Of Soil, Situation, and Salubrity: Medical Topography and Medical Officers in Early Nineteenth-Century British India

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For early nineteenth-century British medical officers stationed on the Indian subcontinent, the practice of medicine was not restricted to their care for ill or wounded soldiers. High troop mortality and contemporary medical theories placed demands on medical officers to discern the environmental causes of disease and make recommendations for locating troops in salubrious places. "Miasmas," or noxious exhalations emanating from swamps, low-lying areas, jungles, and places of dense vegetation, were considered as principal agents of disease. Contemporary medical paradigms, grounded in the ancient Hippocratic theory of "humours," purported that bad airs could not be avoided, for they always harbored disease and harmed human populations. In addition to air, temperature and moisture were believed to influence health.[1] As medical theories converged with colonial demands, medical officers collected environmental data and wrote a genre of reports called "medical topographies," documents that evaluated soils, vegetation, and climate in terms of the health of British troops and European populations in the tropics or newly colonized regions.[2]

The present study places medical topography and medical officers within current literature that surveys geography's role in European imperialism. The first section focuses on the low-level colonial medical officer, and his role influencing colonial discourse on human acclimatization, the idea of whether human beings may live successfully in new climates and environments. The following section examines medical topographies as independent articles and reports written by medical officers in the 1820s. These medical topographies, penned more out of the medical officers' independent initiatives than a state-mandated survey, presented a distinct position on human acclimatization. The third section traces changes in the genre during the 1830s, noting broader political transformations in

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colonial India, the role of medical topography in the medical officer's professional advancement, and changing role of the imperial state in producing topographic memoirs. Moreover, the section reviews how epistemological differences between colonial and metropolitan science, *laissez-faire* social attitudes, utilitarian reformist policies, and contrasting views of acclimatization framed the subsequent production of medical topography. The final section is a brief study of Sir James Ranald Martin (1796-1874), an important figure in nineteenth-century tropical medicine and public health. His support of medical topography illustrates the significance of specialists in promoting and advancing ideas about climate and health, thus shaping the colonial state's geographical practices.

The Specialist in the History of Geographic Thought

Geography's Specialists

Geography has been implicated in supporting and facilitating the exercise of imperial power over societies, their natural and cultural resources, and their landscapes.[3] Analysis of medical topography illustrates how geographical knowledge influenced European colonial government and the landscape.[4] The study of medical topography also allows historians of geography to explore the complex, and often contradictory, processes of colonialism, geographical practices, and writing of colonial texts. What will become evident is that medical topography evolved within a context of contingent relationships between the individual and colonial society, self-interest and imperial service, and internal divisions within colonial society. The study of medical topography helps illustrate how social class and expansion influenced the translation of geographical ideas into practice.

The specialist—whether cartographer, surveyor, or medical topographer—played an important role in the construction of imperial geographies. As Felix Driver suggests, the history of geographic thought and empire needs to incorporate "the activities of armies of anonymous cartographers, navigators, surveyors, and explorers ... whose practical labors in Europe and the imperial frontier were vital to the projects of colonialism."[5] Geographical practices need to be understood as products mediated through specialists or men "on-the-spot," whose work within the colonial project was bounded by bureaucratic, social, and professional limitations. Recent histories of geography, such as Matthew Edney's study of mapmaking in British India, have begun to examine the role of these contingent relationships.[6] Edney illustrates how the study of cartography reveals tensions among Enlightenment epistemological ideals of observation, representation, and cartographic practices. The British cartographic project was based on intersecting ideologies of colonialism, contradictory ideals of science, and professional hierarchies. Through a close examina-

tion of the mapmakers, Edney tells a story of geographical practice that, rather than a ubiquitous tool for empire, was often confined, contradictory, and incomplete in a fractured bureaucratic context.

Examining the relationship between geography and empire through the story of the specialist and his social context opens the analysis to a more complex, and possibly contradictory, set of influences on geographical ideas of imperialism. The specific context in which the man "on-the-spot" conducted daily life directly shaped geographical practices and texts. Moreover, an understanding of the specialist is another approach to the history of geography and empire that goes beyond the grand narratives of adventurers and cartographic explorations. It answers the criticisms that Godlewska and Smith level against geography's historiography. For them, the history of geography must rise above descriptive accounts of disciplinary events and the careers of great men of geography.[7] With careful consideration of the specialist, one can trace how ideas of society and nature relations have a local history within the imperial project, a history often linked to specific men "on the spot." Medical topography is one of these "local" histories.

Men on the Spot: Medical Officers and Empire

Medical topography was not an activity of "great men of geography." In fact, the problem of status had vexed medical specialists since the early years of the East India Company in the late eighteenth century. As one historian of tropical medicine, H. Harold Scott, wrote, "the status of the medical officer in those days was not an exalted one."[8] In one instance, a military officer noted that "the medical officer is always despised and disregarded."[9] During the early colonial period, Anglo-Indian medical officers were not considered the best of imperial servants, according to the social standards of English society, and they rarely improved their status within the ranks of the Army.[10]

Ill treatment and low esteem of medical officers mirrored their lower-to-middle class "Celtic" origins.[11] Education of medical recruits also reflected their social status in British society. The medical service was dominated by surgeons and officers from the University of Edinburgh or other universities in Scotland, whereas a negligible percentage earned degrees from Oxford or Cambridge Universities.[12] Moreover, medical officers remained low in the colonial army "order of precedence." For example, medical officers were not eligible to receive the highest military honors, such as the Order of the Bath, or command a pension equal to that of combat officers.[13] Medical officers' social status also reflected the underrated position of the medical services in relation to other Anglo-Indian professions.[14] During the nineteenth century, medicine and surgery were considered crass vocations that did not garner social advancement or prestige.[15]

