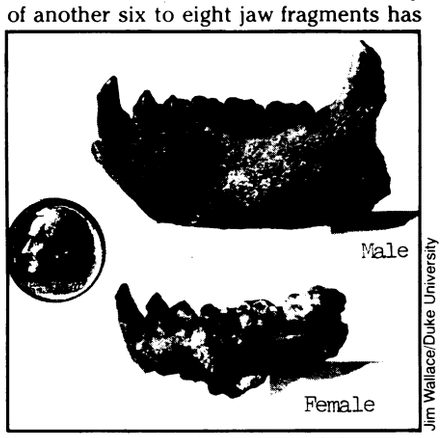
Jaws XII: Aegyptopithecus on the Road to Man

It may be hard to imagine that humans evolved from a skittish-looking, house-cat-sized ape called *Aegyptopithecus* (SN: 4/1/78, p. 196). But the evidence has become so overwhelming in the past few years that researchers say they are now certain that the creature was a common ancestor of both humans and apes. "It's like putting a jigsaw puzzle together, and all the pieces have fallen into place," Duke University primatologist Elwyn Simons told SCIENCE NEWS.

From a dozen lower jaw fossils uncovered since 1977 in Egypt's Fayum Depression, Simons and his colleagues have been able to infer a surprisingly advanced social structure and more authoritatively confirm *Aegyptopithecus*'s place about 30 million years ago on the road to human evolution. At the same time, the discovery of another six to eight jaw fragments has prompted the researchers to seriously doubt that *Aegyptopithecus*'s ape-like contemporary — *Propliopithecus* — was a forerunner of man.



Jim Wallace/Duke University

Jaws of Aegyptopithecus *reveal that large canines are absent in female teeth.*

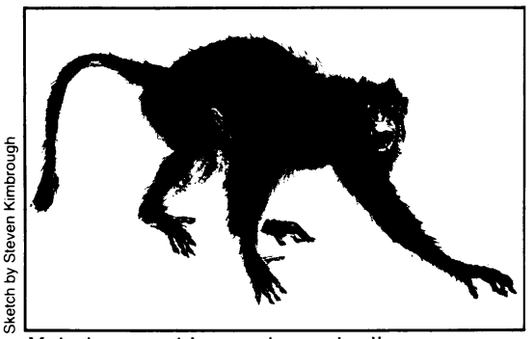
The structure of the relatively well-preserved jaws has revealed "two sexual sizes" among *Aegyptopithecus;* larger and thicker male jaws indicate that males were larger than females — 10 to 11 pounds versus 8 or 9 pounds — and that the males competed against one another for group dominance. "There were probably one or a few dominant males in the pecking order," said Simons, head of Duke's Center for the Study of Primate Biology and History.

But "most important," Simons said in a telephone interview, is the "documentation ... of a larger [than a two-creature] group size at a very ancient time. It requires intelligence to recognize and distinguish [among] animals" within the group, as well as to identify potentially dangerous apes from other "tribes," Simons says. "You don't need this [intelligence] in a mated pair." Gibbons that travel in single pairs, he notes, have the same size teeth. The discovery of similar, sex-related jaw size differences among *Propliopithecus,* on the other hand, appears to detract from that creature's evolutionary importance. On the basis of one specimen found in the early 1900s, one group of scientists has believed that because male *and* female *Propliopithecus* seemed to have small canine and front premolar teeth — a characteristic that distinguishes humans from apes — they may have been the first significant link in the chain that split off from apes and led directly to the ascent of man.

The Fayum fossils disprove this theory, Simons suggests, and at the same time indicate that *Aegyptopithecus* was considerably more similar than *Propliopithecus* to a generally accepted precursor of primitive man — *Dryopithecus,* which appeared about 20 million years ago. *Propliopithecus,* he says, was "more like the lesser apes."

Aegyptopithecus, which lived in the Oligocene period, was a vegetarian, according to Duke anatomist Richard Kay, who worked on the project with Simons and John Fleagle, a paleontologist at the State University of New York at Stony Brook. A study of the remains of eye sockets also indicates the animal was active in the daytime — another characteristic of a relatively complex society; nocturnal primates as a rule are solitary animals with little social structure.

