ABSTRACT

Many engineering structures are designed to withstand a critical mechanical load before failure. When a load greater than the critical load is encountered, the manner of structural failure is important. Nature has been a source of technical inspiration for centuries, and the power of modern scientific investigative techniques has enhanced engineers' abilities to learn from millennia of evolutionary mechanical refinement.

Chitons, a family of marine mollusks, feed on algae attached to rocky substrates, and parts of their feeding organs are subjected to varied loads in the process. In this work, the manner of failure of a chiton's tooth and supporting structure is investigated, and it is suggested that mechanical details of the structure enable load-limiting and fail-safe performance that protects the animal from potentially dangerous overloading.