

Watson and Cricks Great Discovery - The Structure of DNA

In 1953 **James Watson** and **Francis Crick** built the first correct structural model of DNA. They used scale models of atoms to work out their theories about how the structure was set up. When they discovered how the base pairs *Adenine* fit together with *Thymine* and *Guanine* fit together with *Cytosine*, they knew they had found a solution to DNA's structural puzzle.

Each **nitrogenous base pair** was held together by a weak hydrogen bond and stacked flat on top of each other like steps. To each base pair, a two sugar-one phosphate complex attached. This formed the so-called **nucleic acid**. But what made the structure come together in perfect harmony was how the two strands of DNA, that made the double helix, were discovered to wind in opposite directions. This set up of matching base pairs makes DNA well suited for replication. (See DNA Replication)

The DNA model built by Watson and Crick and the accompanying paper published in Nature, showed how DNA's base pair structure is suited for the copying of genetic material. In 1962 they, along with Maurice Wilkins, received the Nobel Prize for Physiology for their work.

One April 24, 2003, scientists at the **National Human Genome Research Institute (NHGRI)** and the **US Department of Energy (DOE)** announced that they had completed the sequencing of the human genome, 50 years to the day that Nobel Prize winners James Watson and Francis Crick published the molecular structure of the DNA double helix. The decoding of the 3 billion DNA letters of the human genome is the result of one of the most ambitious scientific projects of all time, comparable to going to the moon and splitting the atom. This amazing achievement was accomplished by **The International Human Genome Sequencing Consortium** and included hundreds of scientists at 20 sequencing centers in the United States, Great Britain, China, France, Germany, Japan and China. These scientists recognized that the sequence of the human genome belonged to every human being and placed all of the sequence generated by the Human Genome Project into public databases freely available to scientists around the world with no restrictions on its use.

The Structure of DNA

1. Structurally, DNA is made up of **nucleotides**.
2. A nucleotide is made up of a sugar, a phosphate and a base.
3. Nucleotides hook together to make the **sugar-phosphate backbone** of every strand of DNA.
4. Bases pair up with opposite, matching bases on the other strand of DNA.
5. There are four kinds of base pairs made up of adenine (A), thymine (T), guanine (G), cytosine (C). A always pairs with T. G always pairs with C.
6. The two strands of DNA are linked together by weak hydrogen bonds and stacked like a ladder who's sides spiral around each other into their famous **double-helix shape**.

