

# New Plesiosaur Exhibit at Heritage Center State Museum

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The paleontology program recently opened a new addition to the Underwater World portion of the Adaptation Gallery: Geologic Time exhibits at the North Dakota Heritage Center & State Museum in Bismarck. This portion of the exhibit is especially unique in that it seamlessly combines the artwork of a mural with the skeletal cast of the specimen on exhibit. It is something rarely seen in museums anywhere in the world and we are very excited to incorporate this technique into our already immersive gallery.

In almost any museum when the initial discussions begin about new exhibits the first subject to talk about is the amount of space available. Obviously, space can have a very large impact on what is possible with the exhibit. There are generally two solutions to a lack of space for an exhibit. The first solution is to mount the specimen in a scientifically “gray area” of what the creature was

likely able to do with its body. This might mean curving the neck or tail in a manner that may (or may not) have broken bones if the living creature would have attempted to attain such a position, or it could mean putting the skeleton in a dynamic posture that the animal was, or was not capable of (fig. 1). The second solution to limited space is to mount only part of the animal. This is sometimes done in creative ways but incorporates a scientific consensus on what the animal was capable of. In the case of this exhibit we chose to use the interaction between a mural and the mounted cast as an optical illusion, leading the viewer to believe more of the animal is on exhibit than is really there.

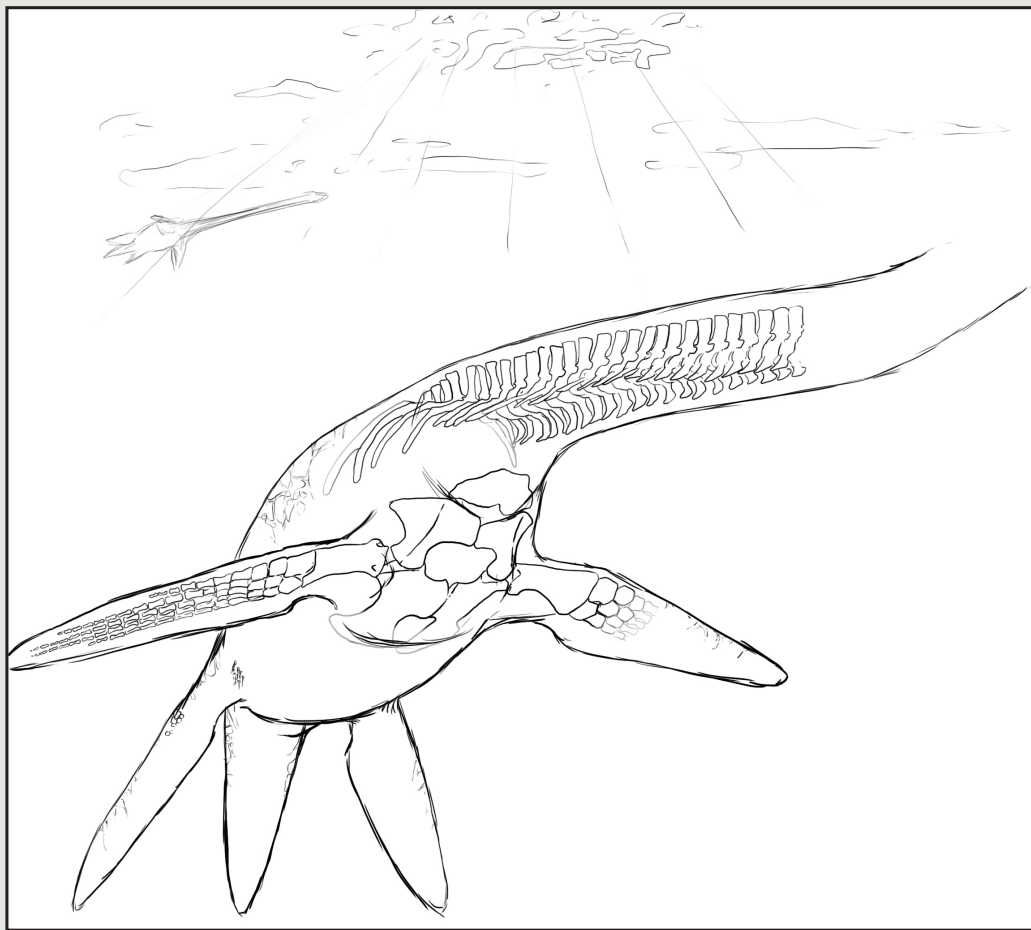
We try to exhibit as much real fossil material as possible. Although it is not always possible to display everything we have from a particular animal, a representative sample or particularly interesting piece is usually our priority for exhibit. In this exhibit we included 15 vertebrae from the neck, a small portion of the 70 vertebrae that made up the neck in the living animal. The second part of the exhibit consists of 38 cast neck vertebrae and a skull of a plesiosaur, mounted in such a way as to depict a seamless transition between the fleshed out mural and the skeleton mount. However, in this particular display, the most interesting piece could arguably be the mural.

