

Wikipedia 11/3/13

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## Introduction to genetics

From Wikipedia, the free encyclopedia

*This article is an accessible, non-technical introduction to the subject. For the main encyclopedia article, see [Genetics](#).*

**Genetics** is the study of [genes](#) — what they are and how they work. Genes are units inside a cell that control how living [organisms](#) inherit features from their ancestors; for example, children usually look like their parents because they have inherited their parents' genes. Genetics tries to identify which features are inherited, and explain how these features pass from [generation](#) to generation.

In genetics, a feature of a living thing is called a "[trait](#)". Some traits are part of an organism's [physical appearance](#); such as a person's eye-color, height or weight. Other sorts of traits are not easily seen and include blood types or resistance to diseases. The way our genes and environment interact to produce a trait can be complicated. For example, the chances of somebody dying of [cancer](#) or [heart disease](#) seems to depend on both their genes and their lifestyle.

Genes are made from a long [molecule](#) called [DNA](#), which is copied and inherited across generations. DNA is made of [simple units](#) that line up in a particular order within this long molecule. The order of these units carries genetic information, similar to how the order of letters on a page carries information. The language used by DNA is called the [genetic code](#), which allows the genetic machinery to read the information in the genes in triplet sets of [codons](#). This information is the instructions for constructing and operating a living organism.

The information within a particular gene is not always exactly the same between one organism and another, so different copies of a gene do not always give exactly the same instructions. Each unique form of a single gene is called an [allele](#). As an example, one allele for the gene for hair color could instruct the body to produce a lot of pigment, producing black hair, while a different allele of the same gene might give garbled instructions that fail to produce any pigment, giving white hair. [Mutations](#) are random changes in genes, and can create new alleles. Mutations can also produce new traits, such as when mutations to an allele for black hair produce a new allele for white hair. This appearance of new traits is important in [evolution](#).

Part of a series on

### Genetics

**Key components**

[Chromosome](#) · [DNA](#) · [RNA](#)  
[Genome](#) · [Heredity](#) · [Mutation](#)  
[Nucleotide](#) · [Variation](#)

[Glossary](#) · [Index](#) · [Outline](#)

**History and topics**

[Introduction](#) · [History](#)

[Evolution \(molecular\)](#)  
[Population genetics](#)  
[Mendelian inheritance](#)  
[Quantitative genetics](#)  
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**Research**

[DNA sequencing](#)  
[Genetic engineering](#)  
[Genomics](#) ([template](#))  
[Medical genetics](#)

[Branches of genetics](#)

23andMe 11/3/13

The screenshot shows the 23andMe website homepage. At the top, the browser address bar displays "https://www.23andme.com/". The website header includes the 23andMe logo, a navigation menu with links for "welcome", "health", "ancestry", "how it works", "store", and "help", and a search bar. Below the header, a large green banner features the text "Get to know you. Health and ancestry start here." and an image of the "welcome to you®" 23andMe DNA Spit Kit. To the right of the kit image, a list of features is provided: "Reports on 240+ health conditions and traits", "Discover your lineage, find relatives and more", and "Get updates on your DNA as science advances". A pink "order now" button and the price "\$99" are also displayed. At the bottom of the banner, the text "Watch a life-changing story." is visible.

23andMe

welcome health ancestry how it works store search help

**Get to know you.  
Health and ancestry start here.**

welcome to you®

23andMe DNA Spit Kit

- Reports on 240+ health conditions and traits
- Discover your lineage, find relatives and more
- Get updates on your DNA as science advances

order now \$99

**Watch a life-changing story.**

Learn.Genetics™ 11/5/13

The screenshot shows the Learn.Genetics website in a web browser. The address bar displays <http://learn.genetics.utah.edu/>. The page features a header with the Learn.Genetics logo, the text "GENETIC SCIENCE LEARNING CENTER", and the University of Utah logo. Navigation links include "En Español", "About Us", "Feedback", and a "SEARCH" button. A "TEACHER RESOURCES & LESSON PLANS" button is also present.

The main content area is divided into two columns. The left column, titled "BASICS", contains four links: "TOUR THE BASICS", "DNA TO PROTEIN", "HEREDITY & TRAITS", and "AMAZING CELLS". The right column, titled "NEW & POPULAR", contains three links: "VARIATION, SELECTION & TIME", "BUILD A DNA MOLECULE", and "CELL SIZE & SCALE".

