 pp. Illus $11.50.

During the last decade, infrared absorption spectroscopy has been increasingly used to identify steroids, and infrared spectrophotometers have become routine instruments in many laboratories concerned with the study of steroids.

The infrared study of steroids was largely pioneered by two of the authors of this volume, the late Konrad Dobriner at the Sloane-Kettering Institute for Cancer Research in New York and R. Norman Jones at the National Research Council of Canada in Ottawa. By combining infrared spectroscopy with absorption chromatography, they were able to develop an elegant procedure for identifying and quantitatively determining the many urinary steroids excreted by patients in a variety of physiological and pathological states. During this investigation, the infrared spectra of more than a thousand steroids were recorded, and a series of spectral absorption characteristics were identified. These characteristics may be used to identify oxygen-containing functional groups, to locate certain unsaturated linkages, and to establish the stereochemical configurations at certain positions. Moreover, the infrared spectrum of a steroid is unique, and if the compound under study has been prepared previously, its identity can be established by comparing its spectrum with that of an authentic sample.

Dobriner and Jones have published many valuable tables containing correlations of spectral absorption frequencies with functional groups in steroids, but until the publication of this book spectroscopists had been handicapped by the lack of a set of reliable steroid reference spectra. This volume contains a collection of nearly 300 spectra and goes a long way toward overcoming the deficiency. Most of the spectra are of steroid hormones and of their metabolites and derivatives, but representative curves for steroid alcohols, bile acid esters, steroid sapogenins, cardiac aglycones, and steroid alkaloids are included.

The spectra are preceded by a short introduction, in which correlations of spectral absorption frequencies with structure are briefly discussed. This is followed by a bibliography that lists the principal publications on the infrared spectra of steroids. It is unfortunate that the introduction was not expanded to include in a convenient form much of the information contained in the original papers listed in the bibliography. Perhaps we may hope that in a future publication this defect will be remedied.

The spectra were obtained for solutions in carbon disulfide and in either carbon tetrachloride or chloroform and were recorded on a modern double-beam spectrophotometer as plots of percentage absorption against wave number; they are generally complete from 650 to 1800 cm^{-1}, but a few representative spectra covering the region 2700 to 3700 cm^{-1}, are given. Each spectrum occupies a full page, and the standard of reproduction is unusually high. I had no difficulty in establishing the identity of some of my spectra with certain of those included in this book. The structural and empirical formula of each compound and the concentration, solvent, cell length, and prism used in each spectral region are recorded. On the other hand, no physical data that might indicate the purity of the samples examined, such as melting points and optical rotations, are listed.

This book is essential to all those using infrared spectroscopy in the field of steroid chemistry. The method of reproducing the spectra should serve as a model for future compilations of infrared spectra.

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The Collected Papers of Stephen P. Timoshenko. McGraw-Hill, New York–London, 1953. xxv + 642 pp. Illus. $15.

The Collected Papers of Stephen P. Timoshenko are presented in four languages—German, French, English, and the universal language of mathematics. As a language, mathematics is subject to the same criterions of style as any other. A mathematical paper may be clear or abstruse, concise or prolix, elegant or uncouth. Every one of these papers is a masterpiece of clarity and elegance; as for brevity, Timoshenko strikes exactly the right balance, at least for engineers, who are seldom profound mathematicians. He never labors the obvious, but on the other hand, he never jumps a great chasm from one equation to another with the cliché "from this we readily derive . . . ," when the reader cannot make the derivation readily, if at all.

Eight of these papers are in German, written during the period 1910–24, two are in French, published in 1913 and 1914, and the remaining 25, the first of which appeared in 1921 and the latest in 1947, are in English. Twenty-three papers written in Russian, between 1905 and 1917, are listed by translated title only; much of the material in these is said to have been translated later into one of the other languages. Publication of the original Russian papers would have been a formidable editorial task, but it is regrettable that they could not have been included or, at least, some indication given as to where their content may now be found. There is substantially no repetition in Timoshenko's works, and nothing he wrote is unimportant.

Although the French papers are only two in number, they occupy a substantial portion of the book. One of them is the famous "Sur la stabilité des systèmes élastiques," 133 pages in length, which ap-

peared in 1913 and did so much to correct previously accepted bases for design of bridges and other steel structures. Both French papers are translations, by others, from material that Timoshenko had prepared in Russian. The German and English papers are his own expression, but it is evident that in every instance he was wise enough to accept competent editorial assistance in these acquired languages. Not a single paper betrays any of the mannerisms, such as omission of articles, characteristic of most technical papers written by the Russian-born.