Despite the institutional and practical connections between medicine and military during the years of colonial expansion of the early nineteenth century, the performance of medical duties proved to be difficult for many medical specialists. High troop mortality jeopardized the efficacy of colonial expansion; however, the poor reputation and lowly status curtailed the medical officers' ability to perform assigned duties. In 1856, prominent military surgeon Martin editorialized:

> In respect to measures of prevention of disease, medical men have always been ready and capable to direct good purpose, but society was not, and is not yet, anywhere possessed of sufficient knowledge to co-operate with them.[16]

Thus, the most profound obstacles that medical officers faced during their tenure as advisor to the British army were ambivalence and disregard.[17]

Medical officers worked within a colonial society that was not only fragmented along the axis of "colonizer/colonized," but also among the British colonials themselves, according to social, professional, and educational hierarchies. These divisions influenced the practice and integration of medical topography in the colonial bureaucracy. The low social and professional status of medical officers within colonial hierarchies accelerated their advocacy of medical topography as imperial geographical practice. Promoting their work was a means to overcome social and professional barriers. Among medical topographers, the struggle for social standing amplified ideological and social fractures within the colonial community. The following sections outline changing ideas about climate and environment expressed in medical topography and connects them to the political and social contexts in which Anglo-Indian medical officers worked.

Medical Topography as Intellectual Inquiry

Medical topography began as an incidental exploration of the tropical environment. During the 1820s Anglo-Indian surgeons conducted independent investigations into the effects of the "unique" Indian environment on military troops.[18] These topographical investigations into the relationship between environment and disease were as much intended to elevate living conditions as to satisfy intellectual curiosities about the Indian landscape.[19] This activity paralleled the general practice of self-reliant medical officers who gathered medical and climatological statistics and observations.[20] In this section, I examine closely three representative medical topographies during the 1820s, a time of British exploration in the Indian subcontinent. Although the purpose of individual medical topographies was distinct, the common agenda was to ascertain how Europeans could acclimatize to diverse localities.[21] Careful landscape selection, more than race, was decisive for European adaptation to climates and tropical environments in colonial possessions.

Early nineteenth-century medical topographies took a typical form. They described microclimate, temperature, soil, and physical topographical characteristics in terms of disease. In 1825, the *Transactions of the Medical and Physical Society of Calcutta,* an influential journal of the British medical community, published a medical officer's account and explanation of the health problems that almost disabled his regiment in Arracan on the coast of the Bay of Bengal (Figure 1).[22] It was a reconnaissance report to identify future medical problems for regiments and contribute to the nascent study of tropical medicine. What compelled J. Grierson, a medical topographer, to write the article was a desire to explain diseases that caused severe fever among troops, in terms of landscape characteristics.

Grierson did not recognize a general tropical climate to which all native troops were acclimatized. Rather, he recognized different regional climate zones throughout South Asia, a factor that explained why both indigenous and British troops fell ill. The man "on the spot" wrote that despite the introduction of "refreshed and invigorated [Madrasi and European] troops," both fell ill and "no class of men was to be entirely exempted [from fever]."[23] Furthermore, the number of sick Madrasi troops

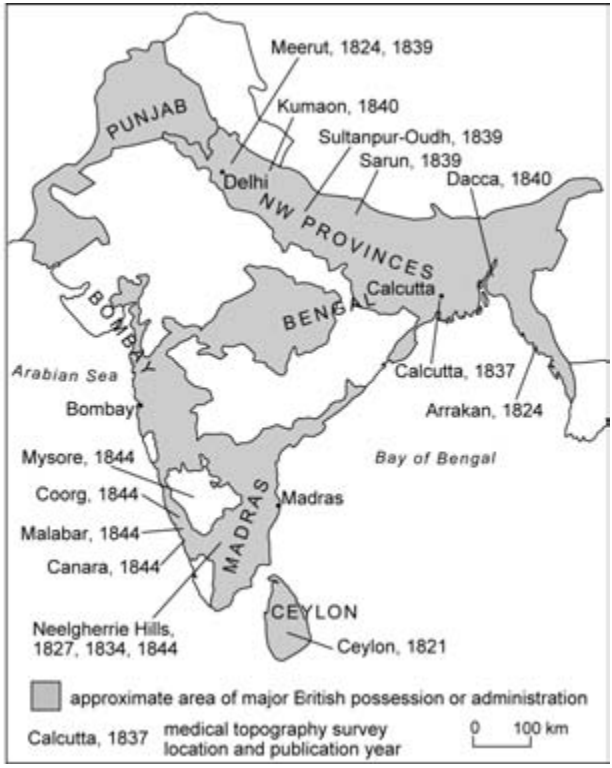

Figure 1. Location of some medical topographies in British India, ca. 1817-57.

doubled, and the Europeans, who previously had been less affected by the illness, began to share the sickness.[24] An unknown factor in the vegetation and miasma-producing environments affected both British and indigenous troops. In short, "the sickness had become universal."[25]

The landscape—its soils and situation, vegetation and physical topography—harbored disease, according to the military medico-topographic vision. Climate and vegetation were clear indicators of health risks, and some places were worse than others.

> Extensive tracts of unwholesome jungle are to be found in every part of India, and much sickness and loss of lives have *occasionally* been experienced by detachments, passing these tracts at certain seasons of the year; yet it has been remarked, that, in the usual annual relief of corps, those ordered to Bengal, Orissa, and the lower part of Behar, *never fail* to suffer, in greater or less degree from endemic fever of these provinces.[26]

When purely climatological theories could not explain the endemic fever among the British-trained Indian soldiers and British troops, Grierson searched for other answers, such as unknown conditions "of the air [miasma], which in other quarters of the Globe besides this, is productive of fever." Although the exact nature of the disease was elusive, Grierson wrote that "the situations in which it is generated have been pretty well ascertained."[27] He looked closely at the geography of detrimental environmental conditions.[28] The "situation" in which fever originated was thought to have a specific geography. Although the disease itself was inexplicable, it could be described by its location.[29] Grierson's description of the physical geography highlighted "prolific" and "noxious exhalations" of rivers, "jungles and morass," and the "noisome swamp." Soil types, land use, and vegetation as well as topographical features such as hills, alluvial plains, and mountains served as potential sources of disease and miasmas.[30] The threat to colonial troops was not the tropical climate, but local topographies of disease.

