The Evolution of the Sanatorium: 
The First Half-Century, 1854-1904

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Abstract. In the 19th century tuberculosis was the major threat to health in Europe and North America. It was thought to be caused by heredity compounded by one’s way of life and, even when proved to be an infection, these factors were thought to identify who would catch it. In 1854 Hermann Brehmer asserted that he could cure tuberculosis with a regimen of fresh air, exercise and good nutrition in a sanatorium. Although the medical establishment initially rejected Brehmer’s ideas the sanatorium movement steadily caught hold, and within two decades was supported by eminent physicians. Rest replaced Brehmer’s exercise, as the key remedy. The sanatorium regimen put Galenic principles of hygiene into practice.


In the 19th century tuberculosis was the most common single disease causing death in Europe and North America. For instance, at century’s end, the number of deaths from tuberculosis in Germany exceeded that from all other infections. Institutions known as sanatoria appeared for...
the treatment of people with active or threatened disease. It is generally
acknowledged that in 1854 Hermann Brehmer started the sanatorium
movement in Görbersdorf, Silesia. Initially the medical establishment
rejected the ideas behind sanatoria and their regimens but by century’s
end they were supported. An example of a community’s espousal of
the sanatorium is provided by the 1904 report by Manitoba’s provincial
bacteriologist, Dr. Gordon Bell: “That the sanatorium treatment of pul-
monary phthisis is the best known to medical science, and has yielded
most gratifying results where the climatic conditions were very similar to
our own.” With such encouragement the province undertook to provide
such a facility for its citizens.

This paper examines why Dr. Bell had such confidence in the value of
sanatoria and why he referred to climate. The founders of the sanato-
rium movement published little and their success relied much on word
of mouth. However in the last half of the 19th century there were many
accounts in English language medical journals and textbooks of the
treatment at sanatoria. To these accounts are added a few German pub-
llications, while to set the scene and take advantage of retrospective
views on the origins of the sanatorium, other publications are included.

TUBERCULOSIS AND ITS CAUSES

To understand what led to the formation of the sanatorium it is neces-
sary to examine current beliefs as to the nature and causes of tuberculo-
sis. Tuberculosis was a constant threat to human health, without dra-
matic outbreaks as were seen with cholera and smallpox. Most doctors
were confident they could diagnose tuberculosis by its characteristic fea-
tures of chronic cough, often bloody, fever, and wasting coupled with
percussion and auscultation to reveal its lesions. These lesions were
identified by pathological studies and by 1819 Laënnec described the
tubercle as the defining abnormality of the disease. This led Schoenlein
to propose that the disease be called tuberculosis. By mid-century the
pathology of various stages of the disease was recognized.

At the beginning of the 19th century acute diseases were mostly attrib-
uted to contagion or miasma. For the most part tuberculosis was viewed
differently, and only in Italy was Fracastoro’s concept of it as a contagion
was followed. Fracastoro insightfully described the formation of an ulcer
in the lungs and its discharges, “seminaria” being the vehicle of spread. He
recognized both person-to-person spread of the disease and conta-
gion at a distance for phthisis.

In France and Britain phthisis was categorized as a disease of hered-
ity although to others, a poor way of life and environment were con-
sidered to be confounding factors or even responsible. This perspective
was to greatly influence the treatment of tuberculosis. In 1835 Clark, a
renowned expert on consumption saw the disease as a general disorder of the body affecting mainly the lungs. He described it as commoner in children of consumptive parents. He also associated it with sedentary occupations, especially for city dwellers in damp, cold, inadequately ventilated conditions. He recommended that delicate children, at risk for developing consumption, should be raised in the country where exercise in the open air promoted the tone of the body and an equable circulation. Attention to diet was important because consumption was thought to result from a general disorder of the body. Clark entirely disbelieved contagion as a cause. Such views permeated the writings of many other experts at this time.