D. H. Young's brief biographic sketch of the author is probably the most nearly complete story of Timoshenko's career that has been published. Born in the Ukraine in 1878, the son of a surveyor, he was educated as a railway engineer. The years before World War I he spent chiefly as a teacher in the Engineering Institutes at Kiev and St. Petersburg, learning English by studying such mathematical works as our own English classic in the field of applied mechanics, Love's *Theory of Elasticity*. Driven from Russia by the Bolshevik revolution, he spent a brief period in Jugoslavia, arriving in this country in 1922. During his 5 years in industry, chiefly with Westinghouse, he organized the Applied Mechanics Division in the American Society of Engineers, now the most fruitful source of applied mechanics literature in the entire field. Since 1927, he has been educating engineers, not only the students at the University of Michigan and Stanford University where he has held increasingly important academic positions, but all practicing engineers who are concerned with the design of machines or structures. Obviously, there is material in this life for a full-length biography, and one may hope that Young will undertake it.

In making this collection, the editors have discarded "a few papers, the content of which was deemed to be of more technical than scientific interest." Engineers will make no complaint; they have a gold mine in the volume as published. In the eyes of the design engineer, however, it is Timoshenko's chief virtue that his work, however scientific, invariably has some concrete design application and, moreover, it has an application that the engineer can comprehend and utilize. While others delight in pure abstractions, Timoshenko does not scorn a concrete result or even a numerical answer. He always offers the bridge that we so badly need between pure mathematics and practical design. Through him and his able colleagues we have progressed from "mechanics" through "applied mechanics" to "engineering mechanics," of which Timoshenko is the great disciple.

Physically, this book is a thing of beauty, worthy of the man whose collected works it holds. Handsomely bound, with an attractive type face on excellent paper, the format is marred only by the use of Continental numerical punctuation in the English texts (3.000.000 for 3,000,000 and 0,742 for 0.742). This is an idiosyncrasy that will offend British readers no less than Americans and is inadequately explained by the fact that the book was printed in the Netherlands. The preface states that these papers "are reprinted as they were originally published, any corrections or additions appearing in the form of footnotes." Spot checks indicate that this verbatim reproduction has been carried out meticulously, with the exception of the unfortunate numerical punctuation mentioned. The absence of a single corrective footnote in the entire 642 pages shows the care with which the original papers were prepared and proofread by the author.

This is a volume that any mathematician or any mathematically literate engineer or scientist should be happy to own. It could be used as a textbook, not so much in mathematics as in the art of scientific communication. It should be the *vade mecum* of every young scientist who aspires to express complex mathematical concepts in a manner that will help the designers of our machines and structures to create a better and safer world.

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Die Welt der ungewohnten Dimensionen. Versuch einer gemeinverstandlichen Darstellung der modernen Physik und ihrer philosophischen Folgerungen. Arnold Hildesheimer. Sijthoff, Leiden, 1953. 368 pp. Illus. + plate. Fl. 17.90.

This book on modern physics written in German is for the intelligent layman, defined in this case as a person possessed of at least 10 grades of Central European primary and secondary schooling. A native of Germany and a citizen of Israel, Hildesheimer is a broadly educated industrial chemist with considerable professional success in both countries. According to the biography on the dust jacket, he must have received his doctor's degree about 1910. In other words, although not an active participant in the development of contemporary physics, he has had full professional education and experience in a neighboring field. The book shows that the author also has maintained an active interest in philosophy and, more particularly, the philosophic implications of modern physical theories.

The author's background is pertinent to this review insofar as the writing of a nontechnical book on modern physics and modern epistemology is a highly personal business. To what extent prospective readers will enjoy such a book will depend to some extent on the degree to which they are "in resonance" with the author's approach, given factual competence.

Apart from an introductory section, which deals with the nature of scientific knowledge and its limitations, the book devotes approximately 100 pages each to three parts concerned with classical physics, relativity, and quantum theory, respectively, and about half as much space to a concluding (fourth) part on epistemological implications. According to the various prefaces, the book was read in whole or in part by W. Heisenberg, Gall, a teacher of mathematics and physics at Haifa, and Max Born, O. R. Frisch, and H. Groot. This battery of distinguished readers is both