

Finding Genes in Plants and People

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Genes lie behind much of the variation among people, animals, and plants. But where in the three billion “base pairs” of human DNA are the genes involved in a disease? I use statistics to track down genes and to link them to the functions they regulate.

My research aims to unravel the mystery of which genes are involved in diseases and traits that affect agricultural plants, trees, and humans. Not so surprisingly, many of the biological processes that lead to variation in humans lead to similar kinds of variation in animals, agricultural crops, and other organisms.

As a statistical geneticist, I try to identify the genes (segments of chromosomesmade up of DNA) that are involved in human diseases such as multiple sclerosis and different types of cancer. Using statistics I am able to describe the variation of a particular disease in both sick and well individuals and then associate or correlate this variation with regions of chromosomes that contain genes influencing the disease. Once pointed to the correct chromosomes and regions of the chromosomes, researchers can study the genes in those areas so that doctors can understand how they influence a particular disease.

In agricultural plants a similar statistical analysis called quantitative trait locus mapping allows us to identify genes that are responsible for specific functions and to breed them into related species to carry over their beneficial properties. For example, there is a type of tomato that grows in South America that is naturally resistant to insects such as aphids and white flies.We can identify the genes that cause this natural resistance and breed them into the cultivated tomato that we eat. Consumers eat healthy foods at lower prices, and we protect the environment from harmful chemicals.