and the emphasis is on "established facts useful to the research worker."

In the past 15 years the mouse has been even more extensively used in research in genetics, bacteriology, endocrinology, and cancer and in radiation studies. Great advances have been made in some of these fields and an impressive array of new data has accumulated. The question then arises whether it was worth while to reprint this book without revision. The answer is in the affirmative.

It would certainly have been desirable to have several of the chapters brought up to date, but, as it stands, this book still contains a body of basic, useful information, and it deserves a place on the reference shelf in any laboratory that uses rodents as research animals.

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Hormones and the Aging Process. Proceedings of a conference held at Arden House, Harriman, N.Y., 1955. Earl T. Engle and Gregory Pincus, Eds. Academic Press, New York, 1956. 323 pp. Illus. $8.50.

This is a book that is much more important than its size. As a matter of fact, this is one of the most informative books ever written on hormones and aging. The list of contributors reads very much like a "Who's Who in Endocrinology," and their contributions are important to this increasingly complex subject. The editors were most judicious in selecting their participants, and they have edited the present volume in a very scholarly manner. There are many, perhaps too many, books compiled on a whole array of subjects, but it is my opinion that *Hormones and the Aging Process* will long remain a leader in its field. The combined basic and clinical approach bridges the gap from theory to practice.

This book is heavily endowed with information that is both interesting and cleverly presented. The rich academic flavor of Arden House is obvious throughout the 18 chapters that comprise this volume: "Aging and urinary steroid excretion" (G. Pincus), "Effect of aging on the steroid metabolism as reflected in plasma levels" (L. T. Samuels), "The thyroid in the aging process" (R. W. Rawson), "Urinary excretion of gonadotropin as a function of age" (A. Albert, R. V. Randall, R. A. Smith, and C. E. Johnson), "Hormonal regulation of muscle development" (C. D. Kochakian and Carol Tillotson), "Steroids and protein metabolism in experimental animals" (J. H. Leathem), "Androgenic and anabolic action of testosterone derivatives" (V. A. Drill and F. J. Saunders), "Naturally occurring pathology in the aging rat" (D. J. Ingle), "Effects of hormones on protein metabolism" (A. White), "The role of steroids in calcium and phosphorus metabolism" (O. H. Pearson), "Newer techniques in the study of calcium metabolism in man and effects of hormones thereon" (D. Laszlo and Herta Spencer), "Mechanisms regulating fluid and electrolyte metabolism" (R. E. Weston), "Steroid hormones in osteoporosis" (G. D. Whedon), "Sex steroid replacement in the aging individual" (W. H. Masters), "Effects of steroids in women with breast cancer" (B. J. Kennedy), "Endocrine regulation of prostatic growth" (H. Brendler), "The effects of some of the steroid hormones on the metabolic balances in aged males" (N. W. Shock), and "Cerebral metabolism in the aging process: the steroid factor" (G. S. Gordon and J. E. Adams, with the technical assistance of E. Martinez).

Of particular interest to me are the following chapters. In his chapter on "Aging and urinary steroid function," Pincus has developed the opening chapter with the wisdom and intellectual know-how of a seasoned teacher. His last paragraph is certainly indicative of a crowning achievement: "We are confronted with two similar findings: that aging and certain chronic stress conditions tend to diminish the output of certain urinary steroids. The simple conclusion would be that in aged persons the decrement is the effect of the cumulative stresses of living. In states of chronic stress this effect is telescoped. If this suggestion is warranted many questions arise. First of all, is this effect true of all chronic stress states? If so, what does the chronic stress, or the aging process, in fact do to steroidogenic mechanisms? In the case of adrenocortical steroid production impairment may be due to damage in the adrenal cortex or to impairment of adrenocorticotropin production. We have elsewhere published data indicating that in schizophrenic subjects there is an impairment of certain ACTH-stimulated adrenocortical steroidogenic processes. This impairment appears to persist into old age in schizophrenics. Normal, healthy old men do not show this defective response to ACTH. It thus follows that the reduced steroidogenesis in the normal aging may be the result of reduced ACTH production by the pituitary. What are the factors controlling pituitary production of ACTH? Which are age-labile? These and related questions are open to experimental investigations. . . . With care and patience we may emerge with a coordinated scheme of certain aspects of endocrine function in youth and old age."

