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NOTABLE NOTES

The Purple Dye That Heals

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Buckets of purple dye rain down on Canadian engineering students every year to honor the mid-19th to mid-20th century Engineering Corps of the British Navy, who were distinguished by their purple armbands.[1] This triphenylmethane dye, gentian violet (GV), also known as crystal violet, methyl violet, pyocyanin, or hexamethyl pararosaniline, was first synthesized in 1861 as the "Violet de Paris" by Charles Lauth, a French chemist. In 1880, the German pharmacist George Grubler popularized GV and sold it exclusively to scientists. Hans Gram used GV to create the Gram stain for bacteria in 1884, but GV's antiseptic and antitumor properties were not discovered until 1891.[2]

However, many questioned GV's medicinal value, and it was abandoned until John Churchman identified its bacteriostatic properties in 1912. Gentian violet became a common treatment for a variety of diseases ranging from impetigo to burns,[2] for which it is still currently used.[3] It is important to note that these prior allegations of GV's potency are difficult to validate because of the variety of GV dye compositions that existed during that time.[2]

Today, GV is characterized as a symmetric compound with 6 methyl groups, called hexamethyl rosaniline, which can be synthesized through a variety of reactions. Although interest in GV waned during the 1940s owing to the advent of sulfa drugs and penicillin, there has been renewed interest in it, especially with the rise of antibiotic resistance.[2]

Gentian violet is now known to be antimycotic, antibacterial, anthelmintic, and antiangiogenic.[2] It is potent against fungi like *Candida*, which causes thrush and various yeast infections,[3] as well as bacteria including *Streptococcus, Pseudomonas*, and *Staphylococcus,* and even methicillin-resistant *Staphylococcus aureus* found in ulcers, atopic dermatitis, and otitis media. Gentian violet coatings of newborn umbilical cords and invasive devices, like urinary catheters, exhibit increased antibacterial protection. Gentian violet can also protect against Chagas disease transmission via blood transfusions and infections caused by the protozoa *Leishmania* and the parasitic nematodes *Strongyloides* and *Enterobium*. Further research is required to capitalize on GV's promising antiangiogenic and anticancer properties.[2]

In addition to its medicinal effects, GV is used to develop fingerprints in forensics and stain tissue cultures and DNA in the laboratory. Gentian violet is also used to dye a variety of products ranging from ballpoint pen and printer ink to antifreeze and leather jackets.[3] Although GV interacts with cellular DNA, it generally has minimal adverse effects and is US FDA–approved to be sold over the counter.[2] Thus, GV is an interesting dye that has nonmedicinal and therapeutic applications.

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1. Au M. The science behind purple dye. The Cannon. http://cannon.skule.ca/the-science-behind-purple-dye-3/. Accessed August 2015.

2. Maley AM, Arbiser JL. Gentian violet: a 19th century drug re-emerges in the 21st century. *Exp Dermatol*. 2013;22(12):775-780.

3. National Biochemicals LLC. Crystal Violet [product information sheet]. www.nationalbiochem.com/pdf/pis/MC3886%20PS.pdf. Accessed August 2015.