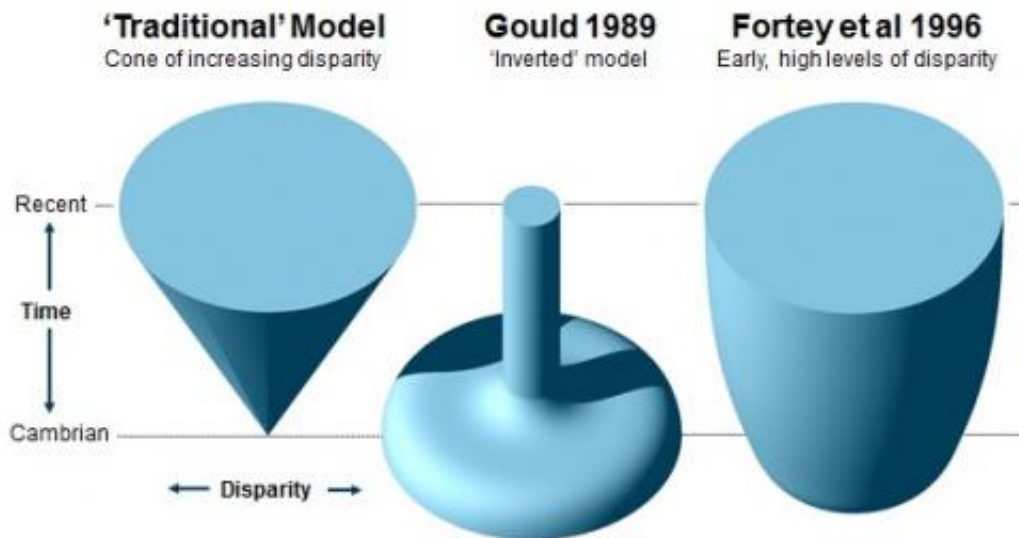


Scientific study turns understanding about evolution on its head

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Latest research turns traditional 'V-shaped cone model' of evolution on its head

(Phys.org) —Our understanding of how animals on the planet evolved may be wrong, according to scientists at the University.

In a new paper, recently published in the *Proceedings of the National Academy of Sciences*, [evolutionary biologists](#) from the Department of Biology & Biochemistry looked at nearly one hundred fossil groups to test the notion that it takes groups of [animals](#) many millions of years to reach their maximum diversity of form.

Contrary to popular belief, not all animal groups continued to evolve fundamentally new morphologies through time. The majority actually achieved their greatest diversity of form (disparity) relatively early in their histories.

Lead researcher from the Department of Biology & Biochemistry, Dr Matthew Wills said: "This pattern, known as 'early high disparity', turns the traditional V-shaped cone model of evolution on its head. What is equally surprising in our findings is that groups of animals are likely to show early-high disparity regardless of when they originated over the last half a billion years. This isn't a phenomenon particularly associated with the first radiation of animals, or periods in the immediate wake of mass extinctions."

The team used published descriptions of extinct groups in order to construct 'morphospaces'; empirical spaces in which anatomically similar species plotted close together, and more dissimilar species plotted further apart. By looking at the manner in which the occupied 'volume' of space changed through time, they were able to track changes in morphological disparity.

Author Martin Hughes, continued: "Our work implies that there must be constraints on the range of forms within animal groups, and that these limits are often hit relatively early on. The only exceptions to the rule are groups that were wiped out at times of mass extinction. These groups tend to have 'flat topped' and 'top-heavy' evolutionary trajectories overall."

Co-author Dr Sylvain Gerber, added: "A key question now is what prevents groups from generating fundamentally new forms later on in their evolution. Equally intriguing is the manner in which some groups are able to break free from these constraints."

"Our results hint that this may hinge upon the evolution of new 'key innovations' that enable groups to exploit new resources or habitats, for example dinosaurs growing feathers and evolving wings or fish evolving legs and moving onto land to claim new territory."

More information: 'Clades reach highest morphological disparity early in their evolution', [dx.doi.org/10.1073/pnas.1302642110](https://doi.org/10.1073/pnas.1302642110)

Provided by University of Bath

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