Asian DNA Enters Human Origins Fray

A large genetic analysis of Chinese citizens and others indicates that modern humans, probably originating in Africa, migrated across Asia in a southeasterly direction before heading north into what is now China.

This challenges the long-standing view of Chinese paleontologists, based on fossil evidence, that an East Asian branch of *Homo erectus* independently evolved into *Homo sapiens*.

"It is now probably safe to conclude that modern humans originating in Africa constitute the majority of the current gene pool in East Asia," holds a research team headed by geneticist Li Jin of the University of Texas in Houston.

The scientists, who come from several institutions participating in the Chinese Human Genome Diversity Project, examined genetic relationships among 28 of China's 56 official ethnic groups, including the majority Han population. Analysis focused on short DNA segments, called microsatellites, that over time accumulate varying numbers of repeated sequences of nucleotides, the basic DNA subunits.

The researchers first used a computer program to construct an evolutionary tree of genetic relationships—based on 30 microsatellites per person—among 14 East Asian populations, 3 populations from Africa, and 8 from elsewhere in the world. This mathematical approach assumes that relatively isolated populations branch off from evolutionary precursors in a treelike progression.

The researchers constructed a second such genetic tree, based on 15 of the microsatellites, for 32 East Asian populations (including the 28 Chinese groups) and the 11 non-Asian populations.

Both reconstructions indicate that East Asian populations derived from a single lineage in Southeast Asia, Jin and his coworkers report in the Sept. 29 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES. This result is consistent with the existence of a prior genetic source in Africa, but not with a separate emergence of modern humans in East Asia, the scientists contend.

The new DNA data also show that genetic differences exist between southern and northern Chinese groups and that greater genetic variation occurs in the southern populations.

The East Asian findings fit with the theory that humans migrated out of East Africa around 100,000 years ago and, perhaps by crossing short stretches of sea, traveled along Asia's southern coast before heading into East Asia, says geneticist L. Luca Cavalli-Sforza of Stanford University School of Medicine in an accompanying commentary. Further studies need to include DNA from mid-Asian populations to test for other possible expansion routes, he says.

However, Alan R. Templeton, a geneticist at Washington University in St. Louis, challenges the use of evolutionary trees. Jin's group did not employ methods for establishing whether far-flung populations maintained genetic ties through interbreeding, which would have undermined the assumption of a branching of separate ethnic groups, he says.

In an upcoming AMERICAN ANTHROPOLOGIST, Templeton reports that regional evolution in areas outside China, which he analyzed using others' data sets, occurred within a network of DNA links rather than a tree. —*B. Bower*

Where there's smoke, there are sprites

When slugger Mark McGwire started his home run streak this spring, meteorologists in the central United States were watching a different sort of hitting record in the making. From April through early June, a rare and powerful form of lightning blasted the ground far more frequently than normal, reports a team of scientists. At the same time, blood-colored flashes called sprites were lighting Earth's upper atmosphere at an unprecedented rate.

The meteorologists blame the unusual electric display on massive forest fires in Mexico that sent vast trails of smoke sailing over the United States.

"The amazing thing about this is that it shows the incredible interconnectedness of nature," says Walter A. Lyons of FMA Research in Fort Collins, Colo., whose team made the discovery. El Niño–warmed waters in the Pacific caused a drought in Mexico, which fed the fires that created the smoke that altered the lightning thousands of miles away and spawned sprites 50 kilometers up in the sky.

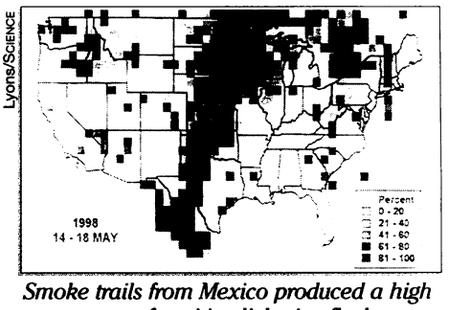
In normal thunderstorms, more than 90 percent of the lightning flashes hitting Earth carry negative charge from the clouds to the ground. The rest are called positive flashes because they have the opposite polarity.

This spring, a nationwide network of lightning detectors showed that storms over the central United States spawned positive flashes at three times their normal rate, Lyons and his colleagues report in the Oct. 2 SCIENCE. During a particularly intense series of storms in mid-May, 59 percent of the cloud-to-ground flashes were positive. Like McGwire, these storms were power hitters. The electric current in the positive flashes averaged twice the typical value of such lightning.

The scientists also detected an abnormal number of sprites—fleeting electric discharges that shoot upward, far above thunderstorms. One storm spawned 380 sprites; the most witnessed during studies of more than 100 storms over the past 6 years.

Satellite images linked the electric displays to the smoke. Storms with excess positive flashes developed in the band of smoke blowing north from Mexico.

Scientists have known for some time that forest fires can alter lightning, says Don J. Latham of the Intermountain Fire Sciences Laboratory in Missoula, Mont. In a study of one fire, Latham found that clouds above the conflagration generated mostly positive lightning. Fires, he suggests, generate such flashes because they send electrically charged particles into the sky .



Smoke trails from Mexico produced a high percentage of positive lightning flashes.

The new study, however, shows that smoke can produce positive flashes thousands of kilometers from the fire, long after the electric charge in the smoke has dissipated. "It's an anomaly and it begs an explanation," says atmospheric physicist Charles B. Moore of the New Mexico Institute of Mining and Technology in Socorro.

The Mexican fires put many fine particles into the air, and that may have changed the way clouds became electrified, says Lyons. Because researchers still don't understand how clouds get charged up in thunderstorms, the recent discovery could provide a flash of insight into this process. —*R. Monastersky*