Researchers find sea otter dental enamel 2.5 times as strong as humans

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A sea otter wraps itself in kelp in Morro Bay, California. Credit: Mike Baird from Morro Bay, USA/via Wikipedia

A team of researchers with members from the U.S., Germany and Kuwait has found that sea otter dental enamel is approximately two and a half times as strong as human dental enamel. In their study published in

the journal *Biology Letters*, the team describes how their analysis of sea otter teeth revealed a high number of layers of protein-rich gel that give their teeth much greater strength and how that finding might impact the study of some of our ancient human ancestors.

The study carried out by the team was not due to simple curiosity about how the playful sea creatures manage to crack open clam and crab shells without breaking their teeth, it was also an effort to learn more about the history of human teeth.

To find out how strong the sea otter teeth and enamel really are, the researchers collected several tooth samples from sea otter skulls, and tried to crunch them using a compression machine that also displayed the force being exerted. In so doing they found that sea otter teeth were able to withstand two and a half times as much force as human teeth.

By looking at the teeth under a microscope, the researchers could see that the otters had more crack resisting layers than human teeth (19 per millimeter for them versus 14 for us). The crack resistant layers are made up of a gel high in protein in both species and serve as a means of preventing cracks from propagating. The team also noted that the enamel layers were arranged in a pattern that was more circular than is found in humans.

The findings by the team are interesting for another reason—some of our early ancestors, the hominin *Paranthropus boisei* (from around 1.2 to to 2.3 million years ago) had the same number of crack resistant layers in their teeth as do the modern sea otters. This suggests of course that our early ancestors were cracking some pretty hard stuff with their teeth as well. That finding may help researchers better understand the diet of *P. boisei* and also suggests that over a very long period of time, our teeth have grown weaker.

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