
Catawba Sanatorium: Its Founding and Early History

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You who must walk in darkness,
 Away from the worlds bright song,
Comfort yourselves with dreaming
 Dreams will make you strong

Swift are the feet of the runner
 Climbing the endless hills
But sweet and sure is the joy
 A white dream distills

Only in quiet places
 Life is minted true
Comfort yourselves, O dreamers,
 Keats was one of you.

“White Sorrow,” Virginia McCormick¹

This poem was included at the end of Dr. Earnest Drewry Stephenson’s twentieth anniversary history of the Catawba Sanatorium. It was meant as a tribute to those lost to tuberculosis in the sanatorium and a comfort to those still receiving treatment there. The pastoral imagery reflects the rural mountainous location of the sanatorium, which both isolated the institution from the outside world and ensured its patients a rest from the polluted air of the cities. The idealism of the piece, which describes an ultimate cure for tuberculosis, is typical of the period. Dr. Robert Koch had, in 1882, announced the causative agent of the disease, and many were beginning to claim that the “captain of the hosts of death” could be cured by proper rest and sanitation.² Their faith was justified in some ways by a general decline in death rates from tuberculosis that began in the 1870s, decades before Catawba, one of the first state-run ventures to combat the disease, opened in 1909. However, the death-rate decline was far from even across different

levels of society. A growing sanitarian movement during the late nineteenth century led to a general improvement of the quality of life for the middle class, which partially led to this decline.³ Meanwhile, the poor sections of the cities were often affected with two or three times the number of new cases of the wealthier regions,⁴ slowing the decline of the disease.

The history of tuberculosis is a “chronicle without closure ... filled with phantoms and puzzles,” according to Katherine Ott, a leading scholar on the subject.⁵ In her book, *Fevered Lives*, she examined the development of medical knowledge and the way it affected the lives of those stricken with tuberculosis. In her evaluation of sanatoria, Ott argued that although a small percentage of consumptives ever spent time in a sanatorium, the overall system represented a shift to standardized medicine.⁶ Sheila Rothman, on the other hand, has attributed the gradual eradication of the disease not to the distinct medical practices within the sanatoria but rather to the patients’ isolation from communities and inability to spread the bacillus.⁷ These two works, and many others, focused primarily on the broader picture of tuberculosis in America during the nineteenth and twentieth centuries.

Two published works directly focused on the history of Catawba Sanatorium. Written by a doctor and nurse employed there and while the sanatorium was still accepting tuberculosis patients, the books, for the most part, promoted Catawba’s success and omitted unpleasant details.⁸ With the benefit of more than 100 years of hindsight since the sanatorium was opened, this article will attempt to provide a more balanced view.

Within Virginia’s history of treating tuberculosis, Catawba represented a slow but steady shift in thinking, while retaining some continuity with earlier treatment. Its establishment reflected a shifting landscape of thought that began around 1882. The discovery of the tubercle bacilli by Robert Koch introduced the concept of bacteriology to tuberculosis treatment. Although the medical profession in general was slow to accept this idea, the concept did introduce a new understanding of how the disease was spread and led health officials to consider new methods to limit new cases. Also in 1882, Dr. Edward Livingston Trudeau, father of the American sanatorium, first came into contact with the Brehmer-Dettweiler method of treatment.⁹ This method, the closed sanatorium, stood in sharp contrast to the open sanatorium system that had taken root in the American West earlier in the nineteenth century in the form of health resorts. The immediate difference between these two systems was the prevalence of medical supervision, which was strict and all-encompassing in the closed system and more advisory in the open system. In the end, Trudeau’s model of a closed sanatorium focused on treating those who could not afford it, won

out. In its first decade, Catawba reflected the growing influence of these trends as resident physicians increased their control over patients' lives and increasingly relied on microscopes to diagnose the disease.

Physicians were not the only group to begin exerting control over the lives of tuberculosis victims. The attitude that the state should provide for the public health of its citizens began to take hold. Sheila M. Rothman has suggested that this attitude was an offshoot of the "Progressive Era's spirit of reform," which put an increased emphasis on the health and happiness of the average worker.¹⁰ However, the Virginia legislature and the State Board of Health disagreed completely about the best method to combat disease. The creation of Catawba magnified this conflict, promoting an atmosphere of careful defense surrounding it in its early years. To create an appearance of effectiveness, the majority of those admitted to the sanatorium were examined to admit "only those patients whose cases [were] deemed curable."¹¹ Another complication in the state's efforts to combat tuberculosis was the size of Catawba. Its limited number of beds prompted the lingering question posed by Dr. B. L. Taliaferro in the sanatorium's 1917 report: "What are 163 beds for 4,003 cases—1,765 white and 2,238 colored?"¹²

This question addressed the root of the issues in Virginia's fight against the "great white plague." Much of Catawba's importance was that it represented the state's first concentrated effort against a disease whose deadliness had peaked in the mid-1800s.¹³ However, the small sanatorium, limited to mostly middle-class white patients, could not impact the entire population of Virginia. In an era when most other aspects of citizenship were being denied to African Americans, they were also denied admission as patients. On the other hand, African Americans composed an integral part of the staff at Catawba.

Climatology and Tuberculosis in Virginia

When the state undertook to combat tuberculosis, the disease had existed since the Greeks wrote about it under the name *phthisis*. Later it became known as consumption or the white plague. There was no consensus on how to treat tuberculosis despite a sense of dread surrounding it. Most leading physicians at the time considered it hereditary, an understandable claim due to the frequent loss of entire families from the disease. As opposed to the major epidemic diseases of the nineteenth century, it did not have an observable causal element that could be attacked to end it. Therefore, there was no known overarching policy that Virginia could enact; nor would the state have had the infrastructure to institute such change. Until the early twentieth century, state health departments were usually formed only in

times of emergency. The Virginia Board of Health was not reorganized in a permanent manner until 1908.¹⁴ Furthermore, such a temporary board of health was usually tasked with elimination of a more drastic epidemic linked to poor sanitation—smallpox, malaria, and typhoid for example. Rothman suggested that these health officers, whom she called “sanitarians,” mostly worked on improving water systems and sewage treatment. Although targeted elsewhere, some of these policies and programs ultimately had an effect on decreasing the number of cases of tuberculosis as well.

Before the state took over the treatment of tuberculosis, care for Virginia’s invalids fell largely into their own hands or, if they could afford it, a doctor’s best judgment. At that time the medical profession was based largely on “vitalism,” a concept considering both a person’s physical and spiritual state.¹⁵ When Koch’s work on the tubercle bacilli began to suggest that tuberculosis was contagious instead of hereditary, it was only the latest evidence of how diseases were caused and spread by physical means. Many originally rejected the idea that bacteria could spread disease, but slowly, the mounting evidence from different studies began to change doctors’ outlooks. Many merely modified the earlier theory about heredity by claiming that while the disease itself was not inherited, a susceptibility to it could be passed down.

