vitro reproducible denaturation (despecialization) of proteins. Although the entry of fat-soluble carcinogens may be through the mitochondria and may be connected with disturbances of lipid metabolism (Hamperl, Calcutt, and Payne), the role of cell proteins is more important. Much stressed phenomena, such as rapid cell division or increased O_2-consumption (Deotto), are secondary, and changes in the redox metabolism do not yet appear significant. Interaction of carcinogenic hydrocarbons with SH-groups is likely, and infrared absorption spectra indicate modifications of nucleic acid behavior. The less specialized enzyme patterns and the decrease in catalase (Greenstein) are examples of chemical dedifferentiation. The internal configuration of the protein molecule and the association of molecules are essential, not the straight chemical composition. As Yamafugi believes, induced aberrations in protein metabolism can result in the formation of viruslike or genelike structures. These experiments should be repeated. Defects in the interaction between nucleus and cytoplasm are basic in carcinogenesis (Haddon, J. Schultz). The abnormal formation of more stable denaturation products of protein releases energy that can be used for uncontrolled cell multiplication (O. Schmidt).

S. Weinhouse in his well-organized 53-page chapter on oxidative metabolism of neoplastic tissues shows how Warburg's original ideas have dominated this field in spite of doubts Warburg himself had expressed. He winds up by stating "that there is little in favor of the Warburg hypothesis." As early as 1930, the possibility was recognized that metabolization of substances other than glucose might contribute to the respiratory activity of tumors, and it was proved by study of the RQ (Dickens and Limer). Contrary to generally accepted assumptions, methyl esters of some fatty acids, for example, are readily oxidized by tumor slices (Ciaranfi); and with the isotope tracer method, it can be shown beyond doubt that tumor cells do oxidize fatty acids. Newer knowledge of intermediary steps of catabolism and of possible interconversions force us to abandon earlier interpretations.

Glycolysis is qualitatively similar in tumor and in other tissues, and the potential rates are equal in both (LePage *et al.*). Harmonic control of metabolism is possible, but we do not know how any single hormone affects a particular enzymatic reaction, nor do we know the optimal content of enzymes or of coenzymes that may interconnect different intracellular metabolic processes. Further careful studies of individual enzyme activities may reveal differences between normal and neoplastic tissues.

Pullman's chapter on electronic structure and carcinogenic activity is an elaborate version of a lecture given before the European section of the Union Internationale contre le Cancer in 1953. This chapter can be appreciated only by the specialist.

H. P. Morris' 64-page chapter on the experimental development and metabolism of thyroid gland tumors testifies to the complexity of the problems. Seven pages deal with thyroid cancer in man. The chapter's primary concern is with data obtained in the last ten years by applying, in the animal experiment, thyroid-lethal doses or tracer doses of ionizing radiation. Attempts have been made to compare thyroid gland responses in man with similar ones in the controlled animal experiment. Morris' report on the many experiments and interpretations does not make easy reading, but it is highly instructive.

The goitrogenic effect of *p*-aminobenzoic acid probably consists in inhibiting tyrosine iodinase (Fawcett and Kirkwood). The organic binding of iodine is essentially controlled by the pituitary gland (Morton, Albert and Lorenz). Although thyroid tumors do occur in dogs and horses, they are very rare in rats and mice, which are therefore suitable subjects for experiments. Goitrogen-induced thyroid tumors in mice can metastasize to the lungs (Morris, Dalton *et al.*), but on resumption of a normal diet the activated thyroid epithelium might involute (Gorbman). Thyroid tumors developed in rats fed a low iodine diet, whether or not 2-acetylaminofluorene was added (Axelrad and Leblond).

The goitrogenic substances are not carcinogenic. When true independent carcinoma occurs after their prolonged use, is arises through overstimulation by excess TSH (Purves and Griesbach). Thyroid tumors of mice can be easily transplanted (Morris). In Bielschowsky's work with methylthiouracil-induced rat tumors, the first generation was a colloid adenoma, but the fourth was a rapidly killing anaplastic giant cell carcinoma. The decisive role of the pituitary gland in the pathogenesis of goiters (Griesbach) formed a basis for many investigations.

This interrelationship of thyroid tumors and pituitary tumors has been seen in man also (Rasmussen and Nelson). Experiments with I^{131} have given varying, partly unexplained results not depending only upon dosage (Gorbman, Goldberg and Chaikoff). Human lives have been saved by treatment with I^{131}, but many years of follow-up will be needed before we know whether or not I^{131} in this dosage is cancerogenic, and ways should be found to increase the avidity of thyroid tumors for I^{131}. Wegelin's idea expressed long ago that thyroid cancer originates from thyroid adenoma is probably correct. The study of thyroid tumorigenesis in relation to hormonic imbalance might serve as a model for studying tumorigenesis in other organs.

