Eurasia and North America were the two areas where the deglaciation was the most intense," says Alroy.

This discovery, he contends, backs up the overkill hypothesis, first proposed in 1967 by Paul S. Martin of the University of Arizona in Tucson. Martin and other researchers discussed the hypothesis most recently in *Extinctions in Near Time* (1999, Ross D.E. MacPhee, Kluwer Academic), the outgrowth of a conference held 2 years ago at the American Museum of Natural History in New York. According to these scientists, the first human hunters who crossed the land bridge had great success catching animals that had never evolved any defenses against the most efficient predator on the planet.

The new evidence, however, does not win over opponents who have long battled the overkill hypothesis. "I'm skeptical that the arrival of humans on the scene had much to do with it. I think the dominant factor was the changing climate," says paleontologist Ernest L. Lundelius Jr. of the University of Texas at Austin.

The climate of 11,000 years ago was particularly harsh, with more extreme seasons than animals had experienced during the last ice age or the warm periods between previous glacial epochs, says Lundelius. At the time of the last interglacial, for instance, a large ground tortoise lived in central Illinois, in a region where winter temperatures today would prohibit the survival of such a reptile, he says.

Anthony D. Barnosky of the University of California, Berkeley questions Alroy and Sears' results because the fossil data for South America remain much poorer than for North America. "Probably what they're seeing is a real sampling bias," he says.

As for cause of the extinctions, he takes a Solomonic approach. "You had a correspondence in time of both purported causes. In fact, what probably happened was a one-two punch," he says, invoking both climate and human hunters. "If only one or the other had happened, it would not have been as severe," he says.

In the past 2 years, a third possible explanation has entered the ring. People could have sparked the extinctions without hunting the species to death, but rather by introducing new epidemic diseases to the hemisphere, says Ross D.E. MacPhee of the American Museum of Natural History.

The pathogens might have jumped from people or from the animals that march alongside them, such as rats, fleas, and other parasites. "There is this invisible biotic baggage that accompanies humans wherever they go," says MacPhee. He considers disease a much more plausible explanation for extinction of dangerous animals like mammoths than is a band of hunters sweeping over the continents.

Alroy discounts the disease hypothesis, saying that animals had been crossing back and forth between Asia and North America for 65 million years without ever causing a crisis of the magnitude seen 11,000 years ago. MacPhee, however, sees the arrival of people as adding a new mode of transportation by which species-jumping diseases could enter the Americas. He and a colleague are currently trying to culture microorganisms from the bones of animals that died at this time.

Defenders of the overkill hypothesis have long noted that large animal extinctions on different continents didn't all happen at the end of the last ice age. In Australia, for instance, an arkful of some 60 species died out around 50,000 years ago, about the same time that people first arrived.

Evidence reported earlier this year supported the link between human invasions and animal extinctions, but it raised a new hypothesis to explain the connection. The early human residents of Australia may have killed off animals indirectly by setting widespread fires that altered the mix of vegetation, according to researchers from the University of Colorado at Boulder (SN: 1/9/99, p. 21).

Future studies of fossils from the Americas and elsewhere may ultimately reveal whether people had a hand in all of these extinctions and whether that hand was bloody, sooty, or simply loaded with infectious germs. □

Biology

Weird jaws let tiny snake gulp fast

An eating style and jaw structure unlike that of any other known vertebrate may give a minute predator an edge in its perilous hunts.

Texas threadsnakes raid ant nests to prey on the young, a bold move for such a small attacker. An adult threadsnake in the genus *Leptotyphlops* grows 6 to 8 inches long and a bit thicker than a strand of spaghetti, and it weighs about a gram. Its size renders the snake vulnerable to serious injury and death when attacked by ants.

This rather delicate predator turns out to have a unique jaw structure for high-speed gulping, thus minimizing time in a risky ant nest, say Nate J. Kley and Elizabeth L. Brainerd of the University of Massachusetts at Amherst. In the Nov. 25 NATURE, they describe videotaping the snakes in a Plexiglas feeding chamber.

Most snakes eat big prey by stepping their upper jaw, one side at a time, over the victim, essentially walking dinner into their mouths. The process takes minutes to hours.

Kley

A threadsnake (on a dime) may be a bold hunter, but ants pose lethal danger.

Threadsnakes, however, depend on their toothy lower jaw, which is divided at the midline. The halves bend in, then out, "like a pair of swinging doors," as the researchers put it. The snakes can flip their jaws several times a second, pulling meals down the hatch in an eye blink. Kley notes admiringly, "They're able to pile away dozens of little ants in a minute." —*S.M.*

Living insect with eyes like trilobites'

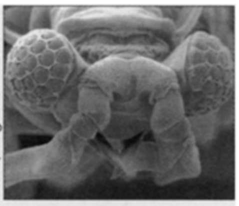
The raspberrylike eyes bulging from the head of an oddball insect seem to work like no other insect eyes known to science—except perhaps those of the long-gone trilobites.

A detailed study of the eyes of the tiny *Xenos peckii*, parasites of paper wasps, has revealed unique vision, report Elke Buschbeck and other Cornell investigators in the Nov. 5 SCIENCE.

Only the males have eyes at all. The females don't seem able to see or to fly, and they live out their entire lives inside the body of the paper wasp where they hatched. The males do leave home, bursting out of the wasp's body and spending all 2 hours of their adult lives flying around searching for paper wasps that contain suitable females. With so little time, good vision may offer a big advantage to a guy on a mission. The scientists estimate that visual processing takes up some 75 percent of the insect's brain.

Each eye contains 50 lenses, a paltry number compared with more typical insect eyes like the fruit fly's 700-faceted vision contraption. Yet each *X. peckii* lens is as big as about 15 fruit fly facets and lies over its own retina with more than 100 photoreceptors. A fruit fly facet feeds only eight photoreceptors.

Buschbeck, Birgit Ehmer/Cornell



The bulging eyes of the parasitic Xenos peckii *have fewer, but larger, lenses than a typical insect eye.*

Such optical equipment could allow each lens of the parasite's eye to see what the researchers call a chunk of an image instead of just the pinpoint processed by the facet of a typical compound eye. The only structure like it, they say, occurs on fossils of trilobites. —*S.M.*