A NEW DYED PURPLE OPAL

Nathan Renfro (nrenfro@gia.edu) and Shane F. McClure
GIA Laboratory, Carlsbad

GIA's Carlsbad laboratory recently received a group of opals for identification reports that showed an unusual bright purple bodycolor and strong play-of-color (figure 1). The stones were said to be natural material from a new deposit in an undisclosed location, although subsequent rumors suggested Mexico or somewhere in South America. Two things about this material were immediately apparent. First, the color was unlike any previously reported for opal. It was also very porous, having a slight stickiness to the touch and rapidly absorbing water when immersed, making it a hydrophane opal.

Figure 1. This 5.90 ct hydrophane-type opal showed gemological features consistent with material from Wollo Province, Ethiopia. The purple color proved to be caused by dye. Photo by Robison McMurtry.

Gemological examination produced spot RI measurements between 1.37 and 1.41. The specific gravity ranged from 1.70 to 1.77, measured hydrostatically before allowing the stones to completely absorb the water. All samples showed a very weak blue reaction to short- and long-wave UV radiation. A broad-band absorption from around 550 to 600 nm was seen with the desk-model spectroscope. Magnification revealed pseudo-octahedral to irregularly shaped dark crystals and "digit-pattern" cellular play-of-color (figure 2). Also seen in some samples were subtle concentrations of purple color around pits, small fractures, and surface-reaching inclusions (figure 3).

This combination of features and properties is consistent with hydrophane opal from Ethiopia (see B. Rondeau et al., "Play-of-color opal from Wegel Tena, Wollo Province, Ethiopia," Summer 2010 *G&G*, pp. 90–105). However, opals from Wegel Tena are not known to show this purple bodycolor, which along with the color concentrations suggested that these stones were dyed. To confirm this, several samples were soaked in acetone (with the client's permission) for at least 16 hours. After soaking, the acetone appeared near-colorless to very light purple, indicating that the purple color was soluble but not readily removed. Visible spectra were collected from the acetone to identify the features causing the purple color. The spectra revealed two absorption features at 555 and 594 nm (figure 4).

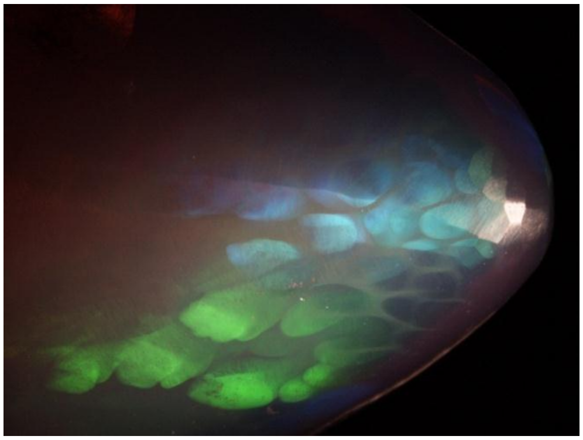

Figure 2. The cellular structure or "digit patterns" of the play-of-color is common in Ethiopian hydrophane opal. Photomicrograph by S. F. McClure; magnified 10x.

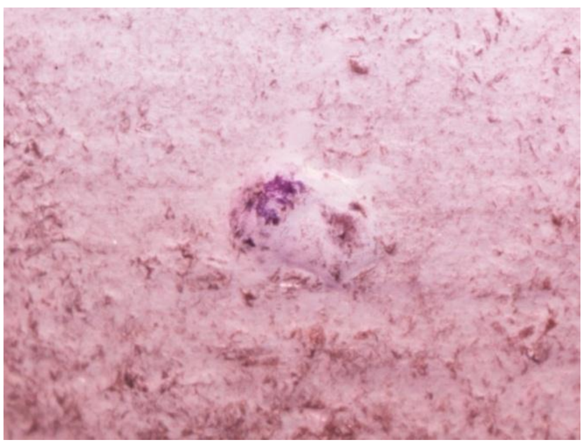

Figure 3. Some samples of the opal showed subtle purple color concentrations in pits and scratches. Photomicrograph by N. Renfro; magnified 50x.

