Arterial Embalming

by Saint-Rowan Tackitt

Body disposal is an important aspect of any culture, as it is an important aspect of communal living. The dead must be disposed of somehow, and the way in which they are reflects the values of their culture. Yet as technology advances and options are expanded, it is culture which may change in response. Such has been the case with modern arterial embalming. This practice has been highly influential in the cultures which developed it, and continues to dominate conversation about body disposal today. I would argue that it even has an effect on biology, as with many cultural practices, arterial embalming can have consequences for the environment and health of the living.

Past

The word “embalm” previously meant, simply, “to give a pleasant fragrance to” and “to preserve.” As such, ancient methods of embalming generally consisted of coating a body in herbs and honey to obscure decay. Modern understandings are tied to arterial embalming, in which a body’s blood is replaced with a chemical mixture injected through an artery (typically the right carotid). Scottish anatomist William Hunter is credited with creating this method during his studies of anatomy and body preservation in the 17th century. Prior to his discoveries, body preparation was typically conducted by female relatives, with disposal carried out by male relatives or undertakers. It was embalming which allowed undertakers to professionalize and legitimize their field. Through embalming, undertakers were able to be recognized as colleagues to physicians who were selling a scientific service, marketing themselves as disease experts who

handled dangerous corpses for the protection of the populace.

Embalming was a popular choice in England by the 1890s, in large part due to its promise of preserving identity and status while preparing the deceased for Judgment Day. However, it was also considered unnerving. 19th century England was fascinated by suspended animation, artificial resuscitation, and anatomical dissection due to their counterintuitive relationships to death. A living person could appear to be dead, a dead body could be revived, and death was not found in a discrete form within the body. As such, when embalming offered a "deathless" corpse, people were disturbed. Embalming could alleviate fears of being buried alive by guaranteeing death, but it also turned the corpse into a "confusing signifier" (Scandura 1996, 13). Decay, and even mutilation by a physician, were considered more appropriate (Scandura 1996).

Arterial embalming was developed separately in the United States. Physician Thomas Holmes created an arsenic-based method during the Civil War in order to transport fallen soldiers home before decomposition could take hold. This method was popularized by Abraham Lincoln's three week funeral procession, during which the public was able to view his body. Demand for embalming grew exponentially. Similarly to its British counterpart -- and with help from religion and urbanization -- embalming's popularity allowed for the development of the American funeral industry. Now referred to by critics as the funeral industrial complex, this enabled the formaldehyde-based method to remain the primary choice for Americans until cremation's takeover in 2015, and continues to hinder the development of alternatives through its hegemony (Tackitt 2021) in spite of serious biological concerns.

Present

Every year, 4.3 million gallons of embalming fluid -- including 827,060 gallons of formaldehyde, methanol, and benzene -- is put into American soil, alongside “20 million feet of wood, 4.3 million gallons of formaldehyde and other embalming fluids, 1.6 million tons of reinforced concrete, 17,000 tons of copper and bronze, and 64,500 tons of steel” (Mosbergen 2021). Not only is this a waste of resources, but a danger to the living. Dr. Holmes’ arsenic-based methods were ended in the early 20th century due to their harmful health effects and interference in criminal investigations, and later studies have found increased levels of arsenic -- as well as copper, zinc, and led -- in the groundwater surrounding cemeteries from the late 1800s (Chiappelli and Chiappelli 2008). Why would modern cemeteries be any different? A 1980s report raised concerns about cemeteries as a potential water pollution source, which were dismissed by the White House due to a lack of studies; however, similar studies from around the world have found formaldehyde in groundwater, with concentration increasing relative to cemetery proximity. The Environmental Protection Agency (EPA) has known about the probable dangers of formaldehyde since 1987 and regulates it as hazardous waste, listing it in the top 10% of the most hazardous chemicals for the environment. In 2002, the World Health Organization (WHO) found that formaldehyde injures or kills plant root systems and developing marine plant life, and according to the National Cancer Institute it acts as a simple irritant in low amounts but causes “myeloid leukemia and rare cancers, including cancers of the paranasal sinuses, nasal cavity, and nasopharynx” at high levels of exposure. Additionally, contrary to the 19th century beliefs which have remained perpetuated by the funeral industry, dead bodies are not inherently dangerous and are not “cleaned” by embalming. The small number of communicable diseases

