

TEXAS STATE UNIVERSITY MULTI-DISCIPLINARY INTERNAL RESEARCH GRANT

END-OF-PROJECT REPORT

Examination of Upper Threshold Events on the Necrobiome Associated with Human Decomposition in a Subtropic Ecosystem

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PROJECT ABSTRACT

Texas State University is ideally situated to be at the forefront of research into the necrobiome and terrestrial carrion recycling. The decomposition or recycling of dead animals (carrion) has important implications in a variety of fields investigating the biodiversity and ecology of terrestrial ecosystems. The understanding of human decomposition is also critical to forensic scientists charged with estimating time-since-death, cause and manner of death, and postmortem treatment of bodies. The purpose of this study is to examine the effect of maximum or upper threshold events on the structure and activity of bacterial and arthropod species associated with human decomposition and how it effects nutrient release into the ecosystem. Five bodies were placed at the decomposition facility on Freeman Ranch. Microbial data were collected by swabbing the oral cavity and anus at time of placement and at specific accumulated degree day intervals. In addition, insect traps were placed and sampled at ADD intervals. DNA extractions were conducted and microarray data were obtained from Glomics to measure species diversity and the functional genes present on the human remains as well as how they changed through the decomposition process to detect threshold events. Over 98,000 functional genes were identified, most associated with carbon and nitrogen cycling, metal homeostasis, and colonization. Considerable variation was found between each of the donated remains. Biodiversity appears to

be affected by upper threshold events but the abiotic factor is unclear at this time. The effect of upper threshold events were inconclusive for insect activity.

GRANTS SUBMITTED

Development of an Accurate Method for Estimating the Postmortem Interval for Human Remains in a Subtropical Terrestrial Ecosystem: Examination of Upper Threshold Events and Season of Death on Human Decomposition, National Institute of Justice, Research and Development Grant for Criminal Justice Purposes, \$499,842 requested, April 15, 2016. *The grant was not awarded but overall the reviewer comments were positive. Once we resolve the Geo-Chip problems we anticipate being successful in the 2018 cycle.*

Effect of Decomposition on Biometric Identification. Combating Terrorism Technical Support Office, \$100,000 per year for 4 years, June 14, 2015. *This grant was partially related to the current project.*

Center for Necrobiome Research and its Application in Decomposition Ecology and Forensics. NSF-NIJ University/Industry Collaborative Research Center –*Texas A&M received funding for center planning meeting to propose ideas to industry leaders. We met with industry leaders on June 6, 2016 and are still in the process of securing commitments from industry.*

GRANTS AWARDED

At this time no external grants have been awarded directly related to this project.

PLANNED GRANT SUBMISSIONS

Development of an Accurate Method for Estimating the Postmortem Interval for Human Remains in a Subtropical Terrestrial Ecosystem: Examination of Upper Threshold Events and Season of Death on Human Decomposition, National Institute of Justice, Research and Development Grant for Criminal Justice Purposes, February 2018.

Decomposition Ecology. National Science Foundation, Collections in Support of Biological Research Program. October 2018

PROBLEMS ENCOUNTERED

We encountered a few problems that we are currently working on before submitting an external grant. We encountered some difficulty with the consistency of the method used to trap the insects. We are currently working on solutions with experts at TAMU. In addition, the microarray data were more complex than expected. We are currently working with experts at FIU and TAMU to statistically analyze the data.