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Hard Rock Miners` Phthisis in 19th and Early 20th Century Britain: From Diagnosis to Compensation

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Hard Rock Miners' Phthisis in 19th and Early 20th Century Britain: From Diagnosis to Compensation

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Professor James Vernon
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Abstract

Introduction: Hard Rock Miners Phthisis in 19th and Early 20th Century Britain: From Diagnosis to Compensation

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The development of new technologies and new patterns of working were indispensable to the accelerated economic growth, which characterized most of nineteenth century Britain. For much of that period the demand for raw siliceous containing materials increased sharply. In this process, equipment, which was ever more sophisticated, generated increasingly fine and more harmful siliceous dust, increasing early disability and death in mines and quarries as well as in numerous other industries. The present study examines the elaboration of silicosis, the disease, and the development of social policy directed at its prevention and compensation from the 1830s until 1918. I concentrate mainly on the nineteenth century and the twentieth century until 1907. In 1907, the law recognized that an occupational disease was a notional injury and a few became compensable. Others, including silicosis were certain to follow. Both the etiological elaboration and prevention of silicosis, and, ultimately compensating its sufferers occurred over a very long period. My major subject is the causes of this time lag. While this study emphasizes mining and quarrying, workers in siliceous industries outside of these occupations had the same issues.

Others have reviewed the nature of medical practice in the nineteenth century but medical interest or disinterest in occupational disease during that period has only received cursory coverage. Indeed, this is characteristic of the slighting of occupational disease as opposed sanitation by historians during most of the period I have studied. While some investigators have alluded to the early public health emphasis on worker well-being, I also address how occupational health became a secondary consideration for most of the nineteenth century, despite its promise of achieving as much as "Chadwickian" sanitation, at much less cost. In this, Chadwick and his coterie of second-generation utilitarians with their stress on engineering as opposed to medical investigation were largely responsible.

The government created commissions and committees to learn more about occupational health conditions. However, it appears that it offered these, without much intent to follow through, but rather, as a temporarily sop to placate those with a special interest in the subject. This work studies in more depth than others of which I am aware, the 1862-64 *Commission of the Condition Of All Mines In Great Britain To Which The Provisions Of The Act 23 & 24 Victoria Do Not Apply* (coal mines). During those proceedings, I found that the etiology and partial prevention of silicosis were clearly established. This information was relegated to the blue books for reasons that I also investigate. When interest in silicosis revived, there was little or no reference to this work.

Students of the subject have noted that in the 1880s British medicine was anecdotal and derived from experience in private practice. I have attempted to show how this influenced the elaboration of a specific disease, silicosis. In addition, medical teaching, membership in societies and with an interest in some aspect of medicine, (very likely, what submissions were accepted to medical journals as well) were controlled by a metropolitan medical elite with little or no scientific, social or pecuniary interest in the diseases of miners. This view was transmitted to general practitioners as well. Another aspect of the present work, different from most, has involved a careful reading of all the issues of *The Lancet* and *The British Medical Journals* from 1864 through 1906. I found relatively few articles relating to silicosis, confirming that the readers' level of interest was not very great. In addition to demonstrating a paucity of articles about miners' lung disease, these journals also reported on the controversial role of tuberculosis in the elaboration of silicosis. Failure to scientifically address this debate significantly delayed compensating for and preventing silicosis. Additionally, I show that the journals revealed a terminological obfuscation that made the understanding of what silicosis was, very difficult. Various authors commented on this confusion but their criticism does not appear to have resulted in any editorial attempt to rectify the problem (assuming that any editorial intervention existed). The science of statistics was in advance of other medical tools and did provoke some interest in silicosis but the journals and reports of the commissions also show how statistics were manipulated to minimize the incidence of silicosis.

Moreover, organizations presumably having a keen interest in the etiology and prevention of silicosis (and its compensation) were often, themselves, a source for the lag. These included unions, mine and quarry owners, both the Liberal and Conservative Parties, the public health establishment and, to a lesser extent, the mining and quarry inspectorate. Most work on this subject studies the post-WWI period. This work shows that these organizations had distinctly different attitudes about compensation legislation than they held the in the twentieth century. In the process of arriving at the correct etiology of silicosis, and, as a result, whether it should be indemnified, all interested parties picked through what was on offer to patch together some commonality of position that had little to do with any adherence to an overall structure, coherency or rational knowledge. Inevitably, their motives were an admixture of highly parochial and shortsighted deliberations and considerations that were more altruistic. Any attempt on the part of various parties to act in unison was a material and a practical matter and had little to do with systematic logic. The authority of the interested organizations related to the power that sustained them and to what was required to disrupt them and bring about fragmentation. In this process, as Bruno Latour has pointed out, the content of what was achieved, always involved fusion with the context. This work concludes that when problems resist timely solutions, the reasons are always multiple and that they shift over time without result until a reconciliation of various social and cultural differences becomes possible. In fact, reconciliation did occur despite the fact that the motivations of the negotiating parties were contradictory.

Introduction

Hard Rock Miners' Phthisis in 19th and Early 20th Century Britain: From Diagnosis to Compensation

Alarmed by the high morbidity and mortality in certain occupations, Sir John Simon, M.D. pointed out: "The canker of industrial diseases gnaws at the very root of our national strength."[1] The development of new technologies and new patterns of working were indispensable to the accelerated economic growth that characterized most of nineteenth century Britain. For much of that period, the demand for raw siliceous containing materials increased sharply. At the same time, increasingly sophisticated equipment generated ever finer siliceous dust that accelerated and further aggravated its harmful affect on the lungs. It was responsible for a marked increase in early disability and death in mines and quarries as well as numerous other industries. These included sanding, filing, cutlery, roofing, piping, guttering, and the manufacture of doorknobs and other fixtures, copper wire, electromagnets, household products such as pots and pans, most flatware, water heaters, coinage, and chemical applications such as ceramic glazes, and Fehling's solution. Tin was crucial to the production of bronze, pewter, as a dye casting alloy, white metal and as a solder. Quarrying was requisite for pottery, brick-making, glass, for fettling material. Sand was vital for molding, bedding, blasting and limestone.

The present study examines the elaboration of silicosis, the disease, and the development of social policy directed at its prevention and compensation from the 1830s until 1918 My interest in undertaking it was kindled by the great time lag that occurred between its scientific elaboration and its acceptance by the medical community as well as the long legislative process that finally sought to protect and compensate miners suffering silicosis. While this study emphasizes mining and quarrying, I am well aware that workers in siliceous industries other than mining suffered from the same issues. I found scientific acceptance of the etiology of silicosis and the pursuit of ameliorative legislation were not interdependent. Moreover, organizations presumably having a keen interest in the investigation of, prevention from and compensation for occupational diseases were often, themselves, a cause of the lag. The present inquiry attempts to address how this happened, how the etiology of silicosis was finally acknowledged and how legislation was ultimately achieved. In this process all interested parties picked through what was on offer to patch together some commonality of position with little recourse to overall structure characterized by coherence or rational knowledge. Inevitably, their motives were an admixture of highly parochial and shortsighted deliberations with more selfless considerations. Any attempt on the part of various parties to act in unison was a material and a practical matter and had little to do with conventional logic. Their authority related to the power that sustained them and to what was required to disrupt them and bring about fragmentation. In this process, as Bruno Latour has pointed out, the content of what was achieved always involved fusion with the context.[2]

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[1] Wilson, Arnold, Sir, M.P., and Levy, Hermann, Professor. Workmen's Compensation First ed. Vol. 1. 2 vols. London, New York, Toronto: Oxford University Press, 1939, p. 119

[2] Latour, B. (1987). *Science In Action : How To Follow Scientists And Engineers Through Society*. Cambridge, Mass.: Harvard University Press. P. 6.

Most studies[3] in this area concentrate on the period after World War I, at which time interested parties differed greatly on the subject from their pre-war predecessors. The scientific issues were largely resolved. Unions and owners had shifted some of their previously hard-line positions. Moreover, in contrast to the historical work in both periods, this endeavor is equally concerned with that of the medical aspects not only as they relate to the elaboration but, equally, as to how they did or did not affect social policy. It does so along the lines outlined by George Rosen, namely, attempting to trace the growth of knowledge concerning silicosis in its relationship to varying social and economic influences. However, it extends his suggestion by attempting to correlate the oft-disregarded advances in the elaboration of silicosis, the disease, with the varying social, political and economic conditions that swayed medical men to accept or reject them.[4]

I find that medical men were well aware of the etiology and prevention of silicosis in the proceedings of the *1861-4 Metalliferous Mining Commission* which I address at some length. Unfortunately, this information was rapidly forgotten. One of the reasons for this very significant oversight rests with the course that Edwin Chadwick had charted for public health in the 1830s and 40s. Few, if any historians of the public health movement have alluded to a shift in policy that made occupational health the step-child of public health.[5] In fact, at the onset of the public health movement, occupational health was public health. Long before sanitation became the prime consideration of public health, the health of factory workers was the more pressing concern. Serious interest in the health of workers in the nineteenth century was evidenced first in the ineffective *Health and Morals of Apprentices Act, 1802*. It assumed momentum in 1830 with the factory reform movement promoted by Richard Oastler and Michael Sadler, and dramatically illustrated in C. Turner Thackrah's pioneer study, *The effects of arts, trades, and professions on health and longevity*.[6] Lord Ashley responded to the movement by undertaking passage of the *Factory Act, 1833*.

Edwin Chadwick, a principle in the movement to address health and morals, especially with respect to the health of the pauper population heralded the notion that preventive social action was applicable to the problems of poverty and disease. Subsequently he became secretary of the *Poor Law Commission* and in that context authored "the fundamental document of modern public health," *Report…on an inquiry into the Sanitary Condition of the Labouring Population of Great Britain*
(1842).[7] Chadwick was one of the outstanding figures in the second third of the nineteenth century. His views were largely influenced by his close association with Jeremy Bentham from

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[3] Bufton, M. W., & Melling, J. (2005). Coming Up for Air: Experts, Employers, and Workers in Campaigns to Compensate Silicosis Sufferers in Britain, 1918 - 1939. *Social History of Medicine, 18*(1). Bufton, M. W. a. M., Joseph. (2005). "A Mere Matter of Rock": Organized Labour, Scientific Evidence and British Government Schemes for Compensation of Silicosis and Pneumoconiosis among Coalminers. *Medical History, 49*, 155-178. Weindling, P., & Society for the Social History of Medicine. (Eds.). (1985). *The Social History Of Occupational Health*. London ; Dover, N.H.: Croom Helm.

[4] Rosen, G. (1943). *The History Of Miners' Diseases, A Medical And Social Interpretation*. New York: Schuman. P. xi

[5] Frazer, W. M. (1950). *A History Of English Public Health, 1834-1939*. London,: Ballière, Tindall and Cox. Rosen, G. (1958). *A History Of Public Health*. New York,: MD Publications. Brockington, F. (1965). *Public health in the nineteenth century*. Edinburgh: E. & S. Livingstone. Porter, D. (1994). *The History Of Public Health And The Modern State*. Amsterdam ; Atlanta, Ga.: Editions Rodopi.

[6] Thackrah, C. T., Meiklejohn, A., & Thackrah, C. T. (1985). *The Effects Of Arts, Trades, And Professions On Health And Longevity*. Canton, MA: Science History Publications U.S.A.

[7] Rosen, G. (1958). *A History Of Public Health*. New York,: MD Publications. P. 208-12

whom he derived a theory of efficiency and justice in tandem with the scientific and rational organization of the affairs of state in which policy-making would become a managerial practice. Reducing the cost of destitution and poverty by preventing the premature mortality of breadwinners was another feature of his theory of government. The core of his approach to public health was embodied in his 'sanitary idea.' This notion was grounded in the miasma theory of disease etiology; that is, that putrefying, decaying organic matter contaminating the air in a gaseous state was responsible for disease. In this conception, filth and its attendant odor was the culprit. Where there was no smell, there was no diathesis to disease. The accumulation of malodorous filth could be remedied by the construction of civil engineering works providing efficient sewage and drainage and the supply of clean water. His influence was further felt because of a well-known antipathy for the practice of medicine, although he did employ medical men in the public health movement who held similar views. Nevertheless, his sanitary idea was independent of medical analysis.[8] Chadwick's agenda was realized as a result of the Public Health Act (1848) that created the General Board of Health, of which he was the only salaried member. Assisting him as medical advisor was his philosophical comrade, Southwood Smith. I maintain that in that capacity, Chadwick and Smith were able to divert interest and support from occupational accidents and disease to refuse piles, privies, sewers. drainage systems and impoverished foul smelling dwellings. The latter, of course, had wide appeal in the cities and among the middle classes. Moreover, I agree with Oliver MacDonagh that "even on its own showing Benthamism was scientific only in the sense in which its inquiries were to be conducted in a disinterested and rational manner. What was to be done was classification of data rather than experiment, yet what was to emerge from the inquiry was to be not hypothesis, but dogma."

Though Benthamism believed it subverted *a priori* thinking, nevertheless it was generalized, abstract, and *a priori*. In fact, the universalism of the doctrine led to a fatal disregard of social and political patterns of behavior such as that demonstrated by Chadwick during his tenure at the Poor Law Board.[9] I disagree with MacDonagh, however, with respect to mining: the origin of governmental change was the exposure of a social evil, either sudden and catastrophic, or, dramatic in another sense because of the revelation of a private philanthropist or of an altogether fortuitous observer such that these events excited man's instinct to legislate the evil out of existence.[10] Sudden and catastrophic mine explosions occurred regularly but only briefly excited sufficient sympathy to force legislation.

While the medical community was largely excluded by Chadwick, it evidenced very little enthusiasm for political intervention on behalf of miners' health, safety and well-being. On the other hand, this study suggests that even if it had been willing, the medical institution, for the greater part of the nineteenth century, lacked the power to effect social policy save to some extent as it related to lobbying on behalf of the profession itself. It was also the case that in those instances where the profession itself or individual doctors hoped to effect social policy, they were hampered by feeble networks of influence. Anne-Marie Moll has argued that effecting change is a matter of networks that cohere practically and materially, and not a question of mere logic. Even when a medical advance achieves recognition, it "is because there are actors outside the laboratory who associate themselves with it. In doing so, they may pick through what is on

[8] Porter, D. (l999). *Health, Civilization and the State: A history of public health from ancient to modern times.* Uk, USA and Canada: Routledge.
[9] MacDonagh. (1958). The Nineteenth Century Revolution in Government: A Reappraisal. *The Historical Journal, I*(1), P. 66..
[10] Ibid, P. 68

offer and take bits and pieces. Massive structures or a coherent episteme does not overwhelm them.[11] This was the case in our period. Additionally, the much-discussed social settlement of the mid-century, itself, appears as a negotiated collusion arrayed against networks that had been effective.

The lag between identification and an action to address a problem is not specific to occupational disease. It is the *modus operandi* of a good many social problems. How, then, did change finally occur during our period? The present endeavor would agree with M. Savage and A. Miles that national political structures were largely independent except that they required inaugurating programs relevant to the audience whose vote they were soliciting. [12] It may also be that some programs were a feint to displace censure for other agendas not so easily made popular. Because the goals and strategies of interested groups varied and did not agree, the creation of policy and its promotion among the varying constituencies was very complicated. More often than not, legislation was crucially dependent on inciting enthusiasm and capturing the organizational and interpretive skills of the local political activists, a skill at which Joseph Chamberlain was particularly adept. This work proposes that when problems resist timely solutions, the reasons are almost always multiple and that they shift over time without result until a reconciliation of various social and cultural differences becomes possible and that reconciliation may occur even when the reasons for reconciliation are only complimentary. In fact, sometimes they are even contradictory.

In Chapter I examine what was known about miners' lungs disease in the nineteenth century, most of the workers in the field were also well aware of the previous excellent studies of investigators such as Georgius Agricola (1494-1555), Paracelsus (1493-1541) and surgeon and apothecary, Charles Turner Thackrah (1795-1833). Thackrah's great work, *The Effects of Arts, Trades and Professions, and of Civic States and Habits of Living, on Health and Longevity* (1832) had a wide readership. In it, he described the health problems of lead miners, grinders, and of those who raised and chipped sandstone with a precision equal to those who were to describe them for the next seventy-five years. Moreover, he accurately implicated the type and particle size of the aggravating dust.[13]

Chapter 2 examines why the *1862-4 Commission's* "blue book" was lost, and how it happened that later silicosis became an object for investigation. The *1861-64 Commission* had strongly suggested that silicosis was not dependent upon tuberculosis for its malign effects. This fact as well as others of great import detailed in the *Proceedings* were ignored and only emerged independently at the end of the nineteenth and at the beginning of the twentieth centuries. Until then, the medical community tended to conflate silicosis and tuberculosis. That tuberculosis was not an occupational disease proved the cause of considerable dispute as to which one was truly damaging and whether silicosis by itself was benign and not the chief cause of the early morbidity and death among miners suffering lung disease. This was an erroneous argument that became a considerable source of delay in scheduling as a compensatory disease. This chapter relies heavily on *The Lancet* and *The BMJ* for its sources. These journals were reviewed from 1861 through 1906 because both were widely read by general practitioners, the group most likely

[11] Mol, A. (2002). *The Body Multiple: Ontology In Medical Practice*. Durham: Duke University Press. P,64

[12] Savage, Michael, and Miles, Andrew. *The Remaking Of the British Working Class, 1840-1940*. London ; New York: Routledge, 1994. P.19-29

[13] Thackrah, C. T. (1832). *The Effects of Arts, Trades and Professions, and of Civic States and Habits of Living, on Health and Longevity: with Suggestions for the Removal of many of the Agents which Produce Disease, and Shorten the Duration of Life.* (Second ed.). London and Leeds: Longman, Reesw, Orme, Brown, Green, & Longman; Simkin & Marshall. Leeds: Baines and Newsome. P. 89-95.

to have encountered dust diseases in their practices and most likely to have hoped for more information. Instead, both journals were either silent or the source of misleading and imprecise information and were seemingly supported by the metropolitan medical elite.

Chapter 3 examines that period in the last quarter of the nineteenth and early twentieth centuries during which the concept of collective responsibility became more pervasive. The realization that accidents at the workplace were for the most part beyond the workers' control led to proposals to make the workplace safer and to compensate occupationally induced injuries. Ultimately, occupational diseases were considered notional injuries for prompting similar proposals.[14] This chapter looks at how and in what form silicosis prevention, mine and quarry safety and compensation were achieved as well as what roles medicine, the mining inspectorate, unions, the press and the public chose to play in matters concerning prevention and compensation.

Chapter 4 discusses the evolution of liability and of compensation laws. Neither unions, owners, inspectors, the medical profession, nor the public played major roles in promoting it. As the laws evolved, none was content. It remained for Joseph Chamberlain who had championed compensation for injuries and injurious deaths to cobble together the *1897 Workmen's Compensation Act* despite less than enthusiastic Liberal or Conservative support. He embraced workmen's compensation for injury with fervor and possessed sufficient charisma to win over eminent personages and ordinary people to his cause, even though, among voters, compensation for industrial accidents or disease was of rather low priority in their political wish list.

Chapter One: Silicosis: Lost and Found

> A healthy young man enters upon work in a lead mine; in a few years, more or less, he begins to experience some degree of difficulty of breathing—nothing to hurt him very much as he continues an efficient miner; still, however, 'he is touched in the wind.' Along with this difficulty of breathing, there is an increased expectoration of mucus, often tinged, more particularly after leaving work, of a bluish black colour. The difficulty of breathing continues, and generally increases as age advances, rendered worse, perhaps, by an attack of bronchitis now and then supervening. On recovering from these attacks, he again resumes work; or, should it happen that he has no acute attacks, he goes on working with increased shortness of breathing, expectoration and failing strength… He has great languor, and frequent fits of severe coughing and evidence of imperfect oxygenation of the blood in the blueness of the lips, &c. He may now have got to 40 or 45 years of age; he is low in health and strength, and is compelled to give up work, and stay at home as a worn-out miner. But even at home, his health cannot be restored. …The poor worn-out miner now soon dies exhausted; that is to say, in a year or two he is cut off by persistent chronic disease of the chest, aggravated by acute or sub-acute seizures now and then taking place.[15]

[14] Bronstein, Jamie L. Caught in the Machinery: Workplace Accidents and Injured Workers in Nineteenth-Century Britain. Stanford, Calif.: Stanford University Press, 2008. p. 127

[15] PP *Statistics and Evidence* by Dr. Peacock, Chief of the Statistical Department in the General Register Office p. 13]. Ewart, resident medical officer of the London Company at Middleton in Teesdale had had many opportunities to observe a host of others who suffered impairment, disability and early death from the same cause.

Dr. D. Ewart described a miner whose lungs were irreversibly damaged from inhaling silica rich dust. He was certainly not the first to depict this disease. Indeed, miners' phthisis (silicosis) is one of the oldest known of the occupational diseases, well described by Hippocrates in the classical period (*ca*. 460 BC – *ca.* 370 BC), and by Agricola (1566) and Ramazini (1713) more recently. It became especially widespread in 19th century Britain with advances in technology and industrial growth and remains a significant problem wherever siliceous mining operations are extensive. Miners were not the only laborers to suffer the disease. In the late eighteenth century, medical men also attributed non-tuberculous phthisic deaths to the large quantities of silica dust associated with needle production and knife sharpening.

Though this is a study of how silicosis as it affected miners and quarriers became a matter of concern, study and legislation, it is important to emphasize that other industries productive large amounts of silica dust greatly increased the numbers afflicted. That medical investigators and government chose not to study and make recommendations for all such work sites predisposing its laborers to the same disease certainly delayed an appreciation of its pervasiveness; it is not overstating the case to suggest that a policy of *ignore and delay* was intentional. The *1862-61 Commission Appointed to Inquire into the Conditions of All Mines in Great Britain to Which the Provisions of the Act 23 & 24 Vict. Cap. 15* [Coal] *Do Not Apply with Reference to the Health and Safety of Persons Employed in Such Mines* (hereinafter cited as the *1862-64 Commission*) provides an excellent demonstration of the artful implementation of *ignore and delay*. As I show, it laboriously obtained valuable knowledge only to be lost in the *blue books*. How this came about is a major interest for me. Even as humanitarian impulses became more focused in the mid-century, the impetus to address silicosis waxed and waned. The recognition that both industry and government were obliged to address its devastating potential for early disability and death experience a number of starts and feints.

Diverging Paths: Public Health, Occupational Health and Their Activists

Early in the nineteenth century, government on the rare occasions when it addressed the health of the nation, directed its attention to workers, particularly, women and children. In essence, occupational health was public health. During this period structural environmental alterations was not a public health consideration, rather its focus was the health of some segments of the laboring population. Factory Acts, not sanitation, were the order of the day. Provisions limit the hours of work for children and to provide them with a basic education for children came before Parliament as early as Peel's *Health and Morals of Apprentices Act, 1802*. Like many of its successors, the *Act* was ineffective but it established the state's right to involve itself in the health and welfare of laborers. Peel's Select Committee of 1816 and a House of Lords Committee in 1818 cited the harmful affect of employing children at a very young age in cotton and woolen mills. The *1819 Act* addressed this issue by fixing the age limit for the employment of children at nine years and forbidding work beyond twelve hours for those less than sixteen years of age. Unfortunately, the *Act* did not provide for paid inspectors. In 1830, Richard Oastler described the appalling working conditions and the obvious physical deformations of young children working 12 hours daily in textile factories (without referring to shelter, nourishment, clothing, etc. that were just as easily implicated).[16]. The Tory, Michael

[16] Hamlin, C. (1998). *Public Health And Social Justice In The Age Of Chadwick : Britain, 1800-1854*. Cambridge England ; New York: Cambridge University Press. P.16

Sadler took up this cause and persuaded the *1833 Factories Inquiries Commission* that children exposed to impure air, fatigue, sleep deprivation, prolonged standing and unnatural postures were prone to incurable diseases with high mortality. The *Commission* did not take up poverty. Lord Althorp's *Factory Act, 1833* "became famous not because it granted generous conditions to factory workers but because it contained a provision, lacking in all previous legislation, that a central staff of paid inspectors should be appointed who would be independent of the factory owners and free from local pressure and influence.

The inspectors were empowered to enter any factory, to examine children, to make such inquiries as they thought fit and to initiate such rules and orders, as they considered necessary. Twice a year they met in London to discuss various problems they encountered and to draw up reports that provided Parliament an impartial source of information. Prominent among the inspectors' recommendations were fencing machinery and provisions to safeguard against some health liabilities. The inspectors often exceeded their statutory duties, recommending in the broadest sense the well-being of the workers, but to no avail. [17] Charles Turner Thackrah's revelatory *The Effects of Arts, Trades and Professions and of Civic States and Habits of Living, on Health and Longevity* (1832) appeared at about the same timer but unfortunately, neither his nor the inspectors' findings provoked substantive change. Thereafter, throughout the decade, whatever little assistance the workers received was an unanticipated spin-off of *The Reform Act of 1832* and of Edwin Chadwick's *Poor Law Report of 1834.* The widespread protests precipitated by these events may have motivated some labor legislation as a sop to the disenfranchised and the discontented.

Chadwick had served as Jeremy Bentham's secretary, but his *utilitarianism* favored insuring discipline and order rather than maximizing happiness or extending democracy; in his view, provisions for food, sickness, education or old age hampered trade, the freedom of the labor market and discouraged individual irresponsibility. "One could not have dependency and liberty." [18] Thus, the reason for considering destitution was to reduce its extent. By 1837, Chadwick was more firmly in control of the fortunes of public and occupational health, allowing him to implement his sanitary ideas. He had a fixed notion that inhaling air exposed to corrupting matter, whether rotting corpses, the exhalations of other people already infected, sewage, or rotting vegetation and, perhaps, by extension, dust, caused most, if not all, disease. His annual *Poor Law Commissioner's Reports* (1837-39) unmasked marked health inequalities among the laboring poor for which he proposed eradicating what he considered the causal factor, namely, poverty forced insanitary living conditions that led to disease and to further immiseration. In Chadwick's opinion, the *Poor Laws* were supposed to have abolished environmental disease by taking the deserving poor out of insanitary environments. Later, even this interpretation fell under the rubric of sanitation. Namely, disease caused poverty.[19] The undeserving, impoverished poor posed a greater problem. They were living in conditions that were decidedly not sanitary. As he pointed out in his study, *The Sanitary Condition of the Labouring Population of Great Britain* (1842) their health and that of the public at large necessitated the removal of "noxious wastes" and the cleansing of homes and streets and adequate supplies of untainted water.

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[17] Frazer, W. M. (1950). *A History Of English Public Health, 1834-1939*. London: Ballière, Tindall and Cox. P. 23-7.

[18] Hamlin, C. (1998). *Public Health And Social Justice In The Age Of Chadwick: Britain, 1800-1854*. Cambridge England ; New York: Cambridge University Press. P. 88.

[19] Szreter, S. (1996). *Fertility, Class And Gender In Britain, 1860-1940*. Cambridge, England ; New York: Cambridge University Press. P. 88.

However, he failed to appreciate the personal in the spread of disease. As Christopher Hamlin has pointed out, in the history of public health most of the conditions considered problematic are due to a complex network of causes. However, it usually happens that a single cause in the network is isolated as the problem and in turn the locus of prevention.[20]

The Sanitary Condition of the Labouring Population of Great Britain (1842) placed the blame on environmental circumstances that only government intervention could improve by authorizing. a strong central agency with dictatorial powers, a view that ultimately cost him his job.[21] Furthermore, it indicted local administration for its laggard response to the problem and it mocked the medical profession for its impotence without conceding in the slightest to its curative claims. With respect to making environmental changes, he noted, "the chief remedies… [consisted in] applications of the science of engineering, of which the medical men know nothing."[22] Researched and published at his own expense, seven thousand copies of the *Sanitary Report* was circulated free of charge to every Mechanic's Institute in the kingdom. [23] It "burst on a startled middle-class public… Its sales far exceeded that of any other blue books… and since it was his name alone [Chadwick] which appeared on the title page, to him went the fullness of glory."[24]

Persuaded by the *Report*, Parliament passed the *Mines Act 1842*. It prohibited the underground employment of women and of boys less than ten years of age. Most importantly, the *Mines Act* created the mining inspectorate, the first step in the regulation of unsafe mining conditions. Unfortunately, employers quickly discovered ruses that effectively blunted enforcement. The *Factory Acts* and the *Mine Acts* covered a small segment of the industrial population and many years were to elapse before other industries gained a measure of protection.[25] Moreover, moving slowly because of an apprehension that a mining accident could incriminate *faulty* inspection and saddle the inspectorate with the responsibility, the government waited until 1850 to appoint its first underground inspector, Hugh Seymour Tremenheere. [26] The *Public Health Act, 1848* preceded his appointment. It provided for a General Board of Health and Chadwick became its only salaried member. His friend and associate, Southwood Smith, became its medical advisor.[27] The *Public Health Act* provided for the establishment of local boards of health in any city, town, borough, parish or place having a known or defined boundary in which the number of deaths reported annually exceeded, on the average, the proportion of twenty-three to a thousand of the population. However, the relatively weak State rarely succeeded in establishing local boards (thus becoming a matter of public initiative) and it possessed only a few sanctions to force local boards to pursue their charge. Subsequently, the

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[20] Hamlin, Christopher. "State Medicine in Great Britain" in Porter, D. (1994). *The History of Public Health And The Modern State*. Amsterdam ; Atlanta, Ga.: Editions Rodopi. P.133.

[21] Newsholme, A. (1935). *Fifty Years in Public Health; A Personal Narrative With Comments*. London: G. Allen & Unwin ltd. P. 85-7.

[22] Hunter, D., & Raffle, P. A. B. (1987). *Hunter's Diseases of Occupations* (7th ed.). Boston: Little Brown & Co. P. 212

[23] Chadwick enlisted the help of Neil Arnott, M.D., Southwood Smith, M.D., John Simon, M.D., James Phillip Kay (-Shuttleworth), M.D. and William Farr, M.D. in this endeavor; all of whom became prominent in establishing the cause and prevention of miners' lung disease.

[24] Finer, S. E. (1952). *The Life And Times Of Sir Edwin Chadwick*. London: Methuen. P. 209

[25] Rosen, G. (1958). *A History Of Public Health*. New York,: MD Publications. P.265-6.

[26] Henriques, U. R. Q. (1979). *Before The Welfare State : Social Administration In Early Industrial Britain* (1st ed.). London ; New York: Longman. P. 108-9.

[27] Porter, D. (1999). *Health, Civilization, And The State : A History Of Public Health From Ancient To Modern Times*. London ; New York: Routledge. P. 119.

first report (1849) of the *Health of Towns Commission* noted that while it was interested in all the causes of poor health, the only remedies it would consider were structural—drainage, water, building regulations—which would require minimal legislation. The *Report* assured the dominance of public health and its ultimate separation from occupational health. A second report (1855) held that the key question of whether destitution was the cause or consequence of early morbidity and mortality was moot, since no sanitary improvement could entirely prevent it.[28] Chadwick had prevailed.

The *Public Health Act, 1848* also provided for Medical Officers of Health (MOH). These were medical men having no curative medical duties but responsible only for the health of the community.[29] Chadwick, Southwood Smith and Shaftesbury wrote their job description. All entertained the liberal, rationalist faith in empirical science, as prerequisite tool for discovering how the social organism functioned and, thus, for remedial action.[30] For them remedial action meant sanitary engineering. Sanitation in the guise of public health took precedence over all other matters that might pertain to public and to occupational health. This was the case even as it applied to children.

Chadwick ever critical of the medical profession, encouraged the vestries and districts to offer meager salaries, which limited the number and quality of medical men employed. [31] The duties of the MOH inspectors reflected Chadwick's "sanitary idea." They were to ascertain and report atmospheric pollution in various situations or structures or emanating from any offensive process or trade carried on in any manufactory, yard, house or premises within their district that could prompt the prevalence of a disease.[32] In 1856, the MOH also became responsible for surveying markets, slaughterhouses, dairies, bake houses, workshops of various kinds, and various offensive trades besides nuisances, housing and drainage regulations and for recommending structural changes. The duties of the MOH never included addressing the health and safety of laborers even though they witnessed the devastating affects of occupational diseases in their dwellings. Their duties as defined clearly separated the differing trajectories of public health from occupational health which came to rely on mine and factory inspectors.

Early on, the MOH tended to avoid issues that were potentially too difficult for owners and their surrogates to accept. Their timidity prompted John Simon to urge them to obtain the support of the public by a bold and consistent performance and to make themselves independent of their vestry or district boards, which was reflected their reports were of high quality.[33] The MOH was often the first to call attention to public health problems. Moreover, despite Chadwick's antagonism, the MOH allowed medical men to take part in a new professional venture, namely, government administration and to set themselves up as public health experts.[34]

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[28] Hamlin, C. (1998). *Public Health and Social Justice In The Age Of Chadwick: Britain, 1800-1854*. Cambridge England ; New York: Cambridge University Press. 219-20.

[29] In 1847, Liverpool had independently employed its first Medical Officer of Health (London followed shortly thereafter).

[30] Szreter, S. (1996). *Fertility, Class and Gender In Britain, 1860-1940*. Cambridge, England ; New York: Cambridge University Press. P. 87.

[31] Brockington, F. (1965). *Public Health In The Nineteenth Century*. Edinburgh: E. & S. Livingstone. P. 182.

[32] At the 1860 meeting of the Society of Medical Officers as quoted by Rosen, G. (1958). *A History Of Public Health*. MD Publications P. 209-10.

