

new technologies, new settlement patterns, increased population, and new forms of social organization. These developments were largely haphazard—so much so that, like modern man, prehistoric man usually wasn't aware of what was really happening to him.

The first great step forward was man's emergence from the animal world into the world of culture—that is, into a world in which imagination created new tools and new ideas that transformed the environment. A second major step was taken with the emergence of literate food-producing societies brought about by the domestication of animals and plants, population growth, and the creation of writing. The third and most recent step, which is beyond the scope of this book but which is part of the same story, is the industrial-

atomic revolution and present-day population explosion.

Each of these events has radically altered the direction of man's development, initiating vast changes in his relationship to the world around him and in his relationships to his fellow men. The documentation of these changes and of man's response to them during the long prehistoric period forms a basic background to the social and intellectual dislocations we are currently experiencing. *Prehistoric Societies* provides an excellent guide to this background and should be required reading for all those who consider themselves educated but who are unfamiliar with the subject of prehistory.

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## International Series on Dynamics

This textbook, **Foundations of Solid Mechanics** (Prentice-Hall, Englewood Cliffs, N.J., 1965. 539 pp., \$18), by Y. C. Fung, is intended to bridge the gap between elementary textbooks and the more advanced literature; it does an incredibly good job of meeting its objective. The text was developed at California Institute of Technology for a graduate course which represents a broadening of the traditional elasticity course. Major emphasis is on the linear theory of elasticity, but about one-third of the book deals with topics that are not traditionally considered a part of static or dynamic elasticity. These include plastic behavior of materials, elasticity and thermodynamics, thermoelasticity, irreversible thermodynamics, and finite deformation. Fluid mechanics is specifically excluded, but the author has nevertheless included a formulation of the constitutive equation for a linearly viscous fluid.

The treatment varies somewhat in depth from topic to topic, but it is nowhere shallow and is almost always exceptionally clear. The basic introductory chapters and the treatment of dynamic and static elasticity are especially outstanding. The thermodynamic formulations are limited to small deformations. In irreversible thermodynamics, the author limits himself to linear processes, states the Onsager reciprocal relations, and presents Biot's treatment of relaxation modes and hidden variables, with application to linear

viscoelasticity. In the chapter on thermoelasticity he achieves a practical flavor by calculating the temperature and stresses in a turbine disk as an example. The 22-page chapter on linear viscoelasticity introduces tensorial relaxation and creep functions, formulates stress-strain relations in differential equation form, and discusses boundary value problems and integral transformations, waves in an infinite medium, quasistatic problems, and reciprocity relations. Finite deformation is treated in chapter 4, called "Analysis of strain," and in the final chapter, chapter 16, called "Finite deformation." The last chapter contains the fundamentals needed for formulating equations of motion in the presence of finite deformation and a clear derivation, given in a material (or "Lagrangian") description, of the von Karman equations for the large deflection of plates. There is a useful 27-page bibliography in which other books and important papers are cited.

The reader will find here a carefully written, readable book which assembles a large amount of useful material. The topics treated seem to be sensibly selected with an eye to engineering applications and tutorial value. The book is as up-to-date as can be expected in a rapidly developing field. Naturally, the instructor who is alert to current developments in rational and technical mechanics may decide to omit or present improved versions of some sections, but it should never-

theless be possible to give a very good course by following the book closely. The students who work through this book will get a sound introduction to solid mechanics.

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## An Introduction to Histology

This short monograph, **Living Tissues: An Introduction to Functional Histology** (Pergamon, New York, 1965. 154 pp. Paper, \$2.95), by R. L. Holmes, is stated to represent an introduction to the study of the morphology and the function of tissues. It is simply and clearly written and outlines the basic concepts and methods of classical histology. In addition, it stresses the use of newer histochemical, fluorescent, and autoradiographic techniques and attempts to point out the functional significance of structural elements. It is by no means a comprehensive text but consists of a series of examples that illustrate the organization of tissues. A series of 36 photomicrographs are included, which are of good quality and complement the text. References are kept to a minimum and when given refer to more comprehensive texts and to a few classical articles in the older literature. A more thorough bibliography would have been useful to the novice.

This volume appears to accomplish the author's main goals. One decided drawback is the lack of information concerning the ultrastructure of cells as determined by electron microscopy. Material illustrating the qualities of phase-contrast microscopy is also omitted. This volume can be recommended for the biologically oriented high school student and the undergraduate who requires an introduction to histology.

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## History of Science

"Michael Scot may be regarded as the leading intellectual in Western Europe during the first third of the thirteenth century." With this statement Lynn Thorndike begins his most recent book, **Michael Scot** (Nelson, Edinburgh, 1965. 151 pp., 30s.). And certainly Michael

was a man of many interests: his known career begins with his translation of much of Aristotle's work (with the commentaries by Averroes) from Arabic into Latin, and ends with his death about 1235 when he was astrologer and general scientific advisor to the Emperor Frederick II. Within another generation his attainments became legendary. But for this reason it is now difficult to discern the historical figure beneath the legends, certainly difficult to improve on the attempts to do so that were made by Charles Haskins 40 years ago.

Thorndike tacitly accepts this, so that the present work opens not with a critical biographical study but with a brief and largely conjectural survey of Michael's life. This section summarizes the established facts of his career, and discusses the inferences with which earlier writers have tried to fill the gaps; Professor Thorndike includes some of his own. The treatment is too superficial to reveal much of Michael's scientific personality; it does not, for example, consider the content or importance of his contribution to the intellectual life of Frederick's court. Indeed, it is Thorndike's belief that, whatever Michael's contemporary reputation, he was not particularly original or influential as a natural philosopher, and that he was of much greater importance to intellectual history as a

transmitter of Aristotelian and Arabic knowledge.

