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| **Genetic Drift and the Founder Effect** | | | |  |
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| |  | | --- | | Polydactyly -- extra fingers or sometimes toes -- is one symptom of Ellis-van Creveld syndrome. The syndrome is commonly found among the Old Order Amish of Pennsylvania, a population that experiences the "[founder effect](http://www.pbs.org/wgbh/evolution/library/glossary/glossary.html#founder_effect)." Genetically inherited diseases like Ellis-van Creveld are more concentrated among the Amish because they marry within their own community, which prevents new [genetic](http://www.pbs.org/wgbh/evolution/library/glossary/glossary.html#genetic) variation from entering the population. Children are therefore more likely to inherit two copies of the particular [recessive](http://www.pbs.org/wgbh/evolution/library/glossary/glossary.html#recessive) genes that lead to genetic disease. | |  |  |  |
| **Genetic Drift and the Founder Effect:** | |  | |
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| Eastern Pennsylvania is home to beautiful farmlands and countryside, but it's also a gold mine of information for geneticists, who have studied the region's Amish culture for decades. Because of their closed population stemming from a small number of German immigrants -- about 200 individuals -- the Amish carry unusual concentrations of gene [mutations](http://www.pbs.org/wgbh/evolution/library/glossary/glossary.html#mutation) that cause a number of otherwise rare inherited disorders, including forms of dwarfism.  One form of dwarfism, Ellis-van Creveld syndrome, involves not only short stature but polydactyly (extra fingers or toes), abnormalities of the nails and teeth, and, in about half of individuals, a hole between the two upper chambers of the heart. The syndrome is common in the Amish because of the "[founder effect](http://www.pbs.org/wgbh/evolution/library/glossary/glossary.html#founder_effect)."   When a small part of a population moves to a new locale, or when the population is reduced to a small size because of some environmental change, the genes of the "founders" of the new society are disproportionately frequent in the resulting population.  If individuals in the group tend to marry within it, there's a greater likelihood that the recessive genes of the founders will come together in the cells that produce offspring. Thus diseases of [recessive](http://www.pbs.org/wgbh/evolution/library/glossary/glossary.html#recessive) genes, which require two copies of the gene to cause the disease, will show up more frequently than they would if the population married outside the group.  In the Amish, in fact, Ellis-van Creveld syndrome has been traced back to one couple, Samuel King and his wife, who came to the area in 1744. The mutated gene that causes the syndrome was passed along from the Kings and their offspring, and today it is many times more common in the Amish population than in the American population at large.   The founder effect is an extreme example of "[genetic drift](http://www.pbs.org/wgbh/evolution/library/glossary/glossary.html#genetic_drift)." Genes occurring at a certain frequency in the larger population will occur at a different frequency -- more or less often -- in a smaller subset of that population. As in the example of human diseases, genetically determined traits that would ordinarily be uncommon in the overall [gene pool](http://www.pbs.org/wgbh/evolution/library/glossary/glossary.html#gene_pool) might crop up with distressing frequency in a small subset of that pool. | |