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Catastrophe in a Biological Context

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Science can be described as the study of patterns. Many of the physical phenomenon that interest scientists have a repetitive behaviour suggesting that they are robust in their response to small changes. Basically small changes in conditions have small changes in outcomes. This is reflected in mathematical models by the continuity of the functions used to describe the phenomenon. The state variables are usually continuous functions of the independent variables such as time, space and temperature. In general, the corresponding discrete models follow the behaviour of the continuous models closely. But there are exceptions, such as discrete population models which give rise to chaotic behaviour which is not predicted by the corresponding continuous models.

There are many situations when there are sudden changes or discontinuities which are treated in isolation – for example, the impulsive reaction to the sudden stopping in a car crash of a car happens in a short time period – afterwards the laws of motion still apply. There are other phenomenon when small changes result in a quite different qualitative behaviour. There is an obvious sudden change in volumetric expansion when water reaches 100 degrees. An interesting example is that of the growth of squid in the 24 hours after birth. It is significantly different if the water temperature is raised by just one degree.

There appears to have been a breakdown in the pattern.

However deeper investigation reveals that there are patterns in the breakdown. The study of the breakdowns and their classification is often referred to as Catastrophe Theory.

In this talk catastrophe patterns will be discussed and the controversy surrounding the applications of them to biology will be considered.

We will look at problems in enzyme reactions to indicate that the Catastrophe concept can provide insight and a source of new approaches to analyze them.

Mød op, hør foredraget og grib chancen for at blive medlem af Eulers Venner.
Vi giver kaffe og kage.