[33] Hardy, A., & MacLeod, R. M. (1988). Public Health and the Expert: The London Medical Officers of Health 1856-1900. In R. M. MacLeod (Ed.), *Government And Expertise : Specialists, Administrators, And Professionals, 1860-1919.* . Cambridge England ; New York: Cambridge University Press. P. 141.

[34] "Expertise" was not as vigorously defined by Victorians, particularly before the 1880s when there was no meaningful definition even of "professional advisors."… "expertise" could be a quality possessed by

In addition, their duties paved the way for the state to inspect private property when authorized by law to do so. The MOH were active in the Epidemiologic Society and in establishing the public health section of the British Medical Society. They often allied themselves with other health-minded bodies such as the Royal College of Physicians and the National Association for the Promotion of Social Science. As the mid-century progressed, medical officers of health came to concentrate less on preventative measures and more on individuals.[35] Ultimately, their outlook shifted from evangelical charity or social engineering to municipal socialism, town planning, the administration of social welfare and social and biomedical science. However, "the political realities of the local government board—its struggle for funds and staff in competition with other departments and the uneasiness of their prominent citizenry with elements of its structure and charge—made them impotent activists in the cause social medicine. [36] In contrast, early on, mining inspectors were not constrained by the caprice local boards or their economic exigencies but, for both, whatever, the form bureaucracy, self-expression became increasingly limited.

The *Public Health Act, 1848*, had fixed a period of five years duration for the General Board of Health. At its termination, Parliament refused an extension, a move in no small part related Chadwick's dictatorial manner and tactlessness, which had deeply offended local boards. For its part, *The Times* noted the "Aesculapius and Chiron in the form of Mr. Chadwick and Dr. Southwood Smith have been deposed, and we prefer to take our chance of cholera and the rest than be bullied into health."[37] During Chadwick's tenure, the sanitary state of urban areas had improved steadily but he had been unduly optimistic about the favorable effect of sanitary improvement upon the health of the community. He believed that his sanitary measures would have a marked influence upon mortality rates within a comparatively short space of time. Unfortunately, appreciable as these improvements had been, they had not accomplished any improvement in mortality rates. During the period 1841-5, before sanitary reforms, the general death rate in England and Wales was 212.4 per 1000 living and the infantile mortality rate 148 per 1000 births. From 1851-5 were slightly higher at 22.7 and 156 respectively undoubtedly due to the cholera epidemic of 1854-5. Ten years later the mortality rate remained virtually unchanged. Because the Chadwick and his allies had assumed that the main factor influencing mortality rates was sanitation, they made a serious mistake. They had neglected "to consider such other influences as housing, overcrowding, nutrition, hours of work, factory conditions [one may add mining conditions] and the many other environmental factors which affected the life of the individual—indeed the whole complex of influences which the progressive urbanization of the population brought to bear upon each member of the industrial community…Factory conditions [and certainly mines] had not improved in spite of the strenuous efforts to Shaftesbury, Sadler and others."[38]

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administrators or professionals, generalists or specialists. They were notably, but not always, inspectors or advisors… MacLeod, R. M. (1988). *Government And Expertise :Specialists, Administrators, And Professionals, 1860-1919*. Cambridge England ; New York: Cambridge University Press. P.21.

[35] Hamlin, Christopher. "State Medicine in Great Britain in Porter, D. (1994). *The History Of Public Health And The Modern State*. Amsterdam ; Atlanta, Ga.: Editions Rodopi. P.151-2.

[36] Hardy, A., & MacLeod, R. M. (1988). Public Health and the Expert: The London Medical Officers of Health 1856-1900. In R. M. MacLeod (Ed.), *Government And Expertise : Specialists, Administrators, And Professionals, 1860-1919.* . Cambridge England ; New York: Cambridge University Press. P. 132.

[37] Frazer, W. M. (1950). *A History Of English Public Health, 1834-1939*. London,: Ballière, Tindall and Cox. P. 60.

[38] Ibid. Frazer's accomplishments are impressive. He held the following: O.B.E., M.D., M.Sc., Barrister-at-Law, Professor of Public Health, University of Liverpool; Medical officer of Health, City and Port of Liverpool. P. 78-9.

Boyd Hilton and Karl Figlio have noted that medicine during the first half of the nineteenth century was a vehicle or bourgeois principles. It emphasized personal responsibility for illness and tended to absolve the industrial work process. Chadwick's program attributed the sources of poverty either to disease or to ignorance. It did not implicate inadequate wages. This "permitted the anxious middle and upper classes a politically safe, medical discourse with which to attempt to wrestle with the disturbing spectacle of urban suffering and squalor amid their own guilty prosperity."[39] Toward mid-century, however, personal responsibility took on a new meaning. Formerly understood to mean that healthy minds led to healthy bodies by virtue of subduing the body's baser element, *the laws of nature* became dominant. Society and men's minds were subject to the same laws of nature as the physical world. The mind was dependent on the body and underlying physiological and neurological conditions influenced moral and mental aspects of life. [40]

As long as cleanliness meant health and dirt meant disease, the science of hygiene was easily manipulated to include morals as in Watson's *Lectures on the Principles and Practice of Physic* (1843). Here, the point of convergence with medicine is suffering:

It is ours to know in how many instances…bodily suffering and sickness are the natural fruits of evil courses; of the sins of our fathers, of our own unbridled passions, of the malevolent spirit of others. We see, too, the uses of these judgments, which are mercifully designed to recall men from the strong allurements of vice, and the slumber of temporal prosperity; teaching that it is good for us to be sometimes afflicted.[41]

The religious and emotional evangelicalism in the 19th century recognized an uneasy common cause with 18th century rationalism.[42] During the 1830s, several varieties of the evangelicalism significantly influenced efforts to improve the public health. One branch espoused by Shaftesbury saw God as constantly directing earthly affairs by special warnings and judgments. It found no predictability, but a perpetual—and to mortal eyes arbitrary—governance, and presumed that those whom it had pleased God to place in positions of worldly influence should exercise a similar measure of control over society. Although there was no certainty that good works earned salvation this group saw the Lord's work was an indisputable duty. Here character-reformation was necessarily the first requirement for the improvement of material conditions.[43] Although taking an interventionist approach to social and economic problems, this branch of generally envisioned improvement in moral rather than material terms.

Another branch of evangelicalism opposed any interventions to improve social conditions. For this group, behavior predictably influenced one's fortune. In a world beset with temptation, and ordained to confront trial and the exercise of judgment, only "self-help" could assure salvation. God did not require government interference with men's lives, spiritually or economically. Though seemingly paradoxical, these same believers supported emancipation because slavery was obviously incompatible with free will and individualism. Otherwise, this

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[39] Szreter, S. (1996). *Fertility, Class and Gender in Britain, 1860-1940*. Cambridge University Press. P. 88-9.
[40] Hilton, Boyd, *The Age Of Atonement: The Influence of Evangelicalism on Social And Economic Thought, 1785-1865*. Oxford, New York: Clarendon Press; Oxford University Press. (1991). P. 307.
[41] Watson, Thomas. Lectures on the Principles and Practice of Physic (1843) as quoted in Hilton, Boyd, *The Age Of Atonement : The Influence Of Evangelicalism On Social And Economic Thought, 1785-1865*.Oxford, New York: Clarendon Press; Oxford University Press. (1991). P.155.
[42] Hamlin, Christopher. "State Medicine in Great Britain in Porter, D. (1994). *The History of Public Health And The Modern State*. Amsterdam ; Atlanta, Ga.: Editions Rodopi. P.133.
[43] Hamlin, C. (1998). *Public Health And Social Justice In The Age Of Chadwick: Britain, 1800-1854*. Cambridge England ; New York: Cambridge University Press. P. 87.

group was infamously indifferent to issues such bare subsistence wages, inadequate sustenance and housing and other similar social iniquities. Surprisingly, in view of their close association with Edwin Chadwick, James Phillips Kay (Shuttleworth) shared this belief. He was a dissenter, an evangelical and a Whig who was inflamed by religiosity. Author of *The moral and physical condition of the working-class employed in the cotton manufacture of Manchester* (1832) he believed that workers were the victims of social, moral and physical disease for which they might not be responsible. However, this condition did not constitute an error in the cosmic sense because natural events were not arbitrary. Rather they were the outcome of natural laws that could only reflect God's providence, which must not be opposed. Rather, society had to complement God's providence. "Poor laws, factory acts, revolution, or interference with markets would worsen matters. While dehumanized factory hands could not be blamed for their situation…they and not the conditions in which they lived, might still be the proper site of remediation—through countervailing forces, such as spiritual discipline, education, police and sewers." [44]

Southwood Smith, M.D., an Edinburgh trained physician, Unitarian minister, disciple of Jeremy Bentham and close friend of Chadwick had a different, albeit evangelical take. Disparaging the appeal to sin, guilt, retribution, and deliverance, he preached that God's love was a more powerful ingredient than his justice was and a loving God would not inflict eternal punishment. "What can be improved must be improved and will be improved until man in society reflects the benevolent purposes of the Almighty."[45] Smith was able to steer a middle course between his evangelicalism and Benthamism. His utilitarian convictions, like those of Chadwick, incorporated environmental determinism as well as a harmonious creation.[46] Moreover, "there was an ideal system of social ecology (set in natural law or ordained by God and outlined in the Levitical laws of hygiene."[47] As Smith anticipated, any successful campaign for *social benefit* had to include arguments that accommodated evangelical duty, and a utilitarian prescription for improvement. The *Whig Poor Law Amendment Act of 1834* is a case in point. While it was the product of economic and political liberalism emphasizing rational reform, it also suggested a utilitarian impersonal system of relief stressing self-discipline and restraint, and implied an evangelical moral refrain. Others believed that disease was a "product of ill-considered arrangements," but they assumed that as social conditions improved, character would progress automatically. Intense moral suasion was unnecessary." [48] Tories of a liberal bent supported the *Act* as well, marking the end of Tory power-paternalism.[49] However, the

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[44] Hamlin, C. (1998). *Public Health and Social Justice in The Age Of Chadwick: Britain, 1800-1854*. Cambridge England ; New York: Cambridge University Press. P. 76-8.

[45] As quoted in Hilton, B. (1991). *The Age Of Atonement : The Influence Of Evangelicalism On Social And Economic Thought, 1785-1865*. Oxford New York: Clarendon Press; Oxford University Press. (1991). P. 76.

[46] Szreter, S. (1996). *Fertility, Class and Gender In Britain, 1860-1940*. Cambridge, England ; New York: Cambridge University Press.

[47] Hamlin, Christopher. "State Medicine in Great Britain in Porter, D. (1994). *The History Of Public Health And The Modern State*. Amsterdam ; Atlanta, Ga.: Editions Rodopi. P. 146.

[48] Hilton,B *The Age Of Atonement : The Influence Of Evangelicalism On Social And Economic Thought, 1785-1865*. Oxford, New York: Clarendon Press; Oxford University Press. (1991).P.91

[49] Ibid. P. 225-6.

inhumanity of the 1834 legislation appalled High Tories, Tory-Radicals such as Oastler and Bull and the *Young Englanders* such as Disraeli.[50]

Boyd Hilton's argument that the term evangelical covers a range of theological positions and that it would be futile to make the distinction too rigorously applies. "…evangelicalism could hardly have had the impact ascribed to it if it had been confined to those who formally acknowledged the label." Agreeing with G. M. Young, Hilton also emphasizes that morally evangelicalism imposed itself on many who were indifferent or even hostile to its religious basis; nevertheless, it was able to establish a moral hegemony over public life that was out of all proportion to subscribers.[51] Alternatively, perhaps evangelicals did not exert such extended control but merely expressed a similar language deriving from other sources. Either way the ramifications of evangelicalism were widespread and pervasive.[52]

"By the later nineteenth century when the threat of revolution in Britain had subsided and the middle classes felt more secure, public theology gradually softened and more accommodation was sought, both between various religious denominations and with professionalizing sciences." In the 1860s, many influential Church of Englanders recognized the necessity to accommodate to Darwinism and shortly thereafter, the newly developing sciences of electricity and bacteriology substantiated science's contribution to humanity's wellbeing. [53] Scientific materialism was subverting the role of faith in the construction of disease.

However, the medical laws of nature were difficult to define. This was the case especially with regard to disease transmission. Three differing theories that affected the perception of silicosis and its relationship to tuberculosis dominated at various periods throughout the century until after Koch's work in 1883. One version, the contagionist theory postulated that a constellation of weather conditions and local circumstances caused epidemics; the atmosphere itself produces certain diseases capable of spreading as long as that particular pattern persists. A more scientific version of contagion claimed that a specific agent caused epidemics or a particular disease. John Snow's, M.D., F.R.C.S., and F.R.C.P [54] and William Budd's, M.D., F.R.C.S [55] work certainly supported that view, but acceptance was slow. John Simon attempted to incorporate both contagionist and non-contagionist theories: that is, organisms, either discrete or non-specific, caused infectious diseases, but they could only act in conjunction with other elements such as atmospheric states, the condition of the soil or social factors.[56] Even after Koch's discovery, a majority of medical men were convinced that person-to-person spread of a single agent was most contagious in association with environmental changes such as the level of sub-soil water or foul air.

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[50] Hamlin, Christopher. "State Medicine in Great Britain in Porter, D. (1994). *The history of public health and the modern state*. Amsterdam ; Atlanta, Ga.: Editions Rodopi. P.136.

[51] Hilton, B. (1991). *The Age Of Atonement : The Influence Of Evangelicalism On Social And Economic Thought, 1785-1865*. Oxford and New York: Clarendon Press ;Oxford University Press.(1991). P.219

[52] Ibid. P.26.

[53] Pickstone, J. V. (2001). *Ways Of Knowing : A New History Of Science, Technology, And Medicine*. Chicago: University of Chicago Press. P. 49-50.

[54] Cholera is a specific living organism derived from the excreta of the diseased and is transmitted into the alimentary tract by soiled hands, contaminated food and water, 1849 and 1855) Rosen, G. (1958). *A history of public health*. New York,: MD Publications. P. 105

[55] The typhoid agent is found in patient's stools and becomes contagious when hygiene and living conditions are poor. 1856.)

[56] Rosen, G. (1958). *A History Of Public Health*. New York,: MD Publications. P. 288.

Anticontagionists were in the ascendency during the 1850s and they were especially involved in politics. Mostly, they were liberal reformers who, after the failed 1848 revolutions, fought for individual freedom against despotism and reaction and found concrete evidence of democratic repression in the idea of quarantine and its bureaucratic enforcement. Since many physicians were liberal and of middle class background, the infringement on trade that quarantine promised also had its influence. Chadwick, his friend, the physician Neil Arnott and W. H. Duncan, M.D.,[57] Southwood Smith and Virchow were all prominent anticontagionists. Wholly unsupported and improbable as it was, Chadwick's rejection of the theory of contagion, and that of the colleagues he selected, had the quality of a fanatical religious belief. In 1844, Arnott, appearing at the *Royal Commission for Enquiring into the State of Large Towns and Populous Districts*, testified that the atmospheric pollution of decomposing food substances and of bodily impurities collecting in and around dwellings was the chief cause of many of the diseases that impair physical and mental health, and a considerable cause of early death. Duncan also testified that there was a clear link between housing conditions and the outbreak of diseases such as cholera, smallpox and typhus. In 1844, he told the *Commission* that "By the mere action of the lungs of the inhabitants of Liverpool, a stratum of air sufficient to cover the entire surface of the town to a depth of three feet, is daily rendered unfit for the purposes of respiration." Duncan succeeded in convincing the *Commission* that the health of the entire city was in jeopardy. In this formulation, epidemic diseases were not contagious. Rather they exerted their primary and essential condition in an atmosphere that could exist over thousands of square miles and yet affect only particular unwholesomely kept localities. Filth was indispensable; an atmosphere not charged with it was benign. In August 1852, even though the ship's doctor and its passengers attributed a cholera epidemic to the crowded state of the steerage, this theory allowed a medical officer of health inspector to forego quarantine because the ship had previously passed through a stratum of atmosphere charged with the cholera poison.[58] While this theory did not address dust, it seems clear that it applied similarly in miner's lung disease. However, in constructing disease, the social and the scientific are often conflated. Those who did not wish to find the workplace at fault, could fall back on less than rigorous science that was readily accepted by co-religionists, free-traders, as well as contagionists and anti-contagionists..

Although not programmatic, the health of the public as a legitimate concern of the state had its origins in the Enlightenment. The massive transformation from an agrarian to an industrial society early in the 19th century led to massive immiseration and made this concern of much greater moment. A growing population was relocating to hastily built, high density industrializing areas where proximity and the nature of work predisposed them to epidemics and to occupational accidents and diseases, all of which were associated with a devastating mortality rate. Such alterations had to collide with many aspects of society. The success of the *sanitary idea* rested in the Government's realization that the pursuit of self-interest was failing to achieve the utilitarian goal of the greatest happiness of the greatest number.[59] Valuing a scientific and rational organization of the affairs of state, it could not ignore protecting the physical welfare of the community and seized upon structural changes in the environment as the means. This took

[57] W H Duncan was Liverpool's (and Britain's) first city medical officer, and a key member of the Health of Towns Association in Liverpool (established April 1845)Duncan was instrumental in promoting Liverpool's first Sanitary Act in 1846. He worked with the Borough Engineer, James Newlands, to tackle the problems of poor housing and sanitary provision in the city.

[58] Frazer, W. M. (1950). *A History Of English Public Health, 1834-1939*. London,: Ballière, Tindall and Cox. P. 58.

[59] Szreter, S. (1996). *Fertility, Class And Gender In Britain, 1860-1940*. Cambridge University Press. P. 88.

precedence over protecting the health and safety of the laboring poor and silicosis became a low priority. It also spoke to the strong popular desire for economic gain and increased efficiency and to the fact that British politicians of the early nineteenth century were mostly educated in classics rather than natural philosophy. When faced with escalating costs and/or unrest over such matters as the relief of the poor and the containment of epidemics, they were willing to accede to the intellectual authority and their 'reformist' doctor friends. Moreover, they were also mindful that national (and class) interest in improving navigation, agriculture or mining required data collections and analyses to which they turned over to experts. In such ways old institutions were partially converted to analysis, and new institutions, such as the geological survey or the Poor Law Commission, realized the recommendations of the analysts."[60]

However, *Reformist* doctors who took part in these analyses were few in number. In Victorian Britain, *medical science* tended to be the preserve of young doctors, not yet established as consultants, who were eager to win a name as teachers, or to impress professional societies by showing their findings or by importing continental knowledge. They aspired to be *analysts* in a world of experiences (of craft and natural history). By the end of the century, a few such would-be medical scientists had gained salaried posts as anatomists, physiologists or pathologists in medical schools. They included the pioneers of bacteriology—the new form of medical analysis which was taken up by public health doctors…"61 Most medical men were motivated differently than their twenty-first descendents. John V. Pickstone has pointed out "British medicine was dominated throughout the nineteenth century by physicians and surgeons whose chief pride was their lucrative private practices. They did not see themselves as medical scientists; they taught bedside skills that would prove useful when their protégés set up as general practitioners (and referred their difficult, rich, cases to their old masters. The move toward what we would now consider more professional conduct had its beginning in 1832, when some medical practitioners chagrined by the public's poor opinion (and by the call of conscience) and disaffected by the metropolitan medical hegemony, rallied to the Provincial Medical and Surgical Association (and to the British Medical Association, its successor, in 1856). Between 1832 and 1858, these professional organizations attempted to improve the profession's image through public service; however, pressing successfully for Parliamentary action was another matter.[62]

The *Medical Act of 1858* was a major achievement for the profession, setting the stage for educational standards and greater utilization of medical men by the State. It provided an amalgamated medical register of approved medical practitioners. Only these could be eligible for public employment. The *Act* also created the General Medical Council as the overseer of ethical medical conduct.[63] Regrettably, though provincial practitioners attending the mining sick knew best the extent and manifestations of miners' lung disease, the *1862-64 Commission* appointed as consultants, metropolitan *specialists*, not particularly familiar with them. Following their analyses, none of these became activists in the cause of occupational health legislation.

The failure of these *medical elites* to become more politically active related, in part, to their dependency on competing networks of lay patronage and power and whose interests were

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[60] Pickstone, J. V. (2001). *Ways Of Knowing : A New History Of Science, Technology, And Medicine*. Chicago: University of Chicago Press. P. 132.
[61] Ibid. P. 112-113.
[62] MacLeod, R. M. (1988). *Government And Expertise: Specialists, Administrators, And Professionals, 1860-1919*. Cambridge England ; New York: Cambridge University Press. P. 11.
[63] Frazer, W. M. (1950). *A History Of English Public Health, 1834-1939*. London: Ballière, Tindall and Cox. P. 74-5.

organized more fully in opposition to the factory and mine bills. Throughout this study, we shall find that doctors were reluctant to push for changing any industrial production methods that were damaging to health. Even when medicine agreed that some intervention might be necessary, "medical discourse was here caught up in a delicate negotiation with the claims of political economy, or, more crudely stated 'whether it were better that a child should labour twelve hours a-day and be sufficiently fed or ten hours a-day and be insufficiently fed." Moreover, they did not necessarily subscribe to interventions exclusively orchestrated by the State. Despite the moral rhetoric of some of its members, generally, medicine sought to generate a climate of sympathy and to influence a body of enlightened employers rather than to affect the actual process of state regulation, "eschewing partisan commitment to particular solutions." In addition, the impact of medical-moral arguments was constrained by divisions within the profession that made formulating a single, coherent position impossible.[64]

Parliament Considers Protecting Miners

Following publications of Chadwick's *Sanitary Reports,* a number of catastrophic mining accidents stirred the public conscience. Lord Shaftesbury, referring to Chadwick's work, to reports of the inspectors', and to his own belief that underage children were being shunted from the factories to mines, convinced Parliament to convene *the Royal Commission on the Employment of Children in Mines and Manufactures, 1842.*[65] Its ensuing *Report* also showed an "unerring eye for abuses likely to interest and shock a middle-class audience," such as the presence of women in the mines alongside men, all laboring half-naked because of the great heat. It lamented the stunted physiques of children workers, described the lung disease to which they were prone (attributing it to dust), and told of the many accidents they incurred because they were unable to manage ventilatory safeguards. The *Commission's* discoveries confirmed "the full and heartbreaking tragedy which the army of workmen patiently endured before they could voice their protest against conditions which were considered by their masters, and by society at large, as necessary and inevitable."[66]

Coming in the wake of the *Public Health Act, 1848,* the *Report on the State of the Population in Mining Districts* graphically described the truncated lives of miners. The same year, the explosion in the Darnley Main Colliery resulting in seventy-five deaths, further pricked the public conscience. Mine explosions associated with deaths of that magnitude had been relatively rare but with deeper drilling, fire damp explosions had become much more common, Even if these accidents had little effect upon the overall death rate of miners, they underscored the morbid potential of the mining industry. Legislation followed. The *Mine Act of 1850* was the first of a series of enactments relating to the inspection of collieries. The *1860 Mines Act* extended the coverage of the *1842 Mines Act* to iron and ironstone workers but did not include metalliferous miners or quarriers. Like its predecessors, it prohibited the employment of women, restricted the hiring of boys and ordered the constant production of an adequate amount of artificial ventilation to dilute and render harmless noxious gases. This is another example of the

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[64] Gray, R. Q. (1996). *The Factory Question And Industrial England, 1830-1860*. Cambridge, England ; New York: Cambridge University Press. P. 83.

[65] Hunter, D., & Raffle, P. A. B. (1987). *Hunter's Diseases Of Occupations* (7th ed.). Boston: Little Brown & Co. P. 132.

[66] Wilson, A., Sir, M.P., & Levy, H., Professor. (1939). *Workmen's Compensation* (First ed. Vol. 1). London, New York, Toronto: Oxford University Press. P. 15

piecemeal legislation of industries that exposed their workers to the same disease; quarries and metalliferous and mineral mines had to wait their turn. The same situation prevailed in factories.

Prospects for more studies of the health of miners and for legislating on their behalf improved considerably with John Simon's appointment as the medical officer to the Privy Council and then in 1858, as head of the Medical Department of the Privy Council (replacing the General Board of Health). Simon was fortunate that during his tenure, local government began to acknowledge that public health was a problem for which it had to assume responsibility. [67] There is little doubt that given adequate resources and support, Simon would have pursued more fully the study and prevention of occupational diseases wherever they occurred, regardless of gender and age. His reports for 1860, 1861 and 1862, based on E. H. Greenhow's investigations described the adverse conditions of employment affecting women and children in the non-textile trades unprotected by legal protection. In 1861, Parliament authorized yet another *Children's Employment Commission*. It issued its first report in 1863 (while the *1862-64 Commission* was in session) calling special attention to the employment of children in pottery factories at an early age and to the danger to the lungs from dust, particularly in scouring processes and to lead in pottery glazes. The *Factory Act, 1867* brought a number of other occupations under the supervision of the factory inspectors such as blast furnaces, copper mills, iron foundries, copper and brass foundries, and, generally, any factory employing fifty persons or more. However, a large number of exceptions diminished its usefulness considerably.[68] At the same time, the *1862-64 Mines Commission's* recommendations lost their way in the "blue books."[69] The major occupational issues for Parliament prior to 1873 remained child and female labor. In 1873, Dr. Bridges and Mr. Holmes at the request of the Local Government Board investigated the dangers arising from the emission of fine dust, especially in carding areas. Ten years later (1883), Parliament passed an Act requiring the regulation of trades where there was danger from dust.

In contrast to Chadwick, Simon was loyal to his professional colleagues. He had played a major part in drafting the *Medical Act of 1858*. He offered many qualified medical official appointments within the central administration, especially noteworthy since there was no provision for a full-time medical staff. His solution was the appointment of temporary medical inspectors from among the highly qualified medical staffs of the London hospitals.[70] In that regard, as I show, all of the prominent medical men who attended the *1861-64 Commission* had strong professional, if not social ties, to one another. Simon strongly believed that "state craft and medical knowledge should sincerely take counsel together for the Health of the People," a task for which he brought these men, personally known to him together.[71]

The National Association for the Promotion of Social Science (NAPSS), the Epidemiological Society and the London Statistical Society were prominent venues where medical practitioners and politicians encountered one another. Overlapping membership was

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[67] Hardy, A., & MacLeod, R. M. (1988). Public Health and the Expert: The London Medical Officers of health 1856-1900. In R. M. MacLeod (Ed.), *Government And Expertise : Specialists, Administrators, And Professionals, 1860-1919.* . Cambridge England ; New York: Cambridge University Press. P.129.

[68] Frazer, W. M. (1950). *A History Of English Public Health, 1834-1939*. London,: Ballière, Tindall and Cox. P. 104.

[69] The nickname formerly given to a Parliamentary paper. In the 19th century, many of these were issued with a blue cover, and the term was applied to all parliamentary papers.

[70] As quoted by Frazer, W. M. (1950). *A History Of English Public Health, 1834-1939*. London,: Ballière, Tindall and Cox. P. 98.

[71] Ibid. As quoted by Frazer, W. M. from Sir John Simon, *English Sanitary Institutions, Reviewed In Their Course Of Development, And In Some Of Their Political And Social Relations*. P. 7.

substantial in all. Departments of the NAPSS addressed law reform, education, crime, public health, and social relations. George Hastings, son of the founder of the British Medical Association was able to bring many of its members into the NAPSS, and cooperation between both organizations resulted in the creation of the Joint Committee on State Medicine (1867-1881). Though the NAPSS proposed to assist policymaking by replacing political bias with empirical research, in fact, radical liberals and Liberal-Conservatives directed its activities and they were not without bias. Critics of the NAPSS claimed either that any interference into the lives of citizens undermined the whole philosophy of individual freedom or that it did not press for a more expansive "state medicine" having greater powers of intervention and bureaucratic health administration. [72]

Population health was not only an important concern of the NAPSS but of the Epidemiology Society as well. Its membership included prominent politicians and leading figures from the professions such as Lord John Russell, Lord Shaftesbury, William Gladstone, Chadwick, Farr, Southwood Smith, Kay-Shuttleworth, William Guy, and Simon.

The Epidemiological Society of London was another influential group. In 1850, Shaftesbury became its first president. Greenhow was an active member. The Society dedicated itself to the study of diseases of soil and climate.[73]

The London Statistical Society supplied many of the analyses leading to reform. British social reformers were later than were their continental counterparts in taking to statistics, but by the 1830s it became a well-established means for measuring social inequalities by providing facts presented as neutral stated numerically. These activists founded the Statistical Society of London "to institute a rigid examination into the causes and conditions which influence the origin, propagation, mitigation and prevention of epidemic disease, and to give advice to authorities on the best means of prevention." They also organized section F of the British Association for the Advancement of Science. Earlier the British had tended to neglect numerical knowledge because the 'truths' they valued were ethical or even theological, while statistics purported to be apolitical and divorced from theory.[74] The *1832-34 Poor Law Commission* very successfully utilized statistics and it became obvious immediately that this science would prove useful in advancing or substantiating government policy.[75] At about the same time, both Edwin Chadwick's and William Farr's zealous pursuit of social statistics provided convincing numerical evidence instrumental in promoting investigative studies, commissions and committees.

Farr was a talented statistician whose work was vital to legislative moves to improve miner health. In 1829, he went to Paris to study *cutting edge* statistics with Pierre Louis (1787-1872). Louis had been a student of Pierre Simon Laplace (1749-1827). Using Laplace's probability curves, he was able to evaluate the affect of differing therapeutic interventions, ultimately leading to the concept of *double blind* trials. He also provided models for the social statistics employed by Adolphe Quètelet (1796-1784), very likely also in Paris during Farr's sojourn there. Though strongly deterministic Quètelet postulated the *average man* who sets the standard for deviance as it occurs in a particular society and attempted to show that when social

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[72] Porter, D. (1999). *Health, Civilization, And The State : A History Of Public Health From Ancient To Modern Times*. London ; New York: Routledge. P. 76-78.
[73] Ibid. P. 73.
[74] Ibid. 280-2
[75] Poovey, M. (1998). *A History Of The Modern Fact : Problems Of Knowledge In The Sciences Of Wealth And Society*. Chicago ; London: University of Chicago Press. p. 306

conditions change so do the statistics.[76] Not only was Quètelet important in the early Parisian statistical movement, he also played a prominent part in the development of the London Statistical Society in which Farr was particularly active. Like other reform-minded medical men of the 1830s, Farr sought to establish a quantitative medical science that would become an engine for advancing medical knowledge and an instrument for promoting social welfare. In the 1830s, he fashioned statistical tools, which he later used with great imagination, to build a program of health surveillance, research, and public health advocacy. Actuarial methods were a crucial element in this attempt and, indeed, Farr helped establish procedures and standards that have survived in 20th century epidemiology.

Both Chadwick and Farr utilized vital statistics not just to map distributions of life expectancies or marriage rates among the different classes but also to calculate relationships for different classes such as occupation on the one hand, and life expectancy on the other. By calculating relationships, they were able to illustrate clearly how socially structured experiences mediated lives.[77] Another medically important contemporary of Chadwick's and Farr's (especially known to Farr), William Guy M.D. shared their enthusiasm and talent for the use of statistics. Guy was a professor of forensic medicine (1837), an assistant physician at King's College Hospital (1842) and, later, one of the founders of the Health of Towns Association.[78] His legacy is obvious in the *1858 Medical Act*. Very appropriately, he was critical of the insufficient medical knowledge possessed by a majority of physicians and believed them to be excessively practical and preoccupied with individual cases. What is more, he suggested that even the judgment of an experienced physician, the essence of the art of medicine, was really the result of a rough calculation of chances, the type of calculation the numerical method would formalize and make available to inexperienced practitioners.[79] Greater certainty required knowledge of entire groups and of the probability of events. As David Wooten points out, "we might go so far as to say that the statistical table was the first direct threat that Hippocratic medicine had faced in over two thousand years. By 1860 the revolution represented by the table was complete." Ultimately, the statistical approach served to elevate the status of its practitioners to that of bona fide scientist. The scientific achievements of medicine required thinking about life expectancies.[80] It was a considerable achievement gained, in no small part, by the application of the science of statistics to the public health. This achievement tended to alter informed public. Previously it had generally placed great faith in the sciences, but had tended to exclude medicine as a pure scientific endeavor because it offered few cures. It continued to offer few cures but prevention had become a better bid.

The Journal of the Statistical Society urged that "statistical data must constitute the raw material for all true systems of economy and legislation, local and national" and it quickly became standard to conduct surveys preliminary to taking an action.[81] Initially statistics was a

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[76] Porter, R. (1997). *The Greatest Benefit To Mankind : A Medical History Of Humanity From Antiquity To The Present*. Hammersmith, London: HarperCollins. P.312-3

[77] Abrams, P. (1968). *The Origins Of British Sociology, 1834-1914; An Essay With Selected Papers*. Chicago: University of Chicago Press. p.17

[78] Porter, R. (1997). *The greatest benefit to mankind : a medical history of humanity from antiquity to the present*. Hammersmith, London: HarperCollins.

[79] Eyler, J. M. (1979). *Victorian Social Medicine: The Ideas and Methods of William Farr*. Baltimore: Johns Hopkins University Press. P, 31.

[80] Ibid. as quoted by Robert Woods from David Wooten's Bad Medicine: Doctors Doing Harm since Hippocrates (2006). P. 485.

[81] Quoted by Cullen from Journal of the Statistical Society of London May 1838. Cullen,

tool employed by political economy, a "science of states," rather than to a subdivision of mathematical logic. The ideological thrust of political economy was critical; it focused analysis of social progress as an index to the progress of the nation. It measured progress in terms of the distinct experience of class if only to show, contrary to appearance, that all classes were sharing in the progress of the nation.[82] Obviously, this was not the case; what appeared to be real was factual and the problems that quickly surfaced were social and only related to the political economy peripherally. Moreover, as we shall find in the next chapter, it did not take long to determine that numbers were endlessly susceptible to manipulation by self-serving arithmeticians and infinitely useful to governments that wanted to give the appearance of insulating policy from the kind of *a priori* interestedness associated with party politics.

