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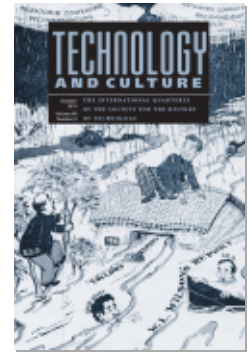
A Vital Mediation: The Sanatorium, before and after  
Antibiotics

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## A Vital Mediation

### The Sanatorium, before and after Antibiotics

**BHARAT JAYRAM VENKAT**

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**ABSTRACT:** As drug-resistant strains of tuberculosis spread across India, commentators have warned that we are returning to the sanatorium era. Such concerns might be symptomatically read in terms of loss; however, prophecies of return might also signal that there is something to be regained. Rather than lamenting the end of the antibiotic era, I shift the focus to ask about the sanatorium, not simply as a technology of the past, but as a technology of an imminent future. In examining late nineteenth- and early twentieth-century conversations about treating tuberculosis in India, I demonstrate how the the sanatorium was figured as a therapeutic technology that mediated the relationship between the body and its colonial milieu. In this light, I argue that contemporary prophecies of a future past register not simply the loss of antibiotic efficacy, but also a desire to return to a therapeutics that foregrounds issues of vitality, mediation, and environment.

#### Introduction

“Back to the sanatorium era!” Dr. Zarir Udwardia exclaimed with a flourish. It was the summer of 2015, and I was speaking to Udwardia about his work treating drug-resistant tuberculosis patients in his clinic in Mumbai. “And at times, it feels like that,” he added. “That there are no drugs left.” Four years earlier, Udwardia and his team at Mumbai’s P. D. Hinduja Hospital had sent a letter to the journal *Clinical Infectious Diseases* announcing that they had identified the first cases of *totally* drug-resistant tuberculosis in India.<sup>1</sup> Similar reports had been filed from Italy in

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1. Zarir Udwardia et al., “Totally Drug-Resistant Tuberculosis in India.”

2007 and Iran in 2009. Yet the letter from India struck a nerve, catalyzing fevered denial from the Government of India alongside media coverage of a coming apocalypse in the form of an “incurable” strain of tuberculosis.

In light of such incurability, what might it mean to *return* to the sanatorium era? On one hand, such a return might signal the exhaustion of revolutionary potential. Rather than the fulfillment of the utopian dream of mass antibiotic treatment, many of my interlocutors in India predicted the advent of a septic dystopia that had, to some degree, already arrived.<sup>2</sup> With the spread of drug resistance, seemingly curable conditions like tuberculosis have become potentially fatal. With this in mind, it is tempting to read the “sanatorium era” and what has been referred to as a “post-antibiotic era” as functionally equivalent. From the vantage of our present moment, both are quite spectacularly marked by a deficit or incapacity figured in terms of antibiotics. Yet to read both of these time periods simply in terms of lack obscures the broader therapeutic landscape of which antibiotics only constitute a part. As such, when my interlocutors spoke of a return to the sanatorium era, they seemed to be gesturing toward something more than a cruel inevitability, something more than a loss.<sup>3</sup>

Rather than lamenting the end of the antibiotic era—there is enough of this in both the scholarly and popular literature—I want to shift the focus to ask about the sanatorium, not simply as a technology of the past, but perhaps surprisingly, as a technology of an imminent future. I want to suggest that understanding what might be at stake in sanatorium treatment *now* requires an analysis of what was at stake *in the past*. In this sense, an India *after* antibiotics might resemble an India *before* antibiotics not simply in the form of an incapacity or loss, but also in terms of the regaining of a specific configuration of illness, vitality, and environment epitomized by the sanatorium. What I want to suggest is that this prophecy of a future past also signaled a desire to return to a particular mode of therapeutic intervention and its associated forms of clinical and epidemiological reasoning.

Sanatoriums are particularly valuable sites for understanding continuities and transitions in therapeutic form in India.<sup>4</sup> Many sanatoriums across

2. As Christoph Gradmann points out in “Re-Inventing Infectious Disease,” declarations of the end of the antibiotic era stretch back almost three decades. Yet such claims take on a special force and character in light of a contemporary geopolitical configuration in which India is frequently figured as a reservoir of drug-resistant microbes threatening to overtake those more well-heeled parts the world. See Lyle Fearnley and Bharat Venkat, “Reservoirs of History.”

3. I should note, however, that at least one of my interlocutors, a former government officer whose approach to tuberculosis partook of a high degree of techno-optimism, was very clear that such a return was pure and simple a “return to the dark ages.” In his view, this kind of return held nothing redemptive.

4. The scholarly literature on sanatoriums in India is minimal. Sunil Amrith, “In Search of a ‘Magic Bullet’ for Tuberculosis”; Helen Valier, “At Home in the Colonies”; and Bharat Venkat, “Cures” have all discussed the end of the sanatorium in India in terms of the fabled antibiotic trials in 1950s South India. See also Mark Harrison and

India survived the transition into the antibiotic era by being repurposed for the epidemics of the day.<sup>5</sup> Elements of their earlier architectural structures have endured—airy courtyards, for example—even as the broader therapeutic philosophy associated with sanatorium treatment has been for the most part relegated to the dustbin of misguided medical opinion.

In the early days of my research, I stood in the on-call room of one such ex-sanatorium, situated just beyond the limits of the south Indian city of Chennai. In the otherwise sparsely decorated room, a framed image of Robert Koch hung on the wall. Koch is regarded as the father of microbiology, the discoverer of the bacteria that cause tuberculosis, and the man who confirmed (along with Pasteur) that pathogenic microbes live among us.<sup>6</sup> His influence was such that his likeness has found its way across oceans and into former sanatoriums and chest hospitals across India. The hospital where I found myself, still commonly referred to as Tambaram Sanatorium, seemed a fitting place for Koch's image, as tuberculosis patients had been receiving treatment here for almost a century.

Yet when I think back to that image of Koch overseeing the quiet movements of government physicians during their breaks, it strikes me now as something of an encroachment. Not simply because Koch's bacteriology had evinced resistance from both Indian and European doctors and administrators as inapplicable to the colonies in the early twentieth century. Nor am I referring to the opinion of an earlier generation of historians who diagnosed European science as a steely "tool of empire."<sup>7</sup>

No, the reason is rather more specific. As I would learn, the founder of Tambaram Sanatorium had taken the illustrious Dr. Koch as his intellectual adversary. An Indian Christian born and raised in Madras but trained in Britain, Dr. David Chowry Muthu's professional life would play out in the uncertain time opened up by Koch, in which bacteriological reasoning grew in popularity despite the lack of a concordant mode of therapy that could specifically target bacteria.<sup>8</sup> Put simply, bacteriology offered a therapeutic philosophy with no technology for its implementation. Rather than attempting to bridge this gap, Muthu took it as an opening to proffer arguments against bacteriological forms of reasoning. In their place, he championed his own version of a vitalist metaphysics which took the sanatorium as its primary therapeutic technology.

