

English 280, Second Place; Professor, Carol Bollin

## **The White Plague**

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*Homo sapiens sapiens* have survived myriads of catastrophes in the hundreds of thousands of years they have been on the Earth. From the most calamitous of human activities—pollution, wars, industrial accidents, nuclear meltdowns, and so much more—to the most devastating of natural disasters—earthquakes, volcanoes, storms, fires, and floods—humanity has inexorably endured, becoming stronger in the process; yet, among these scourges, one is scarcely mentioned: disease. Often tucked away into the folds of human antiquity and overlooked, disease has nevertheless existed as long as humans have lived to diagnose abnormalities in the body's condition—the factors causing them (such as microbes and viruses) have existed even longer.

Various pandemics and epidemics have taken an innumerable amount of lives throughout history, but one disease is distinct in the suffering it has caused. Its many epithets—“consumption,” “phthisis,” “The Captain of Death,” “the robber of youth,” “the King's Killer,” “scrofula”—are a testament to that. Tuberculosis (TB) is unique in its interactions with humanity. From devastating early farming societies to the ancient Egyptians and Greeks to Europe and the Americas, the disease is regarded as one of the world's deadliest; yet, it is often seen only in clinical and statistical terms. We forget that there are people who suffered, actual lives that were significantly affected by tuberculosis—people like Laura Woods, her family, and the folks of the Texas Hill Country, portrayed in Janice Woods-Windle's 1998 novel *Hill Country*—and that even today in Haiti, India, parts of Africa and beyond, the disease continues to destroy lives. In the future, it may prove to be even more deadly. For these reasons, we need to

fully understand what this awful disease is and its lethal consequences not only for people, but also for society as a whole, in order to treat it.

This disease has numerous forms, each with its own causes and symptoms, but all types are derived from the genus *Mycobacterium* of the phylum Actinobacteria. Medical historian Helen Bynum claims the ancestor of today's pathogenic *Mycobacterium* existed three hundred million years ago (for reference, modern humans have existed only about two hundred thousand years) (Bynum 1). Bioarcheologist Doctor Charlotte A. Roberts and anthropologist Doctor Jane E. Buikstra list the different types of infectious *Mycobacterium* in their work *The Bioarchaeology of Tuberculosis: Mycobacterium leprae* causes leprosy in humans while the *Mycobacterium tuberculosis* complex causes tuberculosis, which consists of *M. africanum*, *M. bovis*, *M. canettii*, and *M. tuberculosis* itself (Roberts and Buikstra 4). These are species that not only infect humans, but animals as well.

At some point in its evolutionary course, mycobacteria had to come into contact and interact with humans in order to produce today's pathogenic tuberculosis. There are several theories as to how that could have occurred. In her book *Spitting Blood: the History of Tuberculosis*, Helen Bynum cites a few of them. One is the widely accepted model of horizontal transfer: when humans came into regular contact with animals, *Mycobacterium tuberculosis* evolved from *Mycobacterium bovis*, a species that infects cattle (Bynum 2). This occurred when hunter-gatherer groups shifted over to pastoral and agricultural societies that relied on the domestication of animals. As humans consumed more and more animal products (meat, cheeses, and milk), the disease was able to spread to them. Bynum also cites another model, one that relies on vertical transmission, rather than horizontal: human ancestors harbored early mycobacteria within their bodies, allowing both to evolve over time (Bynum 2). A third model

Bynum provides contradicts both of these theories: according to her, results in recent DNA sequencing reveal that *M. bovine* may have mutated from *M. tuberculosis*, which may have existed much longer before (Bynum 3); however, whatever the disease's origins may be, it is important that we look at what makes it so effective in taking life.

Many other diseases have existed as long as TB, some longer. What makes *Mycobacterium* so deadly? The answer lies in its pathogenesis when it infects an organism. Most cells, whether bacterial or eukaryotic, undergo mitosis and cytokinesis, processes by which a cell duplicates its genetic material and organelles and splits into identical daughter cells. This is how cells can grow. Cell growth is defined not by how large a cell gets, but by how many times it can multiply itself. Bacterial species able to quickly divide and multiply are considered fast growing.