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Catalysis. vol. II, *Fundamental Principles* (pt. 2). Paul H. Emmett, Ed. Reinhold, New York, 1955. vi + 473 pp. Illus. $12. vol. III, *Hydrogenation and Dehydrogenation.* Paul H. Emmett, Ed. Reinhold, New York; Chapman & Hall, London, 1955. vii + 504 pp. $12.

This series of books is now emerging as an excellent summary of what is known about the theory and practice of catalysis. The books should be an important reference source for years; at least seven volumes in the series are now projected.

Volume II completes the presentation of fundamental catalytic principles. This volume appears to be stronger than Volume I. One might have hoped that the editor, with perhaps one or two others, would have written the entire survey of fundamental principles so that the whole could have been better integrated. The arrangement of topics might surprise some readers.

Volume II begins with a classification of heterogeneous catalytic vapor phase reactions by W. B. Innes. A survey of the measurement and defect of pore distribution in solid catalysts is next presented by A. Wheeler. Two chapters on the nature of catalytic surfaces and on complexes on catalyst surfaces by H. M. Hulbert are rather difficult reading for the uninitiated. General theories of heterogeneous catalysis are well surveyed in the next chapter by a group of authors. Finally, the general nature of homogeneous catalysis and of the factors that influence the behavior of homogeneous catalytic systems are given by E. L. King.

Volume III is devoted entirely to a portion of the field of catalytic hydrogenation. It is restricted to those reactions in which hydrogen is simply added to unsaturated bonds without ejecting any other molecules. B. M. W. Trapnell begins logically with the catalytic exchange reactions of hydrogen and deuterium and with the inner conversions of the ortho-para varieties. Next, the catalytic hydrogenation of ethylene is taken up by D. D. Eley. This excellent chapter makes clear that the complex nature of the ethylene molecule leads only to speculation on the mechanism of hydrogenation.

The hydrogenation of olefinic hydrocarbons, of carbon-carbon triple bonds, and of nitro compounds is then presented. Factors such as possible mecha-

nisms, catalysts, their preparation, poisoning, and reaction conditions are included.

The catalytic synthesis of ammonia is taken up in the next two chapters, which comprise a third of the volume. W. G. Frankenburg takes the reader through the entire story of this most important and interesting synthesis. From initial laboratory experiments to the technical problems, reaction conditions and handling problems and catalyst studies are covered. The second chapter, on ammonia by several Dutch authors, describes the work done since 1940, by which time surface area measurements could adequately be made. The still unsettled problem of a priori heterogeneity of the catalyst surface is debated.

The synthesis of methanol and the hydrogenation of glyceride oils are followed by a final chapter on catalytic dehydrogenation. All the information on these reactions appears to have been carefully summarized by the various authors, but these chapters are written in a more technical vein.

The editor is to be commended for bringing together such an excellent group of contributors. The practical information and experimental details are certain to prove invaluable to workers who follow. Typography and freedom from errors remain highly commendable.

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The Mammalian Fetus: Physiological Aspects of Development. Cold Spring Harbor Symposia on Quantitative Biology, vol. XIX. Biological Laboratory, Cold Spring Harbor, New York, 1954. xii + 225 pp. Illus. $8.

One hundred and thirty-eight biologists and physicians assembled at Cold Spring Harbor from 7 to 14 June 1954, to hear and discuss the 27 papers (32 authors) on fetal physiology that were presented there. Grants from several sources made possible the participation of 20 Europeans from countries in which much of the pioneering work in this rapidly developing field of research has been initiated (Great Britain, 14; Sweden, 2; and Belgium, Finland, France, and Norway, 1 each). The remaining 12 participants were from the United States.

The papers can be roughly grouped in the following categories. (i) General and summarizing (S. R. M. Reynolds, F. P. Chinard, A. St. G. Huggett, Clement A. Smith). (ii) Endocrine system (A. S. Parkes, Alfred Jost, Joseph P. Holt). (iii) Uterine relations and placental physiology (Bent G. Böving, Finn Bøe, J. C. McClure Brown, F. W. Rogers Brambell, A. St. G. Huggett, Donald H. Barron and Giacoma Meschia). (iv) Growth (J. S. Nicholas). (v) Genetics (Salome Gluecksohn-Waelsch, Liane B. Russell and William L. Russell). (vi) Fetal circulation and circulatory changes at birth (G. V. R. Born, G. S. Dawes, J. C. Mott and J. G. Widdicomb, John Lind and Cargl Wegelius). (vii) Respiratory control and asphyxia (K. W. Cross, J. A. Miller, Jr.). (viii) Biochemistry and metabolism (E. F. McCarthy; James Walker; C. E. Räihä; R. A. McCance and E. M. Widdowson, 2 papers; Claude A. Villee; G. Popjak).

There is a certain amount of repetition, an unavoidable result of assembling a group of independent papers under one cover. A few errors were noted: "full filled" for "fulfilled" (p. 24), "hypothecate" for "hypothesize" (p. 38), and "unusually" for "unusual" (p. 215). The practice of printing discussions only when they were submitted to the editor in manuscript form has had two curious results. The participants are represented as making verbal exchanges in highly technical language that would rarely be spoken and, if spoken, not easily understood; several of the discussions are essentially short papers illustrated with one or more graphs (pp. 39–40, pp. 91–92, pp. 165–166).