Similar correlations of disease and landscape can be seen in other medical topographies. T. Jackson's "General and Medical Topography of Meerut" was intended to locate barracks and cantonments in Northern India (Figure 1). Cantonments were thought to prevent exposure to endemic fever, dysentery, cholera, and other diseases.[31] Using similar methods and medical assumptions as Grierson, Jackson described permanent military installations and cantonments to read the salubrity of the Indian landscapes. More precisely, this medico-topographical survey exemplified the attitude of possibilism, the belief that science and knowledge of the landscape could prevent ill effects of climate on one's constitution and unnecessary exposure to disease.

Jackson began by describing the location for new military facilities using climatological characteristics, zoology, and vegetation as medical

indicators. Although near the site there were "a few swamps," they were "not near or considerable enough to affect the health of the stations." And Meerut, he observed, was "happily situated some degrees" outside of tropical latitudes enjoying "some exemption from the violence of the diseases incipient" to those regions.[32] Although escaping illness was impossible, the topography of Meerut caused only medical problems to which the British were accustomed.

Following prevailing medical paradigms, disease and miasmas were always present. It was the task of the medical topographer to map such dangers, explain them in terms of their effects on the troops' constitution, and make recommendations accordingly. The medical topographer of Meerut viewed the landscape as potentially adaptable to European needs. He wrote that the "favorable" climate produced European fruits and vegetables, while export-oriented sugarcane, indigo, and cotton could be grown during the wet season on the same fields.[33] The viability of European crops led Jackson to conclude positively that Meerut was a salubrious site for a new cantonment.

The final example of 1820s medical topography concerns the location of a hill station in the uplands of southern India. In his "An Account of the General and Medical Topography of the Neelgherries," D. Young presented the Medical and Physical Society of Calcutta with "a full and accurate thermometrical observation, taken in different elevations in the tract of mountains… and to add such observations of a general nature, as may perhaps be useful."[34] Of the three examples presented here, Young's account is the only medical topography that includes a detailed map of the study area and a series of meteorological data. Young described boundaries, wrote of the possibilities for European habitation (with some modification of vegetation and housing) and considered how to domesticate the landscape for colonial occupation.[35] While generally enthusiastic about the construction of a hill station, Young ended on an ambiguous note, hinting at European vulnerability, both medical and political, in their colonial adventures on the continent. Despite the benefits of cooler altitudes, the diseased landscape still posed danger to European inhabitants. He recounted "a melancholy illustration of the notorious unhealthiness of the jungles by which they are surrounded."[36] A cautionary tale of a Bangalore medical officer of "robust health," who died upon descending from the Nilgiris, warned visitors that unless they secured

> good houses with fireplaces, accommodation for servants, and every comfort and convenience of Great Britain,…their hopes of an agreeable and renovating sojourn on the Neelgherries [will be] crowned with disappointment.[37]

A close reading of these medical topographies reveals a coherent position on human acclimatization. Racial differences did not explain disease

because both Indian and British troops became ill during their exploits on the frontier. Nor did medical topographers invoke ideas of a generic continental "tropical" climate as the reason for European illness. Rather, local topography, climate, soil and vegetation—conditions that could be mapped and recorded—played a more significant role in human disease. Only local climate and environment determined the salubrity of barracks, cantonments, and hill stations.

Medical Officers, Topographic Memoirs, and Imperial Practices

The 1830s marked a profound change in the relationship between South Asian societies and the colonial state. The colonial state began to consolidate power on the continent. Part of this consolidation was a shift in governance. In 1828, Governor-General William Bentnick introduced Utilitarian political philosophy into colonial governance, altering the way in which the colonial state perceived its role in relation to Indian society. Rather than following *laissez-faire* social policies, the Utilitarian approach supported reformist-oriented social policies in relation to indigenous communities. With the ascendancy of Bentnick's social reform programs, a paternalistic and progressive utilitarian ideology gained almost universal acceptance among the British in India.[38] A new hegemonic Utilitarian vision of Britain's role in India began to emerge.[39]

The Imperial Practice of Medical "Men-on-the-Spot"

Medical officers actively promoted their medical topographies during the emergence of Utilitarian-oriented government in British India. During the 1830s when the British gained some security of their colonial possessions, medical officers wrote articles in prominent Anglo-Indian medical journals and letters to the colonial government on the importance of medical topography to security of the empire.[40] They promoted the practice of medical topography as a foundational link between medicine and the colonial state. First, medical officers situated their scientific knowledge in support of reform-based government intervention in Indian society. Second, medical officers stressed their specialist contribution to the preservation of the military and, by extension, the Empire.[41] In both cases, they based their advocacy of medical topography on epistemological claims of first-hand observation and the new science of statistics.

