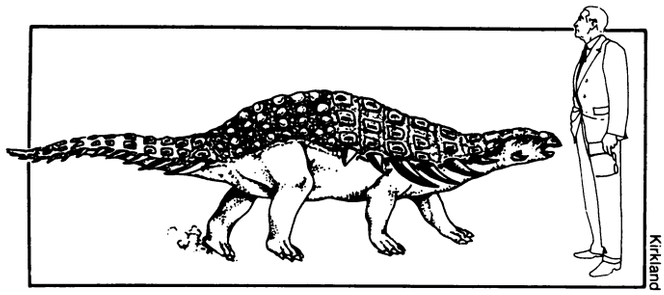
When armored tanks walked on four legs

The fossilized bones of an armor-plated dinosaur have surfaced in an unlikely spot – about 20 million years out of place.

Amateur and professional paleontologists on a dig in Colorado last summer found the specimen in 142-million-year-old rocks from the late Jurassic period, making it the oldest known ankylosaur in North America, says excavation leader James Kirkland, who announced the discovery this week. The next-oldest known ankylosaur from North America lived about 20 to 30 million years later.

The Colorado ankylosaur belongs to the family Nodosauridae – passive, plant-eating animals built like fortresses. Thick, bony armor covered their backs and heads, protecting them from the sharp teeth and claws of predators. Some nodosaurs also possessed the biological equivalent of barbed wire – horn-like spikes jutting out from their sides. The spikes may have helped when a large attacker attempted to flip the creature over to reach its unprotected belly, says Kirkland, a paleontologist with Dinamation International Co. in Fruita, Colo.


Kirkland

Artist's rendering of the Colorado nodosaur, based on fragmentary evidence discovered last summer. Human figure offers size comparison.

The new find fills a major gap in the nodosaur record. The earliest specimens date back over 175 million years to the early Jurassic. With the exception of a few nodosaur fragments found in Europe, the next-oldest specimens have come from the early Cretaceous period. Until now, scientists had virtually no information on nodosaurs from the intervening span of at least 40 million years.

"That's an enormous amount of time. And the problem has been: What was going on with these animals?" says Kenneth Carpenter of the Denver Museum of Natural History. The new specimen "falls between those two intervals, so it provides us with a missing link," he says. Carpenter is currently studying the relationships among the known ankylosaurs, a suborder that includes Nodosauridae and Ankylosauridae.

Kirkland and his co-workers recognized the animal as a nodosaur after finding distinct pieces of armor and large, protective side spines. Their discovery came on the last day of the excavating season, and they plan to search for more parts of the animal this year. Kirkland says the skull may still lie buried in the quarry. From the length of the side spines, he estimates that the animal stretched about 12 feet from head to tail.

Part of the excitement arises from the fossil's origin in a late-Jurassic rock layer known as the Morrison Formation. "The Morrison is what really put dinosaurs on the map," says Kirkland, noting that it has yielded some of the best-known American dinosaurs over the past century. Through all those years of digging, however, America's Jurassic nodosaurs went undiscovered. Kirkland says last summer's find demonstrates that even in the most intensively studied sites, important fossils remain hidden, waiting to shed new light on the reptiles that once ruled the Earth. *– R. Monastersky*

Gene defect tied to Alzheimer's cases

British researchers have identified a genetic defect associated with an inherited form of Alzheimer's disease, marking the first link between a gene and the degenerative syndrome. But the inborn error occurs in only a fraction of Alzheimer's cases, and its true role in the disease remains unproven.

A research team led by John Hardy of St. Mary's Hospital Medical School in London discovered the typographical error in the genetic code of a person who had died of early-onset Alzheimer's, an inherited form of the disease that usually strikes during the fourth or fifth decades of life and accounts for less than one-third of all Alzheimer's cases. The defect, located on chromosome 21, causes cells to insert a single incorrect amino acid while manufacturing a substance called amyloid precursor protein. Family members not affected by the disease, and 100 unrelated, normal individuals from the local population, lacked the genetic error.

DNA analysis of 18 individuals with early-onset Alzheimer's in 16 other families revealed two members of one family bearing the same mutation, the researchers report in the Feb. 21 NATURE.

Some researchers have suspected that Alzheimer's results from an inherited or acquired genetic garble that causes cells to produce defective amyloid precursor protein. Breakdown products of the precursor protein appear in large quantities in the brains of Alzheimer's patients, suggesting to these scientists that the disease results from production of an unusually fragile precursor protein.

But until now, all attempts to demonstrate a link between the precursor protein gene and Alzheimer's had proved inconclusive. That left other scientists arguing that amyloid breakdown and deposition represent red-herring side-effects of a more fundamental and still unidentified pathological process.

The current study does little to settle the argument, and may strengthen an increasingly popular hypothesis that Alzheimer's has many underlying causes. Moreover, while scientists may find the newly discovered amino acid substitution in some Alzheimer's patients, it remains unclear whether the defect plays a real pathological role or simply tags along with a more critical genetic error.

The researchers caution that some stretches of DNA taken from their Alzheimer's patients remain unexamined, leaving open the possibility that more important mutations lay elsewhere within the amyloid precursor protein gene or in entirely different chromosomal locations. Also unclear is the relevance of the work to the much more common form of Alzheimer's, which strikes individuals late in life. *– R. Weiss*

Nylon: Sheer havoc

Two scientists trying to decipher the chemistry of global warming point provocatively toward the mass production of stockings and other nylon products as a factor. Their calculations, detailed in the Feb. 22 SCIENCE, provide the firmest evidence yet that humans are responsible for a significant fraction of the nitrous oxide entering the atmosphere.

Nitrous oxide, released as a by-product of nylon manufacturing, contributes to the destruction of stratospheric ozone and is a powerful greenhouse gas. Chemists Mark H. Thiemens and William C. Trogler of the University of California, San Diego, calculate that nylon production worldwide accounts for about one-tenth of the annual 0.2 percent increase in atmospheric levels of the gas. That's a small contribution compared with the nitrous oxide made by bacteria, Trogler says. "But with nitrous oxide's atmospheric lifetime of 150 years, the accumulation is going to have some bad long-term consequences."

The researchers suggest that nylon makers use available technology to prevent nitrous oxide release. □