Indoor air was considered to be particularly harmful. Florence Nightingale had observed, “After the Crimean war, it was found that the death rate among soldiers from consumption alone and its cognate diseases (the monstrous products of breathing foul air) exceeded the death rate from all causes among the civil population.” Excessive carbon dioxide of the expired air was blamed. Cornet described it thus “the air, especially in dwellings and when many people are together, contains a large number of gases derived from the air of expiration, the perspiration of people, from heating, cooking etc., and these in strong concentrations, ...a small admixture of noxious air is not indeed perceptible to the senses, but has none the less an undesirable effect upon the appetite and other bodily functions.” The noxious effect of indoor air was to hamper nutrition of the body, rather than affecting the lungs themselves. Some physicians thought poor nutrition alone led to tuberculosis. Dobell attributed the malnutrition producing consumption to a disorder of the pancreas. Restricted chest movement made the lungs particularly vulnerable to tuberculosis for it reduced the air and blood supply to the lungs. Bad posture encouraged by stooping—the gentlewoman over her needlework and the scholar over his books bred consumption. For women the constriction of corsetry put them in particular peril. All these factors were important in those whose family history put them at risk. As late as 1896 Ransome stressed that the first step in preventing phthisis was to check the family history when contemplating marriage. Even Fracostoro acknowledged heredity played some part for he remarked on phthisis developing over six generations of a family. Although heredity was considered paramount as the source of the disease contagion was not completely ruled out. Pollock quoted Weber who had, in 1874, reported that wives of consumptive husbands frequently developed the disease while few with healthy husbands did. It seemed husbands rarely developed the disease from wives. Weber blamed pregnancy for undermining the health of wives.

In the second half of the century microbiology proved that many diseases resulted from infection by micro-organisms. In 1882 Koch pre-
sent his meticulous research providing evidence that the bacterium *Mycobacterium tuberculosis* was the cause of the disease.\textsuperscript{22} But the concern that heredity and daily life were important did not die, and, if anything they became more important because they explained why only some people succumbed to the infection. Over the next decade it was acknowledged that the bacterium caused the disease but it was still difficult to understand how tuberculosis could emerge in families with no contact and where living conditions and nutrition were good. Heredity alone was still thought to explain some cases.\textsuperscript{23}

THE NATURAL HISTORY OF TUBERCULOSIS

Tuberculosis was recognized as a disease whose progress had unique characteristics, and this was reinforced, after Koch’s discovery, when it was compared to other infections. Clark had acknowledged that consumption could be latent but he thought that this meant that the disease was silently destroying the lungs rather than lying dormant.\textsuperscript{24} Later this notion was called incipient tuberculosis. Pollock better described latent phthisis, after its true cause had been found, thus “a long latent period of years during which the germ has been there but produced no effects on the system.” He had no way of confirming this and wondered if the disease was even contracted before birth. Pollock also stressed that active phthisis was well known to consist of exacerbations and remissions.\textsuperscript{25}

The priority of treatment became to catch the disease at its latent or incipient stage before it became fully active. Therefore to treat tuberculosis, or better still to prevent it, it was important to identify those at risk because of their heredity and ensure that this was not aggravated by lack of fresh air, poor chest expansion or poor nutrition. One other factor was the climate in which the person lived.

CLIMATOLOGY AND TUBERCULOSIS

The study of the meteorology, benefits and harm of different climates was a major medical discipline known as Climatology.\textsuperscript{26} The Hippocratic attention to “Airs, Waters and Places” was promulgated.\textsuperscript{27} During the 19th century there was a major shift in thinking about what was the best climate for tuberculosis. The temperate weather of Northern Europe was at first considered to be too cold and damp for the consumptive. Clark wrote that was no other disease in England for which a change of climate was considered of such importance and advised that “the sooner the patient removes to a mild climate, especially if winter is approaching, the greater the benefit.”\textsuperscript{28} He concluded his book on consumption thus: “A residence in a mild climate for some years will greatly promote the restoration of the general health, and tend to prevent a recurrence of dis-
ease in the lungs.” Clark favoured the south of Europe, in particular Italy whence went his patient, physician and poet, John Keats. When a move to a warm climate was impossible then residence in a heated bedroom was a poor substitute. Pollock also favoured a dry air of moderate temperature. Neither Clark nor Pollock expected the warmer climate to cure the disease but simply ameliorate the symptoms.

Legend has it that it was an English physician, George Bodington, who was responsible for the chief shift in therapy, both encouraging residence in a cold climate and providing an institution in central England for the purpose. In 1840 he questioned the belief that cold hastened the formation of tubercles, and he described his treatment of consumption illustrated with six case reports. He emphasized that patients should be in the open air, partake in exercise, and receive good nutrition. He believed “the application of cold pure air is the most powerful sedative that can be applied.” This was so heretical that the reviewer in *The Lancet* thought that it was not worth “expending any portion of our critical wrath on his crude ideas and unsupported assertion.”

