

# The Distribution of Dermal Ossification in Giant Ground Sloths

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Among extinct giant ground sloths a select few species exhibit integumentary armor. These sloths had small bones called dermal ossicles distributed within their skin, providing defense. The bones vary in shape, size, and distribution. Dermal ossicles are rarely found directly associated with other skeletal elements, making the study of their distribution relative to the body difficult. Many ossicles are found with fossil ground sloths, but they are often scattered and isolated due to early degradation of soft tissue. They are held in place by skin alone, which is generally lost before the process of fossilization.

Studies to date hypothesize that dermal ossicles demonstrate patterns such as rows around elongate skeletal elements like the ribs and spine, and mosaics (stars and rosettes) around rounded ones like the pelvis. Definitive evidence of this correlation requires a specimen with ossicles in their original orientation and a clear link to a portion of the ground sloth's skeleton. A fossil satisfying these conditions is currently housed in the collection at Anza-Borrego Desert State Park® (ABDSP).

In November of 1960 paleontologists from Los Angeles County Museum collected a fossil specimen of *Paramylodon harlani* from ABDSP. The fossil was stabilized and stored until 1997, after which it was returned to ABDSP. Consisting of a partial innominate resting on a mat of fossilized dermal ossicles, this find is noteworthy due to its preservation of the ossicles in their original orientation (without the skin) and the innominate in life position relative to them.

Utilizing 3D photogrammetry, the fossil was photographed and rotated incrementally to capture its shape from a variety of angles. The photos were uploaded into the 3D modeling software Agisoft Metashape, which uses overlapping images to create a realistic digital copy of the fossil. This copy was overlain onto a digital model of a complete *Paramylodon* skeleton using the innominate as a reference. Combining the two models places the ossicle mat approximately where it would have been on a living giant ground sloth. After examining the distribution of dermal ossicles relative to skeletal regions, patterned areas of the ossicle mat appear loosely correlated with structures such as the spinal column and pelvis.