The book as a whole is a worth-while addition to the literature of embryology and physiology and gives an up-to-date impression of most lines of research in what has been until recently a neglected field. Immunoembryology and the large field of experimental embryology are touched on in only one paper, that by Salome Glueckson-Waelsch, and fetal behavior and the nervous system are neglected entirely.—G. DUS.

New Books

Steels for the User. R. T. Rolfe. Philosophical Library, New York, rev. ed. 3, 1956. 399 pp. $10.

Structure Reports for 1942–1944. vol. 9. A. J. C. Wilson, Ed.; N. C. Baenziger, J. M. Bijvoet, and J. Monteath Robertson, Section Eds. Oosthoek's Uitgevers MIJ (for the International Union of Crystallography), Utrecht, Netherlands, 1955. 448 pp. Fl. 65.

Recent Studies in Avian Biology. Albert Wolfson, Ed. Published under the sponsorship of the American Ornithologists' Union. University of Illinois Press, Urbana, 1955. 479 pp. $7.50.

Advanced Analytical Chemistry. Walter Wagner, Clarence J. Hull, and Gerald E. Markle. Reinhold, New York; Chapman & Hall, London, 1956. 282 pp. $6.

Nellie Landblom's Copybook for Beginners in Research Work. Nellie Thompson Landblom. The author, P. O. Box 248, Fort Collins, Colo., 1955. 118 pp. Paper, $2.95.

Through the Mathescope. C. Stanley Ogilvy. Oxford University Press, New York, 1956. 162 pp. $4.

Advances in Protein Chemistry. vol. X. M. L. Anson, Kenneth Bailey, and John T. Edsall, Eds. Academic Press, New York, 1955. 425 pp. $9.

Annual Review of Entomology. vol. I. Edward A. Steinhaus and Ray F. Smith, Eds. Annual Reviews, Stanford, Calif., 1956. 466 pp. $7.

The United States Patent System. Legal and economic conflicts in American patent history. Floyd L. Vaughan. University of Oklahoma Press, Norman, 1956. 355 pp. $8.50.

By Sea on the Tonquin. The dramatic account of the voyage and building of Fort Astoria and of the establishment of the interior fur trade. Cecil Dryden. Caxton, Caldwell, Idaho, 1956. 289 pp. $4.50.

Thermodynamics and Statistical Mechanics. vol. V of Lectures on Theoretical Physics. Arnold Sommerfeld. F. Bopp and J. Meixner, Eds. J. Kestin, trans. Academic Press, New York, 1956. 401 pp. $7.

Guide Pratique de Mycologie Médicale. A l'usage des médecins, des laboratoires et des botanistes précédé d'un tableau d'orientation diagnostique et thérapeutique. Jean Coudert. Masson, Paris, 1955. 364 pp. Paper, F. 5200; cloth, F. 6000.

Psychology of Industrial Conflict. Ross Stagner. Wiley, New York; Chapman & Hall, London, 1956. 550 pp. $8.

Remington's Practice of Pharmacy. A textbook and reference guide for pharmacists, physicians, and other medical scientists. Eric W. Martin and E. Fullerton Cook, Eds. Mack, Easton, Pa., ed. 11, 1956. 1707 pp. $18.

The Psychology of Human Differences. Leona E. Tyler. Appleton-Century-Crofts, New York, ed. 2, 1956. 562 pp. $6.

Ergebnisse der Medizinischen Grundlagenforschung. K. Fr. Bauer. Thieme, Stuttgart, Germany, 1956 (order from Intercontinental Medical Book, New York 16). 855 pp. $30.75.

Eléments d'Immunologie Générale. P. Gastinel, R. Fasquelle, and P. Barbier. Masson, Paris, 1955. 335 pp. F. 2000.

Jaarboek der Koninklijke Nederlandse Akademie van Wetenschappen, 1954–1955. N. V. Noord-Hollandsche Uitgevers Maatschappij, Amsterdam, 1955. 349 pp.

Supplemental Drawings for Embryology. Graham DuShane. University of Chicago Press, Chicago, 1955. 44 pp. $1.50.

The Mycology of the Whooping Crane, Grus americana. Illinois Biological Monogr. vol. XXIV, No. 2. Harvey I. Fisher and Donald C. Goodman. University of Illinois Press, Urbana, 1955. 127 pp. Cloth, $3.50; paper, $2.50.

Progress in Biophysics and Biophysical Chemistry. vol. 6. J. A. V. Butler, Ed. Pergamon, London, 1956. 274 pp. $9.50.

The Torment of Secrecy. The background and consequences of American security policies. Free Press, Glencoe, Ill., 1956. 238 pp.

Common Sense in Research and Development Management. George W. Howard. Vantage Press, New York, 1955. 104 pp. $2.75.