

Coomassie Brilliant Blue Dye as a Method for Analyzing Fracture Markings in Bone

Abstract

Coomassie Brilliant Blue Dye is a dye commonly used to stain proteins. Because of its ability to adhere to proteins, this research has focused on perfecting a method of dyeing a fractured flat bone in order to most accurately observe and analyze fracture markings within the trabecular layer. Stereoscopic microscopy was the chosen technique of analysis for this research because of its proven effectiveness in glass and ceramic fractography to observe varying depths. In order to most effectively apply stereoscopic microscopy to this research, the following variables were manipulated to maximize color contrast in the trabecular layer in order to observe the clearest fracture markings: the drying time of the bone in an oven before dyeing, concentration of the Coomassie blue dye in ethanol, and number of rounds of dyeing the bone and rinsing with ethanol. To find the most effective procedure, seven fresh porcine scapulae were first dissected, then immediately broken via a weight drop. Multiple procedures were then investigated by drying the fractured bone in an oven for various lengths of time, dyeing the bone using varying procedures, and finally performing analysis using stereoscopic microscopy. Ultimately an ideal procedure was developed. In the future, this procedure has many implications for varying specialties within the scientific community such as in forensics and medical research. The ability to clearly observe and therefore accurately analyze these fracture markings could be beneficial in determining the origin of a fracture as well as the modes of fracture and stress states during fracture.