*Mycobacteria* are not; Helen Bynum states it takes nearly twenty-four hours for *M. tuberculosis* to divide even once (an astounding seventy-two times longer than *E. coli*, which can divide once within twenty minutes) (4). *Mycobacterium tuberculosis* takes so long to grow mainly because of its complex cell wall. Bynum explains that *M. tuberculosis* cell walls consist of lipids and glycolipids (lipids with an attached carbohydrate) (4). This may not seem significant, but it is indeed an evolutionary marvel. The cell wall can withstand most of the human body's defenses by resisting acids, defense proteins, and some antibiotics (4). It's terrifying to think about: a disease able to tolerate the human body's immunities and modern medicine's treatments. It is no wonder, then, that tuberculosis has long been a scourge.

Another reason TB can be so deadly is its ability to stay dormant within the body. After infecting someone, the disease doesn't necessarily have to remain active, but instead can act much like the Shingles virus or the Herpes Simplex Type One virus and remain latent to awaken at some other time. One way this happens is through so-called "tubercles" that form in the lungs.

These tubercles form when bacterium enters the lungs. The body's immune system automatically reacts to defend against the trespasser. Specialized cells attack and surround the invaders and they are calcified, forming the round, nodule-like tubercles that sit within the lung. At any time, whether by stress or other diseases, the bacterium can reactivate. How terrifying to think that someone could have the disease and still spread it to someone else without realizing.

This is a fear Laura Woods subconsciously realizes. Just a short while after her marriage to Peter Woods, Laura finds herself alone on the Wilderness Ranch, fulfilling the requirements of the Land Alienation Act that could allow her family to gain a sizeable amount of acreage in Texas. There she meets the trapper Gunther, a bitter, volatile man with a ragged wet cough. She describes him as "... cadaverous, smelling of death, trousers covered with what she could only imagine was dried blood" (Windle 167)—she also believes he has tuberculosis (Windle 168). Laura fears not only for herself but also for the life of her unborn child. The terror only ends when Gunther dies in an ice storm outside her cabin. Laura is incredibly lucky that she never contracts the disease—so many others were not so fortunate.

Now that it's possible to understand how the disease operates, it's important to know how it manifests in the body and what symptoms it causes—which entirely depends on the type of tuberculosis (TB has had so many names because of the various symptoms it causes). Most often, the disease is known for its pulmonary form, in which the sufferer coughs and spits up blood, is plagued by fever, and slowly wastes away—hence the terms phthisis and consumption, which are both associated with degeneration; however, tuberculosis isn't limited to solely infecting the lungs. Charlotte Roberts and Jane Buikstra state that TB can become extra-pulmonary when it infects the lymph nodes and/or intestinal walls. (Buikstra and Roberts 19). For example, the lymph nodes of the neck swell when infected, leading some to diagnose the

ailment as scrofula (Buikstra and Roberts 8). Stacie D. A. Burke, a professor of Anthropology, explains other forms the disease takes: when TB infects the blood, it is known as military tuberculosis; when the disease infects the brain and/or spinal cord, a more serious condition called tuberculosis meningitis develops (Burke 29). But these are only a few of the disease's many forms.

Tuberculosis is infamous for the amount of lives it has reaped. The bacterium's complicated cell wall, ability to hibernate in a host, and infect and re-infect multiple body parts makes it an especially resilient species—but these factors on their own cannot fully explain how it can devastate whole populations. The answer lies in transmission. Infectious diseases can be spread via direct or indirect contact. Tuberculosis is disseminated through droplet transmission: a person with the illness exhales (usually by coughing or sneezing), releasing droplets that contain the bacteria. These droplets then make contact with another person, who can also either develop the disease, or carry it around in its latent state. Occasionally indirect transmission can occur when the droplets land on a surface that a person touches and becomes infected, but this must happen in a short time period because the bacteria in the droplet(s) have to be viable.

This droplet form of transmission is an especially important factor when looking at how the disease can infect whole populations. Stacie D. A. Burke quotes Jeffery R. Starke when she says tuberculosis is “the quintessential family disease” (Burke 29), perfectly paralleling Sherwood Davies' life. In American Experience's documentary *The Forgotten Plague: Tuberculosis in America*, he discusses his family's history with TB: Davies' maternal grandparents and father died of the disease while his mother carried it, just as he did (1). Davies' circumstances, though unfortunate, were common throughout America and Europe when the disease was still active. TB was known to infect entire families for years and years—hence the

term “family disease;” though, when looking at transmission of the diseases forms, this makes a lot of sense.

