Book Reviews

Science and Civilisation in China. vol. 2, *History of Scientific Thought.* Joseph Needham. Wang Ling, research assistant. Cambridge University Press, New York, 1956. 696 pp. Illus. $14.50.

With the appearance of this *History of Scientific Thought* (in China), Needham launches the second volume of his formidable undertaking of a seven-volume history of *Science and Civilisation in China.* Inasmuch as each volume constitutes a relatively independent unit, it seems appropriate to emphasize its subtitle in calling attention to this second volume.

The temporal span of Chinese science, as presented here, runs approximately from the time of Confucious until the merging of Chinese science into "the world-wide unity of modern science" in the 17th century. This is almost exactly the same period covered by a standard history of Chinese philosophy, such as the recently published *Short History of Chinese Philosophy* by Fung Yu-Lan. The significance of this apparent parallel rise and fall of Chinese philosophy and scientific thought is not clearly elucidated by Needham, but when it is added to the fact that the characters in the two histories are nearly identical, it emphasizes the close and continuous dependence of Chinese science on philosophy. Scientific thought is obviously closely related to philosophy in other cultures, and certainly in Europe, but in Europe the degree of that interrelationship has waxed and waned, and some of the greatest exponents of scientific thought have been indifferent philosophers, to say the least. One receives the impression from this book that no comparable waxing and waning occurred in China. When the philosophers ceased to interest themselves in scientific thought, scientific thought itself ceased.

There is some question whether this is the impression that Needham intends to give, for he frequently makes allusion to the debilitating effect on Chinese scientific thought of the prejudice of philosophers against working with their hands, and seems to suggest that there were other Chinese thinkers who did not have this prejudice. These suggestions consist, however, of references to later (and still unpublished) parts of his work, which will deal with the specific sciences and technology. Insofar as we can learn from the present work, these handworkers participated very little in the development of scientific thought.

On the other hand, it seems to be on the basis of the evidence of these handworkers that Needham frequently states that Chinese scientific thought in various areas was equal to or greater than contemporary thought in the West, and his general conclusion seems to be that Chinese thought was in advance of the West until the Western "scientific revolution" of the 17th century. That he fails to produce a clear exposition of the relationship of technology to scientific thought is a weakness of the book, but an understandable one, since it remains to be accomplished in the relatively better known area of Western science. Unfortunately it is somewhat exaggerated by Needham's insistence on the importance of this relationship that he fails to describe.

Needham concludes that the Chinese world-view depended on "a totally different line of thought" from that in the West. This conclusion is reached at the end of a long and impressively worked out chapter on the influence of the development of theories of the laws of nature on legal thinking and legal systems in the two cultures. Here, and elsewhere, he emphasizes the organic character of the Chinese world-view. He makes little use of that favorite term of historians of European science, *vitalism,* and his approach appears refreshingly original in comparison with the tendency of many writers on the history of science to view the subject in a framework of mechanism versus vitalism. A factor that aids him greatly in avoiding this framework is the apparent unimportance of mathematical thinking to the Chinese world-view. This is surprising in view of the opinion which has been commonly held of late that Chinese work in mathematics was considerable, and we may hope that Needham will cast light on this in a subsequent volume. Meanwhile, although he does not declare with any emphasis that mathematical thinking had little influence on Chinese scientific thought, he certainly does not give it a very significant role. This, above all else, gives the book a different character from that of any modern history of scientific thought in Europe.

Regardless of what criticisms may be made of various aspects of Needham's work, this volume, like its predecessor, exhibits a breadth of learning and a concern for the apparatus of scholarship, which makes it not only a monumental work in its field, but also an indispensable guide for future students in this field. All in all, the book raises more questions than it answers, but this is to the credit of the author, for the study of Chinese science in the West has scarcely been advanced heretofore to the point where one knew what the questions are. More would be unreasonable to expect of an author whose labors have laid all Sinologists and historians of science in his debt. It is also worth noting that he provides a guide to the essential portions of the book, for the "busy experimentalist" who does not have time to read it all.

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Biology of the Laboratory Mouse. Staff of the Roscoe B. Jackson Memorial Laboratory. George D. Snell, Ed. Dover, New York, 1956. viii + 497 pp. Illus. $6.

This is a new printing, unabridged and unaltered, of the first edition, which was published in 1941 by the Blakiston Company and has been out of print for some time. The rationale for this book is stated clearly by the editor, George D. Snell, in the preface: "Of all the laboratory mammals, probably none has contributed more to the advancement of knowledge than the common mouse. . . . A result of this extensive use of the mouse is that a large body of information has grown up concerning it. This, however, is so widely scattered through the literature that it is often a major undertaking for the research worker who wishes to use it to locate and gather the particular facts that he needs. Much of this information is assembled in this book."

The subject matter is divided into 13 chapters of which all but one were contributed by members of the laboratory: one chapter each on embryology, reproduction, and histology; six chapters on genetics and/or tumor formation (gene and chromosome mutations, genetics of spontaneous tumor formation, genetics of tumor transplantation, endocrine secretion and tumor formation, and the milk influence in tumor formation); four chapters on general subjects (inbred and hybrid animals, parasites, infectious diseases, and care and recording). The scope of the book is limited of necessity

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-