species or genus, is one of the few living giants in the extensive group of mammals (Primates) to which he belongs, (2) that man's physical structure, both skeletal and visceral, has numerous well-known and much-discussed peculiarities that, like his gigantism, show him to be far advanced in the period of "phylogeronty" or racial old age, while (3), in his mental constitution man unites the dominating type of social behavior that is common to most anthropoid primates (well described by Yerkes and his associates) with such a unique genius for "implementing" it as to make the combination a totally new phenomenon in animal evolution. This combination may well prove to be, in the end, as racially lethal as the huge size and great bodily specialization of titanotheres, proboscidians and dinosaurs appears to have been in the past.

Though the idea of racial death as the normal end of every evolutionary line is not a new one, it is seldom given the place it deserves in the discussion of man's future. Professor Blackwelder alludes to it (p. 365), but Professor Goodale is silent on the subject. As an exception to this rule I may quote from an article entitled "A Palaeontologist Looks at Life," by Professor Herbert Leader Hawkins:

> . . . The conclusion seems inevitable that simplicity is safe and complexity is dangerous. But if the main tendency of evolution is toward specialization then evolution leads inevitably to extinction. The rates of progress may vary, but the destination is the same. . . . And yet there is nothing strange in the contention . . . are we not aware that we [as individuals] are living in the constant anticipation of death sooner or later?[1]

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THE LAW OF URBAN CONCENTRATION

ON page 19 of the July 4th issue of SCIENCE, E. L. Thorndike, in reviewing G. K. Zipf's book on "National Unity and Disunity," referring to his discovery of the law of urban concentration, remarks, "This discovery may rank with Quetelet's discovery that the statures of men are distributed in accordance with the so-called normal probability curve."

This discovery is neither new, nor perhaps quite as striking as Professor Thorndike seems to indicate. That the size of cities and their rank when plotted on doubly logarithmic paper form essentially a straight line, seems to be first indicated by F. Auerbach, and was shown to apply to the cities of the United States in my book, "Elements of Physical Biology," 1925, pages 306–307. That a relation of this sort is not uncommon is a well-known fact, the outstanding example perhaps being Pareto's law of the frequency distribution of incomes. Another example is Williss's "Theory of Age and Area," as applied to the frequency of biological genera and species (see *loc. cit.*, pages 311, *et seq.*). Still another example is the Frequency Distribution of Scientific Productivity, as shown by me in the *Journal* of the Washington Academy of Sciences, 1926, Vol. 16, page 317. From this last source, I may quote the following sentence (page 323): "Frequency distributions of this general type have a wide range of applicability to a variety of phenomena, and the mere form of such a distribution throws little or no light on the underlying physical relations." This type of frequency distribution is, in fact, Pearson's type XI, a special case of type VI.

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DR. LOTKA is right in giving to Auerbach the credit that I gave to Zipf; and I apologize for my ignorance of Lotka's discussions of curves which use ranks and are based on the extreme value of the series. Very likely he is right also in regarding them as relatively unimportant cases of curves of extreme skew, but I still hope that they will be more than that.

E. L. THORNDIKE

SCIENTIFIC BOOKS

ENDOCRINOLOGY

Endocrinology. The Glands and Their Functions. By R. G. HOSKINS, M.D. 388 pp. New York: W. W. Norton and Co. 1941. $4.00.

AMONG the many notable advances in the field of the biological sciences in the last fifty years none has been more spectacular than that relating to the endocrine glands. Unfortunately, much that has been written concerning these organs reflects more the enthusiasm of the investigator than it contributes to the advancement of knowledge, and this has been particularly true in the field of clinical endocrinology.

While the remarkable effects of small quantities of certain hormones upon bodily function are a continued source of wonder, a full appreciation of their action is not gained unless the function of the endocrine glands is projected against the operation of the organism as a whole. Until it was clearly recognized that the endocrine glands operate as an integrated system, largely controlled by the anterior pituitary, there was a tendency to believe that they possessed an autonomy of action that set each individual member apart from the others. Even more deplorable was the undue emphasis placed on the hormone as an entity without recognizing that the tissue or tissues upon which it acts

[1] *Proc. Cottswold Naturalist's Field Club*, vol. 33, pt. 3, p. 223, 1929, December, 1930.

form the second component by which endocrine activity is expressed.

