

Evolving to the beat of a different theory

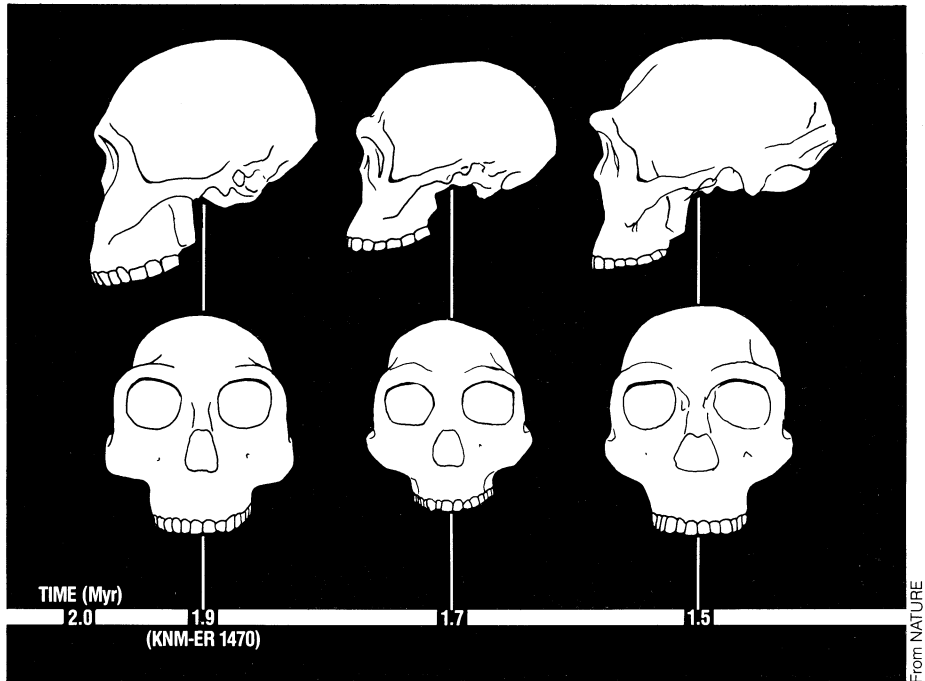
The tempo of human evolution is at the center of a fierce argument based on a frustrating scarcity of data. The theory of punctuated equilibrium, which has recently gained popularity, states that humans and other species evolved over periods of rapid change interspersed with much longer static periods (SN: 7/4/81, p. 12). In the July 9 NATURE, four anthropologists argue against that view and take the more traditional stand—most changes in human evolution have been both gradual and cumulative. "What we think we've done is to confirm Darwin's and Huxley's views on evolution," says principal author John E. Cronin of Harvard University.

In a review of much of the human fossil data, Cronin and collaborators say that apparent cases of punctuated equilibrium in the fossil record are due to erroneous assignment of dates or to incorrect identification of fossils. The specimen labeled KNM-ER 1470, for example, was originally dated as being 2.6 million years old, but later re-dated to 1.8 million years old. This change reduced the minimum time of the species *Homo habilis* and took away a possible example of a species remaining static over the long period of a million years.

As evidence for continuous and gradual change, Cronin and collaborators charted 44 morphological traits among four hominid species and three specimens they consider intermediary. They found a "clear directionality" in the development of a number of the traits. For two of these, body weight and cranial capacity (which reflects brain size), they plotted graphs using estimated values for each of the four species then connected the points with a straight line. "The trends seem to show no jumps or discontinuities. Any impulse to draw a step diagram [the model of punctuated equilibrium] through the points should be resisted while the most parsimonious approach is to interpret the trends with a best-fit line," say Cronin, Noel Boaz of New York University, Christopher B. Stringer of the British Museum and Yoel Rak of Tel Aviv University.

