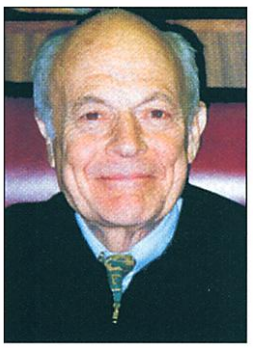
high. In the absence of rigorous testing, he said, limiting the testimony of fingerprint examiners would "make the best the enemy of the good."



On second thought. Fingerprint identification can continue, Judge Pollak ruled.

The new decision is a mixed blessing for practitioners, allowing them to declare matches but implying that they are technicians, not scientists, says James Starrs, a forensic scientist and law professor at George Washington University in Washington, D.C. "It's a blow to their status in the scientific community," he says. However, Pat Wertheim, a forensic scientist at the Arizona Department of Public Safety in Tucson, says the distinction between scientists and technicians makes little difference in a trial. "For all practical purposes," Wertheim says, "the 12 people on the jury couldn't care less."

–ADRIAN CHO

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EVOLUTIONARY BIOLOGY

Ancient DNA Untangles Evolutionary Paths

Analyzing ancient DNA for clues into the deep past has had a bad rap: Too many false reports of recovered dinosaur DNA have sullied the field's reputation. Now, that's about to change. Two independent research groups have shown that, when studied correctly, genetic material preserved in cold environments can reveal quite a bit about the past.

Alan Cooper, a molecular evolutionist at the University of Oxford, United Kingdom, and his colleagues used ancient DNA to reconstruct the migration patterns of subarctic brown bears living up to 60,000 years ago. Similarly, David Lambert's group at Massey University in Palmerston North, New Zealand, examined 6000-year-old DNA from Antarctic penguins to determine the rate at which the birds' genomes evolved.

The two teams report their findings on pages 2267 and 2270, respectively. "Both these papers begin to chart a new course in ancient DNA studies," comments Robert Wayne, an evolutionary biologist at the University of California, Los Angeles.

Researchers first began extracting sequence information from DNA in museum specimens about 15 years ago, gradually moving on to ever older material. Much progress has been made using antique DNA to study genetic variation and to place extinct species in their family trees, but supposed extractions of DNA from dinosaur fossils or million-year-old insects in amber casts proved to be studies in modern contamination.

Cooper avoided some common technical pitfalls by studying bones from northern Alaska, the Yukon, and Siberia, where DNA was kept on ice for thousands of years in the permanently frozen soil. In addition to these fresh-frozen samples, he and his colleagues had access to hundreds of bones in museums with their DNA still in intact fragments. To check the work, a second lab reanalyzed the DNA samples.

Cooper's team used the samples to look at the history of an intriguing geographic region. Until 11,000 years ago, the area called Beringia had a land bridge between the Asian and American continents, enabling species to cross back and forth—including humans about 13,000 years ago. The bones "provided an amazing opportunity to look at the genetic record" of several species, such as bears, bison, and lions, at what was "a biological crossroads," Cooper explains.

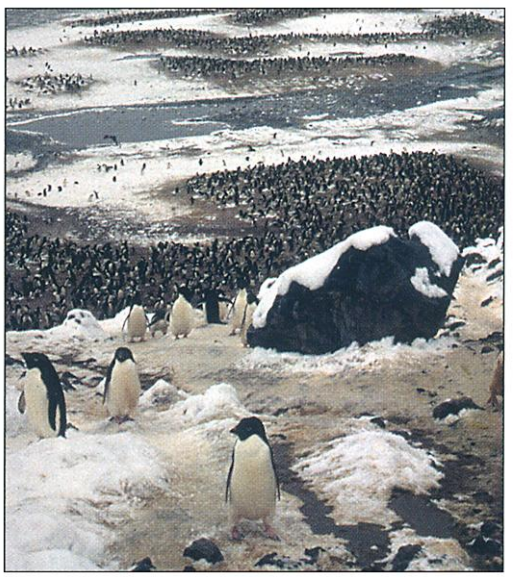
The researchers analyzed DNA from bones of 36 brown bears, using radiocarbon dating to verify the ages of 30 bones. They sequenced two pieces—one 135 and the other 60 bases long—of the mitochondrial genome and grouped the bears according to the degree of similarity in the sequences. The work indicates that the distributions of these ancient genetic groups did not correspond to those of modern populations. This finding serves as a caution to researchers that "what we see in present-day [distributions] is not necessarily true about the past," says Rob Fleischer, an evolutionary biologist at the Smithsonian Institution in Washington, D.C.

The data further indicate that brown bears may have disappeared from much of Alaska and the Yukon 35,000 years ago, only to reappear 14,000 years later. Because this reappearance corresponds with the disappearance of a larger animal called the short-faced bear, Cooper suggests that competition between the two species influenced the changes in their distributions.

Meanwhile, Lambert and colleagues took advantage of frozen remains from a species at the other end of the globe. Adélie penguins' large colonies have existed for thousands of years, with the same birds and their descendents returning to the sites year after year. As a result, "here you have [layers of bones] in colonies that are beautiful" and ripe for DNA studies, says Axel Meyer, an evolutionary biologist at the University of Konstanz, Germany.

Lambert's team members collected and dated 96 bones from various layers and gathered 300 blood samples from living birds. They and a lab at the University of Auckland, New Zealand, analyzed a rapidly evolving 352-base sequence from the mitochondrial genome, cataloging changes between the ancient and modern samples. From that, they calculated the rate of evolutionary change.

In the past, studies estimating mutation rates have obtained just a few data points over very short (one or two generations) or very long (perhaps millions of years) time scales. But in this study, the researchers were able to "use the whole history of the past 6000 years and the genealogy of the genes to extrapolate the mutation rate," says Wayne. Lambert's group puts that rate at about two to seven times faster than were previous estimates for other species.



Homebodies. Antarctic penguins that have historically stuck to the same breeding sites proved perfect for studies of ancient DNA.

Questions remain about both studies, however. Lambert says more bones were needed for Cooper's group to draw its conclusions. And Cooper wishes the DNA for the penguin study went back farther than 6000 years, so the variation would better reflect long-term rates of evolution. Others, including Fleischer, applaud the amount of DNA that Lambert collected but still worry that ancient changes in the penquins' distribution could have distorted the results.

Nonetheless, says Svante Pääbo, an evolutionary biologist at the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany, "the study of ancient DNA has now advanced to a point where one can study genetic variation within species over thousands of years and [obtain] data that can be trusted." Lambert's and Cooper's studies may thus push the use of ancient DNA farther along the path to redemption.

–ELIZABETH PENNISI

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