

In their Mon Valley workshop, the artisans of Phil Fraley Productions (far right) revitalize artifacts from before the dawn of mankind. The underside of the mastodon's right front foot (near right) shows both the one-of-a-kind intricacy of the steel armature as well as its functionality. By loosening just a few screws, scientists may remove any bone from the mounted skeleton for individual study.



Mastodon makeover

Artisans breathe new life into a
prehistoric treasure at the State Museum

by Mark Kenny



MARK KENNY (2)

In the sprawling Turtle Creek workshops of Phil Fraley Productions near Pittsburgh, **THE AIR FAIRLY SCREAMS WITH THE SOUNDS OF PNEUMATIC GRINDERS AND TUNGSTEN ARC WELDERS.** Reggae music, cranked loudly, mingles with the steady-handed hammering of metalsmiths **WHO ARE POUNDING AWAY AT INTRICATE STEEL CRADLES** designed to uphold the skeletal remains of **A 12,000-YEAR-OLD MASTODON.**

FRESH FROM A THREE-YEAR, \$36-million revitalization of the prized dinosaur collection at Pittsburgh's Carnegie Museum of Natural History, the Fraley artisans, along with their peers at the company's headquarters in Paterson, N.J., recently wrapped up their latest project—the Marshalls Creek Mastodon.

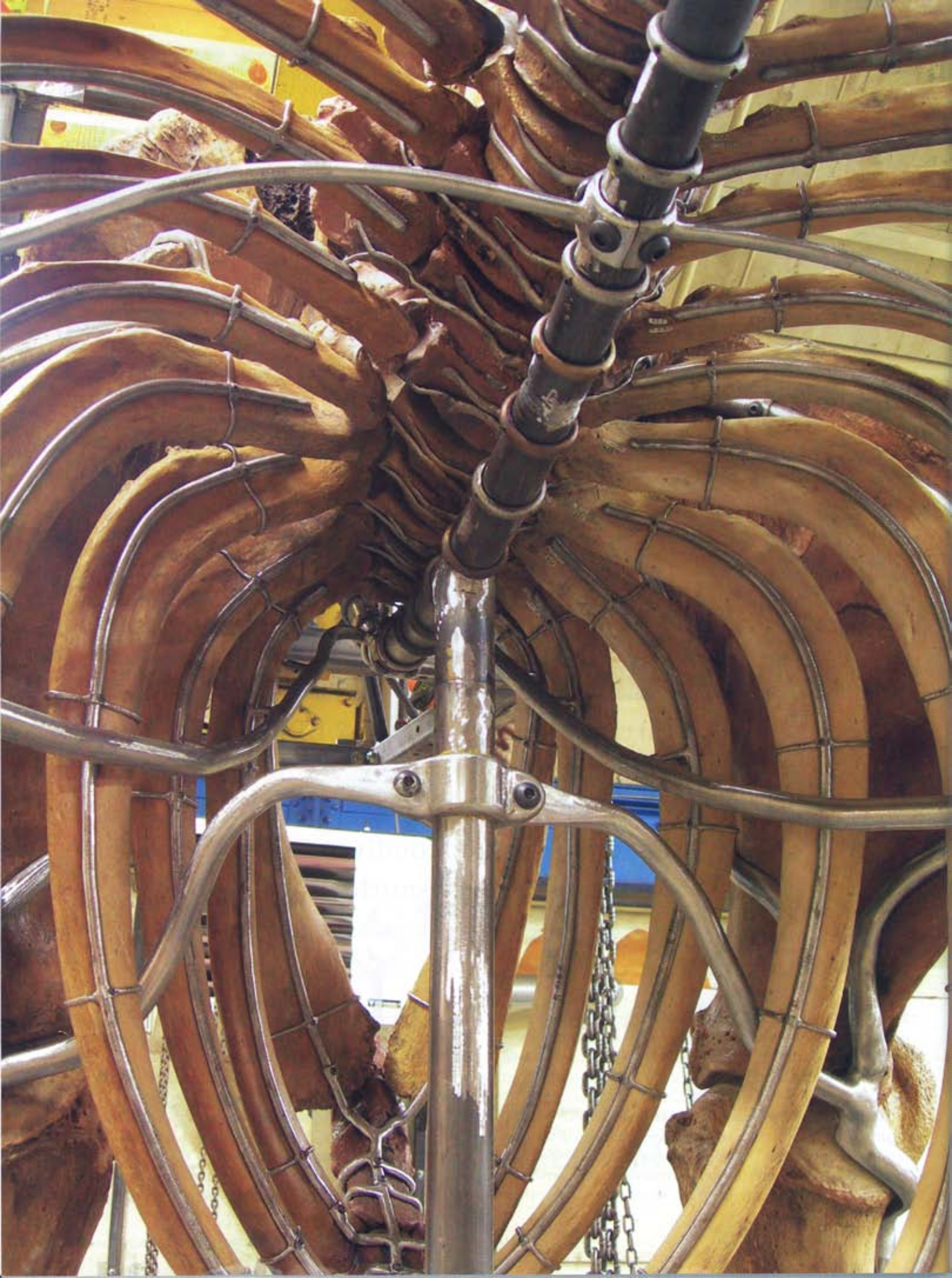
Recovered from a peat bog in Marshalls Creek, Monroe County, in 1968, the nearly complete skeletal remains of this prehistoric pachyderm (*Mammot americanum*) had been on display for decades at the State Museum of Pennsylvania in Harrisburg.