By undertaking the civil registration of births, deaths, and marriages, the General Record Office (GRO), organized in 1836, became the linchpin for a substantial advance in British statistical information.[83] Before the 1840s, one could not be certain if life expectancy varied regionally or with local environment. In fact, until the large-scale information collected in the 1840s, even bills of mortality, amassed and stored locally since 1662, were not sufficient for the formulation of life tables. One could not even be certain if life expectancy varied regionally or with local environment.[84] The registration system devised by Farr and his successors at the General Register Office mirrored a particular medical view of what was wrong with the world. It emphasized certain age groups, places, occupations, causes of death, and it constructed categories for analysis such as 'healthy districts, zymotic diseases' and 'social classes' ".[85] As Robert Woods has pointed out, "places, epidemics and politics are inter-linked and the recognition of these situations prompted a variably appropriate response from government.[86] Farr was one of the first to employ geographical analyses for epidemiologic use by showing death's predilection for unhealthy environments. Deriving his statistics subsequent to the census of 1851 in order to determine how occupation might influence health, he chose a number of districts with a heavy mining population and determined their rate of mortality in deciles. Previously he had determined the mortality in the healthiest districts of the country and so had a standard for comparison. The statistics he compiled overwhelmingly supported the claims that metalliferous mining claimed a heavy toll of early impairment and death, and supported siliceous dust as the culprit.

Medical Witnesses and The *1862-64 Commission on the Condition Of All Mines In Great Britain To Which The Provisions Of The Act 23 & 24 Victoria Do Not Apply*

Greatly indebted to Farr's work, Dr. John Simon, chief of the Medical Section of the Privy Council, initiated a study (1858) of the high morbidity and mortality found in certain

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M. J. (1975). *The Statistical Movement In Early Victorian Britain : The Foundations Of Empirical Social Research*. Hassocks Eng. Harvester Press ; New York Barnes & Noble. P. 8

[82] Abrams, P. (1968). *The origins of British sociology, 1834-1914; an essay with selected papers*. Chicago: University of Chicago Press. P. 17

[83] Other government entities important in gathering statistical information included the Board of Trade, the War Office and the Admiralty, and the Poor Law Commission, the Home Office and the Privy Council Committee on Education.

[84] Poovey, M. (1998). *A History Of The Modern Fact: Problems Of Knowledge In The Sciences Of Wealth And Society*. Chicago ; London: University of Chicago Press. P. 306 and p.281-84.

[85] Woods, R. (2006). Medical and Demographic History: Inseparable? *Soc Hist Med, 20*(3), 483-503. P. 488-9.

[86] Ibid. P. 480

occupations. Quickly appreciating a great disparity in mortality from one district to another, he commissioned Edward Headlam Greenhow, M.D. to calculate the mortality from a given disease in a limited number of districts for the year 1841, but quickly added another one hundred and five registration districts and extended the study for the years 1849-50. In this endeavor, Farr had generously shared his statistical reports for the years 1849-53, the data from the 1851 Registrar of Deaths (listing by age grouping those who died of lung disease), his corresponding calculations based upon the census of 1861, and the Death Registers of the years 1860-2. Greenhow verified that life expectations at different ages varied according to occupation, wealth and hygiene. Most importantly for this study, he showed that pulmonary diseases, including phthisis, were the cause of almost a quarter of the annual mortality of England and that pulmonary phthises were responsible for more than 50,000 annual deaths. Of these, significant numbers of deaths were non-tubercular especially among laborers in certain occupations.[87] When he compared the death rates from all pulmonary diseases suffered by the male population above the age of twenty, the local death rates ranged from 66 to 869 per hundred thousand and the high death rates in this category depended on employment in particular occupations. He identified two types of work, which were especially harmful: those that caused mechanical irritation of the air passages by the diffusion of considerable amounts of metallic or earthy particles (tin and copper mining or flax-dust or cotton or woolen fluff) and those that exposed workers to abrupt changes in temperature. However, he believed that particulate matter was the predominant influence. In 1860, Simon again asked Greenhow to investigate and report on those areas of the country where there appeared to be an excess of phthisis. Those working in dusty occupations such as mining suffered the greatest toll.[88] However, like Calvert Holland in 1843, he also confirmed the high incidence of phthisis among grinders as well as many others employed in dusty trades.[89] Greenhow's findings were published as *Papers relating to the Sanitary State of the People of England*[90] in which he enunciated a truth which public health as it was then practiced ignored (much to the detriment of occupational health): "Anyone who will candidly consider what are the possible meanings of those differences of death-rates, can arrive, I think, at only one conclusion. The diseases which are known to prevail in different districts with such surprising degrees of inequality are eminently the diseases which can be prevented."[91] Greenhow's *Papers* bears out the case that as late as 1860, the medical section of the Privy Council, the forerunner of public health agency, did not separate occupational diseases from its purview.

Simon presented Greenhow's mining report to both houses of Parliament. A change of opinion had occurred in the eighteen-fifties, the retaliative principles of the previous decades were beginning to give way to a new and more indulgent approach to social reform. As Kitson

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[87] Tuberculosis had been identified as a specific disease by prominent members of the Paris school, Laurent Bayle (1774-1816) and, especially, René Laennac (1782-1826). Laennac established on autopsy examination that tubercle formation preceded symptoms and pulmonary auscultatory findings in not only the lungs but in lymph nodes, the larynx. Johann L. Schoenlein (Zurich) had named this form of phthisis, tuberculosis (1839) since tubercle formation seemed the initiating cause. It was not until 1882 that Robert Koch identified the etiologic agent, the tubercle bacillus and it was not until 1890 that he conclusively established it as the specific cause.

[88] Simon, J. (1860). *Third Report of the Medical Officer to the Privy Council* (No. 3). P. 117-8

[89] Holland, G. C. (1843). *Diseases of the lungs from mechanical causes; and inquiries into the condition of* the artisans exposed to the inhalation of dust. London: Churchill.

[90] Greenhow, Edward Headlam. *Papers Relating to the Sanitary State Greenhow, Edward Headlam.* P. *Papers Relating to the Sanitary State of the People of England, London 1858*. 1st ed. Farnborough, Hants.: Gregg, 1973.

[91] Quoted from Greenhow, "On the Standard of Public Health for England" in Newsholme, A. (1935). *Fifty Years In Public Health; A Personal Narrative With Comments*. London: G. Allen & Unwin ltd. P. 43.

Clark noted, "the tone of England became gentler" Why this change occurred when it did is not easily determined but some, at least, believed that change was necessary in order to regulate the poor, or to reward them for "settling down" after the Chartist challenges. In any event, the legislature became much more receptive to schemes for the improvement of sanitation, housing, conditions of work, and treatment of the insane and of criminals. It also embarked on a program streamlining both the apparatus of the state and it legal underpinnings.[92] It was in this more receptive arena that Simon effectively described "the great sacrifice of human life and the increase of human suffering in places which have a high death-rate, the loss entailed on the community by excessive sickness, the constant and necessary attendance of a high mortality, and by the deaths of parents prematurely cut off, leaving families to be maintained at the public charge."[93] The Home Secretary was persuaded to endorse further investigation of the hazards involved in this type of mining on grounds of necessity and economy for which the *1862-64 Commission on the Condition Of All Mines In Great Britain To Which The Provisions Of The Act 23 & 24 Victoria Do Not Apply* (coal mines) was created. Nevertheless, sanguine hopes had to be tempered by the continued aversion to increased state intervention and public spending.

The *Commission* sat from 1862 to 1864. Royal commissions were popular parliamentary adjuncts during the Victorian era. Known as *command papers* because Parliament received them at the command of the monarch, royal commission reports examined various aspects of British society in meticulous detail. Published as blue books, the press summarized them but the public could purchase them as well. The entire process was impressive and expensive. Even usually critical foreign neighbors conceded British excellence in this endeavor. Commissions had the authority to summon witnesses and to take evidence under oath. They were a form of inquiry appealing, for different reasons, to Whiggish Benthamites, Liberal free-marketers and paternalist Tories. While future politics revolved more clearly around social issues, during the period of this *Commission*, the power of accumulated knowledge and the will to use it was gathering momentum and the distance was narrowing between the high politics of cabinet and parliament and the low politics of local interest and activism. Increasingly, debates in Parliament were occurring in an atmosphere of pointed criticism of its inefficiencies. Moreover, greatly anticipated reforms forced convening Royal Commissions more frequently since they allowed the liberal state to make it visible and very likely served to feed, perhaps manage, public debates.[94] When deemed expeditious, commissions provided a quick temporary fix for removing contentious issues from the parliamentary table while at the same time serving to pacify, at least temporarily, those agitating for the redress of perceived injustices. By nature, commissions were invasive vehicles for categorization on a number of levels and thus a step in the process of social control.[95] However, once acquired, the information was not necessarily welcomed nor was it always obvious how to deal with it. Their work completed, commissioners often considered that the conditions uncovered were necessary, inevitable and pointless to modify. Their recommendations often failed to initiate adequate legislative action. This situation prevailed even after the 1850s when the goal of social scientists and humanitarians was social unity.

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[92] Hilton, B. (1991). *The Age Of Atonement : The Influence Of Evangelicalism On Social And Economic Thought, 1785-1865*. Oxford New York: Clarendon Press; Oxford University Press. P.268.

[93] Greenhow, E. H. (1973). *Papers Relating To The Sanitary State Of The People Of England, London 1858* (1st ed.). Farnborough, Hants.: Gregg. p.16-17

[94] Frankel, O. (2006). States Of Inquiry: Social Investigations And Print Culture In Nineteenth-Century Britain And The United States. Baltimore: Johns Hopkins University Press. P. 40.

[95] Gray, R. Q. (1996). *The Factory Question and Industrial England, 1830-1860*. Cambridge, England; New York: Cambridge University Press. P. 69

Not unlike many other commissions, the *1862-64 Metalliferous Mines Commission* was thorough to the point of tedium. On the other hand, it demonstrated greater reliance on the expert testimony of medical men than previously, a sign of increasing respect for their special knowledge. After the medical reforms of 1858, the medical profession, for its part, was eager to arbitrate not only *facts* but to act as an appropriate agency to frame legislation relating to matters of public and occupational health, usually, however, for the benefit of the profession. In this regard, the *1862-4 Commission* drew on the expertise of a very small cadre of physicians and surgeons who, by virtue of professional ties and friendship constituted themselves as authorities in the emerging and diverging fields of occupational medicine and public health.

Of those who came to be recognized medical authorities on miners' lung disease, in part the result of serving the *1862-4 Commission*; it is ironic that Chadwick, no friend of the medical profession, should have played a significant part in establishing the reputations of Neil Arnott, Southwood Smith, Farr, Kay Shuttleworth and Simon. Certainly, he never yielded in the slightest to any claims of medical curative power and remained certain that "the chief remedies… [consisted in] applications of the science of engineering, of which the medical men know nothing." [96] At the time, Chadwick was not entirely wrong. As David Wooten (*Bad Medicine*) has suggested, medicine prior to 1865 was largely a matter of failure. Arguably, the turning point was the recognition of Joseph Lister's breakthrough among health professionals and in hospitals.[97] Even more ironic was Chadwick's unintentional role in transforming public health and its offspring, occupational health, into medical specialties. Although by his continuing influence on his protégées in public health and in government, he did succeed in vitiating occupational health by alienating it from public health and. At this juncture (1862-64), however, all of Chadwick's medical confreres and their associates were prominent in the proceedings of the *1862-4 Commission*. They all shared similar pursuits and training, membership in the same organizations and attendance at the same hospitals. Chadwick, Southwood Smith, M.D. (1788-1861) and Neil Arnott, M.D. (1788-1874) became friends when Chadwick was a law student. Arnott later became a well-known sanitarian and the author of *"On the fevers Which Have Prevailed in Edinburgh and Glasgow*" that appeared in the House of Lords report, *Sanitary Condition of the Laboring Population, Local Reports for Scotland, 1842*. He may have encouraged Chadwick to press for Farr's appointment to the GRO. Arnott along with Farr and Simon had served on the Scientific Committee appointed by the General Board of Health to investigate the cholera epidemic of 1853-1854. Southwood Smith, like Chadwick, was a former secretary to Jeremy Bentham. His position in the London Fever Hospital gained him recognition as an expert on febrile illnesses. Moreover, his views on preventing disease by mechanical means such as ventilatory devices were well known. He was very active in establishing organizations such as Health of Towns Association and the London Epidemiological Society. Smith was responsible for authorizing the drawings that appeared in the very important *Children's Employment Commission, First Report, 1842* detailing their marked susceptibility to accidents, disease and early death. He argued that Members of Parliament who might think themselves too busy to read the text of the report would turn over its pages to glance at the illustrations and convince themselves the darker side of industrial life. Arnott, Southwood Smith, Farr, Kay-Shuttleworth and Simon were well acquainted with those "experts" who advised the *1862-64 Mining Commission*: Greenhow, Peacock, Taylor, Bankart, Robert Angus Smith and Bernays.

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[96] Ibid, quoted by Finer, S. E. (1952). *The Life And Times Of Sir Edwin Chadwick.* London: Methuen. p.218

[97] Woods, R. (2006). Medical and Demographic History: Inseparable? *Soc Hist Med, 20*(3), 483-503. P. 484.

These men, in turn, maintained relatively close professional, if not social, ties. Moreover, they were all aware that there was a direct connection between certain physical conditions and disease and that the diseases were preventable by the removal of these conditions.[98]

Simon had been lecturer in pathology at St. Thomas's Hospital (1847). This situation brought him into contact with most of the medical advisors with whom we are concerned in this chapter. It was a position that proved very advantageous as the first medical officer of health for the City of London in 1848. He was well liked and acknowledged a great leader and teacher.[99] Southwood Smith (1788-1861) and Neil Arnott (1788-1874) had been medical students together. Both James Phillip Kay-Shuttleworth (1807-77) and Peacock trained at the University of Edinburgh. Kay-Shuttleworth had called public attention to the execrable sanitary conditions prevailing among the Manchester laborers employed in cotton manufacturing. Edward Headlam Greenhow, the only medical commissioner on the *1862-64 Commission*, trained in Scotland (Aberdeen) and settled in London. In 1853, he became lecturer in public health at St. Thomas Hospital, the first such chair in the United Kingdom. In 1861, he became assistant physician and lecturer on public health and medical jurisprudence at the Middlesex Hospital. Thomas Bevill Peacock, M.D., a principal investigator for the *1861-64 Commission*, also served as assistant physician to the staff at St. Thomas's and at the London Hospital for Diseases of the Chest. He was a founding member of the Pathological Society of London (1846) at which he and Greenhow presented papers on the pneumoconioses. Dr. Bernays, another principal researcher for the *1861-64 Commission*, assisted in the chemical laboratory at St.Thomas's. Another investigator, Alfred Swayne Taylor, F.R.C.S., trained at the then united hospitals of Guy and St. Thomas, as did Farr and Bankart. Isambard Brunel had employed Taylor to test the air in a tunnel under excavation in the Thames to determine whether it produced illness. He concluded that some areas of the tunnel contained excessive amounts of carbonic acid that appeared to occur when there was no free communication with the atmosphere. His public reputation rested upon his appearance as an expert witness, taking account of legal as well as scientific criteria, especially utilizing chemical and anatomical data and in so doing, he established forensic toxicology as a medical specialty[100]. Bankart, also a consultant for the *1862-64 Commission* had been Taylor's student and was a demonstrator of anatomy at Guy's. On the separation of Guy's and St.Thomas's hospitals, he attached himself to Guy's, training with Astley Cooper, and later becoming professor of medical jurisprudence (1831) and lecturer in chemistry at the same institution (Farr was a regular attendee of the Clinical Report Society at Guy's Hospital). Bankart's emphasis on carbonic acid as an agent of miners' lung disease may have reflected the influence of Taylor. However, Bankart also thought that particulate matter was a cause as well. All of the above actively participated in professional and public-spirited organizations: the Statistical Society (Lyon Playfair, Farr, Chadwick), the Pathological Society of London (Arnott, president 1855; Peacock, president 1865; Simon and Greenhow), the National Association for the Promotion of Social Science (Farr, Simon, Chadwick), the Chemical Society (Robert Angus Smith, Playfair, Taylor), the Health of Towns Association (Playfair[101], Simon, Robert Angus Smith) and the Epidemiological Society (Simon, Southwood Smith, Greenhow).

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[98] Finer, S. E. (1952). *The Life And Times Of Sir Edwin Chadwick*. London: Methuen. p.160

[99] Smith, G., & Lee, S. (1912). *The Dictionary Of National Biography 1901-1911*. London: Oxford University Press. P. 316.

[100] Coley, N. G. (1991). Alfred Swaine Taylor, MD, FRS (1806-1880): Forensic Toxicologist. *Medical History, 35*(4).

[101] Sir Lyon Playfair (1818-1898) studied medicine at Glasgow and Edinburgh but never took a medical degree. He served as a Liberal Member of Parliament where he was a consistent advocate of the medical profession, most

The collegiality and common interests of all the *expert* witnesses very likely assured the promotion of one another in hospitals, on committees, in medical journals, and in various organizations in which they were members. It assured the invitation of those interested in cardio-pulmonary physiology and diseases to serve the *1862-4 Commission*. Importantly for their reputation, their mutual support such allowed for the establishment of centers of particular disciplines at the institutions that they staffed, creating a power nexus that jointly or individually laid claim to significant authority over the scientific investigation of public and occupational health concerns. These *experts* were self-constituted. Self-constituted is not meant to disparage the extensive knowledge acquired. Still, they had little or no experience of the mines or of treating miners' lung disease. Certainly, the medical doctors serving the mining communities had a better understanding of silicosis and a greater claim to expertise, and very few of their patients ever went to metropolitan centers where the *experts* might have studied their illness more intensively. The local practitioners who treated their diseases were economically disadvantaged due to meager fees for services in an overcrowded profession, existing as a professional proletariat distant from metropolitan medical elite and distant from them socially and with respect to continuing medical education. [102] Knowing that they were looked down upon, these local practitioners increasingly rallied to a society and to publications that spoke more directly to their needs: the Provincial Medical and Surgical Association created in 1832, later to become the British Medical Association and *The Lancet* and *The British Medical Journal*.[103]. In the future, these same practitioners stood to gain from the enactment of employers' liability and workers' compensation laws, but for a long time were prevented from doing so by powerful medical societies. In the present period, employers' liability and workmen's compensation were not contemplated nor were medical men ever in the vanguard of promoting such legislation.

The Chairman of the *1862-, 4 Commission*, George Kinnaird's (1807-1878) a Scotsman, was closely associated with Ricardo, Cobden and Bright. His principal legislative work was the closing of public houses on Sunday, but he also had been keenly involved in founding and maintaining reading rooms and free libraries in and around his estate, starting industrial and night schools for ploughmen, and in attempting the reclamation of criminals, especially juvenile delinquents. He had had a long interest in regulating the hours of employment permitted children working in mines, both in order to allow time for an elementary education and to protect their health. This interest brought him in touch with the medical profession early in has career. Almost certainly, he would have read and approved Greenhow's *Report of the circumstances under which there is excessive mortality of young children among certain manufacturing populations* submitted in 1861. Kinnaird was also interested in the abatement of smoke nuisance that would have predisposed him to favor dust and gas control in the mines. [104] Given Kinnaird and Greenhow's mutual interests, it is not surprising that Kinnaird appointed him the *1862-64 Commission*. He was the only medical commissioner. The *Commission* believed it their duty to obtain information about every fact with possible influence on prolonging or accelerating

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especially in its goals for public health. Robert Angus Smith became his assistant when he was professor of chemistry at the Manchester Royal Institution.

[102] Digby, A. (1999). *The Evolution Of British General Practice 1850-1948*. Oxford ; New York: Oxford University Press.

[103] MacLeod, R. M. (1988). *Government and expertise : specialists, administrators, and professionals, 1860-1919*. Cambridge England ; New York: Cambridge University Press. p.11

[104] Stephen, L., & Lee, S. (1885). *Dictionary Of National Biography*. London: Smith Elder & co. P. 191.

miners' lung disease.[105] In this endeavor, the *Commission* appears to have relied heavily on Greenhow for the selection of "expert medical" witnesses and to have willingly authorized the investigations he recommended. Given his many associative links, it was an easy task. The *Commission* also questioned mining captains and agents (responsible for employing and supervising miners), owners, miners themselves and doctors employed by the owners or mine clubs. Among the subjects addressed were the mode of working the mines, the wages of the miners, the character and sufficiency of their food, their social habits, the state of their cottages, the mine clubs and doctors, the early employment of children and the working of mines by joint stock companies.[106]

Farr's appearance early in the course of the *Commission* set the elevated tone of the proceedings. His ongoing statistical work had gained him a deservedly great reputation and considerable influence. Farr's testimony was appalling. In 1851, he had launched a study measuring how occupation influenced health by comparing the living at each age and the deaths at each age and then determining the rate of mortality in deciles. He selected miners because they represented a well-defined occupation. Choosing a certain number of districts with a heavy mining population, he abstracted the birth and deaths of miners. Previously he had determined the mortality in the healthiest districts of the country and thus had a standard for comparison. In order to accumulate a certain mass of facts, he studied the metal mining Cornish districts as a single entity. He also studied coal miners in Durham, Northumberland and Wales and in the Staffordshire districts.

Because some districts registered pulmonary deaths as consumption, and other districts as asthma etc., Farr felt it was best for statistical purposes to throw all the diseases of the lungs into one class under the general name of *pulmonary disease*. This arrangement enabled a more accurate comparison of the rates of mortality from disease of the lungs in different districts than if the several diseases of these organs were separated nominally. Farr's classification thus comprised under one heading phthisis, laryngitis, bronchitis, pleurisy, pneumonia, asthma and deaths from these causes were simply listed as *pulmonary disease*. The mortality among Cornish metalliferous miners from ages 15 to 35 was no higher than the mortality of the rest of the population in their districts, or of the rest of the population of other counties of England. After the age of 35, however, the mortality among the Cornish miners rose precipitously. Those not engaged in mining but living in those districts where mining was a major industry had a mortality rate of about 10 in 1000; among the miners it was 14 in a 1000 increasing to 34 in a 1000 from age 35-45 without any significant increase in the non–mining population. From 55-65, it was 24 in the non-mining population, and 63 among the miners. After 65, the number of men still working in the mines was trivial. The mortality of children under 15 years in Cornish mining communities was less than the mortality in Norfolk, an exemplary agricultural area. Under the age of five, the mortality of the male children in Cornwall was 55 per 1000 and of the male children in Norfolk 65 per 1000. The above indicates that the districts themselves were healthy, and that the air outside of the mines was not injurious to health. Similar statistics applied to women. The health of women and children (not working in the mines) proved much lower in Cornwall than in the industrial areas. In fact, the southwestern counties were among the healthiest in England. Farr concluded that whatever may be the cause of the mortality among the

[105] P.P. Royal Commission, (1864). *Report of the Commissioners Appointed to Inquire into the Conditions of All Mines in Great Britain to Which the Provisions of the Act 23 & 24 Vict. Cap. 151 Do Not Apply with Reference to the Health and Safety of Persons Employed in Such Mines*.Cd. 3389 vol 24 P. vii-viii.
[106] Ibid. P. vii-viii.

miners, it is not in the situation above ground or in the general sanitary condition of the people.[107]

Analyzing the above statistics somewhat differently, Farr assumed the rate of mortality among the males exclusive of miners at each period of life to be 100. This method showed that the mortality among the miners was 114 between the ages of 25 and 35, 186 between 35 and 45, 455 between 45 and 55, 831 between 55 and 65 and 430 between 65 and 75. Pulmonary disease was the chief cause of the excess of mortality among the Cornish miners. Since younger mining men did not show a greater mortality, he concluded that either miners' lung disease progressed very rapidly after onset or that, if encountered early in there careers, progressed very slowly. "A much greater discrepancy will be observed between the rates of mortality from pulmonary disease among the miners and non-miners than has been shown to exist between the rates of mortality from all causes among the two sections of the population respectively. This is undoubtedly due to the fact that exposure to the peculiar evils incident to their occupation causes many miners to die of pulmonary diseases who in different circumstances would have died of other complaints."[108]

Cornwall was generally a healthier environment than other counties where mining was extensive. Nevertheless, there were distinct mortality differences between the coal and metalliferous district, being much greater in the latter areas. Because the mortality from cholera in Cornwall during the years 1848-1853 was high in the coal mining areas and low in the metalliferous areas, Farr believed metalliferous miners' lung disease was not dispersed through water and "putrefying excrement. Although he could not describe the most favorable conditions for longevity, the mean duration of life for males in the healthy districts was 43 years while the mean duration of life among Cornish miners was 35. In all England it was 39 years, including the large towns save for the Durham and Northumberland mining districts where it was 42 years. Twenty eight and three quarter's percent (28 ¾ %) of all the deaths in England among males above 15 were from lung disease but the death rate was nearly twice as great (56%) among Cornish miners. In Staffordshire the mortality was 26 ½%, , and, in Merthyr, South Wales, it was 30 ½%. It was only 19 ½% among Durham miners. Farr attributed part of the excessive mortality of the Staffordshire and Merthyr districts to poor sanitary conditions. That the Durham and Northumberland miners were chiefly colliers and because their age of death was older, led Farr to conclude that coal miners were relatively exempt from consumption. He attributed this difference to the mines in these areas being relatively well ventilated, free from gritty dust and gunpowder smoke. Temperatures in these mines also tended to be relatively steady and miners did not have to climb high ladders. He believed that the iron miners of Ulverston and Cleveland, and the Salt Miners of Cheshire were comparatively free from lung disease for the same reasons.

If the Cornish miners enjoyed a similar exemption from these causes of death, the average duration of their lives would be considerably greater instead of considerably less than that of other Englishmen… It will be remarked that at all ages between 25 and 65 the proportion of Cornish Miners who die from other causes than consumption and lung disease is small, and if the death rate from those diseases were the same as it is amongst the Miners of Durham, the

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[107] P.P. Royals Commissioners. (1864). *The Epitome of Statistics and Evidence by Dr. Farr, M.D., F.R.S., Chief of the Statistical Department in the General Register Office with Reference to the Health and Safety of Persons Employed in Such Mines.* Cd 3389 vol.24, Para. 19707.

[108] P.P. Royal Commission (Witnesses) (1864). *Epitome of Evidence Taken Before the Commissioners to Inquire into the Conditions of All Mines in Great Britain to Which the Provisions of the Act 23 & 24 Vict. Cap. 151 DoNotApply with Reference to the Health* Cd 3389 vol.24 *and Safety of Persons Employed in Such Mines. London: Houses of Parliament by Command of Her Majesty*. Cd 3389 vol.24 P. x-xiii.

death-rate would be considerable below the average, notwithstanding the greater liability of Miners to fatal accidents, which is considerable, though very much less than that to which Coal Miners are exposed." [109]

When Farr was questioned whether miners' consumption was like ordinary consumption, he responded negatively, noting that consumption among miners was so well characterized that miners themselves called it miners' consumption.[110]

Drs. Peacock and Bankart, whom the *Commission* had employed directly, confirmed Farr's work. Their charge was to examine a great number of working miners at the work site and at their dwellings. Peacock and Bankart's investigative methods were similar. Peacock studied 83 miners who were ill and unable to work and 500 who continued to work. Bankart randomly examined 150 miners (introduced by local medical men) in their houses, as they went to and from work, while underground, or at the surface as they came up from the mine. The large majority of these miners suffered respiratory diseases such as chronic bronchitis, broncho-pneumonia, and emphysema, in all stages of severity. Additionally, they examined those disabled by sickness of various kinds, those who though ailing were still able to attend to their work, and those who were in comparatively good health. Both interviewed local practitioners treating miners as well. Peacock described one of them, Dr. D. Ewart, the resident medical officer of the London Company at Middleton in Teesdale, as "medical man of great experience in the diseases of miners." As was true for many of the informants interviewed by Peacock and Bankart, Ewart said that the lead miners in the districts of Alson, Nenthead, Allenheads and Weardale complained of much *stour* or dust created by blasting and boring in shales of sandstone and beds of limestone (siliceous rocks). "Some say that the 'stour' is worse than anything else." [111] Ewart agreed and attributed the miners' lung disease to excessive dust inhalation, especially when the air was dry. Previously he had published a case in which, after prolonged indisposition, cough, expectoration, difficulty of breathing, etc.., a piece of sandstone as large as a pistol bullet, which had apparently formed in one of the large bronchi by the accretion of sand particles, was expectorated by a miner. After the escape of the mass, the bronchitic symptoms had been relieved.

Peacock and Bankart were disappointed at not having participated in more postmortem studies but they recognized that the prejudices of the surviving relatives against such examinations were very likely too strong to overcome. In fact, they had only succeeded in autopsying the body of a one miner registered as dying from "miners' consumption." They found evidence of old inflammation in all the tissues of the lung, which was firm, solid, and black. In other portions, cavities had formed by its disorganization while the pleura had become a dense

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[109] P.P. Royal Commissioners. (1864). *Appendix to Report of the Commissioners Appointed to Inquire into* the Condition of Mines in Great Britain London: Houses of Parliament. cd. 3389 vol 24 P. 154-71. Para.19,689-19,757.

[110] P.P. Royal Commissioners, (1864). *The Epitome of Statistics and Evidence by Dr. Farr, M.D., F.R.S., Chief of the Statistical Department in the General Register Office (1864). Epitome of Evidence Taken Before the Commissioners to Inquire into the Conditions of All Mines in Great Britain to Which the Provisions of the Act 23 & 24 Vict. Cap. 151 Do Not Apply with Reference to the Health and Safety of Persons Employed in Such Mines. 70.204 London: Houses of Parliament by Command of Her Majesty. London:* cd. 3389 vol 24 P Para 19,7366..

[111] For example, free silica is also dispersed in the air and inhaled by workers engaged in the mining of copper, tin, lead, iron, zinc, bismuth, antimony hard coal, and gold, and in cutting granite, and others of lesser note and in sandblasting, and in the manufacture of silica abrasives. Northern mines were generally worked in the harder crystalline rocks, and therefore, were probably less dusty.

fibrous mass. Importantly, they commented on the absence of tubercular disease.[112] Later, the conflation of silicosis with tuberculosis would significantly affect research, prevention and compensation. They also regretted that the medical men connected with the mines had not engaged in more research into the causes and nature of miners' lung disease; namely, by investigating the localities and the air in which the men worked and by performing more postmortem examinations.

Peacock found that if miners began working underground in the early period of life, their subsequent decay was premature. "Experience shows that when persons in early life are exposed to injurious influences they suffer from them more severely, and earlier fall under their influence, than if they had attained a more advanced age and greater constitutional vigor."[113] Almost half of the disabled men he examined began working before the age of 14. The miners were generally pale, thin, and sallow, an appearance contrasting strikingly with the women and children who were fresh colored, stout, well developed, and in every respect a healthy looking class. If employed in the mines the women worked mostly at the surface, and their healthy appearance and color resulted from working out of doors in fresh air and sunshine. The unhealthy look of the men appeared to increase in proportion to their years, the length of time employed underground, and the nature of their work during that time. It was especially evident in men beyond about 35 years of age. When men over that age presented a fresh color and healthy appearance, they had usually not worked in a mine for some time, or had been working at the surface for some time.[114]

Also similar to Farr, Peacock found that miners' lung disease was more common in Cornish copper and lead mines than in similar mines in the north. He attributed this disparity to a greater number of horizontal shafts in the north, providing aeration superior to that in found in the predominantly vertical shafts existing in Cornwall. Northern miners also worked shorter hours (eight hour per day) and thus suffered less dust exposure. While Peacock did not identify silica as such, he did note that the hematite iron (non-siliceous) miners were "free from those affections which are so productive of disease and premature failure of power in the men employed in the copper and lead mines in Cornwall, Devon, and North Wales as well as the North of England.[115] Of equal importance was the finding that tutmen as opposed to tributers incurred miners' lung disease more severely and over a shorter period. Tutmen, contracted at so much a fathom, drove the levels, sank shafts, and erected rises and winzes. They had to cut new ways through the rock, and often labored at such a distance from any shaft or winze so that the air coming down those channels could not reach them. Not only had the men to breathe impure air because of defective ventilation, but in many of the workings the temperature was very high. Tributors acquired ore from ventilated and partially explored levels previously worked by tutmen. They did not do the sinking and driving in the mines. Tributors were paid so much in the pound at the market value of the ore that they brought to the surface. Though tributers often worked overtime for extra wages, Peacock thought that their longer hours of employment in a healthier atmosphere was less injurious than the labor of the tutmen working shorter hours where the air was noxious. He also called attention to the excessive dust created by boring and blasting in shale or plates of sandstone and beds of limestone (siliceous materials) and concluded that

[112] P.P. Royal Commissioners (1864). *Appendix to Report of the Commissioners Appointed to Inquire into the Condition of Mines in Great Britain*. cd. 3389 vol 24 P P. 94.
[113] P.P. Royal Commissioners. (1864). *Medical Report On the Conditions of Miners: Appendix to Report of* the Commissioners Appointed to Inquire into the Condition of Mines in Great Britain. cd. 3389 vol 24 P P. ix-x,
[114] Ibid P. 23
[115] P.P. Royal Commissioners. (1864). *Medical Report On the Conditions of Miners: Appendix to Report of the* Commissioners Appointed to Inquire into the Condition of Mines in Great Britain. London. P. 94

dust or gritty particles, thrown off from the sandy strata, added considerably to the suffering of these miners, especially when the air was dry. Peacock also observed that tubercular consumption was rare among the miners he examined. Rather, miners' asthma lung was not only the most common respiratory illness among all metalliferous miners in the North of Britain and in Cornwall but also the same disease in both areas, and it was distinct from tubercular phthisis. He also thought that climbing was injurious. However, of the different causes he enumerated as probably affecting adversely the health of the miners, by far the most influential was the defective quality of the air that they breathe. [116] Other than gritty particles, Peacock believed that overheating from exertion followed by exposure to cold air on exiting the mines predisposed to the miners' lung disease and he urged the installation of elevators and proper changing rooms.[117]

For both Bankart and Peacock, good ventilation provided the best protection against the diseases, but they had different justifications. Bankart believed that the chief cause of miners' lung disease was carbonic acid (CO2), mostly due to the exhaustion of oxygen by respiration, from the combustion of candles, and the explosions of gunpowder in poorly ventilated shafts. He had found that in proportion to oxygen, CO2 was 20 to 30 times greater than normal, accumulating in poorly ventilated galleries and shafts. While CO2 in high concentrations can be lethal, it normally diffuses rapidly in the atmosphere where its concentration is constant within a very narrow range. For example, in a crowded outdoor area, the ordinary chemical test for CO2 does not show its presence in 200 cubic inches of air. On the other hand, Bankart determined its presence instantly in only 3 or 4 cubic inches of air taken from the Cornish mines. Consequently, the contaminated air was slowly absorbed into the blood, tending to debilitate the victim, and to render him susceptible to numerous diseases.[118] Also injurious was the large quantities of decaying timber in the mine *as well as the suspension of solid particles of powder* (italics mine). Of course, ventilation was the key to preventing either etiologic consideration.