In fact others had questioned the harm of cold climates and the benefits of warm climates. Johnson, who studied the influence of tropical climates on disease, noted the high rate of phthisis in the sailors stationed in the Mediterranean. Louis, using several sets of observations, amassed the strongest evidence that northern climates were harmless. He found no relationship between the season and admissions to hospital in Paris. He criticized the belief that the climate led to excessive deaths from consumption in the animals of the Paris menagerie, for it ignored the rate in their natural environment. The similar opinion that the Parisian cows died from consumption due to life in a cold climate overlooked that they were kept in warm stables. He also cited that troops stationed in “excessively cold” Canada had less phthisis than in mild Bermuda. And Pollock, who generally recommended warm climates, admitted that “we have sent patients to winter in the dry, pure air of Canada with the greatest advantage.” He pointed out that the northern clime promoted vigour in its races while southerners were indolent.

The emphasis was on the purity of the air, with dryness as an added benefit, for dampness was much associated with tuberculosis. Welch described how the mortality from phthisis in a Canadian barracks, from 1830-37, was 23 per 1000 until it was drained and ventilated. With reduced dampness the mortality fell to 9.5 per 1000 from 1863-72. In due course sites with sandy soils that were dry were often chosen for treating consumptives and a sojourn in desert areas was popular. Cold air could produce dryness too. Weber pointed out that Canadian winters might be 10 times colder than London but it was a dry cold so bearable. He illustrated his belief in the value of life in the fresh air with an account of a large Silesian family ravaged by phthisis. Those members
who remained in cities died of the disease, while those who moved to rural environs, including emigration to a farm in Manitoba thrived.  

THE FOUNDING OF THE SANATORIUM

Hospitals specializing in the care of consumption had been founded, but these provided a place for the poor to die rather than to be cured and for physicians to study the disease. One exception had been the short-lived Pneumatic Institute of Thomas Beddoes (1760-1808) who attempted unsuccessfully to cure the disease with inhaled gases. In general medical leaders presumed that there was no hope of cure for tuberculosis; medications were valueless except for symptom relief and there was no point in special places for its treatment. All this was to change in the second half of the century with the founding of the sanatorium. The story of the founding of sanatoria is revealed in the biographies of the three physicians, Hermann Brehmer (1826-89) at Góbersdorf in Silesia, Peter Dettweiler (1837-1904) at Falkenstein in Germany, and Edward Trudeau (1848-1915) at Saranac in New York State.

Brehmer, whose work influenced the other two physicians, was the founding father of the sanatorium. His theory as to the cause of tuberculosis guided his approach to treatment and he provided an institution to offer his course of therapy. There are several accounts of what inspired Brehmer and it is hard to determine which is the true story, for little was recorded at the time. The most certain accounts are Brehmer’s own book on tuberculosis and writings of his contemporaries, above all Adolphus Knopf (1857-1940), who was himself an acknowledged expert on the disease and born in Germany. Brehmer had studied natural sciences, mathematics and astronomy, and had moved to Berlin to study botany. He met the physiologist Johannes Muller and this inspired him to switch to medicine. He graduated in 1853 with a thesis Tuberculosis primis in stadiis semper curabilibus that suggested the heretical notion that tuberculosis could be cured. Brehmer based his claim on the pathological studies of Rokitansky who showed that healed tubercles could be seen at autopsy and that the heart was atrophic in fatal tuberculosis, although Rokitansky stated that this was found in any wasting disease. Brehmer reasoned that the weak heart reduced the circulation to the lungs and that their resulting poor nutrition predisposed those with the hereditary tendency to develop tuberculosis. Brehmer’s book described how appropriate exercise with good nutrition would strengthen the heart, improve the circulation and so heal the lungs. This mirrors Clark’s views on the need for an equable circulation and attention to diet.

