tains, in an orderly form from the pathologist's point of view, a review of the recent findings with respect to the diseases discussed. Some of the material is excellent. The chapter headings give an excellent idea of the scope of the volume: "Diseases of the Gastro-intestinal Tract," "Diseases of the Liver and Biliary Tract," "The Anaemias," "Diseases of the Blood, the Clotting Mechanism," "Hypertension," "Diseases of the Kidney and Genito-urinary Tract," "Adrenal Diseases," "Diseases of Iodine Metabolism," "Diseases of Bone and the Parathyroid Gland," "Diseases of the Nervous System," "Diseases of Muscle," "Diabetes Mellitus and Hypoglycaemia," "Disorders of Nutrition," "Miscellaneous Disorders of Metabolism: I. Some Abnormalities of Amino-acid and Haemoglobin Metabolism," "Miscellaneous Disorders of Metabolism: II. Connective Tissue Disorders," "Miscellaneous Disorders of Metabolism: III. Porphyrias," "Miscellaneous Disorders of Metabolism: IV. Haemochromatosis," "Miscellaneous Disorders of Metabolism: V. Glycogen Storage Diseases and Galactosaemia," "Miscellaneous Disorders of Metabolism: VI. Lipidoses," and "Disorders of the Reproductive Organs."

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Stress and Strain in Bones. Their relation to fractures and osteogenesis. F. Gaynor Evans. Thomas, Springfield, Ill., 1957. 245 pp. Illus. $6.50.

In this short monograph the author has attempted to bring together most of the data, including his own extensive researches, pertaining to the mechanical behavior of various bones, the structural characteristics of bone as a tissue, and the relationship of these mechanical data to osteogenesis, fracture healing, and the production of fractures.

He has wisely included a simple and easily understood introductory chapter on the elementary principles of mechanics and stress analysis and a glossary of engineering terms at the end of the book. Nine of the 14 chapters (not including the introduction) are devoted to the mechanical behavior of bones and bone, including methods and mathematical analyses. The rest are devoted to the correlation of these data with biological phenomena.

Throughout the book the author has very carefully and critically evaluated the vast literature in the field and has correctly pointed out a number of errors, both in semantics and interpretation, which have been perpetuated for many years; in doing so he has done the field a distinct service. I believe, however, that the sections on the purely mechanical aspects of the problem could have been improved if the author had included a small section, with diagrams and illustrations, on the external force systems causing stress and strain in bone—that is, gravity, inertia, ground forces, and muscle forces—demonstrating how they produce stress and strain in bone. This is particularly true of muscle action, since failure to include the effect of muscle action vitiates much of the published data on the stress distribution, stress magnitude, and so forth, on intact long bones. Most of these tests have been carried out on statically or dynamically loaded femurs by means of one applied force—for example, on the head of the femur.

Since muscles act not only by increasing the magnitude but by changing the line of action of the resultant force, and exert their effects only between their origins and their insertions, the resultant stress distribution and the magnitude of the stress can be markedly altered. Static or dynamic tests, therefore, on firmly fixed femurs, for example, loaded through the femoral head, with the opposing force only at the tibial end, have very little in common with the actual distribution in the femur *in vivo*. The author is aware of this, since he included some of Pauwels' work on models, in which various braces were applied to simulate certain muscle actions, but I do not think he emphasizes sufficiently the deficiency of data collected on *in vitro* loading and the impossibility of correlating this with the actual conditions as they are *in vivo*. The studies of the author and his collaborators recording strain directly from living animals should make it possible, in the future, to circumvent a great many of these difficulties.

The mechanical data which the author has compiled from his own and other researches on the structural characteristics of various bones and on bone as a tissue should prove very valuable to workers concerned with the safety and tolerances of the human body under circumstances of mechanical stress (as in automobiles, airplanes, and so forth) and should help these groups in designing safer vehicles.

The section devoted to fracture production should prove valuable to orthopedic surgeons, particularly in the evaluation of the type of internal or external support to be used in immobilizing fractures and in protecting against the type of bone stress most likely to disrupt continuity of the opposed bone surfaces.

In the sections which will most interest biologists—those on the relationship between mechanical stress, osteogenesis, bone architecture, fracture healing, and so forth—the author is unavoidably hampered, not only by the lack of previous critical experiments, but also by the fact that in the past the problem has not even been defined conceptually in terms of modern biology. Attempts to correlate trabecular orientation of spongy bone and computed or *in vitro* determined stress lines in models and intact long bones is quite naive, and this is well brought out by the author. Unfortunately, most of the literature in the past has focused on gross architectural changes such as trabecular pattern in spongy bone, but little has been done with ultrastructural changes in compact bone. For the most part, the experimental work in the past has not been very critical or conclusive. Most of these deficiencies are well discussed by the author, including the lack of any good suggestions about the mechanisms involved whereby mechanical stress alters bone architecture, healing, and so on. Again, I believe the author might have improved this section with some more pointed comments on the need to consider the biological effects of mechanical stress at various ultrastructural and structural levels. The orientation of collagen fibrils, primitive fibers, fibers, fiber bundles, and so forth may be quite different even in compact bone, and the reaction to mechanical stress at these different levels may be quite different. The same is true of the collagen in trabeculae. There may be no relationship between the orientation of the gross trabeculae, the orientation of the ultrastructural components of the trabeculae and their relative behavior to mechanical stress. If mechanical stress does affect the production and resorption of bone and the ultrastructural arrangement of the components of bone, it does so by physiochemical means not yet even defined conceptually, let alone demonstrated experimentally.

In his well-written monograph, Evans has, by assembling the data, critically evaluating them, and pointing up deficiencies in the biological approaches to this important problem, pointed the way, and this book should do much to stimulate more basic research in this field.

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William Harvey. His Life and Times: His Discoveries: His Methods. Louis Chauvois. Philosophical Library, New York, 1957. 271 pp. Illus. $7.50.

The celebrations of the tercentennary of William Harvey's death in 1957 may have motivated many to look for an adequate biography of the physician of Charles I, who made what is probably the greatest physiological discovery of all time. They will have discovered to their surprise that no recent work of this kind exists.