In the chapter on "Urinary excretion of gonadotropin as a function of age," Albert and his associates have summarized and extended the original observations from their laboratory in the Mayo Clinic and Mayo Foundation. Their data indicate that children of both sexes, below the age of puberty, do not excrete detectable urinary gonadotropin. In premenopausal women there is a progressive and fourfold rise in urinary gonadotropin between the ages of 10 and 50 years. These values seem to increase progressively after the menopause, and the urinary gonadotropins attain a peak value 15 to 19 years following cessation of the menses but then fall progressively throughout the next 20 years. In men a demonstrable, although slight, increase in urinary gonadotropin occurs as a function of age, but this increase is less than half of that of women at the ages of 10 to 49 years, and only a fifth of that of women over the comparable age span of 50 through 89 years. (Hisaw will be proud of his young disciple at the Mayo Clinic, especially since this is the finest study of its kind yet recorded along with the observations of Bahn *et al.*, also emanating from Albert's laboratory.)

In "Androgenic and anabolic action of testosterone derivatives," Drill and Saunders have produced a scholarly group of experiments, and their chapter is one of the most interesting and outstanding ever written on this subject. It is clearly obvious that the chalk dust has never left the fingers of these two champions of clarity, conciseness, and pedagogy at its best. No tacit assumptions are made here. In comparing the anabolic and androgenic effects of testosterone (and its propionate) with those of 19 nortestosterone (and its derivatives), they have found that (i) all of these androgens produce nitrogen retention in rats on a constant food intake; (ii) all the nor-compounds studied have a better anabolic androgenic ratio than testosterone, testosterone propionate, methyl testosterone, methylandrostenediol, and androstanolone; (iii) at minimal effective intramuscular doses, 19 nortestosterone, 17-methyl-19-nortestosterone, and 17 ethyl-19-nortestosterone are equally potent in increasing levator ani weight; and (iv) above the minimal effective dose, 17-ethyl-19-nortestosterone, administered intramuscularly, produces the greatest effect on levator ani weight. Substitution of the methyl, propyl, butyl, ethynyl, or vinyl radicals for the ethyl radical reduces anabolic potency, even though a favorable anabolic and androgenic ratio is maintained. These scientists have a thorough grasp of their subject matter and have pursued it most extensively.

In "Naturally occurring pathology in the aging rat," D. J. Ingle's modesty is outflanked by his careful analysis of con-

ditions leading to naturally occurring pathologies in aging rats. His systematic approach reveals that (i) 100 percent of the rats that were more than 12 to 15 months old developed tumors of the mammary glands, (ii) 97 percent of the rats had gross changes in the aortas representing calcifying atherosclerosis, (iii) 46 percent had pitting in the kidneys caused in part by the dilation of the tubules at the surface, (iv) ulcers of the cardiac portion of the stomach were observed in 25 percent, and (v) 90 percent had adrenal glands that were spotted and granular. Ingle's discussion of "Adaptation diseases, adaptation energy and recommendations for further research" graphically illustrates both his scientific storehouse of information and his ability to single out important facets that lend themselves to crystallization.

The zenith of intellectual endeavor reaches a spire of meaning in "Sex steroid replacement in the aging individual" through the efforts of W. H. Masters. The discussion of a third sex will be received as both stimulating and provocative, depending, of course, on the age of the reader.

This book is recommended without any reservations. Here is a book that will make everyone appreciate more thoroughly the physiological process of aging that lies ahead in each of our careers.

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Gmelins Handbuch der Anorganischen Chemie. System No. 60. *Copper.* pt. A, sec. 1. Edited by Gmelin Institute under the direction of E. H. E. Pietsch. Verlag Chemie, Weinheim/Bergstrasse, ed. 8, 1955. 710 pp. Illus. $92.85.

Gmelins Handbuch der Anorganischen Chemie. System No. 60. *Copper.* pt. A, sec. 2. Edited by Gmelin Institute. Verlag Chemie, Weinheim/Bergstrasse, ed. 8, 1955. 755 pp. Illus. $101.04.

This volume, as do the others in this excellent reference series, impresses the reader with its thoroughness and with the breadth of its coverage of the topic. It is stated that the literature through 1949 has been completely examined and in certain instances through 1954. The table of contents is highly detailed. At the beginning of the sections on many of the major topics, lists of general references are given. These general references are not confined to German treatises but include works from a number of different nations.

