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Analysis of enzyme, carbohydrate and mineral distribution in the foot of abalone shellfish.

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The meat of the abalone shellfish has been labelled as a luxury food for thousands of years. The source of this epicurean delicacy is the foot, which is the most conspicuous external feature of this organism. The foot is a large muscular organ with an extensive nerve and vascular supply that serves both sensory and locomotory functions. The foot is also involved in many other functions such as locating and manipulating food, attaching eggs to substrates, cleaning the shell, finding potential mates and thwarting predators. The foot is primarily made up of epithelial tissue, connective tissue and muscle.

In this study the distribution of functional and structural elements was investigated in the pedal organ of two species of abalone, *Haliotis tuberculata* and *Haliotis discus hannai*. The pedal and peripheral epithelia expressed high levels of activity for the following enzymes: chloroacetate esterase, α -naphthyl butyrate esterase, alkaline and acid phosphatase, peroxidase and carbonic anhydrase. The sub-epithelial ganglion cells were positive for α -naphthyl butyrate esterase and acetylcholinesterase. Neutral mucins, acid mucins, carboxylated mucins and sulphated mucins were found in epithelial cells, in sub-epidermal gland cells and in the ground substance of the connective tissue and muscle. Melanin was identified in the sub-epidermal gland cells and in the pedal and peripheral epithelial cells. The basement membrane of the pedal epithelium was positive for calcium.

A myriad of cell components and cellular activities in the tissues of the abalone foot were demonstrated, revealing cell types and reflecting the molecular pathways at work within these tissues.