

Lyndon B. Johnson Space Center

# roundup



NASA STS125-S-002

**Last dance with Hubble**

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# It came from inner space

*Team of renowned experts explore inside Leonardo—the world's best-preserved dinosaur*

By Laura Rochon



NASA/STAFFORD JSC2008E027183

*Group photo of key members of the Leonardo Project team. Representation included organizations such as Carestream Health/Eastman Kodak, NDT Group, ConAm, Houston Museum of Natural Science, Children of the Middle Waters Institute and Myth Merchant Productions.*

**His species** may not have been the fittest. But his remains survived millions of years undamaged.

Leonardo, a 77-million-year-old fossilized dinosaur mummy discovered in Montana, arrived in Houston where an all-star team of paleontology researchers, scientists and imaging experts took a peek inside him at Johnson Space Center.

The young *Brachylophosaurus*, buried alive at the age of four, is exceptional in that he was found with almost 90 percent of his body covered in fossilized skin, earning him an entry into the Guinness Book of World Records in 2004 as the Best-Preserved Dinosaur ever found. Because most of the skin is unbroken, it is necessary to study him using a variety of high-tech imaging instead of digging into and damaging the fossilized corpse.

NASA partnered with the Houston Museum of Natural Science and Montana's Great Plains Dinosaur Museum to provide just the unique facility at Ellington Field to haul the 23-foot-long, 2-ton duckbill dinosaur into—Hangar 150, which is insulated with lead walls to protect against radiation during diagnostic X-rays of aircraft. The team assembled

for over a week, occasionally in the middle of the night due to the use of intensive cobalt radiation required for powerful, nondestructive imaging onto digital X-ray plates.

Among the group of 40 experts involved in the “Leonardo Project” include iconic paleontologist Dr. Robert Bakker, who is credited with the “Dinosaur Renaissance” and was an advisor to the movie “Jurassic Park.” He said the greatest discovery so far about Leonardo is that, with this equipment and expertise, you can explore dinosaur “inner space—see the ribs, the shoulder and ghost of internal organs, and the 3-D internal map we have of Leonardo is remarkably precise. But he is still much of a mystery, and that’s why we’re exploring his inner space.”

The Houston Museum of Natural Science will showcase the famous fossil in the world premier of their exhibit, “Dinosaur Mummy CSI: Cretaceous Science Investigation.” The display is set to run Sept. 19, 2008, through Jan. 11, 2009.

Leonardo will get more exposure this month on the Discovery Channel when their special, “Secrets of the Dinosaur Mummy,” premieres Sept. 14 at 8 p.m. CDT. Michael Jorgensen, producer/director for Myth Merchant Films, has been traveling with the Leonardo Project team documenting their imaging and diagnostic process.

Jorgensen said he has an interest in “good, once-upon-a-time stories. When you tell people about a team that’s found, not just bones of a dinosaur, but the whole body with organs inside, that’s a pretty compelling once-upon-a-time story.”

