* Selective forces that maintain genetic variation
* Connectivity is relevant to the genetic variation – important for conservation biologist
* Mutation is rare – depending on the part of the genome sampled – most mutation is deleterious or lethal – impact on fitness so deleted by selection
* If the population is big enough – beneficial allele will get selected for
* If the population is small – genetic drift – the beneficial allele won’t have time to be selected for
* Genetic load – proportion of deleterious allele in population level – mostly masked in heterozygous form
* Neutral and near neutral mutation maintained by selection
* Genetic variation enhanced by gene flow (migration)
* Can be enhanced by mutation if drift isn’t fast enough
* Selection – balancing selection maintains genetic variation in population
* Heterozygote advantage – malaria resistance – help maintain sickle-cell anaemia causing allele in the population
* Rare allele advantage – frequency depending survival or mating – rare colouration will benefit – maintain rare allele in the population
* Rare allele advantage – human shirt experiment – the smell response corresponds to maximising heterozygosity in that part of the genome
* Gene environment interaction – selection along the altitudinal gradient
* Gene environment interaction – frequency of allele in Harlequin frog shift across environmental gradient – another example – poison frogs with diversity bright colour – bright colour is warning signal – need consistent marketing – those colours are quite close together – make wax frogs and translocate them and identify bite mark – no difference in predation according to colour – blue frogs in red frogs don’t get eaten – look at the mitochondrial genome and make population tree – different colours on the tip refer to different colours – got the same colour that evolved independently multiple times – confirmed in nuclear analysis – so mutation has got fixed and maintained in the population – no evidence of strong directional selection for colour type and predation
  + Different colour mutation in different population – single or couple mechanism/mutation that can change colour
  + If it was a complex or series of loci that were involved, the likelihood of getting random mutation that changes the colour is less likely
  + How do mutation get fixed if no directional selection? – got fixed by drift – time divergence in different colours – related to Pliocene – dry fragmented habitat – give rise to conditions of colour-form getting fixed – OR – mutation does get fixed by drift
  + There could be a cost to hybridisation – may not be the colour – the individuals mate assortatively to avoid low fitness – may not relate to the warning signal – but not the trait that is important wit respect no hybrids
* Aposematic signals – how signals evolve to communicate with predators – different from mimic – 2 forms – when mimic adopts colouration of predators to avoid being hunted – other poisonous frogs that adopt colour of poisonours frogs to take advantage of the colour – other frogs that are not poisonous but have the same colours as frogs – exploit the selective pressure that already occurs
* If it was completely random, no relationship between colouration and genetic divergent Fst – pairwise measure of Fst – if no geographic process, no relation between pairwise Fst (divergent) and the trait (colour) that is present
* Could model changes of environment in time – can use program that looks at species distribution – look at how the distribution would have shifted in time – once the information is obtained – look if the lineages that arose are consistent with the pattern of habitat fragmentation – come up with matrix of the tree
* Bioinformatics are very important – but sometimes can have mistakes because using wrong statistical tests