the less evolved Smilium group, a question which can be settled when specimens are found with plates in place. I propose to restrict *Scalpellum gabbi* Wade to the carina represented in his plate 62, figs. 3 and 4. The figures are inverted.

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STREAM DOUBLE REFRACTION EXHIBITED BY JUICE FROM BOTH HEALTHY AND MOSAIC TOBACCO PLANTS

IN previous papers[1,2] we reported that juice from tobacco plants infected with tobacco mosaic virus exhibits a stream double refraction characteristic of sols containing rod-shaped particles. Juice from healthy tobacco plants did not show double refraction. The juice was always obtained by freezing the tissues, followed by thawing, pressing and centrifuging.

Since the publication of these results we have found that centrifuged juice from unfrozen, macerated, healthy leaves regularly exhibits stream double refraction, and juice pressed from healthy tissues which have been frozen, thawed and pressed may sometimes show stream double refraction if uncentrifuged.

After juice from unfrozen, macerated, healthy tobacco leaves was subjected to Vinson's[3] safranin—Lloyd's reagent treatment for purifying tobacco mosaic virus—the purified preparation failed to show stream double refraction; however, purified virus from unfrozen mosaic leaves exhibited strong stream double refraction and, like the unpurified virus, could usually be diluted with 200 parts of water before double refraction disappeared. These results apparently indicate that all the detectable doubly refractive material was removed from the healthy juice, but that none was removed from the infective juice by the purification treatment, and suggest the possibility that much or all of the doubly refractive material in the juice from diseased plants may be different from that in juice from healthy plants. However, the present evidence is insufficient to warrant conclusions as to whether the virus particles are or are not responsible for all or part of the double refraction exhibited by juice from diseased plants.

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SCIENTIFIC BOOKS

Principles of Genetics; A Text-book, with Problems. By E. W. SINNOTT and L. C. DUNN. McGraw-Hill Book Company, New York. Second edition, xvi + 441. 1932. $3.50.

Recent Advances in Plant Genetics. By F. W. SANSOME and J. PHILP, with foreword by SIR DANIEL HALL. P. Blakiston's Son and Company, Philadelphia. x + 414. 1932. $4.00.

THE two publications cited above are of interest from the light they throw upon the rapid evolution of genetics within recent years, entirely apart from the information which they may lay before the student. It was not so long ago that genetics was concerned chiefly with 3:1 ratios or modifications of such ratios. The original concept of the gene was independent of its location in the chromosome and the intimate behavior of chromosomes was of relatively little interest to geneticists. Cytologists seemingly had tired of working out the alteration of generations in lower forms and the relatively few who remained in the field of cytology appeared interested in the structure of chromosomes and their behavior in nuclear division without much concern as to what differences in structure and behavior mean to the organism and its offspring. A change has taken place in the attitude of geneticists toward cytology which has been especially marked within the last half dozen years. Chromosomal behavior has become the foundation upon which modern genetics is now being built as is shown by the two texts under review.

The American text by Sinnott and Dunn is a revised edition of their 1925 publication. Two new chapters have been added, one on the contribution of genetics to evolutionary theory, and one on the relation between genetics and development. The chapters on the application of genetics in plant and animal breeding, on inheritance in man and on the problems of eugenics have been eliminated. The treatment of biometric methods has been rewritten by D. R. Charles and placed in an appendix. Among the topics which have received new or extended treatment may be mentioned the induction of mutations by radiation; recent analysis of chromosomal changes; segmental interchange between chromosomes; the cytological demonstration of crossing-over; mapping of genes in chromosomes by cytological methods; chromosomal and genic balance; and the physiological interpretation of the facts of heredity. At the end of each chapter are given a dozen or more reference problems aimed to stimulate the student in extending his grasp of the subject under discussion by study of original sources

[1] *Proc. Soc. Exper. Biol. Med.*, 30: 155–157, 1932.
[2] SCIENCE, 77: 26–27, 1933.
[3] *Phytopath.*, 22: 29, 1932.