While we do not know for certain that this purple opal is from Ethiopia, the similarities reported here and others that will be outlined in a subsequent report are hard to ignore. With the abundance of Wollo opal on the market since its introduction in 2008 and the nature of the material, it would be no surprise to see treated samples. Unusual bodycolors of opal should immediately arouse suspicion of artificial coloration. Even more alarming is the potential for creating natural-looking bodycolors such as orange or black (e.g., www.stonegrouplabs.com/SmokeTreatmentinWolloOpal.pdf).

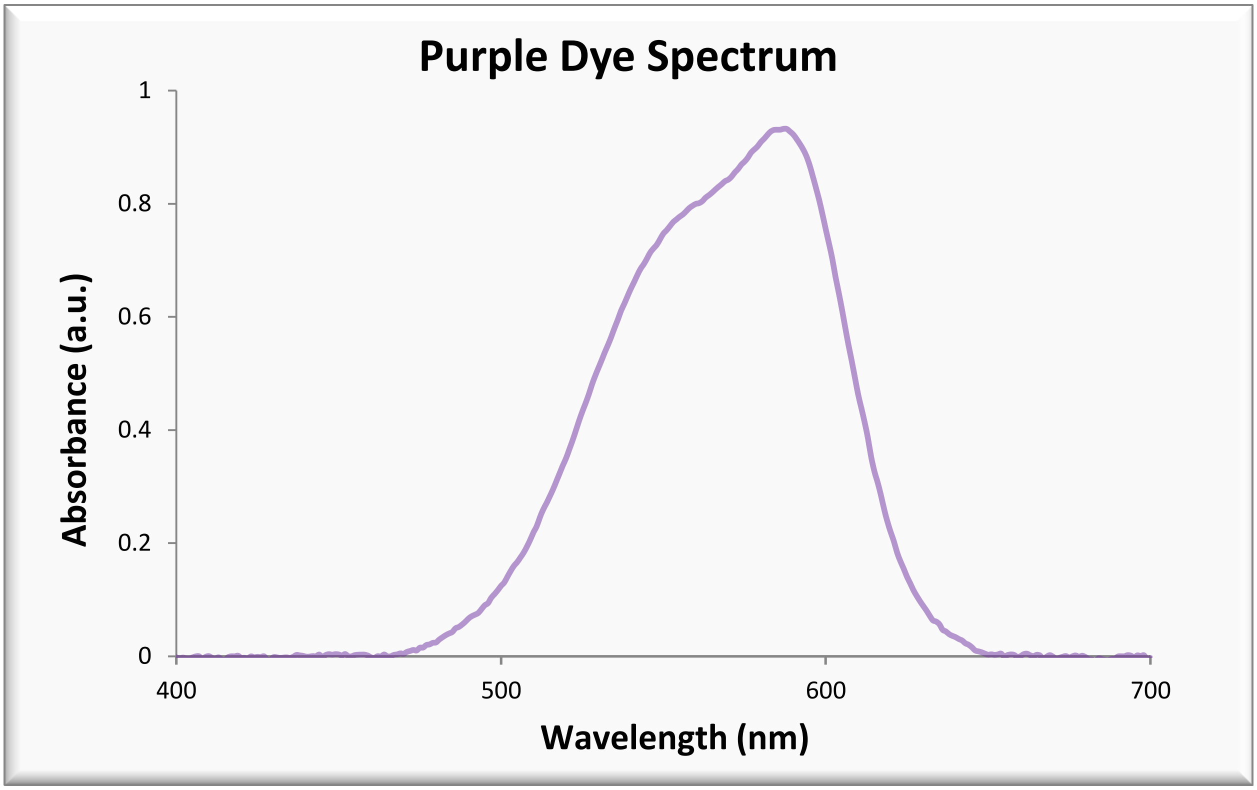

Figure 4. The visible absorption spectrum taken from the acetone used to test for dye in the purple opals showed a broad absorption feature composed of two peaks at 555 and 594 nm.