More precisely, the *left side* of the skeleton had been exhib-

ited—in full profile—in a faux-earthen fiberglass panel display designed to show how prehistoric remains look in mid-excavation when still encrusted in soil and stone.

The bones of the animal's right side had been safely shelved for years, out of public view. But two years ago, under the direction of the museum's senior curator of paleontology and geology, Dr. Robert M. Sullivan, the Fraley team began to refurbish and restore the entire skeleton.

Their challenge: Extract one-half of the specimen from its fiberglass cocoon and then hand-form a steel support structure



to reunite both halves of the mastodon skeleton so that it can be displayed at full size. The end result is an elegant, yet functional, interlocking steel armature that realistically presents the imposing beast that once roamed the post-Ice-Age environs of what is now Pennsylvania.

PUTTING THE MASS BACK IN MASTODON

Part of a broader project to refurbish exhibits and galleries at the State Museum, the restored mastodon made its return debut there in January where it serves as the centerpiece for a traveling exhibition on Ice Age mammoths and mastodons, called *Tusks!*

When that exhibit moves on in the spring, the Marshalls Creek Mastodon will stay behind and be transferred to a new permanent display on the third floor of the museum.

“Instead of resembling a stiff, rigid quadruped, the restored mastodon actually looks like a living proboscidean,” says Sullivan, referring to the scientific order that includes the elephant and the extinct mammoth and mastodon.

The specimen received untold hours of skilled attention in the exacting hands of Fraley team sculptors, painters and metal-smiths, all working under the guidance of Dr. Daniel Fisher, a renowned expert invited to collaborate on the project. The result? The Marshalls Creek Mastodon figure shatters the mold of older mounts that depicted mastodons as stoic behemoths with all four feet planted solid on the ground like the columns of a Greek temple.

“Many mastodons that I’ve seen mounted have a sort of Eeyore look to them,” says Fisher, a professor of geological sciences at the University of Michigan and curator of paleontology at the university’s Museum of Paleontology. “They look sad-sack, down in the dumps, sort of too tired for the next bite. This mastodon is anything but.”

CRAFTING THE SKELETON’S SKELETON

With nearly 30 years of experience in his field, Fisher is a member of the International Mammoth Committee. His work as a lead researcher on a multinational team studying the frozen remains of a one-month-old woolly mammoth was featured by National Geographic in both a 2009 television special and a magazine article.

For the Marshalls Creek project, he used e-mail and faxes to collaborate with Sullivan and to guide the Fraley team in reconstructing the skeleton to embody the true characteristics— and character—of mastodons, from the curve of the animal’s spine to the tilt of its foot in mid-stride.

Although similar to elephants, mastodons were much sturdier and their bones larger in diameter and circumference. And while

This view from inside the beast’s belly gives a unique perspective of the interconnectedness of the steel armature supporting the newly mounted mastodon.



