Newsweek

(Multicolored) Diamonds Are a Girl's . . .

By Sharon Begley | 5/18/10 at 7:01 PM

Ice. Bling bling. Rocks. Diamonds. However you know them, it's always risky replacing mystique and magic with science. But while regular diamonds haven't lost their allure even among those who know they're basically just a compressed hunk of coal, colored diamonds—like the famous Hope—have an advantage in the mystery department: despite centuries of study, scientists aren't sure what gives some—they come in pink, blue, red, orange, green, yellow, purple and five other basic hues—their color.

Alan Bronstein wouldn't mind changing that. To that end, the New York City-based diamond collector and dealer has amassed two world-class collections of colored diamonds: the 296 naturally-colored-diamonds of the Aurora Collection (total carats: 267.45), now on display at the Natural History Museum in London, and the 240 of the Butterfly of Peace (166.94 carats), which was at the Smithsonian Institution from 2004 to 2005.

I've known Alan for almost a decade, and although I don't know any other diamond merchants I suspect he is one of the few who gets more joy from seeing his gems written up in scientific papers with such titles as "Fluorescence Spectra of Colored Diamonds Using a Rapid, Mobile Spectrometer" than he does seeing one on a bride's ring finger.

While the Butterfly was at the Smithsonian, Bronstein's gave scientists there permission to subject it to an ultraviolet laser that caused the stones to fluoresce. His stones were in good

company. As researchers led by James Butler of the Naval Research Laboratory reported in January in the journal Geology, they studied the blue diamonds in Bronstein's Butterfly—plus the Hope diamond and the Blue Heart, the world's two largest known natural blue diamonds. The 45.52-carat Hope is the record-holder among deep-blue diamonds; owned once upon a time by one English and three French kings, it's now in the Smithsonian's National Gem Collection.

Unbeknownst to most admirers, when the Hope is exposed to ultraviolet (UV) radiation, it phosphoresces red. When the NRL's Butler and colleagues shined UV on three synthetic, one treated, and 67 natural blue diamonds including the Hope, the Blue Heart and blues from the Aurora Butterfly and the Aurora Collection, they wound up with a way to distinguish natural blues from synthetic and treated ones. Basically, the color of the phosphorescence serves as a "fingerprint," the scientists say, with specific wavelengths of the phosphorescence—500 (greenish blue) and 660 (orange red) nanometers--for natural blues, but no 660 for synthetics.

Colored diamonds have not given up their secrets by far, however. Scientists have figured out that blue diamonds get their color from boron and a soupçon of nitrogen, while greens get their hue from radiation and pinks from crystal deformation. But the defect or doping agent (that is, the natural element that is present in trace amounts) that produces brown diamonds is unknown, the NRL's Butler and colleagues note in the Winter issue of Gems & Gemology, a publication of the Gemological Institute of America. And although hydrogen has been identified in purple (the rarest colored diamond) and gray-blue diamonds, they acknowledge, "the specific configuration causing the color has not yet been identified." Nor do scientists know what gives orange diamonds their color. Mystery intact.