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Michael Worboys, "A Disease of Civilization"; and Sheela Prasad and B. Venkat Raju, "The Magic Mountain Revisited" for brief discussions of Indian sanatoriums in the pre-antibiotic era. Unsurprisingly, the history of the sanatorium in the United States and Europe has received far greater scrutiny.

5. For example, Tambaram Sanatorium, which I discuss in this essay, was repurposed in the 1980s in the face of an emerging HIV epidemic in India.

6. See Bruno Latour, *The Pasteurization of France*.

7. See Daniel Headrick, *The Tools of Empire*; and Roy Macleod and Milton Lewis, *Disease, Medicine, and Empire*.

8. See Katharine Ott, *Fevered Lives*; Venkat, "Cures."

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Much has been written about Koch.<sup>9</sup> By contrast, almost nothing has been written of Muthu. In fact, it was some time before I was even able to find a photo of Muthu: not in his sanatorium, not even in the city where he had been born, but in a crumbling copy of the nationalist journal *Modern Review* that I found stashed away in a library in Kolkata. In what follows, I turn to the evolution of tuberculosis as a problem in India, and to the life and work of Muthu. My intent is not to produce a hagiography of a subaltern scientist (he was hardly that), nor is it to write a counter history of an alternative science.<sup>10</sup> In fact, Muthu's critiques of bacteriology, and even his vitalist predilections, were for a time widely embraced by medical practitioners and public figures in both India and Britain. As the century plodded on, however, his popularity began to wane among respectable medical professionals (while simultaneously soaring among spiritualists and other esoteric groups). It was not so much that Muthu's views radically diverged from the mainstream. Rather, I suggest that the mainstream underwent a radical narrowing in which bacteriological thinking became increasingly intolerant of other forms of reason—in particular, the vitalist forms of reason in which sanatorium treatment made sense.

This essay, then, represents an effort to examine how such forms of reason informed understandings of tuberculosis and its treatment in colonial India. I begin by discussing how illness and vitality were conceived of in terms of the body's relationship to the environment, a relationship configured within a dialectic of enclosure and openness. More precisely, I try to understand how both enclosure from and openness to the environment were understood to diminish vitality and engender tuberculosis. Focusing on late colonial conversations about the causes of the disease in India, I examine how Muthu and others attempted to understand the circumstances that engendered tuberculosis among diverse segments of the Indian population. Critically, ideas about race, gender, and geography were central to such discussions about the susceptibility of different kinds of bodies.

From the question of causality, I then turn to the question of therapy. If both enclosure and openness were thought to produce tuberculosis, then how might bodies and environment be reorganized into a more vitalizing configuration? Through an analysis of Muthu's clinical philosophy and practice within the broader context of Indian and European conversations about illness and vitality, I argue that the sanatorium was figured as a therapeutic technology that mediated the relationship between the Indian body and its colonial milieu. Rather than extreme enclosure or openness, the

9. Thomas Brock's laudatory *Robert Koch* notwithstanding, the historian of science Christoph Gradmann (2004, 2006, 2009, 2014) has produced an important body of scholarship offering a critical assessment of Koch's work, its reception, and his methods.

10. See J. P. S. Uberoi, *The Other Mind of Europe*; see also Ashis Nandy, *Alternative Sciences*; J. Lourdasamy, *Science and National Consciousness*, 104–5; and Amit Prasad, "Beyond Modern."

sanatorium operated simultaneously to expose and confine the body. The sanatorium and the broader garden colony of which it was to be a part were intended to be a technology of mediation: through it, the healing power of nature, and of air in particular, could be harnessed to treat patients.

While tracing this dialectic of enclosure and openness, as well as its mediation via the sanatorium, I aim to understand how various sources of vitalist thought came to inform a specifically clinical philosophy. Just as bacteriology made possible certain forms of therapeutic practice and technology, so too did vitalism. As I demonstrate below, vitalist understandings of body and environment were central to how Muthu conceived of the mediating power of the sanatorium. Although explicitly vitalistic approaches to therapy fell out of favor within much of biomedicine by the mid-twentieth century, I conclude by returning to the present to ask how this mode of therapeutic reasoning is experiencing a second coming in an India after antibiotics.

## Part I: Enclosure and Openness

Up until the closing decades of the nineteenth century, the majority of colonial medical officers would have agreed that Indians were not particularly susceptible to tuberculosis. This was variously explained in explicitly racialized and geographic terms, usually involving some combination of immunity, heredity, constitution, climate, geography, and virgin soil. By contrast, British troops, administrators, and their families were seen to be particularly susceptible to the disease. From the late nineteenth century into the first decade and a half of the twentieth century, however, evidence slowly mounted that tuberculosis was in fact affecting Indians. It was in spaces where Indian bodies were subject to regular medical supervision and confinement—army cantonments, prisons, and particularly zenanas—that medical practitioners first gained experience of tuberculosis in Indians.<sup>11</sup>

By 1884, when Muthu was twenty years of age, he had relocated to London to pursue his medical training. His education was likely financed by evangelical missionary organizations in South India, and his commitment to the Church was evident through his various civil commitments: as a

11. It is important to note that a range of conditions that share symptoms with tuberculosis can be discovered within the Ayurvedic canons, suggesting that knowledge of the disease was well-developed among Indian medical practitioners. This is a claim that is frequently expressed within twentieth-century texts on tuberculosis in India, both in English and in vernacular languages (see Bharat Venkat, “Of Cures and Curses”). Yet I would take Latour’s somewhat nominalist tack here and suggest that understanding a specific cluster of symptoms as tuberculosis and not *kshayarogam* or *kasanoi*, especially prior to the twentieth-century establishment of their equivalence, makes a serious difference in regard to the kinds of knowledge and technology that are assembled around it. See Bruno Latour, “On the Partial Existence of Existing and Nonexisting Objects.”

member of the Young Men's Christian Association, as secretary of the Indian Christians Union of Great Britain, and as a member of the British Medical Temperance Association, in connection to which the press baptized him as the "Christian Brahmin."<sup>12</sup>

In May 1887, Muthu was invited before the Zenana Missionary Society of the Church of England in London to speak about this problem of confinement in relation to the zenana.<sup>13</sup> The Society, established in 1880, was comprised of British women tasked with traveling to India (and to a lesser extent, China) to educate, convert, and care for native women understood to be trapped within the domestic confines of the zenana. In addition to teaching scripture, these missionaries educated Indian women about modern conceptions of hygiene, extending both the civilizing mission and the Anglican mission simultaneously.<sup>14</sup> Such work could be characterized in terms of what David Hardiman has called Christian therapy, a "blend of medical science, charitable sentiment and evangelical faith."<sup>15</sup> In his speech before the Zenana Missionary Society, Muthu spoke about the "ruling power of women in the Zenanas, and repeated that until their opposition to Christianity had been overcome only the outskirts of the citadel had been taken."<sup>16</sup> Despite their powerlessness in the male-dominated world of politics, Muthu maintained that women and the customs that they preserved reigned supreme in the home. As such, for Christianity to make headway on the subcontinent, he argued that it was necessary for missionaries to focus their efforts on converting women.<sup>17</sup>

12. On Muthu's work with the YMCA, see Young Men's Christian Association, *Report of the Thirteenth Triennial International Conference*. On Muthu's affiliation with the British Medical Temperance Association, see *Morning Star*, 1.

