

Paleontology

Mary Murray reports from the Fourth North American Paleontological Convention at the University of Colorado in Boulder

Extinctions: The earthly argument

Paleontologist Robert T. Bakker of the University of Colorado Museum in Boulder has a new candidate for "death star," the great unknown cause of mass extinctions (SN:4/21/84, p.251). He does not believe, as some scientists do, that gigantic meteorites, crashing into the earth and blackening the sky with dust and ash, killed the dinosaurs and other extinct creatures. Bakker instead pins the death star, symbolically, on a man, the British Army general, Lord Horatio H. Kitchener, who in the late 19th century brought Asian cattle to Egypt, inadvertently setting off a plague of rinderpest that continues to this day and is slowly killing off the great herds of African antelope.

Bakker's idea is that species immigration — which, like the Asian cattle immigration, often introduces disease into stable populations — may account for a great share of the mass extinctions. "It seems to me dinosaurs went out not with a bang, but with [illnesses such as] diarrhea," Bakker told participants at the meeting.

For one afternoon at the conference, Bakker and others who believe extinctions occurred gradually, not instantaneously by meteorite impact, held sway. At a session entitled "Death by Earthly Causes," they brought out their best arguments for the idea that extinctions were caused by such things as disease, changes in climate and changes in ocean temperature and salinity.

Bakker points out that most mass extinctions were preceded by a decline in "evenness" among species. For example, for a half-million years before the great extinctions at the end of the Cretaceous period (about 65 million years ago), there was an overwhelming abundance of *Triceratops* among the dinosaurs, Bakker says. "What we see before the end is the premonition of mass extinction," Bakker says. "The giga-fauna [largest animals] are reduced to low evenness."

Biologist J. David Archibald of San Diego State University describes evidence showing that 16 of 19 turtle species in Montana survived the extinctions at the Cretaceous-Tertiary (K-T) boundary. Such evidence supports the concept of gradual or "stepwise" extinction, but not one large catastrophe, Archibald says.

Jack A. Wolfe and Garland R. Upchurch Jr., paleobotanists at the U.S. Geological Survey in Denver, describe evidence from leaf fossils suggesting that the North American climate changed from dry to wet at the K-T boundary. Leaves from the Cretaceous period are small and have many hair follicles, which appear to be adaptations to drought, Upchurch says. But the leaves from the Tertiary period are much larger and lack evidence of the hairs that would help them retain water. Thus, Upchurch says, "The extinctions at the K-T boundary must be due to a complexity of ecological changes rather than a single factor."

Jonathan R. Bryan of the Florida State Museum in Gainesville reports a systematic study of sediment layers spanning the K-T boundary near Braggs, Ala. The fossil evidence from this site suggests that only 36 percent of the 83 species present at the site went extinct at the boundary, Bryan says.

William B. Gallagher of the New Jersey State Museum in Trenton reports a similar study of K-T boundary layers at Sewell, N.J. Noting the apparent gradual extinction of species in the layers, Gallagher does not suggest a specific cause of extinction, but proposes the more general "double-whammy theory: Things got bad, and then they got worse."

Although the gradualists dominated the afternoon's discussion, their counterparts in the extinction debate were present at the conference. One of them, David M. Raup of the University of Chicago, earlier in the day suggested that paleontologists may be too quickly judging the impact theories by "Roman law," — that is, by saying, "They're guilty." He proposes that paleon-

tologists learn more about extraterrestrial phenomena that affect the earth. "Luis Alvarez [who came up with the impact theory] is learning paleontology as fast as he can," Raup says. "And it would be far easier for us to learn astronomy."

Oldest East Coast mammals

When construction workers in South Carolina recently dug a new hole for a hydroelectric turbine, they unearthed evidence of the oldest mammals yet discovered on the East Coast of the United States, reports paleontologist Robert M. Schoch of Boston University. Amateur collectors picking through the excavation near St. Stephen, S.C., found five teeth and a broken skull bone. Four of the specimens apparently come from four different German-shepherd-sized, hairy creatures, and the other two come from squirrel-sized mammals, Schoch says. All of them lived about 60 million years ago.

"I don't know of any other Paleocene mammals in the Southeast," Schoch says. Until now, the earliest known mammals from this area dated from the late Eocene, about 38 million years ago, Schoch says.

One of the larger teeth appears to have come from a previously unknown dog-sized mammal, which Schoch has named *Mingotherium holtae*, after the Black Mingo fossil layer, where the tooth was found.

"We had suspected before this that there must have been mammals on the East Coast in the Paleocene," Schoch says. "This is opening up a window on what they were."

Paean to a leader in evolutionary theory

Stephen Jay Gould of Harvard University told his fellow paleontologists in Boulder that he has had only two great heroes in his life. "Joe DiMaggio is the first; I patterned my batting stance after him," Gould said. "George Gaylord Simpson is the second; I patterned my life after him."

Gould's remark was typical of the high praise heaped upon the late Simpson at the meeting. The scientists spent an afternoon assessing Simpson's work on theories of evolution rates and the impact Simpson has had on paleontology. Simpson, a former curator of the American Museum of Natural History in New York City, and author of 40 books (the most famous being *Tempo and Mode of Evolution*) and 760 papers, died nearly two years ago at the age of 82.

Before Simpson began his work in the mid-1930s, the great majority of paleontologists did not accept Charles Darwin's theory of evolution by natural selection. Simpson, who did believe in natural selection, spent much of his career applying evidence from the fossil record to the theory. Most notably, he developed theories about rates of evolution and why some species evolve faster than others. It is his legacy that today, the great majority of paleontologists believe in natural selection.

"Simpson made paleontology a partner in evolutionary theory," Gould says.

Speaking plainly against creationism

If one-half of U.S. adults consider the biblical story of creation valid, as many polls and surveys show, then paleontologists are failing to communicate the theory of evolution clearly enough, according to Norman D. Newell, curator emeritus of the American Museum of Natural History in New York City.

Newell urges his colleagues to write more clearly, to write more often for general audiences and to work at the grass-roots level to improve science education in public schools so that the evolutionary theory of creation will be better understood. "I suspect that it is up to us to see that paleobiology gets significant attention in our local classrooms," he says.