Since doctors had limited knowledge about what would have an effect on the sick, most prescribed healthy living and a change in climate. The idea that climate could positively or negatively affect diseases is known as climatology and is first seen in the writings of Hippocrates.¹⁶ Physicians debated exactly which conditions were favorable; most around the turn of the twentieth century thought that effectiveness largely depended on the patient. Another group was convinced that a cure through climate could be deadly since the patient would be unable to return to his/her native climate without risk of relapsing. Belief in climatology led to the foundation of open sanatoriums in key regions that were said to have restorative climates. These health resorts had limited doctor surveillance, were in isolated locations, and were quite expensive. In general they became a refuge for some of the wealthier consumptives and other health seekers from the 1850s through the early twentieth century.

In Virginia, health resorts developed around natural springs in the mountainous regions. They gained popularity during the same time period in which tuberculosis was responsible for the majority of deaths in the state. Notable among these was the Roanoke Red Sulphur Springs Resort, which occupied the same property later used for the Catawba Sanatorium.¹⁷ The resort’s healing waters were heavily advertised to persuade people to vacation

at the springs. They were also bottled and sold nationwide as “Catawba Iron, or All Healing” potions.¹⁸ Since the effectiveness of prescribed treatment was thought to depend heavily on a person’s constitution, such cure-alls were often accepted as real possibilities for relief. To reinforce its reputation for healthfulness, Roanoke Red maintained a doctor on staff for its visitors. These visitors, in season, were generally affluent and sometimes came from far away or from large cities, especially Baltimore and New York. The sanatorium that replaced the resort had similar features: its location was decided by advocates of climatology, and its first patients were mostly middle and upper class.

Beyond glamorous resorts like Roanoke Red, wealthy Virginians were offered many other opinions about finding a curing climate. Men were most often encouraged to travel to climates as varied as the Caribbean, the Alps, Colorado, New Mexico, California, the South, or the Adirondacks. Women were advised to travel in some cases but usually only domestically and always accompanied by a male relative. More often, women were prescribed a routine that could be carried out near home since it was thought that they were more attached to the domestic sphere and would recover better in familiar surroundings.

The experience of impoverished patients differed greatly since they usually could not afford to travel or even seek medical advice. Nor did they have enough money to stay at home to recover because the loss of wages would devastate their families. It was common for the sick to work for as long as possible, creating additional risk to their health and that of those around them. Any help the poor received usually came from a charitable or government-run organization.

African Americans usually had an experience similar to that of the lower classes, with the added difficulty that charitable societies frequently refused them help on racial grounds. This type of discrimination was widespread in Virginia, with many health care providers determined to provide care only for white members of society. Catawba was founded at a time when the death rate from tuberculosis of African Americans in Virginia was about 50 percent more than the rate of white deaths.¹⁹ However, tuberculosis had long been considered a disease that only affected whites, and some scholars of the time tried to exclude African Americans from this narrative. Some claimed that no recorded cases of tuberculosis existed on antebellum slave plantations and that either freedom or the attempt of black people to live in white society caused so many of them to fall ill.²⁰ No state provision was made for African-American victims of tuberculosis until the foundation of Piedmont Sanatorium in 1917.

In summary, more than 30 years after the discovery of the tuberculosis bacillus, there was no consensus over treatment for tuberculosis or whether it could be cured. A 1914 report from the Virginia Board of Health summed up the nature of the disease: “[I]t is not so much a disease of the lungs as it is a symptom of a social and economic disorder; it is not so much a disease as a condition.”²¹ Virginia’s leading physicians published treatises on the prevention and cure of tuberculosis or sold products they claimed would cure it, misinforming the public and giving false hope.²² Furthermore, such brochures often persuaded the public that a cure had been found and turned public opinion against those who were either so unlucky, immoral, or stupid as to have gotten the disease.

The second conversation that dominated the sanatoria movement regarded the cost of admission. By 1900, the old view of tuberculosis as an upper-class malady was fading, yet many classist ideas were applied to the admission of patients. Particularly, insistence on the morality of patients and strict discipline in the institution revealed upper- and middle-class expectations. Additionally, the cost of one bed per week was nearly half of an average week’s salary in 1910.²³ Although Catawba was meant to help the citizens of Virginia, the cost often made it impossible for the poorest citizens to afford its treatment. Long-standing traditions saw treatment not as a public good but as a private commodity. This mindset began to shift as cities organized attempts to fight the spread of the disease and the state established its first sanatorium.

The Battleground: Choosing a Site for Virginia’s Sanatorium

Although the creation of a state sanatorium was not the only goal of the Virginia Board of Health when the legislature created it during the 1908 session, it was one of the legally mandated goals. The board was “particularly instructed to organize a fight against consumption,” and from the \$40,000 appropriation given to the State Board of Health in 1908 (a ten-fold increase), “\$20,000 ... was allotted for the foundation of this sanatorium.”²⁴ Almost immediately after being appointed commissioner of health for Virginia, Dr. Ennion G. Williams began searching for a suitable location for the state’s sanatorium. Although he was not given clear guidelines to follow on selection, this topic became the first major point of contention between the state legislature and the State Board of Health. Swayed by the reputation of the famous Roanoke Red Sulphur Springs and its powerful advocates, the board of health decided to stake its reputation on what became a somewhat questionable location for the state sanatorium. For the sum of \$18,774, the state purchased around 600 acres of land, including

a hotel containing thirty rooms, two cottages containing twelve rooms, two cottages containing eight rooms, four cottages containing four rooms, and two cottages containing two rooms, besides barns and buildings on the farm. . . . [A]ll of these structures were in bad repair, and a number of them were beyond rehabilitation [sic].²⁵

Most of these buildings would not survive the first few years at Catawba. The hotel was refurbished, and material from demolition of several cottages was used to build lean-tos, the precursor to the pavilion-style buildings that would later be utilized at Catawba. When the sanatorium first opened, space was very limited with only about 30 available beds. The first few months of operation were more costly than productive. The initial purchase of the sanatorium consumed almost the entire \$20,000 budget for 1908. Between getting the buildings in shape to receive patients and paying doctors and nurses, the sanatorium also overspent its 1909 budget of \$20,000 by more than \$4,000.