13. As reported in the annual publication of the Zenana Missionary Society, *India's Women*. Zenana is a controversial term used primarily to refer to the domestic inner space where women were kept segregated from both the outside and from men. While the term is somewhat specific to Muslim households, it was also used more generally to refer to South Asian practices of segregating women within a separate space in the home. For example, the acclaimed Bengali writer Bankimchandra Chattopadhyay uses the word to describe the inner space of a Hindu household in his novel, *Rajmohan's Wife* (1864), regarded as the first Indian novel in English. In an introduction to this novel, Meenakshi Mukherjee points out that Chattopadhyay might have used this term because it would have been more familiar to an English-reading audience. It should also be noted that the term "zenana" shares some of the semantic burden of the word "harem" with all of its eroticized, Orientalist mystique. Mukherjee, Introduction.

14. As Jean and John Comaroff argue in *Of Revelation and Revolution*, the aims of colonial governance and missionary enterprise did not always neatly coincide. This was particularly true in India, where the government, under both East Indian Company and Crown rule, hesitated to allow missionization in British territories for fear of promoting political instability. This is not to say that linkages did not emerge on occasion, but rather that a neat symmetry cannot be assumed between the methods and goals of church and state.

15. David Hardiman, ed., *Healing Bodies, Saving Souls*, 153.

16. Zenana Missionary Society, *India's Women*, 195.

17. The argument that Muthu makes here resonates with Partha Chatterjee's oft-

Yet Muthu's concern stretched beyond the question of religious conversion. Lending support to a growing consensus among British missionaries in the late nineteenth century, Muthu argued that the zenana posed an obstacle to both spiritual salvation and physical health. Enclosed within the zenana, Indian women were not only shielded from Christian influence, but also from medical treatment. Antoinette Burton has argued that such an understanding of the zenana led many British women of the time to agree that "evangelization must go hand in hand with medical treatment."<sup>18</sup> And as men were prohibited from entering the zenana, only women could provide that distinctively Christian form of therapeutic ministry that could save both the mortal body and the immortal soul of the Indian woman.

When Muthu delivered his speech before the zenana missionaries, there was still little in the way of formal investigation concerning the extent and nature of tuberculosis among Indians. It was only in 1912, at the annual meeting of the All-India Sanitary Conference in Madras, that a resolution was passed calling for research into tuberculosis in India, stating that "statistics appear to show that this disease is rapidly increased [sic] in India . . . but it is doubtful whether the increase is real or apparently only due to such causes as more accurate diagnosis and registration."<sup>19</sup> These uncertainties remained unresolved for another two years, until a similar resolution was passed at a subsequent Sanitary Conference in Lucknow. In a sign that the reigning consensus had shifted, a heading for cases of tuberculosis among Indians was created in district and municipal returns in that same year.

As a result of the Lucknow resolution, an ex-medical missionary and Director of the Medical and Sanitation Department for the Nizam of Hyderabad named Arthur Lankester traveled across Burma and India for eleven months collecting evidence concerning the prevalence of tuberculosis on the subcontinent. In particular, Lankester drew on the accounts of women medical missionaries and physicians, whose work in the zenanas made them among the vanguard in detecting tuberculosis among Indians. His informants assured him that there was "scarcely a zenana . . . which has not some case of tuberculosis!"<sup>20</sup> Reinforcing the importance of missionary intervention, he noted that women confined to zenanas were usually unable or unwilling to leave their home in order to seek medical treatment.

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discussed account in *Nationalist Thought and the Colonial World* of an inner/outer divide that configured colonial modernity. Men could accede to the modernization of their *habitus* within the public sphere, but the purity of Indian tradition was maintained by women in the home, who supposedly remained untainted by outside influence. Indian men could therefore become modern while Indian women safeguarded tradition. Chatterjee, *Nationalist Thought and the Colonial World*.

18. Antoinette Burton, "Contesting the Zenana," 378.

19. Arthur Lankester, *Tuberculosis in India*, 2.

20. *Ibid.*, 140.



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However, despite this emphasis on the zenana, Lankester made it clear that tuberculosis in Indians was unrelated to religious, ethnic, or racial grouping. Hindu or Muslim, what mattered was whether one was secluded and confined. “To secure privacy, efficient lighting and ventilation are absolutely disregarded, the zenana or women’s apartments being usually the most insanitary part of the house. No wonder that tuberculosis, which thrives in damp, dark, airless corners, plays havoc in the zenanas.”<sup>21</sup> The zenana was not only an inherently pathogenic site, but also a source of contagion, a breeding ground from which tuberculosis spread roughshod through the cities and into the outlying areas. “The disease of consumption,” he wrote, “has emerged from the quiet of the zenana into the open life of the people.”<sup>22</sup>

But how precisely was confinement in the zenana understood to engender tuberculosis? And how could tuberculosis then spread beyond the zenana? For Lankester, tuberculosis was not simply the result of darkness, seclusion, insanitary conditions, and poor ventilation. It was also about bacteria. “There are special corpuscles or cells in the blood, lymphatic glands, and other organs, which under conditions of perfect health can deal with the tubercle bacilli, destroying their vitality and their power to multiply.”<sup>23</sup> For Lankester, the vitality of the bacteria that cause tuberculosis was no match for the vitality of an unconstrained and healthy body.

Although vitalism in medicine has a long history with many incarnations, it generally refers to the idea that something distinct from matter—understood as a force, power, or principle—animates and gives life to matter. This vitality erects the boundary between the living and the non-living, and in some versions of vitalism, the animate and the inanimate.<sup>24</sup> As Michael Worboys has convincingly demonstrated, there was never a singular germ theory, nor did germ theory simply replace older forms of etiological reasoning.<sup>25</sup> Rather, the germ was often articulated with these older ways of thinking about disease causality, as in Lankester’s suturing of bacteriology and vitalism.

In 1915, Lankester submitted a report of his findings to the colonial government. This report was a clarion call, circulating throughout the various presidencies. In Madras in particular, Lankester’s report helped to

21. *Ibid.*, 141. Despite Lankester’s assertions, the association of the zenana, and therefore tuberculosis, with Muslim women was increasingly common. For example, delegates at the All-Indian Sanitary Conference in Bombay, held in 1911, expressed particular concern about tuberculosis among Muslim women in Calcutta. See All-India Sanitary Conference, *Proceedings*, 136.

