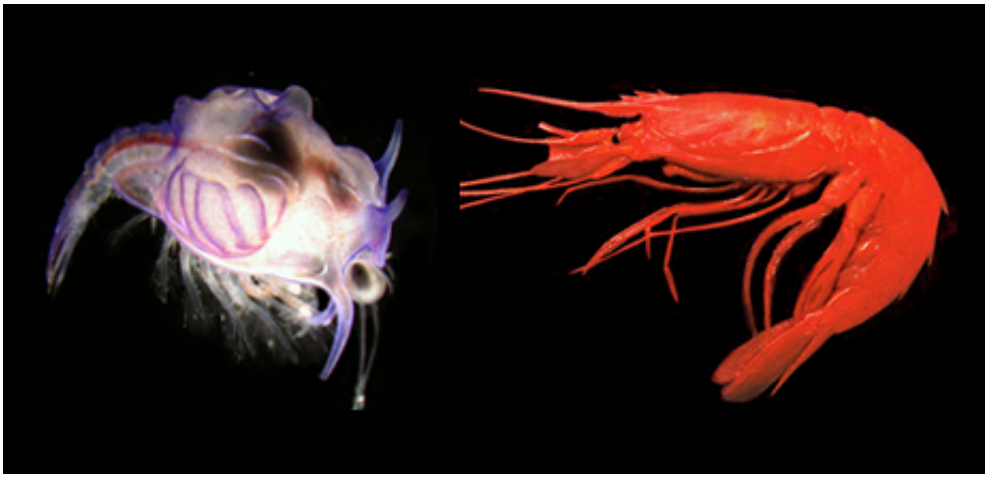
Computational biologist solves 200-year-old oceanic mystery

August 27 2012



Cerataspis monstrosa, on the left, and Plesiopenaeus armatus, on the right

(Phys.org)—The origin of *Cerataspis monstrosa* has been a mystery as deep as the ocean waters it hails from for more than 180 years. For nearly two centuries, researchers have tried to track down the larva that has shown up in the guts of other fish over time but found no adult counterpart. Until now.

George Washington University Biology Professor Keith Crandall cracked the code to the elusive crustacean's DNA this summer. His findings were recently published in the journal Ecology and Evolution, and his research was funded by the National Science Foundation and the Gulf of Mexico Research Initiative. In it, Dr. Crandall, the senior author

of the paper, explains how "monster larva" and the deep-water aristeid shrimp known as *Plesiopenaeus armatus* are one in the same: larvae and adult forms of the same species.

Attempts to find the adult incarnation of the larva weren't without significant effort over the span of time. The crustacean's ability to morph into a shrimp bearing no resemblance to its juvenile form was a challenge as externally, the two couldn't be more different.

C. monstrosa, has heavy armor, a thick body and exceptional horn ornamentation. Described as "monstrous and misshapen animal," it is the preferred meal for its predators such as skipjack, yellowfin and blackfin tuna and dolphin. The Plesiopenaeus, resembles a lobster or crab with its red, enclosed exterior and is elusive. It calls the deep sea waters such as the Atlantic Ocean home but finding the specimen to make a match has proven to be difficult for zoologists.

Dr. Crandall said it was not until the late 19th century that researchers started to suspect a link between the Cerataspis and some of the deep sea shrimp. Mid-water oceanic collections in the northern Gulf of Mexico unexpectedly included a single specimen of *C. monstrosa* for genetic analyses.

"Because previous studies suggested an affinity between Cerataspis and penaeoid shrimp, and more specifically the family Aristeidae, we sampled heavily within these groups," he said. The Crandall lab has been collecting crustacean DNA sequence data for a number of years and therefore had an excellent reference database to compare the Cerataspis DNA.

That's when analysis placed the larva and the deep-sea shrimp as one in the same.

"It's very exciting to have solved a nearly 200-year-old conundrum," said Dr. Crandall. "This was a project that involved having good luck with obtaining the sample, exceptional field knowledge to preserve the specimen and know that it was something special, outstanding state-of-the-art molecular and analytical tools to collect unique data that have only been available in the last 10 years to answer this question and to have an outstanding database of reference sequences to compare against."

The National Oceanic and Atmospheric Administration also supported some of the research by providing financial support for the ship time, ship, crew members and collection resources.

"Larval-adult linkages not only aid in our understanding of biodiversity, they provide insights into the life history, distribution and ecology of an organism," said Dr. Crandall.

More information: onlinelibrary.wiley.com/doi/10 … 02/ece3.347/abstract

Provided by George Washington University