TRIDIMENSIONAL ACQUISITION METHOD OF SMALL FOSSIL ORGANISMS

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Young specimens of Discinida (BRACHIOPODA) have been recovered from an outcrop that records the Ordovician-Silurian gap from Paraná Basin (Ordovician-Cretaceous) in Mato Grosso, Brazil. These organisms are found preserved over mold form and replaced by iron oxide. They present an average size of 20 mm in diameter to the dorsal valves (n=62) and 22 mm to the ventral (n=13). Aiming to help on the identification of these fossils a 3D imaging has been performed. However, the biggest difficult found related to the tridimensional image acquisition was the choice of the technique that presents the best results, in other words, the most reliable technique to reproduce the fossil ornaments in 3D, which can help in their correct taxonomic identification. According to previous works, the scanning techniques (probe and laser) and computed tomography (used pixel size of 0.125 millimeters) did not show enough resolution to reproduce a reliable image of this fossil. Notwithstanding, the most effective technique was the conventional X-ray microtomography, using the conic beam configuration as radiation source. This non-destructive technique is based on the emission of X-ray particles through a sample on a rotation stage. These particles suffer attenuation and reach a scintillator, converting the X-ray into visible light that is captured by a photodetector, generating a series of bidimensional images of the sample. The used resolution (images pixel size) in this analysis was 2.79 micrometers, that to be achieved it was necessary to cut the sample, using laser ablation, removing only the fossil from it through a laser beam irradiation, resulting in a sample with 0.2 millimeters in height and 0.1 millimeters in diameter. To make the fossil tridimensional reconstruction, the 992 2D sections previously obtained were submitted to a rendering process, converting the slices into an orderly stacking, which reproduced with a reliable grade the fossil structures and ornaments. This reconstruction was made using Blob3D, a powerful quantitative tool that can discern different sample features based on various attenuations suffered by X-rays. Nevertheless, to materialize the reconstructed solid (3D printing), the number of transversal sections must be considerably raised in order to raise the resolution and hence make a trustworthy reproduction of the original fossil, then interpolation software should be used to generate a large number of new slices among those previously generated by microtomography. By our currently results, it is possible to infer that conventional X-ray microtomography is the most accurate technique to reconstruct a small invertebrate fossil. New samples will be analyzed to compare the results.

Key-words: Discinida; X-ray microtomography; 3D