

DNA MATCHING

The DNA molecule itself resembles a sort of “twisted ladder”. The steps of the DNA ladder consist of four different molecules-adenine, thymine, cytosine and guanine. These four molecules make up the “letter” of the genetic code. Step-by-step these letters spell out the formulas for every living organism. The formula for a human being –the human genome- contains over 3 billion letters. At the level of our genes, we are, all of us... nearly identical.

But even though the differences in our genes are slight, with modern genetic sequencing technology we can detect and identify these differences. The uniqueness of our genetic code can then be used as a tool in a variety of applications, from human identification and paternity determination, to criminal forensics.

Forensic scientists can recover and extract DNA from the smallest of cell and tissue samples. Once a sufficient sample has been obtained, a multi-step process, called “DNA electrophoresis” is performed that can make visible even tiny molecular differences in a genetic sequence.

First, specialized enzymes are used to chemically “cut” the DNA strands at specific locations in the genetic sequence. This cut DNA is then placed in an electrically conductive gel. When an electrical current flows through the gel, the tiny pieces of DNA are carried along at different speeds depending on their size. This results in a distribution of DNA throughout the gel that is uniquely determined by the specific genetic sequence. Two genetic sequences that are unique will be cut into pieces of slightly different sizes, and these different sized chunks will move at varying rates through the gel, leading to different final patterns. This final pattern represents a sort of “fingerprint” that is unique to that individual.