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Human Evolution Speeding Up, Study Says

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for [National Geographic News](#)

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Explosive population growth is driving human evolution to speed up around the world, according to a new study.

The pace of change accelerated about 40,000 years ago and then picked up even more with the advent of agriculture about 10,000 years ago, the study says.

And while humans are evolving quickly around the world, local cultural and environmental factors are shaping evolution differently on different continents.

"We're evolving away from each other. We're getting more and more different," said Henry Harpending, an anthropologist at the University of Utah in Salt Lake City who co-authored the study.

For example, in Europe natural selection has favored genes for pigmentation like light skin, blue eyes, and blond hair. Asians also have genes selected for light skin, but they are different from the European ones.

"Europeans and Asians are both bleached Africans, but the way they got bleached is different in the two areas," Harpending said.

He and colleagues report the finding this week in the journal *Proceedings of the National Academy of Sciences*.

Snips of DNA

The researchers analyzed the DNA from 270 people in the International HapMap Project, an effort to identify variation in human genes that cause disease and serve as targets for new medicines.

The study specifically looked for genetic variations called single nucleotide polymorphisms, or SNPs (pronounced "snips"), which are mutations at a single point on a chromosome.

(See an interactive [overview of human genetics](#).)

"We look for parts of chromosomes that are common in the population but are new, and if they are common but recent, they must have gotten to high frequency by selection," Harpending explained.

"And the reason we know they are new or recent ... is that they haven't had time to break and re-form," he added.

Over time, chromosomes randomly break and recombine to create new sequences of SNPs along the chromosome. A large number of identical SNPs means the mutation is advantageous and new.

The researchers' analysis found that 7 percent of human genes have been undergoing rapid, recent evolution.

If humans had always evolved at this rate, the difference between modern humans and chimps should be 160 times greater than it really is.

(Read related story: ["Chimps, Humans 96 Percent the Same, Gene Study Finds"](#) [August 31, 2005].)

"We realized we must be in a transient [phase], that evolution hasn't been going this fast for long in our species," Harpending said. "And so we wondered why."

According to Charles Darwin's famous theory, evolution happens faster in big populations.

Harpending said the timing of the newly observed evolution acceleration coincides with explosive growth in human population, coupled with humans living in new environments and changing cultures.

The biggest changes have come since the end of the last ice age, about 10,000 years ago, which opened up new environments for the quickly expanding human population to grow from millions to billions.

More people mean more mutations, Harpending noted.

"You are also giving them the potential to be adaptive mutations," said Brian Verrelli, who studies population genetics and evolution at Arizona State University in Tempe and was not involved in the research.

Regional Differences

Verrelli said the new study is interesting and accurately explains the accelerated evolution with a plausible model based on demographics.

Importantly, he said, the research indicates that any speed-up in evolution "had to have happened differently in different geographic regions."

While Harpending and colleagues have yet to connect all the different evolving genes with specific traits, they have linked a few.

For example, Europeans as recently as 8,000 years ago developed lactose tolerance, which allows adults to drink fresh milk—a staple of the agricultural economy.

(Read related story: "[Stone Age Adults Couldn't Stomach Milk, Gene Study Shows](#)" [February 26, 2007].)

Genes that suppress body odor and dry ear wax are spreading rapidly in Asia. In Africa, a speed-up is found in genes that thwart malaria.

Many of the evolving genes appear related to changes in diet that accompanied the widespread adoption of agriculture, Harpending noted.

For example, Europeans can easily digest cereal grains, but Kalahari Bushmen (or San) in Africa, Australian Aborigines, and Native Americans often become diabetic when eating a high-carbohydrate diet.

"We can see the genes changing. We are evolving to cope with these new cereals," Harpending said.

Eventually, this rapid pace of genetic evolution should slow, assuming the human environment and diet stabilize, Harpending said.

However, infectious diseases evolve more quickly in large, sedentary populations, which may keep the adaptation cycle ramped up for the foreseeable future.

"It's going to take a while to stabilize," he said. "By 'a while,' I'm talking tens of thousands of years."

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