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Microtaphonomy of Modern Deer Phalanges

Dissolution of dinosaur bones in EDTA (Ethylenediaminetetraacetic Acid) often reveals forms in the shape of blood vessels, bone cells and red blood cells. Researchers have interpreted these structures as original dinosaur soft tissue or alternatively, bacterial biofilms. However, no one has yet observed the taphonomy of soft tissue structures within vertebrate bones on a microscopic scale. Thus, the internal processes of vessel and cellular decay as well as the growth of bacteria and their possible role in rapid soft tissue mineralization remain largely unexplored. To better understand these potential processes, I undertook a series of experiments examining how microtaphonomic processes vary across differing environments. The decay of modern deer phalanges was observed across a suite of laboratory conditions modeling aqueous anoxic, aqueous oxic, intensely radiated and frozen environments, each subdivided into three sediment types - mud, sand and a mud/sand mixture. Phalanges were removed and observed under a Field Electron Microscope roughly every three months for the duration of a year. Image analysis revealed that under these experimental conditions, bacterial activity was largely inversely proportional to the preservation of internal soft tissue. Bones in environments with less bacterial activity had consequently less decay with desiccation being more prevalent, whereas environments that displayed large groupings of bacteria had little recognizable soft tissue remaining. This study could be furthered significantly by using mass spectrometry on standard soft tissue found and X-ray crystallography for any kind of mineralization. These tests would determine if and how bacteria chemically affect original soft tissue.