Patterns of Life

Alan Turing and Morphogenesis

Voice Over:

The tiger, with its elegant stripes is the undoubted real king of the jungle. But what makes tigers striped and cheetahs spotty? Genetics? Rival gang colours?

World War II code-breaker and father of computer science, Alan Turing has a much simpler explanation…

After spending a presumably rainy spell pondering the blotches on cows, he came up with a mathematical explanation for skin patterns.

Imagine two chemicals spreading out over an animal. One changing skin pigment, and the other stopping it. Turing used simple equations to show how the two chemicals interact as they spread to create stripes.

When there are two sets of these reactions, criss-crossing each other, they make spots. Size matters too. If the reaction takes place when the embryo's very small, the patterns will come out bigger, like the blotchy islands on the common cow.

Turing's ideas have been developed to simulate the markings on shells, fish and butterflies. He called the chemicals 'morphogens', though he couldn't prove they existed.

Sixty years later biochemists have found chemical morphogens working just as Turing predicted, so we can add 'oracle' to his already rather impressive CV.