Brehmer determined to put his idea into practice and chose to do this at Góbersdorf in Silesia where his sister-in-law had opened a hydro-pathic spa in 1849. It was an attractive site being in the mountains that
would provide the essential exercise through uphill walks. In 1854 he began to treat patients and billeted them in the village. He proposed to build a medical centre for tuberculosis, but initially he had difficulty obtaining official support; Brehmer’s democratic views were unpopular with the Prussian government. In 1857 Brehmer published his book “The Laws and Healing of Chronic Tuberculosis of the Lung.” This also received no support, with only the Vienna Weekly Medical Journal noting it and then to denigrate its claims. Brehmer persevered and Dr. Flugge of Hanover referred him patients. More significantly, with the help of two influential friends, the explorer Alexander van Humboldt and the clinical scientist J. L. Schoenlein, he was allowed to build his institution, and what is considered to be his true sanatorium was opened in 1859. Brehmer’s theories were not accepted in his lifetime by the medical establishment and his contribution never honoured by the Prussian government. As late as 1885 a review of a later edition of his book in The Practitioner was scathing. He died four years later and there were only two short obituaries in the English language press. Thus began the sanatorium movement that was to dominate the treatment of tuberculosis for the next 100 years.

There are other accounts of what inspired Brehmer, although the grounds for them are uncertain. The first appeared in 1906 that Brehmer had read Bodington’s obscure monograph and so chosen to locate his sanatorium in a cold climate. But Bodington’s work was not recognized until much later. Certainly in its obituary of 1882, The Lancet credited Bodington with being “the first, or among the first, to advocate the rational and scientific treatment for pulmonary consumption” namely exercise and fresh cold air, and this idea that the English Bodington, rather than the German Brehmer, was instrumental in the development of sanatoria seems attractive to English historians. But there is no evidence in his own book that Brehmer knew of Bodington, or in Knopf’s accounts, and this was the conclusion of the tuberculosis experts, the American Lawrason Brown and English Bignall. A second story is pertinent to Brehmer’s choice of a mountainous region for his sanatorium. It is that as a botany student, Brehmer who himself had tuberculosis, had gone to the Himalayas and there recovered. This inspired him to choose the mountains. Waksman first gives this account but he gives no references to substantiate it. Several subsequent historians also refer to this. Again this is not mentioned in Brehmer’s book or by Knopf. It may be that his friend Humboldt, who had explored the Andes, recommended mountainous areas as being healthy. Rogers in his review of altitude therapy of tuberculosis refers to the Humboldtian doctrine.

The second leader of the sanatorium school was Peter Dettweiler who contracted consumption while serving as a surgeon in the military. He
recovered at Görbersdorf, served again in the 1870 French war, but the disease relapsed and he returned. With improvement he became Brehmer’s assistant. In 1875 he founded his own sanatorium at Falkenstein in the hills close to Frankfurt. He had visited England and it is thought he was aware of Bodington. He had reservations about Brehmer’s emphasis on exercise and focused on rest as the chosen treatment. He did not think mountains were important.\textsuperscript{60} His sanatorium was easier to visit from England and this perhaps meant his methods were better known there.

The third founder was Edward Trudeau, who introduced sanatoria to North America. He had succumbed to tuberculosis as a young physician, and in 1873 he chose to spend his last days in the Adirondack Mountains of New York, where he could pursue his pleasures of hunting and shooting.\textsuperscript{61} However his disease remitted, and as his health improved, he returned to medicine and began to read journals. He described how he read in 1882 of an account of Brehmer’s sanatorium in Anstie’s English \textit{The Practitioner}.\textsuperscript{62} Inspired by this he resolved to develop a similar institution in Saranac. Helped by his New York physician, the influential Alfred Loomis, and the philanthropy of wealthy New Yorkers who holidayed in the area he raised funds. In 1885 his first accommodation, “The Little Red Cottage” for consumptives opened. He determined to work for free and provide care “for working men and women who came here with short purses.”\textsuperscript{63} Saranac flourished. Many physicians and surgeons were patients there including such Canadian leading surgeons as Edward Archibald and Norman Bethune both of Montreal\textsuperscript{64} and future medical superintendents of sanatoria, David Stewart of Manitoba\textsuperscript{65} and A. E. Miller of Nova Scotia.\textsuperscript{66}

Two other names, of places rather than people, are equated with the early sanatorium movement. The first is Nordrach in the Black Forest, which Otto Walther, a pupil of Brehmer, founded in 1889. Walther was a strong supporter of exercise particularly in the convalescent phase of the disease.\textsuperscript{67} Nordrach sanatoria were developed around the world and the regimen copied, including at the prestigious Brompton Hospital Sanatorium, Frimley, England.\textsuperscript{68}