Figure 1. Patients at Building 22, one of many buildings at Catawba. (Postcards from Catawba, catawba.dbhds.virginia.gov/images/postcards/bldg22.jpg)

The legislature noticed Catawba's overspending as well as the deficit created by the State Board of Health, which spent \$42,669.40 when it had a \$40,000 budget.²⁶ As a result, there was a defensive tone to the State Board of Health reports in 1909 and 1910. Their focus was to show results and to help Williams make the argument that more money was needed to expand Catawba's effectiveness. While pushback from the legislature initially

centered on the expenses of the board, such opposition likely induced Catawba officials to limit its growth during its early phase. One of the most memorable examples of legislative criticism was the Noel–Williams dispute of 1910. J. C. Noel, a Republican, brought charges against Ennion G. Williams, claiming to have a source that had recommended cheaper land for the sanatorium. According to a newspaper article written at the conclusion of the hearing on these claims, the letter in question came from a Delegate Spessard (possibly Michael P. Spessard of Craig County) and “suggested Newcastle as a fit site for the sanatorium, saying that a good site could be bought for one-sixth of the price paid for that at Catawba,” a location characterized as “low and damp.”²⁷ Noel also decried the lack of accountability of the state board, claiming that it “drew out thousands at a time, deposited it at Salem, expended it, and we have no receipts.”²⁸

Part of the problem in ascertaining the fitness of Catawba as a site was the lack of consensus about a good climate for the treatment of tuberculosis. Although Commissioner Williams and the other board members considered the healing reputation of Catawba to be indisputable, others did not necessarily agree. Dr. Robert Williams, the first appointed head physician of Catawba Sanatorium, “characterized the site as ‘hopeless.’” He believed patients could not climb the steep, high areas around the sanatorium, effectively confining their exercise to “a narrow sphere and retarding their improvement.”²⁹ In the view of some leaders in the treatment of tuberculosis, Catawba lacked the conditions for a cure. Thus, it is not surprising that the expenditures of the board and its choice of a site raised some eyebrows.

Noel’s objections were met with widespread resistance from supporters of Williams and anti-tuberculosis work in Virginia. Many prominent men also rushed to defend the honor of Commissioner Williams and the board, including “Senator Keezell, ... Raleigh C. Martin, ... Carey Shapard, ... Dr. W. W. Smith, ... [and] Senator Halsey.”³⁰ Leading the defense was Virginia’s 29th District Senator Charles T. Lassiter, who replied to each concern. In response to complaints about the property’s cost, he claimed that “this particular land sold at a much lower price” than nearby land and that “the buildings alone ... were worth more than the price paid for the land.”³¹ He furthermore vouched for the site as a place of healing, pointing out that it “was for many years considered a Mecca for consumptives” both for location and the healing waters.³² He also cited the sanatorium’s young record, claiming that everyone treated had been at least improved by his or her stay.³³ Above all, the defense was adamant that the board had acted in the best interests of the citizens of Virginia and had never been dishonest

to the legislature. In the end, Noel was forced to relinquish his claims, and the legislature appropriated an additional \$40,000 to Catawba for that year.

It is clear from these discussions that the reputation of the healing powers of Catawba Valley provided the bulk of the motivation for its acquisition. In his 1929 history of the sanatorium, Dr. Earnest Stephenson retrospectively defended the purchase of the property, pointing out that the Roanoke Red Sulphur Springs was “known far and wide for its pure Sulphur water”³⁴ and that “many influential and prominent men” had renewed their health there.³⁵ A number of the early State Board of Health annual reports used these same arguments to justify the need for more cottages in the open air and to blame the faulty constitutions of patients who failed to improve there.

Legitimate reasons did exist to complain about the site. No railroad line connected Catawba to the nearby Northern and Western Railway line; nor were the roads in good condition for hauling patients and supplies. According to Stephenson, the Norfolk and Western Railroad promised speedy construction of a branch road, which was not finished until well after the sanatorium opened.³⁶ As a result, “practically all material [for the construction of open-air tents and the rehabilitation of the out-buildings] had to be hauled from Salem” for 12 miles over Catawba Mountain using almost impassable roads.³⁷ The arduous journey from the railroad in Salem to the sanatorium later reemerged as a divisive issue between the board of health and the state legislature. Regardless of other drawbacks, it seems that climatic conditions at Catawba informed the board members’ reasoning for locating the institution there.

In later years, the battleground for Virginia’s anti-tuberculosis efforts would grow substantially. Within a year of its establishment, Catawba had tripled in size. Noel’s attempts to discredit the board had failed, and the institution had already gained a reputation for “cures,” according to newspapers around the state.³⁸ An initial newspaper report of the opening of the sanatorium reported that the State Board of Health did not intend to make it “a resort for hopeless consumptives” but rather wanted to “admit only those patients whose cases are deemed curable.”³⁹ These hopeful reports, however misleading, were aimed at increasing public confidence that the state government was doing all it could to fight the dread disease. In 1910, as the board sought public support for a large appropriation to expand Catawba, the *Staunton Spectator* called for its immediate enlargement because of its “large percentage of successful cases.”⁴⁰ Most of Catawba’s media coverage was positive, emphasizing the curable and preventable nature of the disease and justifying appropriations made by the legislature supporting an expansion.

The 1910 State Board of Health report to the governor focused on these physical changes to the institution.⁴¹ An additional four open-air pavilions, built “to meet the most exacting sanitary and climatic conditions” according to the “unit system of sanatorium construction,” meant that patients were divided into distinct communities within the institution.⁴² New facilities also included an office building, completed “at small cost,” and an amusement hall, which “forms a most valuable addition to the State’s property.”⁴³ Commissioner Williams pointed to the careful planning and low cost of these improvements, almost as a preemptive defense in case a second round of accusations by Senate Republicans should occur. He even defended the accounts of the sanatorium, which, in his estimation, had been “economically and wisely administered” by A. Lambert Martin, business manager of Catawba.⁴⁴ The rapid expansion was balanced by a severe lack of trust by Senate Republican members, especially since Virginia’s economy continued in a recovery phase after a recession. However, the influence of the institution was steadily broadening over this period, which brought new challenges.

The new pavilions brought the sanatorium’s total space to 109 beds. Despite this increased capacity, only 161 patients received treatment during the year. This is likely due to the fact that the new units were not opened until near the end of the year.⁴⁵ Williams acknowledged that the physical impact of Catawba had been very small as the number of patients treated at the sanatorium (161) was only 1.5 percent of all estimated cases in Virginia during 1910 (10,545).⁴⁶ By 1916, the total capacity of the institution only reached about 168.⁴⁷ The physical space never allowed all the consumptives who wanted treatment to receive it, and the waiting list remained long in the period before 1917, when the state would open its second sanatorium. In addition to Catawba’s space problem, the sanatorium faced a shortage of doctors and nurses willing to marshal patients to recovery.

