Developmental Nutrition

Development of the Functions of the Small Intestine in Mammals and Man. O. KOLDOVSKY. Karger, Basel, 1969 (U.S. distributor, Phiebig, White Plains, N.Y.). viii + 204 pp., illus. $12.70.

The epithelium of the small intestine has been attracting increasing attention in recent years because it provides a useful material for studying on the one hand patterns of enzyme differentiation and their control and on the other the relation of enzymic differentiation to the functions of digestion and absorption. The Laboratory of Developmental Nutrition of the Czechoslovak Academy of Sciences in Prague has been a leading center of work along these lines, and in *Development of the Functions of the Small Intestine in Mammals and Man* Koldovsky, former director of the laboratory, summarizes the investigations carried out there between 1958 and 1966.

The greater part of the book is devoted to the digestion and absorption of the major foodstuffs in the rat from birth to adulthood. Other laboratory animals are included, however, and fetal development is not neglected. The problem of carbohydrate digestion and absorption in nurslings has especially concerned the author and his many able and enthusiastic young co-workers, and one of the most valuable chapters in the book deals with their findings on that topic. In several animals, they have shown that the infant intestine transiently produces a beta-galactosidase that cleaves milk sugar; they have demonstrated that this activity is directly related to the capacity for lactose absorption, and have also found that the pattern of beta-galactosidase production is at least partly dependent on the secretion of adrenal corticoids. Similar evidence, as far as available, is also presented for intestinal lipases and peptidases. Reflecting Koldovsky's interest in clinical problems, there is a chapter on evidences of functional differentiation in human fetuses and newborn infants.

This monograph is, however, more than simply a recital of the findings of the author's research group, for work from other laboratories is presented in ample detail. Among the most useful features of the book, in fact, are its inclusion of numerous studies published in European journals not well known in the United States and its coverage of the historical background of the past 90 years. The bibliography includes more than 600 items. There is no index, but this deficiency is partly compensated for by a detailed table of contents.

Well illustrated and written in the author's own simple and straightforward English style (which should serve him well in this country, to which he moved soon after the unhappy events of August 1968), the presentation is always clear and easy to follow. The book will be of value both to developmental biologists interested in the course of biochemical and physiological events in early life and to pediatricians and others concerned about the medical problems implicit in the patterns of intestinal differentiation.

FLORENCE MOOG
Department of Biology,
Washington University,
St. Louis, Missouri

Hormones and Behavior

Endocrinology and Human Behaviour. Proceedings of a conference, London, May 1967. RICHARD P. MICHAEL, Ed. Oxford University Press, New York, 1968. xviii + 350 pp., illus. $18. Oxford Medical Publications.

The 18 papers in this book are by some of the leading investigators in the field, and they are generally of high caliber. The makeup of the book reflects that this is a relatively young field. It contains a number of good general reviews of specialized endocrine systems which serve as background information and a few papers dealing with endocrine-behavior relationships in animals. Somewhat fewer than half of the papers deal with studies of the human. The book contains much useful old and new material and is well organized.

Because of the specialized interests of the planners of the conference, there is more emphasis on pituitary and gonadal than on thyroid and adrenocortical relationships to behavior. The papers that deal with endocrine-behavior relationships naturally fall into two categories: how hormones influence behavior, and vice versa. These were the papers that seemed particularly important to this reviewer, and they will be discussed in more detail.

The effects of antenatal androgens on behavior in the monkey are discussed by Goy and in the human by Money. The critical period for the effect of androgen appears to be much earlier in these species than in rodents. The exposure of pregnant monkeys or women to excessive androgen causes the female offspring to have a number of male behavioral characteristics. The monkeys demonstrated more male sexual behavior, whereas the girls, though "tomboyish," did not give any evidence of altered sexual orientation to produce more lesbianism. The data emphasize the paramount importance of environmental factors in sexual orientation in the human.

Money has found that girls exposed to high androgens (congenital adrenal hyperplasia and progestin treatment) in utero tend to have high I.Q.'s whereas girls who congenitally lack ovaries do not. He proposes the possibility that "a flood of fetal androgen may in some way be beneficial to I.Q." Obviously, if such a relationship does exist it also involves other variables, since if androgen were the only factor boys would automatically be brighter than girls—a rather difficult position to support.

The papers of Michael and Hamburg, which complement each other, concentrate on how hormones influence behavior postnatally. Michael describes the pattern of sexual activity in rhesus throughout the menstrual cycle. The high level of sexual activity at ovulation and the subsequent decline are due both to changes in receptivity of the female and changes in interest in her of the male. Both of these variables are dependent on the female's ovarian steroids. The signal to the male of the female's receptivity appears to be a pheromone which requires the male's sense of smell for recognition. The paper of Hamburg includes a good study of changes in a number of psychological and behavioral factors throughout the human menstrual cycle and during treatment with different types of oral contraceptives. Here, too, it is evident that the pattern of ovarian steroids is a basic determiner of subjective and objective changes in the human female. Changing of ovarian hormone levels by the oral contraceptives alters psychological reactions, and the pattern of these alterations is related to the composition of the contraceptive. In view of Michael's work, one wonders if cyclic changes in the man's interest also occur.

The converse question, What do psychological changes do to hormones?, has also produced some good papers.

Rakoff catalogues the numerous disturbances in gynecological endocrinology that are associated with psychological problems, and Russell and Beardwood analyze anorexia nervosa. These are good papers which describe the problems well and leave the reader tantalized by thoughts about basic mechanisms that have so far not been approachable because of inadequate methods.