22. Lankester, *Tuberculosis in India*, 15.

23. *Ibid.*, 142.

24. In recent times, see Mel Chen, *Animacies* (2012) for a linguistically-inspired deconstruction of this boundary. Jane Bennett, *Vibrant Matter* (2010) attempts something similar, but is too quick to attribute vitality to matter that is traditionally understood to be inanimate for what seem to be purely methodological purposes.

25. Michael Worboys, *Spreading Germs*.

persuade many physicians and colonial health officials that tuberculosis posed a serious problem for the health of the Indian population.<sup>26</sup> Undoubtedly, Lankester's concern was not only with the Indian population, but also with the effective functioning of mission and empire. The spread of tuberculosis outward from the zenana threatened those who were involved in the routine operations of colonial governance. In addition to medical officers and missionaries, he mentioned the danger to a wide range of government employees, including railway ticket masters, clerks, school teachers, police officers, postal workers, and telegraph operators.

Lankester's view on the relationship between zenanas and bacteria was echoed in official medical circles. In 1923, the Director-General of the Indian Medical Service, C. A. Sprawson, wrote that the increased mortality of Muslim women

is due to the restriction of the zenana which confines women to their rooms and to a narrow courtyard; usually there is no garden. The middle-class Mohammedan woman sees nothing else than this during her life, and within that small and insanitary area are enclosed female relations and children and often one or more servants. I have several times seen tuberculosis run through a zenana and destroy the majority of its inmates in a few years.<sup>27</sup>

Like Lankester, Sprawson conceded the necessity of bacteria for the development of tuberculosis. Likewise, he also underscored the influence of one's surroundings. However, unlike Lankester, Sprawson added that this influence was passed down hereditarily to the point of becoming a racial characteristic. In effect, Sprawson argued that both custom and the built environment shaped a racial group over generations. As such, the pernicious and devalizing effects related to enclosure were not only embodied, but genealogically transmissible.

Muthu's view mostly overlapped with the positions outlined by Lankester and Sprawson. Based on his travels throughout India, he reported that:

Among Mohammedan women, who were secluded in ill ventilated zenanas, the death rate was nearly three times as high as among men. In fact, the more strictly the purdah system was observed the greater was the morality, as among Mohammedan women; and where it was not enforced, as among the Burmese women, it was even lower than among men.<sup>28</sup>

26. B. Eswara Rao, *Tuberculosis and Public Health Policies*, 34.

27. C. A. Sprawson, "Tuberculosis in Indians," 483. The Director of Public Health for the Madras Presidency shared these concerns, noting in 1923 that "among purdah women conditions are even worse [than among non-purdah women], *tuberculosis* being particularly common." Cited in Cecilia Van Hollen, "Birth on the Threshold," 44.

28. David Chowry Muthu, "Some Impressions," 518.

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Like Sprawson, Muthu argued for a devitalizing racial inheritance. “The social customs and prejudices of *centuries*, such as the caste system, the purdah system, and child marriage, have helped to undermine *the vitality* of the people, so that . . . thousands of them fall victims to the disease,” he wrote.<sup>29</sup> Unlike Lankester and Sprawson, however, Muthu offered no role to bacteria, disallowing the possibility that tuberculosis was infectious. For Muthu, the constraining force of the zenana and other customs reduced the vitality of Indian women, leading to a diseased condition without the intervention of bacteria. For Sprawson, Lankester, and many others, an intermediary step was needed: conditions in the zenana might reduce vitality, but disease still required the intervention of infectious bacteria.

What was clear to these medical officers, to missionaries, and to Muthu, was that tuberculosis was made possible through the diminishment of vitality that took place in enclosed spaces. Yet Muthu’s emphasis on the primacy of devitalization and his rejection of contagionist etiologies led him to further consider how tuberculosis was engendered beyond the confines of the zenana. If the zenanas were not spreading infection, how then did Indians who, relatively speaking, lived out in the open, fall ill with tuberculosis?

As part of his research, Muthu temporarily left his sanatorium practice in Britain and traveled extensively across India in the early 1920s. He wanted to learn about the prevalence of the condition among Indians, as well as about the availability of treatment facilities. In 1923, he wrote of his findings: “My last extensive tour from Bombay to Burma one way and from Nepal to Nilgiris in another has convinced me that tuberculosis is increasing in many parts of India, especially in presidency capitals, great industrial and commercial centres, and the large towns, and it appears also to be extending to rural areas.”<sup>30</sup>

Clearly, the Indian city was a particular problem. He explained away rural cases as examples of migrant laborers who had most likely fallen ill in cities and returned to their homes to die. In general, Muthu concluded that “in many Indian cities out of three deaths recorded among adults one dies of consumption.”<sup>31</sup> Yet even among cities, there was much variation. Muthu noted that cities like Bombay and Madras had much higher rates of fatality than a city like Bangalore, renowned at the time for its gardens—an important point, as I will discuss in the next section. Muthu reported witnessing the condition among “all classes and races, from the humbler ranks of coolies, mill-hands, and servants, to the educated and well-to-do communities.”<sup>32</sup> From the latter group, he singled out “junior clerks with small and fixed incomes, college students burdened with the strain of long hours

29. Muthu, “A General Survey,” 23–24 (emphasis added).

30. Muthu, “The President’s Address,” 118.

31. *Ibid.*

32. Muthu, *A Short Account*, xcix.

and a heavy curriculum, and child-mothers badly nourished with poor stamina.”<sup>33</sup>

How did Muthu understand the existence of tuberculosis among such a diverse set of urban denizens, the majority of whom lived their lives beyond the confines of the zenana? Certainly, there were degrees of enclosure within “cities like Delhi and Lucknow . . . full of slums, blind alleys, and narrow passages, where the sun never shines and fresh air never penetrates, and which easily outrival any of the slums we have seen in London.”<sup>34</sup> Such urban sites clearly resembled the zenana in their capacity to close the body off from light and air. Yet enclosure was not an adequate explanation for the devitalization of other segments of the population who regularly traversed the urban outdoors.

To address this issue, Muthu drew an illuminating parallel between early twentieth-century India and England during the industrial revolution, pointing to shared devitalizing conditions of urban crowding and pauperization. There was, he wrote, “a general resemblance between poverty and sickness.”<sup>35</sup> Yet such an explanation did not go far enough. What distinguished India and other colonial milieus from England was the rapid transformation of the environment and ways of living. Colonial subjects were radically unprepared for these new modes of existence. Robbed “of their freedom,” tempted by “rifles and drink,” and forced to endure the “speculators, planters, gold-diggers, convicts, and the refuse of European communities,” the “moral habits” of subject peoples were not “strong enough to stand the strain of such a violent change of environment.”<sup>36</sup>

To be clear, it was not simply *change* itself that was a problem. For Muthu, the environment was in fact in a constant state of flux, and life itself was characterized by a constant adaptation to this variation.<sup>37</sup> Both healthy and diseased states were a part of this same process of adjustment, a series of “continuous adaptations to maintain harmony and equilibrium.”<sup>38</sup> Muthu explained this relationship between healthy and diseased states by recourse to a metaphor of a general waging war: “If health can be understood in terms of the ordinary plan of a war campaign which a general follows in the course of war, disease can be likened to his alternate plan which he keeps in this pocket to be used should a crisis arise and the first plan prove unsuccessful.”<sup>39</sup>

This back-up plan—disease—was still understood to be a route to victory, and made use of the same resources but in a different arrangement.

