Dinosaur DNA claim dismissed as a mistake

Strands of DNA identified last year as belonging to a dinosaur actually come from contaminating bits of human genes, conclude molecular evolutionists from several different laboratories.

Scott R. Woodward of Brigham Young University in Provo, Utah, reported a year ago that he had detected pieces of DNA from 80-million-year-old bones (SN: 11/19/94, p.324). He identified the fragments as part of the cytochrome b gene from dinosaur mitochondria—the tiny power plants inside cells.

Researchers from the State University of New York (SUNY) at Albany argue this week that Woodward almost certainly detected contaminating strands of human DNA. "Human DNA is probably the most common laboratory contaminant. It's exceedingly difficult to keep human tissue out of an experiment, because specks of dust have human skin and hair on them," says SUNY's Caro-Beth Stewart.

In the Nov. 30 NATURE, Stewart and Randall V. Collura explain how human DNA could have confounded Woodward's analysis. They discovered that several higher primates have multiple, imperfect copies of the cytochrome b gene, which jumped from the mitochondria into the nucleus as long as 30 million years ago. These nuclear inserts are nonfunctional.

When Woodward checked for human contamination, he compared the DNA strands against human mitochondrial genes, but the nuclear inserts had not yet been discovered.

Stewart and Collura's data confirm findings published in the May 26 SCIENCE. Hans Zischler of the University of Munich in Germany had identified pieces of the cytochrome b gene in the human nuclear genome and suggested that these nuclear inserts had contaminated Woodward's analyses of the dinosaur bone.

In the same issue, S. Blair Hedges of Pennsylvania State University in University Park identified the strands as human on the basis of a phylogenetic analysis. The bone DNA more closely resembles DNA from humans than DNA from reptiles or birds, the nearest living relatives of dinosaurs. "All of the evidence suggests that it is contamination," comments Hedges.

Woodward did not construct an evolutionary tree to check how closely the bone DNA segments resembled human DNA, because, he says, the strands are too short for meaningful phylogenetic tests. Despite the new findings, he discounts the contamination theory. "I still think what we have represents an ancient DNA segment from the bone."

— R. Monastersky

Oldest Lyme-carrying microbes found

Scientists have found early accounts of ring-shaped rashes and other symptoms of Lyme disease in Germany. But these case reports, one dating as far back as 1882, don't isolate the agent responsible, leaving open the questions of whether the curlicued bacteria that cause Lyme disease (smaller scanning electron micrograph, below) existed back then and whether they were carried by the same host that carries them today, the European wood tick (larger micrograph).

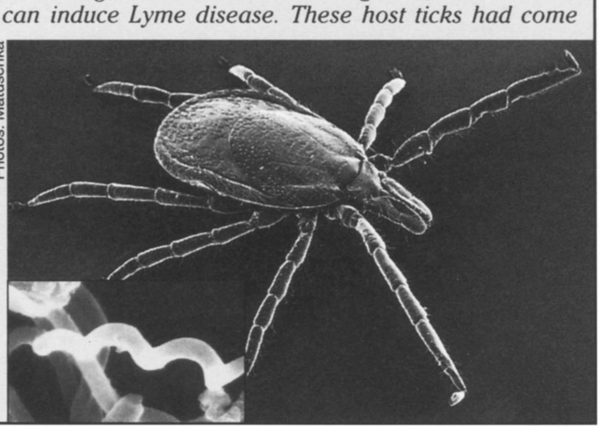
Franz-Rainer Matuschka of the University of Berlin's Humboldt Medical Faculty and his coworkers believe they have now resolved the issue. In the Nov. 18 LANCET, *they report finding Lyme bacteria in 19th-century ticks, making these insects the bacterium's earliest known hosts.*

The Vienna Natural History Museum in Austria supplied 21 ticks for study, all pickled in alcohol. Matuschka's team extracted each insect's midgut, the part of the host where Borrelia *bacteria live today, and used a technique known as polymerase chain reaction to amplify the DNA found there.*

The genetic material in two midguts matched that of B. garinii, *one of three forms of the bacteria that can induce Lyme disease. These host ticks had come from a Hungarian cat in 1884 and from a fox caught in Austria in 1888.*

Though Matuschka would like to hunt for even earlier infestations, he suspects that obtaining older ticks to chop up will prove difficult. He notes that, this time around, "curators were reluctant to hand over [specimens] they had stored for more than 100 years." — J. Raloff

Photos: Matuschka



Quantum unity from packaged cold atoms

A third group has now succeeded in creating a Bose-Einstein condensate out of a cloud of ultracold atoms. Instead of clumping together while maintaining separate quantum states, as in normal condensation, these atoms end up in a single quantum state and so act as a coherent entity.

Although Albert Einstein and Satyendra Nath Bose independently predicted the existence of this peculiar state of matter more than 70 years ago, no one had observed it until last summer (SN: 7/15/95, p.36; 9/9/95, p.164). In the latest advance, Wolfgang Ketterle and his coworkers at the Massachusetts Institute of Technology have managed to pack and chill more atoms faster than ever before to produce a Bose-Einstein condensate.

"We can get about a million condensed atoms every 10 seconds," Ketterle says. That's enough to start determining the characteristics of this unknown state of matter. These studies may provide insights into other quantum phenomena, such as superconductivity.

The group reports its feat in the Nov. 27 PHYSICAL REVIEW LETTERS.

Ketterle and his coworkers use laser beams to cool and trap sodium atoms. Once the atoms have been brought to sufficiently low temperatures, the team can turn off the light and switch on a weak magnetic field to confine the atoms even more tightly. An extra laser beam serves as a plug to keep atoms from leaking out as they are cooled further.

In one experiment, the group created a Bose-Einstein condensate consisting of as many as 500,000 sodium atoms within 7 seconds at a temperature below 2 microkelvins.

Ketterle and his colleagues are now overhauling their equipment to improve its stability in order to study the sodium condensate. Because no one has yet characterized the material and because the theoretical predictions disagree, these measurements are expected to provide the first clues to the behavior of Bose-Einstein condensates.

"When physicists discover something new, they behave a little like children," Ketterle remarks. "They want to look at it to see what happens. They want to drop it. They want to squeeze, shake, and bang it."

"That's what we're going to do," he says.

For example, the researchers plan to use light to probe the condensate and track its stability. Eventually, the atoms of a Bose-Einstein condensate start combining into molecules, destroying the condensate's unity. "At our high [atomic] densities, we can force this process to happen in a matter of seconds," Ketterle notes.

— I. Peterson