Resident Physicians and Staff

The initial man chosen by Ennion G. Williams to command the post of resident physician was Dr. Robert Williams (no blood relation to Ennion Williams). He was considered a good choice because of his “wide experience and special training for this line of work.”⁴⁸ Robert Williams traveled the country to study procedures and methods of sanatoria construction. However, he resigned before the institution opened its doors, citing as his reason insufficient state funds for a sanatorium on the scale he wished.⁴⁹ Williams’s short time as the medical director at Catawba indicates that the sanatorium was not reaching the high standards of treatment expected in other parts

of the country. His travels revealed that sanatoriums in Colorado and east coast states such as New York and New Jersey provided more than 600 total beds for the treatment of tuberculosis by the time Virginia was moving toward opening those first 35 beds at Catawba.⁵⁰ Larger expenditures were needed in Virginia, and those were not forthcoming until the late 1910s, once Catawba's "good results" had been adequately confirmed.

Robert Williams's resignation became a major issue during the attacks by legislator Noel because the State Board of Health had given him \$2,262.76 despite his failure to deliver any services to the patients at Catawba. Williams had received approximately a year's compensation while only in the board's employ for about two months.⁵¹ Although it was explained that this charge was compensation for Williams's travels, the incident reveals more of the fiscal conservatism shown toward the resident physician.

Robert Williams's short tenure began a string of short residencies. Next came Dr. Truman A. Parker, then Dr. W. D. Tewkesbury from 1909 to 1910, followed by Dr. W. E. Jennings in 1911. Finally came Dr. John J. Lloyd, serving from 1911 to 1917.⁵² Until Lloyd, none of the resident physicians had stayed long enough to have a measurable impact on the institution. Lloyd was particularly involved in lobbying the state for the creation of a separate institution for Virginia's African Americans, oversaw the installation of an x-ray machine at Catawba, and oversaw most of the building improvements.

Another crucial staffing problem was the difficulty in retaining trained tuberculosis nurses. As early as 1910, the annual report mentions this issue, blaming "the nature of the disease" for the reluctance of nurses to work there as well as the "isolated location ... which offers few amusements during the hours off duty."⁵³ This was not an uncommon problem during this era, as citizens began to realize the contagious nature of the disease. Many preferred not to expose themselves to its danger, and apathy still led many not to take the fight against the disease seriously. Catawba was able to solve the problem of nursing staff on its own. Before the end of 1910, only about a year after the institution was opened, "a training school for cured and arrested patients" was established that would enable them to "keep the nursing corps full by employing chiefly [their] own [graduates of this school]."⁵⁴

Although the school could not meet all of the needs of the institution, it could nearly do so by 1913. The need "to employ general graduate nurses" had become increasingly rare.⁵⁵ The dedication of the former patients to the current ones was a general feature of the fight against tuberculosis. Long experience showed that most of the doctors who made a life of studying

the disease were suffering from it themselves, as in the case of Trudeau, the inventor of the sanatorium system. Ex-patients also supplied the greatest number of nurses trained in tuberculosis prevention methods.

The disadvantage to this practice was that the former patients would occasionally relapse. Due to the frequent recurrence of symptoms, nurses would often become bedridden and unable to work. Nevertheless, their dedication to Catawba and the betterment of the patients there did not waver. In 1915, the nurses had formed an alumni association to allow them to better provide for the needs of patients and nurses who reverted to being patients.⁵⁶ This dedication of patients resulted from the personal impact the disease had had and from the extensive patient culture that had developed.

Patient Demographics and the Culture at Catawba

During 1909, the first full year of Catawba's operation, it cared for 52 patients. The oldest patient was 50 years old and the youngest only 17, with the average patient age 31.⁵⁷ It was not unusual for the 20 to 50 age demographic to be the most represented at institutions like Catawba. In 1914, five years after Catawba's establishment, 1,666 of 3,591 deaths from consumption "were of persons between the ages of 20 and 39—the young fathers of dependent children, the mothers of infants."⁵⁸ This age group was especially at risk of contracting the disease because people out in the working world had a greater chance of coming into contact with infected consumptives. This often led to situations in which breadwinners were forced to spend their time trying to regain their health. Often such situations ended in tragedy. The death of a family's wage earner left it without a steady income, and life insurance benefits were often withheld when the cause of death was consumption.

In the general pattern of the disease, the male to female ratio was almost even at 28:24.⁵⁹ Although men had historically more options for treatment, the sanatorium system did not favor one sex over the other. Men had a hard time staying for an extended period of treatment because they wanted to go back to their occupations and to produce income. This was an added concern because treatment at the sanatorium cost \$5 a week, or about a third of the average monthly household income at the time.⁶⁰ This concern did not affect women as much because they were still largely employed in the domestic sphere; however, the separation from home life was harder on them in many ways than it was for the men. The diseased men to women ratio stayed more or less constant from 1909 to 1917, as befit the character of the disease.

Occupations held by patients were widespread, middle-class positions. Of 425 patients in 1914, some 75 were engaged in some form of domestic work. Another 13 were nurses, two were physicians, 38 were clerks, and 14 had no occupation. Those who were housewives or unemployed young adults usually came from higher-class families that could afford treatment. More important than the exact demographics of those admitted to the sanatorium were those cases not allowed in. African Americans comprised the largest group of those excluded from entry and are perhaps the most important to note because they were kept out as a matter of race, whereas the poor were kept out by a factor of circumstance. African Americans were dying of tuberculosis at a rate two or three times higher than that of whites.⁶¹ However, the state did not provide a place where they could go for treatment for several more years. As Williams stated: “[I]ndeed, the only [N]egroes who may expect treatment . . . are the insane and the criminal.”⁶² Virginia was not alone; no state-run sanatoriums for African Americans existed in any part of the former Confederacy before 1917. Virginia was the first state to recognize that treating its African-American population would also benefit its white citizens. Commissioner Williams and Dr. Lloyd were two players in this debate who used their knowledge and involvement at Catawba to direct the state toward founding another institution, this one for African Americans.

