COLOR IN OSTRACODE SHELLS: TAPHONOMY AND PALEOTEMPERATURE INTERPRETATION

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Interpretations of geologic history would be enhanced if taphonomic processes, including color changes in shells, were better known. This study deals with the origins and alteration of post-mortem colors in podocopid ostracodes. Modern shells were subjected to elevated temperatures and pressures in reactor vessels with sediments, simulating some burial conditions. Fossil shells from outcrops and boreholes were heated and treated with solvents, in an attempt to identify the coloring agent(s).

Modern marine shells are white to pale yellow (Munsell 5Y 8/1 - 2.5Y 8/4). Upon heating at atmosphere, up to about 650°C, they became slightly redder, slightly darker, and less color saturated, but never dark (Munsell "value" less than 5). From 650-850°C they became yellower and lighter, and above 850°C chalky and more yellow. Shells at elevated temperatures <u>and</u> pressures (T-P) with organic-poor sediments and/or iron compounds developed higher color values and lower chromas; they did not become dark. Thus, modern ostracode shells subjected to elevated T-P changed colors, but alone never attained the dark colors seen in many fossils. Only those heated in matured organic-rich sediment and/or crude oils became dark (dark grays, browns, and blacks), like some fossils. Fossil ostracodes from boreholes in Mesozoic and Cenozoic sedimentary rocks showed downhole color differences similar to those from experiments. That is, the colors of fossils are different in hue, value and chroma in different thermal zones and ostracode color appears to be broadly indicative of thermal history.

Fossils near igneous intrusions are dark, while the lowered values and chromas of those in metamorphics also are correlatable with paleotemperatures. Reheated dark fossils lightened at about 375-450°C, eventually becoming pale yellow to white, apparently indicating that organic coloring agents were driven off. This, and the fact that modern ostracodes develop dark colors only when heated in organic-rich substances, support the contention that the dark color originates from extrinsic organic materials. Pyritized shells become weak red (Munsell 10R 4/4) upon heating; thus, they <u>can</u> be distinguised from those colored by organics.

Therefore, ostracode colors appear to be diagnostic of T-P and present the potential for use in paleotemperature reconstructions. A wide range of fossils, including conodonts, phosphatic brachiopods, scolecodonts, and palynomorphs are known to show recognizable and useful evidence of thermal maturation and it is proposed that ostracodes be added to the list.