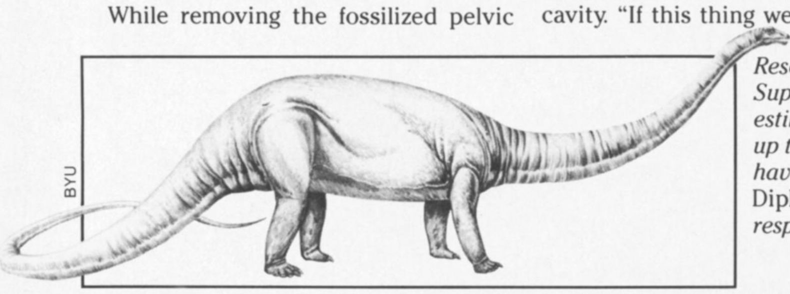
Huge dinosaur bones discovered hollow

Paleontologists studying the gigantic dinosaur "Supersaurus" report the animal had an inner cavity within portions of its pelvic bones—a finding that puzzles those trying to understand Supersaurus and other large dinosaurs.

When researchers from Brigham Young University in Provo, Utah, unearthed these pelvic bones in Colorado last summer, the sheer size of the pieces amazed scientists. Measuring more than 6 feet long, the fossilized bones include the ilium, or hip bone, and the sacrum — several vertebrae fused together and attached to the ilium for strength (SN: 9/24/88, p.203). The bones indicate the animal was up to 120 feet long and not fully grown, says Brigham Young paleontologist Wade E. Miller. These measurements make Supersaurus one of the longest dinosaurs known.

While removing the fossilized pelvic bones from their rocky bed of some 135 million years, the Utah researchers were able to examine portions of the fractured ilium in cross section. Instead of finding solid fossilized bone in the front section of the ilium, they discovered the cross section looked something like a sandwich, with walls of bone on either side of silt/clay rock, the scientists announced last week.



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Researchers think Supersaurus, with an estimated length of up to 120 feet, would have resembled this Diplodocus *in most respects except size.*

During the dinosaur's life, Miller explains, some soft material filled the ilium. But this inner matter would have decayed after death, leaving a void later filled by fine particles of silt and clay that entered the bone through fractures. Parts of the sacrum also show hollow features.

Scientists who study the largest dinosaurs—a group called sauropods, which includes Supersaurus and *Apatosaurus* (better known as *Brontosaurus*)—do not know what to make of the bones. While some small carnivorous dinosaurs had hollow bones, "it has never been mentioned in the literature [on sauropods]," says sauropod authority John S. McIntosh of Wesleyan University in Middletown, Conn.

Yet hollow ilia might not be *that* unusual among sauropods. McIntosh says researchers may not have recognized such features while examining fossils before. Moreover, paleontologists have not had the opportunity to check the insides of unbroken dinosaur bones. McIntosh says computerized axial tomography, also known as CAT scanning, or other nondestructive tests might reveal whether intact fossils are solid bone.

Aside from finding fine-grained rock inside the bone, Miller says, other signs indicate parts of the Supersaurus pelvic bones were hollow. Much of the recently excavated ilium is crushed, possibly from the weight of sediments accumulating on top of the bone as it fossilized. The Utah researchers have also found bony struts that span the inside of the ilium, probably strengthening the pelvis, which helped support an animal weighing as much as 30 tons.

Miller and others have speculated that hollow bone sections served to cut down on body weight and reduce the amount of bone the animal had to produce. "What I suspect, and this is speculation, is that there was probably something like marrow in there. It may have been a site for blood cell formation," Miller says.

McIntosh questions whether weight considerations could explain the hollow cavity. "If this thing were hollow, something had to be inside. And if liquid were inside, I'm not sure it would really cut down on weight that much."

Mark Philbrick/BYU

Scientists are trying to explain why Supersaurus had hollow cavities in sections of its pelvic bones. The cavity can be seen here between two sheets of fossilized bone that are the outer walls of the hip bone.

The perplexing pelvis is not the only topic of debate among scientists studying this creature. Supersaurus is an unofficial name given to a group of oversized bones from the Diplodocidae family found near each other. Some researchers believe all these bones belonged to one type of dinosaur, yet others say the bones may represent several types of large diplodocid dinosaurs. Scientists are also trying to decide whether Supersaurus belonged to the same genus as the similar, but smaller, *Diplodocus*.

—R. Monastersky

Scientists form-fit diamond-like cloak

In the material world, diamond gleams in its own celebrity. Its combination of optical transparency, superlative hardness, electrical insulating abilities and unmatched talent for conducting heat would make it ideal for, say, making a faster generation of electronic chips that withstand high temperatures or creating coatings that protect the sensitive and fragile infrared detectors common in today's military targeting systems.

Since naturally occurring diamond — an ultra-regular three-dimensional grid of carbon atoms — is ill-suited for such uses, scientists have tried for years to devise laboratory methods for building — carbon atom by carbon atom — diamond and diamond-like films.

At a Materials Research Society meeting in San Diego this week, electrical engineer John A. Woollam reported his group's success in devising a way to coat a variety of optical materials with a thin film of hard, semi-transparent diamond-like carbon that both blocks moisture and reduces reflection of light from the underlying material. The efficiency of solar cells and radiation detectors degrades when portions of incoming light reflect away.

Made from ionized and fragmented methane molecules (each composed of carbon and hydrogen atoms), the resulting hydrogen-containing films resemble diamond but do not form into the regular, crystalline lattice of genuine carbon-only diamond, says Woollam, of the University of Nebraska in Lincoln. He worked with colleagues at the university and at the NASA Lewis Research Center in Cleveland.

Since different materials bend and reflect light to differing degrees, no single anti-reflective diamond-like carbon coat can fit them all. But by controlling such factors as the film thickness and the temperature at which the diamond-like carbon deposits, the researchers can tailor the coat for most cases, Woollam says. The coatings eliminate reflection from semiconductor substrates such as silicon and greatly reduce reflection from other materials such as diamond and specialized glasses containing heavy metals. Diamond-like carbon does a poorer job of preventing reflection from common glasses, Woollam notes.

The researchers also found that diamond-like carbon can serve as a primer coat for the tougher feat of getting a film of genuine diamond to adhere to normally incompatible materials such as metals. The small grains of the resulting diamond films scatter light, so the films cannot serve in optical devices. But Woollam remains optimistic that further work will disarm such problems.

—I. Amato