formed man of his time on the subject.

Never forgetting that men—scholarly, inquisitive, competently educated—are the prime ingredient in medical education, he soon came to know virtually every able and promising medical scientist in Europe and later in the Americas, with the aid of his card index spotting the leaders of the next generation, offering them fellowships, encouraging their development. As Gregg's philosophy of giving developed, it became evident that he and Simon Flexner, in a sense his predecessor in the Rockefeller Foundation, had fundamentally different approaches to the problem; Flexner favored the concept that support of centers of excellence would result in upgrading all institutions, Gregg that the brightest men wherever found should be the medium through which the foundation would work. The story of the years of giving is well told by Penfield and deserves thoughtful reading by anyone who is on either the giving or the receiving end of philanthropy.

It is difficult to assess the impact of Gregg and the Rockefeller Foundation on medical education in Europe and America, but it was probably great. There is no doubt that Gregg became a seer in his own time, being consulted by persons from all over the world. In May 1953, he turned westward to retirement at Big Sur, leaving the foundation with the timeless quip, "Nothing succeeds like a successor."

Out of his great attachment to Alan Gregg and his intimate knowledge of scientific medicine, Wilder Penfield has drawn a compelling picture of an unusual man. The picture, however accurate, has unresolved paradoxes—a widely ranging warmth of spirit coupled with a need for *Binnenleben*, life within oneself, the loneliness of the poet. As seems proper, Penfield has elected to give us only those thoughts from the commonplace book that he believed Alan would now willingly share. Perhaps in some distant day those that are at present secret may yet reveal the essence of Alan Gregg.

Included in an appendix are the aphorisms of Alan Gregg, selections from his writings, and a list of his numerous publications. There is an index.

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Factors in Effectiveness

Institution and Outcome. A Comparative Study of Psychiatric Hospitals. LEONARD P. ULLMANN. Pergamon, New York, 1967. 213 pp., illus. $7.50.

A recent summary of the health of the United States population notes that "by far the largest number of patient-days in hospitals results from mental illness." As a public health problem, and a more broadly social problem, mental illness is of such great magnitude that it requires no emphasis. Hence any contribution to the more effective functioning of psychiatric hospitals promises large social dividends; in addition, a heightened understanding of how these institutions operate promises to further our knowledge of human organization in general, whether it be hospital, university, or factory.

In the present volume Ullmann makes such a contribution. His achievement is impressive on at least two counts: he offers a closely reasoned and elegantly executed investigation of how a group of 30 hospitals performs the essential task of returning hospitalized individuals to the community; and he supplies a historical and social-psychological analysis of mental hospital organization within which his specific research findings take on full human meaning.

The measures of the effectiveness of hospitals in reaching the goal of getting patients back to the community were, first, the percentage of individuals who attained early release (defined as being discharged within 274 days after admission and remaining in the community for at least 90 consecutive days) and, second, the percentage of individuals with long hospitalization (two or more years). It should be noted that these were all Veterans Administration hospitals, a fact that made it possible to obtain useful standard records and maximum comparability; at the same time, this restricted the patient population to males and may also have imposed certain organizational idiosyncrasies that limit the generalizability of findings.

Ullmann began with the hypotheses that *small size* and *increased staffing* would be associated with effective hospital performance. His hypotheses were confirmed, although the detailed analyses make it plain that the relationships are complex. For instance, small hospital size is more closely associated with early release as a measure of effectiveness, and increased staffing appears more intimately related to a lower percentage of patients with long hospitalization. The author goes on to show that small size is already accepted as desirable, but that the uses of increases in both funds and staff need to be specified; more money and more people will not influence discharge rates unless the money is put in the right places and the people are the right people. Still more fundamentally, psychiatric institutions will not change for the better unless the assumptions on which they run are changed. In the Veterans Administration, for instance, the very basis of financial support is tied to an antitherapeutic premise: the more patients occupying beds, the more nearly the hospital is fulfilling its mission. In reality, of course, such a funding procedure encourages the very kind of custodial long-term care that modern social psychiatry is at pains to combat. The hospital, the author asserts, must shift from the conventional bureaucratic mode of organization, with its emphasis on hierarchical control, toward a more flexible, decentralized mode that brings staff and patients closer together; essentially, he argues for what some have called "collegial bureaucracy" and others term a "neoteric" model of organization.

This is an extremely valuable book. It adds to our knowledge of organizational functioning. If the author's modestly phrased but trenchant suggestions for improvement of psychiatric hospitals were acted upon, hospital personnel, patients, and society at large might profit immensely.

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Scattering

Scattering Theory of Waves and Particles. ROGER G. NEWTON. McGraw-Hill, New York, 1966. 699 pp., illus. $19.50.

This book is a large treatise on all possible applications of the Schroedinger equation and related wave equations, including those for electromagnetic waves. It contains a detailed description of new and old techniques so far discovered in this field, and many exercises as well. The author has produced a very complete and homogeneous book written in a clear and orderly fashion. His mastery of the

current literature on the subject in its varied forms, journals, preprints, and private letters, including obscure papers by derelict authors, is absolute and amazing, and he has been very careful in tracking down the original sources of interesting ideas. The bibliography alone (about 30 pages of fine print) is a welcome contribution.

