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Assessing Eggshell Pigment Fossilization Potential with Artificial Aging

Modern bird eggs are unique from those of reptiles in that they may be naturally pigmented; recently, evidence was found to support the presence of pigment in fossilized dinosaur eggs. The purpose of this study is to determine the likelihood of pigment preservation in eggshell that has undergone fossilization. Two aspects of the fossilization history of eggshell are considered: pre- and post-burial conditions. Pre-burial conditions include exposure to sunlight and meteoric water. Sunlight is simulated using a UV lamp with a peak wavelength of approximately 370nm. Meteoric water is simulated using dry ice in distilled water to produce carbonic acid. Post-burial conditions consist of either extremely high temperatures or lower, typical to geological reality temperatures. Emu eggs are used to test the preservation potential of biliverdin, the pigment responsible for blue-green coloration. Brown chicken eggs are used to test the preservation potential of protoporphyrin IX, the pigment responsible for brown coloration. White chicken eggs are used as a control. Preservation potential is assessed by comparing the presence of pigment in unaltered eggshell to the presence in eggshell altered either by only pre-burial conditions or by both pre- and post-burial conditions. This is done using high performance liquid chromatography (HPLC) and histological thin-sectioning. HPLC provides chemical identification of the presence of pigments. Histology provides visual comparison between conditions including both coloration and structural changes. Results will aid in ascribing color to fossilized eggshell and may allow for additional learning in the area of dinosaur reproduction.