* Lecture 9
* Mutation, migration, selection
* Case studies
* First assignment
* A loop – environmental and genetic components linked – have to worry about both
* Environmentals include climate, competition, disease – selective pressures
* Selective pressures end up in inbreeding
* Adults that are selected for – some might migrate, mutate, and reproduce
* Mate selection might go on
* And then get chance sampling – random genetic drifts – random genetic drift increases as popular size gets smaller
* Large pop.
  + Selection more affective
  + Greater mutation – mutation unlikely lost due to genetic drfit
  + Adaptive potential is systemically larger as pop gets larger
  + Eg. rabbit – 10 billion – increases enormously in Australia (invasives)
* Greater adaptive potential in large pop
* Small pop vulnerable to change – unmasking of deleterious alleles – genetic drift is so strong that selection isn’t having much effect
* The smaller the pop – sampling error – get lesser variation
* Loss the rare alleles through random sampling – can investigate the rare alleles across generation to check bottleneck
* Throughout generations, the wild alleles become close to 1 (fixed) and the other got lost
* Noise is reduced when pop size is increased
* Selective pressure – can see selection for brown phenotype
* With larger pop size – can see increase in brown – even though with noises in small population, can still see the same thing happening
* In small pop – hard for selection to happen cuz drift just take away rare alleles
* Bottleneck
  + Less genetic diversity - Not well-presented
  + Lost rare alleles
* Connectivity – important to define it
  + Genetic connectivity – individuals move from patches to another and reproduce successfully – gene flow slowly over time across neighbourhood – can happen across generation that links two areas
  + Connectivity increases – loss of allele richness decreases
  + Don’t lose alleles through genetic drift and new gene flow into the population
  + What features of environment influence connectivity – for conservation
* Characterise the population and variation – and what process retains the variation
* Slide 13 – line connects the haplotype
  + In the red pop, genetic variation has been lost (more circles in history)
  + In blue pop, lost rare haplotypes but overall still retain gen variation
  + Mitochondrial haplotype – mitochondria are better for dealing with degrading samples
  + Size of circle represents the frequency of the haplotype
* Rabbits – invasives in Australia
  + Founder effect
  + Genetic variation is important
  + Releases of domestic rabbits by Europeans lessen the founder effect and supplement the genetic variation
  + Expect low gen variation when they just established and as they went to new places, expect even more losses of gen variation – sequential founder effect – Australian rabbits lower genetic variation than other countries – but no sequential decreases of gen variation
  + Measure effective number of alleles because less influenced by sampling error
  + By looking at 40000 SNPs, there were multiple introductions into Australia, that is why no sequential founder effect – genetic clusters throughout different regions
  + The genes that are not neutral are related to immune responses
  + Rabbits were controlled by myxoma virus in Australia but the rabbits become resistant
  + The genes that infer myxoma virus immune responses increased but dropped when a new virus was introduced
  + Genetic variation may not be as low as we thought
* Epigenetics might make a population respond well to the environment
* Methylation controls gene regulation – stop DNA from unwinding – prevent transcription – easy to measure – expect to be less in invasives
* Variation at the genetic level is the raw material for evolutionary changes but epistasis are also very important for conservation