This explains why the bulk of *Michael Scot* is not so much an analysis of his thought as an attempt to mirror in it the "Western Christian view of nature and science in the early thirteenth century." Thorndike has drawn a wide variety of scientific observations and speculations from works attributed to Michael, principally from his astrological *Liber introductorius*, and arranged them under eight arbitrary but serviceable headings (for example, meteorology, medicine, sociology). The effect is of course to make Michael and his contemporaries appear less philosophers than historians of nature; only occasionally are his views treated in enough depth to relate him to the later scientific tradition (as when his theory of the rainbow is shown to be closer to Albert the Great's than to Grosseteste's). Inevitably, too, the scope of the material presented is somewhat restricted by the astrological function its sources were meant to serve. Nevertheless, the book is of real interest as an illustration of the character of Western science in the first years of its acquaintance with its full Aristotelian inheritance.

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## An Atlas of the Laboratory Mouse

This long-awaited atlas is disappointing, especially in view of the work that must have been involved. Without an accompanying text even an excellent atlas has limited usefulness; this one, **The Anatomy of the Laboratory Mouse** (Academic Press, New York, 1965. 149 pp., \$6), by Margaret J. Cook, with its superficial coverage, inadequate figure legends, inconsistencies with respect to anatomical terminology, and inaccuracies, will appeal to few who work with mice. There is little of value to researchers who need a model with which to compare observed deviations, and beginners will find the figures confusing. The drawings are amateurish, needlessly repetitive, lacking in detail, and inaccurate. The legends are inconsistent, nondescriptive, and, in cases, misleading.

Because bones lend themselves to line drawings, the section on skeleton is perhaps better than either of the

other two. However, Cook's drawings of the bones cannot compare in clarity and attention to detail and proportion with those in papers published by Grüneberg, Bateman, Stein, and others. Magnifications are noted in the legends for bones (but not for viscera and blood vessels); they would be more meaningful if they were uniform. For example, the dorsal aspect of the skull is drawn  $\times 6$  and the lateral aspect  $\times 8$ ; the "upper surface of the right manus"  $\times 6$  and "of right pes"  $\times 4.5$ .

In the introduction the author makes this statement: "Reproductive organs are also drawn in some detail." Yet in none of the 13 drawings of parts of the male system is the relation of ductus deferens or of accessory glands to urethra shown. Relationships between parts of other systems—such as the urinary, female reproductive, and digestive systems—are unclear; endocrine glands and lymph nodes are al-

most totally ignored. Although the "strain" depicted, LAC Grey, may differ "considerably" from others, as the author suggests, such features as three phalanges in the pollex (Fig. 36), one superior cava (Figs. 91 and 96), and sheets of mammary tissue (Figs. 49 and 50) instead of separate glands are so unusual as to have warranted special mention.

This book cannot be recommended to those interested in detail, proportion, and accuracy, nor even to those interested in a general picture of mammalian anatomy.

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## New Books

### Mathematics, Physical Sciences, and Engineering

**Advanced Mechanism.** Joseph Stiles Beggs. Macmillan, New York, 1966. 286 pp. Illus. \$12.95. Macmillan Series in Mechanical Engineering, edited by Fred Landis.

**Alloys of Niobium.** D. A. Prokoshkin and E. V. Vasil'eva. A. M. Samarin, Ed. Translated from the Russian edition (Moscow, 1964) by N. Kaner. Molly Gleiser, Translation Editor. Israel Program for Scientific Translations, Jerusalem, 1965; Davey, New York, 1966. 350 pp. Illus. \$16.50.

**Basic Developments in Fluid Dynamics.** vol. 1. Maurice Holt, Ed. Academic Press, New York, 1965. 459 pp. Illus. \$17.50. Five papers: "The numerical solution of problems in gas dynamics" by O. M. Belotserkovskii and P. I. Chushkin; "Bluntness effects in hypersonic small disturbance theory" by J. P. Guiraud, D. Vallée, and R. Zolver; "The stability of parallel flows" by W. H. Reid; "Blast wave theory" by Akira Sakurai; and "Laminar boundary layers on cambered walls" by F. Schultze-Grunow and W. Breuer.

**Chemistry.** Michell J. Sienko and Robert A. Plane. McGraw-Hill, New York, ed. 3, 1966. 668 pp. Illus. \$8.95.

**The Chemistry of Open-Chain Organic Nitrogen Compounds.** vol. 2, *Derivatives of Oxidized Nitrogen: Hydrazines to Nitrates*. Peter A. S. Smith. Benjamin, New York, 1966. 543 pp. Illus. \$35.

**Engineering Mechanics.** vol. 1, *Statics*. Irving H. Shames. Prentice-Hall, Englewood Cliffs, N.J., ed. 2, 1966. 318 pp. Illus. \$7.50. Prentice-Hall Engineering Science Series.

**Explorations in Elementary Mathematics.** Seaton E. Smith, Jr., Prentice-Hall, Englewood, N.J., 1966. 298 pp. Illus. \$5.95. Teachers' Mathematics Reference Series, edited by Bruce E. Meserve.

**Handbook of Fluorescence Spectra of Aromatic Molecules.** Isadore B. Berlman. Academic Press, New York, 1965. 268 pp. Illus. \$8.50.