Below these columns is a horizontal navigation bar with tabs for "GENETIC TECHNOLOGY", "VIRTUAL LABS", "EPIGENETICS", "THE NEW SCIENCE OF ADDICTION", and "VARIATION, SELECTION & TIME". The "GENETIC TECHNOLOGY" tab is currently selected.

At the bottom, there are two featured sections: "STEM CELLS" and "GENE THERAPY".

MedlinePlus 11/11/13

The screenshot shows the MedlinePlus website in a web browser. The address bar displays <http://www.nlm.nih.gov/medlineplus/geneticdisor>. The page features the MedlinePlus logo with the tagline "Trusted Health Information for You" and identifies it as a service of the U.S. National Library of Medicine and NIH National Institutes of Health. A search bar is present with a "GO" button. Navigation buttons include "Health Topics", "Drugs & Supplements", "Videos & Cool Tools", and "ESPAÑOL". A horizontal menu lists "Other Topics" with letters A through Z and "All Topics". The main heading is "Genetic Disorders". Below this, a text box explains that genes are the building blocks of heredity, passed from parent to child, and hold DNA instructions for making proteins. It further states that mutations can change these instructions, leading to medical conditions called genetic disorders. To the right, there are two small images: one of a chromosome and one of a DNA double helix. Below these images is a "MEDICAL ENCYCLOPEDIA" section with links to "Alström syndrome", "Basal cell nevus syndrome", "Beriberi", "Cystinuria", and "Genetics". The Windows taskbar at the bottom shows the date and time as 9:04 AM on 11/11/2013.

MedlinePlus  
Trusted Health Information for You  
A service of the U.S. National Library of Medicine  
NIH National Institutes of Health

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Health Topics Drugs & Supplements Videos & Cool Tools ESPAÑOL



Other Topics: A B C D E F G H I J K L M N O P Q R S T U V W XYZ All Topics

## Genetic Disorders

Genes are the building blocks of heredity. They are passed from parent to child. They hold DNA, the instructions for making proteins. Proteins do most of the work in cells. They move molecules from one place to another, build structures, break down toxins, and do many other maintenance jobs.

Sometimes there is a mutation, a change in a gene or genes. The mutation changes the gene's instructions for making a protein, so the protein does not work properly or is missing entirely. This can cause a medical condition called a genetic disorder.

You can inherit a gene mutation from one or both parents. A mutation can also happen during your lifetime.

ADAM

### MEDICAL ENCYCLOPEDIA

- [Alström syndrome](#)
- [Basal cell nevus syndrome](#)
- [Beriberi](#)
- [Cystinuria](#)
- [Genetics](#)



Genome.gov 11/5/13

genome.gov  
National Human Genome Research Institute  
National Institutes of Health


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**Highlights**

**NIH to hold webinar on the draft Genomic Data Sharing (GDS) policy**

On November 6, 2013, from 11 a.m. to 1 p.m. Eastern, the National Institutes of Health (NIH) will host a webinar to provide an overview of the draft Genomic Data Sharing Policy and answer questions from the community. The meeting is free and open to the public. To register and submit questions go to: [Public draft GDS webinar](#)

**News Update**

 **The Jackson Laboratory**  
Leading the search for tomorrow's cures


**Jackson Lab adopts NCHPEG's website**

The Jackson Laboratory (JAX), a highly regarded institution for genetics research and education, recently signed an agreement with the National Coalition of Health Professional Education in Genetics (NCHPEG) to acquire and maintain the coalition's website. NCHPEG's website hosts a wealth of instructional programs on genetics. [Read more](#)




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What is a Gene?

**Quick Links**

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 Digital Media Database  
 NHGRI Smithsonian Genome Exhibition

**Newsroom**

[NIH awards \\$17 million in grants to augment genomics research in Africa](#)  
September 30, 2013

[Media Availability: NIH Launches First Phase of Microbiome Cloud Project](#)  
September 27, 2013

Yourgenome.org 11/13/13

The screenshot shows the homepage of the Wellcome Trust Sanger Institute's Yourgenome.org website. The browser address bar displays "http://www.your...". The website header includes the logo "yourgenome.org" and the tagline "Stimulating interest in and discussion of genetic research". A navigation menu contains links for "About Us", "DNA, Genes & Genomes", "Human Genome", "Genomes, Health & Society", and "For Teachers".

