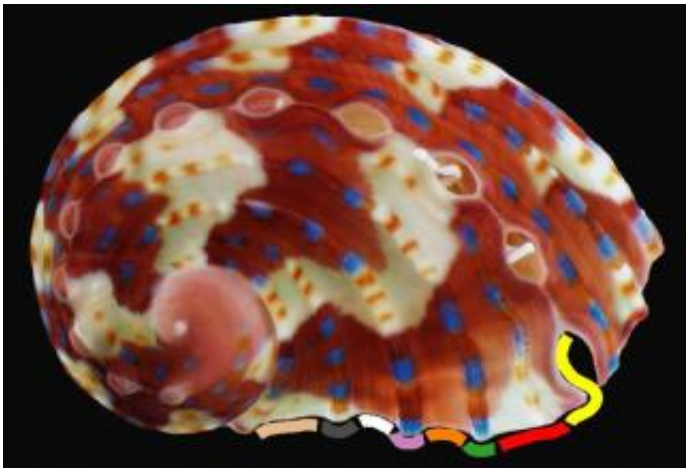
Patterns on tropical marine mollusc shell mirror gene expression patterns

November 22 2006



Picture of a juvenile H. asinina shell. Credit: Daniel Jackson

Scientists have identified a group of genes that control the formation of shapes and colour patterns on the shell of the tropical marine mollusc referred to as 'abalone'. A study published today in the open access journal *BMC Biology* reveals that the shape and colour patterns on the shell of the mollusc mirror the localised expression of specific genes in the mantle, a layer of skin situated just below the shell. The authors of the study identify one gene in particular that controls the formation of blue dots on the shell of the mollusc.

Daniel Jackson, Bernard Degnan and colleagues from the University of Queensland, Australia, collaborated with colleagues from the

Department of Geobiology at the University of Göttingen, Germany to analyse gene expression in the tropical abalone Haliotis asinina. They sequenced 530 randomly-selected genes expressed in the mantle tissue of the young abalone.

Jackson et al. identified 331 genes that encode proteins expressed in the mantle. Using a bioinformatics approach they find that 26% (85) of these genes encode secreted proteins. Jackson et al. then analysed the expression patterns of 22 of the genes encoding secreted proteins. They find that each gene is expressed in a specific, discrete area of the mantle, involved in the formation of a specific layer, shape or colouration pattern of the shell.

They identify one gene in particular, Has-sometsuke, whose expression pattern maps precisely to pigmentation patterns in the shell. Blue dots on the shell of the abalone correspond to zones of high Has-sometsuke expression. By comparing the abalone DNA sequences with the genome of another related mollusc, Lottia scutum, the authors also show that genes encoding the secreted mantle proteins, which they call the 'secretome', in abalone, are likely to be rapidly evolving genes.

Jackson et al. conclude: "The unexpected complexity and evolvability of this secretome and the modular design of the molluscan mantle enables the diversification of shell strength and design, and as such must contribute to the variety of adaptive architectures and colours found in mollusc shells."

Source: BioMed Central

marine-mollusc-shell.html