



A51 Time to Skeletonization (TTS): *Dermestes maculatus* De Geer Skin/Hide Beetles and Skeletonization on *Python Bivittatus* Kuhl Burmese Python Remains

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Learning Overview: After attending this presentation, attendees will understand the effect of using a *D. maculatus* (skin/hide beetles) to create a TTS baseline for flesh removal in a controlled laboratory setting.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by addressing the process of rendering forensic cases for subsequent forensic anthropological analysis and to set a baseline for *D. maculatus* TTS in a controlled environment.

Cleaning techniques of skeletal remains conducted through maceration were passed down from Dr. William Maples at the C.A. Pound Human Identification Laboratory to a student of his at the Human Identification and Trauma Analysis Laboratory at Florida Gulf Coast University. The maceration process requires that the laboratory consider space, plumbing, exhaust control, and/or incubator costs, as well expenses related to the physical labor and time spent rendering the remains. Conversely, laboratory colonies have minimal physical plant requirements (i.e., reptile tanks and heating pads, substrate, and black-out materials that can range \$150–\$200 in initial supply costs) and low labor and time requirements for upkeep. Recent use of dermestids for cleaning skeletal remains have become more favorable, especially in museums and medical supply companies.¹

D. maculatus are forensically significant and can assist forensic anthropologists in case analysis by cleaning delicate remains (e.g., neck organ blocks, subaqueous, or osteoporotic) with minimal to no damage and in a timely manner. In addition, beetles can reach into small, delicate, and easily fractured areas (ethmoid, lacrimals, infranasal conchae) to ensure thorough cleaning.² As their name implies, this species prefers dried—but not mummified—skin, muscles, ligaments, cartilage, and tendons. Although the beetles work “fast,” little research has been conducted to quantify their activities.

This study evaluated the optimum environment for the *D. maculatus* to render remains to bone. Past research has investigated the relationship between temperature and insect activity on the skeletonization process as part of estimations of Accumulated Degree Days (ADD), Postmortem Interval (PMI), or Time Since Death (TSD). This study builds upon the previous work by including the following variables: biomass (skeletal muscle and bone), insect abundance, and moisture content. Using three tanks, this study controlled for ambient temperature, light density, amount of biomass (g), and moisture (ppm). The samples drawn from Burmese pythons collected by the Conservancy of Southwest Florida (COSWFL) that were part of a larger study on these invasive species. The COSWFL personnel skinned, eviscerated, and disarticulated the pythons into 30cm–50cm sections. Wet (35%–40%) and dry (7%–14%) samples were placed into the colonies (3,000–15,000 beetles) with data being collected in two-hour intervals for the first six hours, then observed in six-hour intervals until all soft tissue was removed. With each observation, the weight (g), moisture, temperature, and pictures were taken for each of the samples using Vernier probes when applicable.

This study concludes that *D. maculatus* preferred the dry samples. The comparison of 400g–1,200g of python segments found that dry remains skeletonized significantly faster. The sample cleaned the fastest was two days (dry) and the slowest was nine days (wet). In no instance did the beetles observed eating the skeletal material. Consequently, this research highlights that *D. maculatus* colonies can be an important addition to forensic anthropology laboratories run by dedicated professionals.

Reference(s):

1. Sommer, Helmut G., and Sydney Anderson. Cleaning Skeletons With Dermestid Beetles—Two Refinements in the Method. *Curator: The Museum Journal*. 17, no. 4 (1974): 290-298
2. Hooper, Emmet T. Use Dermestid Beetles Instead of Cooking Pots. *Journal of Mammalogy*. 31, no. 1 (1950): 100-102.

Skeletonization, Burmese Python, *Dermestes Maculatus*