The other place was Davos in Switzerland. In 1844 Luiz Ruedi noted that scrofulous glands healed rapidly in Davos. In 1853 Alexander Spengler (1827-1901) fleeing revolution in Baden, settled there and noted the lack of consumption in the local population. In 1865 a Dr. Friedrich Unger, who was familiar with Görbersdorf, learned of Davos and visited. Encouraged by his advice Spengler wrote a paper recommending Davos for consumption in 1869.\textsuperscript{69} In 1878 the influential physician Clifford Allbutt described his observations of the treatment of Davos.\textsuperscript{70} Davos, and surrounding Swiss communities built many sanatoria and these were widely supported by patients from all over Europe but particularly Britain. Davos was the site of Thomas Mann’s “\textit{The Magic Mountain}.”\textsuperscript{71}
A major debate of the early sanatorium movement was whether it was the cold air of northern latitude or the elevation of altitude that was most important for health. There were many observations that dwellers in the mountains seemed free of tuberculosis, often to succumb if they moved to the lowlands for employment. Clark gave the telling anecdote of a young Pyrenean girl who, adopted by a princess and taken away from her mountains, died of scrofula, while her brothers remained in rude health. That it was the isolation of mountain communities, not their environment, that was protective was not considered since the dominant cause of the disease was heredity. That isolation was the reason is suggested by Arthur Ransome’s description of how the fishermen of Labrador perished of consumption when they moved to the more populated St. Lawrence valley.

Certainly there was strong support for the value of altitude in the English press—The Lancet extolled it in two leading articles in 1886. Three benefits were identified: the rarefaction of the air that stimulated deep breathing, the purity of the air and the cold. The thin air produced deep breathing that gave inhabitants a large chest size and encouraged lung growth at the apex, the part of the lung vulnerable to phthisis. Hippocrates had similarly noted that inhabitants of the mountains were of big physique. The rarefaction encouraged an increase in the heart’s action and an increase in the blood so improving the nutrition of the lungs. The observed increase in haemoglobin with altitude even led to the suggestion that at altitude the blood became germicidal for the bacillus. Microbiological studies confirmed the purity of mountain air being relatively free of bacteria. The cold was thought to have an antiseptic effect and that Canada’s cold air had similar properties. Further support for higher altitudes was the school of thought that ultra-violet rays, obtained naturally from sunlight, were of benefit; Ransome had shown these rays did indeed damage the bacilli of tuberculosis.

Studies of the effects of altitude on death rates, allowing for urban or farming populations were interpreted as confirming altitude was protective for consumption. But in the end sanatoria were built in many locales, and Frank Rogers, who much later assessed the rise and fall of altitude therapy for tuberculosis, concluded that the support for altitude reached its apogee in 1908, after which it was realized that it was of no extra benefit.

THE SANATORIUM REGIMEN

Piéry and Roshem called the sanatorium regimen “La cure hygiéno-diététique.” The cure had a long tradition, for it addressed Galen’s six non-naturals, air, food and drink, rest and exercise, sleep, excretions, and state of mind as the key factors to be considered. The way of life, not medications, was the means to overcome the disease.
The priority of all sanatoria was to expose the consumptive to the maximum degree of fresh air. Balconies were a common feature on which the patients spent the day.\textsuperscript{87} Trudeau put the value of fresh natural air to the test with a renowned experiment in which he took rabbits inoculated with tubercle bacilli. Four of five confined to a damp, dark cellar died compared to only one of five living in the cold outside air.\textsuperscript{88}

Good nutrition was the second emphasis. The patients received abundant food with up to seven meals a day. Plenty of milk and fats with strong wines and spirits were given. The patient’s weight was used as one indicator of progress.\textsuperscript{89} Cod liver oil was much favoured.\textsuperscript{90}

Rest and exercise was a major consideration in the sanatoria. Brehmer and his pupil Walther believed exercise was more important, while Dettweiler and Trudeau concluded rest was more beneficial. At first Brehmer was vague about what he meant by exercise. At Görberdorf he built paths up the mountains for patients to follow but, realizing that consumptives were easily exhausted, provided benches for frequent rests. At Nordrach the regimen also emphasized exercise principally for rehabilitation after recovery.\textsuperscript{91} At one extreme Marcus Paterson at Frimley gave patients construction projects, and, influenced by the work of Almroth Wright, decided that such exercise cured tuberculosis through what he called auto-inoculation.\textsuperscript{92}

