Marine snails get a metabolism boost

May 3 2011

Most of us wouldn't consider slow-moving snails to be high-metabolism creatures. But at one point in the distant past, snail metabolism sped up, says a new study of marine snails in the journal *Paleobiology*.

"Many of the marine snails we recognize today — such as abalone, conchs, periwinkles and whelks — require more than twice as much energy to survive as their ancestors did," said co-author Seth Finnegan of the California Institute of Technology.

The findings come from a new analysis of snail fossils formed one to two hundred million years ago, during a period dubbed the Marine Mesozoic Revolution.

Estimating the metabolism of an animal that lived millions of years ago isn't easy. But body size gives us a clue, the authors said. In animals alive today, animals with bigger bodies tend to have higher basal metabolic rates, they explained.

"Bigger-bodied creatures simply require more calories to carry out basic functions," Finnegan said.

By assembling a database of several thousand species of living and extinct snails, the researchers were able to compile body size measurements from the snail fossil record stretching back more than 200 million years, and compare them to physiological data from different-sized snails living today.

The overall trend? Between 200 and 80 million years ago, the resting metabolic rate of tropical marine snails more than doubled, said co-author Jonathan Payne of Stanford University.

The driving force for this change was probably diet, the authors argue. Clues from fossilized shells suggest that prior to this time, most marine snails fed on plants and decaying organic matter. Then, over time, some snails evolved to feed on each other, Finnegan explained.

"To the best our ability to tell from their fossilized remains, almost none of the snails that lived prior to the Marine Mesozoic Revolution were predatory," Finnegan said. "Then the snails that really began to diversify during this period were dominated largely by predatory groups."

The evolutionary arms race between snail predators and their prey drove them to rev up their metabolic rates, Payne explained.

"As predators evolved to be faster and stronger, and prey evolved thicker, more reinforced shells to avoid being eaten, they had to use more and more energy to survive," he said.

The next step will be to see if the same trends can be found in other animals too, the authors added.

"Marine snails are one of the most diverse groups of animals out there, but we should see the same trend in other well-preserved animals too," said co-author Craig McClain of the National Evolutionary Synthesis Center in Durham, NC.

The team's findings appear in the May 2011 issue of Paleobiology.

More information: Finnegan, S., C. McClain, et al. (2011). "Escargots through time: an energetic comparison of marine gastropod assemblages

before and after the Mesozoic Marine Revolution." *Paleobiology* 37(2): 252-269. DOI: 10.1666/09066.1