yielding the usual expressions for velocities and accelerations.

In the treatment of dynamics and "energetics," there are many points of pedagogical merit. Having introduced the concept of mass and the vector formulation of the second law, the author deals with motion relative to a noninertial system of reference. In this the resultant force acting is reinterpreted to include "frame" and Coriolis forces—the presentation of this artifice being direct and appealing and not having the vague touch of mystery engendered by the use of the term "reversed effective."

The development of work and energy principles is more or less standard in approach. Here again the coherence of text, examples, and exercises, and their orientation with respect to preceding work, are explicitly brought out.

It is not until the time integral of the principal equation of dynamics is treated that the second law of motion is given in general form. Logically this arises as a natural outcome at this point. Little attention, however, is given to this form as such: rather, the impulse-momentum principle is preferred.

The more sophisticated ideas of force fields, with the concomitant utilization of vector operational methods, appear in the final chapter on rigid mechanics. The approach again is purely functional, since two of the final chapters of the text are devoted to rather concisely analytical expositions on the mechanics of deformable bodies and of ideal fluids. A brief treatment of one-dimensional wave motion and kinetic theory constitute the final chapters.

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The Lipids: Their Chemistry and Biochemistry, Vol. I, ***Chemistry.*** Harry J. Deuel, Jr. New York–London: Interscience, 1951. 982 pp. $18.50.

The great mass of knowledge already accumulated, and the accelerating flood of information being published, have made it difficult for the specialist in any one of most fields to keep in mind the innumerable facts of pertinence in that field, and have made it impossible for most scientists to be versed to their own satisfaction in related fields. To mitigate the difficulty, there is fortunately an increasing number of periodic reviews, comprehensive symposia, and monographs.

Professor Deuel, well known for his many contributions to the biochemistry of the lipids, has undertaken the formidable task of preparing a compendium on the lipids. In this volume he has assembled the information on the chemistry of the lipids in an admirably organized way. The biochemistry of the lipids is to be the subject of Volume II.

The author has covered the area so intensively into 1950 that most individuals, even specialists, will find practically everything they desire, and the extensive bibliography of over 3500 citations will certainly, in most instances, make possible the convenient location of any available additional information sought. The lengthy table of contents provides an outline of the material covered and will usually lead at a glance to any desired topic. The text itself displays this carefully prepared outline by the use of typographically distinct headings, subheadings, etc., facilitating the location of desired information. The index has been most exhaustively assembled, approximately a sixth of the total pages being devoted to the indexes of authors, subjects, and plant and mineral sources of the lipids.

Extensive discussions are included of all the well-known and apparently of the other less well-known simple, compound, and derived lipids. Each substance is discussed with respect to provenience, isolation, purification, and physical and chemical properties, including methods of preparation. Physical properties are correlated with chemical nature. Solubilities, melting points, boiling points, and spectral behavior, for example, are considered in detail with respect to structure of the various types of fatty acids. Among the many topics discussed are crystalline habits and polymorphism of the fatty acids, analysis of fats, constants used in identification of fats, oil and fatty acids, interesterification, inhibitols and antioxidants, chromatographic separation, including an admirable concise presentation of the theoretical basis for adsorption phenomena, stereoisomerism of the carotenoids and vitamins A, activation of provitamins D, and biological activity in relation to chemical structure of vitamins E and K and related compounds. Every topic, in fact, that could be expected is treated in adequate detail, and every constituent of living tissues, insoluble in water but soluble in fat solvents, or related to the accepted lipids, is discussed.

Structural formulas are generously employed, with very few detected errors; 102 figures and diagrams are included. Of the 204 tables, some are taken from or based on tables of other authors, but many have been newly prepared.

Biochemists, and all others whose work relates to the constituents of living tissues and their functioning, will find this a valuable source of ready, comprehensive information on the chemistry of the lipids, and many will find this an indispensable addition to their personal libraries.

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Morphogenesis: An Essay on Development. John Tyler Bonner. Princeton, N. J.: Princeton Univ. Press, 1952. 296 pp. $5.00.

The problem of development of form has been variously considered by many individuals, most of whom become bewildered by the multiplicity of types and by the inadequacy of any generalization to explain the many differences. Most biologists accept form without thinking of it as one of the fundamental problems which every living thing must solve in its own peculiar species' way.

In the search for a single generalization to cover all the contingencies of the three fundamental construc-

tive constituents of living systems, Bonner invokes the ultimate microconstitution. Biologists always manifest an unusual penchant for hoping that chemists and physicists will promote their fields to the clarification of biology. When the biologists think usefully in precise instead of generally descriptive analogies, the significance of chemical and physical fundamentals will be biologically applicable. Bonner has considered selected morphogenetic examples from the entire biological field. He has stressed the cardinal factors which focus attention on the development of form. Although he may be accused of superficial treatment, he has picked his materials wisely.

