Homo erectus shows staying power on Java

A fossil species often classified as a direct human ancestor survived much longer in Indonesia than previously suspected and may have coexisted for at least several thousand years with *Homo sapiens*, according to new age estimates for a fossil site in Java.

H. erectus, now estimated to have inhabited the Indonesian island of Java until sometime between 27,000 and 53,000 years ago, died out as *H. sapiens* more successfully exploited local Stone Age environments, assert Carl C. Swisher III of the Berkeley (Calif.) Geochronology Center and his colleagues. Many researchers have argued that a similar scenario played out in Europe and the Middle East, where Neandertals lived at the same time as *H. sapiens* before going extinct around 35,000 years ago.

"It looks like independent [*H.*] *erectus* and [*H.*] *sapiens* lineages evolved in Southeast Asia," holds study participant Susan C. Antón, an anthropologist at the University of Florida in Gainesville. "It wouldn't have taken a huge technological or intellectual advantage for one species to have replaced another over a number of generations."

Investigators familiar with the new results agree on two points: The revised dates require further verification and, if they hold up, they will fuel rather than resolve the ongoing debate over the nature of modern human origins (SN: 6/20/92, p. 408).

Most prior age estimates for these *H. erectus* finds on Java fell between 100,000 and 250,000 years ago. Given that timing, some researchers argued that in Southeast Asia, *H. erectus* evolved into *H. sapiens*.

The revised ages indicate that *H. erectus* survived so late on Java—at least 250,000 years longer than on mainland Asia and perhaps 1 million years longer than in Africa—that it could not have been a human precursor in Southeast Asia.

Swisher's team estimated ages from analyses of the rate of uranium decay in four animal teeth found in sediment at two sites on Java that had yielded *H. erectus* fossils more than 60 years ago. Uncertainty over whether the teeth absorbed uranium quickly or slowly after being buried led to the spread in age estimates that the scientists report in the Dec. 13 SCIENCE.

Modern humans originated in Africa more recently than 200,000 years ago and then migrated throughout the world, in Antón's view. Separate *H. erectus* and *H. sapiens* lineages could have coexisted in several regions, she notes. For instance, *H. erectus* may have settled Australia more than 100,000 years ago (SN: 9/28/96, p. 196), followed by *H. sapiens*.

"The new dates for *Homo erectus* on Java are remarkably young," remarks anthropologist Christopher B. Stringer of the British Museum in London, a proponent of relatively recent African origins of modern humans. "I'm inclined to view them favorably, but this [new study] isn't the last word."

Simultaneous *H. erectus* and *H. sapiens* populations in Southeast Asia may have stayed totally separate or interbred to such a limited extent that *H. erectus* genes were not passed on to later human groups, Stringer holds.

Anthropologist Milford H. Wolpoff of the University of Michigan in Ann Arbor disagrees. Wolpoff and other proponents of multiregional evolution argue that *H. erectus* fossils actually belong to an anatomically diverse form of *H. sapiens* that arose in several parts of the world over the past 2 million years.

"Even if these new dates on Java are correct, the anatomical features of available fossils still support multiregional evolution," Wolpoff contends. For instance, commonalities in the shape and dimensions of Javanese *H. erectus* and Australian *H. sapiens* craniums signify close genetic ties, he says.

"The proper way to define both a living and a fossil species is the $64,000 question," Antón states. —*B. Bower*

Gene tells male fly how to go a-courtin'

In pursuit of a mate, male fruit flies go through an elaborate courting ritual in which they chase, lick, and stroke a female and vibrate a wing to produce a love song. Researchers have now identified an insect gene, *fruitless*, that governs these and other aspects of male sexual behavior. Mutations in this one gene can turn the male fly's passion toward males as well as females, block him from singing his song of desire, or prevent successful copulation.

"To have a complex set of behaviors controlled by a single gene is quite exciting," says Steven A. Wasserman of the University of Texas Southwestern Medical Center in Dallas, who heads one of the four research teams that found and studied *fruitless*.

The collaboration, which also includes groups led by Bruce S. Baker of Stanford University, Jeffrey C. Hall of Brandeis University in Waltham, Mass., and Barbara J. Taylor of Oregon State University in Corvallis, reports its findings in the Dec. 13 CELL.

Interest in *fruitless* began in the early 1960s, when a scientist creating mutant fruit flies noticed oddities in the courting and mating behavior of some of his insects. A few of the male mutants actively courted both males and females. They also proved unable to mate successfully with females, thus earning them their name, *fruitless*.

Earlier this year, Japanese researchers finally unearthed part of the gene whose mutant form causes the unusual behavior of the *fruitless* male flies. Wasserman and his collaborators have now identified the complete normal gene, which is about 70 times larger than most other fruit fly genes. The gene is a complicated one, apparently able to generate several forms of a protein that regulates the activity of still-undetermined genes, says Baker.

When scientists created new mutations in *fruitless*, they found that the gene's influence extends beyond the male fly's sexual orientation and ability to copulate. Some mutations inhibit nearly all his courtship; others, though not depriving the fly of flight, check his ability to vibrate his wings for a love song. "They stick their wings out near a female but can't sing," says Hall.

The gene does more than govern sexual behavior. Some mutations in *fruitless* inhibit the development of a male-specific abdominal muscle. The most severe ones kill the insect, whatever its sex, very late in its pupal development. "We can't say *fruitless* only affects males or that it only affects behavior," cautions Hall.

Taylor's group found that *fruitless* functions in a mere 500 or so brain cells, less than 1 percent of the brain's total, and nowhere else in the fly. Since female flies with *fruitless* mutations display no obvious behavioral differences, researchers were surprised to see that the gene seems to work in both sexes. Brain cells with active *fruitless* genes are located in clusters, some of them in regions already implicated in aspects of courtship.

Is there a *fruitless* gene involved in human sexual behavior? Scientists, who have not yet found a human gene closely resembling the fly gene, tread carefully around that provocative question. "It's certainly possible there's going to be a human counterpart to *fruitless*. What is certain is if it's there, it won't control behavior, it will merely influence it," says Wasserman.

Ralph J. Greenspan, a fruit fly biologist at New York University, adds that it's difficult, if not impossible, to extrapolate the new insect findings to people. "Sexual behavior looks like it's pretty different, even in closely related organisms," he notes. —*J. Travis*