Activity - Genetic Drift

There are actually two processes by which organisms evolve at the genetic level. One is through natural selection and you will be familiar with this through examples of antibiotic resistance in bacteria and industrial melanism in the peppered moth (*Biston betularia*). However, evolution can also occur through the process of genetic drift. This is when the frequency of alleles that are of similar fitness will change *at random* through time. It is effectively a form of *sample error*. A summary of this process can be found at the following website:

http://evolution.berkeley.edu/evolibrary/article/evo_24

As you read through the website, identify the effects that genetic drift can have within a population and between populations. Also, identify the conditions under which drift has its most pronounced effects. You should also work out *why* genetic drift has these effects from a statistical perspective. A simulation activity may help with this:

http://www.biology.arizona.edu/evolution/act/drift/manual.html

Drift has many consequences for genetic evolution, mainly because deleterious (bad) mutations can reach very high frequency, or even fixation in small populations. For instance, it has had dramatic effects on the frequency of genetic diseases in the Afrikaans-speaking population in South Africa.

It also has significance in conservation genetics, where endangered populations suffer an increased incidence of genetic disease in a phenomenon called inbreeding depression.

Genetic drift also has dramatic effects on selectively neutral areas of the genome, and this actually provides us with much of the information that we use to construct evolutionary trees. In 1968, Motoo Kimura, a theoretical population geneticist, even proposed that the vast majority of molecular evolution was due to drift. You can watch a lecture about this theory and read about its origins at the following link:

http://oyc.yale.edu/ecology-and-evolutionary-biology/eeb-122/lecture-4#ch1