The European Parliament's 140-page report, issued on 15 March by a five-person panel of independent experts, was scathing about aspects of Cresson's management of DGXII and the education directorate, DGXXII. The report said that Cresson, a former French prime minister who has headed the directorates since early 1995, "failed to act in response to known, serious, and continuing irregularities over several years" in the 5-year, $700 million Leonardo da Vinci program to help fund vocational and professional training. Audits have accused an outside contractor of defrauding the program of millions of dollars.

Cresson also was criticized in the report, and in earlier inquiries, for helping a French friend with dubious qualifications gain contracts to work for DGXII and, later, the EU's Joint Research Centre. However, this week's report said that no commissioner "was directly and personally involved" in fraud or received money personally. Cresson did not comment on Tuesday. Earlier, she had denied being aware of any fraud.

In the wake of the resignations, officials in Brussels are speculating that an interim commissioner might be named to head DGXII until the new commission is chosen later this year. One Brussels insider says Swedish officials had expressed an interest in the science directorate. Another source says that Portugal's research minister, José Mariano Gago, might be considered for the permanent position. But, says another source, "it's too early to even speculate."

–ROBERT KOENIG

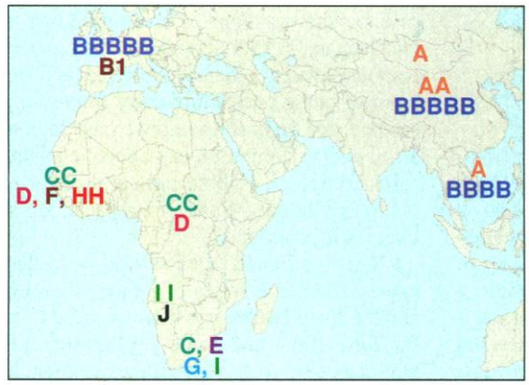
HUMAN EVOLUTION

Genetic Study Shakes Up Out of Africa Theory

A new DNA analysis is casting doubt on the popular notion that all modern humans descended from one small population of ancient Africans. This "Out of Africa" theory had gained support in recent years, as a string of genetic studies suggested that a single group of ancient, sub-Saharan people left traces of their genes in modern people—implying that only this group succeeded in taking the final evolutionary leap to becoming modern humans. This new human species then migrated throughout world, replacing populations of "archaic" humans, such as Neandertals. Or so the story goes.

But a few anthropologists have always questioned this tale, and this week the skeptics added new data to their cause, as population geneticist Jody Hey and anthropologist Eugene Harris of Rutgers University in Piscataway, New Jersey, presented evidence that two human populations dating to at least 200,000 years ago left their genetic legacy in modern people. One group gave rise to modern Africans and the other to all non-Africans, Hey and Harris report in the 16 March *Proceedings of the National Academy of Sciences*.

To remain distinct, the two ancestral populations presumably lived in different places, which fits with a competing theory of human origins, called multiregionalism, in which modern human traits evolved in various populations and then were spread around the world by small groups of migrants who interbred with other populations. "It's important evidence," Henry Harpending, an anthropologist at the University of Utah, Salt Lake City, says of the new study. "A lot of us thought [the question] was answered." And although Harpending, who has done genetic work supporting the Out of Africa scenario, doesn't support multiregionalism, he agrees that "if we follow the implications of [this work], then the Out of Africa hypothesis is wrong."



Genetic divide. Non-Africans have versions A and B of the *PDHA1* gene, while Africans have a different set of variants.

Multiple analyses of mitochondrial DNA and Y chromosome variations have bolstered the Out of Africa hypothesis. But Hey and Harris found a different pattern when they compared different versions, or haplotypes, of a gene on the X chromosome called *PDHA1*, which codes for a key enzyme in sugar metabolism. They gathered DNA from six French, seven Chinese, five Vietnamese, one Mongolian, six Senegalese, three African Pygmies, three members of the Khosian tribe near Angola, and four South Africa Bantus.

By assuming that the number of sequence differences between two haplotypes corresponds to the time since populations carrying them split apart, Harris and Hey built an evolutionary tree for the gene. To turn the sequence differences into an absolute measure of time, they calculated the gene's mutation rate, based on the number of differences between chimp and human *PDHA1* genes, which are assumed to have split 5 million years ago. Such molecular clocks have come under fire lately (*Science*, 5 March, p. 1435), but the team notes that other analyses show that *PDHA1*'s clock appears to keep steady time.

The tree showed that modern variants of the gene go back to two ancestral haplotypes. One gave rise to several modern haplotypes found only among Africans. The other ancient haplotype eventually gave rise to one variant seen today in some Africans, and another variant that—some 200,000 years ago—evolved into the two haplotypes seen today in non-Africans. What's more, the team found a so-called "fixed difference" between Africans and non-Africans: At one spot in the sequence, all the Africans had one base, while all the non-Africans had a different base. This is the first time such a fixed regional difference has been found in human genes, and it "is a strong indication of an historical division" in the population, says Hey.

All this offers a serious challenge to the Out of Africa hypothesis, says Rosalind Harding, a population geneticist at the Institute of Molecular Medicine in Oxford, United Kingdom. Although the previous studies may have accurately traced particular genes, a given gene may not accurately reflect a population's movement. Moreover, the new work isn't the only one questioning Out of Africa. Harding's previous work revealed ancient, non-African haplotypes in the beta globin gene. And work by Michael Hammer of the University of Arizona, Tucson, showed that a haplotype on the Y chromosome apparently arose in Asia and then moved back to Africa in an early migration (*Science*, 25 April 1997, p. 535). But the new study, with its finding of a fixed difference, offers more clear-cut evidence of multiple ancient populations. "It's the best study of the lot," says anthropologist Milford Wolpoff, a longtime multiregional defender at the University of Michigan, Ann Arbor.

But both Hey and Harding say Out of Africa isn't yet obsolete. For one, "[our study] is just a one-gene view of human history," Hey cautions. For another, he thinks that the two ancestral populations both could have lived in Africa, close enough for some interbreeding, so that the traits that distinguish modern humans emerged in both groups. Then, perhaps 100,000 years ago, one group left Africa. Thus humans "could still be out of Africa," Harding says.

What's needed now, Harding and Hey say, are more studies of more genes, particularly nuclear genes, to see which scenario they match. If future work supports the tale told by the *PDHA1* gene, says Harding, then in 5 years, "we could be looking back and saying this [report] was the key paper."

–ELIZABETH PENNISI

SOURCE: JODY HEY