

of the human femur, made it the basis of his trajectory hypothesis and his "law of bone transformation."

Key developments following this beginning are discussed by Roesler.

Other papers in this volume are also excellent. Currey is a fascinating speaker with a broad perspective. Hayes' article is a superior stereological study of the trabecular bone. Woo's paper on long bone remodeling contains many new data. And there are many others on which I will not comment. This volume is highly recommended to bioengineers.

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Perspectives in Biomechanics, Vol. 1, Parts A and B. Edited by H. Reul, D. N. Ghista, and G. Rau. The first of a series of monographs edited by D. N. Ghista. Part A, 528 pages, Part B, 363 pages. \$214.50 (2 Vols). Harwood Academic Publishers, New York, Chur, London, 1980.

Biomechanics is mechanics applied to biology. It indeed covers a very broad territory. The area covered by this volume is described by the following chapter headings:

- 1 Towards an effective theory-to-medical practice approach in biomechanics, by D. N. Ghista, R. Reul, G. Rau, M. Waschmann
- 2 Solid mechanics in biomedicine, by H. G. Kingsbury, J. L. Nowinski, T. W. Chou
- 3 Fluid mechanics in cardiovascular flow, by T. J. Pedley, T. K. Hung, and R. Skalak
- 4 Human micro and macro heat transfer, in vivo and clinical applications, by W. J. Yang.
- 5 System theory in biomedicine, by R. Rosen
- 6 Mechanics of walking and running, by R. M. Alexander
- 7 Ergonomics in medicine, by R. Barnotat and G. Rau
- 8 Mechanics in agriculture, by A. T. Johnson
- 9 Homeokinetic physics of societies, by Iberall, H. Soodak, and C. Arensberg
- 10 Dynamic response and protection of the human body and skull in impact situations, by R. H. Huston and N. Perrone
- 11 Mechanisms, evaluation, prognosis, and management of head and neck injury, by King Liu
- 12 Spinal mechanics: kinematics, kinetics, and mathematical models, by M. M. Panjabi and A. A. White, III
- 13 The impact of biomechanics on the neuromuscular rehabilitation, by L. Vodovnik, T. Bajd, and A. Kralj
- 14 Compartment analysis in biomedicine, by M. Kwahara.
- 15 Biomechanics of neuro-sensory systems, by E. Biondi, F. Grandori, A. Pedotti, and R. Schmid
- 16 The mechanics of the interaction between ventilation and perfusion, by S. Cameron
- 17 Kinematic theory of function and evaluation of articular joints, by Y. Youm
- 18 Selection criteria for polymeric implant application with representative modifications for increased acceptability, by J. W. Boretos

These articles survey the fields covered, and present selected lists of references up to about 1978. But a perspective is a personal thing, and different persons see different things in the same field. For example, the motion or locomotion of man and animals is treated several times in this book; by Kingsbury et al. in Chapter 2, by Huston and Perrone in Chapter 10, by Liu in Chapter 11, and by Youm in Chapter 17. They are all good. But the substances are very different, and the lists of references differ to a surprising degree. Some references considered basic and central in importance by one author are not mentioned at all by another.

There are lots of very good passages in this volume. Overall this is a very useful reference book. Its wide coverage will broaden people's views on biomechanics.

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Osteoarthromechanics, edited by Dhanjoo N. Ghista, Ph.D., 485 + x pages, \$49.50. McGraw-Hill, New York, 1981. Copyright by Hemisphere Publishing Co.

This book opens with a chapter by Subrata Saha on the

dynamic strength of bone, which contains a very useful survey and lists of data. The second chapter is by J. L. Nowinski on the effects of holes and perforations on the strength and stress distribution in bone elements. This contains detailed analyses of holes with mathematical details given in several appendixes. Chapter 3 by R. Collins and H. B. Kingsbury presents a comprehensive review of the theories on the lubrication of human articular joints, and experimental results. Chapter 4 by James Pugh is entitled "Biomechanical Aspects of Osteoarthritic Joints: Mechanisms and noninvasive detection." The pathological changes in the tissues are discussed thoroughly, and the method of impact testing as a noninvasive diagnostic technique is presented with some detail. I find this an excellent chapter. Chapter 5, "Finite-element applications in joint-replacement design and analysis," by Thomas P. Andriacchi and Steven J. Hampton, presents the finite element method succinctly. Design applications are emphasized in the discussions. The next chapter, 6, by Peter S. Walker, is on Artificial Joints. It presents the history of the subject, the kinematics, kinetics and materials of artificial joints, and their design and performance. It is an excellent survey.

The rest of the book, about half of the volume, is concerned with the spine. It begins with Chapter 7 by the Dutch authors A. W. M. Schijvens, C. J. Snijders, J. M. Seroo, and J. G. N. Snijder, on the mechanics of the spine: analysis of its flexibility and rigidity, postural control, and correction of the pathological spine. This is a good, simple, introductory chapter. The analysis of standing and sitting is very good. The next chapter, 8, by Lars Sonnerup, is entitled "Stress and strain in the intervertebral disk in relation to spinal disorders." Chapter 9, by Gordon C. Robin and Zvi Yosipovitch, is entitled "The biomechanics of thoracic and lumbar spine fractures: their fixation and stabilization." Chapter 10, by J. E. Lonstein and R. B. Winter, is entitled "Mechanics of the deformity and treatment in scoliosis, kyphosis, and spine fractures." The final chapter, 11, by Rae R. Jacobs and D. N. Ghista, is entitled "A biomechanical basis for treatment of injuries of the dorsolumbar spine."

Thus it is seen that the spinal mechanics is given a major share of attention. The style of most of the chapters remains physical and physiological as opposed to mathematical and computational.

The whole book is lucid and concise, well illustrated and well printed. I recommend it highly.

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Cardiovascular Fluid Dynamics, by Uric Dinnar, Ph.D. 252 pages, U.S. \$69.95, Foreign \$79.95, CRC Press, Inc., Boca Raton, Florida.

After a brief introduction of the cardiovascular bed as a system, and some elements of physiology of the circulatory system, the book begins with a chapter on the properties of flowing blood, then goes on to the structure and physiology of blood vessels, propagation of waves in arteries, pulsatile flow in rigid and elastic tubes, analog models of the circulation, the heart as a pump, blood flow in the microcirculation, and finally, fluid mechanics of thrombus formation. Thus in a relatively small space it surveys the arterial blood flow, some aspects of microcirculation, heart, and blood. No specific reference is made to the specialized circulatory systems of various organs. Features of flow in vein caused by its collapsibility are not discussed.

The text is mathematical. It leads the reader quickly to the mathematical formulation of the problem and the solutions and interpretations. In many places the mathematical level required of the reader seems to be quite low. So is the required