Study offers clues about how conodonts used earliest vertebrate teeth

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(Phys.org) —Researchers from the University's of Bristol and Birmingham in the U.K. have made progress in identifying the ways that a conodont used its teeth—the earliest ever found in a vertebrate. In their paper published in *Proceedings of the Royal Society B*, the team describes how they used 3D modeling developed for use in testing I-Beams for use in construction to reveal the inner details of the teeth.

Conodonts were a very early type of vertebrate—an eel-like creature that lived approximately 200 million years ago. Researchers only know of their existence because of teeth they left behind. But until now, it wasn't known how the teeth might have been situated on the organisms (they had no jaw) or for what purpose they might have been put to use.

In this new effort, the researchers were able to create virtual images of one species of conodont—*Panderodus acostatus* using a special type of tomography on teeth that have been found. Doing so revealed several different types of teeth which apparently served different roles for the early sea creature. In the 3D recreations, the different sets of teeth were color-coded to set them apart from one another. The teeth, all situated on the head of the creature were spaced apart as occurs with modern animals e.g. incisors, molars, etc. One set of teeth, for example, had a circular cross section which meant they could have been bent or twisted, indicating that they were likely used to hold prey in place. Another set of teeth were more narrow and sharper, obvious hints that the organism had a cutting, piercing or slicing ability. Because there is no other evidence available it's not clear how the teeth might have worked in conjunction

with other body parts however.

Also, the researchers still don't know exactly how the teeth were kept anchored to the body as it's assumed the rest of its tissue was soft. Modern animals have teeth anchored to bone, such as the jaw or facial plate. In order to make use of its teeth, *P. acostatus* would have needed a strong base to hold its teeth in place or an ability to reproduce them rapidly if they were lost.

More information: Cutting the first 'teeth': a new approach to functional analysis of conodont elements, *Proceedings of the Royal Society B*, Published 14 August 2013 DOI: 10.1098/rspb.2013.1524

Abstract
The morphological disparity of conodont elements rivals the dentition of all other vertebrates, yet relatively little is known about their functional diversity. Nevertheless, conodonts are an invaluable resource for testing the generality of functional principles derived from vertebrate teeth, and for exploring convergence in a range of food-processing structures. In a few derived conodont taxa, occlusal patterns have been used to derive functional models. However, conodont elements commonly and primitively exhibit comparatively simple coniform morphologies, functional analysis of which has not progressed much beyond speculation based on analogy. We have generated high-resolution tomographic data for each morphotype of the coniform conodont Panderodus acostatus. Using virtual cross sections, it has been possible to characterize changes in physical properties associated with individual element morphology. Subtle changes in cross-sectional profile have profound implications for the functional performance of individual elements and the apparatus as a whole. This study has implications beyond the ecology of a single conodont taxon. It provides a basis for reinterpreting coniform conodont taxonomy (which is based heavily on cross-sectional profiles), in terms of functional performance and

ecology, shedding new light on the conodont fossil record. This technique can also be applied to more derived conodont morphologies, as well as analogous dentitions in other vertebrates and invertebrates.