"The important thing is we have enough new finds" to draw such conclusions, says Simons. The study will be formally reported in NATURE later this year. □



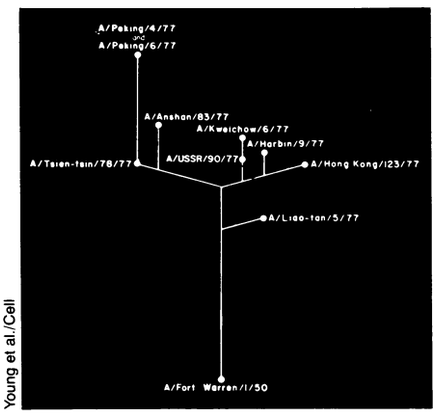
Sketch by Steven Kimbrough

Male Aegyptopithecus: *A tree dweller.*

Life story of ever-changing influenza

The shifty nature of influenza viruses is more than surface deep. Genes responsible for the internal components can change just as speedily and as dramatically as do the genes for surface proteins, Peter Palese told the Gustav Stern Symposium on Perspectives in Virology held in New York last week.

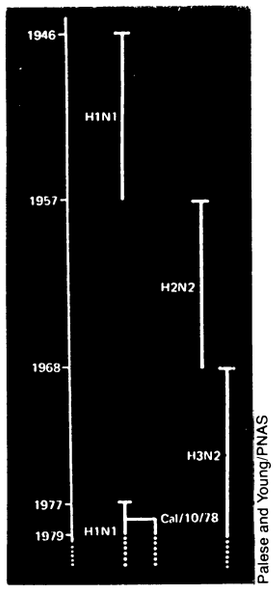
Viruses can alter by gradual accumulation of small changes in the genetic material and also by interchange of entire genes, Palese says. He and James F. Young, both at Mount Sinai School of Medicine in New York, using new gene-probing techniques, have found that an influenza virus prevalent last winter contained surface proteins of one virus combined with some of the inner components of another.



Young et al./Cell

The history of that "recombinant" influenza virus makes quite a tale. The parent, called H1N1, caused a worldwide epidemic in 1977. Scientists were surprised to discover that H1N1 was similar to an influenza strain preserved from a 1950 epidemic. In fact, it was so similar that few persons over 25, who had developed immunity to the earlier version, succumbed to the 1977 H1N1 outbreak.

The reemergence of H1N1 was the first



Palese and Young/PNAS

Influenza virus H1N1, which circulated from 1946 to 1957, reappeared in 1977, and Cal/10/78, a recombinant of H1N1 with strain H3N2, showed up the next year (right). Evolutionary tree of H1N1 demonstrates that some 1977 strains are more distant genetically from each other than from the 1950 strain.

return of an influenza virus to be detected, Palese says. Other new epidemics seemed to reflect shifts to viral surface proteins never before experienced by human populations.

Where was H1N1 hiding for 27 years? "We can rule out 27 years of normal passage in man," Palese says. He has observed that during transfer from person to person an influenza virus changes approximately 4 percent of its genetic material every 11 years or so. The 1977 virus is so similar to the 1950 variety that scientists say it probably was frozen. It is a matter of speculation whether the virus actually reemerged from someone's deep-freeze, as Maurice Hilleman of the Merck Institute for Therapeutic Research contends, or somehow was biologically carried along unchanged—perhaps as part of a person's or an animal's genetic material or in a non-infective form in immune-suppressed organ transplant patients. Friedrich Dienhardt of the University of Munich suggested facetiously at the symposium that an influenza-infected explorer fell into a glacier in 1950.

Beyond that gap in the influenza A virus's life history, H1N1 variations developed with normal rapidity during the 1977 epidemic, Palese and Young report. They analyzed ten of the 1977 viral strains from Eastern Asia and arranged them, according to their genetic differences, into an evolutionary scheme. They point out that the virus changed more in a 6-month period in 1977 than it did "frozen" from 1950 until its reemergence in 1977.

Because the body's defense system recognizes viruses by their surface components, it had been thought that a virus has the best survival potential if its surface proteins are altered. But variations recently found in almost all the influenza genes indicate that antibody attack is not the only force responsible for new strains. Palese speculates that a virus might have an advantage, especially early in an epidemic, if it contains proteins altered so that they can carry out more efficient viral replication inside human cells or they can increase the spread of the virus. "The influenza virus seems somewhat less stable than other viruses," Palese explains. In preliminary experiments, it accumulated more genetic changes during passage in laboratory tissue culture than did another RNA virus of comparable size.

Drastic as well as gradual genetic changes play a role in virus history. Scientists suspect that each pandemic virus either adopts genes from animal viruses or is a reemerged human virus that had not circulated for many years.

The interchange between the 1977 H1N1 and another influenza is the first documented recombination of viral genes in human disease. In 1977 two influenza A strains were in circulation simultaneously — the reemerged H1N1 and H3N2. Alan P. Kendal of the Center for Disease Control observed that some patients were infected with both viruses, and thus provided an opportunity for gene exchange between the viruses. In California in November 1978 a recombinant virus was isolated. In the December PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES Palese and Young report that the virus has four genes, including H and N, from its H1N1 parent and four genes from an H3N2 influenza.

