SCIENCE NEWS of the week

Human Ancestors Make Evolutionary Change

Some scientists believe that *Homo erectus,* the species directly ancestral to modern humans, is a model of evolutionary stability and a prime example of the theory of "punctuated equilibrium," which holds that individual species have a clear beginning and end (SN: 7/25/81, p. 52). This view was fostered by a recent study indicating that for nearly 1.5 million years these precursors of *Homo sapiens* remained largely the same, rapidly changing in form and developing larger brains only when a new species was about to appear.

Several lower forms of life are undoubtedly marked by long periods of relatively little change followed by rapid transformations into new species, a cornerstone of punctuated equilibrium theory, but this pattern clearly does not apply to *H. erectus,* contends an anthropologist who recently trekked throughout the world to survey all known *H. erectus* specimens. "It appears that there are significant evolutionary changes within a conservatively defined sample of *H. erectus,"* says Milford H. Wolpoff of the University of Michigan in Ann Arbor.

Wolpoff, whose research itinerary included stops in China, Indonesia and North America, took a variety of skull, jaw and dental measurements from 92 of these "prehumans." He divided the specimens, which date from about 1.4 million years old to 400,000 years old, into early, middle and late *H. erectus* groups. Averages of the measurements for each group were compared across the 1-million-year span.

With only a few exceptions, he found pronounced differences between the early and late *H. erectus* samples. The changes are in the direction of a modern profile, reports Wolpoff in the just-released Fall 1984 PALEOBIOLOGY; cranial capacity expands while jaw and tooth size shrinks. The few skull and jaw features that remain stable do not detract from the evidence that two major "adaptive systems" of the *H. erectus* lineage changed substantially over time, he says.


David Brill/Nat'l. Geo. Soc.

Skull of a 1.6-million-year-old H. erectus *youth, discovered after Wolpoff's survey.*

Wolpoff also studied 13 individuals who are either late *H. erectus* or early *H. sapiens.* There is no distinct boundary between the two species, he says, again suggesting that in this case punctuated equilibrium theory does not apply. That theory, as proposed in 1977 by Stephen J. Gould of Harvard University and Niles Eldredge of the American Museum of Natural History in New York City, assumes that there are clear demarcations between successive related species, and that evolutionary changes are often spontaneous responses to unexpected environmental demands. The continuous, although not necessarily constant, rates of change within *H. erectus* do not reflect this assumption, adds Wolpoff.

Gould and Eldredge first used *H. erectus* as an example of their theory following a 1981 report by G. P. Rightmire of the State University of New York at Binghamton. He studied 65 individuals designated as *H. erectus* and concluded that the species did not significantly evolve over time.

But Rightmire's study is seriously flawed, says Wolpoff. Up to 16 of the specimens he used may not be *H. erectus,* and his statistical analysis was not adequate to uncover evolutionary changes.

Rightmire acknowledged to SCIENCE NEWS that he would take a different statistical approach if he conducted a new study. "But it's difficult to see [Wolpoff's study] as a coherent statement on the entire species," he argues. "Wolpoff is hardly following a conservative approach to defining *H. erectus."*

When two specimens that may not be *H. erectus* are taken out of Wolpoff's early sample and another is removed from the late sample, there is no statistically meaningful difference between the cranial capacities of the two groups, says Rightmire. "There are signs of rapid evolutionary change, especially in brain size, as *Homo erectus* gave way to *Homo sapiens,* although this does not necessarily mean there was a branching of species as punctuated equilibrium theory predicts."

"[Rightmire] is absolutely wrong," re-

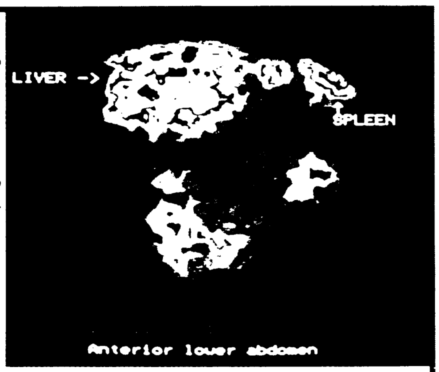
Aiming at cancer

What do you do with a semipowerful guided missile? Monoclonal antibodies, the proteins produced by immune system/cancer cell hybrids, have become important seek-and-bind weapons in diagnosing cancer and other illnesses (SN: 5/7/83, p. 296). But the missiles are not as good at search-and-destroy missions — researchers have had only limited success in using monoclonal antibodies alone against cancer (SN: 8/22/81, p. 117). Now, others are arming the antibodies with radioactivity, drugs or toxins. Clinical trials of immunotoxins — antibodies linked to drugs or toxins — are just beginning.

The first step in the process is getting a good antibody (see photo). Robert W. Baldwin and his colleagues at the University of Nottingham in England have hooked an antibody called 791T/36 to methotrexate, a widely used anticancer drug. The antibody is the product of a mouse spleen cell fused to a long-lived mouse tumor cell. It seeks out certain types of cancer cells, though it is not completely specific and will bind to some normal cells. In conjunction with the Xoma Corp. of Berkeley, Calif., Baldwin will begin human testing of the immunotoxin in September, he said at the recent American Cancer Society seminar for science writers in San Diego.

In a separate study begun last October, researchers from the University of California at San Francisco and Xoma Corp. initiated what they believe to be the first trials of immunotoxins in humans. They are using melanoma antibodies hooked to a fragment of the potent plant toxin ricin. Safety trials on several patients with melanoma have been completed and efficacy trials will begin soon, says Xoma spokesperson Carol DeGuzman.

Hooking a drug to an antibody can improve drug penetration — with the methotrexate-antibody conjugate, more drug is pushed into the cell than if the drug alone were used. Still, Baldwin says, "There are enormous problems to be solved," among them the body's potential to produce antibodies to the antibody. "But I think it will develop into a usable approach." — *J. Silberner*



Cancer Research Campaign/Univ. of Nottingham

The monoclonal antibody 791T/36, labeled with radioactive indium to reveal its location, attaches to cancer cells as well as to healthy liver and spleen. Here it shows a recurrent tumor (at bottom) and an unsuspected tumor (middle right).