is to be called *Plastic Behaviour and Design* and is to describe the investigations pertaining to the inelastic ranges of loading.

The first two chapters of volume I present a summary of the specifications and practices that existed in various countries at the time the Steel Structures Research Committee was formed. Differences were observed in the specified live loads, wind loads, working stresses, and column formulas. The procedure indicated for checking the proportions of beams and columns was common to most building codes. For gravity loads, the beams were to be checked as simply supported beams and the columns were to be checked as pin-ended columns with or without eccentric loads. Provisons for continuity of columns were usually in the form of "effective lengths."

The next five chapters deal with the experimental phases of the investigation and present the results of tests on an experimental frame and three actual building frames. Various stiffnesses of beam-to-column connections were considered. These ranged from light beam connections, as in the experimental frame, to exceptionally stiff connections, as in a hotel building. Strains were measured for the various stages of construction ranging from the bare frames to the frames with floors laid and columns encased. It was observed that the behavior of an actual building was radically different from that assumed in the design methods in common use. The behavior was closer to that of a rigidly jointed frame than to that of a structure with hinged-ended beams. The columns had appreciable bending, and even comparatively light beam connections transmitted much heavier bending moments than had been anticipated.

The results of tests concerning the moment-angle change relationships for various types of beam-to-column connections are presented. These results are used in interpreting the behavior of the actual building frames, in developing several analytic procedures for frames with semirigid connections, and in developing a design method for such frames. Various conditions of loading and different types of frames were considered in arriving at a set of recommendations for the design of beams and columns in building frames. In the recommendations for the design of beams, allowance is made for the restraining moments at the ends of the beams. Adjusted standard curves are presented for different connections to maintain constant load factors, even though the design is based on working loads and working stresses. In studying the critical loading conditions causing single curvature or double curvature of columns, the yield stress of the material is used as a criterion of failure. As might be expected, the moments in the columns are large and extremely sensitive to the loading conditions considered. The book includes a summary of the recommendations made by the Steel Structures Research Committee in regard to the design of steel building frames.

In conclusion, the author discusses the reception of the recommendations given by structural designers and organizations involved in codifying practice. In general, a reluctance has been shown in modifying existing codes and rules of practice. This reluctance is principally due to the complications that are involved in the recommended design procedure without such complications being offset by a reduction in the amount of steel required in a building frame. Provided that no adjustments are made in load factors, the recommended design procedure, although rational, leads to lighter beams but heavier columns than ordinarily called for. The author indicates that volume II is to deal with a simpler method of design based on the plastic behavior of structures.

FRANK BARON

Structural Engineering Laboratory,
Division of Civil Engineering and Irrigation,
University of California, Berkeley

Biographical Memoirs. vol. XXVIII. National Academy of Sciences, Washington, D.C., 1954 (Order from Columbia Univ. Press, New York). 311 pp. Plates. Paper, $4.

This volume includes notices of Francis G. Blake by John Rodman Paul, of Gano Dunn by Vannevar Bush, of Merritt L. Fernald by Elmer D. Merrill, of Frederick P. Gay by A. R. Dochez, of E. B. Hart by Conrad A. Elvehjem, of Ludvig Hektoen by Paul R. Cannon, of Raymond A. Kelser by Richard E. Shope, of Elmer A. Sperry by J. C. Hunsaker, of George L. Streeter by George W. Corner, and of Frank C. Whitmore by C. S. Marvel. The biographies are as various as their diverse subjects and authors. Perhaps the single quality they share in common is their ability to move the reader to unbounded admiration for the energy, industry, imagination, and humanity of the men they portray. These men were all born, roughly, within the last third of the 19th century, and they have all contributed greatly to the vigor of present American thought. The facts of their lives constitute the raw material of contemporary intellectual history, and for this reason, as well as for the sake of commemorating these individuals from a personal point of view, the volume is fascinating to read.

JANE OPPENHEIMER

Department of Biology, Bryn Mawr College

Coronary Heart Disease in Young Adults. A multidisciplinary study. Menard M. Gertler and Paul D. White. Harvard Univ. Press, Cambridge, 1954 (For the Commonwealth Fund). xviii + 218 pp. Illus. + plates. $5.

This monograph represents the result of a concerted effort of nine well-known researchers and cardiologists trying to explain why some young persons are singled out and die following an acute coronary episode. Even a few of the conclusions give impressive evidence of the results of this study:

1) Coronary heart disease is more likely to occur if parents or siblings have experienced the disease.

