
Preface

✂ ✂ This book is written for a single-semester undergraduate course in genetics. Two factors influence its content and organization. The first factor is the central and unifying position of genetics in the biological sciences, which requires considering such diverse areas as biochemistry, physiology, cytology, development, behavior, and evolution. The second factor is a desire to present, wherever possible, the experimental procedures and data that have led to our present concepts in genetics. This manner of presentation is an outgrowth of my firm conviction that education should not result solely in the accumulation of a body of information but must also include an understanding of the methodology used in the discipline studied and of the limitations in our knowledge about the subject.

It has been traditional to begin textbooks in genetics with a consideration of the work of Mendel and the principles of inheritance that his findings elucidated. However, recent discoveries on the nature of the genetic material and the manner in which it operates have shed new light on the chemical bases of many previously known genetic phenomena. In order that the student may benefit from this more recently acquired information in his study of inheritance patterns, the first topics considered are the nature and functions of hereditary material, the genetic code, and the physical basis of inheritance. Discussions then follow of gene interactions, multiple-factor inheritance, sex linkage and sex determination, chromosome numbers, chromosome mapping, chromosomal rearrangements, and extrachromosomal inheri-

tance. In all these discussions, the insight provided by recent findings on the nature and functions of the genetic material is stressed. Next follows an analysis of concepts of the gene as a mutable unit, a recombinational unit, and a functional unit. This consideration of the different aspects of the gene leads into a study of the regulation of gene action and the control that genes have over metabolism, development, and behavior. The final topics discussed are the genetic composition of populations of organisms and the fate of genes in succeeding generations of a given population. Other subjects included in these latter discussions are the roles of mutation, selection, migration, and genetic drift in determining the genetic composition of different populations of a species and the permanent establishment of genetically diverse populations through species formation.

Wherever possible, the relationship of genetic phenomena to man has been stressed. This is done not only to increase the student's interest in the material being discussed but also because human genetics has become one of the very active fields in modern research. The present explosive period of genetic research and publication has added a tremendous body of information to an already considerable amount available from the older literature. Because of the necessity of limiting the various discussions in the book to workable dimensions, a list of further readings is provided at the end of each chapter. Some of these references are designed to give the student historical background for topics covered within the chapter, while others are provided

to afford the student a wider acquaintance with modern research efforts in the field.

It has been four years since the first edition of this book was published. In that time, the field of genetics has continued its explosive contribution to virtually every aspect of biology and medicine. The current edition has been revised with this recent material in mind. New topics have been added, and a number of original discussions have been rewritten in the light of new information. In addition, there have been a number of substantial changes in the organization of the book's contents. It is hoped that these additions and rearrangements will help present the material of genetics as the exciting body of information it is.

Since its publication, this book has been used by many genetics classes both in the United States and abroad. I am deeply grateful to those instructors and students who have written either to the publisher or directly to me and have made suggestions for the book's improvement. Their recommendations have received careful study during the preparation of the present edition. I am especially indebted to two of my own students, Miss Harriet Rubenstein and Miss Helena Stuler, who spent many hours giving me the advantage of the student's point of view. The present effort has been guided by and has benefited a great deal from all of the above. I sincerely hope that those who use this book will continue to advise me of their reactions to it.

This book has benefited from the efforts of many persons. I am especially indebted to the following associates, each of whom graciously consented to review parts of the manuscript and also offered valuable suggestions for its improvement: Dr. Leonard C. Norkin, Dr. Rose R. Feiner, Dr. George C. Carmody, Dr. Betty C. Moore, Dr. Donald J. Komma, Dr. Norman M. Schwartz, Dr. Muriel Lederman, Dr. William N. Tavolga, and Dr. Frederick E. Warburton. I also wish to express my gratitude to the reviewer for the thoroughness with which he read the entire manuscript and for the comments he made. Any shortcomings of the book, however, are my responsibility alone. Finally, I wish to express my appreciation to Mr. Joseph T. Fevoli for preparing all the illustrations, Mrs. Rita Berkowitz and Mrs. Anne W. McCartney for performing the arduous task of typing the manuscript, and Mrs. Joan Sobel and Miss Helena Stuler for their aid in preparing the questions and problems. Credits for tables and figures from other publications are given in the legends according to the wishes of the author or publisher. I am indebted to the literary executor of the late Sir Ronald A. Fisher, F.R.S.; to Dr. Frank Yates, F.R.S.; and to Oliver & Boyd, Ltd., Edinburgh, for permission to reprint Tables 3 and 4 from their book *Statistical Tables for Biological, Agricultural and Medical Research*.

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