However the majority of physicians felt that exercise in active tuberculosis, as revealed by fever, weight loss and spitting blood, was harmful. Dettweiler encouraged patients to rest outside in a reclining position. He was unsure if this was possible in winter but after trying it with intelligent and tractable women he introduced the habit.\textsuperscript{93} Sheltered terraces enabled patients to rest in the fresh air even in the snow (Figure 1). Eventually rest in a reclining posture became the most important part of the regimen everywhere, with patients discouraged from the least exertion while ill.\textsuperscript{94} Years later it was demonstrated that lying flat increased blood flow to the apex of the lungs and may have helped healing—the same effect as Brehmer had aimed to achieve with exercise.\textsuperscript{95} By the end of the 19th century the balance between rest and exercise was similar at all sanatoria, and the amount prescribed depended on the stage of the disease. For instance in 1898 a physician from the Brompton, who was a patient at Nordrach described how one first rested in rooms with wide open windows, then began leisurely walks which slowly increased until several miles climbing up to six hundred feet was attained, followed by further afternoon rest.\textsuperscript{96}

Weber had recommended that delicate children should sleep in well ventilated rooms and exposed to the night air.\textsuperscript{97} This habit acquired early would ward off tuberculosis. For those in sanatoria the rest cure in fresh open air was continued at night for patients slept on balconies open to the air or in rooms with open windows with central heating to offset the cold (Figure 2).
Even before Koch had found the tubercle bacillus was excreted from the lungs, Dettweiler encouraged expectoration by patients but ensured that the sputum was collected in flasks. Once the importance of infection was accepted the control of sputum became a major focus of public health campaigns.

Finally, attention was paid to the role of the patients' temperament and state of mind. There was a common belief that there was a romantic association between the creative arts and the consumptive. Cornet stressed the importance of addressing the patient's state of mind with sympathy and honesty. The aim of treatment was "heightened hygiene of body and mind." He advised consumptives to shun frivolity and keep their minds occupied with relaxing activities—reading romances and crime fiction was too exciting. But faced with death the consumptives had a reputation for high living and fatalism.

Brehmer also used hydrotherapy for his patients. Patients were subjected to ice cold douches under high pressure which was one area that Brehmer personally supervised. The practice was an offshoot of his sister-in-law's spa and a visit to the influential Priessnitz he had made as a student. Few other centres used hydrotherapy.

The sanatorium was a world of discipline. As Osler wrote for home treatment "A rigid regime, a life of rules and regulations, a dominant will on the part of the doctor, willing obedience on the part of the patient.
and friends—these are necessary in the successful treatment of tuberculosis.” Much was asked of the patient, and so it was recommended that physicians should live in close contact with their patients so as to see that suitable meals were consumed, and that the rules and regulations were strictly obeyed. Lawrason Brown, Trudeau’s successor at Saranac informed the patient of “details of treatment and the importance of implicit obedience.” The success of the sanatorium regimen was a reflection of the strong personality of the physicians. Medical paternalism was expected.

In 1901 The Lancet opened the year with a series of articles in which leading physicians gave the message that sanatoria were crucial for the management of phthisis. Physicians in Europe and North America embraced this doctrine, for by 1904 there were 135 sanatoria in existence. Germany led the way with support from state, philanthropists, and voluntary organizations. Brehmer’s Kurhaus became a magnificent building, providing accommodation for the rich, middle class, and poor (Figure 3).

DISCUSSION

Fifty years after Hermann Brehmer introduced the sanatorium regimen for the treatment of tuberculosis, it was accepted by leading physicians
in Europe and North America. Tuberculosis was the major disease that faced their communities. Medications had proved fruitless. The sanatorium promised a cure or, at least, a means of controlling severe disease. The results provided by sanatoria and the experience of patients supported the claims. In particular doctors who had been patients in them spread the word or, more tellingly, founded their own sanatoria. These accounts had been published in leading medical journals or in books written by physicians at influential institutions and were widely available. No wonder that Manitoba’s Dr. Gordon Bell endorsed sanatorium treatment as the best known to medical science. And yet Brehmer’s science on which the treatment was based was weak. He had been correct that autopsies had shown tuberculous lesions could heal, but he was mistaken in attributing the disease to poor nutrition of the lungs from an atrophic heart. Moreover his choice of the mountains for placing his sanatorium probably reflected the ease of using his sister-in-law’s spa rather than knowledge that mountain air was good for consumption. Similarly in North America, Trudeau found himself in the mountains since he could hunt and fish there rather than because he thought mountain air was beneficial for tuberculosis.