The lifetimes of the hominid species are regarded by these scientists as further evidence for gradual evolutionary change. Each of the species, from *Australopithecus afarensis* to *Homo erectus*, lasted approximately 740,000 years. Punctuated evolution would have produced high variance in the durations of species, since each new form would have been the result of a rapid and random event.

Cronin and collaborators are aiming their challenge primarily at a 1977 paper by Stephen Jay Gould of Harvard University and Niles Eldredge of the American Museum of Natural History in New York.



Fossil to fossil: Did humans evolve with gradual or discontinuous change?

Eldredge told SCIENCE NEWS that human evolution had been described in that paper in a couple of paragraphs but no detailed analysis has been made. He says that questions of evolutionary tempo can be better answered by looking at non-human organisms that have left more complete fossil records. In the case of trilobites, a class of distinct arthropods, for example, there is a clearly "rectangular" pattern of anatomical change. He says that a species remained the same for 5 to 10 million years, giving rise to distinct new species and finally becoming extinct.

Eldredge objects that the recent NATURE paper does not accurately portray the "punctuated equilibrium" point of view. "They have us mixed up with saltationists, who believed there are sudden jumps in anatomical features," he says. "We believe features change rapidly, over thousands of years, which is short in geological time, but not in single-generation jumps."

"Nobody disputes that brain size and body weight get bigger during human evolution," Eldredge says. But he doesn't believe a graph with a straight line connecting only a few points is a serious argument for continuous, gradual change. "When an organism gets a good anatomical idea, it sticks with it for a while," he explains.

Ian Tattersall, a physical anthropologist colleague of Eldredge, argues that Cronin has set up a straw man. "Nobody has gone through the human fossil record and made explicit the cases [of sudden change and extended stasis], but anyone who knows the record can find them," he says. "Where

a pattern is discernable, something happens rapidly or there is not much change for a long time. The few good cases of gradualism occur in time periods where the picture is not clear at all." □

Boring problems threaten LEP, HEP

*"There once was a place called Villars
Where there was more than one star;
They talked about LEP
And the future of HEP,
But decisions were made in the bar."*

The July/August CERN COURIER attributes this limerick to the physicist Hans Boggild. Villars is a town in the Swiss mountains where representatives of the European international physics laboratory CERN gathered to discuss plans for their newest project, the construction of a Large Electron-Positron collider (LEP) in what CERN COURIER called a "Club Méditerranée ambience." The picture is enough to make U.S. physicists cry in their drinks, that is, if they could afford bar prices in a Swiss mountain resort.

If LEP is built, physicists generally (and not only European ones) expect the future of high energy physics (HEP), aka particle physics, to be played out there in the environs of Geneva. LEP will provide collisions of electrons and positrons flying at energies up to 100 billion electron-volts. Out of those collisions are expected to come the things that will test and maybe prove the

next large step — in the language of old-time TV quiz programs it could be called the next plateau — in the unification of physics, the unified field theories, the grand unification theories that are expected to lace up all of physics.

CERN proposes to have LEP constructed and running by 1987. And the momentum rolls on with only one possible hitch: a court case brought in France. The plans are for LEP's tunnels, which house the rings in which electrons and positrons will circulate, to extend into the Jura Mountains on the French side of the border. CERN plans to build a test gallery into the Jura in early 1982. According to a report in the July 2 *NATURE* a court in Lyons has handed down an injunction against the boring on the motion of an environmentalist group, the *Association pour la Protection de la Nature Gessienne* (the last word refers to the Pays de Gex, the name of the small region involved). The decision turned on whether the proposed boring was temporary, which is permitted under the law protecting the environment in this part of the Jura, or permanent, which is not allowed. CERN considers the gallery temporary, but if the boring should show that this layout is feasible, the gallery would become a part of the final installation. The court chose to regard it as permanent.

CERN has not yet been officially informed of the decision. As an international organization CERN will get the notice from the French foreign ministry when the case has worked its way through appeals. CERN's French partisans hope to have the injunction annulled by a higher court, or failing that, to persuade the French parliament to change the law.

