and misleading statements throughout the text (for example, "The most modern development of the polarization microscope is the interference microscope"; "Its [DNA] metabolism is not very well known"; ". . . all grain counts made with tritium as a label are suspect, and so are all theories founded on these counts"). The specialist can overlook these deficiencies, or read between the lines where necessary, but for the beginning student or general reader who wants a brief review of the rapidly moving field of chemical cytology, Kuyper's book is not very satisfactory.

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Basic Medical Science

A History of American Pathology. Esmond R. Long. Thomas, Springfield, Ill., 1962. 474 pp. Illus. $12.50.

This is an important book—as important to American medicine as a whole as it is to American pathology. The author has succeeded in producing an extraordinarily readable and informative book that should be required reading for everyone interested in the past, present, or future of medicine in America.

The work is divided first with respect to time, beginning with the 16th and 17th centuries and continuing to the present day; it is then subdivided with respect to space (with attention to geographic considerations), specialities, general and special pathology, societies and journals, the effects of the greatly increased support of medical research, in which pathology has shared, and current trends in the practice of pathology as a profession.

American pathology divides itself naturally into two periods: pre- and post-Welch. This is noted in stating: "So began, in 1886, the history of the Pathological Department at Johns Hopkins University, which was to revolutionize not only the teaching of pathology in this country, but in large measure that of every branch of medicine as well." It is further noted that: "After the middle of the century the trend in American visiting was toward central Europe, and, whatever the terminal objective, whether medicine or surgery or a specialty like ophthalmology, it was recognized as sound common sense to acquire a good background in pathology," which was mainly pathological anatomy.

This continued for many decades thereafter; there was, in fact, no other course open to anyone who aspired to a knowledge of the fundamentals of medicine, in preparation for any branch of clinical medicine; not until the first quarter of this century did medicine, surgery, and the specialties themselves begin to offer alternate pathways. In a brief section entitled "Current trends in pathology," the author calls attention to "the apparent conflict between the old time traditional pathological anatomy and experimental pathology, on the one hand, and clinical pathology as a hospital service function on the other." This conflict he regards as more apparent than real, and he concludes that "it appears clear that pathology, wherever its teaching and research are principally conducted, will be coordinated more closely than has ever been the case before not only with clinical medicine but with the basic sciences in biology, and with physics, chemistry and mathematics as well."

The book illustrates a difficulty encountered by all writers on the history of medicine, and doubtless by those in other fields as well. Although the author is able to treat the early history of American pathology at a leisurely pace and to give as much as several pages to the contributions of a single worker, the tempo is stepped up as the modern period is approached, and as more and more names and topics clamor for attention. That this leads to longer and longer sentences and to fewer words per person and per topic, to the extent that the book comes to resemble a compendium, is not peculiar to this work; it reflects the rapidity with which medicine has grown to a point at which it has become almost unmanageable.

The author states that: "The history, while stressing the growth of ideas, is devoted in large measure to a record of the men and women who made contributions of significance. The number of these is large, and inevitably, the account of each is condensed." Perhaps the only answer is greater selectivity, such as is apparent in the choice of 55 photographs of leaders in pathology for reproduction. Many names could have been omitted, especially of those who are still living and whose position in the history of American pathology is not yet secure.

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Russian Résumé

Plasticity of Crystals. K. V. Klassen-Neklyudova, Ed. Translated from the Russian. Consultants Bureau, New York, 1962. 196 pp. Illus. $12.50.

This "Authorized translation from the Russian" of an integrated "collection" of papers written during 1957 and 1958 by the Laboratory of the Mechanical Properties of Crystals (Institute of Crystallography, Academy of Science of the U.S.S.R.), is printed on unsized paper from typescript, with an unjustified right margin.