2) The disease is associated more with a specific body build (the fat, muscular type) than with an increase of body weight.

3) The coronary patients are physically more masculine than the controls but are psychologically more feminine, possibly because of their cultural background.

4) The coronary patients are slightly hypothyroid.

5) Coronary heart disease can exist without hypercholesterolemia, even though this is often present; the predisposition is more important than any other factor.

The book is well arranged and its reading is easy and pleasant. The only criticism that can be made is the limitation to a small number of patients (100 cases) and the scarcity of patients of certain racial groups. This decreases the statistical value of the study. In spite of this, the monograph represents an important step in the slowly growing mass of knowledge about coronary heart disease.

ALDO A. LUISADA
Division of Cardiology, The Chicago Medical School

Vegetable Tanning Materials. F. N. Howes. Chronica Botanica, Waltham, Mass.; Butterworths, London, 1953. xi + 325 pp. Illus. $5.50.

A cheerful soul may find the world a good place to live in and may find that trees have wholesome personalities. The vegetable tanning materials are characters that have been important for thousands of years in converting raw hides, which are almost as unstable as meat, into durable leather.

Native plants found in different parts of the world contain enough tannic acid, or similar compounds, to be useful in local tanning, and during the last 100 years tanning materials have become an important part of world trade.

Commercial extracts have been developed from barks, fruits, leaves, roots, plant galls, and even woods. They may be liquid, solid, or spray-dried powder. Evaporation is done under a vacuum or as a spray, because the less heating required, the greater the preservation of useful organic compounds.

Vegetable Tanning Materials authoritatively covers the 39 commercial vegetable tanning materials of the world, together with outlines of the processes for the manufacture of extracts and for vegetable tanning. Also discussed are the sizable world trade in these materials and the biology of the tannins. Other tanning materials than vegetable are indicated. The 16 illustrations and the 10 figures add to the reading interest. There are references to other works and a list of the botanical names.

The three materials (extracts) used throughout the world in largest tonnages are mimosa or wattle bark, which is cultivated on plantations in South Africa and Australia; quebracho wood, a slow-growing tree scattered through forests in the Argentina-Paraguay area; and chestnut wood from the mountain regions of the southern United States, France, and Italy. Hemlock and oak barks have been replaced by these three items. Chestnut trees in the United States seem to be doomed by a blight, but the dead trees can be used along with the remaining live ones.

Of increasing importance is the bark of the mangrove tree, which grows in tropical swamps where rivers mix with salt water. Among other tanning materials covered and in general use are myrabolans, a dried fruit from India; sumac leaves from Sicily; acorn cups from Turkey, and divi-divi pods from tropical America.

THOMAS G. GREAVES
Research and Development Department, American Dyewood Co.

Crystal Data. Classification of substances by space groups and their identification from cell dimensions. J. D. H. Donnay and Werner Nowacki. Memoir 60. Geological Society of America, New York, 1954. ix + 719 pp. $5.

This important and stimulating volume consists of two independently prepared and essentially unrelated tabulations of crystal data.

Part I, by Nowacki, consists of a listing by space group and general chemical nature of 3782 structures reported in the literature prior to July 1948. The purpose of this listing is to provide statistical data on the distribution of crystal structures among the 219 possible symmetrical packing arrangements that are permitted by our geometry. Nowacki refers in his preface to some preliminary use that he has made of this material in trying to understand one of the great unsolved problems of crystallography: Why does a particular chemical entity in a particular thermodynamic state pick one type of crystal packing rather than any other? Very little progress has been made in the understanding of this problem, but the present tabulation takes an important preliminary step.

Tables 1–6 represent numerical analyses of the data of the main table of part I. From these tables it is clear that nature concentrates on only a few of the many space patterns available to it. For 41 space groups no structures have been reported, while in 32 groups only one appears. Only 10 space groups have individually more than 3 percent of all structures, and together these 10 groups contain about 46 percent of all structures.

When one narrows the chemical classification, the figures become even more striking. In the inorganic structures, again 10 space groups contain more than 3 percent of the structures reported, and together these groups contain about 50 percent of the structures of this type. In the organic structures, only eight space groups have more than 3 percent and together these eight groups account for 60 percent of the structures. The three most popular space groups account for 43 percent of all organic structures. A final example concerns the aromatic and heterocyclic molecules which are often flat and are, therefore, particularly attractive to crystallographers. In this category, eight space groups contain more than 3 percent of all