

# Exploration of the Molecular Circuitry Involved in the Adaptive Coloration Properties of *Sepia Officinalis*

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## ABSTRACT:

Cuttlefish are a class of marine animals that has perfected rapid, dynamic, and effective adaptive coloration in the context of a plethora of backgrounds despite apparently lacking the means to distinguish color using their eyes. Very little is known about the chemical circuitry governing this remarkable behavior; however in recent years the advances in proteomics, genomics, and metabolomics have provided biological researchers the tools to better understand complex biological phenomena. The power of high throughput mass spectrometry and gene expression microarrays will be used to elucidate the distinguishing chemical and genetic components of the leucophore, the cell responsible for reflecting a very broad bandwidth of light through chromatophore layers which are cells responsible for a variety of pigmented colors exhibited by the animal. Further, LTC John Ingram, of the Photonics Research Center, is resolving the spectral characteristics of the live animals, dissected skin, and purified leucophore cells using HyperSpectral Imagery analysis. We hope to discover optical handles that will help characterize the ability of the cuttlefish to blend into so many different environments with ease. By understanding how nature uses biological molecules to conceal the cuttlefish, we will take steps toward engineering a synthetic mimic to help defend soldiers and equipment in many different environments.

**KEYWORDS:** Cuttlefish, genomics, hyperspectral imagery

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