Medical topography elevated the status of medical officers' roles in South Asian colonization because it opened up possibilities for them to participate actively in the expansion of colonial territories. Specialized "first-hand" empirical knowledge, observations of the relationship between the Indian landscape and European health, and the integration of medical statistics with principles of climate and disease bound medical topogra-

phy to the state colonial project. Medical topography, argued medical officers, contributed to a more scientific understanding of Indian environment based on detailed local knowledge that was better than other ways of knowing tropical medicine.[42] Medical officers "pose[d] the power, by the means of established medical inspections [medical topography], to meet the approaching disease as early as possible."[43] Medical topography's use of the new science of statistics further supported the medical officer's claims of authority within the army and the colonial state apparatus. The power of medical topography could be located in, what historian David Arnold argues, the notion of progress "inherent in this new statistical sense."[44]

Medical officers' epistemological claims of first-hand experience and statistics also must be understood within the context of the imperial world, specifically the tension between metropolitan or London-based scientists and colonial medical officers. As discussed previously, the colonial medical "man on the spot" represented a lower social class, often hailing from the peripheral Celtic realms of Scotland. Moreover, medical service in British India did not reach as high a level in the colonial professional rankings as other services, such as the Indian Army, whose social composition often reflected Oxbridge education and the English higher classes. The medical service's concern for social position within the colonial world fostered conservatism in medical theory and skepticism towards medical theories developed in the metropole. In fact, medical officers actively resisted the new medical trends developed in London, such as new theories of disease.[45] Colonial medical officers and metropolitan scientists followed different paradigms of etiology, theories on the spread of disease. Metropolitan medical professionals developed a new "contagionist" theory, which was based on the person-to-person spread of disease. However, colonial medical officers ascribed to the more conservative paradigm of miasmatic etiology, the spread of disease by air and vegetation.[46]

Medical topography was a counterpoint to the metropolitan scientific community in London. The emphasis on observation and local "field" experience central to writing medical topographies gave medical officers the confidence to challenge the intellectual authority of metropolitan medical theories.[47] For medical officers, direct experience and first-hand observations of disease and "tropical" illness were the only ways of knowing and identifying the sources of disease. Introductory comments in *Notes of the Medical Topography of Calcutta* (1837) reflected the medical officers' view that field-based epistemiology trumped medical theory:

> The opportunities of making decisive observations on some of the causes of disease which occur in the experience of the Medical Officers of fleets and armies, who are perfectly informed of the whole circumstance of the organized bodies of men…are more superior to those which other practitioners enjoy.[48]

Dr. John Annesley, the famous advocate of colonial medicine, noted that "a mass of highly valuable information, regarding climate and diseases of India, might be collected which might be the means of establishing a system of medical practice upon some rational footing."[49] The "rational footing" based on field knowledge and statistics, rather than metropolitan theories, could explain the perceived relationship between landscape and disease.

Utilitarian Landscapes

Medical topographers of the 1830s also promoted a reformist view of the landscape by weaving acclimatization ideas into the colonial ideological fabric of utilitarianism. Unlike previous military surgeons who focused on the local landscapes of disease, utilitarian medical officers viewed biological acclimatization of Europeans as impossible. Interventionist reform of the landscape was the only means to expand the geographical reach of the military in the tropics. A medical topography, *Notes on the Medical Topography of the District of Sarun* (1839), written by Robert Rankine, reflects how this landscape interpretation supported the utilitarian political project of the 1830s.

Rankine's *Notes* evaluated Indian productivity and economic development while advocating interventionist medical "improvements."[50] He viewed the landscape in terms of its economic uses for the British and the "Native" as part of the growing economic potential to develop the colony. He also highlighted the inefficiencies of the land's topography because it fostered illness and agricultural underproductivity. Rankine argued that moral reform of the "Native," economic development, and "preservation" of British colonists rested on governmental intervention to sanitize the urban landscape. Historian of geography David Livingstone neatly summarized this colonial position: "Since biological acclimatization was impossible, cultural ingenuity and environmental management were the only resort. The human race had to take the initiative from cold environments; now it must be the same with the tropics."[51]

Precise quantification and ordering of the District of Sarun in terms of area, number of villages, population, religious composition, and per-annum revenue distinguished Rankine's *Notes* from military medical topographies of the 1820s.[52] In contrast with the tentative observations about military illness, disease-ridden jungles, sites of deathly effluence, and unknown landscapes of the early military medical topographies, Rankine wrote with scientific confidence that came with fifteen years' experience in the region. His medical topography was more a map than memoir; Rankine's narrative landscape was imperforate, complete, and quantified. Rankine devoted almost half of this report to the description of regional commodities and condition of roads and communication. He lamented the situation in which cultivators dispensed with their produce in fields

because of transport problems. Rankine's economic evaluation suggested that reform and improvement would realize Sarun's economic potential; he also noted conditions that did not meet with his approval. Accordingly, he observed that the unhealthy miasmatic state of one subdistrict, Chumparun, and conditions of destitution and illness retarded productivity of this otherwise valuable possession.[53] Rankine claimed that:

> [i]t would be unfair to judge the moral character, manners, and habits of the people, by our own standards [and] the division of the community into castes, as the climate operates as an insuperable barrier to improvement.[54]

Perceived stagnation and medical inefficiency also sparked his desire to identify "improvements" and inspired him to argue for strong measures that "could only be carried into effect by rigid, though unpopular exercise of authority, on the part of Government." He justified the authoritarian measures of the government by insinuating that only the "detached and rational" colonial government could implement the needed improvement.[55]

In addition, Rankine proposed to reorder the urban landscape by widening roads, improving the "ventilation," and condemning "a vast number of trees and rooting up all the bamboos now growing luxuriantly."[56] Town improvements would "renew and purify the confined atmosphere, render conflagrations less destructive, and check the generation of those myriad insects, which constantly annoy its inhabitants." After all, in Rankine's opinion, "there can be nothing more unpleasant, or more prejudicial to health, than the stagnant atmosphere."[57] He further proclaimed the benefits of vaccination, although he admitted that because of the resistance by the indigenous communities to such intimate interference and social reformism by the colonial state, it would not have been feasible, even under paternalistic government guidance.[58] The military medical topographies of the 1820s also noted these miasmatic threats to health, but Rankine's suggestions for improvements were qualitatively different. Instead of modifying colonials' behavior by locating barracks on salubrious sites, the new ideology and science of medical topography supported the government's active transformation of the landscape according to its own needs and desire to "reform" the Indian population.