Painting the mural took a little planning and mathematics. Since the mural was being painted internally by one of the authors (Becky Barnes), it was decided it would be most beneficial to paint the mural on canvas then increase the size of the mural digitally rather than painting directly onto the wall. We measured the exhibit wall at 106 inches wide, and then purchased a 40-inch-wide canvas. We calculated how much the original painting would need to be enlarged to fit the exhibit space (265%). Then we checked the size of the cast vertebra that would be mounted directly on the mural (9.5 inches tall). The transition between the cast vertebra and the painted vertebra needs to be seamless, so at 265%, the last painted vertebra needs to be 3.6 inches tall in order to seamlessly transition between painting and cast once it is enlarged.

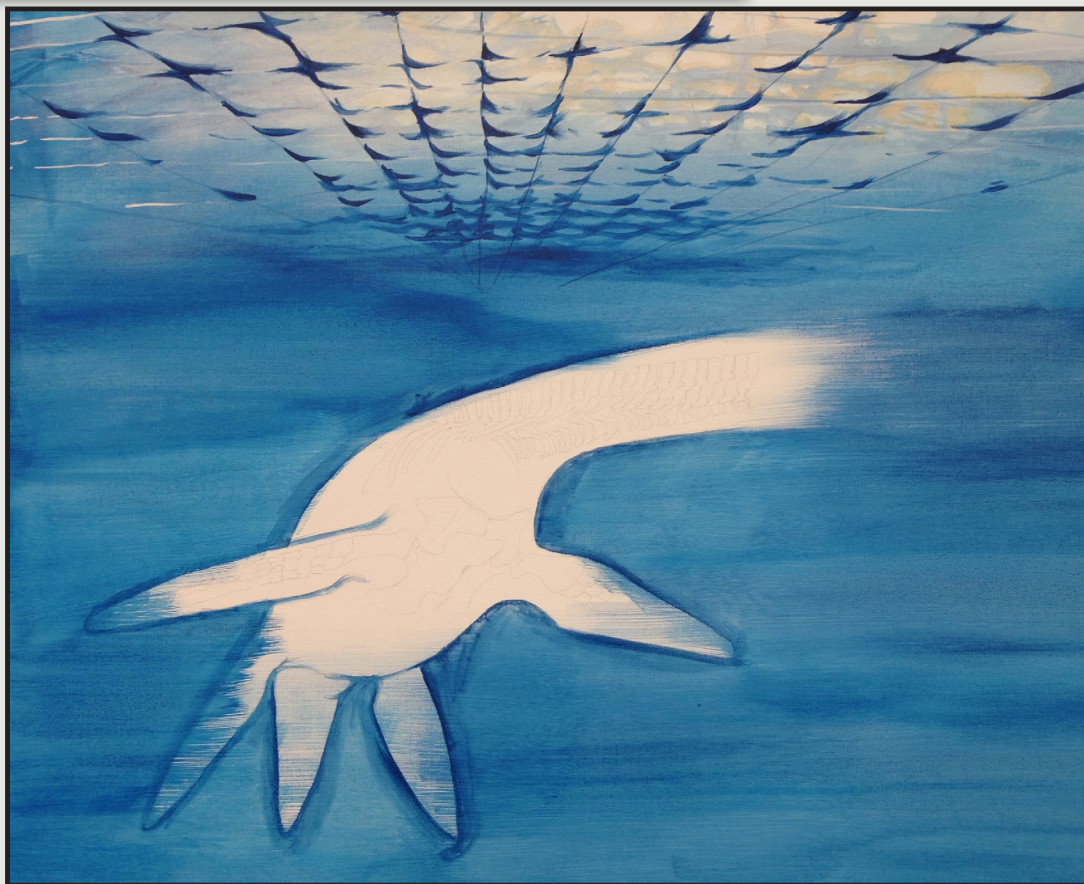
**Figure 1.** Cast skeleton of *Barosaurus* at the American Museum of Natural History. The likelihood of these animals being able to stand up on their hind legs is still debated among paleontologists. Photo by Matt Wedel (Taylor and Wedel, 2016).