33. *Ibid.*, c.

34. *Ibid.*, cii.

35. Muthu, *Pulmonary Tuberculosis: Its Etiology and Treatment*, 82.

36. *Ibid.*, 133.

37. Following Rudolf Virchow, Muthu insisted on the “inherent law of life by which an organism adjusts itself to various environments.” Muthu, “A General Survey,” 110.

38. Muthu, “A General Survey,” 110.

39. *Ibid.*, 110–11.

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“The symptoms which arise in disease are part of the curative process of nature, and tuberculosis . . . carries with it the cure of the disease in its fever, inflammation, caseation, fibrosis, etc.”<sup>40</sup> For Muthu, it was only when the body “fail[ed] to adjust itself to abnormal conditions that disease takes a pathological character.”<sup>41</sup> Put differently, disease was not necessarily—and not primarily—a bad thing. *Curative disease* represented the body’s effort to adjust to a changing environment. By contrast, *pathological disease* represented a failure to adjust, which often occurred when change was too extreme or too rapid.<sup>42</sup> For Muthu, this was precisely what had happened under colonial rule. What was at stake was not simply the incorporation of morally dubious and insanitary customs. Indeed, even changes that might seem relatively innocuous—for example, adjustments in sartorial practices among Indian Christians and Parsis—were troubling. The problem, then, was the rapid pace of change, which weakened the body’s capacity to adapt. This loss of capacity constituted, for Muthu, a pathological form of disease.

In part, Muthu’s thinking echoes the nineteenth-century model of tuberculosis as a “disease of civilization.”<sup>43</sup> Yet for Muthu, tuberculosis was not simply a product of colonial modernity, but of any devitalizing mode of existence, such as life in the zenana. On the one hand, openness to a rapidly shifting colonial milieu weakened the body’s capacity to adapt. On the other, the body’s enclosure within the zenana shielded it from the vitalizing forces of air and light. If openness and enclosure represented a devitalizing dialectic, if both exposure and confinement could engender pathology, then where and how might the Indian body find its vitality restored? The answer was to be found in the reconciliation of openness and enclosure, through the careful mediation of the body’s relationship to its environment via the sanatorium.

40. Ibid., 111.

41. Muthu, *Pulmonary Tuberculosis: Its Etiology and Treatment*, 116.

42. Muthu’s concern about rapid social change has an analogue in the political theory of Henry Sumner Maine, an administrator in colonial India. See Karuna Mantena, *Alibis of Empire*. More generally, the years following the rebellion of 1857 witnessed an increasingly conservative approach to introducing change in India on the part of the colonial government, at least in regard to social and religious custom. At the same time, the sanctioning and stabilizing of certain practices as “custom” undoubtedly produced much change despite the colonial government’s avowed conservatism. See for example Nicholas Dirks, *Castes of Mind*.

43. Mark Harrison and Michael Worboys, “A Disease of Civilization.” Arthur Lankester took a slightly different view, contending that tuberculosis in India was the result of the country being “improperly civilized.” Cited in Harrison and Worboys, “A Disease of Civilization,” 115.

## Part II: A Technology of Mediation

After concluding his research trips around India in the early 1920s, Muthu made a confidential report of his findings to the Madras government. He urged them to take action and establish a sanatorium in the city.<sup>44</sup> At the time, there were only about three sanatoriums in the entirety of the Madras Presidency—an area with a population that was equivalent to the entirety of Great Britain and Ireland—located in Madanapalle, Conoor, and Mysore. In total, Muthu noted that there were about seventeen or eighteen homes and sanatoriums devoted to tuberculosis throughout the entire country.<sup>45</sup>

The viability of sanatorium treatment, especially for the poor, was a matter of much debate. Sanatorium treatment was thought to be an expensive affair, as it required the construction of new infrastructure and long admission periods for patients. The colonial government concluded that sanatorium treatment was too expensive, and therefore inappropriate for the masses.<sup>46</sup> This refusal to provide financial backing left the problem of tuberculosis among the native population primarily in the hands of missionary groups, philanthropic organizations like the Dufferin Fund, and private individuals.<sup>47</sup>

Nonetheless, Muthu insisted on the importance of sanatorium treatment for Indians. If life in both enclosed spaces and the urban outdoors was devitalizing, then for Muthu and many others, the proper therapeutic response could only be found in the sanatorium. As a treatment for tuberculosis, this approach had only been in use in Britain from about the late 1890s, when Muthu's sanatorium on the Isle of Wight became one of the earliest such institutions in Britain. Muthu traced the origins of the philosophy underlying sanatorium treatment, commonly referred to as the “gospel of fresh air,” to the establishment of the first sanatorium in Germany by Hermann Brehmer in the 1850s.

The role of Nature in Muthu's therapeutics, and in the sanatorium movement more generally, can be attributed in part to the lasting influence of German *Naturphilosophie*, which in turn drew upon Romantic concep-

44. References to the report can be found in “The British Legion Village for Tuberculous Settlers,” 31. Unfortunately, I was unable to locate a copy of the actual report.

45. David Chowry Muthu, “The Problem of Tuberculosis in India,” 192.

46. As David Hardiman notes, tuberculosis was “a growing problem that received greater government attention in the colonies from the First World War onwards, yet few tuberculosis patients were put in special sanatoria, as was the practice in Europe and America at that time.” Hardiman, *Healing Bodies, Saving Souls*, 34. It is notable that at the same time, sanatorium treatment received government support back in Britain.

