

# Dinosaurs, Mummies and Space-shuttles

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## Abstract

The word “mummy” has been used to mean many different things, but is synonymous with excellent preservation in the realms of archaeology and palaeontology. The term signifies the preservation of soft tissue, such as hair, muscle, tendon, but especially skin. The most familiar examples to us are human, usually of the Egyptian variety, but many such remains include both human and animal remains from all over the world. While some mummies are artificially created by human effort, many are the natural product of accidents or specific environmental conditions. There are multiple preservation types that are unique to each environment in which the physical remains of organisms come to rest. The processes that impact upon a body post-deposition introduce the splendidly macabre science of taphonomy, literally ‘burial-laws’.

The fossilized impressions/remains of dinosaur skin occur in various contexts. Post-mortem factors can move both bones and soft-tissue elements from a body after death, often generating frustratingly isolated samples. The fossil skin impressions attributable to dinosaurs may also be found as isolated patches not associated with a dinosaur skeleton. In other cases, fragmentary skin impressions are found associated with a skeleton. It is curious to note that for some reason, patches of skin on hadrosaur tails are the most common. Only a select few palaeontologists and fossil hunters have ever known the experience of discovering, excavating, preparing and studying the fossil remains of a dinosaur mummy. Such stories illustrate the changing nature of palaeontological science as new ideas and techniques can be applied to the most special of dinosaur fossils. While it is possible to deploy 21st Century science on such ancient remains, the recovery of such animals has changed little since the first dinosaur mummy was discovered a little over 100 years ago.

Charles H. Sternberg and his sons, possibly the most successful palaeontological dynasty, were the first to discover the mummified remains of a dinosaur in 1908. This was a find that surpassed anything that Sternberg had ever seen in his forty years of fieldwork. This must have been not unlike the feelings of Howard Carter upon opening the intact tomb of the Egyptian pharaoh Tutankhamen in 1922, resulting in equally unprecedented insight to another world.

In 1999 a prehistoric burial site scene was discovered by a young fossil hunter, Tyler Lyson, now a successful scientist working at the Smithsonian in Washington D.C. This is the discovery that would lead to an international interdisciplinary alliance centred around a beautiful fossil. Tyler had discovered the mummified remains of a hadrosaur dinosaur in the Hell Creek Formation of North Dakota (USA). Through a series of very fortunate events, I got to work with Tyler and was able to help build the team of scientists who gained access to this remarkable fossil. The dinosaur was nicknamed ‘Dakota’ and is possibly the first dinosaur to properly wear the ‘mummy’ badge, based upon the information harvested from these fossil remains.

The study of this remarkable fossil took our team from NASA facilities where we probed Dakota's innermost secrets with high-powered tomography to particle accelerators where the chemical ghosts of past biology were still present in the fossilized soft-tissues. Even the diagnostic chemistry that typifies melanin skin pigment has now been mapped and its coordination chemistry constrained within the prehistoric hide of this very special fossil. This lecture will take you on a whistle stop tour of the people, places, science and discoveries associated with a very special fossil dinosaur called Dakota!