As noted above, both Peacock and Bankart distinguished miners' phthisis from tubercular phthisis. Indeed, Bankart, very appropriately, disliked the terms *phthisis* and *consumption*, claiming that their usage led to confusion as to the disease to which they referred, and, not infrequently, the conflation miners' and tubercular diseases. This is an important issue to be addressed in the following chapter. He clearly distinguished the two diseases:

> Besides these cases, there are a few of tubercular phthisis, which present the ordinary symptoms of this complaint. This disease does not appear to be very common, probably not so much so as in most other towns and districts of proportionate population. There is an explanation of the erroneous impressions that have been formed as to the large proportion of tubercular consumption amongst miners. It is as follows:—The complaint from which they commonly suffer, and from which they know themselves that they mostly die, is termed by the men 'miners complaint' or 'miners consumption,' and the medical men, in making out certificates of death, have entered the cause of deaths as miners

[116] P.P. Royal Commissioners (1864). *Appendix to Report of the Commissioners Appointed to Inquire into the Condition of Mines in Great Britain*. cd. 3389 vol 24 P. 14. Para. 70:203
[117] Ibid. P. 95
[118] P.P. Royal Commissioners. (1864). *Medical Report On the Conditions of Miners: Appendix to Report of the Commissioners Appointed to Inquire into the Condition of Mines in Great Britain*. London. cd. 3389 vol 24 P.179-81.

> consumption, or simply consumption, and this, in the hands of the Registrar, probably has been construed into tubercular phthisis.[119]

Peacock and Bankart both noted that when tuberculous phthisis was present, there was usually a hereditary predisposition. Bankart only encountered four cases of tubercular consumption, three of these had near relatives who had died of the disease, and they had never worked underground. They found that close, ill-ventilated and poorly drained houses were common among miners and non-miners with and without lung disease and, therefore, not a circumstance essential to miners' lung disease. Both noted that tubercular consumption occurred in men at a much earlier age than those who suffered from the more decided forms of miners' "asthma."

In addition to Peacock and Bankart, the *Commission* had also asked Alfred Swaine Taylor, M.D., F.R.S. and two chemists, R. Angus Smith, F.R.S., and Alfred J. Bernays, Ph.D., F.C.S. to report on air quality in the mines. Taylor had been one of Bankart's instructors at Guy's Hospital. Earlier Isambard Brunel had asked Taylor whether the air quality in a tunnel under excavation across the Thames was harmful. Taylor compared those samples taken from the tunnel with those taken underground in the mines. Both samples contained excessive amounts of carbonic acid, especially in areas in which there was no free communication with the atmosphere. "Air so contaminated is clearly unfit for human respiration. A gas which destroys life instantaneously, when in a pure state, cannot be breathed continuously day by day in a diluted state, without affecting the health of a person." [120] Taylor also believed that the mining candles rapidly vitiated the air. He did not measure dust. Even so, his solution was similar to that offered by proponents of mitigating dust, ventilation. With respect to prevention, it made little difference which of the two explanations was operative. The prevention of dust or of high concentrations of carbonic acid required ventilation. Again, it was not the charge of the *Commission* to determine the etiology of miners' lung diseases. [121] Smith had studied with Liebig and in 1842, he became an assistant to Dr. Playfair, professor of chemistry at Manchester Royal Institution. Bernays was the author of a popular science book, *Household Chemistry: Understanding the Rudiments of Science Applied to Every-Day Life* (1854). Smith was well known in scientific circles for his research on the various concentrations of gas in ambient air. Because the ratio between the amounts of oxygen and nitrogen present in the air was relatively constant even under variable conditions of time and place, opinion held that chemical analysis could not elicit impurities of town air. Smith believed otherwise and began by making a series of determinations of the sulfur compounds introduced into the air by combustion. Somewhat later, he conducted numerous determinations of other impurities such as ammonia and carbonic acid. In 1864, he made a detailed examination of the air of mines, comparing it with that from various districts in large towns. He also attempted to determine the physiological effect of carbonic acid in an airtight lead chamber. He monitored the carbonic acid concentration and recorded the pulse and respiratory rate and the rate at which candles burned and their light diminished from out side the chamber while his subjects remained in the chamber, often for hours. These experiments convinced him that carbonic acid was physiologically more harmful than he had originally thought. He also found that this gas "almost always comes in bad company," namely, dust, Because the concentration of carbonic acid appeared to be the best chemical test for ventilation

[119] Ibid. P. 94.
[120] Ibid. P.179.
[121] Fellow Chemical Society

of rooms rendered impure human exhalations, he developed a technique for measuring carbonic dioxide levels which could be converted into a figure for the carbonic acid concentration.[122] Bernays' investigated air obtained in different mines. Out of 42 samples, only a few did not contain a proportion of carbonic acid considerably in excess of that which occurs in ambient air. Bernays did not discount the relevancy of "solid particles," especially in dry mines where dust was created from boring or the use of the pick, and from blasting hard rock and, then, failed to settle. When an end was 50 or more fathoms from any draught the difficulty of furnishing an adequate supply of fresh air to the men who are driving it becomes very great, and this difficulty is further increased by the culpable negligence of the men or that of the agents (whose business it is to see that the men do not neglect their duty, in allowing heaps of ore or 'deads' to remain in the levels which choke them up and injuriously interfere with the circulation of air." He also noted that tutmen or tributers contracted respiratory disease differentially. However, Taylor's, Bernay's and Smith's professional interest in gasses diverted them from the real culprit, silica.

Very likely, the Commissioners had the work of Bankart, Taylor, Angus Smith, and Bernays in mind when they wrote, "the reports of these gentlemen are extremely valuable and interesting, as throwing light upon the causes and nature of those diseases to which miners are peculiarly liable, and with *respect to which there has been much difference of opinion* (italics mine)."[123] While these investigators attributed miners' lung diseases to gasses, they did not exclude dust. That the *Commission* chose to give more credence to the chemists rather than a host of medical men (see below) who favored "dust" bears out the period's confidence in "science" as opposed to "medicine." At the time, medicine was deemed an impure science and therefore, untrustworthy. Nevertheless, there was no disagreement over the value of ventilation as the all-important preventative measure.

Despite questions regarding whether medicine was sufficiently scientific, the medical men appearing before the *Commission* appear knowledgeable and well trained. They all had considerable experience treating miners, either on behalf of miners' associations or, less often on behalf of the mine owners.[124] Most were convinced that miners' lung disease was occupational. Even those who placed more etiologic emphasis on carbonic acid or oxygen deprivation also implicated dust or particles. Moreover, they were nearly unanimous in distinguishing miner's phthisis from tuberculous phthisis. Of course, this distinction had important therapeutic implications. Miners' disease offered hope of prevention; tubercular disease offered none. One was clearly occupational; the other clearly was not. Most also believed that excessive climbing, sudden exposure to cold air, or hot air were aggravating factors. All were of the opinion that mining from an early age predisposed neb\n to premature death. All subscribed to ventilatory measures for prevention.

Charles Foster Barham, M.D. (1804-1884), was one of the many highly qualified medical witnesses. After studying at Edinburgh as well as in Paris and Italy, he took the degree of M.B. at Cambridge in 1827 and qualified for the more advanced M.D. degree in 1860. He practiced with distinction in Truro where he was senior physician to the Royal Cornwall Infirmary, contributing many articles to its *Reports* and *Journal*. He also served as consultant physician to the Truro

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[122] Eyler, J. M. (1979). *Victorian Social Medicine: The Ideas and Methods of William Farr*. Baltimore: Johns Hopkins University Press. P. 221-3.

[123] P.P. Royal Commission (1864). *Report of the Commissioners Appointed to Inquire into the Conditions of All Mines in Great Britain to Which the Provisions of the Act 23 & 24 Vict. Cap. 151 Do Not Apply with Reference to the Health and Safety of Persons Employed in Such Mines.* cd. 3389 vol 24 P. vii-viii

[124] Mine owners usually employed medical men to treat accidents rather than sickness.

Friendly Society and was president of the southwestern branch of the British Medical Society. In 1840, he wrote a *Report on the Sanitary State of the Labouring Classes in the Town of Truro* and in 1842, he served on the *Commission on the Employment of Children*. "The two subjects which had especial charm for him were the climate of Cornwall and the diseases of miners who contributed to its wealth." [125] When asked whether there was general agreement amongst the medical men as to the nature of miners' lung disease, Barham responded as that his medical community (a medical center in the midst of Cornwall mines) had understood clearly the nature of the disease for some time and early on had distinguished it from tubercular phthisis. Generally speaking, there had been no essential difference prevalent upon the subject.

My own view is similar to what I stated more than 20 years ago. I had then had a pretty large opportunity of seeing the mining population, both in the mining districts of Devonshire, in the neighborhood of Tavistock, and in Cornwall; and my opinion remains the same, namely, that there are two large sections of the diseases of miners which are, I may say, essentially distinct; one, the diseases of the young miner in early life up to perhaps about 25 which is partly ordinary consumption—what we call scrofulous consumption such as might occur in the general body of the community… And secondly, what is more properly miners' consumption which finishes the originally healthy and sound miner when he gets perhaps to be from 40-50 years of age, and upwards which is a slow disease, the result of his occupation purely. I think as being the direct effect of impure air and the inhalation of mechanical particles;—irritation of the lining of what we call the bronchial tube—the air tubes; and also the effect of climbing to a considerable extent, too great a strain upon the heart and upon the chest. These two classes of diseases deserve to be kept distinct by any person who would investigate the effect of mining occupation both on scientific grounds because they are capable of being obviated in very different degrees.[126]

While those whose practice included miners primarily understood the nature of the disease, Barham pointed out that hospital-based physicians had scant acquaintance with miners' phthisis. Its slow deterioration and the knowledge that it was incurable usually meant that they died without ever becoming patients in hospital. It is surprising, however, that the doctors who treated miners as outpatients failed to initiate discussions on the subject with more "exalted" hospital based physicians at local medical society meetings or through articles in local medical journals. Or, if that was the case, what did their comments and inquiries generate and, if they submitted articles why were they not published?

By far, the greater majority of those medical men questioned by the commissioners responded, as did Rowland Rowland, a surgeon attending at Welsh mines. In his opinion, the mischief did not arise so much from the air miners breathed as from the deleterious effects of the considerable amount of dust in the mines as well as the powder smoke. "I think that it is in consequence of inhaling air containing particles of matter".[127] Somewhat differing opinions occurring much less commonly in the *Commission Minutes of Evidence* are as follows: Dr. Railton Gill stated that carbon was worse (candle and powder smoke) than dust because dust was the immediate irritant and then expectorated.[128] Mr. Taylor, F.R.C.S. a Licentiate at the

[125] Courtney, W. P. (Ed.) (1885) Dictionary of National Biography, Vol. III, Article 1372. Smith, Elder and Company.
[126] P.P. Royal Commissioners. (1864). *Epitome of Evidence Taken Before the Commissioners to Inquire into the Conditions of All Mines in Great Britain to Which the Provisions of the Act 23 & 24 Vict. Cap. 151 Do Not Apply with Reference to the Health and Safety of Persons Employed in Such Mines.* . P.111-16. Para 5226-304.
[127] P.P. Royal Commissioners (1864). *Minutes of Evidence Taken Before the Commissioners Appointed to Inquire into the Condition of Mines in Great Britain, 1864.* cd. 3389 vol 24 P. 508-9.
[128] Ibid. Para: 14,743-14,795. P342

College of Physicians at Edinburgh, had about 350 miners under his care in the St. Austell area. He was of the opinion that the inhalation of a great deal of small particles of copper was injurious to the lungs but he also stressed the adverse effect of climbing and absence of changing rooms (he admitted that he had never visited a changing room). When he was informed that a prior witness had denied that dust was innocuous, he replied that there was no doubt that dust was injurious and in consequence of the lode.[129]

Mr. Kingston (mayor of Liskeard and a surgeon attending ten to twelve small mines) spoke for a distinct minority. In his opinion, "weak lungs" resulted from exposure to "bad air, (not defined)" from muscular exertion (climbing) and "atmospheric causes (not defined). When asked whether he thought any disease had been caused by dust, he responded that he had never heard a miner complain of dust, that there was no dust in "our" mines and that he had never read any medical report in which it stated that the dust was one of the causes of miners' disease (obviously, he was not even remotely current with the medical literature.). He did admit that if miners inhaled dust, it was self evident that injury would occur. Moreover, he acknowledged that the cough and expectoration experienced by many miners was due to emphysema. He also believed that the ventilation in the mines in his district was decidedly good.[130] He had had 20 years experience treating miners on behalf of a Welsh mining company rather than the more usual employment by the miners' associations. While much less common, in some areas the mine owners appointed surgeons as in this case. Sometimes the surgeons lived some distance from the site and, in that event were said to have unqualified men to supply their places. I suspect that being the mayor of Liskeard, and a former employee of a Welsh mining company deeply influenced Mr. Kingston's opinions on dust.

Mr. H.H. Searle, credentialed in London, had double qualifications. He was careful to describe himself as a miners' surgeon but not a mine surgeon. Searle had come to Penzance very shortly after taking his full degree. He was about to leave the place when the men of the mine he attended "struck, and brought me back again: and they said they said they had never been so well served before, and wished me to serve them…the men themselves took me out of the adventurers hands, and chose me as their surgeon."[131] Searle spoke of patients who were permanently short of breath but had to continue working. On the other hand, he knew others who had not worked for a number of years and continued to cough up large amounts of black sputum. He attributed their disease to inhaling "carbonaceous dust" which caused permanent damage.

Almost every medical man interviewed believed that metalliferous miners were much less healthy than their neighboring agricultural laborers and that their disease, while sometimes ameliorated by changing occupations or retiring, was not reversible. When Mr. P. Vincent (a surgeon attending several mines) was asked "if he were an insurer, would he insure anyone with miners' disease to a small extent." He replied, "Certainly not." Even if that miner had been working above ground a certain number of years and was to all appearances well, he still would not consider his life as good as if he had never been underground. The questioner continued: "then it comes to this that if a man ever is attacked by symptoms of the miners' disease his days must always be an uncertain life for the rest of his days, even if he leaves off his occupation? "Yes, I think so."[132] In response to the delicate matter of recommending that an affected miner

[129]. P.P. Royal Commissioners (1864). *Minutes of Evidence Taken Before the Commissioners Appointed to Inquire into the Condition of Mines in Great Britain, 1864* cd. 3389 vol 24 .P. 73-77. Para. 3679-3834.
[130] Ibid. P. 65-7. Para. 3359-3428.
[131] Ibid. P. 171. Para. 7653-7659.
[132] Ibid. P. 241. Para. 10,469-10,471.

discontinue his work, Mr. Rowland, another surgeon, responded that when presented by a pale miner subject to coughs, he was obliged to tell them not to mine. When a miner asked him: "What do you think about my working underground?" his reply was: "Well really I think you have now worked for many years underground and your breath has become short. I recommend you to try to have something to do on the surface or to go out to work with the farmers; and if they do that they recover themselves a great deal, but if they go back to the mine they very often die in less than 12 months."[133]

There was overwhelming accord among the medical men interviewed that miners' phthisis and tuberculous phthisis were distinctly different etiologically, and pathologically independent of one another. This was also the case for medical men not directly involved in treating miners, but rather acting as consultants in nearby urban centers. This consensus seems particularly surprising given the erroneous and consequential conflation of the two diseases by medical men much later in the century. Medical consensus in our period reflected the time-tested manner of establishing a differential diagnosis: the patient's history, physical examination (depending largely on percussion and auscultation of the lungs) and occasional autopsies.

In miner's phthisis, noticeable decline usually began in the mid-30s in contrast to the much earlier manifestations of tubercular phthisis, which, also contrasting, was often associated with a family history, Miners' disease was usually not associated with the classic complaints of tubercular disease such as fever, night sweats and cough productive of frankly bloody sputum. On physical examination, the findings in miners' disease were usually restricted to the lower lobes of the lungs while the findings in tubercular phthisis were found mostly in the upper lobes, often with cavities. Mr. Hutchinson (surgeon) was equally convinced that miners' consumption is distinct from common consumption. "That which passes under the name of miners' consumption is certainly not tubercular phthisis, at least a great number of cases that are registered for phthisis are not tubercular phthisis at all…but they are registered under the head of phthisis, as it is a short term, and easily recorded." Moreover, the hectic symptom (fever, night sweats) of tubercular phthisis was absent in miners; disease.

When questioned about the differences between the two diseases responses typically echoed the opinion of Mr. Hutchinson (surgeon) that miners' consumption is distinct from common consumption. "That which passes under the name of miners' consumption is certainly not tubercular phthisis, at least a great number of cases that are registered for phthisis are not tubercular phthisis at all…but they are registered under the head of phthisis, as it is a short term, and easily recorded." Moreover, the hectic symptom (fever, night sweats) of tubercular phthisis was absent in miners; disease.[134] To the same question, Mr. Vincent (surgeon to several mines and formerly house surgeon in a London hospital and assistant to Dr. Walsh at the University of London) replied, "Yes, certainly; there is not the slightest doubt about it."[135] Mr. John Berryman (surgeon) noted, "…there is quite a distinction between tubercular phthisis and the miners' disease."[136] James Jago, physician to the Infirmary and to the Truro Dispensary believed that miners' disease was a peculiar affection of the bronchial tubes connected with bronchitis and sometimes emphysema. It was not consumption.[137] Mr. Quick, another Penzance practitioner,

[133] Royal Commissioners (1864). *Minutes of Evidence Taken Before the Commissioners Appointed to Inquire into the Condition of Mines in Great Britain, 1864.* cd. 3389 vol 24. P. 508-9.
[134] Ibid. P. 244. Para. 10,551.
[135] Ibid. P.239. Para. 10,404.
[136] Ibid. Para. 4228.
[137] Ibid. P. 245, Para. 10,610.

attributed miners' disease to chronic bronchitis that usually ended fatally. He agreed that it was not a consequence of tuberculosis. Its duration, however, was much more chronic than tubercular disease. In his practice, he had never found miners' disease associated with the large cavities typical of advanced phthisis.[138] Answering the question: "As a rule, do you consider that tubercles are produced by that condition described as miners' disease," Nathaniel John Haydon, Esq., M.D., L.R.C.P**.** replied, "On the contrary, while miners' asthma is frequent, tubercle is a rare disease amongst miners; it certainly may coexist with the asthma but is not produced by it."[139] Several medical witnesses correctly noted that on occasion tuberculous phthisis intervened late in the course of miners' lung disease, which, indeed, is the case, since silicosis predisposes to pulmonary tuberculosis. Mr. Rowland believed that miners were as subject to tubercular disease as the people who work on the surface. However, the difficulty distinguishing "bronchial ulceration" caused by particles (miners' lung disease) from tuberculous cavities was difficult and not as easily resolved by stethoscopic examination as one might hope since all consolidations, tubercular or otherwise elicited the same finding.[140] What Rowland did not mention, but others did, was the centrality of the history in distinguishing the differences.[141]

The Commission had hoped to obtain autopsy confirmation. As we have noted, the families of deceased miners were reluctant to give permission for postmortem examinations and very few were performed. However, Mr. Davies had successfully convinced thirty families of the deceased to allow an autopsy. This is a surprisingly high number for the time and place. He especially selected those cases about which he had a strong suspicion of tubercular phthisis as opposed to miners' phthisis. His experience was much greater than that of the *specialists* queried; Peacock and Bankart had only participated in one autopsy during their investigation on behalf of the Commission. Of these *pre-selected* cases, Davies found that only slightly more than fifty percent revealed tuberculous deposits. He noted that this percentage was not a fair estimate and that an unselected series would show fewer tuberculous deposits. Thus, he was able to demonstrate that in a relatively large series (for the period) of anatomical cases slightly less than half the miners dying of lung disease had no evidence of tuberculous phthisis; the cause of their deaths was occupational.[142] Davies practiced in Wales and had particularly impressive credentials. He was a Doctor of Medicine, a member of the College of Physicians, Edinburgh, a member of the College of Surgeons, England and of the Apothecaries Company, Wales. He had been House Surgeon to a Welsh Dispensary for three years and was currently in a practice treating many miners. Davies also had made the important distinction between the disease associated with metalliferous mining (silicosis) and that encountered in coal mining, "black lung disease" (pneumoconiosis, a much more benign disease). Moreover, he had not noted any cases of miners' phthisis among colliers; this is generally not the case unless they were also drilling siliceous rock as well.[143] The relevance of his findings is great. It is difficult to believe that his

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[138] Ibid. P. 145. Para. 6610-6618 and 6677.

[139]P.P. Royal Commission (1864). *Report of the Commissioners Appointed to Inquire into the Conditions of All Mines in Great Britain to Which the Provisions of the Act 23 & 24 Vict. Cap. 151 Do Not Apply with Reference to the Health and Safety of Persons Employed in Such Mines*. cd. 3389 vol 24 Para. 19,543.

[140] This is not the case. The physical findings of cavities and those of fibrous replacement or emphysema a distinctly different.

[141] Commissioners, K. (1864). *Minutes of Evidence Taken Before the Commissioners Appointed to Inquire* into the Condition of Mines in Great Britain, 1864. London: Both Houses of Parliament. 508-9

[142] Ibid. P. 484-5.

[143] P.P. Commissioners (1864). *Minutes of Evidence Taken Before the Commissioners Appointed to Inquire into the Condition of Mines in Great Britain, 1864.* cd. 3389 vol 24. P. 484-5.

findings should have been lost, or, if known, not confirmed by other investigator. Had this been the case, a long period of inactivity with respect to protecting miners against silicosis or, compensating them for it, would not have occurred.

Mining captains and agents were responsible for hiring and for supervision The Commission also questioned them about the health of miners, the extent of their exertion, their diet, their alcohol consumption and the state of ventilation in their mines. Many of these men had started working as miners and later had advanced to managerial status or employers. Among them, we find greater differences of opinion than among doctors. Not surprisingly, improvement in occupational status often made them more sanguine regarding the miners they hired and the conditions in the mines under their charge. Not infrequently, an agent recalled hearing of miners' lung problems elsewhere, attributing the healthful state of his own mine to adequate ventilation, man machines and changing facilities, presumably due to enlightened ownership. Though defending their own mines, none denied the advantage of good ventilation. Sometimes they blamed miners' lung disease on negligence, but it was very rare for them to deny the disease altogether. Only occasionally does an agent unequivocally cite occupation as the cause of miners' lung disease (see below).

The following is illustrative of the range of mine captain and mine agent opinions:

I perceive of no difference in the health of the agriculturists as compared with the miners. There is not that difference now that there were some years since, in consequence of the improved ventilation of the mines and also, miners paying more attention to themselves that they did formerly; the miners generally speaking have more moral men in all their habits and conduct. There is a vast difference in the health of the miners in the copper and tin mines.

> I think that in the course of time it is the quantity of small dirt and mineral which they inhale into the lungs, small particles of spar (any light-colored lustrous mineral that cleaves easily) and no doubt the powder smoke and perhaps a little deficiency of air occasionally helps it materially but I believe that it is more the fine particles of spar which they get into their lungs more than anything else. They are in the habit of working the pick point when they ought to apply the edge, and consequently making more dust; and they are in the habit if boring their holes dry when they ought to apply water; the consequence is that they make more dust, and from inhaling dust I believe that they get more harm than from any other cause in mining either in ventilation or any other way.[144]

This agent got it right. Forthrightness to this degree was unusual among all of the witnesses, even, the miners themselves. Most unusual is his assertion that ventilation alone is not the cure all.

John Webb was one of the rare sympathetic captains questioned. He also offered an honest assessment stating, "[some captains] having no "thinking powers" do not regard the health of the men even though they knew the air was dangerous. "But I have long argued that there is no reason for men to work in a close, dense atmosphere, and that a little artificial means

[144] P.P. Commissioners (1864). *Minutes of Evidence Taken Before the Commissioners Appointed to Inquire into the Condition of Mines in Great Britain, 1864.* London: Both Houses of Parliament. cd. 3389 vol 24 P. 347. When asked whether miners were affected in the same way as stonemasons, Remfry answered, "I do to a certain extent. On rarely finds references to the similarity between silicosis suffered by metalliferous miners and that suffered by workers in other industries exposing them to siliceous dust in the parliamentary records I have examined P. 347. Para. 14,909.

might be used, in which case the health of miners would surely be improved." Webb frequently inspected mines and, often, when he suggested a ventilatory device was informed '…that the air is not so very bad' and ventilatory measures were not undertaken. "These are the facts, and the miners suffer from it, and I have been long arguing or contending with parties that it should be done." When the miners themselves requested better ventilation, Webb was of the opinion that while owners had not denied it flatly; it was never instituted promptly, if at all. In his opinion, a great deal of the poor air might be avoided with a little attention being paid to it and that not providing it was tantamount to neglect, which happened all too often. Often Webb had heard men complaining of shortness of breath because they worked in "bad air" but, fearful of losing their jobs, they continued working for years, their symptoms increasing imperceptibly until it told upon their constitution.[145] Webb also noted that miners were well aware of "bad air." "There is a striking uniformity in the causes which are assigned by the miners for the impairment of their health; the answer very generally being, when questioned on this point, that is was bad air, powder reek and stour…and some say the 'stour' is worse than anything else… I am disposed to think that dust or gritty particles, thrown off from the sandy strata in which they frequently work, considerably add to their sufferings when employed in the mines."[146]

In answer to, *"Are you prepared to state to the Commission as the result of your experience that the miners are nearly as long lived a race of men as other laborers?"* An agent answered, "In this district, I think they are. They have become so much improved in health in the last few years that they are quite a different race of men to what they were when I first came to the district 25 years ago, and that has taken place since we have had the mines better ventilated, and have had the man-engine at the mines."[147]

"To what do you ascribe their improved health?" "Better ventilation generally and from better provisions made for the men to change their clothes before going underground and after the come up. There are warm places provided for them in which they can dry their clothes."[148]

If miners were unhealthy then it was because "Men drink a little too fast and sometimes they stay a little too long without meat, which is injurious to their health. And another reason it that I believe they climb too fast. However, taking it moderately in eating, drinking, and climbing, I think that miners have a chance of living pretty long. *Sometimes I think that foul air*

[145] P.P Royal Commission. (1864). *Epitome of Evidence Taken Before the Commissioners to Inquire into the Conditions of All Mines in Great Britain to Which the Provisions of the Act 23 &24 Vict. Cap. 151 Do Not Apply with Reference to the Health and Safety of Persons Employed in Such Mines. London: Houses of Parliament by Command of Her Majesty*.: cd. 3389 vol 24 P Para. 5317.

[146] P.P. Royal Commissioners (1864). *Appendix to Report of the Commissioners Appointed to Inquire into the Condition of Mines in Great Britain.* P. 13-14. Peacock proceeds, "I think it probable also, that in this respect the northern mines are more injurious than those of Cornwall, which are generally worked in the crystalline rocks, and which, therefore, are probably less dusty." The reverse is the case

[147] P.P. Royal Commission. (1864). *Epitome of Evidence Taken Before the Commissioners to Inquire into the Conditions of All Mines in Great Britain to Which the Provisions of the Act 23 & 24 Vict. Cap. 151 Do Not Apply with Reference to the Health and Safety of Persons Employed in Such Mines. London: Houses of Parliament by Command of Her Majesty. London: Royal Commission. .* London:. cd. 3389 vol 24 Para. 8218 and 4260.

[148] P.P. Royal Commission. (1864). *Epitome of Evidence Taken Before the Commissioners to Inquire into the Conditions of All Mines in Great Britain to Which the Provisions of the Act 23 & 24 Vict. Cap. 151 Do Not Apply with Reference to the Health and Safety of Persons. Employed in Such Mines. London: Houses of Parliament by Command of Her Majesty.London: Royal Commission. . London.* London: Houses of Parliament. cd. 3389 vol 24 Para. 8836.

does it (italics mine).[149]**"** This assessment was common. It reflects the prevailing criticism of the *undeserving poor* and the popular reliance on individual responsibility.

Mr. John Vivian, a mining captain, later known as the infamous manager of the Dinorwic quarries, stated, "I have been working underground in Cornwall and Brazil and have never known a man to suffer from working underground." Thirty years later, he was of the same opinion. Coming before The *1892-93 Royal Commission on Labour*, Vivian was convinced that quarrying was not dangerous. He claimed that both he and his hospital doctor agreed that there a more healthy life did not exist than that of a worker employed by the Dinorwic quarries.[150]

When testifying before the Commissioners, these same miners, with some exceptions, appear to have been more hesitant to commit themselves on the subject. Moreover, it is not clear whether miners had volunteered or selected. The general mild nature of their criticism or their denial of any problem in the mine in which they were currently working suggests selection or fear of reprisal. For example, a tutworker asked about whether he would work in poor air answered that while poor air would injure anybody's health, "I do not think that it injures the health so much as is considered." In answer to "*Do you know any miners who have suffered from working in poor air "* another miner answered: "I do not know that I do about here now; there are several miners here are bad, but whether it is owing to the poor air or not I do not know." To "*What is the matter with them,*" he replied: "I am sure I do not know; it is what they call about here the miners' complaint, I believe, that is to say, in the lungs and the liver, and one thing and another. I do not know exactly what it is."[151] Another miner queried if he knew of any who have suffered in health, answered that his father had been a miner and had died at 55 (this was a relatively advanced age for most siliceous rock miners). He believed the cause was miners' complaint, occasioned by working in close places.[152].When asked if men continued to work in poor air, another tutworker said that his mine was well ventilated but he believed the air was poor in many other mines. He did admit that miners were more "sickly" than most other laborers.[153] Miners who admitted to *miners' complaint* often attributed it 'stour.' or dust created by blasting and boring in shale's of sandstone and beds of limestone (siliceous rocks).

One miner noted that he was working in poor air because he was paid a pound a month more for his work. Another was well aware that most miners aged 45 to 50, suffered "from what they term the miners' complaint, that is, a tightness and shortness of breath."[154] The tone of remarks such as the above apparently satisfied the Commissioners. If they had been very concerned, they would have asked seriously ill miners to testify as well. Of course, with jobs very likely in jeopardy, one could not expect that miners would yield substantive material on direct questioning; nor was it likely the testimony of captains, managers or owners would be very informative.

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[149] Commission. (1864). *Epitome of Evidence Taken Before the Commissioners to Inquire into the Conditions of All Mines in Great Britain to Which the Provisions of the Act 23 & 24 Vict. Cap. 151 Do Not Apply with Reference to the Health and Safety of Persons Employed in Such Mines. London: Houses of Parliament by Command of Her Majesty. London: Royal Commission. . London.* London: Houses of Parliament. cd. 3389 vol 24 Para. 9985

[150] Commission. (1893). *1892-93 Commission on Labour*. London. P. 41.

[151] Commission. (1864). *Epitome of Evidence Taken Before the Commissioners to Inquire into the Conditions of All Mines in Great Britain to*
Which the Provisions of the Act 23 24 Vict. Cap. 151 Do Not Apply with Reference to the Health and Safety of Persons Employed in Such Mines. London: Houses of Parliament by Command of Her Majesty.
Para. 2931.

[152] Ibid. Para. 2884.

[153] Ibid. Para 5950

[154] Ibid. Para. 6071.

Of those who testified before the *Commission*, agents, captains, miners, chemists, the testimony of the medical practitioners showed much less equivocation. They were very nearly unanimous in declaring that miners' lung disease was occupationally induced and that "dust" was a major etiologic element, if not the major element. However, the *Report of the Commission* chose not to emphasize the accord among the medical men but rather made more of the minor differences in medical opinion and more of the explanation advanced by the chemists that *poisoning* by carbonic acid and/or damps caused miners' lung disease. Today, medical testimony carries significant weight in assessing the cause, transmission, etc. of diseases. In our period, the profession was on the verge of *coming in to its own*. In fact, it is unlikely that medical practitioners themselves would have described themselves as *scientists*. Medicine was considered much more an art than a science and it had largely developed as a "distillation of past experience and the subjective experiences of those who at one time or another have defined themselves as sick. This priority of experience that might, elsewhere, be seen as a mark of medicine's lack of rigor does not mean that it was a bundle of falsehoods. Rather, it was the condition of medicine as a vocation This is not to say that the *Commission* ignored medical opinions. After all, it invited medical *experts* to carry out research and to testify and it did ask local practitioners to testify. However, scientists (chemists) won the greatest respect and chemists who testified especially favored the *poisoning* theory.

