differentiation of the mesenchymal tissue. Elongation (i.e., unequal principal strains) provokes the formation of the collagen fibrils, and therefore of connective tissue. Hydrostatic "pressure" (here defined as a state of strain in which the three principal strains are equal) stimulates the formation of cartilage tissue. There is no specific mechanical stimulus for the formation of bony tissue. Bony tissue proceeds on the basis of a rigid framework (of connective tissue, cartilage or bone), and can be a process of calcification of cartilage, or of a new formation subjected to the laws of functional adaptation.

Pauwels quotes many experimental observations that contradict Roux's hypotheses and support his won. Among these, the most important are the following: 1) In bone remodeling of the femoral neck which is cancellous, the regions in which the largest principal stress is in tension are calcified along the tensile trajectories, showing that tensile stress stimulates bone growth as well as the compressive stress. 2) If a taut tendon is bent by a lateral load, many encapsulated spherical cartilage cells develop between the bundles of fibers in regions subjected to compressive stresses. With such encapsulated cells further modeling of the bone proceeds. This interesting scenario, however, has not yet been verified in detail.

While the cellular dynamics remains to be clarified, it is certainly clear that the consideration of mechanical stress acting on the wound should guide any surgical procedure for treating bone fractures. This book contains many interesting discussions on do's and don'ts of bone surgery.

I am glad to see this English translation of a classical book.

Reviewed by
Y. C. Fung, UCSD, La Jolla, Calif.

Enzyme Engineering, 5, *Proceedings of the Fifth International Enzyme Engineering Conference*, July 29–August 3, 1979, Henniker, New Hampshire, 485 pp., eds., H. H. Weetal and G. P. Royer, Plenum Press, New York, 1980.

Interest in "enzyme engineering" has grown continuously over the past decade. This somewhat nebulous term has come to mean the use of enzymes, cellular organelles, or intact whole cells that have been immobilized by attachment to supports as specific catalysts in certain chemical processes. The range of applications of enzyme engineering has become quite broad, including such areas as biology, medicine, energy, agriculture, food and beverage processing, and the chemical industry. The term was originally proposed at the First International Enzyme Engineering Conference held at Henniker, New Hampshire in the Summer of 1971. As a new graduate student, this reviewer was present at that meeting and shared a sense of excitement about the potential of this technology. This volume containing the work of 170 individual authors is based on papers presented at the Fifth International Enzyme Engineering Conference and is evidence of the partial fulfillment of this potential. A keynote paper by E. Katchalski-Katzir outlines some of the past achievements in enzyme engineering and prophesies about future developments and trends. The rest of the book is a compilation of 84 short papers (average length, four pages), divided under the subheadings of enzyme production, energy, biomass conversion, biomedical and analytical applications, large-scale reactor systems, immobilized cells and organelles, and enzyme engineering in the synthesis of fine chemicals. This book imparts an appreciation for the diversity of the applications of enzyme engineering and the ingenuity of some of the workers in the field. Although the reader will have to turn elsewhere for a deeper understanding of most of the subjects, a text of this sort written at the appropriate time is of value and deserves a place on the practitioner's bookshelf.

Reviewed by
D. A. Gough, UCSD, La Jolla, Calif.

Cell Motility, ed., Robert D. Allen, Dartmouth College; Hanover, N.H., published by Alan R. Liss, Inc., Vol. 1, 1980/81; price: $60.00 personal; $80.00 Institutional subscription, U.S.

This new quarterly journal is devoted to publication of original investigations on the spontaneous motion of single cells and all its related phenomena. The editor invites contributions made by cell structural, biochemical, biophysical, and theoretical approaches. In addition to original research reports the journal will also publish invited reviews, brief communications, book and film and meeting reports.

It is the objective of the editor to provide with this journal, a center forum for the discussion to cell motion which in previous years, has been scattered in several other biological journals. What use can this journal be to the Bioengineer?

Although the bioengineering discipline has made important contributions to the understanding of the swimming motion of micro-organisms or muscle contraction, other important fields related to cell motility have been given little attention. These include the amaeboid movement, tissue cell movements, movement during mitosis, cell cytoplasm rheology, axoplasmic transport, or cytoplasmic streaming, to name a few phenomena which this new journal hopes to address. The variety of experimental approaches and multitude of cellular systems which are listed in the first volume is impressive. These are a multitude of problems that require an engineering analysis. Bioengineers may find the contributions in Cell Motility stimulating, suggesting new areas of research, and a source for the current understanding of its biochemistry and biophysics.

The quality of the research publications and reviews in Cell Motility is excellent. The photographic reproductions are first-rate and the outlay of the individual contributions is well structured and clear.

Reviewed by
Geert W. Schmid-Schoenbein, Ph.D., A.S.L.S.A.
Assistant Professor
Applied Mechanics, Engineering Sciences and Bioengineering
UCSD, La Jolla, Calif.

An Introduction to Microcirculation, (Biophysics and Bioengineering Series, Vol. 2.), by Mary Purcell Weideman, Ronald F. Tuma, and Harvey Norman Mayrovitz, 226 pp., illustrated. New York, Academic Press, 1981. $30.

Substantial advances in our knowledge of the microcirculation in recent years have led to the publication of a number of detailed treatises directed in the main to specialists in the field. The compact volume by Wiedeman, Tuma and Mayrovitz is intended to serve as a primer to bridge the gap between the overly simplified treatment of the subject in textbooks of physiology and the in-depth coverage of selected aspects in monographs. As such, the book meets a real need, in view of the increasing importance of an understanding of microcirculatory behavior in modern concepts of medicine and pathology.

Downloaded From: https://biomechanical.asmedigitalcollection.asme.org on 06/19/2019 Terms of Use: http://www.asme.org/about-asme/terms-of-use
Copyright © 1982 by ASME