Cell signalling molecules in *hydra*: insights into evolutionarily ancient functions of signalling pathways

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Hydra, a Cnidarian believed to has evolved about 60 million years ago, is a favourite model for developmental biologists since Abraham Trembley introduced it in 1744. Several signalling mechanisms that regulate development and pattern formation in vertebrates, including humans, have been found in hydra. These include Wnt, BMP, VEGF, FGF, Notch, and RTK signalling pathways. We have been using hydra to understand the evolution of cell signalling for the past several years. We have identified and characterized, for the first time, the hydra homologs of the BMP inhibitors Noggin and Gremlin, the vascular endothelial growth factor (VEGF), fibroblast growth factor (FGF) and several receptor tyrosine kinases (RTKs). Our work, along with that of others, clearly demonstrates that these pathways arose early in evolution to carry out functions that were often quite different from their functions in more complex animals. Apart from providing insights into morphogenesis and pattern formation in adult, budding and regenerating hydra, these findings bring out the utility of hydra as a model system to study evolutionarily ancient, in contrast to recently acquired, functions of various biological molecules.