The net effect of the *Report* was to suggest etiologic uncertainty, a move making prevention somewhat of an adventure into the unknown. In its defense, the *Commission* acknowledged that proper ventilation had considerably reduced the incidence of coalminers' phthisis and it recommended similar ventilatory schemes in the metalliferous mines. This accorded with the opinions of the chemists as well as the medical practitioners. Acquainted with the systems of ventilation usually adopted in coalmines, it believed it would be easy to adapt similar systems at comparatively small expense, to metalliferous mines, especially using some combination of natural ventilation and artificial ventilatory appliances. It also recognized that atmospheric conditions in the mines might be variable and that at times the circulation of air underground might be regular and sufficient, while at other times it might vary as the result of inversion or stagnation of the current of air in the shafts. In these cases, they suggested a constant up-cast shaft, or failing the efficacy of this method, the application of furnace heating. Additionally, they urged sufficiently sized levels to ensure the removal of refuse and, where applicable, the creation of more frequent communications between levels. They backed the judicious employment of airtight doors and brattices to control the direction of underground currents, and closing up disused winzes, sumps, shafts, and abandoned workings to prevent accidents. Unfortunately, they did not address issues of inspection, enforcement and cost, abhorrent issues at the acme of nineteenth century liberalism.

To a lesser extent, medical men also agreed on the adverse effects of the sudden alterations of temperature that occurred when miners exited the shafts, overheated by their exertions, their clothes dampened by perspiration, upon entering unheated changing areas. They convinced the *Commission* that employers could make arrangements that were more adequate. On the other hand, in cold weather, miners often changed in boiler areas that were also potentially unsafe. In the event, the Commissioners recommended barring the imprudent miners from changing in the boiler houses. They proposed that every mine provide proper, conveniently situated houses in which men could change and dry their clothes. Noting that miners' lung diseases occurred particularly prematurely in those who went below at an early age, they reiterated the recommendations of previous *Commissions* that those boys under the age of

fourteen should only work at the surface of mines in appropriate shelters. They accepted that the exertion of climbing ladders from great depths to the surface had a pernicious effect on constitutions of those already impaired by the severity of their labor and the impure air in the shafts. However, always ready to suggest miners' culpability, the Commissioners noted that they foolishly climbed ladders too quickly, especially when young. Nevertheless, they proposed lifts, which experience in coalmines had proven beneficial and safe, though a matter of some cost to the owners.

Lost in the Blue Books

That the etiology of miner's lung disease became problematic suited the political climate of the period: 19th century liberalism's fear of State surveillance, and its devotion to reason, economy, efficiency, utility, responsibility. Thus, it is not surprising that legislation did not follow in the wake of these proposals. On the other hand, though its recommendations were unfulfilled, the *1862-64 Commission* represents a milestone in the State's interest in occupational disease. Previous commissions had investigated accidents in coalmines and factories as opposed to occupational disease. This *Commission*, heard, as the majority opinion, that exposure to siliceous dust was the cause of significant disease very likely demanding legislative intervention. Ultimately, the information gathered at the *1862-4 Commission* and its recommendations were *lost in the blue books*. This was not information that a liberal Parliament would welcome. Even those participants who understood dust to be the culprit and who were sympathetic to the plight of miners seemingly did not raise their voice to the ensuing silence on the subject.

One might assume that the medical *experts* left the *Commission* keen to find out more about miners' lung disease, to interest their students in the disease and to publish in medical journals on the subject. That they did not, may well have related to the medical mindset of the period. With a few exceptions, medical men were not and did not consider that they were scientists; rather they were practitioners of the art of medicine. Thackrah's second edition (1832) of *The Effects of Arts, Trades and Professions, and of Civic States and Habits of Living, on Health and Longevity: with Suggestions for the Removal of many of the Agents which Produce Disease, and Shorten the Duration. Commission's Report* (now often cited) is a brilliant example of what practitioners of the art of medicine were capable. Surely, our medical experts either ignored or were unimpressed by this work. In his text, Thackrah advanced a method of prevention employing the use of water to diminish free-floating dust.

> In the mines of North of England, the men are injured by working ore in sandstone… A scientific friend to whom I am indebted for my information on this subject, observes…, the sandstone strata, which [is]impervious to water preserve[s] the mine quite dry; consequently, the minute particles of rock formed by blasting or the pickaxe, are kept in a dry state…forming, as it were, an atmosphere of dust, which the miner is constantly inhaling…Last year, there were in the village of Arkendale, in the heart of the mining district, not less than thirty widows under thirty years of age. The prevalent maladies appear to be affections of the lungs and bowel… This statement is surely melancholy enough to call forth the active sympathy of all who witness the facts. If the injury to health and life result from the dust of sandstone could not the simple remedy of water be applied? If water will not percolate through sandstone, might not the frequent use of a common watering can prove a substitute? Assuredly, the wretchedness and

> mortality of miners may be greatly diminished by reducing dust by the employ, by temperance, proper hours, and occasional changes of occupation.[155]

If medical practitioners were unwilling to pursue Thackrah's work, there is no doubt that Parliament was less so. Rudolph Virchow's observation (after studying an outbreak of cholera in Eastern Silesia) is pertinent: "Medicine is a social science and politics nothing but medicine on a grand scale."[156] It is by its very nature a social endeavor as well as a scientific one. In medicine, knowledge, power, science, and society interlink, as in other disciplines. However, medicine throughout the nineteenth century was a weak link, especially, before it became a hope for cure of all the afflicted or those anticipating affliction. Before that, it did not have the power or the inclination, to impose its order on society. The profession did not attempt to ally itself with more powerful institutions that were campaigning for the prevention of occupational diseases and accidents, and, later, for workers' compensation. Ultimately, the success of establishing silicosis as a compensable occupational disease was most indebted to actors outside the laboratory who associated themselves with it. As Anne Borsay has pointed out the development of public policy in the post-modern age is no longer understood as a morality tale in which "heroic medical experts and reformist politicians embark upon a journey of improvement leading unequivocally from charity and poor relief to the post-war welfare state."[157] Even in the latter half of the nineteenth century, execution had less to do with morality and more to do with exigencies. One suspects that the *Commission* and its medical participants, consciously or unconsciously, were not sorry to see their recommendations disappear from view.

I have noted that from the beginning of the nineteenth century, there were isolated attempts to address occupational health issues among children and somewhat later, among women; offering protection to men was a much slower process. Though lacking the authority to enforce legislation until well into the century, there was a half-hearted effort to safeguard laborers at throughout most of the 1860s. During that period and, earlier, various societies devoted to social science, pathology, epidemiology and statistics as well as commissions, committees, command papers and studies touching on silicosis, had gathered sufficiently accurate information to have pressed for *dust* prevention. If the intentions of those involved in generating this information were sincere, their efforts had to fail. This proved the case through almost the entirety of the nineteenth century, even though these associations had the ability to link with similar ones to promote legislative assistance to miners because theoretical divisions among them were sufficient to make consensus impossible. These groups included segments of the dominant political parties and the philosophies that defined them, evangelical Christians greatly influenced by pre- or post-millenarian views and the medical profession's views on disease propagation, their role as practitioners rather than scientists and their unashamed interest in earning a good living. More powerful were the directors of nascent government bureaucracies

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[155] Thackrah, C. T. (1832). *The Effects of Arts, Trades and Professions, and of Civic States and Habits of Living, on Health and Longevity: with Suggestions for the Removal of many of the Agents which Produce Disease, and Shorten the Duration of Life.* (Second ed.). London and Leeds: Longman, Reesw, Orme, Brown, Green, & Longman; Simkin & Marshall. Leeds: Baines and Newsome. P89-90.

[156] McKee, M. (2006). Essays on Public Health and Epidemiology, from Virchow, R.I., report on the typhus epidemic in Upper Silesia. Rudolph Virchow: Collected Works In L. J. e. Rather (Ed.), *Journal of Public Health (1985)* Canton, MA: Science History Publications.

[157] Quoted by Borsay, A. (2005). *Disability and social policy in Britain since 1750 : a history of exclusion*. Houndmills, Basingstoke, Hampshire ; New York: Palgrave Macmillan, p.3. quoted from M. M. Wiener, *The Unloved State*

having a stake in public health. Their influence waxed enough with respect to public health so that the enthusiasm for occupational health shifted to sanitation; occupational health became a stepchild of public health. In the process, occupational health further separated into two departments: one, pertaining to factories and quarries and, the other, to mines—a move that either pitted one against the other in the quest for funding or made one unaware of the work of the other. Whatever the case, it served to vitiate substantive attempts to prevent and to compensate for diseases under their aegis. Of course, industry had little interest in any innovations conceived to be costly and it was certainly not interested in government surveillance. On the other side of self-interest, the economic position of miners during the 1860s was relatively good and they had little interest in *rocking the boat*.

This chapter ends with the meek, unrealized recommendations of the *1862-4 Commission* that nevertheless would have proved beneficial if implemented. The following chapter will survey how and why the recommendations were lost in the *blue books* and how the information they contained were arrived at anew.

Chapter 2: Waiting for the Dust to Settle: Silicosis Lost and Found

The *1861-4 Commission's Report*[158] attests to the fact that the commissioners scrupulously attended to their charge. They obtained information about every fact that directly or indirectly might cause, prolong or accelerate miners' lung disease. Even though the *Commission's* recommendations made more of the etiologic differences among its expert witnesses than had occurred, and its conclusions were modest, yet they were practical and could have been constructive. If implemented, they would have improved the health and longevity of miners. However, after receiving the *Report*, Parliament deferred taking action, making a case for political expediency as the reason for convening the *Commission* as opposed to the provision of useful facts with which to implement legislative actions. Unfortunately, the facts languished in the blue books to which the political parties, the medical profession nor the public referred.

The decision to publish blue books was *conceived* as a means of making the proceedings of commissions widely accessible. Nevertheless, they were not as easily available as one might imagine nor were they unbiased. Their publication depended largely on the interests of a number of official bodies, commissions, committees, panels and inspectorates, as well as the preoccupation of voluntary of reformers, physicians and clergymen, while undoubtedly valuable, whether the information contained in blue books ever played a role in reforms is questionable for a variety of reasons. As S. E. Finer has pointed out, the hope was that they would serve as public tools for marketing ideas.[159] In that regard, the government could never fully suppress (or want to suppress) personal authorship in the documents or overt subjective language in the text. It relied on the press to disperse much of the information included in the blue books and often the press chose to publish its particular interests. The government did not distribute blue books freely and their costs limited any wide circulation. With respect to getting at the facts contained

[158] *Report of the Commissioners Appointed to Inquire into the Conditions of All Mines in Great Britain to Which the Provisions of the Act 23 & 24 Vict. Cap. 151 Do Not Apply with Reference to the Health and Safety of Persons Employed in Such Mines* cd. 3389 vol 24.
[159] Finer, S. E. (1952). *The life and times of Sir Edwin Chadwick*. London: Methuen. P. 40.

in them, it was almost impossible to arrange the proceedings so that information was easily accessible (the *1862-64 Commission* blue book is an excellent example).[160]

The medical witnesses who appeared before the 1*861-64 Metalliferous Mining Commission* agreed that the etiology of miners' lung disease was due to siliceous dust and that it was independent of tuberculous consumption. Chapter 2 addresses how that information was lost and finally recovered. Moreover, the competition between local officials having parochial experiential knowledge and state officials with access to more general *facts* often led to sharp criticism of the blue books and denial of their contents. Sometimes, disciplinary rivalry prompted similar tension, such as, medicine versus chemistry.[161] O. Frankel has observed that commissioned work provided a venue for authorship and a public career for many individuals. However, these tiny teams were the creation of a bureaucratic culture dispatched to study a society that was riveted by social relations, hierarchies, collaborations and strong tensions." The publication of blue books did not necessarily signify a willingness to address the information contained in them. Overlooking and discounting were commonly employed techniques for postponing a legislative action. Then as now, political expediency rather than the provision of useful facts often proved the impetus for ameliorative action.

P.G. Calvert Holland, a physician at the Sheffield General Infirmary and an early leader in occupational medicine, wrote in the 1840s that a legislator could only see "the tendency of the various springs which modify the elements of society." Therefore, the legislator's reasoning was "general rather than particular—- comprehensive rather than accurate.… He looks upon the busy field of industry from a distance, through the medium of previous inquirers." Holland, on the other hand, based his own social explorations on "frequent intercourse with the artisan [that] afforded many opportunities of penetrating to the foundations of evils, which are altogether unnoticed by political economists." [162]

Holland provided an early model for investigating occupational diseases, but he was an exception. Medicine employed techniques similar to those of the legislators. When blue books addressed medical problems that it did not necessarily want to consider for political, social or economic reasons, it ignored them. For example, there was good reason to anticipate that the medical men who served the *Commission* would have disseminated the information they had gained, at least among their peers and students. This was not the case. However, though they may have learned much, they had little or no hands on experience of silicosis itself and their affluent practices were far removed from mining communities. It was not until the last years of the nineteenth century that interest in metalliferous miner's lung revived, with little appreciation of the work of the *Commission*. Moreover, as I show, faulty medical constructions further retarded silicosis research almost throughout the nineteenth century.

Several other related circumstances undermined silicosis research and retard legislative action: the misuse of statistics and obvious prejudice of many investigators, very imprecise medical terminology, and a marked reduction of mining in the southwest and economic recession. It was not until the turn of the century when social, political and scientific

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[160] Frankel, O. (2006). *States Of Inquiry : Social Investigations And Print Culture In Nineteenth-Century Britain And the United States.* Baltimore: Johns Hopkins University Press. P. 19.

[161] Frankel, O. (2006). *States Of Inquiry: Social Investigations And Print Culture In Nineteenth-Century Britain And The United States*. Baltimore: Johns Hopkins University Press. P. 138-9.

[162] Frankel, O. (2006). *States of Inquiry: Social Investigations And Print Culture In Nineteenth-Century Britain And The United States* Baltimore: Johns Hopkins University Press. P. 19.

formulations changed significantly that a more precise delineation of silicosis assumed more urgency.

The BMJ, The Lancet and the Generalists

I have described the influence of statistical studies in initiating the *1862-4 Commission* and how the testimony presented before the *Commission* largely confirmed the impression that silicosis among miners was an independent was a dust related, independent disease. There was every reason to have expected the findings of the Commission to stimulate research. This was not the case. Indeed, the paucity of information concerning "miner's phthisis" after the *Commission* terminated is surprising. During the latter half of the nineteenth century, *The Lancet's* and *The BMJ's* readers were doctors actively engaged in general clinical practice who relied on the journals to "keep up.' In order to establish how informed these practitioners were with respect to pulmonary dust diseases, I reviewed these journals, issue by issue, from 1861 through 1907. Nineteen hundred seven (1907) was my end-point because by that date, the etiology of silicosis was established, and commonly accepted. It was clear that scheduling it for compensation was imminent. Strikingly few articles on the subject appeared until the 1880s. This was the case immediately after the *1861-4 Commission* as well. The few that did appear often provide insight into why the medical establishment approached the problem in such a lackadaisical manner.

A notice in the September 24, 1864 *BMJ* announced that Dr. Parson, a house surgeon in the North Staffordshire Infirmary, had received a gold medal award for his Edinburgh University graduation thesis on clay dust inhaled in large quantities as a cause for phthisis among some workers in pottery ware. [163] The journal did not publish the thesis itself. Another article noted that a "cacoplastic" deposit rather than a tubercle characterized a type of phthisis, which was of a more chronic nature than that of "unmixed phthisis."[164] A month later The BMJ (March, 1865) reprinted C. Drysdale's, M.D. Harveian Society of London lecture. Citing Greenhow's 1858 *The different Proportions of Deaths from Certain Diseases in different Districts in England and Wales*, Drysdale told his audience that were it possible to reduce the mortality from respiratory diseases (including phthisis) in Wales to the proportion found in the most favored districts, an annual saving of forty-five thousand lives would occur. There was no associated information about which districts were least favored and how many of those living in these districts were miners; nor did he state how many had died of respiratory disease unrelated to mining. In a single reference to the 1862-64 Commission, *The BMJ* (Feb. 4, 1865) reported that Dr. Angus Smith had testified to the effect that great mischief must arise from the impure, unwholesome air in metalliferous mines. The same article noticed a lower incidence of lung disease in those coalmines in which ventilation had been improved.

In 1867, *The Lancet* published eight lectures on pulmonary diseases that E. H. Greenhow had delivered to medical students at the Middlesex Hospital. They were remarkable for the scant attention given to dust diseases, especially since he had recently served on the *1861-64 Commission*. the lectures provide some clues with respect to why a well-known clinician and teacher like Greenhow avoided the subject. Moreover, since *The Lancet* and *The BMJ* spoke to general practitioners, this slight may have suggested that the general reader need not devote much time to dust diseases. Chronic bronchitis was the subject of the first two lectures. In his introduction, Greenhow noted that chronic bronchitis was a much more *profitable* subject of

[163] Unknown. (1864). *The British Medical Journal*, P. 367.
[164] Unknown. (1865). Original Communications. *The British Medical Journal*, P. 87. .

study for those whose first enterprise should be a thorough study of those diseases that most likely will demand their attention rather than some diseases that are of interest because they are rare and very likely exotic. However, he did remind them of the intimate connection between chronic bronchitis and grinders and stonemasons' lung disease, emphasizing that when dust precipitated bronchitis a constitutional predisposition produced especial irritation. "There can be no doubt that in many instances such causes only excite the disease when a strong predisposition to it already exists, either from a delicacy of the bronchial membrane consequent on previous attacks, or on long-standing local irritation from the inhalation of dust or of over-dried air, or else from some constitutional derangement of health."[165] Of course, a predisposition does much to relieve the mining adventurers of responsibility. Interestingly, Greenhow did not express this opinion when he served on the Commission. His position on this subject is an early but continuing instance of tethering silicosis to heredity and/or to the influence of another disease. It illustrates a recurrent attempt to separate etiologies in such a manner as to make apportionment of one from the other impossible. Greenhow also noted that dust induced lung disease was more prominent among miners and less so, among grinders and stonemasons (not the case). Perhaps he reached that conclusion because the diseases associated with other siliceous industries usually were reported separately, as if they were different diseases altogether; for example, grinder's phthisis and stonemason's phthisis. Listing silicosis by the occupation at fault suggested that the number of sufferers might be small and that the etiologies might be different. If reported as the same disease in all industries, the numbers would have been very large. Greenhow concluded this lecture by pointing out that in some manufacturing districts the proportion of cases of bronchitis arising from the inhalation of dust was enormously increased. However, "the proportion of cases of bronchitis arising from external causes is decidedly smaller, and that from gouty and other internal conditions of the system is decidedly larger, among the higher classes of patients whom we meet with in private practice, than it is among the working classes who form the bulk of our hospital cases."[166]

Greenhow knew from his own investigative work that a very large number of miners suffered non-infectious bronchitis. However, he did not present any cases involving miners either belonging to his practice, seen in referral or discussed during the proceedings of the *Commission*. Rather, he cited three cases involving stonemasons along with two relatively rare examples involving a cabinetmaker and a painter. The stonemasons were of interest in that the origin of their illnesses was sufficiently clear and unrelated to a family or personal predisposition to bronchial disease. Another stonemason (age not given), seen on referral, had felt himself healthy until approximately ten weeks prior to his death when a "cold" violently exacerbated a chronic morning cough of twenty years duration. Greenhow cited this case as an example of the tendency of the disease to remain quiescent because of the peculiar consolidation of the lungs induced by mechanical irritation. Was he implying that unless there was a familial or constitutional predisposition, stonemason's phthisis remained asymptomatic? On the other hand, commenting on the autopsy examination he noted dense consolidation consisting of a hard tissue of gristly consistency involved the lower lobes of both lungs (typical of silicosis) which were almost coal

[165] Greenhow, E. H., M.D., F.R.C.P. (1867). Clinical Lecture on Chronic Bronchitis, Part I. *The Lancet* (February 16, 1867), p. 199-201.
[166] Greenhow, E. H., M.D., F.R.C.P. (1867). Chronic Bronchitis, Part II. *The Lancet*.

black in color.[167] The microscopic and chemical examination of portions of the lungs showed the presence of minute angular siliceous particles, imbedded in considerable quantity in the lung-tissue.

"With these appearances no one could hesitate to believe that the disease had originated in the cause assigned, that it had been of very slow progress, and imperceptibly brought about a condition of lungs which rendered the first catarrhal attack a fatal illness." Importantly, because of the subsequent conflation of silicosis and tuberculosis, Greenhow explicitly differentiated this case from a case of *phthisis*. "I need not tell you how different such a history is from that of ordinary pneumonia or phthisis.[168]

No doubt, the following remarks reflect his class bias and influenced his opinion regarding the purely occupational origin of miners' lung disease.

> [Miners] belong, as I have told you to a class of which, except in certain districts, you will not find such marked examples common even among your poorer patients, and it may seem to you that they have little practical bearing upon the cases of bronchitis you are likely to meet with in private practice … Few private patients, it is true, are exposed to these noxious influences in sufficient intensity to excite bronchitis directly; but very many unsuspectingly inhale dust or bad air in a degree which gradually produces slight bronchial irritation, and renders them exceedingly liable to contract bronchitis on exposure to any immediate exciting cause. Even the habitual traveling along a dusty road is apt to have this affect, and the constant breathing of hot and dry air in dwelling-rooms, especially if combined, as is too common, with imperfect ventilation, is a fruitful source of the same tendency….Useful as medicinal agents undoubtedly are in allaying or curing attacks of bronchitis, I need not tell you that whenever the bronchial affection is even partially referable to an existing external cause, no permanent good can be effected without the removal of that cause. Among the working classes it is often impossible to accomplish a change of circumstances, though I have seen a few such cases, in which the patients recovered surprisingly. However, among the higher classes of patients, whose habits can be more easily modified whenever they become convinced of the necessity, much may be accomplished in that direction. I say whenever the bronchial affection is even partially referable to an external cause, because I must remind you that, as the facts brought out by my analysis have shown, cases of quite simple bronchitis, such as I have brought before you today, are comparatively rare. Even amongst our hospital patients, external causes in a large majority of cases only develop or aggravate hereditary or constitutional tendencies to bronchial disease, and this naturally obtains still more among the upper classes, which are exposed to those causes only in slighter degrees.[169]

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[167] This patient probably suffered tuberculo-silicosis. Cavitations are not characteristic of silicosis. It frequently occurs in tuberculosis where it is commonly seen in the upper lobes as opposed to the lower. Black lung was used commonly to describe the appearance of silicosis; this is confusing since the pneumoconiosis encountered in anthracite mining is also referred to as "black lung" disease.
[168] Chronic Bronchitis, Part II. *The Lancet* (March 9, 1867), p. 232.
[169] Ibid, p. 232

Greenhow thought that, in Metropolitan areas the proportion of cases of bronchitis arising from dust was decidedly small while constitutional findings such as gout, eczema, psoriasis or the finding of albuminuria, were more important than dust in predisposing to bronchitis *especially among the higher classes of patients whom we meet with in private practice* (italics mine).[170] *The Lancet* commended Greenhow for adding a new dimension to such a familiar phenomenon "Our own experience largely agrees with Dr. Greenhow's and leads us to expect great therapeutic advantage from an attempt to associate cases of bronchitis with a diathesis."[171] In fact, gout, eczema and albuminuria are independent of bronchitis. Undoubtedly, this was a statistical sampling error or the result of two etiologically unrelated entities occurring concurrently such as the mistakenly correlating the increase in lung cancer among women with the wearing of nylon hose. Very likely gout was common in his carriage practice, with acute episodes frequently provoked by gastronomic overindulgence.

In 1868, Greenhouse published *On Chronic Bronchitis, Especially as Connected with Gout, Emphysema, and Diseases of the Heart* (Longmans and Co., 1868). Reviewed in the *BMJ* on April 17, 1869, the critic approved the comprehensiveness of the text especially pointing out that the greatest number of bronchitis cases occurred in the upper ranks of society whose members also suffered various dyscrasias such as gout, rheumatism and other constitutional tendencies. In his book, Greenhow did mention that "numerous" cases of chronic bronchitis were due to external causes such as "simple" exposure, mechanical irritation and the effect of hot or other noxious airs and he specifically attributed Grinder's Phthisis to silica exposure.[172] For the moment, dust, as an etiological agent, was relegated to the dustbin, subverted by constitutionalism.

In the lectures that followed those on gouty bronchitis, Greenhow described three forms of emphysema: those occurring spontaneously as the result of a constitutional "vice," those occurring in association with bronchitis or following repeated episodes of bronchitis or those resulting from "senile decadence." Emphysema is a dilatation of the air sacs (alveoli) where the exchange of oxygen and carbon dioxide takes place. Dilatation of these sacs occurs as an inadequate compensatory response to a host of chronic pulmonary diseases such as silica-induced fibrotic replacement of alveolar tissue. The result is reduced surface area available for respiratory exchange causing an accumulation of carbon dioxide and a reduction of oxygen in blood and varying associated symptoms such as breathlessness. Again, as in previous instances in these lectures, Greenhow failed to notice specific occupation in his description of a case of emphysema occurring in a male "labourer." The thrust of his emphasis was that chronic or general emphysema, as a rule, occurred in lungs in which the tissues are already predisposed by some form of degeneration or constitutional factors. Often it only develops following severe and repeated attacks of chronic bronchitis (commonly encountered in miner's lung disease to which he did not allude).

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[170] Greenhow, E. H.., M.D., F.R.C.P. (1867). Clinical Lecture on Chronic Bronchitis, Part I. *The Lancet* (February 16, 1867), p. 199-201

[171] Unknown. *The Lancet*. March 9, 1867 p. 307

[172] Unknown. (1869). *The British Medical Journal*. April 17, 1869.

Considering his knowledge and experience and the extent of the disease, it is difficult to explain why Greenhow left miner's lung disease out of his medical lectures. Though seemingly doubtful that many would choose to practice in mining districts, where one practices or whether or not one's patients are inclined to certain diseases should not exclude them from the medical curricula. Apparently, Greenhow had little hope miners could "change their "circumstances," but medicine is not all about prevention or cure. That he failed to lobby on behalf of miner's health and safety is perhaps more easily explained. Very likely, he did not believe that the medical profession had a role in lobbying, although it was certainly active in lobbying on its own behalf. With respect to his views on whether government should intervene at the expense of business, the DNB's biographical sketch may provide a further explanation. The entry notes that he was not only a zealous teacher and investigator but also "an excellent and thorough-going man of business," a trait often averse to government intrusion.[173] Whether his father-in-law (second marriage), a member of Parliament, influenced his thinking on this subject is not known. There is no justification, however, for assuming that Greenhow was consciously colluding with mining interests in trivializing the importance of silicosis.

Other than the lectures and occasional articles noted above, summaries of the *Pathological Society of London* and of the *Clinical Society of London* meetings provided generalist readers of *The Lancet* and *The BMJ* with occasional snippets of information on subjects even peripherally associated with miner's lung disease until some years after the *1861-4 Commission*. Moreover, instead of affirming the etiological source of miner's lung disease expressed in the Report of the 1861-4 Commission, these indicate that the patho-physiology of miner's phthisis was becoming increasingly problematic.

Finally, seven years after the *Commission* had completed its charge, *The BMJ* (September 2, 1871) printed Charles Barham MD's inaugural address on his accession as president of the south-west section on medicine at the annual British Medical Association meeting held at Plymouth. It was one of the few extensive articles on the subject of miner's lung disease after the *Commission* disbanded. Barham had served on the *Royal Commission on Employment of Children in Mines* in 1842, was a witness at the *1862-4 Commission* and, later, became an inspector for the Cornwall and Devon mining districts.[174] In his address, he summarized the findings of the 1*862-4 Commission* crediting Dr. Peacock and Mr. Bankart with enriching medical knowledge because of the increased precision gained from directly examining a large number of miners. He praised Dr. Farr's statistics "elaborated with his accustomed skill," and he commended Dr. Taylor, Mr. Angus Smith, and Dr. Bernays for their contributions.

However, Barham regretted that the pertinent contributions of the Commission were "buried in blue books." He told his audience that he was reporting the "great facts which stand in high relief on the face of the tables of mortality–the terrible sacrifices of life entailed by

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[173] Stephen, L., & Lee, S. (1885). *Dictionary of National Biography*. London: Smith Elder & co. P. 524

[174] Historically extensive tin and copper mining had occurred in the region, as well as arsenic and china clay extraction. Resulting greatly increased populations in Redruth and the nearby villages. In the 1850s, the town grew rapidly to house a population of over 8,000 as mining prospered. A long decline, brought about by international competition began in the 1860s. Despite vast fortunes produced by mines, often within only one or two years, conditions in the mines remained dreadful. Accidents were frequent, and there were many deaths. Life was cheap. The average life span of the miners was under forty. Women worked on the surface handling the ore. Children started work as young as eight years. Most mining families were desperately poor. By 1880 two-thirds of Cornish miners had emigrated to the mines of the Americas, Australasia and South Africa. Tin mining lasted some 30 years longer but provided fewer jobs., there were no active metalliferous mines remaining. However, tin deposits still exist in Cornwall, and there was talk of reopening South Crofty tin mines.

underground labour in the Cornish mines; and the one paramount disease, designated consumption in those tables, by which that sacrifice is caused." Like Farr and Greenhow, he noted that the difference in mortality between miners and non-miners in seven Cornish districts was not very great until the age of thirty-five, but increased very rapidly thereafter. To obviate fallacy, all the deaths attributed to consumption were listed with those registered under "other diseases of the lung" and the mortality from these causes was compared with that of the other great mining districts and with that of all occupations in England. Deaths from this combination among all occupations per 100,000 in England were 5,596, in Cornwall, 3,037, in South Wales (mostly coal), 2,655 in Stafford (agricultural) and 1,958 in Durham (agricultural). He attributed the overwhelming cause of death among the miners to their occupation. "The disease here designated consumption is not usually connected with tubercle at the ages when the mortality assigned to it is so great." His definition of consumption included chronic forms of pleurisy, bronchitis, pneumonia, asthma, emphysema, and other chest-affections. Slow decline and progressive loss of breathing-power characterized all of them. Barham attributed the disease among miners to impure air from breathing candle smoke and gunpowder, and from exposure to heat and physical exertion. He never mentioned dust although the consensus of those who had advised the *Commission* believed it to be the primary etiologic agent. He also regretted the rarity of autopsy examinations, the findings of which were arguable because the numbers who entered hospitals and were autopsied were insufficient to prove the point. "The miner will never die of chronic disease in hospital; the process is abhorrent to the feelings of survivors at home, as well as very inconvenient in the cottage."[175]

In the same speech, Barham commended Robert Blee's study (privately funded by mine owners) which he had recently read before the Royal Cornwall Institution. Focusing on the four principal mining parishes of the Redruth Union from 1860 to 1870 Blee had compared the longevity of the mining and non-mining population. Miners' children had not suffered a rate of mortality different from other classes unless of feeble frame or having peculiar susceptibility to disease. These suffered the fatal influence of their occupation very early. Twenty eight percent of the miners registered had died between the ages of 10 and 30 years, and of non-miners, only 18 percent had died between those ages. However, the difference in mortality was not very great up to the age thirty-five. From ages forty-five to sixty-five, the proportion of deaths among the mining class was nearly threefold that among non-miners. Only 9 percent of miners compared to 31 percent of non-miners were living at the age 70.

Blee also reported that in the ten years immediately prior to the study fewer men had died prior to age 50 than had died in the preceding ten years and many more had died at an "advanced age." Nevertheless, during that period, 49 percent miners had died from disease of the chest as opposed to only 27 percent of non-miners. Blee concluded that much of the improvement in health and longevity were the result of more efficient ventilation, improved modes of ascent from the depths of the mine, and careful protection from the great and sudden changes of temperature and to lowered prices of bread and other necessities of life. Had that been the case, improvement could have occurred, although an usual "blip" seems more likely. While thanking the Royal Cornwall Institution for their efforts in benefiting miners, Blee begged them to continue their exertions.[176] Blee's final remark makes clear his interest in presenting the

[175] Barham, M. D., Charles. (1871). Charles Barham MD's inaugural address on his accession as president of the south-west section on medicine at the annual British Medical Association meeting held at Plymouth. *The British Medical Journal* (September 2, 1871), P. 253-255.
[176] See below for discussion of how statistics were manipulated.

improved condition of miners and why he was subsidized by mining interests. “They should be careful to invite in no way the Legislature to interfere in what was unnecessary, and in what was not absolutely required, at the expense of the adventurers. Following Blee’s address a number of those present added their own sanguine appraisals. Mr. Hill said the adventurers were always desirous of doing full justice to the miners and spoke very highly of the conduct of the Cornish miners. Captain James, formerly a miner and currently a manager, said that the miners were satisfied with their position. Only a Mr. C. Fox seemed aware that improvement had not been general, pointing out that the last return showed a death every other day in the pits.[177]

The Role of Statistics in Inquiries, Reports and Investigations Relating to Mining and Miners

Statistical inquiries played a major role in inaugurating the *1862-64 Commission*. Subsequently, reports concerning mines and mining were few in number until the marked reduction metalliferous mining in the southwest in the 1870s and the economic slowdown in the 1880s that generated a number of statistically analyzed demographic and epidemiologic studies to provide an index of prevailing conditions. These indicated that in Cornwall, the value of the output of tin, lead and iron at first contracted and then fell sharply—from around 2,000,000 pounds annually in the 1850s to less than 300,000 pounds by the late 1890s. Employment in Cornwall and Wales diminished accordingly. In 1861, there were only 31,847 miners. In 1881, there were 13,005 and by 1901, the number employed had shrunk to 7366. In Devon, mining was also in sharp retreat over the same period. The lack of work forced miners to immigrate to overseas mining operations where dust hazards were even greater than at home.

