

# Most important scientific event of 2007



The scientific event with the most significant implications for the future was recognition of unique differences between genome sequences of individual people (Pennisi, 2007). It is believed that about 99.5% of human DNA is exactly the same in every person. Within that 0.5% lies the variations that are responsible for individual traits and diseases, including Alzheimer's, Parkinson's, depression, alcoholism, heart disease, and other serious diseases (National Human Genome Research Institute).

Genetic variations also affect how individuals respond to drugs and environmental factors. The goals of National Human Genome Research Institute are to discover and type single nucleotide polymorphisms (SNPs) and other forms of genetic variation on a large scale across the genome; to develop high-resolution maps of genetic variation and haplotypes; and to develop methods for the large-scale experimental and statistical analysis of SNPs, other forms of genetic variation, haplotypes and complex traits (National Human Genome Research Institute).

Previous work on the human genome has included the search for a relationship between specific genes and various diseases, such as an "addiction gene" or a "cancer gene" or some similar link. This research has already led to the identification of specific genes that are responsible for several diseases.

Previous research on the human genome has also identified what separates humans from other primates, genetically speaking. In addition to identifying the genome sequences that are responsible for diseases, breakthroughs that occurred during 2007 will allow scientists to pinpoint the genetic variations

that make me, me and you, you. Individual genomes appear to include the causes of behavioral traits that had been previously attributed to personality or psychiatric characteristics and not to genetics (Pennisi, 2007).

The most obvious application of this research will be in the use of gene therapy to combat diseases. At the simplest level, understanding an individual's predisposition towards certain diseases will allow physicians to recommend preventative treatments and lifestyle choices that can reduce or eliminate the genetic threat. On a more complex level, genetic research can provide new, customized treatments that are specifically designed to match the genetic needs of the individual patient. Genetic medicine could be used to treat diseases after the disease has developed or, in some cases, used to treat genetic disorders during pregnancy.

While the medical applications for genome research show much promise, there are also serious implications for individual privacy and genetic discrimination. Once again, legal and ethical development has not kept pace with scientific and technological development. Despite the introduction of several pieces of legislation designed to help ensure genetic privacy and to shield individuals from the misuse of genetic information, there is still no federal legislation that addresses the issue of genetic discrimination in individual insurance coverage or to genetic discrimination in the workplace (U. S. Department of Energy Office of Science, 2007).

As the ability to sequence the genome sequences of individuals becomes more practical, insurance companies and other interested parties might

consider it cost effective to use genetic sequencing to reduce any potential liabilities from policy holders or applicants. Many insurance companies already have policies regarding preexisting conditions. The leap from policies that exclude preexisting conditions a policy that excludes diseases for which the individual has a genetic predisposition is not that far removed.

The ability to map individual genomes will open new doors for medical treatment of disease. Hopefully, 2008 will see breakthroughs of a similar magnitude in ethics and laws regarding the gathering, sharing, and use of genetic information.

#### References

National Human Genome Research Institute, National Institutes of Health (2008). Genetic variation program. Online. Retrieved May 1, 2008, from <http://www.genome.gov/10001551>

Pennisi, E. (2007). Breakthrough of the year: Human genetic variation. *Science*, 318 (5858), pp. 1842 – 1843. Retrieved May 1, 2008, from <http://www.sciencemag.org/cgi/content/full/318/5858/1842>

U. S. Department of Energy Office of Science (2007). Genetics Privacy and Legislation. Online. Retrieved May 1, 2008, from [http://www.ornl.gov/sci/techresources/Human\\_Genome/elsi/legislat.shtml](http://www.ornl.gov/sci/techresources/Human_Genome/elsi/legislat.shtml)