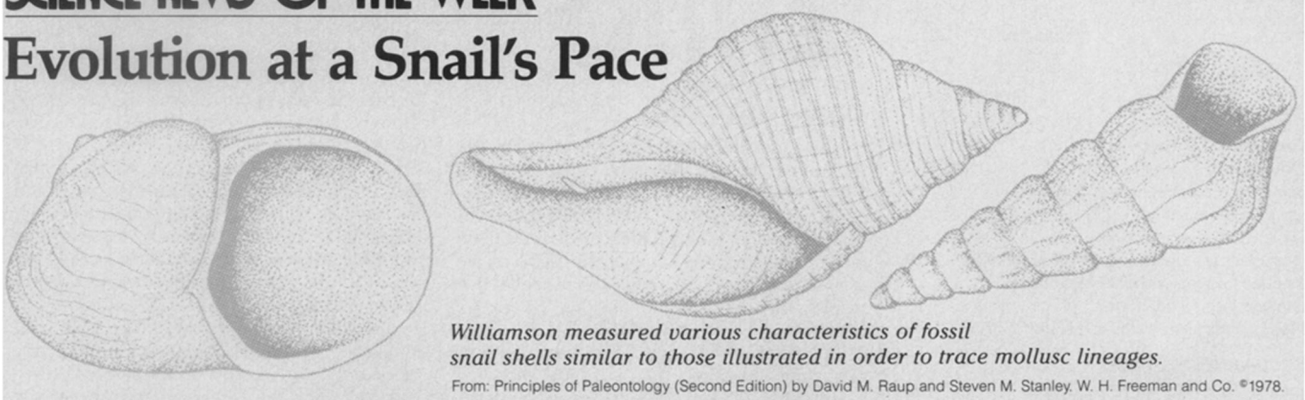
Evolution at a Snail's Pace



Williamson measured various characteristics of fossil snail shells similar to those illustrated in order to trace mollusc lineages.

From: Principles of Paleontology (Second Edition) by David M. Raup and Steven M. Stanley. W. H. Freeman and Co. ©1978.

A recently discovered series of mollusc fossils has provided the first, detailed, unbroken record of how one species evolves into another. The evidence suggests that a species remains unchanged for long periods and then abruptly transforms during times of environmental stress.

Peter C. Williamson of Harvard University's Museum of Comparative Zoology concludes in the Oct. 8 NATURE that, based on his studies of 3,300 individuals representing thirteen species of freshwater snails and bivalves, evolutionary change at the species level does not depend on long-term, gradual transformations.

The well-preserved and abundant fossils came from deposits near Lake Turkana in northern Kenya. By examining fossils through a depth of 400 meters, Williamson traced mollusc lineages over several million years. Because so many different genera and families were represented, he could compare evolutionary patterns of widely varying molluscs.

Generally, the species remained unchanged for long periods of time. Some species living in the lake today still look exactly as they did millions of years ago. However, when the lake level dropped sharply twice in geological history, all the species Williamson studied underwent a brief period of rapid change, lasting from 5,000 to 50,000 years.

Williamson was able to identify recognizable intermediate forms that existed during this time and linked the old and new species. One of the persistent problems in evolutionary biology had been the absence of intermediate forms in the fossil record, Williamson says. He also notes greater-than-normal variations among individuals of a species during the time of stress.

One of the surprising results is that the rate of evolution was the same for snail species that reproduced sexually and for those that reproduced asexually. This challenges the notion, suggested by some evolutionists, that the invention of sex speeded up the rate of evolution by allowing genes to be shuffled around between individuals.

Just as surprising is the finding that new snail species emerged from comparatively large populations of millions of snails spread over a large area, rather than in small, isolated populations, as some evolutionary models had suggested.

Williamson concludes, "The fact that evolutionary change at the species level is shown to be punctuated and achieved by 'revolutionary' periods of extreme developmental instability strongly supports the notion that speciation is a qualitatively different phenomenon from gradual, intraspecific microevolutionary change.

Some scientists disagree with Williamson's conclusion. J. S. Jones, a University College London biologist, questions in the same issue of NATURE whether geneticists must revise their views of how species originate.

He suggests that those studying fossils and those experimenting on living organisms assess the rate of evolutionary change differently because of the different time scales with which they work. "What is an instant of evolutionary time to a paleontologist may appear almost an infinity to a geneticist," Jones writes.

To most geneticists, Jones says, the 5,000- to 50,000-year interval over which shell forms changed and new species were established is more than enough to enable gradual changes to lead to evolution as great as that described by Williamson. Therefore, it is unnecessary to postulate a new evolutionary mechanism is involved.

However, the conventional genetic selection mechanism fails to account adequately for the long time periods when no changes in species occur. Williamson also suggests that the sudden increase in individual variation during periods of rapid change is not a necessary aspect of conventional selection.

Williamson's analysis is likely to be an important piece of evidence in the debate about how evolution occurs, whether by sudden leaps or gradual changes. Further fossil evidence is needed, and new concepts like the apparent resistance of organisms to developmental changes have to be clarified. □

New drug prevents second heart attack

Clinical trials of a drug that can save an estimated 6,500 lives annually are being discontinued to enable the immediate and widespread use of the drug to prevent second heart attacks among cardiac patients. This action, highly unusual within the traditionally conservative medical community, is likely to speed approval of the drug by the Food and Drug Administration.

A National Heart, Lung and Blood Institute study published in the Nov. 6 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION found that propanolol, a beta blocker, produced a 26 percent drop in mortality among patients recovering from heart attack. Of 1,916 patients receiving 40 to 60 mg of the drug three times a day, 135 died of heart attack; of 1,921 patients receiving placebo, 183 died of heart attack. Like all beta blockers, propanolol acts by blocking the action of catecholamines, which stimulate the heart and may cause erratic heart rhythms. The drug is scarcely new; marketed by Ayerst Laboratories since 1965 for relief of angina and irregular heart rhythm, propanolol is already the second most widely used drug in the United States. FDA officials speculate that, although unapproved, the drug has been used by physicians to prevent death by heart attack for many years.

The study's results were reviewed and assessed by an independent Policy and Data Monitoring Board. Early tests on mice that suggested use of the drug might be linked to cancer have not been replicated.

News of the drug prompted an outburst by FDA critics. In an editorial entitled "100,000 Killed," the Wall Street Journal called the delayed use of the drug "a scandal . . . raising the question about whether we should even have an FDA." But according to the FDA, the delay was important. "Our critics act as if this is a perfect world, filled with perfectly safe drugs," an FDA spokesman told SCIENCE NEWS. "This is nonsense. There is no such thing as a perfectly safe drug." □