Scientists herald 10-year anniversary of human genome

June 23 2010, by Jean-Louis SANTINI

A scientific researcher handles frozen embryonic stem cells in a laboratory, at the Univesity of Sao Paulo's human genome research center in Brazil, in 2008. The decade since the human genome was first sequenced has ushered in great leaps in understanding of the origins and evolution of mankind, although medical applications thusfar have been limited.

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Following the first draft of the human genetic code, geneticists at the International HapMap Project began in 2002 mapping genes and identifying those involved in complex disease.

The effort also began shedding light on humanity's early movements,

migrating out of Africa some 50,000 years ago to reach every corner of the globe and showing in some genes the traces of recent evolution.

In June 26, 2000, when two teams -- one a public international consortium, the other a private venture led by Craig Venter-- tied the multi-billion-dollar race to publish a working blueprint of human DNA, then-US president Bill Clinton hailed the "profound new knowledge" that could change history.

"Humankind is on the verge of gaining immense, new power to heal... It will revolutionize the diagnostic, prevention, and treatment of most, if not all, human disease," Clinton said at the time.

Tens of billions of dollars were pumped into genomics research since that landmark event, but the genome has yet to deliver on such hopes that it will unleash a golden age of medicine.

It has, however, shed light on our own past.

Collecting DNA samples over the past decade, researchers have studied the genetic make-up of over 3,000 individuals from 121 populations in Africa, four African American communities and 60 non-African groups including Europeans.

Geneticists have been able to determine, according to a study published last year, that the genetic diversity of Africans is the higher than any other population in the world.

They were even able to confirm the origins of modern man emerging out of Africa, specifically from the region between South Africa and Namibia.

Comparing sequences of the Neanderthal genome and modern humans

has also demonstrated interbreeding between both species and genetic traits unique to humans through evolution.

"The Neanderthal genome sequence allows us to begin to define all those features in our genome where we differ from all other organisms on the planet, including our closest evolutionary relative, the Neanderthals," said Svante Paabo, director of the genetics department of the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany.

Research published in the United States in early June meanwhile revealed the distinct genetics of the Jewish diaspora, according to its unique genome.

"We have shown that despite the fact that individuals from the diaspora have distinctive features that are representative of each group's genetic history, they also share a set of common genetic threads," said Harry Ostrer, professor of Medecine at New York University, at the time.

Great potential for further landmark discoveries using genome maps, scientists say, lies with a dramatic decline in the cost of cracking it was in 1999.

The Human Genome Project (HGP) was funded with three billion dollars, or roughly a dollar for every base pair, or rung in the genetic ladder, and took 10 years to produce the rough draft, which was followed by a "polished" version in 2003.

Today, California companies Illumina and Life Technologies say they can do the same job in a day for less than 6,000 dollars, while rival Complete Genomics is reportedly offering a price of 5,000 dollars.

This plunge in price has even enabled scientists to pry open the DNA of a whole range of non-human species. They have, in fact, mapped the

genomes of more than 3,800 organisms, including the humble mouse and the common fruitfly.

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