AMERICAN MUSEUM of NATURAL HISTORY

Genetics, Genomics, Genethics

Week 3

Molecular Lab Techniques

Part 3: DNA Sequencing and Analysis

Rob: The next step is to take the amplified portion of the genome and determine the positions of G's, A's, T's, and C's along the DNA string. This is done through a series of complex reactions. The reactions from the robot need to be visualised for the positions of the G's, A's, T's, and C's in the DNA strands.

You need to place those reactions into an automated DNA sequencing machine comprised of 108 capillaries, or small tubes, with a solution in them that separates the DNA strand at each individual base along the strand.

On the right we see a computer-generated image of those 108 capillaries. On the left we see a computer-generated image of the intensity of the dyes for G, A, T, and C in only one of those capillary tubes.

All of the information that comes from the automated sequencer is digital, in computer files. That information needs to be processed and analysed. To do this, we use the parallel computing facility.

It consists of over 400 individual processors, all strung into a single control unit that can implement incredibly intensive computational problems. The researcher analyses the DNA sequences from the automated sequencers. These sequences are imported into the parallel-processing computer and displayed on the screen as G's, A's, T's, and C's from many different organisms.

The end-product of analysis on the parallel processor is a picture of the relationships of organisms in the tree of life.