Regional demographics also reflected poor economic performance. While the population of England and Wales was growing rapidly during the second half of the nineteenth century (roughly doubled) that of the Southwest stagnated. The numbers of male miners migrating and emigrating, already strong in the early ninetieth century, became a flood during the third quarter, with Cornwall losing a higher percentage of its population during this period than any other area in England or Wales. Most of these workers were 20 to 39 years of age. Nevertheless, despite the loss of Cornish and Welsh metalliferous miners, the number of employed miners in the rest of the country remained considerable. Understandably, the worsening economy impeded any attempt to improve health and safety conditions. The lack of investment, the necessity to drill deeper, and the pressure to minimize costs and to increase productivity may have further augmented exposure and risks in these mines with a relative increase in silicosis.

The regular reports to Parliament by mining inspectors were occasionally summarized by the press and in *The Lancet* and *The BMJ*. These indicated that despite diminishing orders, 475,329 persons continued to engage in mining. Of these, 382,979 worked underground. The remaining 93,350 included 4956 women who worked above ground. Unfortunately, in their report, metalliferous miners and coal miners were bundled together. Since the hazards of metalliferous mining and those of coal mining were distinctly different (many more accidents in coal mines versus much more lung disease among metalliferous miners), grouping underground coal and metalliferous miners together masked the significant percentage of afflicted metalliferous miners. One would not have known necessarily whether accidents in the coalmines had diminished or whether the incidence of silicosis had diminished. Nor was the reader informed as to the number of children employed and their ages, even though the health problems

[177] Unknown. (1871). The Health of Miners. *The Lancet* (Sept. 2, 1871), p. 268.

of child laborers was an ongoing, common concern throughout our period. *The Lancet* also reported that in 1878 coal production had diminished by over a million and a half tons, ironstone by 1,267,129, fireclay (silica) by 187,955 tons and slate (silica) by 25,123 tons. Concurrently "hard times," had forced 19,062 miners out of work. It is not surprising that the absolute number of casualties diminished because of the declining work force. Accordingly, there were 1,413 in 1877 and 811 in 1878. The author of this report noted that the incidence of accidents had diminished, and, significantly, that. The figures provided were for accidents and not for illness. That the numbers suffering miner's lung disease were not included may have been deliberate since the time *was not ripe for intervention*; perhaps, it was best not to include figures about which nothing could or would be done. Summarizing the Mining Inspectors Annual Reports for 1884, *The BMJ* (September 26, 1885) noted that only 39,332 workers were employed underground in metalliferous operations. The summary did not mention that these men, exposed to siliceous dust, risked incurring a much more lethal lung disease compared to the much larger proportion of men exposed to coal dust. Even though a smaller number, their risk of death and disability from occupational disease were much greater than that of coal miners.[178]

Individual mining inspector's reports also appeared in *The BMJ* and *The Lancet*. Occasionally, these mentioned the deteriorating health of industrial workers subjected to siliceous dust as well as miners, exemplifying the earnest concern most mining inspectors expressed regarding occupational disease even when his charge did not include manufactories. Inspector Fosbroke's report, in *The BMJ* on June 24, 1882 pointed out the high incidence of phthisis among needle-workers. In 1880, 24 deaths from phthisis had occurred in Alcester (population not more than 20,000) and 21 deaths in the Evesham and Stratford Districts (population not quite 26,000), and he urged the appointment of more factory inspectors to monitor them. He was especially desirous that the Medical Departments of the Local Government Boards launch investigations of all those industries associated with a high incidence of lung diseases, recalling that the Medial Department of the Privy Council authorized such a study on a large scale in 1873:

> Mr. Simon always recognized the importance of continuing investigation on the subject. A series of fresh inquiries by various inspectors was indeed begun under his auspices in the year 1873, but the results were never published, and administrative changes put a stop to their further prosecution. The question is, however, one of no little hygienic as well as practical interest, and deserves exact and systematic study by a skilled investigator.[179]

Simon's investigation was never published and Fosbroke did not volunteer whether it was withheld purposively. Clearly, however, studies during the succeeding twenty years soft-pedaled the extent and severity of silicosis. They often suggested that miner's lung disease was waning, and implied that owner instigated ventilatory measures were responsible. Since mining in the southwest was diminishing to rump of its former economic importance, silicosis in that region seemed less pressing. However, this was not the case with metalliferous mining elsewhere or in other industries exposing their workers to large quantities of siliceous dust. Nevertheless, statistical reports indicated that the diminished number of miners afflicted with silicosis was due to improved working conditions rather than reflecting a smaller work force; in fact, with *improved* equipment producing finer dust, it is very likely that the percentage of siliceous miners

[178] Unknown. *The British Medical Journal (*September 26, 1885), P. 615.
[179] Unknown. (1882). *The Lancet* (June 24, 1882), P. 952.

suffered an increased incidence of lung disease. Moreover, investigators studied siliceous industries, one by one, reinventing the wheel by going through the same process of discovery. The result of reporting on industries separately was to minimize for the public the real prevalence of silicosis.

The extent of silicosis was further minimized by reporting on accidents rather than disease. For example, in 1887, *The BMJ* summarized a mining inspectors' annual report in which he indicated the well-known disparity between accidents occurring in anthracite mines and those occurring in metalliferous operations. Eight hundred seven fatal accidents (197 fewer than the previous year) and 146 non-accidental deaths occurred in the collieries; but only 62 took place in the metalliferous mines (three more than the previous year) where an additional 65 died non-accidentally. The new figures showed the accidental death rate in metalliferous mines to be one for every 565 persons employed. Deaths from illness would have tipped the scale in favor of siliceous miners. The author informed his readers that since the passage of the *Mining Acts*, statistics had shown a material reduction in the number and fatality of accidents and suggested that further exacting and painstaking legislation might be unwarranted especially in view of the cost and effort to make it at all operative. In addition, he employed another common *feint*. He placed the burden of responsibility for accidents on those employed by relying who failed to exercise caution, and he believed that any mechanical means of reducing injuries would remove the salutary influence of responsibility. In most studies involving accidents, miners, themselves, became the transgressors, having directly contravened known laws and special rules by engaging in actions, often reckless and savouring of insanity. Not merely were they a danger to themselves as individuals, but likewise to all their fellow labourers in the mine. [180]

Another typical example of statistical manipulation appeared in an 1894 issue of *The Lancet* summarizing the fatalities that had occurred in mining operations. It separated them according to whether they had taken place after the enactment of the *Coal Mines' Regulation Act of 1887* or after the *Metalliferous Mines' Regulation Acts of 1872 and 1875*. Again, accidents but not diseases were listed. Accidents in the collieries far outnumbered those in metalliferous mines.[181] Of course, accidents in metalliferous mining were a relatively minimal hazard but the readers may have felt reassured by this statistic, forgetting that if occupational disease had been listed, its incidence in metalliferous mining would have loomed large, especially had the disabled living at home or those who had died at home had been included.

Casting findings in a more favorable light or blaming workers for accidents varied with reports that were critical of these findings. Dr. William Ogle, successor to Farr at the GRO was well aware of how data could be manipulated or framed erroneously. For example, in his Decennial Supplement for the period 1871-80, he noted that many occupations such as mining required the maintenance a considerable standard of muscular strength and vigor. As soon the health and strength of a man fell below this standard, he was forced to give up his occupation, and either take to some lighter form of labor, if available, or, if his health was too much impaired, retire altogether from work. Consequently, the death rates in these heavy occupations were lower than was the case, compared with the death rate in lighter occupations and still more, as compared with the death rates among those persons listed as having no occupation at all. Many of those who had to give up hard labor took on odd jobs of a more or less indefinite character, and subsequently were listed in the census and in the death registers not as miners but as general labourers, as messengers, or as costermongers, street sellers, etc.:

[180] Unknown (1887). Labour and Mortality in the Mines. *The British Medical Journal* (April 2, 1887), p. 739.
[181] Unknown. (1894). Untitled. The fatalities which occurred in mines last year... *The Lancet*(Feb. 3, 1894), p. 289

> Thus, it comes about that the death rates of general labourers, of messengers, and of street sellers . . . appear to be of appalling magnitude, as also do those of persons returned as of no occupation. Under these headings, however, are comprised the broken-down and the crippled, who have fallen out of the ranks from all the various industries, as well as those who have been throughout life debarred, by natural infirmities or other causes, from following any definite occupation.

Ogle believed that another serious flaw occurred when death rates only reflected the relative healthiness of different industries since these several industries did not start on equal terms as regards the health of those who followed them.

> A weakling will hardly adopt the trade of a blacksmith, a miner, or a railway navvy, but will preferentially take to some lighter occupation, such as that of a tailor, a weaver, or a shop man. This defect in the death rate gives an unfair advantage to such industries as demand much strength or activity in those that follow them. Such industries are in fact carried on by a body of comparatively picked men stronger in the beginning, and maintained at a high level by the continual drafting out of those whose strength falls below the mark.

Additionally, Ogle noted that in comparing the mortality of occupations at different and perhaps remote periods, one had to ascertain whether any epidemic or pandemic diseases had been seriously prevalent among the general population during either of the periods compared; for in that case considerable allowance must be made for anything like accuracy. In 1881, in an attempt to cut down on ambiguously worded death certificates, he created a death certificate for medical practitioners (I shall return to this important topic below). [182] Ogle further contributed to the understanding of silicosis in his *Mortality in Relation to Occupation*, which appeared in the *Transactions 7th International Congress Hygiene and Demography*, in which he pointed out that metalliferous Cornish miners suffered a striking increase in phthisis while coal miners proved much more fortunate. [183]

On the same subject, John Arlidge (see below) questioned the "startling proportion" in which *phthisis* figured as a cause of mortality because miners were often not distinguished by the type of mining in which they engaged. In addition, Arlidge considered the death returns seriously vitiated by the popular nosology that assigned the majority of deaths to *consumption*, a term which the registrars, often be transformed into phthisis. Arlidge believed that the fatal lesion should be listed as pulmonary cirrhosis or fibrosis that had its own nosologic difficulties. He correctly noted that the cause of death was frequently disregarded and supplanted by secondary symptoms of greater prominence.[184] For example, when right heart failure caused profound swelling of the lower extremities and abdomen (edema and anasarca) which was present at the time of death, the cause was listed as heart failure rather than advanced silicosis.

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[182] *Supplement to the Registrar General's Forty-fifth Annual Report*, PP 1884–85 XVII (C.4564). p. xxii-xl.
[183] Rosen, G. (1943). *The History of Miners' Diseases, A Medical and Social Interpretation*. New York: Schuman's. P. 239..
[184] Arlidge, J. T. (1892). *The Hygiene Diseased and Mortality of Occupations*. London: Percival & Co. P. 281.

In 1893, Dr. Newsome (author of the then standard textbook on vital statistics) delivered a series of lectures at the Sanitary Institute of Great Britain. *The Lancet* summarized his introductory lecture on statistics in its December 23, 1893 issue. Newsome insisted that an accurate statistical account of any occupation required showing the number of deaths as a percentage of the total number of persons engaged in that occupation as well as listing the number of annual deaths at each age relative to those living at the same age. Similarly, the proportion between those engaged in any given occupation and the number dying in it, expressed as a rate per 1000, was fallacious since the death rate varies immensely at different ages. He was critical of the Registrar's *Fourteenth Annual Report* for this reason. The *Report* gave the death rate among farmers over twenty years of age as 28 per 1000 while that of tailors was only 20 per 1000. However, the death rate of tailors and farmers listed at matching ages would have revealed that farmers were much healthier than tailors were. The only trustworthy method was to compare the mortality of those engaged in one occupation with the mortality of those engaged in another occupation at corresponding ages. For example, drawing inferences comparing the mean age at death of bishops and curates with another group, tailors for instance, made little sense since men did not usually become bishops until they have reached middle age. The death rate depends on the ages of the living as well. *The Lancet* added that these rules have been so much disregarded as to render a large portion of the occupational statistics previously published untrustworthy. Also worthy of consideration, but more difficult to elicit was classifying the social conditions of the decedents.[185]

Dr. John Tatham's, M.A., M.D. contribution to the supplement of the *Fifty-fifth Report of the Registrar-General* (published by the Queen's printers in two parts beginning in 1897) using updated statistical methods, affirmed the large numbers affected by occupational diseases. Silicosis figured prominently. *The Lancet* summarized the *Repor*t in its issues of January and February 1898. Part I dealt with the general mortality with regard to age and cause in England and Wales and in the several registration subdivisions. Part 2 analyzed the mortality of males above the age of fifteen years engaged in the more important of the British Industries during the three years 1890-92. While previous supplements had addressed similar subject matter, the reviewer for *The Lancet* was impressed by the greater importance Dr. Tatham had attached to occupational mortality and by his addition of a new Healthy District Life Table for 1881–90. "The subjects dealt with in this volume are replete with interest to all members of our profession whether engaged in the practice of State medicine or not."[186]

In Chapter I, I briefly outlined the early history of the GRO, and of the statistical movement in Britain. M. J. Cullen has pointed out that later in the nineteenth century, the GRO's *fact finding* changed in response to the rise of a widely dispersed of metropolitan and provincial statistical societies. Many prominent industrialists were members who used their societies to pursue empirical evidence that would confirm their earnest beliefs; namely, that it was not industrialism but urbanism and public ignorance that were to blame for proletarian poverty. Their solution was to inaugurate locally devised measures to promote sanitation, hygiene and public education to assist the deserving non-pauper poor. This strategy also enabled them emulate the tutelary paternalism of past generations of landowning gentry. This suited equally the growing numbers of doctors, of employers, and of other local worthies whose interests harmonized with those of industrialists and propertied notables dedicated to economic principles of industrial capitalism and its implied social relationships. The promotion of sanitation, hygiene, and

[185] Unknown. (1893). Industrial Hygiene. *The Lancet* (Dec. 23, 1893), p. 1580-1.
[186] Unknown. (1897). The Mortality of Occupations. *The Lancet* (Dec. 25, 1897.), P.1689.

education permitted the anxious upper and middle classes a politically safe medical discourse with which to wrestle with the disturbing spectacle of urban suffering and squalor amid their own guilty prosperity. Poverty was the consequence of disease or ignorance, and not the provision of inadequate wages.[187] Given these interests and its advocates, improving occupational health and safety was not a high priority. It is not too much to suggest that Chadwick had cast his shadow over both the GRO and the medical department of the Privy Council. Unfortunately, when interest in pursuing the problems of occupational health recurred ever-growing Treasury penury restrained it.

Demographic and epidemiologic projects at the GRO and in the various statistical societies increased, in numbers and in scope proportionately to the mounting economic pressures of the period. Simon Szreter maintains that at this time the GRO assumed a thoroughly political role that would inform all its subsequent analytical work. Its reports and statistical analyses calculated how to best promote its own institutionalized practices and its vision of ordered progress and social improvement, and to preclude any possible assistance to antagonistic alternative programs. Szreter also claims the GRO provided ammunition to other forces and to the political nation favoring a particular set of reforms in the battle to alter the social conscience. Toward the end of the century, following Farr's departure it became an institution at bay despite the good work of William Ogle and John Tatham, the Office's superintendents of statistics in the years 1880 to 1907. [188]

What is Phthisis? What is Consumption? The Problem of Terminology

Part of the problem of educating medical men with respect to miner's lung disease of miner's phthisis or consumption (used interchangeably) was how one understood the definition of phthisis and consumption. Attending an 1873 Pathological Society of London Meeting, Burney Yeo, M.D., F.R.C.P. recalled that some years previously an eminent pathologist proposed discontinuing the use of phthisis altogether since nobody knew what another meant when employing it: "We cannot explain our views on the subject without entering into tedious statements concerning conflicting views." [189] Earlier Yeo had urged the use of tuberculosis rather than phthisis, recognizing that" phthisis or rather tuberculosis" was in the front rank of respiratory diseases and statistics might be more faithfully rendered if the later term were used.

Similarly, The Lancet, in 1868, suggested to a query regarding definition tht the most common employed definitions of *phthisis* and *consumption* were that they represented gradually emaciating illnesses usually associated with pulmonary complaints, and often, but not always, employed interchangeably with pulmonary tuberculosis. This definition was solidly entrenched; to replace phthisis and consumption with more specific designations was an "up hill" battle fought as late as the early 1900s. The non-specificity of these terms greatly influenced the understanding of miner's lung disease as well as how it was reported. Many clinicians assumed that "miners' phthisis" or "miners' consumption" was a variant of tuberculosis, and reported it as such. Tuberculosis, in this period was incurable. Silicosis was not curable but it was preventable

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[187] Cullen, M. J. (1975). *The statistical movement in early Victorian Britain : the foundations of empirical social research*. Hassocks Eng. Harvester Press; New York Barnes & Noble. P. 43.
[188] Szreter, S. (1996). *Fertility, Class And Gender In Britain, 1860-1940*. Cambridge, England ; New York: Cambridge University Press. P. 85-89.
[189] Yeo, B., M.D., F.R.C.P., Lond. (1897). Pathology of Pulmonary Phthisis, A Retrospect. *The Lancet* (July 24, 1897), P. 182-4.

and amenable to arrest. To assume that silicosis was a form of tuberculosis was to deny any hope of treatment, in this case, prevention or arrest.

However, *phthisis* and *consumption* were not the only cause of confusion. In naming specific lung diseases, investigators often employed poorly understood terminology (save for the histologists) such as fibrous, fibroid, tubercle, tubular granular, scrofulous, epithelial, catarrhal, bronchial, cirrhotic, hemorrhagic, embolic, interstitial and hemorrhagic to which they then appended phthisis or consumption. Essential to a universally recognized usage was an exclusive name (e.g. silicosis, rubella, rubeola, etc.) without the addition of phthisis or consumption or an appended histological description. Moreover, the use of histological descriptions terminologically does not enhance specificity. Lung tissue has only a limited number of responses to a wide range of noxious stimuli, and thus, more than one disease often provokes the same histological response; thus, a fibrotic or interstitial response is common to a number of lung diseases. Fibrosis does not suggest etiology nor does imprecise *phthisis* or *consumption*. *Fibrotic phthisis* or *consumption* could refer to tuberculosis, asbestosis, silicosis, bysinosis, etc. and, in the case of consumption, to cancer as well. Notwithstanding the above, histological attachments to another imprecise term often at the pleasure of the investigator confused rather than elucidated the clinician. How could the practitioner appreciate descriptions such as "tubular granular," or "cirrhotic," or "fibroid" (as opposed to fibrous) as denoting a specific disease?

Andrew Clark M.D. called attention to this problem at a Clinical Society of London meeting on February 28, 1868. During his report of a case of *fibroid phthisis* (in which the leading histological facts were the absence of tubercles) a member asked him to characterize phthisis. He defined it as a progressive consolidation of the lung, with subsequent destruction of the consolidated parts.

> So far, [he believed] all would agree with him. What he maintained in opposition to those whom he termed 'thorough-going limitarians,' was that this process was not always of the same pathological nature, and that the common notion that it resulted invariably from the deposit in the diseased organ of a foreign body called tubercle, which must work itself out, was a false one.

In spite of his criticism, Clark classified phthisis into groups that all had some histological change associated with it. Thus, he distinguished tubercular pneumonic phthisis, hemorrhagic phthisis; and fibroid phthisis. Fibroid phthisis, for example, had a definite mode of origin, progressing slowly, was typically febrile and occurred usually in persons of middle age. It was often associated with similar changes of the skin and internal organs, and even in the nervous tissue. In his opinion, his scheme was somewhat of an improvement over the generality of *phthisis*. "By giving a name, he said, to this affection, all that we do is to label a certain class of cases as forming a recognizable group, and do not necessarily commit ourselves to any theory"[190] Few of the features of Clark's description fit silicosis and, in fact, he may have been describing another type of fibrotic lung disease (e.g., scleroderma). To use *phthisis* at all was regrettable.

Greenhow, present at the same meeting, was also critical of the use of *fibrous phthisis*. He cited two out of many cases in which the etiologies were different, albeit the pathologic findings were similar. Both of them had progressed slowly, and the patients had retained their

[190] Unknown. (1868). Medical Societies. Clinical Society of London. Friday, Oct. 23rd, 1868. Dr. C.J.B. Williams, vice-President, in the Chair. *The Lancet*(Oct. 31, 1868), p. 569-570.

general health, and pursued their ordinary occupations over a long period. In one, the disease had evidently arisen from the inhalation of dust (probably silicosis though, typically, he failed to mention the nature of the dusty occupation). In this particular case, he was willing to allow that it was independent of any constitutional cause or predisposition.[191] In the other, he attributed the cause to a blow on the chest sustained in a fight (fibrosis due to massive hemorrhage). Greenhow noted the pathologic resemblance of Clark's and his cases to those seen in the so-called peripneumonia exudativa of bovine animals. In this situation, a solid flesh-like mass, intersected by white bands and having the appearance of a granular mass criss-crossed by fibrous bands replaced normal lung tissue. At the end of the evening, both Greenhow and Clark stressed the need for specificity but offered no terminological system to implement it. [192]

Greenhow was also present at a Pathological Society of London meeting on April 20, 1869. Again, he added to the etiological/histological confusion. Sending around the room a specimen taken from a miner and demonstrating what he understood as *interstitial pneumonia*, he attributed the disease to the inhalation of minute particles of soot, dust, or metallic substances. He believed the associated pigmentation was due to the inhalation of sooty particles and blood products about *old miliary tubercles*. Dr. Bastian, correctly objected to Greenhow's use of the term *interstitial pneumonia* since most cases of miner's lung disease showed no evidence of the inflammatory changes of pneumonia but an overgrowth or substitution of the fibrous tissue of the lung.[193]. At the same meeting Wilson Fox M.D., commented that recent researches had convinced him that the pigment found in Greenhow's specimen also derived from external sources as well as from crystals of blood pigment. There was another point in Dr. Greenhow's case which he thought deserved attention: the character of the affection thus induced. He thought it remarkable that, in proportion to the number of persons exposed to the inhalation of these irritating substances, consolidation of the lungs occurred in comparatively few. In these cases, he believed that it was possible that an additional element made the lungs especially prone to consolidation, possibly a tubercular diathesis that caused the inhalation of irritating substances to form tubercles. It is difficult to know whether Fox was referring to tuberculosis with fibrotic scarring or to silico-tuberculosis. Had he mentioned the occupation of the cases he was describing, it would have been helpful.

At the Clinical Society of London meeting on October 23, 1868 Dr. Julius Pollock, exhibited a case of chronic disease of the right lung, with contraction of the right side of the chest. Pollock believed the specimen had features of what he called "fibroid phthisis." Another member, Dr. Thompson objected because the case was not characteristic of that described previously by Dr. Clark, adding that he had never met with a case that corresponded to Dr. Clark's description. Richard Payne Cotton, M.D., F.R.C.P., also challenged Clark. He acknowledged that marked fibrous infiltration occurred in certain cases of phthisis but he took issue that such cases represented peculiar forms of phthisis requiring their own classification. For him, phthisis was one of the diseases of organic degeneration, consisting essentially in the development or deposition of a certain lowly organized and variously constituted material called tubercle. Like Fox, he believed that in the great majority of consumptive cases such deposition was unrelated to inflammatory action, and that inflammation, whether pulmonary, bronchial, or pleuritic was a secondary response. Cotton differentiated consumption from phthisis, claiming

[191] If Greenhow omitted occupation, the error was egregious. Most likely the fault rested with the editor,
[192] Medical Societies. Clinical Society of London. Friday, Feb. 25th, 1868. Sir Thomas Watson, Bart., President in the Chair *The Lancet* (Mar. 14, 1868), p. 347-348.
[193] Unknown. (1869). Pathological Society of London, Tuesday, April 20th, 1869. *The Lancet* (May 1, 1869), p. 604.

that consumption had a completely different mode of origin arising either from simple idiopathic pneumonia, or from that form of lung-inflammation.

Cotton believed that the fibrosis he associated with *consumption* followed tubercle formation while the fibrosis of *phthisis*, as distinguished from *consumption*, was the result of an inflammatory process that invited *tubercle* seeding and decay. Nevertheless, despite the confusing differentiation of *phthisis* and *consumption*, Cotton and Clark admitted that where fibrosis occurred alongside tuberculosis, the associated fibrotic changes either preceded tuberculosis or occurred secondarily as the result of lowered resistance caused by tuberculosis. The initiating element could well have been *dus*t and tubercle could have followed in due course or vice-versa. How was the clinician to understand this?

Even restricting *phthisis* and *consumption* to tuberculosis would have been helpful. In his Croonian Lecture published in *The BMJ* in 1867, Clark had noted

…that, though the scientific sin chiefly prevalent among us in these days was the reproduction of old ideas under the guise of new and often specious terminology, we were not free from the opposite sin, which, though honester in character, was not less injurious in its results. This was the repression and concealment of a new, under the cloak of an antiquated, and sometimes absurd, phraseology. [194]

As an example, Clark cited the term *chronic pulmonary phthisis*. He reminded his audience that prevailing theories prejudiced the observer to favor what was in unison with others. In order to clarify the ambiguous nature of *chronic pulmonary phthisis*, Clark urged careful collation and comparison of symptoms with the results of clinical pathological inquiry. Most importantly, as I noted above, he also attributed terminological confusion to the fact that gross anatomic similarities often were the result of an organ's limited response to injury. For example, fibrosis takes place in response to dissimilar irritants that ultimately might reveal themselves microscopically. In turn, symptoms might reflect disturbed function without necessarily indicating a specific disease. *Phthisis* when it referred to wasting and *consumption* when it referred to *exhausting* might be acceptable but if they were to denote a disease these terms only served to create confusion.[195] A popular medical textbook expressed the same opinion:

> The tendency to take exclusive views, to contend that a single cause produces a result, when that result may follow different causes, often leads to error in medicine as in other subjects. The inflammatory process is not so abruptly limited and so specific in its character that we are always able to speak positively of its existence or non-existence in particular cases.[196]

Lecturing in 1873 on "The Varieties of Phthisis," Reginald Southey, M.D., F.R.C.P. offered another compelling reason for not using pathologic observations to qualify terminology. Morbid anatomy at the autopsy table posed vexing problems because those patients who had survived sufficiently long for the full measure of lung-disorganization to occur differed significantly from those patients who died accidentally or from another disease in which *phthisis* was incipient. In early cases, the difference from normal was often indistinct, inviting various

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[194].Clark, A., M.D. The Croonian Lectures at the Royal College of Physicians. *British Medical Journal* (March 16, 1867), 300-301.

[195] ibid

[196] Palmer, A. B., M.D., L.L.D. (1883). *On the Science and Practice of Medicine or the Pathology and Therapeutics of Internal Diseases* (Vol. II). New York: G.P. Putman. P. 251-2

interpretations. With this in mind Southey urged distinguishing beyond a general description such as phthisis, separating distinct varieties with distinct features and a distinct course.[197]

In 1882, on the same subject, *The Lancet* printed T. Henry Green's M.D. F.R.C.P. (senior assistant-physician to the Brompton Hospital for Consumption and Diseases of the Chest) lecture delivered at Charing Cross Hospital. Green complained that by placing distinct pathological varieties under the heading of *phthisis*, so many forms of chronic pulmonary disease were included as to make the term useless. In order to improve the specificity of *phthisis* he excluded three of the less common morbid conditions of the lung that differed materially in their pathology and their clinical findings from that large class of diseases usually included under the common term. These included chronic pneumonia (the inflammatory disorganization of the lung that results from bronchial blockage), Corrigan's cirrhosis and pulmonary lesions that were syphilitic. Under the term *phthisis*, he included those forms characterized by progressive pulmonary consolidation, by the frequency with which the consolidation undergoes softening and disintegration, and by the fact that the upper portions of the lung are in almost all cases the first to become involved. Phthisis according to this definition would have included pulmonary tuberculosis and silico-tuberculosis (but not pure silicosis in which fibrosis usually begins in the lower lobes and does not soften). [198] He placed miners' lung disease in the comparatively rare, which was obviously wrong. Moreover, retaining *phthisis* at all, left it open to *old* usage.

Even after determining that the tubercle bacillus fulfilled Koch's postulates (1882), phthisis and consumption rather than tuberculosis, with all their vagaries, continued in common medical usage. As late as 1891, at a discussion on the etiology and prevention of tuberculosis in the section on medicine of the British Medical Society, Dr. William Walker (Pollokshaws) also regretted the synonymous use of phthisis and consumption. He regarded phthisis as a purely tuberculous disease and differentiated consumption as occurring in strong healthy men following certain occupation such as stone masonry, quarrying and mining. Laborers in these fields had lung affections, with fibroid deposit and cavities, along with general wasting and ultimate dissolution that he hesitated to call tuberculous. "There was, in fact, the purely tuberculous disease, *phthisis*, and there was the other class, very common in his district, in which there was lung affection and wasting, but which he regarded as separate and different from the purely tuberculous."[199] Finally, after several decades of rarely alluding to the lung disease found among siliceous workers and of suggesting its rare occurrence, a physician reminds the reader that, indeed, it is common, at least, in his district. Obviously, it was essential to discard phthisis and consumption, a matter for taxonomists, the medical schools and editorial board of medical journals. In the meantime, *old-timers* remained perplexed.

Conflating Silicosis and Tuberculosis

Paradoxically, Koch's discovery that tubercle bacillus was the specific cause of the disease only aggravated the mistaken conflation of silicosis with tuberculosis and further delayed

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[197] Unknown. (1873). Abstract of Lectures on The Varieties of Phthisis, by Reginald Southey, M.D., F.R.C.P. *The British Medical Journal* (Feb. 8, 1873), p. 137-139.

[198] Unknown. (1882). Lectures on Phthisis. Delivered at Charing Cross Hospital,
By T. Henry Green, M.D., F.R.C.P.
The Lancet (May 20, 1882), p. 513-514.

[199] Unknown. (1891). Section on Medicine. Discussion on the Etiology and Prevention of Phthisis,
P. H. Pye-Smith, M.D., F.R.S.. President. *The British Medical Journal* (Oct. 17, 1891), p. 846-849..

the elaboration of silicosis. The frequent but inconstant presence of tubercle in siliceous lungs caused vigorous debate among leading investigators. Did the morbid affects of silica inhalation depend on the additional presence of tuberculosis or did the presence of tubercle indicate that tuberculosis had intervened? Prior to Koch, the significance of the tubercle was not so problematic. Early on, Gaspard Laurent Bayle (1810) and Laennec (1811), members of the Paris school, both proposed that tubercle was the hallmark of a particular disease and the result of its unique substance, not found in healthy tissue. Furthermore, Bayle had established that tubercles developed prior to the appearance of any symptoms. F.J.V. Broussais (1772-1838), also highly regarded, disagreed believing that the tubercle was a non-specific inflammatory product but was opposed by Pierre Louis (1787-1872) and J. L. Schoenlein (1793-1864).[200] They remained convinced that tubercle defined a specific form of consumption leading the way for the Paris school to establish clinical criteria for diagnosing that form of "consumption" that had become the most common cause of adult deaths in Europe.

Somewhat later, Jean Antoine Villemin (1827-1892) and Dr. William Budd (1811-1880) demonstrated that tubercular matter obtained from human subjects reproduced tubercular changes when inoculated in rabbits. Villemin concluded that in all the degrees of its evolution, and in all its forms, fine miliary, softened caseous matter, hard calcareous tubercle, and the yellowish tubercle, the tubercle comports itself in an identical manner.[201] Working independently, Budd found that tuberculous matter cast off by persons already suffering from the disease disseminated and reproduced the same form of disease, with identical signs and symptoms in all its victims.[202] Chauveau, a colleague of Villemin's, suspected that the tuberculous material consisted of minute virulent particles, imperceptible by the microscope. Several well-known English physicians including John Simon agreed with Chauveau and confirmed Villemin's work. Simon presented his confirmatory evidence at a London Pathological Society meeting in 1867.[203] The same year, Edward Charlton, M.D. reviewing the diagnosis and treatment of diseases of the chest for *The BMJ* claimed to have demonstrated the existence of a "false tubercle" which did not result in the cavitations characteristic of tuberculosis. He believed it was precipitated by irritating particles inhaled into the lungs such as the siliceous dust created by dressing freestone. Charlton's experience included stonemasons and dry grinders. He did not comment on miners.[204]

> There are few among us who will not have met with these deceptive cases, especially among stonemasons and dry grinders of metal. We never received a stonemason into hospital with the general symptoms of phthisis, but we felt hesitation and a doubt as to the true character of his case. When expectoration

[200] Schoenlein was the first to employ "tuberculosis" (1839)
[201] Unknown. (1867). M. Villemin's Experiments with the Inoculation of Tubercle. *The Lancet*, P.184-185
[202] Budd, W., M.D. (1867). The Nature and the Mode of Propagation of Phthisis. *The Lancet*, P. 451-452.
[203] Unknown. (1867). The Inoculability of Tubercle. *The Lancet*, P.367-368.
[204] Subsequently, improved microscopes in the late 1860s allowed . Adolph Kussmaul's working on the continent to clearly identify the presence of silicosis in a sufficient number of post-mortem specimens. in 1870, the French physician, Visconti, and in 1871, the Italian physician, L Rovida were the first to employ the term silicosis (derived from the Latin, *silex*, flint). Unfortunately for clarity of meaning the term did not take hold among British physicians who continued to use miners' phthisis until the 1920s when international medicine insisted that phthisis referred solely to tuberculosis, or to silicosis associated with tuberculosis, the definition of miners' phthisis after that date. It was not until 1950 that the term phthisis was dropped completely by agreement of the international medical community [Katz, 1994 #218] p. 17.