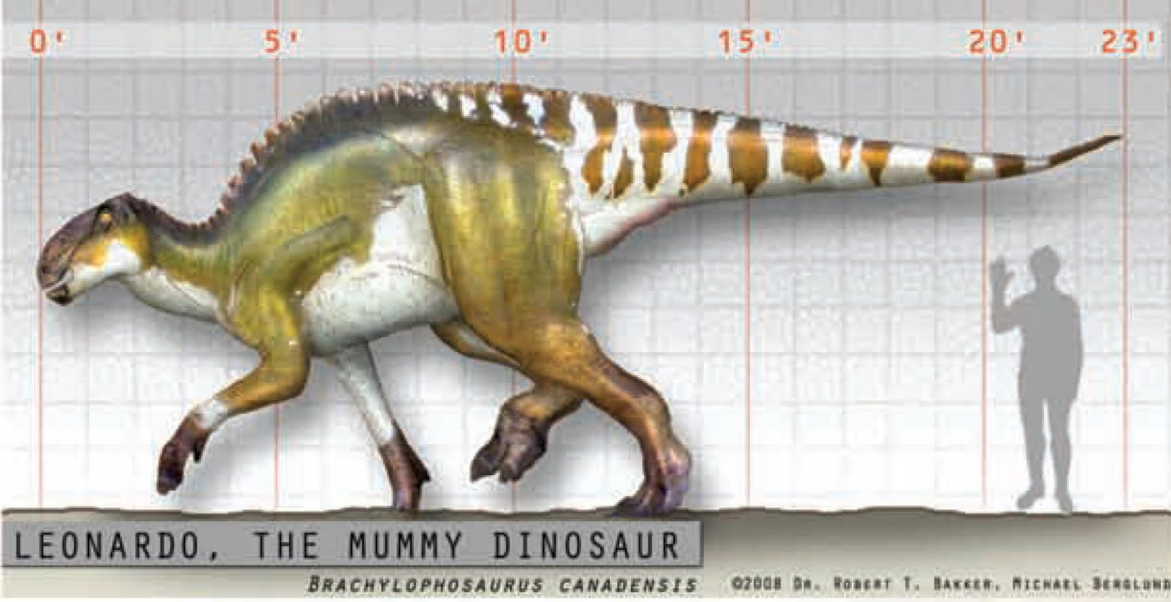
Just what is a fossilized mummy? When original soft tissue such as skin, nails, beak and organs does not decay but is somehow preserved in a unique environment, such as being quickly covered with sediment, the soft tissue is replaced with minerals before bacteria has a chance to destroy it. Over time, it then becomes fossilized—in other words, turns to stone.

*Inside Hangar 150 at Ellington Field, Dr. Bob Bakker (pointing) and the team examine digital X-rays of Leonardo looking for proof of internal organs.*



NASA/STAFFORD JSC2008E027172

ILLUSTRATION BY MICHAEL BERGLUND



*A full-body view of Leonardo, a Brachylophosaurus canadensis, shown with an average-sized human, for scale.*

Joe Iacuzzo, former editor of the Jurassic Park Institute for Universal Pictures, now coordinates the Leonardo Project science team, exhibition and education program. He says the mission is two-fold: to document the physical attributes of Leonardo—viewing the arrangement of internal organs; and to understand the chemical makeup of the fossil and the processes that preserved Leonardo—analyses which could revolutionize what we know about dinosaurs.

Recently, some of the 3-D images captured at JSC were converted into a composite mosaic, applying contrast and different filters, to get actual models of the internal soft tissue structures.

“We’ve found internal soft tissue structure and something in the chest cavity, which is where the heart should be...that’s what ties in so great with NASA—we’ve applied science and technology to Leonardo that has never been used in paleontology before. But the quality of images we took won’t allow us today to say we’ve definitely found organs,” Iacuzzo said.

A determination was made in the last year to not finish preparing the other side of the fossil, specifically because the team does not know what new techniques may be available in five to 10 years.

“We are looking at future generations—the research on this fossil is far from finished. There are undoubtedly things that are inconclusive now, but hopefully in 10 years we can say ‘this is his heart, these are his lungs,’” Iacuzzo said.

Iacuzzo added that the time spent at JSC was extremely productive. “People at NASA have been nothing but wonderful and supportive...it’s nice to be around people that appreciate science. But we also are doing science for the children, whose interest in the scientific method might be sparked by looking at the dinosaur. Then they may be inspired to be doctors, astronauts or researchers. They are the ones that hopefully are going to make our world a better place.”



PHOTO BY GRANT DELIN

*The fossil block, weighing 6.5 tons, reveals secrets that would not be evident from bones alone. For example, note the pouch under the throat—it may be a crop, to store food—a feature that also exists in modern birds.*

Bakker also made the connection about paleontology to space exploration, in that they similarly inspire children to discover and possibly lead them into the sciences.

“A kid’s mind naturally explores—they want to probe the unknown. It’s an adventure and they want to go off on an expedition into the unknown...a surprising, scary mystery to solve and with no limit to space,” he said. “Leonardo is such a special find, because it’s worthwhile getting inside. All science, whether you’re talking about rocket science or dinosaur science, builds on everything that’s been found before you.”