The book represents a résumé, written especially for Russian scientists, of the present status of our knowledge of the plastic deformation of crystals. There are six chapters: "Physical basis of plasticity and strength of crystals" (7 pages) by M. V. Klassen-Neklyudova; "Time and temperature dependence of plasticity characteristics in monocrystals" (52 pages) by V. R. Regel; "Plastic deformation not inducing asterism in Laue spots" (7 pages) by A. A. Urusovskaya; "Formation of regions with a reoriented lattice as a result of deformation of mono- and polycrystals" (38 pages) by A. A. Urusovskaya; "Description of the simplest phenomena of plastic deformation from the viewpoint of dislocation theory" (42 pages) by V. L. Indenbom; and "Effect of grain disorientation angles on the structure and properties of intercrystalline boundaries" (49 pages) by V. F. Miuskov.

Klassen-Neklyudova's chapter serves as an introduction. He explains that, although the plasticity of crystals was a topic of early interest to Russian scientists, such as Joffe, the popularity of nuclear physics forced crystal plasticity into the background. When dislocation theory directed renewed attention to crystal plasticity, the interest of the Russians was again stimulated, but their progress was held up until standard works could be translated. This book is intended to fill the gap in the Russian literature, which occurred between writing the standard works and their translation; systematic description of the present problems is also attempted. This initial chapter also outlines the other chapters.

Regel is concerned with the behavior of single crystals as a function of time and temperature. The relevant experimental work is brought together, and the general physical theories proposed to explain them are discussed. Although

dislocations are involved in this discussion, they are not specifically considered from a geometrical standpoint.

In two related chapters Urusovskaya first discusses the theory of asterism (smearing of Laue reflections as a result of plastic deformation), as a prelude to discussing deformation without asterism, and then kink bands and related plastic features. The common aspects of these phenomena are discussed.

Indenbom specifically treats the dislocation theory of plastic deformation. His treatment is quantitative and concerned especially with the interaction between dislocations.

Miuskov examines the nature of intracrystalline boundaries, including both small-angle and large-angle boundaries. The discussion includes the various theories of such boundaries, the detection of these boundaries by etching, the motion of boundaries under stress, their surface energies, and diffusion along them.

This book assumes a general knowledge of crystal plasticity. Its subject matter centers on the dislocation explanation of the plasticity of crystals. Most, if not all, of the material has already been published elsewhere; the value of the book is in integrating the material. I found the chapters by Urusovskaya, on deformation with and without asterism and on deformation related to kinking, most interesting and very readable.

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Applied Mathematics

Advanced Calculus for Applications. Francis B. Hildebrand. Prentice-Hall, Englewood Cliffs, N.J., 1962. ix + 646 pp. Illus. $13.

This textbook of advanced calculus for students of applied mathematics is a revised and enlarged version of the author's earlier book, *Advanced Calculus for Engineers* [Prentice-Hall (1948)]. In its present form the book is roughly comparable to Sokolnikoff and Redheffer's *Mathematics of Physics and Modern Engineering* [McGraw-Hill (1958)], although, on the whole, it is both less comprehensive and more "integrated" than the latter. It is also some 260 pages shorter and somewhat more heavily weighted in the direction of ordinary and partial differential equations.

Consideration of several examples may clarify this comparison. In Sokolnikoff and Redheffer, numerical analysis is the subject of a final separate chapter of some 60 pages, which touches on iteration methods, interpolation, approximation, and numerical integration of differential equations. In Hildebrand, numerical methods appear mainly as a part (some 25 pages) of an opening four-chapter sequence on ordinary differential equations. The Newton-Raphson iteration technique is also given brief notice in a much later chapter in which Jacobians have been introduced, while the method of Stodola and Vianello is noted in connection with boundary value problems in still another chapter.

Again, in place of separate systematic study, which Sokolnikoff and Redheffer award the subject of infinite series in a chapter of more than 100 pages, Hildebrand integrates parts of this subject into treatments of ordinary differential equations (nearly 70 pages), boundary value problems, partial differentiation (Taylor's series), and functions of a complex variable.

