“Essentially, we are not adapted to the diets we eat today”

An interview with Prof. Debbie Guatelli-Steinberg, US

By Kristin Hübner, DTI

In her book *What Teeth Reveal About Human Evolution* (Cambridge University Press, 2016), anthropologist Prof. Debbie Guatelli-Steinberg describes what fossilised teeth reveal about history and the living conditions of our ancestors. One finding is that the high proportion of soft and sugary food people consume in the Western world these days is to blame for the steady rise of dental problems such as dental decay and malocclusion. Dental Tribune had the opportunity to speak to the Ohio State University professor about the causes of this development and the impact her research may have on modern life.

**Dental Tribune:** Prof. Guatelli-Steinberg, you are studying fossilised teeth in order to shed light on the living conditions of our ancestors. What can teeth reveal about earlier life and human evolution?

Prof. Debbie Guatelli-Steinberg: Teeth make up most of the mammalian fossil record, and this is true for human evolution as well. The reason: teeth are heavily mineralised, so they resist destruction and decomposition. The fact that teeth are likely to fossilise is extremely convenient for physical anthropologists because teeth lock detailed information about diet and dental development in teeth about the morphology of teeth, but that information requires a broader context for interpretation. For example, human first molars erupt at around six years of age, but that fact does not tell one much unless one compares it with other mammals, especially non-human primates. Dogs grow up fast and their first permanent teeth erupt around six months of age. They are much bigger and die much earlier than we do (which is sad for dog owners). Chimps erupt their first molars more on the order of four years of age and do not appear to have natural lifespans that are as long as ours. In other words, rates of dental development reflect the developmental rates of species, but we would not really know that unless we compared humans to other primates. This applies to fossil teeth too: we need a broader comparative context to understand the indications they give us.

In your new book, you say that our teeth were adapted for a very different diet than the one we eat in Western societies today. Could you explain that briefly? What are the (negative) consequences of this change in diet?

Would you say that today’s dental problems, such as the high prevalence of dental caries and periodontal disease, are man-made evolutionary developments?

Yes. Over most of our evolutionary history until the rise of agriculture around 10,000 years ago, we humans were foragers, eating food that could be gathered or hunted. These kinds of foods are the foods that our teeth are adapted to eat. With the rise of agriculture, and particularly with the more recent introduction of processed and sugary foods into the diet, there was an enormous increase in dental malocclusion and pathology. Essentially, we are not adapted to the diets we eat today; as these dietary changes are quite recent in our evolutionary history, an optimal environment for caries-causing strains to flourish.

Why is that? When considering that there were no dentists or even oral hygiene products around, one imagines our ancestors must have been toothless by their mid-20s.

With the softer, more cariogenic foods eaten in an agricultural diet, the oral bacterial environment changed. One scientist, Dr. Christina Adler, from the University of Adelaide and her colleagues, sequenced bacterial DNA obtained from dental calculus adhering to the teeth of early hunter-gatherer and early European agriculturalists. They found that, with this change in the oral environment, and later with the production of processed sugar during the Industrial Revolution, the diversity of oral flora decreased, with caries-causing strains becoming predominant. Essentially, the oral environment had changed to provide an optimal environment for caries-causing strains to flourish.

**What Teeth Reveal About Human Evolution**

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Certainly genetics plays a role. Some individuals are more prone to dental disease than others, but what one eats also plays a role. As far as that goes, there is no perfect diet, but diets that are low in sugar and eating tough foods that may stimulate jaw growth during childhood might help to alleviate our dental problems.

Thank you very much for the interview.