Individual sanatoria produced accounts of their results and these bolstered the belief in their effectiveness. Such data is illustrated in Table 1 that summarized the current state of the results from 15 sanatoria
The definition of mortality is self-evident, but that of cure, absolute or relative or of amelioration is not. The data suggests that the majority of patients improved, and were maybe even cured. Figures given for length of stay for only four places revealed that the mean admission was for three months, although longer periods were considered. The number of beds was given for only eight sanatoria and this ranged from 70 to 250 beds. Ransome felt that if these figures were trustworthy they gave sufficient grounds for a careful trial of the sanatorium plan.

**Table 1**

<table>
<thead>
<tr>
<th>Sanatoria</th>
<th>Name of Observer</th>
<th>Mortality</th>
<th>Cures</th>
<th>Ameliorations</th>
<th>Not Ameliorated</th>
<th>Mean Duration of Residence</th>
<th>No. of Beds</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>Falkenstein</td>
<td>Dettweiler</td>
<td>4 to 4.5</td>
<td>14 14</td>
<td>45</td>
<td>—</td>
<td>Days 90</td>
<td>150</td>
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<tr>
<td>Gorbersdorf</td>
<td>Achtermann</td>
<td>7.51</td>
<td>25</td>
<td>50 to 55</td>
<td>—</td>
<td>93</td>
<td>250</td>
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<tr>
<td>&quot; (Rempler)</td>
<td>Rompler</td>
<td>7.5</td>
<td>25 to 27</td>
<td>50</td>
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<td>110</td>
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<td>Wolff</td>
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<td>—</td>
<td>70 to 73</td>
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<td>40</td>
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<td>—</td>
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<td>Hohenbornef</td>
<td>Meissen</td>
<td>—</td>
<td>14.51 28.91</td>
<td>—</td>
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<td>80 to 90</td>
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<td>30</td>
<td>65</td>
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<td>Gabriovitch</td>
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<td>36.7</td>
<td>33</td>
<td>16.7</td>
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<td>Dottweiler &amp; Nahin</td>
<td>—</td>
<td>13</td>
<td>—</td>
<td>77</td>
<td>10</td>
<td>Only early cases admitted</td>
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<tr>
<td>Canigou</td>
<td>Sabourin</td>
<td>—</td>
<td>43.8</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Adirondack Cottage</td>
<td>Trudeau</td>
<td>—</td>
<td>20 to 25</td>
<td>30 to 35</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>Patients pay two thirds of expenses</td>
</tr>
<tr>
<td>Leysin</td>
<td>Burnier</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>130</td>
<td></td>
</tr>
<tr>
<td>Saint Blasien</td>
<td>Haufe</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>160</td>
<td></td>
</tr>
<tr>
<td>Winyale (Ashville, NC, USA)</td>
<td>Von Ruck</td>
<td>4.10</td>
<td>22.64</td>
<td>42.47</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>Considers that patients should stay 6 months to 2 years</td>
</tr>
</tbody>
</table>


(Table 1). The table lists the sanatorium and the observer of the results. The definition of mortality is self-evident, but that of cure, absolute or relative or of amelioration is not. The data suggests that the majority of patients improved, and were maybe even cured. Figures given for length of stay for only four places revealed that the mean admission was for three months, although longer periods were considered. The number of beds was given for only eight sanatoria and this ranged from 70 to 250 beds. Ransome felt that if these figures were trustworthy they gave sufficient grounds for a careful trial of the sanatorium plan.
But whether the sanatoria really made a difference to the mortality and incidence of tuberculosis is impossible to determine. It can be argued that, once the tubercle bacillus and infection became accepted as the true cause of tuberculosis, that sanatoria removed infectious individuals from the community. But since, in those early years, only latent or incipient cases were admitted this was probably unimportant as these were likely the least infectious cases. Besides, the number of patients treated as shown in Table 1 was minimal and this could have had no effect on the infectivity of the cases residing in the community. In addition, there were so few patients admitted that, even if the majority did improve with good food, rest, and fresh air, this would have had little effect on the overall mortality in the population. After all Rokitansky’s observation that tubercles could heal was made before sanatoria existed. Tuberculosis was declining long before sanatoria existed; for instance in England mortality fell from 350 in 1838 to 150 per 100,000 in 1871. Louis’s point that one must look at the disease in the natural state before drawing conclusions on the effect of environment, also applies to the effect of therapy. This was not done and so it is impossible to judge whether the sanatorium in its first half-century really had a benefit. Nonetheless sanatoria dominated the treatment of tuberculosis for the next 50 years. Dr. Bell’s vision culminated in Manitoba providing 1,200 beds in seven sanatoria by 1959. The same growth was seen all around the developed world.

