

CSUF Biology Department Seminar
Co-sponsored by the CSUF Center for the History and Philosophy
of Science, Technology and Medicine

Dr Mark Springer: UC Riverside



**Tooth Loss and Molecular Cavities in Placental Mammals:
Genomics Meets the Fossil Record**

Wednesday, March 24

MH 121

4:00 – 5:15 PM

Followed by a Reception in H223

Recent Publication:

**Molecular Decay of the Tooth Gene Enamelin (*ENAM*) Mirrors the Loss of Enamel in the
Fossil Record of Placental Mammals**

September, 2009, *PloS Genetics*:

<http://www.plosgenetics.org/article/info%3Adoi%2F10.1371%2Fjournal.pgen.1000634>

Author Summary: Enamel is the hardest substance in the vertebrate body. One of the key proteins involved in enamel formation is enamelin. Most placental mammals have teeth that are capped with enamel, but there are also lineages without teeth (anteaters, pangolins, baleen whales) or with enamelless teeth (armadillos, sloths, aardvarks, pygmy and dwarf sperm whales). All toothless and enamelless mammals are descended from ancestral forms that possessed teeth with enamel. Given this ancestry, we predicted that mammalian species without teeth or with teeth that lack enamel would have copies of the gene that codes for the enamelin protein, but that the enamelin gene in these species would contain mutations that render it a nonfunctional pseudogene. To test this hypothesis, we sequenced most of the protein-coding region of the enamelin gene in all groups of placental mammals that lack teeth or have enamelless teeth. In every case, we discovered mutations in the enamelin gene that disrupt the proper reading frame that codes for the enamelin protein. Our results link evolutionary change at the molecular level to morphological change in the fossil record and also provide evidence for the enormous predictive power of Charles Darwin's theory of descent with modification.