Ancient Ape Limbs

Life wasn't very easy 30 million years ago for *Aegyptopithecus*. The nature of the climate and of these fox-sized apes attracted them to the cool streams of the then-lush forests of the area. However, local rivers were swarming with meat-eating reptiles and fish that frequently turned *Aegyptopithecus*'s quiet dip into a rather violent meal — with the ape as the main course. And few reptiles of that period were inclined to leave any leftovers, even bones.

It was a pleasant surprise, then, when Duke University primatologist Elwyn L. Simons came upon the upper arm bones of *Aegyptopithecus* late last year in Egypt's Fayum Depression, 50 miles southwest of Cairo. The bones, which include part of the elbow mechanism, are at least 30 million years old, and, according to Simons, are among the oldest remains found yet of the oldest known forerunner to higher primates.

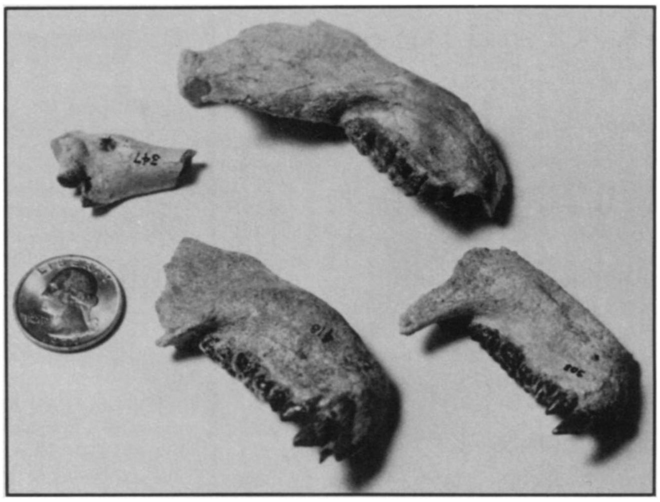
"What's really important is that we now have *found* the limb bones," says Simons, who found first evidence of what he calls the "dawn ape" in 1965 and two years later uncovered a skull and well-preserved teeth of the animal. The limb bones establish *Aegyptopithecus* as "a kind of connecting link between primitive primates and later apes," Simons said in an interview. The find "shows that 30 million years ago [we] had ancestors that did not move around like either modern ape or man," he says.

The arm bones help depict a creature with a "blend of features," one with some similarities to older prosimians, such as lemurs, as well as to the modern South American howling monkey. *Aegyptopithecus* probably walked on all four limbs, Simons suggests, and did not swing under branches like modern apes. The bones themselves contain some similarities to both human and ape, he says, and "have a unique structure that couldn't have been predicted from the study of present-day lemurs, monkeys or apes."

The bone fragments were uncovered in Oligocene rock deposits 250 feet below a lava flow layer dated at 26 million years old. *Aegyptopithecus* fossils occur in sandstone rock outcrops within various football-field-size areas in the Fayum Depression, and frequently are partially exposed in wind-blown sand.

Fayum fossils "never occur as complete skeletons ... are always scattered in bits and pieces." This, Simons explains, is because the ape, a tree-dweller that fed on leaves, was often the victim of voracious predators in the region's streams and rivers. "I guess it's theoretically possible that we might find a [complete] skeleton," says Simons. But, he adds, the odds of that are about 30,000 to 1.

The upper arm and elbow portion of Aegyptopithecus *(smaller fragment, upper left) was recovered in Egypt along with three jawbones, with teeth intact.*



Jimmy Wallace, Duke University

Aegyptopithecus appeared about 35 to 40 million years after the first primates, he says, and around 15 to 20 million years before *Ramepithecus*, the first human-like manifestation of primates. Simons plans a return expedition in September. □

A third neutrino in the beam dump?

Neutrinos are odd particles — not strange, in the technical sense — just odd. They entered modern physics as a conveniently elastic theoretical invention. In the 1930s the beta decay of atomic nuclei, which plays a role in the transmutation of one element to another, was much studied. One of the standing mysteries of beta decay was that some of the energy released was vanishing unaccountably.

In physics, energy is not supposed to disappear. Conservation of energy is perhaps the most basic law of science. So there had to be something taking away the lost energy. A particle was devised to fit: It had zero rest mass, because it had to take away varying amounts of energy from almost zero on up, and it had no electric charge, because it did not activate any of the common particle detectors then used. The Italianate name was bestowed by the late Enrico Fermi.

The neutrino has become one of the most successful of the inventions of theoretical physics, although it took twenty years to find experimental evidence of its presence. Ten years after that a second, different, sort of neutrino was discovered. Theoretical physics is nothing if not versatile, and so a theory has now been developed that has places for two and even more neutrinos. The original neutrino, it was noted, always comes along with electrons, while the second comes along with related particles, the muons. Together these make up the family called leptons, and it is now a theoretical postulate that leptons come in pairs. To every lepton that is not a neutrino, there corresponds its own neutrino. There is some experimental evidence for at least one lepton heavier than the electron or the muon, and now from an experiment at the CERN laboratory in Geneva comes a rather unexpected result, evidence that can be interpreted as possibly revealing a third neutrino.

The experiment is the "beam dump" experiment at the CERN laboratory in Geneva. A beam dump is a place where unwanted particles are sent. When the accelerated protons from CERN's Super Proton Synchrotron collide with targets, they produce a multitude of different kinds of particles. Often only a few of these varieties are wanted for ongoing experiments, and the rest are directed to the dump, a place where they are given a line of flight in which to decay and various absorbers to absorb them. An experiment had been set up to study neutrino behavior in the beam dump for a purpose quite other than detecting new neutrinos, but the beam in the dump was also being monitored by two large bubble chambers, Gargamelle and BEBC.

Both bubble chambers recorded a ratio of electron neutrinos to muon neutrinos that was totally unexpected. Gargamelle's numbers are 9 electron-neutrino events to 18 muon-neutrino events; BEBC's are 15 to 34. But the predicted number of electron events to this total of 52 muon events is only 3.5. So, D. J. Miller of University College, London, who reviews the happening in the March 16 NATURE, points out that the numbers raise the suspicion that a neutrino parent is produced that decays to produce an electron neutrino almost as often as it does a muon neutrino. Miller finds that an obvious possibility, the newly discovered D meson, does not fit the statistics, and he suggests that one explanation could be a new kind of neutrino, one associated with the new lepton designated tau that has been observed in a number of experiments. "Further results from the beam dump experiment are eagerly awaited," Miller writes. □