The CERN Council, which represents the 12 nations that own the laboratory, recently voted a preliminary approval of the LEP project by eight to four. A final vote is being delayed a few months while a couple of countries hold elections. Unanimity would be desirable for psychological reasons on a project this important, but if the eight-to-four continues to hold that will be sufficient to carry the project. LEP is planned to be built out of CERN's existing budget levels — no new money involved. New assessments would require unanimity, but shifting money within a budget level already agreed to does not. Unlike American governments, the CERN member nations commit themselves to given sums for CERN for several years at a time. This way the laboratory can plan ahead.

Meanwhile, U.S. laboratories are closed much of the time for lack of funds. When they run, they operate below capacity, and that is not for lack of people wanting to do experiments. American physics construction projects proceed at a pace of two steps forward, one-and-a-half back. Years ago one always saw the names of prominent European physicists all over papers coming out of U.S. labs. Today it is the American names on European papers. □

No social drinking for pregnant women

Pregnant women should drink absolutely no alcohol because "alcohol consumption during pregnancy, especially during the early months, can harm the fetus," warned the Surgeon General in an advisory last week to U.S. doctors. More than a decade of research chronicles the teratogenic effects of abusive drinking during pregnancy, but the advisory published in the July *FDA DRUG BULLETIN* marks the first time in recent years that public administrators have officially advocated abstinence for pregnant women.

The recommendation arose primarily from a November 1980 report prepared

jointly by the departments of Treasury and Health and Human Services on the general health hazards associated with alcohol. Children of some women who averaged only 1 ounce of pure alcohol daily (two standard drinks) during pregnancy showed significantly decreased birth weights, according to one study cited in the report. Even women who reported drinking as little as 1 ounce of alcohol twice weekly experienced "sizeable and significant increases in spontaneous abortions" when compared with non-drinking women, another study showed.

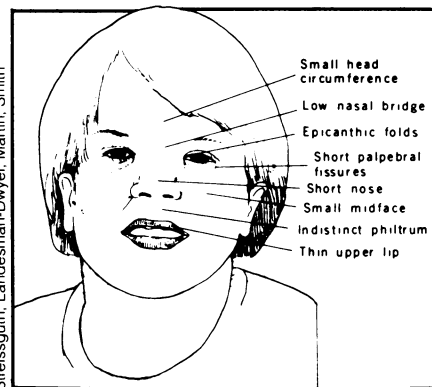
Fetal alcohol syndrome, a condition characterized by specific facial abnormalities, growth deficiencies, central nervous system disorders and mental retardation appears to be triggered predominantly by chronic alcoholism in pregnant women, although heavy smoking, stress, and poor nutrition also contribute to the syndrome's severity (*SN*: 3/26/77, p. 205). Early efforts by public health officials to curtail drinking in pregnant women focused on mothers of potential FAS victims. The shift in recent years to include light drinkers has been gradual, according to Susan Maloney of the National Institute on Alcohol Abuse and Alcoholism.

"The message has become more stringent as the research has indicated that lower and lower levels of alcohol use can affect the fetus," she says. Although some physicians have told her they fear some

pregnant women might unnecessarily panic if told that their low-level alcohol use could harm an unborn child, Maloney discounts the theory. "The pregnant women don't panic," she says. "They generally want the information."

Currently, the campaign to discourage women from drinking when pregnant will stop short of requiring labels on all bottles of alcohol sold, according to Mike Dressler of the Treasury Department, although congressional mandate could change those plans. "If this [the Surgeon General's warning] stirs up Congress, we may have to re-evaluate the campaign," Dressler says. □

(Below) Fetal alcohol syndrome produces abnormal facial features. Gin Row (detail, bottom) an 18th century engraving by William Hogarth.



Sireisguth, Landesman-Dwyer, Martin, Smith

Rosenwald Collection/National Gallery of Art