The main content area features a large banner titled "Genome generation" with the text "Get debating! Explore the ethical and social issues of genome sequencing through this card-based discussion activity." Below this banner are three columns of content:

- YOUR INTRODUCTION TO DNA, GENES AND GENOMES**: A guide to DNA, genes and genomes - and how the instructions they contain are used to build cells and bodies. Links include "Genomes: The Basics" and "Genomes: In Detail".
- YOUR HUMAN GENOME**: Find out about the Human Genome Project, see how DNA is sequenced and explore key genes and locations in our genome. Links include "The Human Genome Project", "Genome Sequencing Centre", and "Genome Explorer".
- GENOMES, HEALTH AND SOCIETY**: Glimpse how new genome research and technologies could affect our health and lives in these topics focusing on contemporary science and issues. Links include "Pharmacogenomics", "Direct-to-consumer testing", "Personal genome sequencing", "UK National DNA Database", "Genomic disorders", and "Evolution of Brain, Behaviour and Intelligence".

On the right side, there is a sidebar with a "BRAF" section containing links to "Genome Generation", "Malana Challenge", "DNA, genes and genomes", "For Teachers", "Sequencing Pipeline", and "Human Genome Project". Below this is a "FOR TEACHERS" section with the text "Teaching resources including animations, activities and worksheets that support UK curriculum and science specifications for 14-19 year olds." and social media icons for RSS, Facebook, Twitter, and YouTube.

At the bottom, there is a "RESOURCES" section with links to "Animations", "Activities", "Researchers", "Glossary", and "Links". The footer includes "Contact us", "Cookies Policy", "Sitemap", "Disclaimer", "Copyright", and the Wellcome Trust Sanger Institute logo.

Genesinlife.org 11/13/13

The screenshot shows the Genes in Life website homepage. The browser address bar displays <http://genesinlife.org/>. The website header includes the Genes in Life logo, a navigation menu with links to WELCOME, GENETICS 101, GENES & YOUR HEALTH, AFTER DIAGNOSIS, TESTING & SERVICES, and RESEARCH, and a request to complete a short survey. The main banner features a woman in a lab coat talking to a patient, with the headline "Why should research matter to me?" and a sub-headline "Learn about which types of research may be important to your health and how you can get involved." A "learn more" button is present. Below the banner is a search bar. The left sidebar contains a "Spotlight On Whole Genome Sequencing" section with a description, a photo of a man and child with a DNA model, and links to the "GENES IN LIFE BLOG" and "ASK THE EXPERTS". The right sidebar features the "Genes in Life Blog" with an article titled "The Human Genome Project: Then and Now" dated November 6, 2013, and a "READ MORE" link. Below the blog is a "On Twitter" section showing tweets from @GenesinLife and @GeneticsUpdate. The bottom of the page has a "Your Genes, Your Health" section with a photo of a woman and the text "Your genes can be important to your health, but they are not the only factor."

http://genesinlife.org/ Genes in Life | Answering y... x

Please help us improve GenesinLife.org with this [short survey](#)!

Follow us on: [Twitter](#) [Facebook](#) [RSS](#)

**Genes in Life**

WELCOME GENETICS 101 GENES & YOUR HEALTH AFTER DIAGNOSIS TESTING & SERVICES RESEARCH

## Why should research matter to me?

Learn about which types of research may be important to your health and how you can get involved.

[learn more](#)

Search search

### Spotlight On Whole Genome Sequencing

What is whole genome sequencing? How is it used, and how does it apply to you? Learn more on the Genes in Life blog, and have your questions answered by our featured experts!

[GENES IN LIFE BLOG](#)

[ASK THE EXPERTS](#)

### Your Genes, Your Health

Your genes can be important to your health, but they are not the only factor.

### Genes in Life Blog

#### The Human Genome Project: Then and Now

November 6, 2013 - 1:03pm

The Human Genome Project was a remarkable feat in the world of genetics. How did it happen and how is it shaping genetic research today?

[READ MORE](#)

### On Twitter

**Genes in Life** @GenesinLife 8 Nov  
When science and celebrity unite: The Angelina Jolie effect in genetic testing. [goo.gl/TklHTS](http://goo.gl/TklHTS)  
Expand

**Genetics Update** @GeneticsUpdate 8 Nov  
Study Finds That Americans Want Doctors' Guidance On Genetic Test Results [snaanalytics.com/RRqgy8](http://snaanalytics.com/RRqgy8)  
1 Retweeted by Genes in Life