As explained earlier, *Mycobacteria bovis* infects cattle (and humans). Because a large portion of American and European diets consisted of meat, milk, and cheeses, that bacterium could easily transfer to human populations, and then spread from person to person—just as easily, someone could breathe in the droplets of an infected victim and come home to unwittingly spread it to their entire family or anyone else to whom they were close. With the disease able to disseminate across not only the human body so quickly but also among large populations and remain resistant to treatment, it’s no wonder that so many fell victim to it—exactly what is happening now in Haiti and parts of India. Most people affected tend to live in poorer regions, where the populations are denser, meaning that transmission is not only likely, but almost guaranteed.

As it is in human nature, people strove (and continue to this day) to find cures—and if cures couldn’t be found, remedies were created to help alleviate symptoms. Throughout ancient times and the Middle Ages, medical advice, while logical, was based on false premises that stemmed from a lack of true knowledge of the human form. Blood-letting illustrates this best: it was commonly accepted in the Middle Ages that the body consisted of four so-called humors—body fluids that corresponded to four personality types. Illness was the result of these four fluids becoming imbalanced. Occasionally, outside intervention was necessary to rebalance the humors. Helen Bynum points out in *Spitting Blood*: since tuberculosis patients often spat out blood, keeping the four-humors system in mind, it was reasonable to assume the body was trying to rid itself of an overabundance; by bleeding someone, the profusion could be removed and allow the body to heal on its own (Bynum 20). Various diets designed to balance the humors

were also suggested—yet, as history has proved, these treatments were unsuccessful in curing the illness.

The ancient Greeks and Romans adhered to the more popular theory that certain airs and atmospheres could affect the phthisic patient. Helen Bynum explains that ancient Roman physicians often prescribed traveling to regions with warmer, dryer climates, where there were supposedly gentler airs. They also recommended sea trips, not just for the airs, but also for the emesis associated with seasickness, which was considered purifying because it purged the body (Bynum 19). This notion of airs and atmospheres was especially popular in America during the 1800s, and it led to significant social and political change.

The documentary *The Forgotten Plague* tells about how many physicians relied on Greek and Roman remedies during the eighteenth hundreds, advocating leaving the industrialized urban sprawl for the supposedly cleaner open airs of the country (2). Among many of the settlers of the west were people with TB looking for the cure. The trapper Gunther may very well have been one of these cure-seekers who came to the unsettled West for its fresh airs allegedly so beneficial for the consumptive patient. Laura often describes in detail the beauty of her home in her biography *Hill Country*: “The land rolled and twisted and folded like a blanket on a giant’s unmade bed,” (Windle 65); at other times, the hill country could be overwhelming in its wildness, with Laura describing the land as “hard and leathery” (Windle 166). Yet, it was these contrasting features of the unsettled West that made it so attractive to many consumptives.

They not only came to the West on the advice of their doctors, but were also drawn in by the aggressive advertising of promoters in growing cities. *The Forgotten Plague* describes a writer named Charles Willard in Los Angeles, one of those advocates (who also had TB). He published *The Land of Sunshine*, a journal that publicized the healing powers that lay in southern

California, urging consumptives (mainly those wealthy and white) to come to Los Angeles for relief (5). It isn't difficult to imagine the lure that California must have had to those with TB. Even Laura—who never had TB—was convinced that California would help her live longer: “If I can get to California where the air is always soft and fragrant and the hills are green and smooth as corduroy,” she reasons, “it might just be I'll live forever, after all” (Windle 449). Imagine, then, the pull a TB victim must have felt: having the terrible disease was to eternally stand in the shadow of death—but then picture the hope the patient must have experienced after being told that perhaps there was relief to be found in the Promised Land that lay beyond the Mississippi River. As a result, thousands flocked to the west. *The Forgotten Plague* shows how the safe haven that Los Angeles considered itself to be slowly transformed into a city of the dying (5). Resources to deal with this booming population soon ran scant.

TB was not without its social ramifications, either. In her book *Spitting Blood*, Helen Bynum notes how aesthetics shifted in response to the TB pandemic in the 1800s: it became fashionable for women of high society to be pale and slender, their cheekbones prominent and their eyes large (Bynum 77-78). The archetypical TB patient was often depicted as a high class, tragic victim of consumption with a slow melodramatic decline—mostly a creation of the Romantics. The era from the late seventeenth hundreds all the way through the eighteen hundreds was dubbed by many as an Age of Enlightenment, a time when empirical knowledge trumped the doctrines of Church. Romanticism was a reaction against the Enlightenment; it rejected reasoning and instead focused on human nature. The evidence of TB is subtle throughout Romantic writing, as in the case of Edgar Allan Poe, who often goes on into detail about his characters' paleness, large eyes, and ill demeanors. Human culture is ever changing and adapting, just as humans are.