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Hematology

Blood Clotting Enzymology. WALTER H. SEEGERS, Ed. Academic Press, New York, 1967. 640 pp., illus. $27.50.

When thrombin acts on fibrinogen, it splits off the amino-terminal portions of two of the three peptide chains. The amino acid sequence of these peptides liberated from a great number of different fibrinogens is now known. As one of the contributors to this book points out, the structure of these peptides reveals a phylogenetic relationship similar to the morphological taxonomy. These peptides represent only about 3 percent of the fibrinogen molecules, and many people are reluctant to use such a small portion of the amino acid sequence of a protein to establish phylogenetic relationships. To me the correspondence is so striking that I can hardly consider it to be accidental. I think that these peptides have an important physiological role and that this is the reason why evolution has left its mark on them.

As the title indicates, this book recognizes the importance of enzymology in the study of blood clotting. At least two of the dozen or so clotting factors are enzymes, thrombin (the clot-forming enzyme) and the clot-stabilizing enzyme, and there are indications that other clotting factors may also be enzymes. This book deals not only with the two known enzymes but with all the known clotting factors. The chapters cover such topics as the molecular characteristics of substances active in blood coagulation, the activation of prothrombin, the transformation of fibrinogen into fibrin, the immunochemistry of the clotting factors, antithrombin, platelets in hemostasis, irregular blood coagulation, and the ultrastructure of the fibrin clot. A discussion of the role of fibrin in the spread of tumors would have been welcome.

Of course, not all the topics could be treated with the same degree of sophistication. It is quite obvious to the reader that fibrinogen and its clotting are better understood than are other aspects of blood clotting, and in fact are in the forefront of protein and enzyme chemistry.

A large portion of the book deals with prothrombin and its conversion to thrombin. Prothrombin now appears to be a complex entity giving rise under various conditions to prethrombin, autoprothrombin C, autoprothrombin I_p and I_c, autoprothrombin II, and autoprothrombin III. As purer and purer prothrombin preparations become available, this complicated picture will probably be modified. As far as I can see at this stage, there is room for different interpretations to develop. The sequence of events depicted by the "cascade" or "waterfall" propositions (which are mentioned in chapter 1 only to be immediately discarded) is attractive, easy to grasp, easy to teach. One is inclined to believe with Keats that "Beauty is truth, truth beauty."

In spite of the determined efforts of the authors to present only well-established facts, occasionally some outmoded concepts come up. I was surprised to read that thrombin is also a "polymerase." The experiments refuting this are clear-cut (provided highly purified components are used). Experts in the various fields may find similar minor points to criticize.

The contributors have attempted to present their topics in such a manner as to profit the uninitiated as well as the expert. A lack of continuity among the chapters reflects more the state of the field than any lack of effort on the part of the authors and the editor, who are to be commended for having undertaken this work.

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Botanical Phenomena

Plant-Water Relationships. R. O. SLATYER. Academic Press, New York, 1967. 378 pp., illus. $16.50. Experimental Botany monographs.

This is the first book to be devoted largely to a biophysical description of plant-water relations. In contrast with other works on the subject, which deal with specific experiments describing ecological and physiological phenomena, this book begins from the other direction, with tools from supporting sciences, and illustrates their applicability with experimental evidence. Thus, it is written from the conceptual point of view and represents a unique and valuable contribution to the field.

Starting with a physicochemical chapter on the properties of water, the author continues with one on the ecological significance of water in the plant environment and then two chapters that are excellent summaries of the physics of soil water. The rest of the work deals specifically with interactions between water and plants, beginning with a chapter on terminology and measurement techniques. Here the author changes from the older terminology based on diffusion pressure to that based on chemical potentials. Although osmotic pressure is defined in terms of potentials in this chapter, it is the one questionable term which is retained in the rest of the book. I would have preferred the use of potential terminology throughout, for uniformity and because of the differences in definition of osmotic pressure in botany and in physical chemistry.

Chapter 6 describes cell water-uptake and permeability phenomena in terms of nonequilibrium thermodynamics. The presentation is quite clear, although the reader will probably need to consult the early work of Kedem and Katchalsky in order to appreciate the reasoning fully. Two chapters follow with a description of water flow through the soil-plant-atmosphere and include valuable insights into the effects of energy exchanges between the leaf and the environment. The author concludes with a concise chapter on the physiological significance of internal water deficits.

On the weaker side, more extensive coverage of the material in the last chapter would have been desirable. For example, there is only passing reference to the extensive literature on hormonal control of water uptake associated with growth and on the effects of water stress on protein metabolism. Missing from the book as a whole are descriptions of solute accumulation and translocation, which, though large subjects in themselves, might well deserve treatment here. The equations used in this account are accurate, and the symbology is clear. There are some typographical