

Molecular basis of shell formation and shell evolution in gastropods

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The Molluscs constitutes one of the most diverse animal phyla, and they have evolved calcified exoskeletons called “shell” ever since the Cambrian. However, the molecular basis of molluscan shell development remains unclear. Thus we sought to understand the role of the homeotic gene *engrailed* in early shell development by focusing on retinoic acid signal pathway. We examined the expression patterns of RA metabolizing enzyme *cyp26* in the limpet *Nipponacmaea fuscoviridis* and found that *cyp26* is expressed around the edge of the shell field. As a result of gain or loss functional analysis of RA, shell deformation was observed in both gain and loss of RA analyses, and *engrailed* is down regulated. These results suggested that the common ancestor of Mollusca likely used RA signaling system to produce the novel phenotypic trait that is to be called “shell” by recruiting the homeotic gene.

Keywords: Shell evolution, RA pathway, Mollusca