In 1948 the first randomized controlled clinical trial of any form of the treatment of tuberculosis was undertaken. This was the addition of the drug streptomycin to the standard sanatorium regimen of bed rest and good nutrition. The design of this trial produced a method to confirm if any therapy was effective. In the next decade drug therapy became established and overtook bed rest, fresh air, and nutrition. As a result the sanatoria began to close 100 years after Brehmer had given hope that tuberculosis could be cured. The sanatoria era had been one of the few times that Hygeia triumphed over Panacea in the treatment of a disease and it was the last time that a mainstream medical regimen followed Galen’s non-naturals as the means to combat disease.

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NOTES

1 The three names tuberculosis, phthisis (from the Greek) and consumption (from the Latin) will be used interchangeably in this paper to reflect the name used by the authority cited. The related disease scrofula, tuberculosis of the lymph glands, will generally be overlooked as this essay concentrated on the pulmonary form.


3 The name sanatorium was derived from sanare (to cure) while the also used sanitarium was derived from sanitas (health); both were used at that time, but in the fullness of time the former was favoured. Again throughout the text the two synonyms will be used depending on the source quoted.


12 James E. Pollock, *The Elements of Prognosis in Consumption, with Indications for the Prevention and Treatment* (London: Longmans, Green and Co., 1866); and James Copeland, *The Forms, Complications, Causes, Prevention and Treatment of Consumption and Bronchitis* (London: Longmans, Green and Co., 1866). Their ideas on its causes can be traced from the indices of their books and are scattered on various pages.


20 Fracastorii, *De Contagione et contagiosis morbis et eorum curatione Libri III*, p. 123.

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30 Pollock, *The Elements of Prognosis in Consumption, with Indications for the Prevention and Treatment*, p. 413.


33 James Johnson, *The Influence of Tropical Climates* (New York: Evert Duyckink et al., 1826), Mediterranean Section 1, p. 223-24.


50 Castiglioni, *History of Tuberculosis*, p. 81.


54 Bodlenton, *An Essay on the Treatment and Cure of Pulmonary Consumption*. Arthur E. Bodlenton Preface quoting Obituary Notice, *The Lancet* 11 March 1882. Full recognition came with Bernard Shaw, *The Doctor’s Dilemma: A Tragedy* (Published 1906, Fairfield, Iowa: 1st World Library, 2004, Act 1, p. 18) “There was my father’s old friend, George Bodlenton, of Sutton Coldfield. He discovered the open air cure in eighteen-forty. He was ruined and driven out of his practice for only opening the windows, and now we won’t let a consumptive have as much as a roof over his head.”


62 Trudeau, *An Autobiography*, p.154; and Lawrason Brown, *The Story of Clinical Pulmonary Tuberculosis*, p. 155. This article in *The Practitioner* has not been identified despite extensive search in libraries and the Saranac archives. Unfortunately the current editor has insufficient staff to browse through the archives of the journal.

63 David L. Ellison, *Healing Tuberculosis in the Woods*, p. 57-58, 75-76.


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73 Clark, *The Influence of Climate*, p. 255.


81 Williams, “The Curability of Phthisis at High Altitude,” p. 975-76.


84 Rogers, “The Rise and Decline of the Altitude Therapy of Tuberculosis,” p. 3.


93 Knopf, “Peter Dettweiler (1837-1937).”


98 Knopf, “Peter Dettweiler (1837-1937).”


102 Cornet, *Tuberculosis and Acute General Miliary Tuberculosis*, p. 549.


104 Kinghorn, “Brehmer and Dettweiler,” p. 954-55. Also Castiglioni refers to Ambrose Pare who recommended cold baths for phthisis, *History of Tuberculosis*, p. 38.