Their motives were not driven by a belief in the inherent dignity of their “colored” neighbors, but rather by self-interest. Williams believed that “our [N]egroes are citizens of a more or less dependent class” and that white people were responsible for taking care of them.⁶³ Additionally, he argued that as “a servant class,” African Americans “frequently spread consumption among those whom they serve.”⁶⁴ Lloyd agreed with that viewpoint. After complaining about the number of Negroes who had applied to Catawba but were refused admittance because of their race, Lloyd stated: “[T]he [N]egro as a source of infection can hardly be overestimated,” and he demanded that some kind of provision be made because “as a human being, he deserves treatment.”⁶⁵ Both Lloyd and Williams continued these pleas for a separate sanatorium for African Americans until the legislature finally approved an appropriation for the purchase of land in Burkesville, Virginia. These two men surely were not the only ones fighting for this outcome; local groups of African Americans had been raising money for an institution for quite some time before the state issued funds to construct the Piedmont Sanatorium. Williams, in his 1916 report to the governor, wrote: “[S]urely a State can write no better history than that of constructive philanthropy.”⁶⁶

Although the color line at Catawba was firmly established, there were lots of places where color lines crossed. For example, Stephenson, at the end of his report, described “Doctor” Charles Twine as a “real old darky.”⁶⁷ Although African Americans were not allowed to receive treatment at Catawba, any account of the institution would have been incomplete without a mention of Twine, Stephenson suggested.⁶⁸ However, the author did not treat him with much respect. The short amount of space used to describe him strongly suggested Twine’s lack of education and contained numerous racial assumptions. Stephenson emphasized that Twine’s guess of his own age was based on “ca’culations,” ridiculing the man’s lack of knowledge about his own life that would have been common among most people in the lower classes, regardless of race.⁶⁹ Twine was also singled out from others of his race as “sober, industrious, and hard-working,” signaling the prejudices of the time against the African-American community. He worked at the sanatorium from its opening until shortly before his death in 1943, but when he died, his death certificate revealed that he had been cared for by Dr. J. B. Nichols, the resident physician after 1921.⁷⁰ The physicians at Catawba would often care for the African Americans who lived and worked at the sanatorium, although they were not admitting tuberculous members of the same race.

Meanwhile, white patients at Catawba were unable to find true and lasting relief for their symptoms. However, in the midst of their on-going recoveries, and with an ever-changing guard stopping through for treatment, the roots of a patient culture took hold. Likely, the strong sense of community was aided by creation of the Catawba Alumni Association, without which life at the sanatorium would have been rather different. The imposition of a six-month-stay rule in 1910 and then a four-month rule afterward made it difficult for individual groups of patients to know each other based on their experiences at Catawba.⁷¹ However, the on-going contact with the community and the development of places where patients could relax and spend free time helped to create a strong sense of loyalty between the patients and the establishment.

As early as 1910, patients had “organized a Sunday school, [were] collecting a library, and . . . devised amusements by the aid of which they pass most agreeably the time of their treatment.”⁷² In 1914, funds were raised to “erect a chapel for the patients.” In the same year, Mr. C. E. Brauer, one of the first patients of the sanatorium, helped the Catawba Alumni Association get “gifts of books, clothing, games, etc.” to patients. Lloyd noted in the report from that year that “new patients are welcomed, and made to feel at home, and a better spirit of fellowship exists among the patient body”

because of the work of the organization.⁷³ Around 1916, the Catawba Alumni Association began publishing *Sunbeams*, a magazine that drew attention to the plight of those suffering from tuberculosis and provided patients with a creative outlet for their frustrations.⁷⁴ The ingenuity of the patients seemed to parallel the old idea that consumption could release a wave of inspiration. Like many other romantic notions regarding tuberculosis, the myth of the consumptive genius took a new form in the growing rigidity of the sanatorium system.

Treatments Used at Catawba

Until the discovery of the anti-biotic streptomycin, treatment at Catawba mostly relied on rest and a good diet. It is hard to determine how effective these treatments were, but it is likely that they hardly had any effect on the course of the disease and that most declared “cures” were only periods of remission. This claim is based on more recent developments with the disease. In 2008, there were 8.8 million new cases of TB, with 1.9 million deaths attributed to it.⁷⁵ Although these cases mostly occurred in regions such as India and East Africa, where poverty and the HIV epidemic contribute to the spread of tuberculosis, we still face this fact: tuberculosis has never been successfully cured. With this fact in mind, it may seem pointless to examine the treatments used at Catawba; however, value can be gained in examining problems that health officials faced. It is also important to try to understand why Catawba medical personnel were convinced that they had solved the problem.

As Katherine Ott has noted, one of the main problems in the tuberculosis narrative was a nationwide lack of reporting protocol.⁷⁶ Many of the ill never saw a doctor, and many doctors did not participate in the state’s efforts to track tuberculosis. Adding greatly to this problem was the difficulty in diagnosing the disease, especially in its early stages. Catawba was founded with the goal of treating only incipient cases of the disease, but fewer than 20 percent of the patients admitted fit this diagnosis.⁷⁷ One of the major problems was that the treatment methods were designed to act upon early cases only. The general treatment combined long periods of rest and exposure to fresh air with training on how to dispose of sputum sanitarily, the protocol in a majority of cases at Catawba.⁷⁸ However, when patients with advanced cases were made to sit in the cold as part of their treatment, they often suffered negative effects. In fact, the State Board of Health recognized the deficiency in their methods when a hard winter forced a realization that an enclosed hospital nearer to the railroad would have worked better for the advanced cases sent to them.⁷⁹

DAILY SCHEDULE

7:15 - Rising Bell.
8:00 to 8:30 - Breakfast
9:00 to 11:00 - Rest in bed or exercise
(walking).
11:00 to 12:00 - Rest in bed.
12:00 - Rising Bell.
1:00 to 1:30 - Dinner
1:45 to 4:00 - Quiet hour, Rest in bed,
No talking.
4:00 to 5:30 - Rest in bed or exercise
as ordered.
5:30 - Rising Bell
6:00 - Supper
9:00 - All patients on pavillions.
9:30 - All lights out.