**Figure 2.** Initial sketch of the plesiosaur to determine scale, orientation, and percentage of visible skeleton.



**Figure 3.** Painted canvas after initial coat of blue acrylic paint used as undercoat.

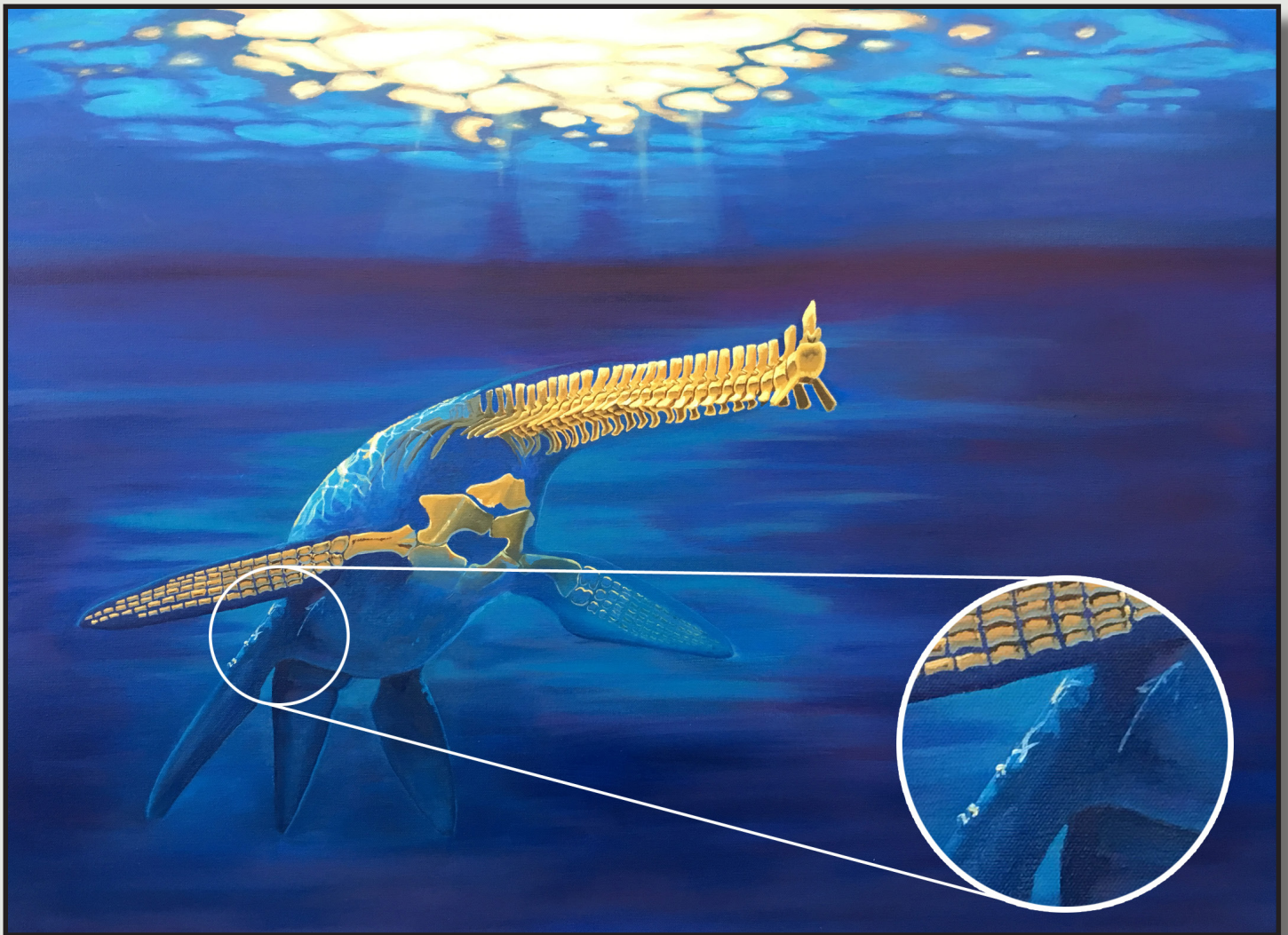
Then it was time to start the painting process. The plesiosaur was drafted in a few different poses, until we found one that fit what we wanted. We needed an underbelly view, since the animal would be above the viewer (fig. 2) and we needed to take into account light sources, so there are not strange shadows. First the plesiosaur was redrawn on the canvas and the lighting and shadows were roughed out. An underpainting of blue and tan acrylic paint was applied to get rid of the blank white of the canvas (fig. 3). Acrylic paint was used because it dries fast, allowing lots of paint to be applied quickly, however this comes at the cost of having to work quickly when blending colors.