47. The Dufferin Fund, also known as the National Association for Supplying Female Medical Aid to the Women of India, was established in 1885 by Lady Dufferin, the wife of a Viceroy of India. The fund provided tuition for British women to acquire medical education to serve as doctors, midwives, and nurses in India and was an important contributor to the spread of Western medicine in India.

tions of Indian philosophy and religion. For Muthu, life depended upon an energy, which he variously spoke of in terms of resisting energies, vitality, vital force, vital powers, and vital capacity. In its most polemic forms, vitalism stood against mechanism as a philosophy that refused to accept that life could be artificially created from non-living substances without the infusion of a vital supplement. Vitalists derided purely mechanistic explanations for causality and the functioning of living organisms. Muthu adhered to such a vitalism, arguing that “Western medical training and temperament, in common with Western thought, tends to view life from a physical standpoint, and base the treatment of disease accordingly. Man is not a machine, but a living personality.”<sup>48</sup>

At the same time, Muthu also looked to what might be broadly described as Indian traditions of vitality, and to a longer history of “ancient Yogis in India” who believed that “breath was life, and that fresh atmospheric air, in its freest state, was charged with a universal principle of life, or vital force, called *prana*.”<sup>49</sup> Muthu elaborated on this theme: “If the Yogi philosophers of India are right, then, besides its chemical constituents, the atmospheric air contains a vital universal principle called *prana*, through which life manifests itself.”<sup>50</sup> He also found a source of vitalist thought in what was termed nature cure. Although this form of therapy had its foundations in Europe, it was taken up with much enthusiasm in India.<sup>51</sup> No less an advocate of nature cure than Gandhi would champion Muthu’s vitalist philosophy in his correspondences with ailing acquaintances.<sup>52</sup>

The turn-of-the-century period in which Muthu was writing also witnessed the increased shuttling of mystical understandings of life between Britain and colonial India.<sup>53</sup> In India, vitalism was popularized and legitimized through occult organizations such as the Theosophical Society, established in Madras by the influential nationalist leader Annie Besant. An-

48. David Chowry Muthu, *A Short Account*, v-vi.

49. Muthu, *Pulmonary Tuberculosis and Sanatorium Treatment*, 81–82.

50. *Ibid.*, 90.

51. See the work of Joseph Alter, in particular *Gandhi’s Body* and “Nature Cure and Ayurveda.”

52. Gandhi’s faith in Muthu’s philosophy led him to recommend him to friends. Gandhi organized the treatment of the son of a jeweler friend, Revashankar Jagjivan Javeri, having Dr. Muthu travel from Madras to Bombay to examine a tubercular bone. Mohandas Gandhi, *Collected Works*, 41:225, 238, 239. Gandhi also wrote to Rajaji and Nehru about Muthu, advising Nehru to follow the advice of Dr. Muthu in the treatment of his wife Kamala, exposing her to “open air, light food and sun” in India instead of taking her to Switzerland. Gandhi, *Collected Works*, 44:55. In a letter addressed to Muthu from 1928, Gandhi wrote: “As you know I have a horror of drugs and the like. I therefore welcome every honest effort to replace them with drugless and what might be termed natural methods of curing a disease which need never find an abode in this sunny soil of ours.” Gandhi, *Collected Works*, 41:368.

53. See Gauri Viswanathan, “The Ordinary Business of Occultism”; and Donna Jones, *The Racial Discourses of Life Philosophy*.



other source of vitalism in India can be found in the work of the Bengali scientist Jagdish Chandra Bose, whose research into metals and plant cells confounded the boundaries between living organisms and non-living matter by applying physiological categories to inert substances.<sup>54</sup>

It is clear that various strains of vitalist thought thrived in India, providing a broad range of “indigenous” intellectual resources with which Muthu could bulwark his own brand of vitalism. These varied sources allowed Muthu to recuperate an Indian history of vitalist thought and medical practice, as well as to make claims both about the precocious knowledge of Indian antiquity and to provide deeper and broader roots for sanatorium therapy. It is important to note, however, that Muthu was not simply a nativist. As Muthu put it, the “attempt to revitalize Indian medicine by European thought ought to be welcomed by all well-wishers of India.”<sup>55</sup> Nature cure, sanatorium treatment, and the like provided a means for Muthu to unearth what, to his mind, had already been known within Indian medical and philosophical systems. For Muthu, the centrality of vital forces to the shaping of health and illness was a profoundly universal truth. And yet it is clear that he sensed the need to conscript a broad range of sources to support this truth against the juggernaut of bacteriological reason.

By offering a mechanistic explanation for a specific disease, Koch’s claim that tuberculosis was caused by bacteria was another nail in the coffin of vitalism. Yet vitalism did not simply vanish. As Craig Gordon puts it, sanatorium treatment was “notable precisely because it marks the persistence of vitalistic understandings of the disease in the face of the advances in medical science that dominate traditional histories.”<sup>56</sup> Despite this persistence, Muthu’s vitalist claims became less and less convincing to other scientists and physicians. As one reviewer wrote of the expanded second edition of his book on the sanatorium treatment of tuberculosis, Muthu “does not alter his conclusions. He is *still a bacteriologic nihilist*.”<sup>57</sup> As Katherine Ott has argued, “Vitalist principles, if couched in theology and metaphysics, could not survive within medicine proper.”<sup>58</sup> Nonetheless, vitalism did survive, smuggled back in through the metaphor of seed (often understood as bacteria) and soil (which could refer to both bodies and the broader environment in which they were situated).<sup>59</sup> As I noted in the previous section, Lankester, Sprawson, and others could still write of the diminished vitality of the soil—figured in terms of gendered and racialized bodies—as long as

54. On Bose’s alternative science, see in particular Nandy, *Alternative Sciences*; Shiv Visvanathan, “The Dreams of Reason”; and Patrick Geddes, *The Life and Work of Sir Jagadis C. Bose*.

55. David Chowry Muthu, “Bogus Medical Degrees,” 1148.

56. Craig Gordon, *Literary Modernism*, 62–63.

57. “Book Notices: Pulmonary Tuberculosis,” 1148 (emphasis added).

58. Ott, *Fevered Lives*, 34.

59. See Aya Homei and Michael Worboys, *Fungal Disease*, 137–38.



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the necessary causal mechanism was redescribed in terms of bacterial infection, sheered of mystical and metaphysical propositions.

For his part, Muthu continued to speak uncompromisingly about vitality as part of a grander metaphysics, refusing to moderate his language in favor of the turn toward bacteriology. “The physical does not embrace the whole of man’s life and environment,” he wrote.<sup>60</sup> “Materialists have confidently claimed that the law of mechanics, physics and chemistry were applicable to living matter, that chemical actions and processes would explain vital phenomena and that thought was the by-product of matter.”<sup>61</sup> Against this mechanism, Muthu drew upon debates in atomic physics concerning the particle- or wave-like nature of matter, or the inconstancy of time-space, citing with approval the work of such physicists as Heisenberg, Bohr, and Einstein. He also cited the work of the French vitalist philosopher Henri Bergson, describing him as one in a “long line of seers who have given a philosophical warrant to the grasping of ultimate reality by the method of intuition.”<sup>62</sup> In light of these challenges to mechanistic science, Muthu declared rather preemptively that “the old materialism is dead, and even the electrons, which for a time replaced particles of matter, have become but disembodied spirits, mere wave-forms.”<sup>63</sup> If even electrons were immaterial, it stands to reason that mechanistic, specifically bacteriological explanations of disease lacked a solid basis.