The style in which the German text is written is clear and easily readable. There are numerous tables and diagrams which help to clarify the text, and the quality of printing and reproduction is excellent. This work is a must for any chemistry library and would be particularly valuable to inorganic chemists, metallurgists, and geologists with an interest in copper or copper ores and minerals.

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Proceedings of the Conference on Pathophysiologic and Therapeutic Problems of Terminal Conditions Associated with the Clinic and Practice of First Aid. State Publishing House of Medical Literature, Moscow, U.S.S.R., 1954. 240 pp. Illus. (In Russian).

The deliberations of this conference were centered primarily around the methods of revival of organisms developed by V. A. Negovskii, director of the Laboratory of Experimental Physiology of the U.S.S.R. Academy of Medical Sciences in Moscow. The discussions were related to problems of restoration of physiologic functions in animals and patients in agonal states and in early stages of clinical death resulting from severe hemorrhage, burns, drowning, electrocution, and so on. Under consideration also were methods of combating late stages of traumatic and burn shock.

Most of the resuscitation techniques reported at the conference involved (in addition to artificial respiration) the utilization of "antidromic" intra-arterial infusions (that is, directed toward the heart) of blood (usually oxygenated) and, at times, of various physiologic salt solutions. The quantities of blood thus infused (under a pressure of 160 to 220 mm-Hg) were comparatively small: 150 to 500 ml, usually the lower figures. Following the restoration of cardiovascular functions, intravenous infusions were resorted to when more blood or a blood substitute was needed.

The history of intra-arterial infusions goes back to at least 1871–74, when two Russian physicians, S. I. Kostaev and S. P. Kolomnin reported intra-arterial administration of defibrinated blood into patients with severe traumatic episodes. F. A. Andreev, in 1913, initiated experimental investigations of this method, continuing his experiments until shortly before his death in 1952. Extensive experimental and clinical observations were made by V. A. Negovskii *et al.* and many others. According to Negovskii's figures, arterial infusions were made in 1714 patients, 797 of whom (46.5 percent) survived. Of the 1714 patients thus treated, 1190 were in severe shock, not responding to other forms of therapy, and 57 percent of these survived; 227 were in agonal states and 45 percent of these survived; 116 were in a state of clinical death and 18 percent of these survived.

Briefly, the principle of the method is based on restoration of coronary blood flow and the alleged stimulation of cardiovascular interoceptors, thus leading to reflex stimulation of the cardiovascular system. A fair amount of basic experimental data is presented but not enough to satisfy the curiosity of a physiologist, at least not mine. The bulk of the emphasis was on clinical observations.

Interesting experiments are reported by E. A. Asratyan (Moscow). He produced controlled cerebral anoxia by raising the cerebrospinal fluid pressure to 300–400 mm-Hg in dogs kept alive by artificial respiration. Although the results obtained may be due also to mechanical pressure, the data are still of interest to clinicians and physiologists. Many of the animals remained alive for months even after 16 to 20 minutes of cerebral anoxia. The author reports four phases of restoration: (i) restoration of bulbar and spinal centers; (ii) phase of overexcitation and hyperthermia, at times resembling the state of decerebrate rigidity (the use of central nervous system depressants during this phase appeared to improve the chances of survival; this phase may last for hours or even days and may alternate with periods of calmness); (iii) phase of depression which may last several hours to many weeks; (iv) slow restoration of central nervous system functions.

The speed and degree of restoration of function depended on the length of the period of anoxia, age, and "constitution" of the dog. Thus, after a period of anoxia lasting 16 to 20 minutes, the dogs were able to sit up after 3 to 4 months and to stand after 6 months or even after a longer period. After an anoxic period of 8 to 10 minutes, sitting was possible after 4 to 6 days and standing after 10 to 15 days. Sensation was affected earlier and for a longer period than motor functions.

Conditioned reflexes (motor defense responses) disappear even after 5 to 6 minutes of anoxia but can soon be fully restored. After an anoxic episode of 6 to 8 minutes the conditioned reflexes disappear for longer periods and are not fully restored; ability to differentiate decreases. The conditioned responses are inconstant but, peculiarly enough, are difficult to extinguish. Following a period of anoxia lasting 8 to 12 minutes, conditioned reflexes disappear even for a longer period, differentiation is never restored, the conditioned reflexes are in-