*The Forgotten Plague* reveals that Robert Koch's discovery of the tuberculosis bacillus itself caused little change. Few people could believe that microscopic organisms could cause such a dangerous illness; Koch's findings weren't widely acknowledged until the late eighteenth hundreds when scientists in Europe and America all brought forth evidence supporting his theory. Before public acceptance of TB's bacterial cause, most scientists still believed that the disease was inherited since they observed TB was most active in families over time. TB victims weren't at fault for their condition—after all, one has no control over the genes one receives—but now, as *The Forgotten Plague* points out, someone could be held accountable for spreading the disease (6). The general acceptance of Koch's findings happened in a crucial point in American history that would have major ramifications for the underclasses of America.

In the late eighteenth and early nineteenth hundreds, more immigrants than ever were entering the United States, but because these people lacked economic power, they often ended up in appalling living conditions: many individuals cloistered in unventilated rooms inside filthy houses with scant resources; working conditions were very much the same—the perfect environments to allow quick transmission of TB. In *The Bioarchaeology of Tuberculosis*, Charlotte Roberts and Jane Buikstra show public health campaigns urging Americans to avoid spitting and spreading the disease (Roberts and Buikstra 8). Other campaigns actively began targeting those with the disease—mainly immigrants and the poor, secluding them to areas away from the healthy population. *The Forgotten Plague* reveals that many TB victims were sent away to sanatoriums, which were often isolated deep in the country, far from any towns or cities (8).

*The Forgotten Plague* emphasizes the duality of living in sanatoriums: TB patients were cut off from society, forced to give up their free will and listen to doctors and nurses while at the same time surrounded by death and trying to live as normally as it was possible (9-10). Exile and

isolation are common themes throughout the history of medicine. When confronted with a seemingly unstoppable disease, humans have often resorted to separating the sick and the strong—partly as a coping mechanism, partly to survive. All throughout Asia and Europe, those afflicted with leprosy were cast out of society in shame. When the Black Death reached Europe, friends and family members abandoned one another, and priests refused to give last rites. In America, those with mental illnesses were locked into asylums and sanatoriums, far out of public eye. Just a year ago, during the Ebola outbreak in Texas, patients and nurses infected with the disease were subjugated to extreme isolation and prejudice.

These sanatoriums were finally closed when antibiotics such as Streptomycin (actually derived from a fungus found in soil) became widely used as treatment—then, as Andrea Cooper, an immunologist in *The Forgotten Plague*, explains, most people prescribed the new drug relapsed in a matter of months; in response, more drugs had to be taken in addition to Streptomycin, creating a so-called “drug cocktail,” the only defense against TB (12). In the United States, TB disappeared from public view, and even though the disease still raged on in other parts of the world, at least now there were treatments to give its victims a fighting chance.

Today, TB is reemerging as a global threat. Charlotte Roberts and Jane Buikstra illustrate the situation today in *The Bioarchaeology of Tuberculosis*: since the 1980s, more and more victims have shown increased resistance to treatment, whether by contracting the MDR (multi-drug resistant) strain, or by inadvertently cultivating the strain themselves by improperly taking their medication (Roberts and Buikstra 35). All of this is further complicated by the rise of HIV and AIDS—diseases that weaken a person’s immune systems and make them further susceptible to TB. These factors have led to a drastic rise in TB rates in the last thirty-five years.

For the sake of millions of lives, the disease must be overcome—but how? The first step is acknowledging that disease is not merely limited to physiological conditions in the body. Because humans are social creatures, they deeply affect one another. Whenever someone falls ill, the people around them are also impacted, from the smallest of colds that inspire casual sympathy to the deadliest of cancers that can stir the deepest of human emotions—and just as much, the environment and culture influence humanity. It isn't enough to treat the symptoms or provide remedies. Genuine treatments can only be created when history is studied and cultural and social practices are examined in combination with scientific application—a truly holistic approach. Every case of tuberculosis is not a clinical situation, but rather a human being with a set of unique circumstances that led them to contracting the disease—they must always be treated as such.

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