What role then did the sanatorium play within Muthu’s vitalist vision? For Muthu, both enclosure and openness—potentially devitalizing relationships to the environment—were mediated and ameliorated via the sanatorium. Within such architectural technologies, the tuberculous body and spirit could be exposed to the therapeutic energies of the air under the careful supervision of the sanatorium superintendent.<sup>64</sup> The type of sanatorium therapy that Muthu envisioned for India was more radical than what he had already planned and enacted in Britain. Muthu contended that traditional sanatorium therapy as practiced in Britain was inadequate in the Indian context, unless it was part of a broader garden colony:

In the garden settlement, there would be a sanatorium for early cases. In another part, houses or bungalows would be reserved for those suspected or threatened with tuberculosis. Still in another part, children of tuberculous parents or those in the pretuberculous stage would be looked after, placed under the best hygienic conditions,

60. David Chowry Muthu, *Science and Religion*, 23.

61. *Ibid.*, 11.

62. *Ibid.*, 19. See also Jones, *The Racial Discourses of Life Philosophy*, on the importance of Bergson to the more mystically oriented versions of vitalist thought.

63. *Ibid.*, 10.

64. Annemarie Adams, Kevin Schwartzman, and David Theodore, “Collapse and Expand.”

and provided with an open-air school. In another place, convalescent or ex-patients would be accommodated with their families, kept under medical supervision, and, if necessary, trained in some outdoor occupation. A public hall would be found useful for propaganda work, for giving lectures on hygiene and health subjects, and as a place of recreation and entertainment. A dairy farm with cows kept under ideal sanitary conditions would complete the equipment of the garden colony, whose grounds would be laid out with spacious walks and broad avenues, so as to give the picturesque appearance of a health resort.<sup>65</sup>

Muthu's vision laid bare the utopianism of the open-air movement. As he imagined it, the sanatorium was only one small part of the larger pedagogical and curative space of the garden colony. The sanatorium would be hooked into a network of institutions including urban dispensaries, rural health villages for ex-patients, and open-air schools. The sanatorium and the broader garden colony were intended as a model for a vitalizing form of living. "Fresh air, food, and rest help to recuperate the patient's failing energies and strengthen the soil, so that Nature may begin her beneficent work."<sup>66</sup> In contrast to the industrial city, the sanatorium and its bungalows were akin to a small, sparsely-populated village that opened up onto nature. In its pedagogical role, the garden colony was a model for society as it should be, as well as an image of society as it once was, intimately tied to nature.

This valorization of nature and rurality in the philosophy of the sanatorium movement, particularly in Muthu's version of it, might be productively understood alongside the modernist vision of Patrick Geddes and the importance that Gandhi gave to the village. In its curative role, the garden colony exhibited a "mimetic therapeutic logic," seeking to "reproduce the qualities of (an apparently disease free) preindustrial and preurban existence—an existence therefore in accordance with Nature's law."<sup>67</sup> The logic of the sanatorium, and the garden colony more generally, was to bolster the vitality of the body in its efforts, allowing the body to move through a temporary state of disease in order to return to a healthy condition—a kind of auto-restoration mediated by nature and the sanatorium. Within the sanatorium, disease might once again be curative rather than pathological.

Rest in the open air was critical to Muthu's treatment program, as he understood rest to "enhance the effects of fresh air."<sup>68</sup> For Muthu, the effi-

65. Muthu, "The Problem of Tuberculosis in India," 192.

66. Muthu, "Some Points," 955.

67. Gordon, *Literary Modernism*, 69.

68. Muthu, *Pulmonary Tuberculosis and Sanatorium Treatment*, 91. "In the summer [the patient] practically lives out of doors day and night . . . his meals and amuse-

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cacy of fresh air was not related to a diffusion of or direct attack against bacteria. As previously noted, Muthu did not see bacteria as a problem. Rather, he argued that life in the open air “lessens irritability, and calms the nervous system . . . stimulates various physiological activities, increases nutrition, and braces up the nervous system.”<sup>69</sup> More than anything, fresh air had a “stimulating and vitalizing influence upon the organism.”<sup>70</sup>

Critically, sanatorium treatment was not simply a prescription for fresh air. Muthu claimed that the most successful treatment for tuberculosis was a highly-structured, personalized regimen that removed the patient from the pestilence of the city and properly disciplined both body and mind while increasing vital energies. For Muthu, a few weeks in the cool, fresh air of a hill station—the favored retreat of British military men, governors, and missionaries—was not only inadequate but positively iatrogenic. A little bit of cure, without the supervision of a doctor, was much more dangerous than no cure at all. As Muthu explained, a visibly broken door is opened and closed much more gently than one that appears intact but has been haphazardly patched-up.

Muthu claimed that the sanatorium superintendent should not be like an army chief, but instead like a captain of a ship “knowing that in his right steering lie the welfare and the safety of those who are slumbering under his care and protection.”<sup>71</sup> At the same time, he should be a teacher, ensuring “patients are educated in right thinking and right living.”<sup>72</sup> In addition to increasing the vitality of the patient, this pedagogical function was seen as one of the primary purposes of sanatorium treatment.<sup>73</sup>

In order to establish his vitalist vision in reality, Muthu acquired 250 acres of land from the Madras government in 1926, located on a slope of a hill just south of Madras, which he attempted to craft into a sanatorium and garden colony called Tambaram.<sup>74</sup> Lacking the funds to complete the

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ments, and even the Sunday services, are all carried out in the open air. In the winter he spends a great part of the day on the veranda, and even sleeps out there if the weather is favourable.” *Ibid.*, 90–91. The architecture and furniture of the sanatorium were also constructed to the same purpose, on the model of the chalet. These chalets were “built so to allow the fresh air to flush through every part of the room,” each furnished with a bed that could be “wheeled right out.” *Ibid.*, 91.

69. Muthu, *Pulmonary Tuberculosis and Sanatorium Treatment*, 90.

70. *Ibid.*

71. *Ibid.*, 109.

72. *Ibid.*, 108–9.

73. As noted by Flurin Condrau in “Beyond the Total Institution,” historians of tuberculosis have viewed this pedagogic mission cynically, as proof that the sanatorium was less a site of healing and more a site of subject formation and discipline. Worboys “The Sanatorium Treatment” exemplifies this trend, arguing that sanatorium treatment between 1890–1914 was largely oriented toward social and not medical aims.

74. The foundation stone for Tambaram Sanatorium was laid in 1927 by C. P. Ramaswami Iyer, a lawyer and prominent member of the Executive Council of the

project, Muthu turned to the Madras government as well as to the Indian public for additional funds, to no avail.<sup>75</sup> In July 1928, just a few months after Muthu had inaugurated Tambaram Sanatorium, his wife Margaret passed away in England. He requested that the Madras government purchase his sanatorium so that he could return to Britain. Although the general weight of colonial government opinion was against involvement in sanatoriums, the Madras government eventually took over the operation of Muthu's sanatorium in 1937. Tambaram Sanatorium, as it is still called, remains operative into the present, but its vitalist foundations have been largely forgotten in the turn toward antibiotic treatment. In this sense, it remains a sanatorium only in name.

