

Extinction: Equal opportunity in death

The dinosaurs had plenty of company when they took their bows at the end of Earth's Cretaceous period, 65 million years ago. Three-fourths of marine species went belly up at the same time, as did prominent land animals and plants. But many important groups weathered the mass extinction, including, thankfully, our own mammalian ancestors. Paleontologists have puzzled over what enabled some species to survive while others succumbed.

A new statistical analysis suggests that the end-of-the-Cretaceous extinction event played no favorites. David Jablonski and David M. Raup of the University of Chicago reached this conclusion after studying a global database of bivalve mollusks as well as a second database covering the Gulf and Atlantic coasts. In the April 21 *SCIENCE*, they report that neither body size nor habitat nor feeding strategy had any influence on an animal's chance of survival.

"That was really surprising," Jablonski says. During less chaotic chapters in Earth's history, such factors often do play a role in helping creatures survive. For instance, evidence suggests that species with smaller bodies have smaller extinction rates during typical times. But the mass extinction at the end of the Cretaceous — which many earth scientists blame on an asteroid impact — did not follow the usual evolutionary rules when picking out survivors.

"It paints quite a portrait of the end-Cretaceous world. All these factors that had mattered suddenly became neutral. That really speaks volumes about how horrendous an event this really was," Jablonski says.

The scientists found only one factor that increased an animal's odds of success. Genera spread across many continents fared better than those with smaller geographic ranges.

Life flourishes amid geologic unrest

When geologic forces thrust up ancient mountain ranges, they gave life a boost as well, according to paleontologists who investigated an ancient evolutionary explosion.

Arnold I. Miller and Shuguang Mao of the University of Cincinnati wondered whether mountain formation could help explain why the number of animal groups exploded during the Ordovician period, from 505 million to 438 million years ago. During that span, the number of marine families bloomed from 160 to 530, while the number of genera ballooned from 470 to 1,580. Some researchers have noted that many mountain ranges appeared at the same time, suggesting a link between the geological and biological revolutions. "But there has not really been a whole lot of evidence proffered in support of these theories," Miller says.

To test the idea, he and Mao categorized the geographic distribution of 6,576 Ordovician marine fossils of trilobites, brachiopods, and mollusks. In the April *GEOLOGY*, they compared how many genera appeared near rising mountains, as opposed to those located in geologically quiet regions.

Although stability might seem attractive to a human, Miller and Mao found that Ordovician animals favored tectonic turmoil. Diversity of animal genera increased most dramatically in areas closest to growing mountain ranges.

Why would geologic activity stimulate evolution? Miller and Mao offer three possible explanations. As young peaks rise, they also erode quickly, filling nearby oceans with sediments. By covering the seafloor with sand and mud, mountain growth might favor the diversification of new animals.

Increased erosion would also flood the seas with nutrients, which could have prompted animals to diversify. Miller and Mao also speculate that geologic upheavals break up habitats, which may have encouraged the development of new species.

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Dipping into nicotine content in snuff

Tobacco foes strove last year to convince Congress that cigarette makers knowingly tinker with nicotine concentrations (SN: 7/2/94, p.7). Such evidence is needed for the Food and Drug Administration to regulate tobacco as a drug. Now, two studies suggest that companies manipulate nicotine delivery in moist snuff, the smokeless tobacco that's tucked between the cheek and gum.

Separate teams led by Jack E. Henningfield of the National Institute on Drug Abuse in Baltimore, Md., and Mirjana V. Djordjevic of the American Health Foundation in Valhalla, N.Y., report in the spring issue of *TOBACCO CONTROL* a range of pH values and nicotine amounts in moist snuff. Researchers had previously measured this potentially addictive drug, but not pH, in snuff (SN: 5/14/94, p.308).

"pH is the gatekeeper to nicotine absorption in the mouth," Henningfield asserts. At a higher (more alkaline) pH, more nicotine is un-ionized and can cross mucous membranes into the bloodstream, he says.

Djordjevic's team found pH values from 5.15 to 8.37 in 17 snuff brands and nicotine content from 3.4 milligrams per gram to 14.5 mg/g. Henningfield's group measured nicotine and pH in six brands and calculated that 7 percent of the nicotine is un-ionized in Skoal Bandits Wintergreen, about 20 percent in other Skoal brands, and 79 percent in Copenhagen.

A third study in the journal looked at data on young snuff users. Scott L. Tomar of the Centers for Disease Control and Prevention in Atlanta and his coworkers found that of 26 teens who used Skoal products, only half still dipped those brands 4 years later. One-third had moved up to the more potent Copenhagen. The rest had switched to other brands. This finding supports congressional testimony last fall from tobacco industry critics. They charged that U.S. Tobacco Company of Greenwich, Conn., uses a "graduation" marketing strategy to get teenagers to begin using Skoal brands, then switch to Copenhagen.

Moist snuff sales jumped 70 percent over the past decade. Recent surveys show that 19 percent of high school boys use smokeless tobacco. This product can cause gum disease and oral cancer, which will strike about 28,000 people this year.

No one has yet measured directly how much nicotine reaches the bloodstream of a snuff user, however, U.S. Tobacco argues that behavior and other factors, not pH, determine bioavailability.

UV effects overblown in Southern Cone?

Blind sheep and bug-eyed bunnies — those were among the horrors described in *NEWSWEEK* 4 years ago in an article on the effects of Antarctica's ozone hole and a resulting rise in UV exposure in Punta Arenas, the major city in southern Chile. News reports claimed not only that thousands of animals were getting cataracts and going blind, but that people were suffering from UV-related eye and skin diseases.

But a study by Oliver D. Schein of Johns Hopkins Hospital in Baltimore and his colleagues reported in the April *AMERICAN JOURNAL OF PUBLIC HEALTH* contradicts these reports. Schein's team looked at records of Punta Arenas' dermatologists and ophthalmologists during October 1992, when atmospheric ozone reached record lows, and in normal months.

The researchers found no significant rise in acute UV-related skin and eye problems during the low-ozone period. What's more, veterinarians who examined 224 local sheep found that none was blind; many had a mild eye disease, but most cases appeared to be caused by an infection. Of 17 rabbits and hares examined, only one had cataracts.

Overall in 1992, southern Chileans experienced a mere 1 percent increase in UV exposure, the group reports.

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