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Structure and Migration; 1.2.8 Demographic History of Human Populations; 1.2.9 Coalescent and Backward-Time Simulations; 1.2.10 Forward-Time Simulations; 1.3 Statistical Genetics and Genetic Epidemiology; 1.3.1 Penetrance Models; 1.3.2 Simple and Complex Genetic Diseases; 1.3.3 Phenotypic, Allelic, and Locus Heterogeneity; 1.3.4 Study Designs of Gene Mapping; References; 2 SIMULATION OF POPULATION GENETICS MODELS; 2.1 Random Genetic Drift; 2.1.1 Dynamics of Allele Frequency and Heterozygosity; 2.1.2 Persistence Time
2.2 Demographic Models2.2.1 The Bottleneck Effect; 2.3 Mutation; 2.3.1 A Diallelic Mutation Model; 2.3.2 Multiallelic Mutation Models; 2.4 Migration; 2.4.1 An Island Model of Migration; 2.5 Recombination and Linkage Disequilibrium; 2.6 Natural Selection; 2.6.1 Single-Locus Diallelic Selection Models; 2.6.2 Multilocus Selection Models; 2.7 Genealogy of Forward-Time Simulations; 2.7.1 Genealogy of Haploid Simulations; 2.7.2 Genealogy of Diploid Simulations; References; 3 ASCERTAINMENT BIAS IN POPULATION GENETICS; 3.1 Introduction; 3.2 Methods; 3.2.1 Evolution of a DNA Repeat Locus
3.2.2 Conditional Distributions and Ascertainment Bias of Allele Sizes3. 2.3 Simulation Method; 3.3 Results; 3.3.1 Summary of Modeling Results; 3.3.2 Comparisons of Empirical Statistics Derived from Human and Chimpanzee Microsatellite Data; 3.4 Discussion and Conclusions; References; 4 OBSERVING PROPERTIES OF EVOLVING POPULATIONS; 4.1 Introduction; 4.1.1 Allelic Spectra of Complex Human Diseases; 4.1.2 An Evolutionary Model of Effective Number of Disease Alleles; 4.1.3 Simulation of the Evolution of ne; 4.2 Simulation of the Evolution of Allele Spectra; 4.2.1 Demographic Models
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5.2 Controlling Disease Allele Frequencies at the Present Generation

Sommario/riassunto

The only book available in the area of forward-time population genetics simulations-applicable to both biomedical and evolutionary studies The rapid increase of the power of personal computers has led to the use of serious forward-time simulation programs in genetic studies. Forward-Time Population Genetics Simulations presents both new and commonly used methods, and introduces simuPOP, a powerful and flexible new program that can be used to simulate arbitrary evolutionary processes with unique features like customized chromosome types, arbitrary nonrandom mating schemes, virtual subp