

Part 4.

Genetics of phenotypic variation and disease

*In Part 4 we turn our attention to the **genetics of phenotypic variation**. We'll cover three main categories of traits: monogenic diseases, cancer, and complex traits, with particular emphasis on complex traits.*

I expect to release these chapters in 2024 –JKP.

As you read you should pay attention to the themes that repeat, but with key differences, across the different categories:

- *The number, allele frequencies and molecular mechanisms of variants;*
- *The types of selection that are most relevant;*
- *The study designs used to identify causal genes and variants;*
- *The main conceptual approaches to data analysis, and major insights.*

Specifically, we cover the following:

*Chapter 4.1: A **Starter Pack** of trait genetics: an introduction to the topics in this section.*

*Chapter 4.2: The **genetics of monogenic diseases**: mapping approaches, the major mechanisms, and selection.*

*Chapter 4.3: The **genetics of cancer**, emphasizing aspects of this huge field that intersect our main themes including somatic mutation and selection.*

*Chapter 4.4: **Quantitative Genetics**: statistical models for the inheritance of polygenic traits, including heritability and artificial selection.*

*Chapter 4.5–4.7: An overview of the main approaches for studying **complex traits**, and major emerging themes: GWAS; SNP heritability; regulatory genomics and the mechanisms of variant effects; and polygenic scores.*

*Chapter 4.8: We close with more on the **population genetics of complex traits** including stabilizing selection and polygenic adaptation.*