
THE SIGNAL AND THE NOISE

BEHIND THE SIGNAL



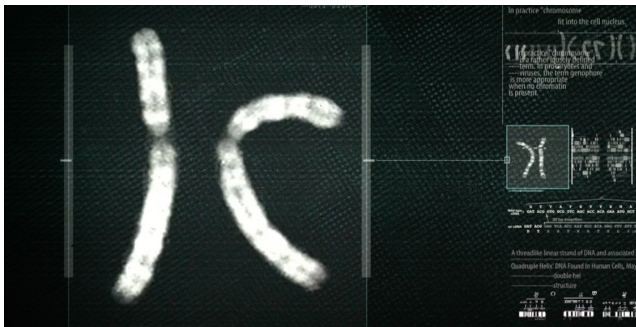
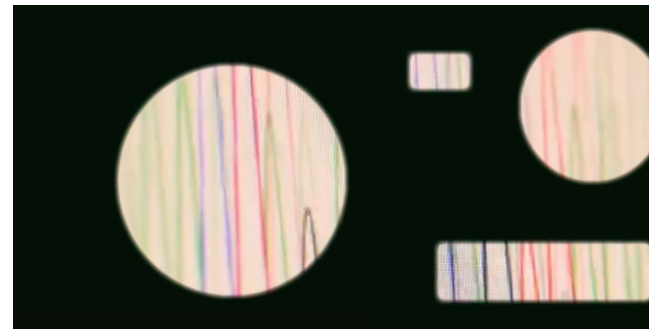
GENOMICAL AMOUNTS OF DATA

Genomics is predicted to become the biggest source of data in the world, producing more digital information than astronomy, particle physics or even YouTube. By 2025 around 1 billion people will have had their genomes sequenced helping researchers find out more about how genetic mutations are linked to health and disease.

SEQUENCES

There are many ways of displaying a genetic sequence. A common format is a "trace" where each peak shows what nucleotide in each position.

Adenine (A) is green, guanine (G) black, cytosine (C) blue, and thymine (T) red. These colours are used universally to help researchers share and compare codes.

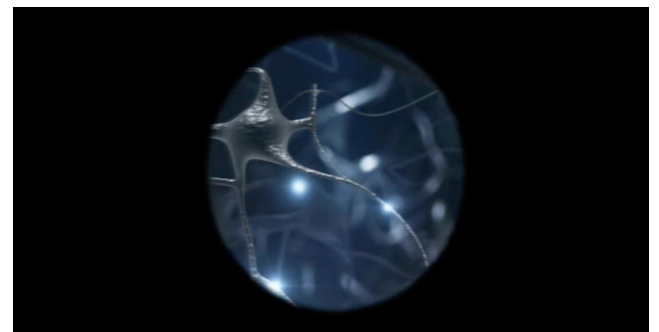


CHROMOSOMES AND CHROMATIN

The DNA molecule is very long; it has to be as it codes so much information. If stretched out human DNA would be about 1.7 meters long. To fit a copy of this into each cell it has to be compressed, folded and zipped up. First the double helix is coiled up into histones which fold up to form chromatin. This is then condensed again to make chromosomes. Humans have 23 pairs of chromosomes.

OPTOGENETICS

It sounds like science fiction to imagine being able to switch genes on and off using light but this already happens in nature. Every morning, sunlight triggers cells to start making proteins that wake you from your sleep. Scientists looked at the sequences of these proteins and found the code for the switch. Researchers can insert the switch code next to new genes and use light to turn them on and off to study their functions.



DNA AS A DEVICE

Medical devices have been implanted into the body since the 1950s. These have developed from crude gadgets to organic materials that can integrate with the body. Recent advancements have enabled the 3D printing of biocompatible materials and even parts of tissues to be printed from living cells opening up new ways to study and treat diseases.

