Discussions in CYTOGENETICS

by

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To my parents:

Isabelle Black Burnham,

and Warren Burnham

FOREWORD

This book furnishes detailed discussions which include methods, theoretical expectations, summaries of published results, and possible applications or uses in further experimentation or in breeding. The first chapter includes a brief summary of basic information, and special aspects of chromosome behavior and the life cycle as a background for the discussions that follow. The next eight chapters fall into two groups: 1. changes in chromosome structure, and 2. changes in chromosome number. It concludes with a chapter on sex determination and one on apomixis.

It is intended as an advanced course which follows courses in cytology and genetics. It is a supplement rather than a substitute for other books in the field. The goal of the course is to aid in attaining a working knowledge which will enable the student to read and understand the published research as it appears; and to plan his own experiments. The study questions and particularly the problems in Appendix 1 are important aids in attaining this goal. Problems 4 and 5 are recommended as a basic introduction. A critical reading of original papers which includes an analysis of the methods used and the interpretation of the results is recommended also. As an aid in their selection, an abbreviated list of references is furnished in Appendix 2. These represent typical papers rather than an attempt to survey a particular topic. Laboratory study of slides prepared from material illustrating various types of chromosome aberrations is essential also.

There is a need for research in all areas of a particular field. In pursuing a current fad in research there is a danger that other important areas may be neglected. Advances in each contribute to the whole. Throughout the book, attention is called to problems on which information is lacking and to special uses or applications which should furnish needed information.

It is a pleasure to acknowledge my indebtedness to Dr. H. K. Hayes for his many helpful suggestions in a critical reading at an earlier stage in the preparation of the manuscript, to Dr. R. C. Pickett, Purdue University, for suggestions on the chapters dealing with polyploidy; to Dr. J. B. Peterson and other members of the Agronomy Department at Purdue for their help and encouragement; to Dr. W. M. Myers and my colleagues at the University of Minnesota; and to the students whose questions have been a help in the attempt to clarify the presentation. I wish to thank Dr. R. E. Cleland for furnishing and checking the data used in Table 45, Dr. E. R. Sears for the print used in Fig. 54, and certain of the information in Table 115, Dr. J. Janick for the print for Fig. 50, Mr. Neal Tuleen for correcting a serious error in the calculations on page 91, and my wife, for her encouragement, reference checking and typing, and help in proof reading, without which this might not have been completed. Mr. Charles Arnt was the artist for Fig. 22, and I am indebted to Mrs. Renate Lichti (West Lafayette, Ind.) for the care and dispatch with which she prepared the remainder of the diagrams.

I am grateful for the generosity of the many individuals and publishers in granting permission to use published tables and illustrations. The citation that accompanies each indicates its source. Material from the Maize Genetics and the Barley Newsletters was used with the permission of the authors. Errors there undoubtedly are, I will appreciate it if they are called to my attention.

C. R. B.

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