By the 1830s, medical topography provided a foothold for medical officers to claim authority within the emerging colonial administration that valued utility and order. Alluding to the environmentally informed political treatise of Montesquieu, eminent colonial surgeon Dr. James Annesley posited that the physician and medical officer were on the level of "the philosopher, the enlightened legislator, and the arbiters of the fates of nations." Knowledge generated from medical topography was essential to the rise (and fall) of civilizations.

> The constitution of the atmosphere derived from soil and situation, according to their nature, are not only the productive source of disease, but also the chief spring of the perfection of the human frame, and of its degeneracy ....They should equally interest the scientific physician, the philosopher, the enlightened legislator, and the arbiters of the fates of nations.[59]

For Annesley, the medical officers' specialist knowledge of soils, situation, and salubrity could lead to the perfection of civilization. Conversely, ignorance of such relationships could plunge society into debasement.

One can identify major cracks within the British imperial enterprise during the era in which imperial power began to consolidate power in South Asia. Social class divided imperial services, *laissez-faire* social policy gave way to reformist utilitarian policy, recently developed germ theory offered an alternative explanation to environmental causes of disease, and medical officers challenged epistemic authority of metropolitan scientists through field-based observation and statistics. Promotion of medical topography and with newly discovered reformist zeal must be understood as part of the tensions within the imperial community.[60] Observation and local experience of the Indian environment allowed medical topographers to challenge universalizing metropolitan medical theories.[61] By taking advantage of their position in the field, their environmentalist knowledge, and published medical topographies, medical men-on-the-spot could promote themselves as "specialists," guides for the military to negotiate the Indian landscape.

Utilitarian views of the landscape distinguished medical topographies of the late 1830s from military medical topographies of the 1820s. This difference rested on the division between regional acclimatization and anti-acclimatization. Military medical topographies identified salubrious retreats for the military to regain and rejuvenate their troops. The focus was on specific effects of local climatic and environmental conditions on troop health without distinguishing British from the British-trained Indian troops. Whereas earlier military medical topographies focused on the physical illness that resulted from the insalubrious landscapes, the Utilitarian medical visions articulated how managing the environment could reform social behavior and morality. Shifts in the administrative ethos of the Government of India during the 1830s changed how people thought about indigenous people and their landscapes. The government could realize reformist dreams through manipulation of local landscapes. Historian Mark Harrison argues the identification of the indigenous population with disease was "part and parcel of the utilitarian attempts to reform and re-order the Indian society" and geography.[62]

The development of medical topography reflects these changes in the British colonial politics.[63] Early military medical topographies recognized that full European acclimatization to the tropics was possible and medi-

cally feasible by recognizing climatic and geographical differences on the ground. Although it would necessitate an intense survey of the landscape to determine the miasmatic locales, locating the source of miasmas could thwart potentially disastrous settlement. Medical topographies of the 1830s, however, confirmed a tropical anti-acclimatization position that advocated environmental intervention as a means for successful colonial governance.[64] The relationship between medical officers and imperial geographies can be further understood by studying Martin (1796-1874), a figure described by one biographer as the man with "topographical tact."[65]

The Man with Topographical Tact

Reviewing Martin's career, an 1858 biographical sketch suggested that the Scotsman's "topographical tendencies" were a result of his early training in geology, physical geography, and mathematics and experiences as a surgeon in the Governor-General's Body-Guard. He also possessed field experience as a medical officer with British troops in India (Orissa 1817-1821) and Burma (1824-26) and through his appointment to the Native Hospital of Calcutta (1830). During Martin's distinguished military and civil service career, he authored *Notes on the Medical Topography of Calcutta* (1837), revised the sixth edition of James Johnson's *The Influence of Climate on the European Constitution* (1856), and served as a prominent member of the Health of Towns Committee and the Royal Sanitary Commission. In 1860 Queen Victoria knighted Martin. In all areas of medical work, he distinguished himself by employing scientific methods of firsthand observation and statistics.[66]

Martin may have been a well-known surgeon and "genius of medical topography," but his colonial career also illustrated the professional challenges common to less distinguished military medical officers.[67] Martin, who fit the medical officers' social profile as a middle-class Scot entering public service in the colonies, faced unending struggles "in the field" with military officers' ambivalence and disregard toward his work. Biographical sketches mourn the caprice of military officers who ignored Martin's medico-topographical suggestions to relocate the troops to more salubrious situations. On many occasions as medical officer with the military unit in Rangoon, Martin faced an indignant attitude toward his post.[68] Martin's biography suggested that proper recognition [of medical officers] remained elusive. One observer noted that Martin:

> was not a soldier, but a surgeon, and this perhaps naturally accounts for the fact that, whatever mark he made on the history of British ascendancy in India, was comparatively indistinct to the public eye.[69]

Despite Martin's struggles within the military and his exclusion from military rewards, recognitions, and pensions, he helped institutionalize

medical topography.[70] First, Martin published his own study, *Notes on the Medical Topography of Calcutta*, which advanced particular Utilitarian and reformist medical visions into the colonial bureaucracy. Second, during his tenure as President of the East India Company's Medical Board and Fellow of the Royal College of Surgeons, Martin called for the administrative sanitary reports to be collected and organized by each presidency. The Medical Board and colonial administration disseminated this work to all incoming medical officers. After 1837, they became a model for the Royal Sanitary Reports.

