

Oldest Australian crayfish fossils provide missing evolutionary link

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Crayfish body fossils and burrows discovered in Victoria, Australia, have provided the first physical evidence that crayfish existed on the continent as far back as the Mesozoic Era, says Emory University paleontologist Anthony Martin, who headed up a study on the finds.

"Studying the fossil burrows gives us a glimpse into the ecology of southern Australia about 115 million years ago, when the continent was still attached to Antarctica," says Martin, a senior lecturer in environmental studies at Emory and an honorary research associate at Monash University in Melbourne.

During that era, diverse plants grew in what is today Antarctica and dinosaurs roamed in prolonged polar darkness along southern Australia river plains. The period is of particular interest to scientists since it is believed to be the last time the Earth experienced pronounced global warming, with an average temperature of 68 degrees Fahrenheit – just 10 degrees warmer than today.

On Feb. 2, the earth science journal *Gondwana Research* published online the results of the crayfish study, which was conducted by Martin and a consortium of Australian scientists, including Thomas Rich and Gary Poore of the Museum of Victoria; Mark Schultz and Christopher Austin of Charles Darwin University; and Lesley Kool and Patricia Vickers-Rich of Monash.

The crayfish body fossils consist of an abdomen and two claws, and the

fossil burrows are nearly identical to those made by modern crayfish in southeastern Australia. "Comparing these fossil burrows to those made by modern crayfish in Australia shows us that their behavior hasn't changed that much," says Martin, who specializes in trace fossils.

Biologists have long been fascinated by crayfish, due to their wide range – the freshwater decapods are found on almost every continent and have adapted to extremely diverse environments. Thomas Huxley, a colleague of Charles Darwin, was the first scientist to ponder how crayfish, which cannot survive in saltwater, could have spread to so many continents, according to Martin. Such studies helped lay the groundwork for plate tectonics, which revolutionized the earth sciences in the 1960s through the theory that the continents were once connected. More recently, molecular biologists have theorized that all Southern Hemisphere crayfish originated in southeastern Australia.

"The evolution of Southern Hemisphere crayfish has challenged researchers since the 1870s," Martin says. "Only now, 140 years later, are we starting to put together the physical evidence for this evolution through the discovery of fossils."

Source: Emory University

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