

Photogrammetry. Using Very New Technology to Work with a Very Old Product.

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Introduction

- Photogrammetry is a method used to make a 3-dimensional digital image of an object, no matter what its size, by taking many photos of a specimen and assembling them using Agisoft® Photoscan.
- Albertosaurus* is a relative of *Tyrannosaurus rex*, but was much smaller. It was first discovered in Alberta.
- Our goal was to test how to use the programs (Agisoft® and Maya®) in order to create 3-dimensional full images of complete specimens. From the models, various other research can be done.

Methods

- We used the camera on a cellphone to take many pictures at all angles around the specimen



Figure 1: This photo shows the many photographs that were taken in order to make the 3-dimensional digital image. This is just one side. The entire specimen consisted of 202 images in total.

- Once the image was generated, all of the background had to be removed from around the specimen.

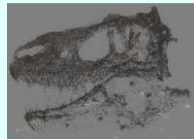


Figure 2: Aligned points stage, the first step in the process.

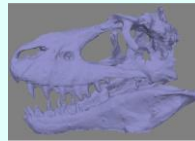


Figure 3: Second step, the mesh. This is the step that would be sent to a 3D printer to be printed.

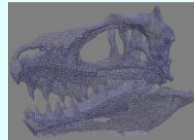


Figure 4: The Wire Frame. Shows the basis of what the specimen will look like when fully rendered



Figure 5: The final product, which looks like the original specimen that was photographed.

- After scanning all of the pieces of the specimen (including the skull, spine, pelvis, tail, arms, feet and all 24 ribs) we put them all into a program called Maya® in order to assemble the entire dinosaur.

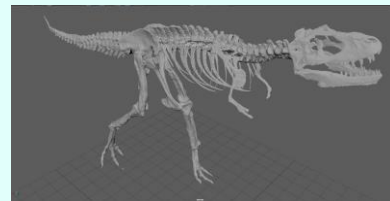


Figure 6a: Diagonal view of the full *Albertosaurus* skeleton.

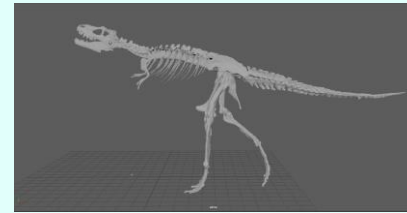


Figure 6b: Left side view of completed skeleton.

Results

- The end result is a complete 3-dimensional model of *Albertosaurus*.

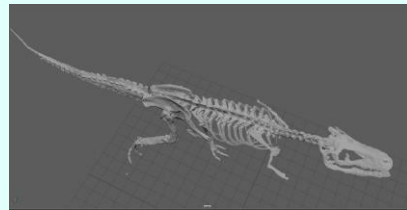


Figure 6c: Top view of full skeleton.

Conclusions

- We found that it was easier to assemble the photographs if the background was as simple as possible. However, enough background helped for orientation.
- The results can be used to create archives or databases of specimens for further analysis. It can help a person to visualize a certain specimen or protect a fragile specimen from breaking due to handling.

- These results can be used to scan parts of a larger specimen that needs to be pieced together. Using Maya®, we were able to assemble the specimen digitally.
- Others can use this method to help to assemble a specimen that was found in pieces instead of trying to assemble the pieces in real life, which can be difficult, especially when the pieces are very large and heavy.
- This model can also be used as a reference for assembling future specimens like it.
- The model can be used to animate the digital specimen in order to study its movements and to show others how it moves. Another example of this is the use of Finite Element Analysis (FEA) which is used to test the stress made on an object.
- The digital files can also be sent abroad for others to study, which can be more cost effective than sending the real specimen.
- A specimen that is scanned can also be 3D printed and made printed at another scale (smaller or larger) to enable a person to easily study these specimens.

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