Third, Martin advocated medical topography as a practical service for imperial expansion. Martin petitioned the Governor-General Charles Metcalf to order a systematized method of collecting medical topographical surveys throughout British India. Medical topography, he argued, was a key to military success, specifically as a necessary strategy to secure imperial claims and select sites for military installations.[71] Medical officers had a unique role in the preservation of the army and colony through the practice of medical topography.[72] Martin included in his petition a model of medical topography. He outlined proper subjects for the official reports, which covered soils and situation to observations on inhabitants, roads, communication, and agriculture. In 1837, Martin's promotion of medical topography came to fruition. Metcalf called for:

> medical officers of each Presidency to be required to furnish or report the [medical] Topography of the Province, District or City, with the localities of which may be acquainted, to be afterward collected by a committee of surgeons to form a [medical] Topographical Memoir.[73]

Thus, Martin's argument for medical topography and successful request that these topographical studies become a general survey for the colonial government illustrates the critical role of specialists in the articulation, acceptance, and integration of geographical practice into colonial bureaucracy.[74] A comparison of Martin's medical topographical model with subsequent colonial gazetteers reveals striking similarities in content, structure, and perspective.[75]

Conclusion

The relationship between geography and colonialism has been broadly understood in terms of institutional and methodological connections with European territorial expansion. Geographical societies, explorations, travel narratives, and cartographical and trigonometrical surveys bolstered the cultural and material expansion of European powers into Asia, Africa, and Latin America. This broad (and useful) theorization between geography and empire, however, obscures how geographical knowledge devel-

oped historically and socially. By exploring the practical labors of geographical thought in its widest sense, one can better indicate the subtle contributions of geography to imperial exploits.

A closer examination of medical topography highlights how the complexity of colonial endeavors and chronic tensions *within* colonialism was an important social dynamic that shaped imperial practices. In this case, social relations within the ranks of medical and military service played a significant role in shaping and buttressing Utilitarian views of the colonial landscape. To advance their position in colonial society, the medical officers situated their science within the colonial state's vision for reform. The medical specialist used medical topography to develop the practical connections between their geographical practices and the new political interventionist project of the 1830s imperial government. Martin's specific role in establishing medical topography as a colonial survey during this political period illustrates the links between context and text, medical officers and medical topography, and the connections of individuals to the colonial state. His advocacy of medical topography can be seen as central to his struggle to lift the status of the medical corps. This "man on the spot" articulated the importance of medical topography (and medical officers) to British rule and reformism, created a standard topographical model for the colonial government, and integrated topographical practices into the general conventions of the Government Medical Board.

This study of medical topography supports the idea that geographical knowledge cannot be automatically characterized as an unwavering tool for colonial policy. Rather, geographical knowledge and practices were specifically articulated, promoted, and integrated at various social levels and in diverse contexts within European colonialism. The fragmented subjectivity of the medical officers as underappreciated "specialists" and as colonists clearly shaped the articulation and promotion of medical topography as a colonial medical survey. Conservative science, in concert with utilitarian policies, proved to be a powerful means for medical officers to establish themselves securely within the colonial hierarchy. These contradictions within European colonialism require a closer examination by historians of geography. In conclusion, medical topography, through its origins as a medical officers' local discourse, leads to a complementary path for the study of colonialism and geography.

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Notes

1. For a contemporary history of eighteenth-century and early nineteenth-century ideas on health, climate, and geography see Clarence Glacken, *Traces on the Rhodian Shore: Nature and Culture in Western Thought from Ancient Times to the End of the Eighteenth Century* (Berkeley: University of California Press, 1967): 551-627; James Riley, *Eighteenth-century Campaign to Avoid Disease* (London: MacMillan, 1987): 1-52; Mark Harrison, *Climates and Constitutions: Health, Race and Environment and British Imperialism in India*, 1600-1850 (Oxford: Oxford University Press, 1999).
2. For the most influential late eighteenth-century and early nineteenth-century writing on the relationship between European health in tropical climates, see John Lind, *Essay on the Diseases Incidental to Europeans in Hot Climates* (London: J. and J. Richardson, 1768); John Hunter, *Observations on the Diseases of the Army in Jamaica and on the Best Means to Preserving the Health of Europeans in that Climate* (London: G. Nicol, 1788); James Johnson, *The Influence of Tropical Climates, More Especially of the Climate of India, on European Constitutions; and The Principal Effects and Disease Thereby Induced, Their Prevention and Removal, and The Means of Preserving Health in Hot Climates Rendered Obvious to Europeans of Every Capacity,* 2nd edition (London: J. Callow, 1815); John Annesley, *Sketches of the Most Prevalent Diseases of India* (London: Underwood, 1825); Annesley, *Researches into the Causes, Nature, and Treatment of the Most Prevalent Diseases in India*, (London: Longman, Rees Orme, Brown and Green, 1828); William Twining, *Clinical Illustrations of the More Important Diseases of Bengal with the Results of an Enquiry into the Pathology and Treatment* (Calcutta: Baptist Mission Press, 1835).
3. For studies on relationship between geography and European colonialism see Neil Smith, *American Empire: Roosevelt's Geographer and the Prelude to Globalization* (Berkeley and Los Angeles: University of California Press, 2003); Peter Collier and Rob Inkpen, "The Royal Geographical Society and the Development of Surveying 1870-1914," *Journal of Historical Geography* 29:1 (2003) 93-108; Collier and Inkpen, "The RGS, Exploration and Empire and the Contested Nature of Surveying," *Area* 34: 3 (2002) 273-83; Morag Bell, Robin Butlin, and Michael Heffernan, eds., *Geography and Imperialism, 1920-1940* (Manchester: Manchester University Press, 1994); Alison Blunt and Gillian Rose, *Women Writing Space: Colonial and Postcolonial Geographies* (New York: Guilford, 1994); Felix Driver, "Geography's Empire: Histories of Geographical Knowledge," *Environment and Planning D: Society and Space* 10 (1992): 23-40; Stephen Frenkel, "Geography, Empire and Environmental Determinism," *The Geographical Review* 82 (1992): 143-52; Frenkel and John Western, "Pretext or Prophylaxis? Racial Segregation and Malarial Mosquitoes in a British Tropical Colony: Sierra Leone," *Annals of the Association of American Geographers* 78: 2 (1988): 211-28; Anne Godlewska and Neil Smith, eds., *Geography and Empire* (Oxford: Blackwell, 1995); Richard Grove, *Green Imperialism: Colonial Expansion, Tropical Island Edens and the Origins of Environmentalism, 1600-1860* (Cambridge: Cambridge University Press, 1995); Brian Hudson, "The New Geography and the New Imperialism, 1870-1918," *Antipode* 9 (1977) 12-19; Judith T. Kenny, "Climate, Race and Imperial Authority: the Symbolic Landscape of the British Hill Stations in India," *Annals of the Association of American Geographers* 85: 4 (1995): 694-714; Kenny, "Claiming Higher Ground: Theories of Imperial Authority and the British Hill Station in India," *Political Geography* 16:8 (1997): 655-73; David Livingstone, *The Geographical Tradition: Episodes in the History of a Contested Enterprise* (Oxford: Blackwell, 1993): 216-59; Bonham C. Richardson, "Detrimental Determinists: Applied Environmentalism as Bureaucratic Self-interest in the Fin-de-Siècle British Caribbean," *Annals of the Association of American Geographers* 86:2 (1996): 213-34; Edward Said, *Orientalism* (New York: Vintage Press, 1978); Said, *Culture and Imperialism* (New York: Vintage Press, 1993); Gwendolyn Wright, *The Politics of Design in French Colonial Urbanism* (Chicago: University of Chicago Press, 1993).
4. Cantonments, hill stations, and forts, as well as hospitals and jails, owe their location and their design to the ideas that informed medical topography; see Anthony King, *Colonial Urban Development: Culture, Social Power and Environment* (London: Routledge and Kegan Paul, 1976); Veena Oldenberg, *The Making of Colonial Lucknow* (Princeton: Princeton University Press, 1984): 96-144.
5. Driver, "Geography's Empire," 29.
6. Matthew Edney, *Mapping an Empire: The Geographical Construction of British India, 1765-1843* (Chicago: University of Chicago Press, 1997).
7. Godlewska and Smith, *Geography and Empire*, 2.