Figure 2. Tuberculosis patients followed a strict regimen at the hospital, as evidenced by this schedule from 1930. (Virginia Board of Health, "Rules and Regulations for Patients" in James E. Young, "A Story of Catawba Hospital," draft, 1984)

The sanitation training that Catawba patients went through was the most important thing that happened at the institution. Since a large percentage of patients left after only a short course of treatment, it was important to educate those who went home on how to properly protect their neighbors from infection.⁸⁰ Williams claimed that Catawba's real impact would take place at home, where former patients would return "an apostle of the cure, able to explain the treatment and drilled in methods of prevention."⁸¹ However, the number of people who went through the system at Catawba was still only a small percentage of Virginia's citizens. Furthermore, since the poor and African Americans infected with the disease had not been educated, the number of new cases did not decrease nearly as much as predicted. Williams pointed out that logic demanded that "when we disposed of that [infected] sputum in a sanitary manner we should have been able to check the disease ... but it has been circumscribed by conditions which render its application extremely difficult."⁸²

Those conditions were ignorance about the disease on the part of both physicians and the population in general. The high percentage of patients sent to the sanatorium in an advanced stage of the disease resulted from a lack of training on how to diagnose tuberculosis. Catching the disease in the early stage was "often a matter of extreme difficulty and can only be done by men carefully trained and constantly in practice."⁸³

Furthermore, there was a sense of frustration on the part of Commissioner Williams because “in spite of the fact that the sanatorium is known to be for incipient cases, physicians send patients to the sanatorium who are in advanced stages of the disease, yet are certified in the application to be incipient.”⁸⁴ As Williams saw it, the failure of physicians to correctly diagnose the stage of their patients’ disease when referring them to Catawba was one of the main reasons that the institution did not have a higher rate of cures. The shortage of trained physicians was only part of the problem. Just as important was the absence of a prevalent impetus for treatment. Since symptoms were not well known by the common citizen, the first signs of the disease were often missed. As those at Catawba saw it, “few true incipients wanted treatment” because they were “not educated as to the necessity.”⁸⁵ This problem was widespread across all groups; however, the State Board of Health targeted only the middle and upper classes in its initial attempts to educate the public. The pamphlets it issued were text heavy, and people had to write in to get them, which eliminated the chance they had to make an impact on the poor and African Americans. According to a 1910 statistical abstract, African Americans were twice as likely to be illiterate as whites, and, therefore, efforts to educate their community through written bulletins were unsuccessful.⁸⁶ In this way, the poor and African-American groups were even cut off from receiving the training in sanitation that would have prevented them from spreading the disease to their families.

Rest, clean air, good food, and sanitation training were not the only weapons Catawba physicians had at their disposal. As early as 1910, tuberculin was used in select cases, and the drug became relied on more heavily during the residency of John J. Lloyd. However, the number of patients who were given the drug was still very small. By 1914, a total of 171 discharged patients had received tuberculin, compared to 734 discharged patients who went through general treatment.⁸⁷ Of those treated with tuberculin, 38 percent were able to return to work versus 29 percent of patients treated without tuberculin.⁸⁸ However, the total number of patients treated with tuberculin was very small.

The sanatorium also tried other radical procedures. In 1913, the physician’s report noted that they had tried “autogenous vaccines in certain cases,” but the results were not recorded.⁸⁹ Starting in 1913, the Catawba staff tried the pneumothorax procedure. This procedure, which continued to be used until the sanatorium closed, involved pumping air into the chest cavity to compress the lung and allow the organ to fully rest so that it might recover. It was fairly unsuccessful. During 1913, it was used in 17 cases, with only one success in “completely compressing the lung.”⁹⁰ Whether a

patient at Catawba was recommended to go through general treatment or one of the more extreme treatments, his/her chance of recovery was about the same. A viable treatment for tuberculosis did not exist until 1944, more than 30 years after Catawba opened its doors, although many of the patients were declared cured or left after a slight recovery only to relapse later.

Casualties: Results of Treatment 1909-1917

Due to the difficulty that separation from home and work caused, neither men nor women generally stayed long. Since the sanatorium had just been opened, the longest stay of any patient was only 20 weeks, or five months, while the shortest stay was one day.⁹¹ In Catawba's early years, convincing patients to continue their treatment at the institution was a difficult task. Many times, eager to recuperate and rejoin their families and everyday activities, consumptives would overestimate the rate of their recovery and leave the facility against their doctor's advice. Katherine Ott has argued that another reason people did not remain long was the social conception of the disease. If someone stayed at the sanatorium for more than a few months, it was considered to be a chronic disease, whereas tuberculosis was not commonly accepted as a chronic disease.⁹² As Catawba entered the 1920s, the four-month rule was abolished as the benefits of long-term treatment for which Lloyd lobbied so extensively became the norm, changing the stigma attached to tuberculosis. It became common for patients to check in for six months. Others stayed for years, hoping to acquire some relief from the acclaimed Catawba physicians.

The numbers themselves tell a different story. Considering the short frame of treatment time, the number of patients recovering is surprising. Dr. Tewksbury, the first permanent head physician, pointed out that not only were Catawba's results positive, they were "obtained in spite of two unfavorable factors," the first being the brevity of treatment received and the second, "the large percentage of advanced cases treated."⁹³

Catawba, although intended and designed entirely for the treatment of incipient, or stage one, cases of tuberculosis, admitted only 12 patients who matched this description in 1909.⁹⁴ A majority of the cases (26) were termed "moderately advanced," or "stage two," and an additional 12 were found to be in a state of "far advanced" consumption.⁹⁵ Admitting the right kind of cases was an ongoing problem because physicians around the country were not equipped to examine their patients' sputum for signs of the bacilli. Additionally, members of the medical profession still resisted the theory of bacteriology. As a result, even younger doctors sometimes began practicing without any training on how to use microscopes, which often

led to misdiagnoses. Even if the bacilli were found in the sputum, some considered the presence or lack thereof to be merely one factor in diagnosis and not by any means the most important.

In light of these complications, it is indeed surprising that the results of the first few months of Catawba's operation were so successful. Of 50 patients who were found to have tuberculosis and had been at Catawba a sufficient time for the physicians to collect data on them, one was apparently cured, six had been arrested, and 40 had improved, while only three were unimproved and none had died.⁹⁶ These groups, and the symptoms that defined the limits of them, were undefined in the report, leaving room for doubt about what the categories described. Weight gain, considered an indication of recovery, was an almost universal phenomenon among the first group of patients at Catawba. Average weight gain for 49 was 9.7 pounds, and only one patient lost weight, a comparatively small 2 pounds.⁹⁷ Therefore, much of the categorization of the patients was clearly subjective and irregular. In fact, the meanings of the categories were not expressly defined until 1912.

With the arrival of John J. Lloyd, these distinctions were used to help interpret the patient information included in annual reports to the governor. Constitutional symptoms were given precedence in determining the patient's condition. This type of symptom usually was defined during this period as "surface indications of a greater and more serious bodily derangement," and Dr. Lloyd put further emphasis on those constitutional symptoms that involved "gastric or intestinal disturbances or rapid loss of weight,"⁹⁸ This fits the prevalence of notes about patients' weight loss and gain. This fact becomes especially important when considering the classifications that Lloyd defined in the 1912 report. Closer examination of those in the largest group—the "improved" class—reveals a possible lack of any one objective factor that determined whether any improvement had been made.

