convenience to the service or the pilots) for studies like those of Mr. Glick, we should soon have a mass of positive information. We may leave it to mathematicians to calculate, on the basis of the work done, the probable number of insects in the air, but the figure must be surprisingly large. There is also another aspect of the matter, which I have not seen referred to. The sea in the vicinity of the coasts (how far out, we do not know) must be constantly receiving a rain of small arthropods, which must represent a not inconsiderable food supply for the marine animals.

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A REQUEST TO MATHEMATICAL GENETICISTS

THE lack of clarity in many papers dealing with theoretical genetics will probably retard to some extent the development of the science. Some of these are valuable contributions, but their merit is unnecessarily limited by the inadequate presentation of the mathematical materials. Much of the mathematics is simple algebra, but the lines of reasoning are frequently very hard to pursue, because many crucial equations are omitted. Sometimes lengthy and rather involved processes must be followed from one printed equation to the next, and there is not the slightest hint in the text as to what these processes are. Geniuses may have little difficulty with these papers, but such geneticists are scarce. Among the rank and file of animal and plant breeders one of the following courses is likely to be followed:

(1) The papers are ignored. Attempts to analyze a few of them bring the conviction that it is useless, and one can "get by" without them anyhow!

(2) The conclusions are accepted, but the reasons for them are not understood. It is obvious that such a state of mind is scientifically unsound.

(3) An enormous amount of time is expended in reading and analyzing the paper—very much more than would be required if a few crucial equations were added. A busy teacher is likely to give up through sheer need of sleep and revert to class (1) or (2)!

We teachers are training the geneticists of the future, and if we are not provided with reasonable opportunities for understanding the advances in mathematical genetics, such contributions may be too little known in the next generation. Genetics will not advance as it should. It is sometimes claimed that editors will not accept papers with too much mathematical material, for such printing is expensive. In reply, it may be said that there is little reason for publishing a paper if it is so brief that it can not be understood. Furthermore, mathematical clarity can usually be attained by adding such a small number of "clew" equations that the costs of printing would not be materially increased.

Biometricians should always remember that they are not writing for mathematicians, but for biologists who know the elements of mathematics, yet are not very familiar with many devices used in mathematical procedure. Please don't leave out so many equations!

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THE RANGE OF HEARING OF CANARIES

TESTS[1] on starlings, English sparrows and domestic pigeons show that the range of hearing of these birds is considerably more restricted than human hearing. Their ranges cover about five octaves; normal human hearing is about ten octaves.

The method used in testing the canaries was the same as in the earlier experiments. The investigation of the hearing of five birds was conducted by means of conditioned reflexes to a range of sound which, during the conditioning of the experimental birds, had been followed by a mild electric shock from the feeding tray. The canaries' range was similar to that of the earlier birds experimented on but was even more restricted. Canary's range, 1,100–10,000 c.p.s., is only slightly over three octaves. Low and moderately high sounds are not heard. However, the bird undoubtedly hears all the sounds produced in its own song.

A. R. BRAND

P. P. KELLOGG

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SCIENTIFIC BOOKS

PLANE TOPOLOGY

Elements of the Topology of Plane Sets of Points. By M. H. A. NEWMAN. Cambridge: At the University Press; New York: The Macmillan Company, 1939, viii + 221 pp., 93 figs. $3.50.

ACCORDING to the publisher's jacket, this book "has the double purpose of providing an introduction to the methods of Topology, and of making accessible to analysts the simple modern technique for proving the theorems on sets of points required in the theory of functions of a complex variable." It is divided into two parts. The first, occupying slightly less than half the volume, opens with some calculus of abstract sets, and investigates properties in metric spaces of closed and open sets, continuous mappings and connected sets.

[1] A. R. Brand and P. P. Kellogg, 1939. *Wilson Bulletin*, 51: 38–41, 1939.