The story of the endocrine glands has a close parallel with that of the vitamins. First, the recognition of the effects of deficiency, then the preparation of extracts that repaired the deficiency; then the isolation (and synthesis) of the active principle; and finally, in the case of vitamins but not yet in the case of the hormones, the identification of the cellular mechanism of which the active principle formed an essential part.

In the present volume the author has attempted the large task of writing a book that covers not only the fundamental knowledge of the endocrine glands as gathered by the experimentalist, but has also endeavored to point out the main clinical features of endocrine disorders in man. These, in themselves, would furnish material for a volume many times this size, but this book, in addition, deals in an interesting manner with the biological and teleological significance of these organs. As may be imagined, there is ample room for criticism on the grounds of omission and condensation of what may be regarded by some as essential material, but such criticism should be tempered by the avowed purpose of the book. It has been written for an audience as broad as its subject matter, "biologists, psychologists, premedical students, physicians and the intelligent general reader." Viewed in this light the author has produced a successful volume, one, indeed, that could have been written by few men and held such a universal appeal.

Dr. Hoskins may be termed one of the "pioneers" in the field of endocrinology in this country. He has seen the subject grow from the sincere efforts of a small group of men to place the study of the endocrine organs on a sound scientific basis to the honorable status it now holds as an important field in the biological sciences. He was one of the founders of the Association for the Study of Internal Secretions and the editor of *Endocrinology* for a long period of years. More recently, he has been the director of the Memorial Foundation for Neuro-Endocrine Research, another borderline field in which hardly the preface has yet been written.

In structure, the book takes up the endocrine glands in turn and after a brief historical outline discusses the work that led to the recognition of each as an organ of internal secretion. The isolation of the active principle, where this has been accomplished, is reviewed, however, with a minimum of the chemistry related to the details of the isolation or the identification of the active principle. The main physiological facts are usually given in good detail, and this is followed by a description of the principal clinical syndromes associated with hypo- or hyperfunction of the organ in man.

To many the last two chapters on "Some General Aspects of Endocrinology" and "Endocrinology of the Future" will prove of especial interest. Here the author gives us his philosophical approach to the problem and outlines the major fields in which he anticipates future work will be done. Such chapters are not usually found in more formal text-books on the subject, but in this volume they are in keeping with the purpose for which it was written and for the audience it is intended.

Those with expert knowledge will find many places in the book that are lacking in detail, and in practically no instance will there be found detailed information of the experiments cited. However, these must be sought in the original articles, of which several of the most important are cited either at the end of each chapter or in the suggestions for further reading at the end of the book.

The reviewer, however, feels he must call attention to one gross contradiction. On page 180 it is clearly stated that the anterior pituitary hormones are of a protein character and are therefore destroyed by the digestive juices. Nevertheless, on page 173 there is reproduced the height and weight curve of a dwarf whose growth was alleged to be accelerated by the administration by mouth of anterior lobe substance. True, no comment is made in the text on the validity of these observations, but this chart does mar what is generally a conservative view of the value of this type of replacement therapy.

In conclusion, the author has succeeded in preparing a book that is eminently suitable for those who wish to obtain a broad picture of the development, present status and future possibilities of endocrinology, and he is to be congratulated on compressing so much readable material into such a small yet well-rounded volume.

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THE THEORY OF NEWTONIAN ATTRACTION

An Introduction to the Theory of Newtonian Attraction. By A. S. RAMSEY. ix + 184 pp. Cambridge University Press. 1940.

THIS is a book of simple text, with many problems of practical interest to the student of applied mathematics. On the one hand it is a good preparation for Kellogg's "Foundations of Potential Theory," which is more precise and much more extensive on the theoretical side, and on the other, for the rich and systematic collection of problems in the Newtonian