Chapter 24 by T. M. Hansen is concerned with the production of collagen in granulation tissue from the point of view of the antigenic and immunologic properties of collagen. The ability of collagen to bind antigens to aggregate thrombocytes, to exhibit chemotaxis and to inactivate complement may be of pathogenic relevance for the development of chronic inflammatory processes in connective tissue. Hansen's paper presents a method of producing granulated tissue by implanting synthetic sponges subcutaneously. Chapter 25 by Zederfeldt discusses various factors influencing wound healing. This is a truly well-written short introduction to the subject. Chapter 26 by Fogdestam and Gottrup discusses method of measuring strength of tissues during wound healing.

I believe that the wound healing process is stress modulated. But the influence of stress field on wound healing is not mentioned by any of these papers! This marks a fundamental difference in the points of view between orthopedic surgeons and plastic and general surgeons. In bone research, Wolff's law has been accepted for a long time. Healing of bone requires an appropriate stress being applied to the bone: the stress must not be too large, neither should it be too small. An optimal range exists for growth. Stresses outside the range lead to resorption. There is evidence that the growth of soft tissue is also stress modulated. Perhaps we will hear more about this in the future.

In conclusion, I recommend this book for any bioengineer's bookshelf.

The Biomechanics of Sports Techniques, 2nd Edition, by James G. Hay, University of Iowa, 519 pp. Prentice-Hall, Englewood Cliffs, N.J. 1978.

This is a delightful book. It is written for physical educators, coaches of athletic teams, and athletes. In this book the basic concepts are very clearly presented, and then applied to the analysis of sports techniques. Chapter 1 is an introduction (8 pp.) Chapters 2–7 (157 pp.) deal with basic concepts: forms of motion, linear kinematics, angular kinematics, linear kinetics, angular kinetics, and fluid mechanics. Chapters 8–17 are analysis of sports techniques. The successive chapter headings are: Baseball, Basketball, Football, Golf, Gymnastics, Softball, Swimming, Track and Field, Running, Jumping, and Throwing. This part occupies 314 pages, and is quite exhaustive. For each sport, the analysis is divided into two parts: Basic Considerations and Techniques. The former deals with the factors involved. The latter gives details with particular emphasis on those areas where there are known to be disagreements among teachers and coaches.

The new edition incorporates new findings of current research. As the author says: "The techniques employed in sports sometimes change at an almost bewildering rate, so that those concerned have a difficult time keeping abreast of them." For example, in the few years since the text was first published, the grab start has almost universally accepted as the fastest starting technique in swimming; the rotational technique has become accepted as a viable alternative to the long-dominant O'Brien technique in short putting; the standing start, recently thought to be a similarly viable alternative to the traditional crouch start in sprinting, has been outlawed by a rule change; and the somersault long-jumping technique has arrived, been banned, and departed. The new techniques are discussed in the book.

I recommend this book to all people interested in biomechanics, not only athletes and coaches, but also to bioengineers, orthopedic surgeons, physiologists, and general readers. It is easy to read and easy to understand, and will make people enjoy sports more.

Fundamentals of Sports Biomechanics, by Charles Simonian, Ohio State University, 221 pp., Prentice-Hall, Englewood Cliffs, N.J. 1981.

This is a textbook for students of physical education, athletic coaching, and dance. It is written in an elementary manner. No prerequisite knowledge of physics or mathematics beyond what is ordinarily taken in high school is necessary. It discusses force, motion, work, energy, and concludes with a chapter on applications to physical education and sports. The treatment is quite brief, with one page on swimming, one page on bowling, one page on diving, one page on gymnastics, etc. Well written and smooth, this book requires little effort on the part of the reader.

Rheological Techniques by R. W. Whorlow, 447 pages, $94.95, first published by Ellis Horwood Ltd., Chichester, distributed by Halsted Press, a division of Wiley, New York, 1980.

Biorheology is a bioengineer's intimate concern, and this book is important to bioengineering. In this book various rheological techniques and instruments are discussed in detail. It is written as a textbook, but is also a reference book. At the end of the book there is an Appendix on commercially available apparatus, including a list of addresses of manufacturers. This will be very useful to people who are choosing instruments.

The chapters headings are as follows:

1. Deformation and Stress
2. Tube Viscometers
3. Rotational Viscometers
4. Creep and Stress Relaxation
5. Dynamic Tests
6. Wave Propagation
7. Analysis of Viscoelasticity Measurements

The mathematical level is elementary. The text is lucid. The references list is comprehensive and up-to-date. Illustrations are good, well drawn and nicely printed. I strongly recommend this book to bioengineers who are concerned with biorheology.

Foundations of Physiological Instrumentation, A Source Book with Experiments, by Normal N. Goldstein and Michael J. Free, 384 p., $39.50, Charles C. Thomas, Springfield, Ill., 1979.

I was looking for a textbook for the undergraduate course in laboratory experiments in bioengineering, and was delighted to find this book. It is well written, and sufficiently comprehensive and detailed for the students. It will be convenient for the instructor to use.

The book is divided into two parts. Part One, entitled *Foundations*, contains the following chapters:

1 Basics and Overview
2 DC and AC Theory
3 Principles of Amplification
4 Noise
5 Instruments and Systems
6 Transducers
7 Processing Signals
8 Electric Safety

Part Two, entitled *Experiments*, contains the following:

1 Membranes, Selective Permeability
2 Frog Sciatic Nerve

3 Bioelectric Phenomena in Plants
4 Human Heart, EKG, Control, etc.
5 Respiration
6 Nerves and Muscles

In addition, there are several useful appendices on instrumentation literature and lab manuals, on anesthesia, catheters, and shop-made instruments.