The second part is devoted specifically to the subject-matter indicated by the title and utilizes the "combinatorial" approach through cells and complexes selected from "gratings" formed by lines in the plane or sphere of analytic geometry. The basic material is essentially an elaboration and adaptation to the plane of a celebrated paper of J. W. Alexander which appeared in the *Transactions* of the American Mathematical Society in 1922, but proceeds much further than such matters as the Jordan Curve Theorem. For example, many of the results of Schoenflies are derived, and a number of the properties of plane domains to be found in the work of American set-theorists are included. For the analyst, the author gives a proof of Cauchy's Theorem based on the topological methods introduced.

The book is modern, well illustrated, very readable and typographically appealing. Numerous exercises are provided. The final 22 pages of the volume contain supplementary bibliographical and mathematical notes and a good index. However, the bibliography seems weak; although in the case of some topics adequate references are given both to their origin and to their more extensive treatments in the literature, in other cases such references are entirely lacking. It is to be hoped that in a later edition this will be corrected in what seems otherwise a work well suited to fulfilling the purposes stated.

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The Physiology and Pharmacology of the Pituitary Body. By H. B. VAN DYKE. Volume II. University of Chicago Press. Pp. xiv + 402. 28 figures. $4.50.

THREE years have elapsed since the appearance of the first volume of this series. In the first volume the author reviewed and discussed the important work on the hypophysis from 1920 through part of 1935, although the background laid by earlier investigations was not ignored. In the new volume the literature for that part of 1935 not covered in the earlier volume and 1936, 1937 and a part of 1938 has been reviewed. All papers relating to the pituitary gland that appeared during this period are not included in the text or listed in the voluminous (80 pp.) bibliography, however. The author has selected, as in the first volume, what seemed to him to be the best and most informative of the publications. According to the author these constitute 78 per cent. of the articles considered. This is a severe but just indictment of recent endocrine literature. That even this percentage should be included is due to the fact that the reviews were limited to the anatomy, physiology and pharmacology of the pituitary body.

The text of this volume is only one hundred pages less than that of the first volume, although the period covered is but one fifth as long. An opportunity was thus afforded the author to be rather more critical in his comments than he was in the earlier work, and to add summaries at the end of each chapter.

The number of chapters has been cut from twelve to ten. This was accomplished by omitting the chapter on the effect of hypophysectomy and by devoting but one chapter, instead of two, to the physiology of the neural lobe. Otherwise, the chapter headings remain essentially unchanged. There are a generous number of illustrations, but none are used which appeared in volume I. They are well selected but, in contrast to the earlier book, are all copies from the literature. This has been an advisable change, in the opinion of the reviewer. A color plate is given to show the relationships of the cells of the pars glandularis. It might be questioned why a colored figure was necessary since the cell lineage given is identical with that described by Trautmann in 1912, whose description of cell relationships has been generally confirmed by cytologists.

The arrangement of the topics is logical and easily followed. Their range is broad, and includes, in addition to those which would obviously be discussed, topics such as the effect of the pituitary hormones and the chorionic gonadotropic hormones on neoplasms, the nervous control of the secretion of gonadotropic hormones, vitamins and minerals in relation to the gonadotropic hormones, to mention but a few. In the review of these subjects and in the chapter summaries an unprejudiced view-point is maintained and optimism in regard to the achievements of endocrinologists is notable by its absence. In regard to the number and action of the pituitary gonadotropic hormones, he holds that the only reasonable position to take is one of suspended judgment, unwelcome as this may be to many readers. He only provisionally and for convenience of discussion accepts a specific "growth-promoting" hormone. Yet he freely acknowledges that notable advances have been made in certain subjects, as for example in the studies on the physiology of the neural lobe.

An index sufficient to enable the reader to locate various subjects is appended. The full titles of the articles in the bibliography are given, which adds to the convenience and usefulness of the book. The opening sentence in the foreword, written by Professor A. J. Carlson, succinctly states what the author has accomplished: "Dr. van Dyke has again rendered a valuable service to biology and medicine in presenting in this second volume his critical digest of the experimental and clinical literature on the pituitary body that has appeared since 1935."

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