Viruses of the H1N1 type collected in the United States later in 1978 and 1979 all consisted of the recombined genes, Palese says. Thus, he believes that the new virus has a survival advantage over the earlier H1N1 forms. Kendal, however, told SCIENCE NEWS that distribution of the recombinant virus is not uniform around the world. He says that in the United States and Japan most viruses were of that form last winter, but in Australia, India and the Caribbean the older, non-recombinant form still prevailed. "The recombinant viruses haven't clearly displaced non-recombinant H1N1," Kendal says. "We really have to wait and see whether in the future both viruses can survive."

A scarcity of influenza A outbreaks this winter so far leaves the scientists short of further data. Kendal points out, however, that the situation could change any day. Sir Charles Stuart-Harris of the University of Sheffield in England told reporters at the symposium that despite extensive analysis of past epidemics, virologists still have no power to predict what viruses will appear each year. □

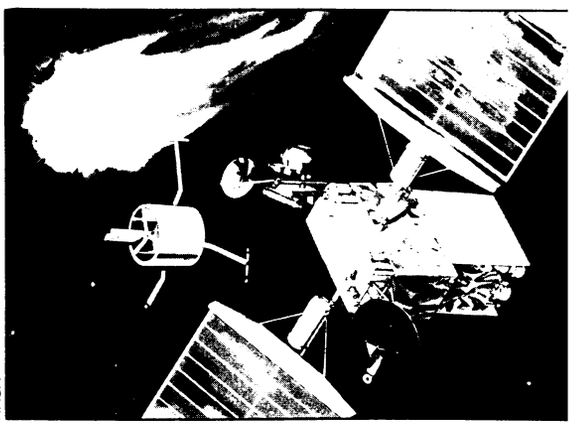
Comets in a storm: Tight money for space

Considerable furor has arisen out of concern among some scientists and others over the future of a proposed mission to send a spacecraft past Halley's comet on the way to a year-long, side-by-side cruise with comet Tempel 2. The crux of the matter is a new engine, the Solar Electric Propulsion System (SEPS), which would have to be developed for the vehicle in order to make the envisioned flight possible.

The mission's advocates consider it important because Halley is the only such large, active comet that will be an available target in this century, combined with the fact that the two-comet trajectory will yield — from the same launching — a chance for prolonged, intensive study of a comet nucleus. The spacecraft, which would have to be launched in 1985, would not need to appear in the National Aeronautics and Space Administration's budget until fiscal 1982, but the SEPS engine, requiring major technological development, would need a longer start. The proposed FY 1981 budget, now in the hands of congressional committees, left NASA's hands with a request for $20 million to begin the SEPS development. On the way to Capitol Hill, however, it made the obligatory detour through the Office of Management and Budget, and there the SEPS was deleted.

The result has been striking. Scientists call one another at night. National magazines and organizations such as the space-colony-oriented L-5 Society have mounted campaigns on the mission's behalf. At the House Subcommittee on Space Science and Applications, chairman Don Fuqua (D-Fla.) has received more than 200 letters on the subject, and, says a staffer, "I haven't seen any that are against." Calling the outpouring "surprising," he adds, "I do not recall any program in the last five years that has produced such a volume of mail."

Last week, Fuqua's subcommittee held a hearing on the science portion of the NASA budget request, which would include the



NASA

Craft probes Halley on way to Tempel 2.

SEPS. Of the testimony presented, the weakest regarding SEPS and the comet mission came from NASA itself, represented by Thomas A. Mutch, associate administrator for space science, whose spoken comments touched only briefly on the matter. His full, 33-page written statement contained just nine sentences about the comet mission, with a single reference to SEPS. (One observer suggested that Mutch's remarks might have been "muzzled," possibly because NASA is already receiving strong administration backing for substantial extra funding to help out the much-delayed space shuttle. NASA now envisions the shuttle's first orbital flight occurring as late as March of 1981.)

The other witnesses before the subcommittee took stronger stances. One possible alternative to the two-comet mission's requirement for prompt SEPS funding, for example, might be to drop the Halley flyby completely, leaving only the Tempel rendezvous (which scientists admit to be the more scientifically valid objective if a choice must be made). A.G.W. Cameron, chairman of the Space Science Board of the National Academy of Sciences, noted the view of the Board's lunar and planetary committee that "in view of the diversity of comets it is important that comparative measurements be made that