Two case studies of patients treated at Catawba in the first year show that the distinctions may have been arbitrary or based on the physician's opinion of the patient's constitutional improvements. The first patient, a woman of 35, was admitted in the third, far advanced stage of tuberculosis. Her temperature was 101 degrees Fahrenheit and her sputum tested positive. After eight weeks of "general" treatment, her temperature remained at 101 degrees and her sputum was still positive. Despite a two-pound weight gain, she was classified as "unimproved."⁹⁹ Comparatively, a male patient of 40 was admitted with the same symptoms. After six weeks of the same general treatment, he gained four pounds and his temperature dropped to 100, but his sputum was still positive. This man's case was labeled "improved."¹⁰⁰

Since the descriptors of these two patients was the only information recorded in the report about their physical status, the missing information concerning why these two patients with such similar situations were granted different distinctions must have been a qualitative observation, which would certainly explain the difference. However, without knowing what type of additional symptom could make a patient “unimproved” as opposed to “improved,” the actual state of these patients is called into question. Since both of them still tested positive for the bacilli, the disease likely was still present in both cases.

The majority of patients each year were listed in the “improved” category, a case in which “constitutional symptoms [were] lessened or entirely absent” and “physical signs [were] improved or unchanged” although “cough and expectoration with bacilli [were] usually present.”¹⁰¹ As can be seen here, the physical signs of damage to the lungs and the presence of bacilli were considered secondary to the side effects of the disease when determining the progression or recession of a patient’s condition. This is problematic when considering that the sanatorium based its reputation on the large number of patients who left in an improved state. This designation did not necessarily mean that they were going back to their communities healthy or incapable of spreading the disease.

Only one category, that of apparently being cured, was a designation that meant the patient was on the way to recovery. Supposedly, this group was free of “all constitutional symptoms” and had “expectoration with bacilli absent.”¹⁰² However, in a 1916 table of patients who had been discharged for six months or longer, no space was left for this designation, only for that of “apparently arrested,” which had the key difference that “expectoration and bacilli may or may not be present.”¹⁰³ This group contained only 27 patients, or 2.4 percent of the total reported.¹⁰⁴ Hindsight indicates that very few patients benefitted from the treatments at Catawba, but contemporaries likely would have viewed constitutional fitness as the most important feature of recovery.

Conclusion

*The drop in mortality in Virginia from 200 per 100,000 in 1900 to 3 per 100,000 in 1970 is ... one of the spectacular success stories in medical history, of which Catawba Sanatorium was an integral part [emphasis added].*¹⁰⁵

In the five-year span before Catawba opened, the death rate from tuberculosis was already trending downward. It fell from 168.2 per 100,000 in 1905 and likely would have continued dropping without the state sanatorium.¹⁰⁶ An increase in sanitation and a higher standard of living for the middle class were likely more influential factors in the decline of tuberculosis during those years. As noted above, the drop in mortality was one of the most important developments of the early twentieth century. More important than the drop itself were the various changes in medical ideology. The standardization of medical diagnosis was based on scientific tests that took one's internal state into consideration rather than merely relying on external symptoms. This article presents the viewpoint that the power of the sanatoria lay in isolating the infected from their families and communities.¹⁰⁷ Further study, however, reveals that there was likely little truth to this claim, especially in Virginia. Taking into account the limits on patients' stays and the unwillingness of many patients to remain in the sanatorium for extended periods, only a small chance exists that tuberculosis would have been removed from their communities long enough to stop the spread of contagion.

However, the change in environment could have provided a positive benefit in the sense that patients were removed from polluted city air, given good food, and cared for by doctors and nurses. Another factor that contradicts Catawba's overall effect on the level of new cases in the state is the limited scope of the institution. Not only was a small number of beds available at Catawba for people to take the cure, but those beds were restricted to whites willing to pay \$20 a month. If the consumptive were African American, then the only chance of being treated before 1917 was if he or she were insane or criminal. It was the voice of Williams and the voice of Lloyd that strongly influenced the building of the Piedmont Sanatorium for African Americans. These two men were respected members of the white community. Thus, they carried weight with the General Assembly, influencing it to allocate funds in 1916 to help not just the white upper classes but also African Americans and the poor. In all, this question of race and class was addressed before 1917, and the ideology laid out in *Plessy v. Ferguson* was put into practice in the treatment of tuberculosis. The next 50 years of treating the disease would be strongly influenced by the decisions made by those involved in making Catawba a success, if indeed it can be given that label.

Modern historians now know that many of the patients who returned to their normal jobs and families relapsed or died. In a 1914 report of 734

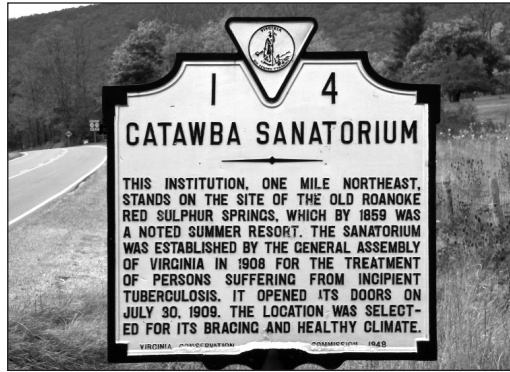


Figure 3. Today, a state historical marker commemorates the institution at Catawba. (Virginia Historical Markers, *MarkerHistory.com*, 2010)

patients who had been discharged for six months, only “213 or 29 percent” were “at work,” 12 percent were lost, 7 percent had failed, and a large percentage (42 percent) were moved from their prior distinction to one of being “improved,” while 39 percent of those who left the sanatorium died.¹⁰⁸ It is possible that the meaning of the word “improved” was changed when describing those who had left the sanatorium’s care, although it is unclear since Lloyd did not provide an alternate definition. If the definition was congruent between cases, that would lead to the unfortunate conclusion that the sanatorium treatment did little good beyond briefly removing the consumptives from their communities and teaching sanitation methods to prevent rapid infection. In fact, the rate of death from tuberculosis only dropped from a national rate of 143.6 per 100,000 in 1909, when the sanatorium was opened, to a statewide rate of 100.2 per 100,000 in 1929. However, the drop was not uniform across all citizens of Virginia, and especially in the history of sanatoria before 1917, the results of treatment at Catawba were not a simple success. People who were sent to the sanatorium were the ones least in need of treatment, and although the reports argued that the results of the institution were encouraging, it is clear from reexamining the tables of former patients that many who left had relapses. The reports acknowledged this fact, and in the 1916 report, Lloyd called the “large death rate” of former patients “a disappointment.”¹⁰⁹ Viewing Catawba and the larger sanatoria movement as a significant factor in the decrease of tuberculosis cases disregards the work underway in education and sanitation across the state and ignores the experiences of both the African American community and the poor.

