PALEOANTHROPOLOGY

New Finds Rekindle Debate Over Anthropoid Origins

When paleontologists disagree, they rarely have the luxury of doing another experiment to see who's right. Instead, they must resort to a more chancy and time-consuming enterprise: returning to the field and unearthing more fossils that prove their point. On page 1885, paleoanthropologist Elwyn Simons of Duke University claims to have done just that. He presents new fossils from the Fayum Desert in Egypt to help resolve one of the most contentious issues in paleoprimatology: What was the common ancestor of apes, monkeys, and humans?

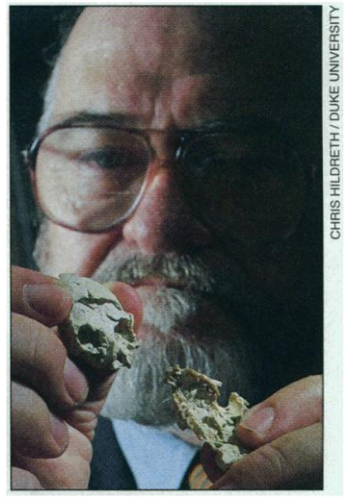
The new fossils, estimated to be 37 million years old, include rarely preserved front teeth of the oldest undisputed higher primate, a small leaf- or insect-eating creature called *Catopithecus*. But given the difficulty of proving kinship among ancient primates, the finds are unlikely to forge consensus about this divisive issue. "These are neat specimens, but they don't address all the competing hypotheses. Until we have more complete material from Asia and Egypt, questions will remain," says early primate expert Herbert Covert of the University of Colorado, Boulder.

The problem of the origin of higher primates, also known as anthropoids, has sparked scientific fireworks for decades. Currently, there are at least four competing theories about how, when, and where anthropoids split from lower primates such as the primitive living lemurs (*Science*, 12 June 1992, p. 1516). One theory favors an extinct group of primates, the diminutive omomyids, as anthropoid ancestors. Another camp, relying on fragmentary fossils from Africa and Asia, suggests that anthropoids themselves are an ancient group, extending back nearly to the dawn of all primates. And Simons says his new specimens support yet a third idea: Another extinct group, the lemurlike adapids, eventually led to all higher primates, including humans. "The oldest documented anthropoids don't look like omomyids. They look like adapids," he says.

Simons bases this conclusion on newly discovered fossils from an extraordinarily productive area of the Fayum Desert in Egypt where he and his crew have already unearthed 21 different primate species. The new fossils are skulls and jaws of *Catopithecus*, which has held the status of oldest undisputed anthropoid since Simons published the first skull 5 years ago (*Science*, 30 March 1990, p. 1567). The new skulls—five or six in all—confirm that this small primate had the accepted anthropoid traits, such as a complete bony cone around the eye socket and forehead bones that are fused together rather than separate.

The new material also preserves incisors and canine teeth in the jaws, a rare find, as front teeth are often broken or lost. These teeth have adapoid traits such as shovel-shaped incisors, says Simons. In contrast, omomyid incisors are pointed, "like carrots," he says.

What's more, *Catopithecus*' upper jaw reveals two big front teeth flanked by smaller ones (just as in humans), while in the lower jaw the lateral incisors are bigger than the central ones. Adapids have exactly the same pattern, but omomyids do not. All in all, according to Simons, *Catopithecus*' teeth look very similar to adapids and nothing like omomyids, suggesting that anthropoids evolved from a branch of the adapid family tree. "The dental resemblances, taken together, show ties between the early anthropoids of the Fayum and one group of adapids, the cercamonines," he says. He believes early cercamonines led to higher primates.



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Boning up. Elwyn Simons examines one of his latest finds.

Simons gets support from Philip Gingerich of the University of Michigan, who came to similar conclusions in the 1970s. At the time, Gingerich was comparing adapids to later anthropoids because the front teeth of early anthropoids were unknown. "It was a case of waiting for more evidence to catch up with the idea," he says.

But those who favor competing theories question whether the similarities between adapids and *Catopithecus* in fact prove they have a common ancestor. "The front teeth are not necessarily compelling characters," says Covert. "They look the same, but do they indicate shared ancestry?" Covert and others think the answer is probably not. Rather than indicating a common ancestry, some of the similarities may have evolved independently in adapids and anthropoids, says anthropologist Robert D. Martin of the University of Zurich in Switzerland: "I think that there is convergence between late adapids and simians (or anthropoids)." Martin praises the Fayum fossils, but says, "I don't find this adapid argument any more convincing than when it was suggested in the 1920s."

Also, although the Fayum deposits hold the first known anthropoids, the group likely evolved much earlier, so *Catopithecus* may look very different from the first higher primates, says Martin. "The Fayum is simply too late," agrees K. Christopher Beard of the Carnegie Museum of Natural History in Pittsburgh, who has his own candidate for the earliest anthropoid. This is a controversial Chinese primate, about 45 million years old and known from two jaws as well as from unpublished material.

Beard named the fossil *Eosimias*, or "dawn ape," but Simons counters that so far, there's no proof that *Eosimias* or any other older specimens are higher primates. "The trouble with all the other early 'anthropoids' is that they are just known from jaw fragments or even teeth. So for them, none of the confirming features of anthropoids can be discerned," he says. "Only the Fayum has certifiable early anthropoids." Simons is not alone in his skepticism about Beard's finds. Says Martin: "About *Eosimias*, I'm on the fence for now."

Still, Beard continues to unearth fragmentary fossils to support his case, most recently a fossil ear bone that he says conflicts with the notion of an adapid ancestor for anthropoids. In an article in press in the *Journal of Human Evolution*, Beard and Ross MacPhee of the American Museum of Natural History show that this ear bone looks much more like an omomyid than an adapid. Thus, although they believe that the anthropoid lineage extends back at least 45 million years, MacPhee and Beard also conclude that anthropoids are more closely related to omomyids than to adapids.

But that argument hasn't won over the skeptics either. The bone was found isolated, so MacPhee and Beard can't prove that it truly belongs to *Eosimias*. And the ear bone looks so much like that of an omomyid that it doesn't boost *Eosimias*' uncertain status as an anthropoid, says paleoanthropologist Richard Kay of Duke. Agrees Gingerich: "That ear bone looks most like an omomyid, which I take to mean that it probably *is* an omomyid."

These recent volleys of evidence, some promoting an adapid ancestor for anthropoids, others suggesting an ancient link to omomyids, seem unlikely to end the debate. So how to solve the mystery of which early primate group led to our own lineage? On this, even Beard and Simons agree: more field seasons, and more fossils.

–Elizabeth Culotta