



INFERRING BIOLOGICAL EVOLUTION from FRACTURE and WEAR PATTERNS



in TEETH

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ABSTRACT How tooth morphologies impact on evolutionary adaptation in fossil and living species is considered from the viewpoint of a biomaterials scientist. Teeth are critical markers of our past and present, how we eat, how we survive. They are relatively hard and brittle with complex microstructures. It is hypothesised that specific tooth forms are adapted to resist fracture and wear in order to accommodate the high bite forces needed to secure, break down and consume food. Distinct modes of tooth fracture are identified and quantified. The micromechanics of wear are also briefly analyzed in the context of abrasive particulates in the food source. Attention is given to the relatively flat molars of omnivorous mammals, including humans and other hominins, and to the elongate teeth of carnivores and herbivores. The lecture is presented as an illustration as to how the materials scientist may reach out to such disparate fields as biology and dentistry.

ABOUT THE SPEAKER Brian Lawn gained B.Sc. and Ph.D. degrees in Physics at the University of Western Australia in 1959 and 1963, respectively. He then spent four years as a postdoctoral fellow in the School of Physics at the University of Bristol and the Department of Engineering and Materials Science at Brown University. From 1968 to 1981, Dr. Lawn was a professor in Physics at the University of New South Wales. In 1981, Dr. Lawn joined the National Institute of Standards and Technology, and in 1987 was appointed to the position of NIST Fellow. He has held Adjunct Professor appointments at several universities worldwide. Dr. Lawn is the author of the text "Fracture of Brittle Solids", first published in 1975 and now in its second edition. In 2001, he was elected to the U.S. National Academy of Engineering, and in 2012 to the Australian Academy of Science. He was awarded an Honorary Doctorate in Engineering by the University of Western Australia in 2008. Dr. Lawn is a Distinguished Life Member of the American Ceramic Society.