in the literature. In addition there is in the appendix a list of over 400 problems based on the text, a large proportion of which demand calculations from data presented. The problem method seems to have met with success at the hands of the authors since the number of problems given is increased over the earlier edition. They should help the student to a more thorough grasp of the subject as is the case with "original" problems in text-books of geometry. They should thus make teaching easier for most teachers. It would not be surprising, however, if a demand should have arisen for a set of answers to be sold only to teachers as has been the case with the problems in texts on mathematics. The authors are recognized investigators and experienced teachers in the adjoining fields of botany and zoology. Their association in the Connecticut Agricultural College as well as more recently in Columbia University has given them an experience and sympathy in applied as well as in fundamental problems of their subject. As one would expect, their text has profited by their experience and appears to be a well-organized and balanced treatment of the principles of genetics which is presented in a form admirably adapted to the classroom.

The English publication by Sansome and Philp is a marked contrast to the American text. Its scope and manner of presentation is not adapted to the generalized undergraduate course in genetics. It is intended, however, primarily for the teacher and the research geneticist and by them will be found a valuable and stimulating book. Its title would suggest that the organisms discussed are plants only. This is in the main true, but a treatise on plants could not be good genetics if it gave no reference to Drosophila, which the authors apparently classify as a banana plant product. The subject-matter is further restricted to the more recent advances in plant genetics; those mainly of the last ten years. A balanced treatment even of this limited period is not attempted and certain topics such as sex, chimeras and the mathematics of inheritance and populations receive little or no consideration. The main purpose appears to be to acquaint the reader with the last words about chromosomes in relation to genetics. In some cases the last word literally had not yet been spoken since there are frequent references to papers in press. The authors might well have had added the subtitle "Chiasmotypy and its effect upon genetic phenomena," since much space is given to this still rather controversial theory. There can be no doubt, however, of the importance to geneticists of an understanding of the early stages in the reduction divisions. This has been hitherto largely a *terra incognita*. Fortunately, it is beginning to be explored through direct cytological observation and we are no longer confined to genetic evidence as to what has happened at this stage. Polyploidy and segmental interchange are discussed in considerable detail, especially in relation to the species problem.

The difference in view-point between the American and the English books may be seen by a couple of examples. Sansome and Philp devote eight pages to the various hypotheses advanced by different investigators to account for speltoid wheats and fatuoid oats because they obviously are a chromosomal problem tied up in some way with the polyploid nature of these species. These abnormal types are apparently not mentioned by Sinnott and Dunn, probably because they felt it wiser in presenting the principles of genetics in a text-book to concentrate upon the phenomena about which there was general agreement. In the English book there is an extensive bibliography of 47 pages placed in convenient position for reference at the end of the text. In the American book the citations are fewer in number and grouped at the end of the chapters to which they refer. This arrangement is doubtless an advantage for the student working over the pages for the first time but is inconvenient for general reference.

The English book is an outgrowth of the association of the two authors in the John Innes Horticultural Institution. It is only a dozen years ago at the Toronto meeting of the A_3S, that the leader of this institution denied that we had any knowledge of how species have arisen in nature, though he expressed the belief that any day the mystery of species might be solved. Bateson was the godfather of modern genetics and outstanding as a leader in genetic thought but, although at Toronto he confessed his conversion to belief in chromosomes, like so many of his day he never really came to think of genetic problems primarily in terms of chromosomal behavior. It is of interest, therefore, to see the John Innes Institution taking such a leading part in making chromosomes and their activities the basis of modern theories in genetics. In the book discussed, which in no small measure is an embodiment of recent investigations at this institution, the formation of new species in a number of plants has been shown to be a relatively simple chromosomal phenomenon.

The book is not a text for elementary students since it treats in large measure of unsettled problems and is not easy reading. It is a useful publication, however, and can be recommended strongly to advanced students and research workers since it brings together the most recent investigations in the modern field of cytogenetics.

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