

# The formula for making teeth will soon be found

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Each cusp of our teeth is regulated by genes which carefully control the development. A similar genetic puzzle also regulates the differentiation of our other organs and of all living organisms. A team of researchers at the Institute of Biotechnology of the University of Helsinki has developed a computer model reproducing population-level variation in complex structures like teeth and organs. The research takes a step towards the growing of correctly shaped teeth and other organs. The results were published last week in *Nature*.

Academy Professor Jukka Jernvall and his team investigate the evolutionary development of mammal teeth. After over 15 years of work, the team has compiled so much data that the main aspects of a formula for making teeth are beginning to be clear. The model shows that regulation of tooth development is already well known. Teeth are a kind of "model species" for Jernvall's team, which means that the study results also tell about the development of other organs.

## A mathematical model applied to the teeth of ringed seals

According to a mathematical computer model, a rather simple basic formula seems to be behind the complex gene puzzle resulting in tooth formations; the jungle of gene networks has a 'patterning kernel' regulating the variation of teeth among individuals in the same population. Also the variation of human teeth from the incisors to the

molar teeth may result from a single factor regulating cell division.

The researchers tested their theoretical model, which is based on mouse [tooth development](#), by investigating seal teeth. The Ladoga ringed seal collection of the Finnish Museum of Natural History at the University of Helsinki provided an ideal population sample for the research because dentitions are highly variable.

## **New teeth and organs?**

The mathematical model proposed by the research team may give new kind of understanding on the formation of organisms' three-dimensional shapes: How do different levels of ontogeny function together? What factors guide the emergence of specific external features? The new research results may promote medical research, such as growing new organs.

Jernvall is known as an international pioneer in cross-disciplinary [evolutionary development](#) biology. A few years ago, the science journal *Nature* chose a [teeth](#) evolution work conducted by Jernvall and two post-doc researchers as one of the 15 educational topics in the field of evolutionary biology. The research published now was conducted with Jernvall's third post-doc researcher, Isaac Salazar-Ciudad. Salazar-Ciudad currently works at the Autonomous University of Barcelona in Spain.

Provided by University of Helsinki

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