Chapter 14: Human Genetic Variation

>Human Variation

* humans vary in many different ways
* physical appearance (skin, color, height), skills, preferences, variation in human disease, etc.
* sources of variation:   
  (1) genetic variation: diff. btwn individuals caused by genes that they inherited from parents  
  (2) environmental variation: refers to differences between individuals cased by environmental factors (climate, habitat, and competing species)
* variation within groups: refers to differences btwn individuals within a given group of people, ex: variation in height in NBA players
* variation among populations: refers o differences btwn entire group of people, ex: diff. in avg. height NBA players versus professional jockeys

+understanding genetic variation -> much easier to work on plants instead of humans -> easy to control parental mating and separate groups of offspring and grow them in known conditions

>Variation in Traits Influenced by Single Genes

* Specific Language Impairment (SLI)
* pattern of inheritance consistent with dominant allele at single locus

>Causes of Genetic Variation within Groups

* 2 mechanism: selection-mutation balance and balanced polymorphism
* selection-mutation balance: mutation can maintain deleterious gene within a population but only at a low frequency-> because disease is fatal only when you get homozygous but many people are heterozygous and thus are carriers
* balanced polymorphism: heterozygous individuals have highest fitness -> hemoglobin S allele is typically 1-10 in Africa -> homozygous normal, you get malaria from falciparum malaria -> homozygous for sickle cell, you die -> heterozygous, you have one copy of sickling cell and you are partially protected against malaria

>Genetic Variation within group

* many traits influenced by many different genes
* heritability: the measure that computes the proportion of variation due to effects of genes
* environmental covariation: similarities btwn environments of parents and their offsprings
* ex: height, not only affected by genes but also by nutritional levels and prevalence of infectious diseases
* twin studies: monozygotic (identical) and dizygotic (fraternal) -> genetic traits should be more similar in monozygotic twins than dizygotic

>Causes of Genetic Variation among Groups

* natural selection in different environments -> favours different genes and different environments
* genetic drift and founder effects are major players
* ex: Hemoglobin S is common only in areas of the world in which falciparum malaria is prevalent
* culture can create natural selection: if only milk is available as source of proteins and you are lactose intolerant, good luck to you buddy
* Genetic drift -> founders effect

>Genetic Variation among group

* stature, height, body size

>The Race Concept

* race is bad biology
* based on three misconception:   
  (1) humans can be naturally divided into one of a number of distinct races  
  (2) members of different races differ genetically substantially enough that knowing one's race gives info about intelligence, personality, etc.   
  (3) the difference between races is due to biological heritage
* ex: skin colour means a diff. race -> false -> skin colour is an adaptation-> ppl with diff. skin might live in different populations and thus might be a bit different due to adaptation but they are of same race, homo sapiens, we all just have a some genetic variation, that's all
* there is no single natural classification of human species
* racial classification schemes explain very little of the world's human genetic variation
* race is just social and political construct