> contained cretaceous material, we always felt more hope than in ordinary phthisis…this was pointed out to the medical profession twenty years ago by Dr. Calvert Holland, but it was reserved for Virchow to explain the presence of these cretaceous masses, and to distinguish between true and false tubercle.[205]

As I have noted previously, most of the witnesses at 1862-4 Commission also were convinced that the tubercle was specific to tuberculosis. The presence of tubercles in some cases of silicosis was due to the predisposition of these patients to tubercular infection. Indeed, the absence of tubercle in some cases of silicosis was proof that the morbidity of silicosis was independent of tuberculosis. Unfortunately, after Buhl (1873) and Klebs (1877) failed to confirm that inoculation of tubercle reproduced the same disease as that suffered by the donor, investigators became less confident about the tubercle's specificity. Subsequent research efforts in Britain, ultimately disproven, suggested that the inoculation of diverse "noxious' matter might also give rise to tubercle.

In 1881, the result of Reinhardt's exhaustive microscopic examination of tubercles was reported in *The BMJ*. He had erroneously found that they were nothing more than common inflammatory products.

> And so tubercle has, perhaps, come to this, that it is merely a form of those common changes which are most conveniently grouped as inflammatory, with this addition, that the presence of a special structure impresses on it a special form." Noting that usage of "tubercle" and phthisis varied markedly, he argued for some general system of nomenclature lamenting that the terms were employed by the new school "with a breadth of application which at one time threatened to extinguish the former terms altogether.[206]

Even though Koch's discovery convinced continental investigators that tubercle was specific to tuberculosis, many British scientists remained skeptical. Burney Yeo, M.D., F.R.C.P. remembered a protracted discussion about the anatomical relations of pulmonary phthisis to tubercle that had occurred at an 1873 Pathological Society of London meeting. He recalled Dr. Wilson Fox asking:

> Is there no way out of this confusion?… There are no subjects in medicine which would, I think, so dispel a spirit of dogmatism and exclusive adherence to one's own opinions as the study of phthisis, on which such differences have existed, and do exist, among the greatest men of the past and present, as may well make anyone doubt the accuracy of his own observations and the justness of his conclusions."[207]

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[205] Charlton, E., M.D. (1867). Diagnosis and Treatment of Diseases of the Chest. *The British Medical Journal* (Aug. 24, 1867), p. 146-148.

[206] Unknown). *The British Medical Journal* (October 1, 1881), P. 545.

[207] Yeo, I. B., M.D., F.R.C.P. (1897). An Address on the Pathology of Phthisis: A Retrospect, Delivered before the Torquay Medical Society. *The Lancet* (July 24, 1897), 182-184.

On the other hand, By 1884 Dr. J. Andrew, M.D., F.R.C.P., and physician to St. Bartholomew's Hospital was convinced, declaring in his Lumleian Lectures that there was "no tubercle without bacillus, no bacillus without tubercle."[208]

That the tubercle was not always present in cases of miner's lung disease did little to dispel the theory that it was the essential malign agent. Some went as far as denying that fibrosis without tuberculosis was injurious and that much of the scarring and contraction seen in silicosis was result old, advanced tuberculosis. This was essentially John Haldane's position. It was to go unchallenged until early in the next century, much to the detriment of silicosis research and to efforts to indemnify its victims.[209] R. Douglas Powell, M.D., F.R.C.P working at the Brompton Hospital for Consumption and Disease of the Chest and at the Middlesex Hospital also believed that occupational phthises required prior infection with the tubercle bacillus for its pathological consequences.

> These conditions [occupational lung diseases] give us the signs of incipient phthisis, and they determine the seat of the lesion should it become confirmed. They appear to me to be at least generally attributable to constitutional or acquired delicacy, plus an exciting cause, be it cold, dust, or hemorrhage. Engrafted upon these primary lesions comes the bacillus parasite, imparting to the lesion its infectiveness, its invasiveness–in a word, its malignancy.[210]

Whether tuberculosis preceded or followed silicosis, few denied that if a miner had suffered tubercular phthisis, his illness progressed more rapidly when exposed to a dusty environment. In addition, if the worker became tubercular after prolonged exposure to siliceous dust, pathologic changes proceeded more rapidly.

An auxiliary issue was how patients with silicosis contracted tuberculosis. Writing in the *Report of the Collective Investigation Committee of the British Medical Association, on the Communicability of Phthisis of the British Medical Association on the Communicability of Phthisis*, Yeo had argued that there was a constant potential for tuberculous infection directly from patients but he could not resolve the relatively low anticipated incidence with reality. This was especially the case when it existed in a household free of tuberculosis.[211]

Based on its low degree of infectivity, some discounted the clinical significance of the bacillus altogether.[212] Others, though agreeing that the disease was mildly infectious thought that tubercular bacillus established itself more readily due to soil conditions and weather, a "want of physique," malnutrition and loss of vitality. They believed that the tubercle bacilli did not breed in healthy tissue. Whether inhaled, ingested or inoculated, the currents and excretions of a health

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[208] Andrew, J., M.D., F.R.C.P. Lon. (1884). Lectures on the Aetiology of Phthisis; Lecture I. *The British Medical Journal* (April 5, 1884), P. 665-669.

[209] John Scott Haldane (1860-1936), a Scottish physiologist, enjoyed great authority during our period for his work blood gasses, on toxic gasses in the mines and his finding that the anemia of Cornish miners was due to hookworm infestation of the water pools in which they worked. He was not a physician and not an expert in tubercular diseases. It is difficult to understand how his conflation of tuberculosis and silicosis held sway in the medical community for so long a period.

[210] Powell, R. D., M.D., F.R.C.P. (1884). On the Causative Relations of Phthisis. *Introduction to a Discussion in the Section of Medicine*. *The British Medical Journal* (Oct. 11, 1884), p. 698-703.

[211] Yeo, I. B., M.D., F.R.C.P. (1885). On Some Points in the Etiology of Phthisis. Read before the Medical Society of London.,. *The British Medical Journal* (April 18, 1885), 772-776.

[212] Coghill, J. G. S., M.D. (1886). Proceedings of the Southern Branch: Isle of Wight District. Thursday, January 28th, 1886. Etiology of Phthisis. *The British Medical Journal*(March 20, 1886), 550-551.

body would eject them. In this configuration, certain elements encouraging infection were remediable such as over-crowded, ill-ventilated workshops, foul air, and indestructible glass dust and steel filing suspended in air of factories, all responding to good ventilation.[213]

Similarly, Andrew also summarized popular opinion during the course of his 1884 Lumleian Lectures on the etiology of phthisis (published by both The BMJ and The Lancet). He underscored the relationship between phthisis, modes of life and industrial occupations but he also called attention to the great difficulty in isolating the influences of work shops and occupations from that of the home, especially that of the sleeping room. Even so, he recognized a subgroup consisting of certain occupations whose employees suffered a high death rate from pulmonary diseases albeit living in well-ventilated and uncongested homes. Surprisingly, he did not provide a list of these occupations, believing it sufficient to mention the chief causes of their unhealthiness such as the presence in the air of fine dust of any kind, of carbonic or of other noxious gases, exposure to great temperature variation, and working in cramped quarters.

Andrew could not account for the excess of phthisis in some trades by direct contagion only. If one accepted that occupational lung disease was distinct from tuberculosis, one still had to account for the possible role of prior infection, or predisposition and or its association with tuberculosis. Where the conditions of home-life and those of work were unhealthy, he believed it was impossible to determine the exact contributions of labor and of home-life and, by extension the impossible task of apportioning compensation. While Andrew admitted that there were physical conditions more or less beyond the worker's control, he also subscribed to the prejudices of his class, blaming the bad habits of laborers, calling them "blots upon his so-called civilization." Additionally, there were active elements of a different order such as those connected with some special, though unknown modification of bodily constitution rendering those in whom it existed more or less liable to attack by phthisis. It occurred in large numbers of men, of one common stock, or, if unrelated, yet living under similar physical and social conditions, either inherited or congenital or acquired. Encountered in so many different forms, and under such widely different circumstances, Andrew found it difficult to believe that its nature was always the same, differences occurring because of race, inheritance, congenital origin, and acquired diatheses.[214]

Of course, the environmental aspects of these arguments had particular appeal to those engaged in public health. Its practitioners were keen to preserve their interest and conviction against those who would limit disease to a microbe. It was difficult for them to abandon Chadwick's absolute devotion to sewage and to make it subsidiary to bacteriology. However, for those concerned with occupational health, the necessity to provide adequate ventilation and dust removal was unaltered by Koch's discovery; it took time, nevertheless, to employ bacteriology to defeat the theory that the tubercle bacillus was the dominant agent in symptomatic silicosis. Under these circumstances, silicosis was destined to remain tethered to tuberculosis well into the first decade of the twentieth century. Until this question could be answered compellingly, it was impossible, for purposes of compensation, to apportion how much of the impairment or the death of a miner was due to occupationally induced, compensable silicosis and how much was due to

[213] Harris, T., M.D. Lond., M.R.C.P. (1889). Clinical Lectures Delivered to the Students of the Manchester Royal Infirmary during the Summer Session, 1889. Lecture I. The Varieties of Pulmonary Phthisis. *The Lancet*(November 16, 1889), 989-991.

[214] Andrew, J., M.D., F.R.C.P. Lon., Lumleian Lectures on the Aetiology of Phthisis, Lecture II. *The Lancet* (May 3, 1884), P. 785.

unrelated, non-compensable, non-occupational tuberculosis. Histology could not provide such a fine distinction.

Gairdner (Glasgow) addressing a section of the meeting of the British Medical Association in 1884, told his audience that a miner might suffer lung disease even if not disposed to tubercular phthisis. However, in addition to impure air, he noted the role of heredity or "life under the horrible conditions that used to obtain." In fact, Gairdner was taking his cue from Francis Galton who claimed that poverty was hereditary. In his view, no physician could doubt the hereditary character of phthisis and the disposition and constitution conveyed from the parent to the child. Gairdner claimed that the extent of phthisical hereditary transmission was borne out by statistics suggesting that heredity was responsible for 25 to 30 per cent of cases of phthisis under treatment in the UK. It is not at all clear whether Gairdner was referring to the hereditary nature of tuberculous phthisis, or to dust phthises or to both. In addition, he failed to recognize the large number of workers who followed their fathers in the same dusty occupation. In this case, heredity was responsible for the environment.[215] However, they would remain liable to tuberculosis.

Gairdner also remembered prisoners in the jails "under the old system," living like animals in close confines, and breathing stale, imperfectly ventilated air. However, as was often the case in this period, he painted a *rosy* picture. Even in districts where there had been a great deal of imperfect ventilation, he said that national statistics had shown a comparative diminution in phthisis occurring where there was less of the massing together of human beings. Having stressed heredity and its role in the environment, he was ready to admit that there were circumstances, in which poor ventilation did not result in tubercular phthisis, for example, coalminers who suffered collier's lung disease in the absence of tuberculosis.

Gairdner believed that despite the above, conditions in the mines were improving. Though he used to see silicosis very frequently in the pathological department of the Edinburgh Infirmary, he did not find it often now. In fact, he did not think he had seen more than two or three cases in the last four or five years. He a attributed the decrease solely to the much greater care now taken in regard to the ventilation of mines. Progress had effaced an unwholesome past. This may have been true for tuberculosis in those areas where an improved standard of living had occurred and for colliers working in well-ventilated mines. However, it only applied (if it applied at all) to hard rock miners because the absolute numbers had diminished because of recession in the industry. With regard to prevention, Gairdner was fully in accord with the advice of Dr. W. R. Thomas: change occupation, move to a more salubrious environment, settle in well-ventilated living quarters, exercise regularly out of doors, sponge-bathe part or all of the body, and eat proper food, such as bread, milk, meat, etc. Unfortunately, it was advice that few could follow, especially, sick laborers or miners with a wife and a dependent family.[216]

Others, a minority of medical men, relying on their clinical experience recognized the independent morbid effects tuberculosis and silicosis. For example, Dr. William's 1878 lecture at the Hospital for Consumption and Diseases of the Chest, Brompton on the varieties of phthisis emphasized the marked fibrotic changes occurring in the lungs among laborers exposed to siliceous dust. He listed various kinds of dust or grit encountered among fork-and-knife grinders,

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[215] Williams, T. C., M.A., M.D., F.R.C.P. (1878). The Varieties of Phthisis. *The British Medical Journal* (March 4, 1878), P. 701-2

[216] Thomas, W. R., M.D., M.R.C.P. (1884). British Medical Association, Fifty-First Annual Meeting. On the Varieties of Phthisis, and the Curability of Some in Certain Stages. Read in Section on Medicine. *The British Medical Journal*(February 23, 1884), 352-353.

colliers and button makers but surprisingly did not include metalliferous miners who suffered silicosis in much greater numbers than did colliers. Correctly, he considered that if tuberculosis intervened, it was a secondary event.[217]

In 1880, Reginald Thompson analyzed the signs and symptoms that might serve to distinguish ordinary forms of phthisis from *infective* phthisis (yet another example of confused terminology). Those characteristic of pulmonary tuberculosis (*infective phthisis*) and uncharacteristic of silicosis (*ordinary phthisis*) included an early dry hacking cough, rapid emaciation, chills, night sweats, fever at regular intervals and, finally, episodic productive cough tinged with blood or frankly bloody and a propensity to attack the upper lobes of the lungs. On the other hand, *ordinary phthisis* was characteristically bilateral, mostly involving the lower lobes as opposed to the upper lobes with minor constitutional complaints. "The physiognomy of the patient is not that of phthisis, and the colour of the skin is of a dull sallow hue, far different from the pallor which is so marked a feature in the consumptive patient. [218]

R. Beveridge, M.D., Physician to the Aberdeen Royal Infirmary recalled that some years previously he had investigated the similarities in several points between the granite workers and those working other trades known to be unhealthy. The results indicated that granite workers early in their work histories were a very healthy body of men, little subject to phthisis. During the years of his observation, the total number of cases of phthisis among the general population of Aberdeen did not increase despite a rapidly rising population; however, it was on the increase among the granite-masons. The only change in that industry was an increase in orders for polished granite, not the conditions of the trade, or the duties of the workers. Rather than relating the increased incidence to increased exposure to dust, he emphasized the difference in the physical condition of the laborers. During the previous five to ten years, stout, robust, country *lads*, previously driven away by the concentration of land in a few hands, had been enticed by the high wages current in the trade in America to emigrate in large numbers. Weaker town bred laborers were taking their place, inferior in physical strength to their predecessors and "unable to resist the exposure necessary to keep the work from being positively injurious because of physical degeneracy.[219] He seems to suggest that mine owner had no alternative but to employ the physically inferior driven from the land to unwholesome cities and unable to emigrate as did their more robust compatriots.

Dr. Myrtle, addressing the British Medical Association Meeting in 1884, did get it right. He noted that the frightful wasting among the stone-workers in Edinburgh was the result of dust exposure and that the phthisis they suffered was neither communicable nor tubercular. He was convinced of the validity of this observation because the wives and daughters of consumptive stone-workers, who nursed them, often in a box-bed, remained well. Despite the close contact, he had never encountered a single case in which the sick had communicated their disease to the healthy. Myrtle also claimed that the diminished incidence of coalminers' lung disease was the result of better ventilation. Indeed, though coal-dust produced a certain deposit in the lung, he had never encountered any tubercular "mischief." This fact was so well known among colliery-surgeons that the late Dr. Hamilton, of Falkirk, had come to believe that inhaled carbon was a cure for phthisis. In fact, he had invented a machine for inflating the lung with lampblack. Myrtle

[217] Williams, T. C., M.A., M.D., F.R.C.P. (1878). The Varieties of Phthisis. *The British Medical Journal*, P..637-639.
[218] Thompson, R. E., M.D., F.R.C.P. (1880). The Infection of Phthisis. *The Lancet*, P.726-728.
[219] Beveridge, R., M.D. (1876). On the Occurence of Phthisis Among Granite Masons. Read before the Medical Section of the British Medical Association in Sheffield, August 1876. *The British Medical Journal* (October 14, 1876), 489-70.

recalled Powell's remark that miners' phthisis began with bronchitis and that their sons suffered the same sequence of bronchitis leading to phthisis because they undertook the same profession with the same hereditable disposition. In fact, he had himself saved several young men from phthisis, the family inheritance, by causing them to give up an occupation.[220]

John Arlidge's Milroy Lectures (1889) delivered at the Royal College of Physicians in London greatly advanced the understanding of silicosis. He clearly differentiated silicosis from tuberculosis, maintaining that tuberculosis occurred secondarily and that it was not essential to the destructive affect of silica per se. Recalling the work of Greenhow, Kussmaul, and Tardieu, he had confirmed that the hard black matter found in in the lungs of workers inhaling hard rock dust contained was mostly silica and was responsible for the extensive fibrosis and the local or general shrinking of the chest. Indeed, a specimen of a potter's lung that he had submitted for chemical analysis as early as 1875 had revealed a composition of 47.78 silica, 18.63 alumina and 5.5 iron peroxide.[221].

Arlidge's investigations revealed that early on, that dust damage was slowly progressive and did not cause severe symptoms until 10 to 20 years of exposure before advancing to such a degree as to throw the workman out of employment or even to cause him serious inconvenience. Even at a time when the malady was fully established, general health, aside from shortness of breath, seemed relatively unimpaired, and the patient may not have been compelled to cease work. This contrasts sharply from tubercular patients who are much more symptomatic at an early stage, suffering fever, night sweats, and extreme fatigue. However, when tubercles did supervene in the silicotic process, they accelerated the onset of disabling symptoms.

…we have to accept the fact that dust induces a malady bearing a strong similitude to tubercular phthisis and yet that the malady is not tubercular in actual nature. In cases of potter's consumption from inhaled dust occurring under my own observation, bacilli have been sought in vain, excepting where lung abscess has occurred, preceded usually by hemoptysis and other indication that tubercular mischief has been at work and complicated the malady. For it cannot be denied that the dust-produced lung disease may coexist with tubercular phthisis; and further, that where labour is prosecuted in a dusty atmosphere, tubercular mischief, in those constitutionally predisposed to it, is more likely to happen.[222]

Arlidge based his opinion on clinical experience, pathological observation, and experimental investigation. He correctly noted that though tubercle occurred often in miners' phthisis, the excessive fibrosis was the result of irritation caused by dust; tubercle was a secondary and accidental infection that contributed little more to the fibrosis caused by silica dust. It was unfortunate that dust did not awaken attention early by causing any immediate tangible consequences because its slow disabling action was ever progressive. Until dust had already worked its baneful results upon the smaller bronchial tubes and air cells by causing

[220] Powell, R. D., M.D., F.R.C.P. (1884). British Medical Association, Fifty-Second Annual Meeting. Proceedings of Sections. On the Causative Relations of Phthisis. Introduction to a Discussion in the Section on Medicine. *The British Medical Journal* (October 11, 1884), 698-703.

[221] Arlidge, J. T., M.D., B.A. Lond., F.R.C.P., Lond. (1889). Abstract of the Milroy Lectures on Occupations and Trades in relation to Public Health, Delivered before the Royal College of Physicians of London by Arlidge, John T., M.D., B.A. Lond., F.R.C.P., Lond., Lecture II. *The Lancet*(March 30, 1889), 615-616.

[222]Arlidge, J. T., M.D., B.A. Lond., F.R.C.P., Lond. (1889). Abstract of the Milroy Lectures on Occupations and Trades in relation to Public Health, Delivered before the Royal College of Physicians of London by Arlidge, John T., M.D., B.A. Lond., F.R.C.P., Lond., Lecture I. *The Lancet*(March 16, 1889), 515-516.

cough, spitting and difficulty breathing, it was tolerated with indifference — an inconvenience of the trade. [223]

Arlidge's last 1889 Milroy lecture dealt more specifically with the nature of the production and the liability that workers incurred by working in metalliferous mines, quarries and allied occupations. He had observed that lung disease varied with the quality of the stone and with whether one worked the stone in the open air or in closed sheds or mining shafts.[224] The danger associated with mining in poorly ventilated area was certainly not new information. He also referred "grinders' rot encountered among Sheffield glazers and dry grinders and recalled that Dr. Calvert Holland (1843) and Greenhow (1858) had described the same lung disease associated with dry grinding and the *hanging* and *racing* of grindstones. The fatality varied with the cutlery manufactured. Scissor grinding caused the most casualties, followed by fork, razor, needle and penknife grinding. He had found that the vast quantity of dust created when one considered that grinding a single razor resulted in a weight loss of eight to ten ounces. Earlier, during an inspection of the needle works at Redditch, Arlidge had collected dust from the bench of a grinder near the stone. On microscopic examination, he again found the specimen to contain numerous angular particles of silica with a minimal amount of steel filings (due to the advanced arrangement in the factory that removed 96 per cent of the steel particles).

Because of his researches into a previously almost neglected field of preventive medicine, Arlidge urged that dust exposure in siliceous industries demanded the most thoroughly qualified medical supervision of factories and workshops. He urged periodical medical examination and inspection of persons employed in recognized unhealthy trades to prevent progression. He believed, correctly, that if the workman leaves the dusty employment for work in agriculture or in other occupation in air free from irritating particles, the disease may be practically arrested; that is, although the part affected may proceed to obliteration, the disease would not extend to other parts of the lung, and the portion destroyed would be negligible as a factor of health and capacity.

Arlidge was also interested in the social aspects of the disease.

> Each business asserts to itself a social status, or else submits to having one thrust upon it; and unfavourable, as well morally as physically, is the position of those labouring people whose lot is cast among occupations which by common consent carry with them the badge of inferiority or degradation, or at best do not elevate them in the social scale. The calling of a scavenger, of a common labourer having no definite trade, or of a miner, in all which occupations the labour required is of a coarse character, calling chiefly for animal strength, the absence of any stimulus to awaken sentiments of self-esteem must operate in a depressing direction on the individual.[225]

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[223] Unknown. (1898). Occupational Mortality. Second Notice. Letter to the Registrar-General on the Mortality of Males engaged in certain occupations in the Three Years 1890-92. Supplement to the Fifty-Fifth Annual Report of the Registrar-General. By John Tatham, M.A., M.D., Dublin. *The Lancet*(January 22, 1898), 215-216.

[224] Arlidge, J. T., M.D., B.A. Lond., F.R.C.P., Lond. (1889). Abstract of the Milroy Lectures on Occupations and Trades in relation to Public Health, Delivered before the Royal College of Physicians of London by Arlidge, John T., M.D., B.A. Lond., F.R.C.P., Lond., Lecture II. *The Lancet*(March 30, 1889), 615-616.

[225] Arlidge, J. T., M.D., B.A. Lond., F.R.C.P., Lond. (1889). Abstract of the Milroy Lectures on Occupations and Trades in relation to Public Health, Delivered before the Royal College of Physicians of London by Arlidge, John T., M.D., B.A. Lond., F.R.C.P., Lond., Lecture II. *The Lancet* (March 30, 1889), P. 615-616.

However, Arlidge was not free from bias regarding worker conduct. Even in hazardous work, he concluded, that there yet might be a recklessness of conduct with regard to health and life. “Moral influences will bear fruit in physical results; so that where an occupation presents in itself no conditions positively injurious to bodily health, it may indirectly, by its moral and social surroundings, prove to be so”[226] Again, these collateral circumstances would have made apportionment in compensation cases difficult. How does one subtract non-occupational environmental and hereditary factors when determining an award for occupational factors? Once again, the political and social crop up in what was otherwise an excellent scientific discourse. This is an ongoing issue through to the present.

Arlidge also listed extrinsic or collateral circumstances affecting workers and exercising a variable effect on their health. Among these, he included crowded living quarters, unsanitary, poorly ventilated housing, diet and the moral atmosphere of the locality. He thought the racial character of the workers played a role and he attributed the percentage of constitutional disease among the workers to early marriages or to intermarriages.

Moreover, Arlidge exaggerated the technical and political advances aimed at improving occupational health and safety. He observed that in the Sheffield needle pointing industry, extraction tubers attached to each grindstone collected the major part of the dust, converting a health-destroying trade into a comparatively harmless one.[227] Despite Arlidge’s optimism, the percentage of those suffering silicosis was not diminishing, especially since the development of more sophisticated drills and grinders caused increasingly minute particles of silica to be more readily absorbed into lung tissue. He offered no statistical evidence for the efficacy of the device but he did conclude his lectures with an apology for the small place allotted to statistics because of limited time as well as a deficiency of homogeneous statistics with which to deal. [228]

Recognizing that silicosis was the same disease in all activities exposing workers to siliceous dust, Arlidge proposed investigating the agent that affected health rather than studying the same disease, occurring in various occupations seriatim as this would prove tedious and repetitious. Had his advice been followed, many lives might have been improved, either by virtue of better ventilation in the mines or by compensation. Following his lectures, Arlidge included much of this material in *The Hygiene Diseases, and Mortality of Occupations* (1892). It was the most comprehensive discussion of occupational medicine to date.

Following Arlidge’s lead, Thomas Oliver, M.D. successfully convinced many well-recognized specialists that siliceous dust was the primary offender in silicosis. Participating in a discussion of silicosis at the annual meeting of the British Medical Society (1903), he characterized silicosis as the deeply pigmented and somewhat solid state of the lung found in miners who during life exhibited signs and symptoms of pulmonary disease of a more or less chronic character due to the dust-laden atmosphere in which they worked. Oliver noted that there were varieties of dust and that each type resulted in a lung disease of varying severity. Each had a descriptive name such as the anthracosis of the coal miner, silicosis or chalicosis of the quarryman and gold miner, and siderosis of the steel grinder. Pneumoconiosis was the generic term for all forms of dust disease of the lung. In his description of an autopsy performed on a gold miner, Oliver observed, “Without doubt, the lungs of miners occasionally are the seat of

[226] Ibid. P. 616.
[227] Ibid. P. 774.
[228] Unknown. (1898). Occupational Mortality. Second Notice. Letter to the Registrar-General on the Mortality of Males engaged in certain occupations in the Three Years 1890-92. Supplement to the Fifty-Fifth Annual Report of the Registrar-General. By John Tatham, M.A., M.D., Dublin. *The Lancet* (January 22, 1898), P. 246.

tuberculosis…The non-detection of tubercle bacilli is no proof of the lesion being non-tuberculous. In 1916, looking back on the previous 12 to 13 years, Oliver wrote:

> The publication of my paper in the *Lancet* [June 14, 1902] was the cause of the South African Government appointing a commission to enquire into the subject. The findings of the commission confirmed the statements I had made so that steps were ultimately taken to improve the conditions under which mining operations were carried out on the Rand. I have always maintained that the difference between gold miners' phthisis [silicosis] and ordinary pulmonary consumption is that the former at its inception is a purely dust disease and only later becomes tuberculous by the bacillus of Koch becoming engrafted upon it. Get rid of the dust in the mine therefore and much of phthisis will disappear. Men whose bronchial tubes are the seat of recurrent catarrh and whose lungs have become irritated by dust are, if the fibrosis is not too well developed, more liable to be injuriously affected by the tubercle bacillus than those whose lungs are healthy. [229]

Oliver along with other prominent workers such as Proust and Charcot also maintained that there was a coal miners' phthisis without tubercle.[230] Thus, when present, tubercle represented an accidental infection that hastened death. The disease was not familial or hereditary in nature. Improved water systems for the further removal of dust diminished the incidence of the disease. Coal miners also risked exposure to silica by working through sandstone strata, shale or segger clay in which case the disease they incurred followed that of silicosis rather than anthracosis. The very fine silica spicules occurring in dust were tenacious and especially irritating. They penetrated the alveolar wall and stimulated excessive amounts of fibro-connective tissue resulting in contraction and loss of surface for respiratory exchange. A marked excess of fibrous tissue, numerous particles of coal and silica along with tubercles and cavities characterized tuberculosis in these cases. It was non-tuberculous not only early on but could remain so during the entire course of the disease. Also, Oliver showed that the inhalation of gasses existing in a strata or the result of explosive fumes did not cause miners' phthisis.[231] He reiterated this opinion at a meeting of the Institute of Mining and Metallurgy reported by *The BMJ* in 1904, attributing very little importance, as far as the causation of miners' phthisis was concerned, to the influence of gases in the mine. However, he thought that fatigue and rapid variations of temperature made the miners subject to pulmonary catarrh, probably paving the way for the dust in the mine to act more harmfully upon the lung.

Haldane and Thomas presented a paper at the Institute meeting as well. They drew attention to the high rate of mortality from lung disease among metalliferous miners compared with men employed in coalmines and admitted the importance of siliceous dust. However, they persisted maintaining that tuberculosis was essential to the morbid outcome. At the same meeting, D. Harrington Sainsbury reviewed the various theories advanced by Haldane and

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[229] Oliver, S. T., M.A., M.D., L.L.D., D.Sc., F.R.C.P. (1903). Miners' Diseases discussed at the Section on Medicine at the Annual Meeting of the British Medical Society, 1903. *The British Medical Journal*, (August 8, 1903), 400.
[230] Oliver, S. T., M.A., M.D., L.L.D., D.Sc., F.R.C.P. (1916). *Occupations From The Social, Hygienic And Medical Points Of View*. Cambridge Eng.: University Press. p. 82-3.
[231] Oliver, S. T., M.A., M.D., L.L.D., D.Sc., F.R.C.P. (1903). Miners' Diseases discussed at the Section on Medicine at the Annual Meeting of the British Medical Society, 1903. *The British Medical Journal* (August 8, 1903), 572.

Thomas and expressed his opinion that the tendency of the times was to regard tubercle as playing too great a part in miners' phthisis.[232]

At the time when silicosis was coming to be accepted as an independent occupational disease an acute form was affecting large numbers of miners further stimulated interest. Many of these miners were British, working in the Bendigo gold mines (Australia), in the Mont Cenis and St. Gothard tunnels and, most especially in the Rand gold mines. The discovery of gold in the Witwatersrand in 1886 drew large number of unemployed miners of whom the majority (85 per cent) was British, fifty percent being Cornishmen. Though long accustomed pulmonary symptoms, they had no reason to anticipate the rapidly progressive form of silicosis they encountered the South Africa. Almost no reference to the problem appeared in the press until long after the disease was well established. Very likely, as Elaine Katz has suggested, censorship can be attributed to the Rand lords who controlled the press and to collusion on the part of the entire community, including its medical personnel (the hospital records were very inadequate). In fact, silence was sufficiently pervasive so that the earliest public reference to the problem in Britain was a report filed by a Transvaal Government Mining Engineer in December 1901 that referred to the death of over two hundred rock drillers (17 percent of the rock drillers hired prior to the War).[233] The cover-up was finally unmasked in 1902 when large numbers of British miners forced to return home by Anglo-Boer War (1899-1902), were desperately and often terminally ill.[234] Another early reference to the problem appeared in a letter to the *Mining Journal* written by Mr. Nicholas Trestrail, and C.E., Redruth.

> In my yearly visit to my native county of Cornwall I have been deeply impressed by the fearful death rate which occurs amongst Cornish miners who have returned from Johannesburg… I know of no trade as dangerous as that of the fast method of working the deep levels of the S. African gold mines. What I propose is that immediate steps be taken to ascertain facts. The death rate among Cornish miners as far as I can get information is a scandal to our civilization.[235]

These miners were healthy when they left Cornwall to take up gold mining in South Africa. Six years or so later, they returned having saved considerable sums but ruined in health and likely to die a few months from silicosis. Gold miners' phthisis was appropriately attributable to the deep mines, poor ventilation and high temperatures. The rock, pierced by compressed air drills, raised thick clouds of fine dust unless water was sprayed upon the rock concurrently. When sufficient dust took firm hold upon the lungs, those structural changes ultimately converted its soft spongy tissue into hard fibrous material. At that point, the men begin to decline in health, to suffer from recurrent colds on the chest, and become short of breath. Ultimately, when the disease was well developed, they became emaciated and weak and were unable to walk a few paces without panting. .and obliged to give up work. Very few of these rock drillers survived more than six or seven years.[236]

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[232] Unknown. (1904). The Causes and Prevention of Miners' Phthisis. *The British Medical Journal*(June 11, 1904), 1387-1388.
[233] Katz, E. N. (1994). *The White Death: Silicosis on the Witwatersrand Gold Mines 1886-1910*. Johannesburg, South Africa: Witwatersrand University Press. P. 3.
[234] Katz, E. N. (1994). *The White Death: Silicosis on The Witwatersrand Gold Mines 1886-1910*. Johannesburg, South Africa: Witwatersrand University Press. P. 7.
[235] Quoted by Katz, E.N. (1994).. *The White Death: Silicosis on the Witwatersrand Gold Mines 1886-1910*. Johannesburg, South Africa Witwatersrand University Press.. P. 118.
[236] Oliver, T. (1916). *Occupations from The Social, Hygienic And Medical Points Of View*. Cambridge Eng.: University Press.

