

"DIOXIN" EMBALMING FLUID: A HISTORICAL INVESTIGATION

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Introduction

I found it while searching the World Wide Web using dioxin as a key word: a bottle and accompanying box labeled Dioxin Peerless Embalming Fluid/Re-Concentrated Dioxin (Figure 1). According to the box, "DIOXIN FLUID is ESPECIALLY Prepared to Embalm the most difficult cases, Is the Greatest Tissue Preserver known to modern science." It can be used to "PREPARE THE PROPER STRENGTH Fluid required for SPECIAL CASES ...drowning bodies, Cancer cases, Child bed fever or Alcoholism." I thought at first that it was a morbid practical joke, but the bottle and box had a genuine early-to-mid twentieth century look.

What was dioxin embalming fluid?

If legitimate, the product could not possibly have been the compound often called dioxin (2,3,7,8-TCDD) that many of us study today. The name dioxin has been around, however, since at least 1909 (See discussion in Ref 1). It describes 1,4-dioxin, also known as *p*-dioxin (C₄H₄O₂), CAS No. 290-67-5, the central two oxygen-containing ring of dibenzo-*p*-dioxin and 2,3,7,8-TCDD. But I couldn't find any mention of this compound in books on the chemistry of embalming fluids (e.g., Ref. 2).

The bottle was empty so I could not analyze the product. The label on the bottle did not list the ingredients, but stated that it had been manufactured by the H.S. Eckels Company, Manufacturing Chemists of Philadelphia. Using the internet again, I was unable to locate the company in Philadelphia but did discover an H.S. Eckels and Company in Guelph, Ontario. Their website included a short history of the company.³ Howard S. Eckels, a pharmaceutical chemist, founded the company and the Eckels College of Mortuary Science in Philadelphia in 1895. A Canadian affiliate was later established. The website did not discuss Dioxin Embalming Fluid, so I wrote to the company asking for more information about the product, its ingredients, and the origin of the name. Their return letter stated that the company had manufactured the product from about 1920 to 1940. But they had no idea how Mr. Eckels arrived at the name.⁴ They enclosed a reprint of an advertisement for the product stating that this "most modern and famous of all embalming fluids" contained two disinfectants: purified formaldehyde and [hydrogen] peroxide.⁵ Another advertisement explained the meaning of re-concentrated: "Chemically Pure Formaldehyde and other ingredients used in Re-Concentrated Dioxin have twice the power of disinfection, drying, penetration and preserving of other fluids which contain the poorer grades known as Commercial Formaldehyde."⁶

“Dioxin” and Public Health

A raging debate took place during the 19th century regarding the public health impacts of urban graveyards.⁷ Following the dominant miasma theory of the day, many sanitarians, physicians believed that putrefying bodies could cause or greatly aggravate infectious disease. A prominent report of the time argued:

When the living body is exposed to putrid emanations in a highly concentrated state, the effects are immediate and deadly; when more diluted they still taint the system, inducing a morbid condition, which renders it more prone to disease in general, but especially to all forms of epidemic disease, and which further predisposes it to pass into a state verging upon if not actually that of putrefaction. The most recent examination of the grave-yards of the metropolis appears to us to show they contain putrefying matter enough to communicate this putrefying process to those who are exposed to it. It is stated by Sir James Macgregor, that on one occasion in Spain, soon after 20,000 men had been put into the ground within the space of two or three months, the troops that remained exposed to the emanations of the sold, and that drank the water from the wells sunk in the neighborhood of the spot, were attacked by malignant fevers and by dysentery.⁸

Reform movements advocated building cemeteries away from cities as well as cremation [N.B. The latter is a modern source of our dioxins⁹]. Following the germ theory revolution of the late 1800s, the hygiene argument began to lose force.^{7,10} By 1902, a prominent public health textbook stated that “there is good reason to believe that whatever diseases may have appeared in the neighborhood of graveyards, have had their origins elsewhere.”¹¹

Embalming played only a small part in the graveyard debate, but hygiene and public health were one of the rationales offered by the funeral business. Modern embalming began in the United States during the Civil War, allowing bodies to be shipped home from the battlefield. It received a further boost when Lincoln’s body was embalmed before transportation to Illinois.¹² Nineteenth century techniques relied on inorganics such as arsenic and mercury compounds. By the turn of the century, new ideas and technology were in place. Based on the germ theory of disease, embalmers claimed that destruction of micro-organisms would halt or slow decay. Besides preserving the body for cultural reasons, disinfection killed infectious organisms and it was claimed that this would protect public health.^{12,13} [N.B. The public health focus on embalming today primarily concern risks to embalmers, e.g. Ref. 14]. Formaldehyde, a potent anti-microbial agent came into extensive use around the turn of the century; it was considered safer than the inorganics and less likely to cover up evidence of poisoning.¹³ Dioxin Embalming Fluid also contained hydrogen peroxide, an organic disinfectant and bleaching agent.

Eckels’ reason for naming his product dioxin has been forgotten. It may be that he wanted a name which sounded scientific, in keeping with the times and the desired image of the funeral industry.¹⁵ But Eckels was a chemist by training. Perhaps the name “dioxin” derived from the two oxygen-containing compounds in the product, forming a linguistic link between Eckels’ dioxin and ours.

H.S. Eckels and Company no longer manufactures “Dioxin,” but a recent list of their products included NuOxin and Trioxin. In a bizarre twist, the horror movie “The Return of the Living Dead” has zombies created by exposing corpses to 2,4,5-trioxin.¹⁶ There actually is a compound called trioxin—it’s a synonym for 1,3,5-trioxane (CAS 110-88-3)¹⁷—but as far as I can tell there is no 2,4,5-trioxin. Let’s hope environmental chemistry avoids that name.

References

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17. National Institute of Standards and Technology Chemistry WebBook: <http://webbook.nist.gov/cgi/cbook.cgi?Name=trioxin&Units=SI>

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Figure 1. Packaging and bottle of Dioxin Embalming Fluid