While building the armature, metalworkers referenced classic stop-motion photos of elephants walking to gain a better sense of a mastodon’s stride. Reassembling the skeleton of a mastodon requires equal parts brawn and ingenuity to get the posture just right.

they were plant eaters, Fisher notes, brute size was a factor in their everyday lives.

“Part of the research that I’ve done in the last decade or so has highlighted just how aggressive these creatures were against each other, particularly the males of the species,” he says.

Unlike carnivores attacking their prey, mastodons engaged in battles that tended to be seasonal and tied to breeding activity, when males were in a state of heightened aggression called musth.

“We’ve observed some of this sort of behavior in elephants,” Fisher says, “but we’ve not known until the last few years that mastodons had exhibited this. They fought terrible battles with one another, and many died as a result. These guys were alert, and they were on the lookout for competitors and potential challengers,” he says.

THE DELICATE NATURE OF STEEL

To convey this beastly majesty, yet maintain the piece’s scientific integrity, required equal parts brain, brawn and ingenuity on the part of Phil Fraley Productions staffers.

Keny Marshall, Fraley’s onsite coordinator of special projects, explains that to move the 400-pound skull and jaw alone, the company used an adapted custom-welded iron cage and plenty of strategically placed foam padding.

During the restoration phase, Fraley employees spent much of their time cleansing the bones of materials commonly used by well-meaning conservators of an earlier generation.

“They stuffed cheesecloth into holes and poured in molten wax, which goes into the fossil and is almost impossible to remove,” Marshall explains. “All of that had to be removed and then

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—DANIEL FISHER

DAVID FRY, ANN ARBOR, MICHIGAN



MARK KENNY



The Marshalls Creek Mastodon is shown in final stages of restoration (right) and on display at the State Museum (left) in Harrisburg.

resculpted out of an epoxy. We used an inert material that doesn't affect the fossil in any way and is reversible. That's the key with all of the restoration that we do—it has to be completely reversible.”

A philosophy of minimal invasion is also what guided the team's metalworkers when crafting each piece of the interlocking steel armature used to support the skeleton. Instead of drilling holes into fossils for inserting and bolting together supporting rods, which was a common technique used in the past with museum specimens, metalsmiths meticulously handcrafted each piece of steel for the mount.

“We built individual mounts for separate bones that are all tied together and welded or joined mechanically to create and build the puzzle,” says Joe Johnson, one of the metal craftsmen who worked on the project. “Each part is unique to a particular pathway that follows across the surface of the bone.”

To form and shape the contours of each metallic cradle, the workers cut, fit and welded the steel, refined it using anvils and torches, and then readjusted until the union of metal and bone was as snug as a handshake.

Facing the interior of the mastodon's cavernous chest cavity, Johnson points out a long, thin ribbon of polished steel arcing along the inside length of a rib bone. “I had to go to the anvil

about 20 different times and hammer slight little bends to make it fit flush like this,” he says.

The final result of this delicate project is an artistic work in its own right—an armature that shields the individual bones, while providing the structural support necessary to display the massive mastodon.

In terms of both form and function, the mount and its armature are a work of beauty. ♦

—Mark Kenny writes from Pittsburgh. He contributed the item on the Voices exhibit at the State Museum in the January/February 2010 issue.

WHEN YOU GO

The State Museum of Pennsylvania is located at 300 North St. in Harrisburg. The restored Marshalls Creek Mastodon made its debut as part of the traveling exhibition, **Tusks! Ice Age Mammoths and Mastodons**, on display through May 2. The exhibit, created by the Florida Museum of Natural History, tells the story of mammoths and mastodons, extinct relatives of modern elephants, that roamed much of North America until the end of the last Ice Age about 10,000 years ago.

After the Tusks! exhibition closes, the mastodon will move to a new permanent home in the State Museum's third-floor Hall of Geology, which is currently under renovation and is expected to officially reopen in the fall of 2010.

The State Museum is open 9 a.m. to 5 p.m., Wednesday through Saturday, and noon to 5 p.m., Sunday. Admission is adults, \$3, and children and seniors, \$2. For more information, contact the museum at 717-787-6778 or www.statemuseumpa.org. 📱