

Preface

This is a book about the conceptual language of genetics. I was motivated to write it for the many people I have met who are interested in genetics, but who find the language confusing and intimidating. I think access to the powerful abstractions and beautiful ideas that underlie our understanding of how traits are inherited has become limited by the growth of well-intentioned, but unnecessarily complicated academic language and jargon. As a result, even relatively sophisticated biologists, chemists, physicists, and physicians have difficulty engaging with some of the ideas that underpin the power of genetic analysis. This is a problem for the future; more and more people will obtain the DNA sequences of their genomes in the next decade or two. These sequences cannot be understood without reference to the basic ideas of genetics.

I believe there is a need for special words and terms to deal with some of the essential abstractions in genetics; these are the focus of this book. At the same time, the field has also acquired, in the last century or so, many unnecessary and confusing words, sometimes as a result of misunderstanding, and sometimes as a result of academic discourse, where the drive for erudition tends to drive out straightforward exposition. In my 40 or so years of teaching genetics, I have come to believe that fundamental genetic concepts can be explained using simple language, without loss of rigor and with only a modest number of indispensable specialized words.

I organized this book around the specialized words that capture the most fundamental genetic ideas. My aim is to convey the meaning and utility of the essential and helpful ones as they are used today. In a few cases, significant disagreement remains among my colleagues over the use of a word or term: I try to make it clear when this is so. Because this is not a book about history, I highlight only those historical issues that remain the source of continuing confusion. The reader will find, nevertheless, that I have included some relatively detailed discussions of the origins and/or applications of some of the more fundamental

concepts. I chose these not for the sake of history, but to aid with understanding by illustrating how such words and ideas work in practice.

In writing this book, I have assumed only minimal background knowledge of genetics. Readers should be able to understand and benefit from this book knowing only the most basic elements: the outline of Mendelian inheritance; chromosome mechanics (mitosis and meiosis) at the cartoon level; and, of course, the idea that functional genes are encoded as DNA arranged linearly along chromosomes. Many readers will have learned these basic concepts in a high school biology course. For those who, nevertheless, would like to refresh their recollection of these fundamentals, I highly recommend the first few chapters of *Genetics Notes* by the late, renowned human geneticist, James F. Crow.¹ In about 50 pages, Crow delivers all the basics a reader will need in clear and simple language. I provided a very few references to the original literature, restricting myself to those papers that are highly emphasized in the book and which are written in such a way that readers can appreciate them.

I hope this book will serve as a helpful companion for those thinking, reading, or writing about genetics; it is not intended to be a dictionary or textbook, let alone a history. No effort has been made to “cover” the field. I have made no attempt to transmit a set of biological facts—I tried to introduce just enough of them to illustrate important principles that underpin our understanding of genetics. In some cases, I have taken liberties. For example, scientists studying diverse organisms have developed different methods for naming their genes, resulting in a lot of species-specific genetic nomenclature. I have tried to avoid or to simplify naming conventions in order to spare the reader the confusion caused by these diverse ways of naming genes.

When I was a teenager, I spent time reading books about chess, bridge, or poker. These books were aimed at players with a wide range of experience. They assumed only knowledge of the rules and the basic moves. Like most readers, I could play these games, but by no means did I play them really well. I acquired and read these books in the hope of improving my game. My hope is that this book will serve, in an analogous fashion, to help readers with diverse interests and experience to think about genetic analysis in a more sophisticated and creative way.

To sum up, it is my hope that readers of this book will find it a useful guide to genetic ideas, regardless of their previous exposure to them. Genetics has come

¹Crow JF. 1986. *Genetics notes: An introduction to genetics*, 8th ed. New York: Macmillan, New York.

to play a central role in modern understanding of biology. It is my dream that more of my professional colleagues will recognize that this means that we, as a discipline, should make our work more generally accessible by modernizing, clarifying, and simplifying the language we use and teach.

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