8. H. Harold Scott, *A History of Tropical Medicine*, 2 vols. (London: Edward Arnold Co., 1938): 105.
9. Scott, *A History of Tropical Medicine*, 49.
10. The term "Anglo-Indian" is a person of British birth, living in the Indian subcontinent.
11. Mark Harrison, *Public Health in British India: Anglo-Indian Preventative Medicine* (Cambridge: Cambridge University Press, 1994): 35.
12. Harrison, *Public Health in British India*, 26-27.
13. [Anonymous], Biographical sketch of James Ranald Martin, *The Lancet* 1 (1852): 405-6; Sir Joseph Fayrer, *Sir James Ranald Martin* (London: Innes and Co., 1897): 150-2.
14. Harrison, *Public Health in British India*, 29.
15. Harrison, *Public Health in British India*, 10.
16. James Ranald Martin, *Influence on Tropical Climates on European Constitutions, Including Practical Observations on the Nature and Treatment of the Diseases of Europeans on Their Return from Tropical Climates* (London: John Churchill, 1856): 105.
17. This division between the military and medical officers has not gone unnoticed by historians; see David Arnold, *Colonizing the Body: State Medicine and Epidemic Disease in Nineteenth-Century British India,*(Berkeley: University of California Press, 1993): 63; Scott, *A History of Tropical Medicine*, 45. Martin lamented the treatment of medical officers, the disregard for their professional advice, and loathed the caprice of "blundering lieutenants," who "know little, and do less"; see Martin, *Influence on Tropical Climates*, 108-9.
18. One medical topographer ended his account by stating that his medical topography was written independent of any colonial mandate, perhaps to satisfy his own intellectual medical curiosity; T. Jackson, "General and Medical Topography of Meerut," *Transactions of the Medical and Physical Society of Calcutta* 1, 4 September (1824): 292-8.
19. Scott, *Tropical Medicine*, 97.
20. Arnold, *Colonizing the Body*, 66.
21. Livingstone, "Human Acclimatization," 375-9.
22. J. Grierson, "On the Endemic Fever of Arracan, with a Sketch of the Medical Topography of that Country," *Transactions of the Medical and Physical Society of Calcutta* 2, 5 March (1825): 201-19.
23. Grierson, "On the Endemic Fever of Arracan," 204.
24. Grierson, "On the Endemic Fever of Arracan," 208.
25. Grierson, "On the Endemic Fever of Arracan," 209.
26. Grierson, "On the Endemic Fever of Arracan," 202.
27. Grierson, "On the Endemic Fever of Arracan," 205.
28. Grierson, "On the Endemic Fever of Arracan," 202.
29. Tropical diseases, such as malaria, had not been accurately explained in terms of microbiology and parasitic infections. Scientists made connections between tropical disease and microbiology in the late nineteenth and early twentieth centuries.
30. Grierson, "On the Endemic Fever of Arracan," 203-9.
31. T. Jackson, "General and Medical Topography of Meerut," *Transactions of the Medical and Physical Society of Calcutta* 1 (1824), 292-8.
32. Jackson, "General and Medical Topography of Meerut," 296.
33. Jackson, "General and Medical Topography of Meerut," 294.
34. D.S. Young, "An Account of the General and Medical Topography of the Neelgherries," *Transactions of the Medical and Physical Society of Calcutta* 4: 7 July (1827): 36-78; the "Nilgiris" is the contemporary spelling for "Neelgherries" (Blue Mountains) referred to in this medical topography. Although not explicitly intended for political maneuvers, this medical topography was essential to the establishment of hill stations. The political and social importance of hill stations is the subject recent historical and cultural geography studies; see Kennedy, *Magic Mountains;* Kenny, "Climate, Race, and Imperial Authority"; Kenny, "Claiming Higher Ground."
35. Young, "An Account of the General and Medical Topography of the Neelgherries," 38; Kennedy, *Magic Mountains*, 39-62.
36. Young, "An Account of the General and Medical Topography of the Neelgherries," 75.
37. Young, "An Account of the General and Medical Topography of the Neelgherries," 77.
38. Thomas R. Metcalf, *Ideologies of the Raj* (Cambridge: Cambridge University Press, 1994): 28.
39. Eric Stokes, *The English Utilitarians and India* (Oxford: Oxford University Press, 1959); Metcalf, *Ideologies of the Raj*, 30-33.