Endnote

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2. Ennion G. Williams et al., *Annual Report of the Board of Health* (Richmond, Va.: Superintendent of Public Printing, 1916), 9.
3. Sheila Rothman, *Living in the Shadow of Death* (Baltimore: Johns Hopkins University Press, 1994), 181.
4. Rothman, *Living in the Shadow of Death*, 184, 185.
5. Katherine Ott, *Fevered Lives: Tuberculosis in American Culture since 1870* (Cambridge, Mass.: Harvard University Press, 1996), 8.
6. Ott, *Fevered Lives*, 144.
7. Rothman, *Living in the Shadow of Death*, 206.
8. Stephenson, *Catawba Sanatorium*, and the subject of the University of Virginia thesis by James E. Young, “A Story of the Catawba Hospital” (Charlottesville, Va., 1984).
9. Rothman, *Living in the Shadow of Death*, 198–199.
10. Rothman, *Living in the Shadow of Death*, 183.
11. “Tuberculosis Sanatorium,” *Highland Recorder* (Monterey, Va., January 29, 1919).
12. Williams et al., *Annual Report of the Board of Health* (1917), 148.
13. Ott, *Fevered Lives*, 8.
14. Williams et al., *Annual Report of the Board of Health* (1910), 3.
15. Ott, *Fevered Lives*, 34.
16. Ott, *Fevered Lives*, 39.
17. “Summer Houses,” *The Roanoke Times* (Roanoke, Va., July 5, 1891).
18. “Roanoke Red Sulphur Springs, Catawba, Virginia,” *The Roanoke Times*, May 25, 1891.
19. The total death rate in 1912, for instance, was 148 per 100,000 compared to 256 per 100,000 African American deaths from the disease (Williams et al., *Annual Report of the Board of Health* (1912), 34, 37)).
20. Ott, *Fevered Lives*, 106, 108.
21. Williams et al., *Annual Report of the Board of Health* (1914), 47.
22. Ott, *Fevered Lives*, 50-51.
23. Scott Derks, *The Value of a Dollar: Prices and Income in the United States 1860-2004* (Millerton, N.Y.: Grey House Publishing, 2004), 104.
24. Williams et al., *Annual Report of the Board of Health* (1909), 10, and Stephenson, *Catawba Sanatorium*, 9.
25. Price of the land found in Young, “A Story of Catawba Hospital,” 25; description of buildings from Williams et al., *Annual Report of the Board of Health* (1909), 11-12.
26. Williams et al., *Annual Report of the Board of Health* (1909), 66, 70.
27. “Former Clerk Gave Noel His Information,” *The Times-Dispatch* (Richmond, Va., March 12, 1910).
28. “Former Clerk,” *The Times-Dispatch*.
29. “Former Clerk,” *The Times-Dispatch*.
30. “Former Clerk,” *The Times-Dispatch*.
31. “Former Clerk,” *The Times-Dispatch*.
32. “Former Clerk,” *The Times-Dispatch*.
33. “Former Clerk,” *The Times-Dispatch*.
34. Stephenson, *Catawba Sanatorium*, 9.
35. Stephenson, *Catawba Sanatorium*, 9.
36. Stephenson, *Catawba Sanatorium*, 10.
37. Stephenson, *Catawba Sanatorium*, 10.
38. Already in late 1910, Catawba was discussed as having been established “for the cure of consumption” (“Daniel’s Mantle Falls on Swanson,” *The Times-Dispatch* (August 1, 1910)).

39. "Tuberculosis Sanatorium," *Highland Recorder*:
40. "To Blot out the White Plague from Virginia," *Staunton Spectator and Vindicator* (Staunton, Va., February 25, 1910).
41. Williams et al., *Annual Report of the Board of Health* (1910), 11.
42. Williams et al., *Annual Report of the Board of Health* (1910), 11, 12.
43. Williams et al., *Annual Report of the Board of Health* (1910), 12.
44. Williams et al., *Annual Report of the Board of Health* (1910), 12.
45. Williams et al., *Annual Report of the Board of Health* (1910), 21.
46. Williams et al., *Annual Report of the Board of Health* (1910), 21, 103.
47. Williams et al., *Annual Report of the Board of Health* (1916), 9.
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49. "'Chasing the Cure' in Rocky Mountain Region," *Daily Press* (Newport News, Va., July 24, 1910).
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51. "Former Clerk," *The Times-Dispatch*.
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59. Williams et al., *Annual Report of the Board of Health* (1909), 88.
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61. Williams et al., *Annual Report of the Board of Health* (1915), 20.
62. Williams et al., *Annual Report of the Board of Health* (1912), 18.
63. Williams et al., *Annual Report of the Board of Health* (1912), 18.
64. Williams et al., *Annual Report of the Board of Health* (1912), 18.
65. Williams et al., *Annual Report of the Board of Health* (1913), 120.
66. Williams et al., *Annual Report of the Board of Health* (1916), 10.
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68. Stephenson, *Catawba Sanatorium*, 15.
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78. Williams et al., *Annual Report of the Board of Health* (1913), 119.
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80. Williams et al., *Annual Report of the Board of Health* (1910), 21.
81. Williams et al., *Annual Report of the Board of Health* (1910), 14.
82. Williams et al., *Annual Report of the Board of Health* (1912), 47.
83. Williams et al., *Annual Report of the Board of Health* (1912), 19.

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88. Williams et al., *Annual Report of the Board of Health* (1914), 241.
89. Williams et al., *Annual Report of the Board of Health* (1913), 119.
90. Williams et al., *Annual Report of the Board of Health* (1913), 119.
91. Williams et al., *Annual Report of the Board of Health* (1909), 88.
92. Ott, *Fevered Lives*, 148.
93. Williams et al., *Annual Report of the Board of Health* (1909), 85.
94. Williams et al., *Annual Report of the Board of Health* (1909), 85.
95. Williams et al., *Annual Report of the Board of Health* (1909), 85.
96. Williams et al., *Annual Report of the Board of Health* (1909), 85.
97. Williams et al., *Annual Report of the Board of Health* (1909), 85.
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99. All above information about female patient from Williams et al., *Annual Report of the Board of Health* (1910), 88.
100. All information about male patient from Williams et al., *Annual Report of the Board of Health* (1910), 88.
101. Williams et al., *Annual Report of the Board of Health* (1910), 107.
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104. Williams et al., *Annual Report of the Board of Health* (1916), 149-150.
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