### Conclusion: The Return of the Sanatorium?

After the last half-century of antibiotic use, a simple return to the pre-antibiotic era seems impossible. As Hannah Landecker has persuasively argued, antibiotics have become “infrastructural” to contemporary forms of social organization.<sup>76</sup> From agriculture and animal husbandry to surgery and chemotherapy, life and death have become reorganized in relation to the effects of antibiotic production, circulation, and consumption. Under such conditions, in which the environment has been transformed through its suffusion with high levels of antibiotics, the contemporary appeal of the sanatorium begins to make sense. Rather than acting as cure, exposure to antibiotics becomes a cause of such drug-resistant forms of tuberculosis. Once again, openness poses a threat.

In India today, finding hospital beds for drug-resistant patients has become an increasingly difficult task. In the summer of 2015, I met with Dr. Anuj Bhatnagar, a senior physician at the sprawling Rajan Babu Hospital on the outskirts of Delhi. Constructed in the 1930s to commemorate

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Governor of Madras. Those in attendance included the businessman Muthiah Chettiar, the former minister Aneppu Parsuramdas Patro, High Court Justices M. David Devadoss and Tiruvenkatachiar, and A. Rangaswami Iyengar, the editor of the *Hindu*. In April of the following year, the twelve-bed sanatorium was inaugurated by the Indian politician and ambassador V. S. Srinivasa Sastri, again with a group of notables in attendance. At the inauguration, four patients had already been admitted to the sanatorium. Muthu asked Gandhi, with whom he had been in correspondence, to compose a note for the occasion, but Gandhi begged off, stating that if he indulged such requests he would never have time for anything else.

75. His original plans had been more ambitious, as he had envisioned constructing “six wards for men and six wards for women, besides administrations offices, quarters for visitors, for post-graduate courses, etc.” Muthu, “The Problem of Tuberculosis,” 193. He only managed to complete about “half the sanatorium, with three wards on each side of the administrative building . . . with verandahs for two patients” and “quarters for medical officers and nurses.” *Ibid.*

76. Hannah Landecker, “Antibiotic Resistance.”

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George V's coronation as Emperor of India, this former sanatorium has become one of the largest tuberculosis treatment facilities in the country. Although imperial decoration has given way to nationalist iconography, the hospital retains elements of its original open-air architecture.

A former TB patient himself, Bhatnagar had recently coauthored a paper that asked whether drug-resistant patients should be treated on an inpatient basis.<sup>77</sup> This study raised a question that had been asked—and powerfully answered—over fifty years earlier in a series of antibiotic trials that took place in Madras. The Madras Study, as it was called, was the first randomized controlled trial in India, organized by an international coalition that included the newly-independent Government of India, the British Medical Research Council, and the World Health Organization.<sup>78</sup> These trials tested the efficacy of a cocktail of antibiotics in treating tuberculosis in a cohort of patients treated at home versus another cohort treated in a sanatorium—specifically, Tambaram Sanatorium.

The Madras Study signaled the death knell of sanatoriums the world over. Regardless of the way in which the body was configured in relation to its environment, antibiotics were widely embraced as an effective cure. The intervening years since the Madras Study have witnessed the consolidation of an outpatient based antibiotic treatment protocol at a global level. As part of this protocol, known as DOTS (directly-observed treatment, short-course) patients intermittently visit providers to receive medications without admission into a treatment facility.

The study that Bhatnagar co-authored seemed to resurrect the question of whether antibiotics were sufficient, or whether admission was once again a necessary part of treating tuberculosis. After the conclusions of the Madras Study, why was this question being reopened, I asked.

“Despite the fact that the sanatorium era is over”—he quickly corrected himself—“or deemed to be over, the fact is that a huge group of patients require admission.” In recent years, he added, the admission rates had been quite high. “Patients are having complications from medicines, or from the more severe forms of tuberculosis,” he explained. Bhatnagar told me that he had warned government officials that the national program—premised on outpatient, antibiotic therapy—would “either cure a TB patient or turn him into a drug-resistant case.”

“And that,” he said, “is ultimately what has happened.”

In 2015, I also interviewed Dr. Nerges Mistry, a biologist and public health researcher who had been studying drug-resistant tuberculosis in Mumbai. “One of my favorite hypotheses,” she told me, “is that it's the environment that drives both infectious and non-infectious diseases, because it sets off inflammatory reactions. If you have lung inflammation, it weakens

77. S. Bharty et al., “Initiation of MDR TB Treatment.”

78. See Amrith, “In Search of a ‘Magic Bullet’ for Tuberculosis”; Valier, “At Home in the Colonies”; and Venkat, “Cures.”

the mucosal system, and you're susceptible not only to tuberculosis, but to any other respiratory disease." For Mistry, the problem was not simply exposure to antibiotics, but to the environment itself. What did she mean by this?

"I'm talking largely about environmental pollution. It has a lot to do with hygiene, sanitation, garbage dumps, and so on." She explained to me that the highest rates of tuberculosis were found in the eastern parts of the city, where migrant laborers arrived in Mumbai and settled in slum housing. There, the environment had been "*degraded*," she told me. "There's tons of pollution in the air that the factories are throwing out. It completely renders your lungs *weak*, and you can catch any of these airborne infections, tuberculosis being one of them." Not only the lungs, but the body, she emphasized, became weaker. Here, the language of immunology and inflammation dovetails with that of vitalism through the idiom of bodily weakening and susceptibility. At the same time, environmental change is scripted in terms of pollution and degradation. Given that antibiotics have their limits, Mistry insisted that what was needed was an intervention at the level of the environment.

At the end-of-days of the antibiotic era, remnants of the pre-antibiotic past—like sanatoriums—are being revived in response to the threat of resistance. Certainly, no one I spoke with dismissed the causative role of bacteria in engendering tuberculosis. In this sense, Muthu's anti-bacteriological vision could never be resurrected wholesale. Nonetheless, in an India in which antibiotic efficacy is fading and drug resistance is on the rise, the primacy of mechanistic etiologies and treatments—namely, bacteria and antibiotics—is being questioned in favor of a renewed logic of vitality and mediation. Confinement in the slum exposes the body to a polluted, degraded environment, one that weakens the lungs, and the body more generally. It is this weakness that makes tuberculosis possible. In an India after antibiotics, the sanatorium once again stands as a technology of mediation in which the body can be exposed to the right things (healthy food, rest, air, and efficacious drugs in proper quantity) and shielded from the wrong ones (the polluted slum, unventilated housing, and drugs that encourage drug resistance). In the sanatorium to come, the body's forces may once again be carefully and diligent marshaled in pursuit of cure.

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