**Evolution of enamel nanocrystal misorientation before and after diet changes.**

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Tooth enamel is macroscopically similar across all vertebrate animals, but at the nanoscale it varied dramatically. Using PhotoEmission Electron Microscopy (PEEM)(1,2) and Polarization-dependent Imaging Contrast (PIC) mapping (3), we first revealed that the enamel nanocrystal misorientation varies gradually across modern human enamel (4). Then, we compared tooth enamel before and after 3 major dietary shifts: the introduction of meat 2 million years ago, the Agriculture Revolution 10,000 years ago, and the Industrial Revolution 200 years ago. Key findings include:

A. After the introduction of meat, the nanoscale misorientation of adjacent crystal increased significantly, by a factor of 1.5x.

B. After the Agriculture Revolution, the misorientation increased even more, by a factor of 2x.

C. After the Industrial Revolution, the misorientation did not change.

D. Comparing modern chimpanzee and modern human, we find an even greater misorientation increase, by a factor of 3x.

These findings were obtained comparing the misorientation of millions of pixels, and they are all statistically highly significant. They provide crucial, quantitative evidence of enamel adaptations to dietary changes throughout hominoid evolution, offering a new perspective on the evolution of our lineage.

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