The presentation of the fundamentals is very careful. The figures showing actual components in the laboratory are useful. But there are some omissions. For example, p. 35, capacitive reactance is discussed at some length. Why so skimpy on inductive reactance? Then, resistor code is given, so that a student can recognize a resistor when he/she sees one. Why not present the code for capacitors as well?

The discussion on solid state devices is very good. The chapter on electric safety is excellent. Safety is an important subject. Bioengineers can make a great contribution to health delivery by paying attention to and improving safety measures in hospital practice. Not only electric safety, but also the question of how to prevent human errors in the operation of medical instruments, such as respirators, etc.

If a complaint can be lodged, it is that many illustrative figures are so small that it is very difficult to read. But overall, I find this book excellent.

Modern Cardiovascular Physiology, by Carl R. Honig, 347 + xiii pp., $15.95 (paperback), Little, Brown & Co., Boston, 1981.

The Human Cardiovascular System – Facts and Concepts, by John T. Shepherd and Paul M. Vanhoutte, 351 + vi pages, $14.95 (paperback), $25.00 (cloth), Raven Press, New York, 1979.

These two new textbooks are both excellent, yet they are very difficult in style and approach. The difference in contents can be seen from their major divisions.

Honig:
1 Properties of Cardiovascular Muscles
2 Hemodynamics
3 Capillaries, Filtration, and Determinants of Transport
4 Regional Circulation and Vasomotor Mechanisms
5 Regulation by Central Nervous System

Shepherd and Vanhoutte:
1 Components of Cardiovascular System
2 Dynamic Behavior
3 Local Control of Cardiovascular Function
4 Neurohumoral Regulation
5 Integrated Responses of the Cardiovascular System to Stress
6 Pharmacodynamics
7 Hypertension Hyperreactivity
8 Diseases of the Endothelium, Supporting Structures, and Active Components of the Cardiac and Vascular Walls
9 Circulation in the Fetus, Changes at Birth, and Congenital Heart Disease
10 Measurement of Heart Function, Vascular Function and Blood Volume

Thus Shepherd and Vanhoutte is more clinically oriented, but Honig contains clinical applications, too, though not as much. The discussion of pharmacodynamics and pathological situations and their management in Shepherd and Vanhoutte is very good; it makes delightful reading as well as being informative.

Both books have in common an emphasis on the systems concept. Both display the complexity of the cardiovascular system. Both stress the importance of the transport phenomena. Yet the styles are different. Honig has more mathematical formulas, whereas Shepherd and Vanhoutte has more diagrams of molecular structures. Honig leans more on the physics side of the problem. Shepherd and Vanhoutte leans more on the chemical side. Honig stresses rheology, and considers it to be one of the important advances made in the past 20 years; Shepherd and Vanhoutte does not mention that word. Honig spends considerable space on microcirculation; Shepherd and Vanhoutte are very brief on that. Honig asks his reader to do exercises to solve the problems presented in the book, and considers that as an integral part of the text; Shepherd and Vanhoutte offer no problems for solution. On the other hand, the superior chapters on neurohumoral regulation and pharmacodynamics are not matched by Honig.

I like both books. An instructor selecting a text book can choose according to his/her inclination and judgment as to what is needed by the student.

Structure and Function of the Circulation, Vol. 1., edited by Colin J. Schwartz, Nicholas T. Werthessen, and Stewart Wolf, 819 pp., $75, Plenum Press, New York and London, 1980.

This book contains 11 chapters. I found them all well written and informative. The contents are as follows:

1 The Arteries in Greco-Roman Medicine, by C. R. S. Harris, 20 pp.
2 Embryology of the Human Arterial System, by W. Pallie, 74 pp.
3 Functional Morphology of Arteries During Fetal and Post-natal Development, by W. W. Meyer, S. Z. Walsh, and J. Lind, 286 pp.
4 Abdominal Visceral Circulation in Man, by E. A. Edwards, 44 pp.
5 Arterial Circulation of the Extremities, by H. Haimovici, 62 pp.
6 Biology of the Collateral Circulation, by D. E. Strandness, Jr., 50 pp.
7 Measurement of Blood Pressure, Blood Flow, and Resistance to Blood Flow in the Systemic Circulation, by J. Ludbrook, 50 pp.
8 Regulation of Arterial Blood Flow, Pressure, and Resistance in the Systemic Circulation, by J. Ludbrook, 44 pp.
9 The Anatomy of the Renal Circulation, by K. Solez and R. H. Heptinstall, 30 pp.
10 The Renal Circulation: Physiology and Hormonal Control, by K. Solez and R. H. Heptinstall, 68 pp.
11 The Innervation of Arteries, by G. Burnstock, J. H. Chamley, and G. R. Campbell, 40 pp.
12 The Blood Supply to Nerves, by W. Paille, 36 pp.

Dr. Harris presents in the first chapter a very interesting account of the Greco-Roman conception of circulation. A mistaken idea, based on a wrongly interpreted observation of fact, prevented the ancients from discovering that blood circulates. The observation was that in dissection of corpses the arteries were found to be patent and filled with air. The interpretation was that the arteries supply the gases to the organs. Following this mistaken idea, all the brilliant achievements of Greek and Roman anatomy were not able to yield a correct assessment of the function of circulation. This discussion is a fitting introduction to the chapters that follow.

The second chapter is devoted to arteriogenesis. It is an excellent presentation with many colored illustrations. The third chapter, by Meyer, Walsh and Lind, treats the morphology of arteries during fetal and post-natal development. It is 286 pages long. The details of the morphology are presented in an unhurried manner. It is one of the most comprehensive treatments of this subject. In today's world of publications, in which the publisher and the editors always try to get the authors to shorten their manuscripts, the appearance of this chapter is a delight. It gives me much pleasure to read the details of the structures of the arterial walls. Information like this is needed if bioengineers are ever going to