



Genomic links

Online resources for further information

Human Genome Project

DNA Interactive

DNA Learning Centre, Cold Spring Harbor Laboratory
<http://www.dnai.org>

A content-rich site for secondary students and teachers that covers (in varying detail) the history, techniques, ethics and applications of genetics. Classroom activities for registered users are found on myDNAi (<http://www.dnai.org/members>), and teachers can use the Lesson Builder to create online presentations with the site's many animations and video resources.

Doegenomes.org

Human Genome Project Information, U.S. Department of Energy: <http://doegenomes.org/>

A huge site with educational materials (including an image gallery), science primers, information about the medical applications, and the ethical, legal, and social issues of the Human Genome Project.

genome.gov

National Human Genome Research Institute (U.S.)
<http://www.genome.gov/Education/>

Includes a 'talking glossary' and a multimedia education kit -- covering history, gene basics, genetic variation and ethics -- for download or viewing online.

The Human Genome

The Wellcome Trust
<http://genome.wellcome.ac.uk/>

A microsite from the Wellcome Trust with comprehensive articles and an increasing number of animated items. Relaunched in 2006.

Your Genome

The Wellcome Trust Sanger Institute
<http://www.yourgenome.org/>
Beginner and intermediate level information about DNA, genes, and the Human Genome Project. Hosts a genetics glossary, an online 'Sequencing Centre' and thematic 'Spotlights' with video interviews and animations. Further Human Genome Project information (including links to the publications and press releases) can be found at: <http://www.sanger.ac.uk/HGP/>

Human Genome Collection

Nature Publishing Group
<http://www.nature.com/nature/supplements/collections/humangenome/index.html>

Genetics & biotechnology resources

Access Excellence @ the National Health Museum (U.S.)
A set of activities and resources developed and submitted by U.S. teachers of biotechnology.

http://www.accessexcellence.org/RC/AB/IE/Intro_The_Human_Genome.html

Biointeractive

Howard Hughes Medical Institute (HHMI)
www.biointeractive.org

Virtual biology labs and lectures with narrated animations on topics such as gene switches, DNA repair, X-inactivation, and the Gleevec leukaemia drug.

Biology4all

Department of Biological Sciences, University of Central Lancashire

<http://www.biology4all.com/>

Home of the biotutors discussion list, a speaker database and resource library -- contributions are made by teachers for teachers, and the resources are distributed under a creative commons licence.

Gene almanac

DNA Learning Center, Cold Spring Harbor Laboratory
<http://www.dnalc.org/home.html>

A rich offering of genetics-related resources; many of them animated. Downloadable resources can be found in the Biology Animation Library at <http://www.dnalc.org/home.html>. New sites include *Greenomes* (plant genetics) and *Inside Cancer* (molecular basis of cancer).

Genetic interest group

<http://www.gig.org.uk/>

An alliance of patient organisations with an interest in genetic disorders. Their education pack *Genes and you* is now available online from the education pages.

Genewatch UK

www.genewatch.org

A not-for-profit group that monitors developments in genetic technologies.

Learn.Genetics

Genetic science learning center, University of Utah
<http://learn.genetics.utah.edu/>

Downloadable flash games and animations covering topics from DNA basics to the genetics of addiction. The animations are relatively friendly (often with characters and sound effects) and suitable for a range of audiences.

National Centre for Biotechnology Education

<http://www.ncbe.reading.ac.uk/>

Resources for teaching biotechnology in schools, developed at the University of Reading, including experimental protocols and equipment. A section on the 50th anniversary of the double helix gives links to DNA-related paraphernalia (including models).

Research Councils, U.K. (RCUK)

<http://www.bbsrc.ac.uk/life/index.html>

<http://www.bbsrc.ac.uk/society/engagement/schools/resources/Welcome.html>

Online exhibitions and biological resources for schools, including 'DNA: the recipe for life' and 'DNA in the garden'. Also links to a site describing the 'Genetic Futures' workshops from 2003.

The Royal Society

<http://www.royalsoc.ac.uk>

The section on Scientific Issues is of particular interest; go to <http://www.royalsoc.ac.uk/landing.asp?id=6> and use the menu at top left to see all the topics. The 'Genetics and Health' section covers information on pharmacogenomics and DNA patenting.

Popular science/media

BBC Science and Nature: genes

<http://www.bbc.co.uk/science/genes/>

<http://www.open2.net/dramaticscience/index.htm>

New Scientist (Genetics focus)

<http://www.newscientist.com/channel/life/genetics>

Nova (PBS in the U.S.)

Cracking the code of life: <http://www.pbs.org/wgbh/nova/genome/>; *Neanderthals on trial*: <http://www.pbs.org/wgbh/nova/neanderthals/>; *Secret of Photo 51*: <http://www.pbs.org/wgbh/nova/photo51/>; *Stem cells*: <http://www.pbs.org/wgbh/nova/sciencenow/3209/04.html>

Exhibitions and science broadcast

Genome: the secret of how life works

Pfizer/Clear Channel

<http://genome.pfizer.com>

The GEEE! in Genome

The Canadian Museum of Nature

http://www.nature.ca/genome/index_e.cfm

The Genomic Revolution

American Museum of Natural History

http://www.amnh.org/exhibitions/genomics/0_home/

The Secret of Life

Royal Institution Christmas Lecture (John Sulston)

<http://www.channel4.com/learning/microsites/G/genetics/>

Bioethics

The BioEthics Education Project

Bristol University

www.beep.ac.uk

A portal with pages clustered according to curriculum-related topic areas, including GM foods, genetics, cloning and reproductive technologies.

Ethical Emporium

Science Learning Centre (London), Windfall Digital etc.

www.windfalldigital.com/ethicalemporium

A pilot resource to help educators of GCSE and A-level to teach ethics of contemporary science in the classroom. The first topic is about *Genes and Antisocial behaviour*.

Human Genetics Commission

<http://www.hgc.gov.uk/>

Recent relevant reports:

Profiling the newborn, 2005.

http://www.hgc.gov.uk/Client/news_item.asp?Newsid=38

Making babies: reproductive decisions and genetic technologies, 2006.

http://www.hgc.gov.uk/Client/news_item.asp?Newsid=52

Nuffield Council on Bioethics

<http://www.nuffieldbioethics.org/>

Recent relevant reports: *Pharmacogenetics: the issues* (2003) http://www.nuffieldbioethics.org/go/ourwork/pharmacogenetics/publication_314.html; *Genetics and human behaviour: the ethical dimension* (2002); http://www.nuffieldbioethics.org/go/ourwork/behaviouralgenetics/publication_311.html

Genome browsers

Ensembl

European Bioinformatics Institute and Wellcome Trust Sanger Institute

www.ensembl.org

The *Ensembl* genome browser provides access to the genomes of more than twenty-five species. Although this is a resource primarily for researchers, it provides overview data for each chromosome and a search function that draws information from resources worldwide.

National Center for Biotechnology Information

National Library of Medicine, National Institutes of Health

<http://www.ncbi.nlm.nih.gov/> and

<http://www.ncbi.nlm.nih.gov/genome/guide/human/>

A resource, primarily for researchers, that provides access to bioinformatic tools and scientific papers (through PubMed). The human genome resources provide access to an amazing catalogue of human genes and human genetic disorders (OMIM) and a relatively intuitive way to find genes on a chromosome 'mapviewer'.