Levi expands his studies of the increases of catecholamines caused by anxiety to investigate the changes in some physiological processes that are influenced by catecholamines. Free fatty acids and triglycerides are increased by anxiety *pari passu* with catecholamines, and this rise is blocked by nicotinic acid. In subjects exposed for three days to simulated battle conditions, protein-bound iodine and erythrocyte sedimentation rate increased and serum iron decreased (presumably Levi has evidence that this does not occur simply because of deprivation of sleep). These findings and those of Reichlin, who summarizes considerable evidence that growth hormone may also be increased by psychological stimuli, suggest possible pathways by which emotional stress could be involved in the etiology of certain diseases.

The book is important to the investigator and of interest to the casual reader. It should stimulate a lot of research.

CHARLES W. LLOYD
Worcester Foundation for Experimental Biology, Shrewsbury, Massachusetts

Energetics

Transfer and Storage of Energy by Molecules. Vol. 1, Electronic Energy. GEORGE M. BURNETT and ALASTAIR M. NORTH, Eds. Wiley-Interscience, New York, 1969. xvi + 240 pp., illus. $11.95.

It is impossible to think of any process in nature in which the energy does not undergo significant changes as the system passes from its initial to its final state. This is obviously true for systems in which a chemical change occurs as the result of absorption of light or ionizing radiation, the passage of an electrical current, or the application of heat, or when any of the reverse of these processes occurs, for example, in a chemiluminescent or exothermic reaction. Although much precise information is available about the distributions of energy in the initial and final states and about the connections between the overall rates of change and variables such as temperature, emitted or absorbed radiation intensity, or current flow, singularly little is known about the detailed mechanisms of the interconversions of energy between any two of the following forms: translational, vibrational, rotational, electronic, and coulombic. Yet we are conscious that phenomena of fundamental importance in biology, such as nerve conduction, vision, and photosynthesis, just as much as important chemical processes, can be fully understood only after all the factors regulating the rate of transfer of energy between various modes or between molecules have been identified. The realization of this fact has clearly prompted Burnett and North to think that it is time to bring together a series of articles by authorities summarizing all of significance that is known about the storage and transfer of energy by molecules in all states of aggregation.

The volume under review is concerned with electronic energy, and it is to be followed by four other volumes dealing respectively with vibrational energy, rotational energy, solid state systems, and biological systems. Objection to this "grand design" cannot reasonably be raised on conceptual grounds, but the reviewer doubts whether the theoretical framework yet exists to enable the significant relationships to be discerned and to be ordered into a coherent pattern. The articles in this first volume illustrate this point. Each is good in its own way, but there is, for example, little in common between the mechanism of energy transfer from a fast charged particle to the molecules of the medium through which it is passing, dealt with in chapter 4, and electronic excitation produced by shock waves, which forms the major part of chapter 2. Even in chapter 1, where Cundall has striven manfully to give shape and form to his topic "Electronic and vibrational transfer in gas phase systems," the theories are so ill developed that often the best that can be done to systematize the information is to cite approximate empirical correlations linking very limited sets of data. Chapter 3, on the "Chemistry of electronically excited states of organic molecules," is the most coherent.

This then is one of those tantalizing but useful books: tantalizing because the unifying theories are not yet apparent and one is inclined to cry with Ovid "rudis indigestaque moles," and useful both as a compendium of current knowledge and as providing, by its very incoherence, a spur to the imaginative theorists and experimentalists who will make possible the much-needed major conceptual advances.

[Volume 2 of the work (432 pp., $18.50) is now available—ED.]

F. S. DAINTON
University of Nottingham, Nottingham, England

Books Received

Advances in Cardiac Pacemakers. A conference, New York, November 1968. Seymour Furman, Ed. New York Academy of Sciences, New York, 1969. Illus. Paper, $30. *Annals of the New York Academy of Sciences*, Vol. 167, Art. 2, pp. 515–1075.

Advances in Solid State Physics. Plenary Lectures of the Professional Group of the German Physical Society: "Semiconductor Physics," and Invited Papers of the European Meeting of the Institute of Electrical and Electronic Engineers: "Semiconductor Device Research," Munich, March 1969. O. Madelung, Ed. Pergamon, New York; Viewag, Braunschweig, 1969. viii + 392 pp., illus. $17.50. Festkörperprobleme IX.

Alfred Nobel. The Loneliest Millionaire. Michael Evlanoff and Marjorie Fluor. Commentaries by Arnold O. Beckman and Henry T. Mudd. Ritchie, Los Angeles, 1969. xvi + 336 pp., illus. $10.

American City Planning Since 1890. A History Commemorating the Fiftieth Anniversary of the American Institute of Planners. Mel Scott. University of California Press, Berkeley, 1969. xxiv + 748 pp., illus. $17.50. California Studies in Urbanization and Environmental Design.

Anatomy of an Expedition. Henry W. Menard, McGraw-Hill, New York, 1969. xii + 260 pp. + plates. $6.95.

Animal Waste Management. A conference, Syracuse, N.Y., January 1969. New York State College of Agriculture, Cornell University, Ithaca, 1969. viii + 416 pp., illus. Paper, $10.50.

Annual Review of Information Science and Technology. Vol. 4. Carlos A. Cuadra and Ann W. Luke, Eds. Encyclopaedia Britannica, Chicago, 1969. x + 550 pp. $16.

Applied Optics and Optical Engineering. Rudolf Kingslake, Ed. Vol. 5, Optical Instruments: Part 2. Academic Press, New York, 1969. xvi + 384 pp., illus. $17.

Archaeology in Sarawak. Cheng Te-K'un. Heffer, Cambridge, England; University of Toronto Press, Toronto, 1969. xii + 34 pp. + plates. $4.35.

Asthme. A meeting, Reims, France, May 1965. Bernard N. Halpern, J. G. Scadding and J. M. Dubois de Montrey-

(Continued on page 171)