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.

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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.