Once the underpainting was finished, it was time to start with oil paints. The oils can be blended on palette, as well as on canvas, which gives a bit of flexibility. The process of painting took many hours, but was still arguably faster than painting directly on the wall since there were fewer interruptions in the relative privacy of the paleontology labs. After the painting was finished (fig. 4), the mural was photographed, digitally enlarged, and printed on a giant wall sticker.

The gallery was temporarily shut down for the exhibit installation. This was in part to keep up suspense for the new display, as well as to keep the public safe around heavy equipment and potential falling objects during installation. The mural sticker was applied to the wall, and the cast neck and skull were strung onto a metal rod and suspended from above. A gentle curve was added to the neck to imply movement of the animal as it swam underwater and to fit the pose shown in the mural (fig. 5).

The exhibit opened to the public in grand fashion on a Friday in late April. More than 1,200 people attended the museum on the day we opened the exhibit, nearly doubling attendance for a normal Friday in April (approximately 700). Another 1,300 visitors came in during the opening weekend, many of them asking specifically about the new exhibit.

There are a few sweet-spots a visitor can stand in, depending on what they want to see. If you choose to stand close to the exhibit case and study the mural, you might spot some small details not easily discernable from far away. There are parasites painted on



**Figure 4.** Final painted 40-inch canvas. The image contains both skeletal and flesh elements of the animal. It even includes barnacles and a lamprey visible to those who look carefully (zoomed inset). It took Becky 67 hours to paint the mural.





**Figure 5.** View of final exhibit. Note how the gentle curve of the painted vertebrae is matched with the mounted cast vertebrae adding to the seamless illusion between painting and cast. The actual fossil vertebrae can be seen in the case at the bottom of the image.

the fleshy areas of the animal, helping to place the specimen into its environment (fig. 4 inset). If you stand near our giant fish, *Xiphactinus*, the skull and neck blend beautifully into the painted scene. If you stand between the faux rock wall and the new exhibit fossil case, you look up to see the plesiosaur and mosasaur narrowly missing each other – perhaps chasing after some fish? Come in to see it yourself, maybe you will discover a sweet-spot we missed.

#### References:

Taylor, M.P., and M.J. Wedel, 2016, The neck of *Barosaurus*: longer, wider and weirder than those of *Diplodocus* and other diplodocines. *PeerJ Preprints* 4:e67v2 <https://doi.org/10.7287/peerj.preprints.67v2>