The provocative points revolve around oversimplified definitions and bring to our attention our own shortcomings in this regard. For example:

> Growth is the increase in size in living matter, involving the intake and storage of energy by new protoplasmic synthesis. . . . Morphogenetic movements are migrations of the protoplasm without synthesis of living materials. . . . Differentiation is an increase in the detectable differences in chemical composition (resulting from synthesis) of parts of an organism which occurs between one time during development and another time.

It is not fair to remove these passages from context. There is in most cases sufficient textual amplification to give a much better picture than expressed here, but the primary definitions should carry a greater degree of precision than is expressed.

The discussion of size and pattern is illustrated mainly by plants. The analogy with crystals, with a clear consideration of surface-volume relations, serves as a fitting interlude for the discussion of physics and chemistry in development. The complexity of the energetics, as Bonner points out, will not of itself explain development. Other physical aspects, such as surface tension, crystallization, or diffusion, are considered as possible parts of the picture of change. Their possible nature in the living system is discussed. This is subject, of course, to the necessary modifications imposed by the biological system, which seems to have an unerring way of never being as completely dependent upon the physical conditions as we would like to have it be. Growth in all its diversity has been discussed. The problems of intrinsic control, genic control, hormonal control, and internal configuration are all touched upon. The logical conclusion is evident that we do not know how the genes and the protoplasmic components manage to create the perfect pattern of growth.

The succeeding chapter deals with the patterns of morphogenetic movements. The synthesis of descriptive reactions moves smoothly through the entire first part, which deals with plants, but as we turn to animal development the picture is not nearly so sharp. The tendency is to accede to a much simpler formalization of vertebrate eggs than is at present possible. Much study will be necessary before the reactive components can be isolated and their relative import on development known.

When the discussion comes to patterns of differentiation we find that "differentiation" is used without any specific reference to the structure involved. The pattern is different from the process by which it has become a pattern, a resultant determination without process of becoming. In attaining differentiation we again must consider the multiple factors that are at work. Bonner points out that there are different levels of differentiation, which may be arrived at independently—although not necessarily so. It is a corollary to this that the pattern of differentiation may also follow a like rule.

Bonner deserves our thanks. He makes no pretense of giving the answer to the problem of form. He has, however, placed it succinctly before us and has focused attention on what we do not know but need to know before a more definite answer can be given to the significant factors underlying the formative pattern of development which results in the specific form of the organism.

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Scientific Book Register

Man and Epidemics. C.-E. A. Winslow. Princeton, N. J.: Princeton Univ. Press, 1952. 246 pp. $4.00.

Low Temperature Physics: Four Lectures. F. E. Simon *et al.* New York: Academic Press; London: Pergamon Press, 1952. 132 pp. Illus. $3.50.

A Brief History of Entomology. Including time of Demosthenes and Aristotle to modern times. Herbert Osborn. Columbus, Ohio: Spahr & Glenn, 1952. 303 pp. Illus. $4.50.

Physical Foundations of Radiology. 2nd ed. Otto Glasser, Edith H. Quimby, Lauriston S. Taylor, and J. L. Weatherwax. New York: Hoeber, Harper, 1952. 581 pp. $6.50.

A Trail of Research in Sulfur Chemistry and Metabolism and Related Fields. Vincent du Vigneaud. Ithaca, N. Y.: Cornell Univ. Press; London: Geoffrey Cumberlege, Oxford Univ. Press, 1952. 190 pp. Illus. $3.25.

Recent Progress in Hormone Research: Proceedings of the Laurentian Hormone Conference (1951), Vol VII. Gregory Pincus, Ed. New York: Academic Press, 1952. 527 pp. $9.50.

Sun, Moon, and Planets. Roy K. Marshall. New York: Henry Holt, 1952. 129 pp. Illus. $2.50.

Connective Tissues. Transactions of the Third Conference, February 14–15, 1952, New York. Charles Ragan, Ed. New York: Josiah Macy, Jr. Fdn., 1952. 166 pp. Illus. $3.50.

Carbohydrate Metabolism: Correlation of Physiological, Biochemical and Clinical Aspects. Rev. ed. Samuel Soskin and Rachmiel Levine. Chicago: Univ. Chicago Press, 1952. 346 pp. Illus. $8.50.

Advances in Electronics, Vol. IV. L. Marton, Ed. New York: Academic Press, 1952. 344 pp. Illus. $7.80.

Mathematical Models. H. Martyn Cundy and A. P. Rollett. New York: Oxford Univ. Press, 1952. 240 pp. Illus. $5.50.

Mechanics. Part I: ***Statics;*** Part II: ***Dynamics.*** J. L. Meriam. New York: Wiley; London: Chapman & Hall, 1952. 671 pp. Illus. $4.00 each.