

CHAPTER 12

ADAM AND EVE

HUMAN GENOMIC ORGANIZATION AND INTRONS

Elsewhere we have presented scientific evidence for the evolution of plants and animals (in the book and in the article “Genetic Evidence for Evolution” on this website). What about our own species? What is the scientific evidence that humans evolved? Scientists have found that human genes are very similar to chimpanzee genes, a little less similar to other apes, less similar to dogs and bears and other mammals, and still less similar to reptiles and birds. This pattern of nested similarity matches the prediction that humans share common ancestry with other animals. This evidence indicates that humans share a common ancestry with chimps which dates to about 5 to 7 million years ago, and longer ago for other animals.

The evidence goes beyond the similarity in the sequences of the genes themselves. There is also evidence for common ancestry in genomic organization and in introns.

Genomic organization: Humans and chimps each have about 30,000 genes. Those genes are arranged on *chromosomes*. Humans have 23 pairs of chromosomes, while chimps and other apes have 24 pairs. In most cases the genomic organization (the order in which the genes are arranged on the chromosomes) can be matched up chromosome-by-chromosome among those species. On some chromosomes certain species have an *inversion* on part of the chromosome. (Imagine taking a stick, cutting out a middle portion, flipping it halfway around, and gluing the stick back together.) When those inversions are taken into account, the genomic organization of the different species matches up impressively. When human chromosomes are compared and matched one-to-one with chimp chromosomes in this way, human chromosome number two is the oddball that doesn't immediately match up. It turns out, however, that this chromosome matches up extremely well with the two remaining chimp chromosomes when those chromosomes are fused end-to-end. Thus, it appears that the common ancestor had 24 pairs of chromosomes and that, in the line of descent leading to humans, two of these pairs fused together so that humans have 23 pairs of chromosomes. The amount of similarity in genomic organization among humans, chimps, and apes goes beyond what would be expected from common function alone and is generally seen as evidence for common ancestry.

Introns: are sections of DNA that do not code for how proteins are made. Mutations in introns almost never have an effect on the organism's survival or function. Human introns are very similar to introns in chimps and apes, far more similar than needed for common function alone. The close similarity of introns in humans, chimps, and apes matches the prediction of common ancestry.

Francis Collins—a Christian, a scientist, head of the Human Genome Project, and one of the leading authorities on human genetics—describes the genetic evidence for common ancestry of humans and animals in more detail in his recent book, *The Language of God* (Free Press, Simon & Schuster, 2006). His conclusion is, “The study of genomes leads inexorably to the conclusion that we humans share a common ancestor with other living things.”