Hildebrand introduces the Laplace transform early as a method for ordinary differential equations and uses it again in connection with a particular partial differential equation and in inversion via contour integration. Here Hildebrand's 40-page introductory treatment, which concludes with a table of some 40 particular Laplace transforms, is considerably more full and comprehensive than the 15-page appendix on the Laplace transform in Sokolnikoff and Redheffer.

Occasionally, Hildebrand's definitions are less than precise. For instance, the first sentence in chapter 8, on partial differential equations, reads as follows: "A partial differential equation is said to be *linear* if, when the equation has been rationalized and cleared of fractions, no powers or products of the unknown function or its partial derivatives are present." Is the partial differential equation

$$\frac{\partial u}{\partial x} + \sin\frac{\partial u}{\partial y} = \tan u$$

linear? And what of partial differential equations which cannot be rationalized and cleared of fractions?

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New Books

Mathematics, Physical Sciences, and Engineering

Boiler House and Power Station Chemistry. Wilfrid Francis. Arnold, London; St. Martin's Press, New York, ed. 4, 1962. 447 pp. Illus. $15.

Consolidated Index of Selected Property Values. Physical chemistry and thermodynamics. Publ. 976. Prepared by the Office of Critical Tables. Natl. Acad. of Sciences–Natl. Research Council, Washington, D.C., 1962. 297 pp. $6.

Creep in Structures. A colloquium held at Stanford University, July 1960. Nicholas J. Hoff, Ed. Academic Press, New York; Springer, Berlin, 1962. 383 pp. Illus. $15.

Digital Information Processors. Selected articles on problems of information processing. Walter Hoffmann, Ed. Interscience (Wiley), New York, 1962. 761 pp. Illus. $27.

Digital Processes for Sampled Data Systems. Alfred J. Monroe. Wiley, New York, 1962. 497 pp. Illus. $12.50.

Diophantine Geometry. Serge Lang. Interscience (Wiley), New York, 1962. 180 pp. Illus. $7.45.

Electric Circuit Analogies for Elastic Structures. vol. 2. Richard H. MacNeal, Wiley, New York, 1962. 277 pp. Illus. $11.50.

Geochemistry in Mineral Exploration. H. E. Hawkes and J. S. Webb. Harper and Row, New York, 1962. 429 pp. Illus. $12.50.

An Introduction to the Physical Chemistry of Iron and Steel Making. R. G. Ward. Arnold, London; St. Martin's Press, New York, 1962. 247 pp. Illus.

Macromolecular Chemistry. A symposium held in Montreal, Canada, July–August 1961. Butterworth, Washington, D.C., 1962 (reprinted from *Pure and Applied Chemistry*, vol. 4, Nos. 2–4). 341 pp. Illus. $9.50.

Management of Materials Research. Metallurgical Society Conferences, vol. 14. Dan H. Fenn, Jr., and Linda M. Fernberger, Eds. Interscience (Wiley), New York, 1962. 181 pp. Illus. $9.

Modern Aspects of the Vitreous State. vol. 2. J. D. Mackenzie, Ed. Butterworth, Washington, D.C., 1962. 267 pp. Illus. $11.50.

Molecular Spectroscopy. The fifth European congress, Amsterdam, Netherlands, May–June 1961 (reprinted from *Pure and Applied Chemistry*, vol. 4, No. 1). 189 pp. Illus. $6.

Nouveau Traité de Chimie Minérale. vol. 15, *Uranium et Transuraniens* (1091 pp.); vol. 20, *Alliages Métalliques* (772 pp.). Paul Pascal, Ed. Masson, Paris, 1962. Illus.

Rock-Forming Minerals. vol. 3, *Sheet Silicates.* W. A. Deer, R. A. Howie, and J. Zussman. Wiley, New York, 1962. 280 pp. Illus. $15.50.

Studies in Optics. A. A. Michelson. Univ. of Chicago Press, Chicago, Ill., 1962. 201 pp. Illus. Paper, $1.75.

The Theory of Electromagnetic Flow-Measurement. J. A. Shercliff. Cambridge Univ. Press, New York, 1962. 157 pp. Illus. $4.50.