40. Martin, *Influence of Tropical Climates*; J. Ranken, "Medical Topography," *Quarterly Journal of the Medical and Physical Society of British India* 2 (1837): 256-61; Fayrer, *Sir James Ranald Martin*, 55-70; India, Office of the Governor-General, Correspondence and Extracts Regarding Medical Topography, British Library, Oriental and India Office Collection, Board of Control (1837) F/4/1557.
41. Martin, *Influence of Tropical Climate*, 108-23; Martin, "The Sanitary History of the British Army in India, Past and Present," *The Lancet* 1 (1868): 339-42.
42. Arnold, *Colonizing the Body*, 76-77; Metcalf, *Ideologies of the Raj*, 114.
43. Martin, *Notes on the Medical Topography of Calcutta*, 141.
44. Arnold, *Colonizing the Body*, 66.
45. Harrison, *Public Health in British India*, 35, 42-43; Anonymous, biographical sketch, 405.
46. Harrison, *Public Health in British India*, 49.
47. Harrison, *Public Health in British India*, 49.
48. Martin, *Notes on the Medical Topography of Calcutta*, i.
49. Annesley, *Sketches of the Most Prevalent Diseases*, 255.
50. Rankine, *Notes on the Medical Topography of the District of Sarun* (Calcutta: G.H. Huttman, 1839).
51. Livingstone, *Geographical Tradition*, 373.
52. Rankine, *Notes on the Medical Topography*, 16, 21, 24, 31, 58-70.
53. Rankine, *Notes on the Medical Topography*, 21.
54. Rankine, *Notes on the Medical Topography*, 40.
55. Rankine, *Notes on the Medical Topography*, 40, 47.
56. Rankine, *Notes on the Medical Topography*, 26.
57. Rankine, *Notes on the Medical Topography*, 26.
58. Rankine, *Notes on the Medical Topography*, 47, 56. This phenomenon has been discussed in a larger elaboration on the relationship between the body and the colonial state, see Arnold, *Colonizing the Body*,116-58.
59. Annesley, *Researches into the Causes*, 47.
60. Mark Harrison, "Towards a Sanitary Utopia? Professional Visions and Public Health in India, 1880-1914," *South Asia Research* 10 (1990): 24; Harrison, "Tropical Medicine in Nineteenth-Century India," *British Journal for the History of Science* 25 (1992): 301.
61. Arnold, *Colonizing the Body*, 19.
62. Arnold, *Colonizing the Body*, 310.
63. Livingstone, *The Geographical Tradition*, 365-6; Richardson, "Detrimental Determinists."
64. Curtin writes that the sanitary segregation within commercial districts in Lagos, Nigeria, did not reflect an acceptance of the mosquito theory as the cause of malaria. Rather "[i]ts apparent medical bias of the 'native town'[was] drawn from nineteenth-century medicine and Indian colonial practice," Curtin, Medical knowledge, 605.
65. Anonymous, biographical sketch, 389.
66. Anonymous, biographical sketch, 389; Fayrer, *Sir James Ranald Martin*.
67. Anonymous, biographical sketch, 404.
68. Anonymous, biographical sketch, 389; Fayrer, *Sir James Ranald Martin*, 18-19; 32-33.
69. J. Fayrer, "News Cuttings: Retirement, Preservation of Health, and Sir Ranald Martin," Wellcome Institute, Contemporary Medical Archives Center, *Royal Army Muniment Collection* 117 (1897): 31.
70. Anonymous, biographical sketch, 387.
71. Martin, *Notes on the Medical Topography of Calcutta*, 158.
72. Martin, *Notes on the Medical Topography of Calcutta*, 155.
73. Office of the Governor-General, *Topographical Memoirs*. The initial proposal by the Governor-General to compile medical topographies was poorly received. The Medical Board argued that the tasks outlined by Martin were too much for military surgeons and suggested that this task be part of the civil surgeons' responsibilities. This was overridden by Metcalf. Instead, he ordered the distribution of five hundred copies of Martin's *Notes on the Medical Topography of Calcutta* (1837) to all incoming medical officers.
74. Understanding this process of articulation, acceptance, and integration of social ideologies in to colonial administration was first elaborated by Richardson, "Detrimental Determinists," 214.

75. Martin's detailed suggestions for the content of the state medical topographies were reprinted in a colonial medical journal; see Ranken, "Medical Topography." State medical topographies also followed Martin's model; see Government of Madras, *Report on the Medical Topography and Statistics of the Provinces of Malabar and Canara-Mysore Division* (Madras: R.W. Thorpe, 1844); Government of Madras, *Report on the Medical Topography and Statistics of the Mysore Division of the Madras* (Madras: R.W. Thorpe, 1844); Government of Madras, *Report on the Medical Topography of Coorg* (Madras: R.W. Thorpe, 1844); Government of Madras, *Report on the Medical Topography and Statistics of Neelgheerie Hills* (Madras: R.W. Thorpe, 1844).