

## Evolution of bivalve bodyplan

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By evolving bilaterally separate shell plates, bivalves have acquired a unique body plan in which their soft tissues are completely protected by hard shell plates. Here we asked how the unique shell morphology of bivalves was brought about by modification of their development. First, we confirmed the old descriptions on the cellular origin of shell field precursors claiming that bilaterally cleaved shell field precursor cells develop into bilaterally separated shell fields. Thus, modification of the early spiral cleavage pattern is tightly linked with the evolution of bilaterally separate shell plates. Furthermore, we found that the specific inhibition of *dpp* during bivalve development results in impaired development of the ligament that separates the shell plates. We conclude that the unique shell plate morphology of bivalves is a result of two distinct modifications during early embryogenesis, namely, modification of the early spiral cleavage pattern and neofunctionalisation of *dpp* for ligament development.

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