Mesozoic Marine Revolution Explanation & Bibliography

GEOL 204 The Fossil Record

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Caylee Bergreen, Max Fitch, Kate Quiroga, & Claire Zhuang

The Cause of Mesozoic Marine Revolution

The cause of the Mesozoic Marine Revolution was the change to durophagous predation in predators, “durophagous predation has been an important cause of significant evolutionary changes in the history of life” (5). Durophagous is a type of eating behavior that consumes hard shelled organisms. The change in the predation style caused some organisms that don't have durophagous predation resistance to go extinct, and some to develop defences against those predators, “Bellerophontid genera lacking predation-resistant features tended to go extinct, leaving the sculptured, tightly coiled forms as the predominant forms” (4). Researches show that the major evolutionary changes started soon after the end Permian extinction. Therefore, the Mesozoic Marine Revolution was a prolonged evolutionary event, instead of an instant one.

Taxonomy

Cephalopods were some of the taxa that diversified significantly during the mesozoic marine revolution (MMR). Ammonoidea were a part of the cephalopods and survived between the time of the paleozoic and the cretaceous. They were slow moving, lived in deep water, and had coiled shells. They used suspension feeding and began to thicken their shells to protect from predators who would drill into them. Eventually, during the MMR, the ammonites began to fade as shells were not sufficient enough to protect from the rising predators during the revolution. However, coleoids began to exist within the cephalopods. Coleoids were cephalopods who no longer had a shell and were able to escape from predators more quickly than ammonites and were more agile. Coleoids began to exist in the Mesozoic and continue to live on in modern ecosystems. Coleoids led to the cephalopods we are used to seeing today such as squid, octopuses, etc.

The Effects on Marine Animals

Due to the Mesozoic Marine Revolution, marine prey would develop passive or active defense mechanisms. Active defense would be associated with morphological changes to the pray or anatomical modifications. For example, *Pecten maximus* shell structure would exhibit more advanced cross lamellar microstructures (1a). This means that their shells were mechanically stronger. As for passive defense, it’s associated with direct responses to predator occurrence like active escape or rapid burrowing. As for *P. maximus*, their outer layer revealed to be porous which meant that the shell’s microstructure weighed less which is a prerequisite for swimming (3b). When in direct contact with a predator, they’d rapidly “swim away” by clapping their valves. Ornamental features offer protection from durophagous predators by increasing the size of the shell and by preventing breakage of their shell by bending it (2c). Ornament is measured as the size of the ribs in proportion to body size, spacing of ribs, and presence or absences of nodes and keels (2c). More highly ornamented taxa were less likely to break their shell. Therefore those with more elaborate ornamental features like keels, nodes, and ribs had fewer scars hence survived better (2d).

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