that may be passed on by a corpse are regulated by the industry -- but this list does not include bloodborne illnesses. While these would otherwise not be a safety risk, embalming requires the draining of blood into the sewer system, which may potentially expose embalmers and the public to disease (Chiappelli and Chiappelli 2008).

While cremation has gained enough popularity to eclipse embalmed burials -- especially since the onset of the COVID-19 pandemic -- it is not a perfect replacement. Many corpses are embalmed prior to cremation, a process which renders them slightly carcinogenic. Cremating embalmed remains releases formaldehyde into the air along with at least 42 other federally regulated “dangerous chemicals.” Formaldehyde can last up to 250 hours in the air and is highly soluble, allowing it to easily combine with precipitation (Chiappelli and Chiappelli 2008). Burning embalmed remains also releases trace metals such as mercury, which can be removed with filtration systems; however, these do not prevent the release of CO2. Cremation has long been considered the more environmentally friendly option due to U.S. filtration and emission restrictions, but in light of the COVID-19 pandemic, restrictions have been lifted in order to address the backlog of dead in funeral homes. Cremating a single corpse releases approximately 600 pounds of CO2, generating an estimated 360,000 metric tons each year in the U.S. alone -- without accounting for burned fossil fuels (Mosbergen 2021).

Future

Arterial embalming has always had a complicated relationship with culture. According to the EPA’s toxicity mixture test, when something toxic is mixed with something non-toxic, the entire thing becomes toxic. This means that by adding embalming fluids (toxic) to a human corpse (non-toxic), the body becomes toxic. While the EPA has determined that a human body

should not be labeled “solid waste” in response to the distress this rule causes mourning families, this does not change the reality or the implications (Chiappelli and Chiappelli 2008). Embalming irrevocably changes the dead’s being, representing a collapse between appearance and essence as it is altered for aesthetic purposes (Scandura 1996).

The potential psychological benefits of recognizing a loved one’s corpse remain challenged by the uncanniness which unsettled Victorians; we cannot move forward until we address the problems of the past. Thankfully, a number of alternatives have been developed in recent years, largely in connection to the Death Positivity movement that began to form at the turn of the century. “Death positivity” is a term coined by mortician Caitlin Doughty in 2013 as a play on the body positivity movement, reflecting the rising idea that death should not be considered “bad” but rather embraced and respected. The more widely recognized Green Burial movement is an offshoot of this idea, and many of the people working with Doughty’s death positivity organization, the Order of the Good Death, are also heading projects for sustainable disposal alternatives. Simple natural burials, in which a body is buried in linen or biodegradable fibers, are the most accessible and environmentally friendly option. However, these require living in proximity to a designated green burial cemetery. Other alternatives include aquamation, or water cremation; Jae Rhim Lee’s Infinity Suits, which are interwoven with mycelium designed to transfer your body’s nutrients to the surrounding soil; and Katrina Spade’s Recomposition, which turns corpses into compost. These are only a few of the many creative options that hope to replace arterial embalming, and with price tags significantly lower than the $8,000 of a modern American funeral (Tackitt 2021).

Notably, many of these projects -- along with the larger death positivity movement -- are headed by women; who, we may remember, were traditionally tasked with caring for the dead

until embalming allowed male entrepreneurs to take over. Coincidentally, this movement has also arisen at the same time that women have flooded the death industry: over 60% of mortuary science students now are women, and forensics is the only STEM field which can claim a female majority (Tackitt 2021). As with many things, our salvation lies in de-colonization and equality. The burial practices of the future will be developed by returning to the past, and hopefully save us from premature demise.

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