As noted above, in an article, appearing in *The Lancet* on June 14, 1902, Oliver unequivocally attributed gold miner's phthisis to the inhalation of dust, and likened it to stonemasons' and steel grinders' phthisis, a relationship not often acknowledged previously. He recognized that dry drilling was "justly regarded by the miners themselves as a fertile cause of lung disease," now intensified by the Ingersoll drill which produced very large quantities of fine dust. Furthermore, Oliver was apprehensive that the Anglo-Boer War having ended, miners would rush once more to South Africa. In the event, he urged altering and improving their methods of mining, and revising and strengthening their mining regulations. Unrealistically, considering the economy, he advised miners quit their work in the very earliest stages of illness and to seek outdoor employment.[237] The *Mining Journal* also publicized Oliver's findings with an immediate call for an enquiry by Cornish and other newspapers. [238]

Shortly thereafter, *The Lancet* published its first report on the silicosis "epidemic" on the Rand, but it seems improbable that its contributors had no knowledge of the silicosis "epidemic" prior to that date. Nevertheless, the journal took credit for informing its readers that its initial report occurred before the South African government was willing or able to release its data. In fact, It was not until September 1902, that the Transvaal government and the Secretary of State for the Colonies finally publicly recognized the extent of the problem. Both *The Lancet* [239] and *The BMJ* [240] published a letter from Dr. G. A. Turner, the acting medical officer of health of the Transvaal indicating that his department was most anxious to obtain any information that would enable it to deal with the disease of gold miners' phthisis. One might have anticipated that their clinical experience would have made these officers experts on the subject. A later issue of *The Lancet* reported that the Johannesburg Chamber of Mines was offering three awards of £500, £250 and £100 for the best suggestions and devices to reduce rock-drilling dust. Most unusually, the author of the also recommended government intervention, at least in South Africa. [241]

The extent of the disease in the Transvaal was so pervasive that W. S. Caine, the MP for mining constituencies of Camborne, solicited the intervention of Joseph Chamberlain (Colonial Secretary at the time) to appoint a Transvaal Commission. He reminded Chamberlain that the death rate among the white rock-drill miners on the Rand, having an average age of 35 years was greater than 70 per 1000, a particularly striking figure given British coal miners and Cornish tin miners experienced a mortality of 6.3 per 1000 and 8.1 per 1000 respectively at an average age of 35. Native African rock-drillers suffered a lower mortality, 42 per thousand (age not given), attributed to their working intermittently with consequent less overall dust exposure.[242] "Almost an entire generation of foreign miners, whose skills pioneered the South African gold mining industry, died from silicosis." The dead included pioneer rock drillers as well as the second cohort of rock drillers who joined the labor force after the Boer War and a significant number of general miners as well.[243].

P. 81-3.

[237] Oliver, Sir Thomas, M.A., M.D., L.L.D., D.Sc., F.R.C.P. (1902). *The Lancet*, June 14, 1902.

[238] Oliver, T. (1916). *Occupations from The Social, Hygienic And Medical Points Of View*. Cambridge Eng.: University Press. P. 82

[239] Turner, G. A., Acting A.M.O.H. for Medical Officer of Health of the Transvaal, Pretoria. (1902). Correspondence dated July 29, 19
Gold Miners' Phthisis. *The Lancet*(September 6, 1902), p. 707.

[240] Turner, G. A. (1902). Correspondence, July 29, 1902. Miners' Phthisis. *The British Medical Journal* (September 6, 1902), p.729.

[241] Unknown. (1902). The Prevention of Miners' Phthisis. *The British Medical Journal* (October 18, 1902), p.1296.

[242] Unknown. (1904). Miners' Phthisis in the Transvaal. *The Lancet* (May 14, 1904), p.1362

[243] Katz, E. N. (1994). *The White Death: Silicosis On The Witwatersrand Gold Mines 1886-1910*. Johannesburg, South Africa: Witwatersrand University Press. P.5.

During localized strikes in 1902, the Transvaal Miners' Association demanded that the government to publicize the health risks associated with gold mining. Both the press and Lord Milner, the newly installed Governor of the Transvaal Colony, sharply criticized their efforts refusing to admit that hard rock drills caused most of the problem. However, Milner did appoint the *Weldon Commission* to investigate the causes and extent of the disease among miners. In 1903, The South African *Miners' Phthisis Commission* issued its report. The *Commission* found the pulmonary death rate of miners on the Rand was six times greater than that of the remaining Transvaal population and that silicosis affected one-quarter of the underground white miners; Black African miners were much less affected since they tended to be intermittent workers and thus, less exposed.The evidence fully convinced the Commissioners that high incidence of pulmonary disease was due to the inhalation of minute particles of inorganic matter with which the atmosphere of the mines was naturally charged. They recommended masks, and wet sprays and jets as well as a supply of air in sufficient quantities and "in such a manner as to render harmless, and to sweep away, the vitiated atmosphere." No other conclusion was tenable and the chief interest in the report rested in recommendations for protecting workers.[244] In 1912, the new state, the Union of South Africa, passed the *Miners' Phthisis Act* scheduling silicosis for compensation. During the eighteen months, ending January 31, 1914, miners or their dependants received compensation amounting to £1,098,136. With the exception of £100,000, gifted by the government, the Gold Mining Companies paid the remainder.[245]

Also in 1904, Haldane and Thomas Martin issued their *Report to the Secretary of State for the Home Office on the Health of Cornish Miners*. The authors found that the death rate among miners from lung disease was much higher than in any other occupation. They confirmed that the chief cause was the production of dust especially associated with dry drilling. The rock drillers suffered most, though Haldane downplayed the gravity of their situation noting that, though their mortality was very high, they were few in number compared to those working elsewhere in the mine. Moreover, he attributed 74 per cent of the deaths among the rock drillers to tuberculosis. This was not the case. The acute, rapidly developing form silicosis suffered in the Rand was rarely associated with tuberculosis while those working elsewhere often suffered the more chronic form that was prone to secondary tubercular infection.[246]

During the proceedings on the health of Cornish miners, one doctor reported that at autopsy, his patient who had mined in South Africa as well as Cornwall revealed largely consolidated lungs from inhalation of dust and smoke. Haldane was convinced that the actual cause of death in this case was tuberculosis but did admit that silicosis may have promoted the tubercular infection. Despite evidence to the contrary, Haldane insisted that tuberculosis was an essential feature of silicosis anywhere. Haldane recalled that during the previous three years, 19 men from the Gwennap parish had died from pulmonary disease and that 18 of these had suffered *phthisis*. All had worked as rock drillers in the Transvaal. They averaged 36 years at the time of death. Those miners who had not worked rock drills included 37 who had died at an average age of 56 years; 25 of them had died from pulmonary disease, without any specification as to type, but very likely silicosis from incidental exposure in the mines. Haldane went on to

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[244] Katz, E. N. (1994). *The White Death: Silicosis On The Witwatersrand Gold Mines 1886-1910*. Johannesburg, South Africa: Witwatersrand University Press. P. 4-5.

[245] Oliver, T. (1916). *Occupations from the Social, Hygienic and Medical Points of View*. Cambridge Eng.: University Press. P. 83.

[246] Unknown. (1904). *Parliamentary Intelligence*. House of Commons. Wed., June 8th. *Miners' Phthisis*. *The Lancet* (June 18, 1904), P.1763.

recommend special legislation for dealing with this very large number of miners who had recently died not only in the Gwennap district, but also in many others besides.

In July 1904, speaking before the Section on State Medicine (of which he was president) of the British Medical Association, Haldane addressed the issue of prevention. He rightly faulted the compressed air boring machine as the most egregious producer of dust, especially when miners were forced to work overhead or in the horizontal position, which did not allow for wet drilling. His solution was to work above the site filling the hole thus created with water that he believed would prevent much dust diffusion. This had become the standard method of rock drilling in the Transvaal and in Cornwall and he thought that it had resulted in a marked reduction of cases implying that operatives of mines in the Transvaal and in Cornwall had largely resolved dust dispersion without any government prodding or sanctions.[247] In fact, save for a few exceptional cases (not described in the article quoted or in the journals under review), no standard of ventilation had existed until 1902 and surely, the trial had not been sufficiently long for any meaningful statistical analysis. Equally, if not more surprising, was Haldane's statement that seventy-four per cent of those miners who succumbed had died from tubercle without even mentioning silica by name or elucidating its role. He was able to admit that twenty-six percent of miners had died of lung disease without evidence for tubercle, but he did not give the cause of their deaths. Obviously, he must have believed dust was important; otherwise, why bother to remove it? He did mention that lung disease affecting both hard rock and coal miners was cumulative and irreparable. Was this because tuberculosis had intervened, and, if so what was its relationship to dust? He and/or the reporter of his address did not say. In addition, Haldane was aware that coal dust seemed less deleterious than rock dust. Did coal dust vitiate tubercle elaboration? Again, he and/or the reporter did not say.[248]

In a slightly earlier paper, on miners' phthisis (coal miners, for the most part) in *The BMJ*, Oliver had also mentioned that phthisis was much less common than it had been fifty to sixty years previously, as the result of technical *improvements*. He attributed this fortunate circumstance to the excellent system of ventilation in the coal pits and to the implementation of the mining laws; he did not mention whether a similar excellent system of ventilation prevailed in siliceous mining or in industries where siliceous dust was prevalent.[249] Unfortunately, siliceous dust is finer and more lethal. While ventilatory improvements had undoubtedly resulted in a diminution in anthracosis, it is unlikely that better ventilation, even if had been employed siliceous industries, would have resulted in similar improvement because of the difficulty in clearing the fine silica particles suspended in the atmosphere. If, on the other hand, coal miners had been exposed to silica by working through sandstone strata, shale or segger clay, Oliver correctly believed the disease followed that of silicosis rather than anthracosis.

Finally, in 1907, the *Departmental Committee on Compensation for Industrial Disease* deliberated on the question of scheduling occupational diseases for Workmen's Compensation. It was the most in-depth official inquiry of industrial diseases to that date. The *Committee* differentiated the history, signs, and symptoms of tuberculosis from those of silicosis, even in its mixed form. It determined that *fibroid phthisis*, (silicosis) in itself, resulted from chronic reactive inflammation surrounding minute foci of inhaled dust that gradually coalesced and invaded large areas, impairing and strangling healthy lung tissue. A lung so impaired was very apt to harbor the

[247] Unknown. (1904). Miners' Phthisis. *The Lancet* (May 21, 1904), p.1444.
[248] Unknown. *The British Medical Journal* (August 6, 1904).
[249] Oliver, S. T., M.A., M.D., L.L.D., D.Sc., F.R.C.P. (1903). Discussion of Miners' Phthisis. *The British Medical Journal* (September 12, 1903), p. 568-573.

tubercle bacillus that would further destroy it. The *Committee* accepted that silicosis with or without supervening tubercle was peculiar to certain trades. It specifically cited the following: grinders (continuously using either grindstones or emery for the abrasion of metals, especially steel), potters engaged in certain processes, stone workers employed on certain kinds of stone (especially if not working in the open air), tin miners (particularly those who previously had been exposed the gold mines of the Transvaal), and ganister miners, including men employed in certain processes of ganister brick making. The *Committee* failed, however, to arrive at any conclusion regarding the slate and asbestos industries, and many other recognized unhealthy trades, partly because even the scope of this inquiry was limited and partly because the Committee found that the statistical data was inconclusive.

Reporting deaths was a problem even at this stage. The *Committee* pointed out that since medical men were rarely specific when certifying the causes of death due to respiratory disease, it was not possible to separate the current English death rates for fibroid phthisis from those from other diseases of the respiratory system. It urged practitioners to make such a distinction and qualify that tuberculosis was present secondarily. Unfortunately, after concluding that employers might properly be required to pay compensation for silicosis, the *Committee* hesitated to recommend scheduling for two reasons. Firstly, owing to the long period of its development, it would not be fair to place the whole burden of compensation on the employer of record 12 months prior to the incapacity. Secondly, for several years before specifically diagnosing the disease, the patient's symptoms did not prevent him from securing employment, though silicosis was active, thus raising another liability issue.[250] *No fault* insurance would have answered, but was not recommended.

Opinion regarding the primacy of tuberculosis in causing disability and death in the presence of silicosis had yielded to theories already prevalent at the *1862-4 Commission* but promoted more scientifically by a new generation of medical men, such as Thomas Oliver. Tuberculosis was a secondary complication. Nevertheless, Haldane and Legge maintained throughout their careers that tuberculosis was the lethal complication, absent which, silicosis would not have been transformed into a prolonged and fatal illness.[251] Despite their eminence, this was not the opinion of the majority of investigators and finally, silicosis was no longer tethered to tuberculosis. Consequently, by the end of World War I, Parliament was ready to accept it as a compensable occupational disease secondarily prone to tuberculosis. Even so, Parliament insisted on scheduling its occurrence sequentially, industry by industry. Urging enactment of the *Workman's Compensation Act (silicosis) 1918*, Mr. Brace, the Under-Secretary of State for the Home Department, presented a Bill to provide compensation for workmen suffering from a disease known as *fibroid phthisis* that workmen engaged in certain industries such as ganister mining and silica brick making suffered. He noted that these workers had been considered by the Industrial Diseases Committee in 1907, but had not been included because silicosis developed slowly and partly because of the difficulty of determining it in its early stages, at which time applicants for the job could have been excluded. This was not fault of the employers. Mr. Brace admitted that [252] by establishing a general compensation fund for the whole of any industry dealt with by the Bill (to which 685 employers will be required to

[250] (1907) Samuel Committee, *Report of the Departmental Committee on Compensatin for In Industrial Diseases*, cd. 3494, Vol. XXXIV HSMO, London.
[251] Bufton, M. W., & Melling, J. (2005). Coming Up for Air: Experts, Employers, and Workers in Campaigns to Compensate Silicosis Sufferers in Britain, 1918 - 1939. *Social History of Medicine, 18*(1). P. 64
[252] Even at this late period, phthisis had failed to give way to silicosis.

subscribe) and from which all claims for compensation will be paid, the burden will be distributed over the trade, with no question of apportioning liability among different employers will arise. The Bill is was intended both as a precautionary measure as well as a scheme of compensation. It also provided for the suspension from employment in the industry of workmen who may be found on medical examination to be suffering from silicosis to a degree rendering it dangerous for them to continue that work. [253]

Why Medicine Was Dilatory

The *1862-64 Commission* never contemplated compensating for miners' phthisis, but it had acknowledged that siliceous dust in the mines was its precipitating agent. Unfortunately, medical men turned their attention elsewhere, and the convincing arguments of the *Commission's* medical *experts* and witnesses languished in the blue books. It took almost fifty years to reach the same conclusions, albeit, scientifically updated. Much of this chapter has traced how it happened that the medical community waited so long to tackle a significant occupational health hazard. Part of the delay resulted from attention to other priorities less often scientific than a matter of professional prestige and the cosmopolitan interests of those who dominated the medical societies, the medical journals and teaching establishments.

For much of the period I have discussed medicine was attempting to boost, if not remake its image, by increasing its economic rewards, improving its social status, and establishing its authority in scientific matter affecting health. Professional overcrowding and a meager income for most was the major impetus. In this setting, The British Medical Association (representing half of all doctors, mostly general practitioners, on the medical register by 1901) treated health related matters as a low priority.[254] In furthering its agenda the practice of medicine under the Poor Law Amendment Act of 1834 and the inauguration of Medical Officers of Health to administer the burgeoning volume of sanitary legislation forced BMA engagement with government by default. Poor law doctors, especially, were overworked and underpaid. Appointments went to those willing to work for the lowest wages, often leading to unqualified practitioners and to those who had failed in private practice. Along with medical services for the poor, a network of sanitary services also called upon the profession. Both required lobbying for better working conditions and, a professional examining and licensing system. August bodies such as the royal colleges distained any political involvement and, even the Provincial Medical and Surgical Association created in 1832 (becoming the British Medical Association in 1856) reluctantly overcame most professional organizations' studied political neutrality. Henry Ekstein notes that in this endeavor, *The Lancet* and the *British Medical Journal* carried on constant warfare with the BMA because of its unwillingness to enter into political disputes. However, if this was the case, I found little evidence of it in the journals' pages, although, on one occasion, *The Lancet* hinted that more involvement might be worthwhile.. "The medical profession does not lend itself, as such, to party causes. All parties alike are interested of profess to be, in the health of the community, in the repression of disease and, wherever it is possible in its extinction. Yet there have been striking illustrations of the fact that unless party purpose can be served by health questions they are apt to fail to excite the interest of the statesman or the politician." The Corn Laws were a case in point because they affected the rise and fall of

[253] *Workmen's Compensation ACT* (1918), *G.A.D. 1918*.
[254] Digby, A. (1999). *The Evolution of British General Practice 1850-1948*. Oxford ; New York: Oxford University Press. p. 326

Government. "The water question does not or does so in an infinitely less degree. To realise the cruelty of a defective water-supply needs little imagination. But, little as it is, it was too much for the generation of statesmen who repealed the Corn Laws. It was not a party question and, until now, remains unsettled."[255] The journal was less timid and much more self-serving regarding professional stature:

> No English statesman has hitherto had the courage to raise to the House of Lords a member of the profession which has included in its roll the names of men second to none in respect of the lasting services which they have rendered to the human race. It is vain to think that such men can aid the councils of the State through the House of Commons; they are otherwise engaged. To submit them to the ordeals of popular election would be to call them from the cherished pursuits of their life, which are of high consequence to humanity and society; but to summon them to the House of Lords would be to pay not too high a compliment to the profession and to sensibly add to the dignity and the wisdom of the upper chamber. "[256]

The Medical Act of 1858 established state registration of qualified doctors and advanced professionalization. The Sanitary Act of 1856 and the Public Health Act of 1875 detailed and extended standards but did little to negate the indiscriminate hiring of often unqualified and poorly paid doctors. During the final quarter of the 19th century, the BMA fought back by refusing advertisement and blacklisting local authorities who did not conform to the standards it required. Beginning in the early twentieth century innovative public health policies such as expanded sanitary services and a larger range of medical services, some offered to all members of society rather than special classes inextricably joined medicine and politics. [257] Nevertheless, as late as 1910, the Webbs noted that, "We do a great deal of State doctoring in England…For the most part… instead of preventing the occurrence of disease, we choose to let it happen, and then find ourselves driven to try expensively to cure it. The BMA missed this opportunity to work towards a *social* health service."[258] Surely, it felt it had to establish it power and authority first. Perhaps it could have done accelerated the process by more *social* involvement. On the other hand, it was necessary to establish better living standards for doctors in order to attract a more talented membership. Whether this was an intentional goal seems doubtful in view allowing massive overcrowding and indiscriminate enrollment of medical students.

The expectation of medical students and their teachers was that graduates would remain in metropolitan areas where the opportunity to earn a decent income (an important and openly discussed consideration during this period) was greater. Miners' lung diseases rarely was rarely encountered in cities, and with this in mind there was little to be gained by including a more than superficial study of it in the medical curriculum. It is likely that the paucity of information on miners' lung diseases presented in *The Lancet* and *The BMJ* was similarly determined; that is, since only a very small percentage doctors were expected to practice in mining communities, the vast majority of their readers had little interest in these maladies. On the other hand, other rare

[255] Unknown. (1893). The New Parliament and the Medical Profession. *The Lancet* (Feb. 11, 1893), p. 308.
[256] Unknown. (1893). The New Parliament and the Medical Profession. *The Lancet* (Feb. 11, 1893), p. 308.
[257] Ekstein, H. (1960). *Pressure Group Politics*. Stanford, CA: Stanford University Press. p. 40-43.
[258] Digby, A. (1999). *The Evolution of British General Practice 1850-1948*. Oxford; New York: Oxford University Press. P. 326

diseases that most medical men would never encounter in their practices were reported, suggesting that class bias and economic considerations played some role.[259]

The successful physicians and surgeons who dominated British medicine further determined delay in the scientific study of silicosis. They saw themselves as clinicians, not scientists. They taught bedside skills but rarely made any important scientific discoveries.[260] I. Burney Yeo, addressing Torquay Medical Society, recalled his experience at the Pathological Society of London in the 1870s. He observed that a large body of influential medical men, over a number of years, had maintained a widespread dislike, "almost amounting to hostility, to the idea of any thing being a 'specific' nature, either in pathology or therapeutics. In fact, the antagonism to specificity led to wild speculation such as the accumulation and decay of non-specific catarrhal products being responsible for pulmonary destruction and the ensuing proliferative and inflammatory changes of the local tubercle."[261]

Toward the end of the century, younger men enthusiastically accepted *science*. They were not yet established, and were anxious for an academic post to impress their colleagues in the professional societies.[262] Unfortunately, those who hoped to obtain prestige by working the same fields as their teachers and predecessors were not afforded much space for innovative investigation.[263]

Green in his lectures on tuberculous phthisis in 1882 spoke of another matter of interest to fledgling doctors that he believed retarded silicosis research. Owing to its usual great chronicity and too frequent fatal termination, it was a less attractive study of interest than other diseases, and thus these "unfortunate subjects secure too little of our time and interest." The imperfect knowledge for rational treatment made it a less attractive endeavor than those diseases that showed promise of a rational therapeutic intervention.[264] By the end of the century, talented students aspired to be "*analysts* in a world of *experience* (of craft and natural history" and, a few such would- be medical scientists were offered salaried posts as anatomists, physiologists or pathologists in medical schools. One new form of medical analysis, bacteriology, particularly appealed to public health doctors, establishing a linkage with government that was to become characteristic "of technical analysis and social management."

Thus, a new paradigm demanding the recognition of sophisticated advances in pathology, histology, bacteriology and statistics was challenging older clinical *experts*. These disciplines were little understood and little valued by their older peers. In fact, prior to Koch's discoveries, most were contemptuous of the laboratory as a legitimate source of medical knowledge. They venerated a distillation of experience and the subjective experiences of those who at one time or another defined themselves as sick. Greenhow's lectures exemplify this approach. This bias is understandable when one recalls that theirs was a period when medicine considered itself much more an art than a science and was contemptuous of technological tools. On the other hand, those

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[259] Pickstone, J. V. (2001). *Ways of Knowing: A New History of Science, Technology, and Medicine*. Chicago: University of Chicago Press. p. 112-13

[260] [260] Pickstone, J. V. (2001). *Ways of Knowing: A New History of Science, Technology, and Medicine*. Chicago: University of Chicago Press. p. 112-13

[261] Yeo, I. B., M.D., F.R.C.P. Lond. (1897). An Address on the Pathology of Pulmonary Phthisis: A Retrospect. Delivered Before the Torquay Medical Society. *The Lancet* (July 24, 1997), p. 182-184.

[262] Pickstone, J. V. (2001). *Ways of Knowing: A New History Of Science, Technology, And Medicine*. Chicago: University of Chicago Press. p. 112-13

[263] Yeo, I. B., M.D., F.R.C.P. Lond. (1897). An Address on the Pathology of Pulmonary Phthisis: A Retrospect. Delivered before the Torquay Medical Society. *The Lancet* (July 24, 1997), p. 182-184.

[264] Green, T. H., M.D., F.R.C.P. (1882). Lectures on Phthisis. *The Lancet* (May 20, 1882), P.813-814.

who did rely on the specificity of the laboratory, such as detailed histological studies of the lungs, found pathologic variations which caused many researchers to error on the side of another sort of multiplicity. They made the assumption every alteration in appearance represented a distinct characteristic of a separate lung disease. Thus, diagnostic designations such as caseous pneumonia, scrofulous pneumonia, etc. resulted in further obfuscation of diagnostic terms. In fact, many of these distinctions represented different stages of the same disease. In all of these nosologic configurations, the delineation of silicosis *lost out*. Recall that Yeo had urged a useful terminology incorporated much more than the anatomical analysis of morbid products since the inferences drawn from them produced nosologic entities that had pushed erroneous results to an extreme. He had recognized that even when one's interests were based in the laboratory, the operating arena or the autopsy room, one had to recognize that a specific illness dictates many different findings in many fields of observation.

Diseases not only have a contested and accidental history but a complex current existence in which their identities are fragile. These identities are recognized differently in sites such as the laboratory, the operating room or the clinic. For example, pathologists might know silicosis in order to judge or confirm the actions of other doctors or to establish a diagnosis, but this tells nothing about how to proceed with the patient. At the same time, practitioners might know silicosis in order to plan their next action respecting medications or the settings on a ventilatory device with little interest in complex investigative devices used to elucidate seemingly small questions.[265] The research endeavors of different specialties may proceed apace but not necessarily hand in hand. Quite a long time often elapses before the one catches up with the other. In the meantime, the body remains a *playing field* for very different interventions with little advantage to the patient, as was the case during the period covered in this chapter.[266]

Those *experts* who attended the *1861-4 Commission* also played a part in retarding silicosis research. Early in the development of medical specialties, those closely identified with emerging disciplines become *specialists* almost by happenstance. They need not have had any broad experience in the field. Nevertheless, their presumed authority greatly influenced the perception of a disease by virtue of what they did or did not teach or publish. These *experts* are not necessarily neutral in relation to the conflicts or the confusion they were asked to solve. They were more likely to be a part of them.[267] When experts are challenged, loss of their influence requires a upsurge of opinion and this takes time. Such was the case in the elaboration of silicosis..

Ultimately, specialization works to the advantage of medical science but the benefit is imperfect. During the period I have covered, several leading clinicians who called attention to this dichotomy. T. Henry Green M.D. F.R.C.P., believed that knowledge of lung diseases remained imperfect, due to the treatment of phthisical patients in special institutions rather than in the wards of general hospitals. These special *units* were the province of *experts* whose day-to-day contact with the same class of disease did not always afford them special knowledge

Finally, political loyalties, social aspirations, and class prejudice worked to the detriment of miners' lung disease. I briefly outlined the early history of the statistical movement in Chapter 1. M. J. Cullen has shown that the GRO's reliance on statistics reflected a wider interest emerging during the 1830s and 40s by the rise of widely dispersed metropolitan and provincial statistical societies. Many of their members were industrialists and medical doctors who pursued

[265] Mol, A. (2002). *The Body Multiple: Ontology in Medical Practice*. Durham: Duke University Press. P.93-94.
[266]Ibid. P. 89.
[267]Ibid. P. 97-8.

empirical evidence to confirm their belief that it was not industrialism but rather urbanism and public ignorance that were to blame for proletarian poverty. Their solution was to assist the deserving non-pauper poor by inaugurating locally devised measures to promote sanitation, hygiene and public education. This suited the medical profession, employers, and other local worthies whose economic interests harmonized with those of industrialists and propertied notables.

Additionally, the implied social relationships of these societies encouraged members to emulate the tutelary paternalism of the landowning gentry of the past. It provided the anxious affluent middle classes a politically safe medical discourse with which to wrestle with the disturbing spectacle of urban suffering and squalor amid their own guilty prosperity. To them, inadequate wages were not the source of poverty. Rather, disease and/or ignorance were the culprits. [268] While this position favored preventing occupational diseases, it did not support compensating for them. Perhaps it played some part at the end of the nineteenth century in maintaining the primacy of the tubercle in silicosis. It was a theory that greatly complicated scheduling silicosis of compensation. It may explain the lack of political activity on the part of the profession in promoting compensation insurance. Certainly, the profession had no qualms about exercising a political role for its economic benefit. It was quite vocal about becoming the paid arbiter in compensation cases.

Simon Szreter maintains that during this period, the GRO, itself, assumed a thoroughly political role that informed all its analytical work. Its flow of published reports and statistics seems to have promoted its own institutionalized practices and to have reinforced a particular set of reforms while denying any possible assistance to what was perceived as a threat to capitalism, especially when profits seemed threatened. At the same time, the statistical department geared its studies to providing ammunition for those forces it approved in the battle for the social conscience. It encouraged public health and slighted occupational health. As I have pointed out, early in the nineteenth century public health was occupational health but, later, Chadwick and his associates offered an alternative for primacy, sanitation that was more *universally* appealing and more advantageous to those who would pay the bill. This may explain why the reports of factory and mining inspectors had little effect on legislation.

At last, toward the close of the century, rampant silicosis among miners returning to the UK to die prompted investigators to re-examine what was known about the disease not only as it occurred in the mines but also in a host of industrial trades.[269] At last, the public was showing it more amenable to addressing worker pressure for a safer environment and for compensation for accidents, and these became a popular element in political platforms. The next chapter examines the political feints and starts leading to compensating miners.

Chapter Three:
Slouching Toward Legislation: Who Wanted What

[268] Cullen, M. J. (1975). *The Statistical Movement In Early Victorian Britain : The Foundations Of Empirical Social Research*. Hassocks Eng. Harvester Press; New York Barnes & Noble. P. 43.

[269] The list of these workers included “nailors” and “stone-cutters,” “tool grinders,” “French mill-stone makers,” “stone-masons” Sheffield knife makers,” “fish hook makers, “potters (esp. with the use of china clay and flint)” “Portland cement,” “glass cutter and polishers, ganister miners, phthisis.

Introduction

With the evolution of liberalism in the final quarter of the nineteenth century, it became politically viable to advance legislative efforts to protect workers from occupational injuries and ultimately, diseases. Reacting to economists who would force social relations into a market mold, the *Gladstonian conscienc*e placed "public duty and the public interest before market rewards and private interests. Indeed, it proved the foundation of the public domain in Britain, and marked the decisive break with the eighteenth-century system of patronage, clientism, and connection." [270] The public seemed ready not only to enforce prevention against injuries and diseases but also to offer legal protection and liability compensation to maimed miners or their surviving families.

As I have outlined in the previous chapters, the time-line between identifying and addressing the social, technical and medical aspects of the disease was very long, indeed. Nevertheless, though the wherewithal for making progress on these issues was readily available, a further quarter of a century elapsed before addressing these measures definitively. This chapter examines the roles played by those groups whose interests included silicosis, namely the mining industry, unions, the mining bureaucracy and medicine in promoting safety and liability legislation. In various ways, they all vied for sway and influence over the politically negotiated processes of social change.[271] When labor, management, the mining bureaucracy, and medicine agreed over some aspects of compensatory legislation both within and without their organizations, it was for practical considerations that did not necessarily cohere logically. Ultimately, all interested parties picked through and patched together programs of what they believed was on offer. Sometimes their interests coincided; sometimes they did not.

The *Great Depression* of 1873 ended the economic exuberance of the preceding decades and awakened fear of social disruption, and moral and physical degeneracy. In this setting social scientists, employing new techniques, sought to learn more about the various socio-demographic and epidemiological aspects of the population's life-experiences. The grim life table statistics of miners, among others, served as an impetus to elucidating occupational health risks, and ameliorating them. The statistics clearly demonstrated how much occupational accidents cost the nation and provoked sympathy for their innocent victims. Previously, prevention, liability and compensation legislation had greatly favored employers. Any consideration of legislating on behalf of workers required, in the first instance, the rationalization and adjustment of the legal rules of responsibility for tortuous acts.

Crucial to this endeavor was the reexamination of three long-standing complaints. Between 1830 and 1840, the Courts limited the extent of an employer's liability by qualifying it with
inconsistent restrictions that virtually invalidated attempts to indemnify workers against on the job accidents. The limitations most offensive to labor were *common employment*, *contributory negligence*, and *volenti non fit injuria*. The doctrine of common employment, established in 1837, held that an injured worker, even though faultless, could not be compensated for his accident, if a fellow worker had contributed to the event. In other words, if either a fellow worker or a supervisor had engaged in a common service and had been responsible for the injury or

[270] Skidelsky, R., & (2004, Friday, June 25, 2004). Now You Don't. *Times Literary Supplement*.
[271] Szreter, S. (1996). *Fertility, class and gender in Britain, 1860-1940*. Cambridge, England; New York: Cambridge University Press. P. 85.

injuries, the employer could not be held liable. The rule considered that all those engaged in one business, even managers and apprentices fell under its auspices. Within this scheme, the point at which the employee's job ceased to be work in common was difficult to ascertain. In fact, the defense made use of *common employment* with a frequency bordering on the shameless. The doctrine of *contributory negligence*, the second limitation on worker claims, was closely related to the above. In this instance, the employer was not liable if the worker had contributed in any way to his/her injury. Of course, it was easy to allege a degree of carelessness, even when the machinery itself was faulty. It was rarely possible to prove personal negligence on the part of the employer. The third qualification, known as volenti non fit injuria held that a worker taking service in a dangerous employment was aware of the risk and that acceptance of the job amounted to an unwritten contract. The effect of this trio of qualifications left the injured worker with very little recourse against the employer. However, beginning in the 1870s, labor became more active in addressing these legal restraints.

Statistical studies in the 1870s revealed almost 5000 mines–metalliferous and coal–engaging 500,000 employees under varied conditions requiring special considerations and rules. By not providing adequate inspection or sufficient administrative backup, the various Acts relating to mining through most of the century effectively failed to force reluctant owners, managers, and supervisors to meet their basic standards.[272] However, as new dangers were isolated, government interference in management became a necessity. Changes became impossible to frame and enforce without a willingness to breach laissez-faire principles, as indeed happened in the 1880s.

Industry, labor, medicine and the mining inspectorate all had some interest in legislative moves to improve the lives of miners but their thinking was rarely coherent in terms of what they supported and what they did not. Their positions were not always in their best interests, nor were their alliances. Sometimes their legislative support was a last minute arrangement; sometimes their lack of support appears myopic in the extreme.

What Did Miners and Owners Want?

In the setting of economic downturn in the 1870s, non-union workers, and union members as well, attempted to hold on to their jobs by tolerating potentially dangerous equipment and atmospheres. Unions, anxious to resolve health and safety issues, nevertheless participated in agreements with employers that overlooked these concerns. Moreover, unions did not always act as a unified or coherent force and their role in addressing occupational disease is replete with examples of fragmentation within organized labor (management as well). Some unions wanted to address occupational injuries and disease forcefully while others feared the potential economic harm or repercussions of such efforts. Resolution of these differences depended on the political realities of the time.[273] These differences did not go unnoticed as author of the following attests:

> …what is the essence of Trade Unionism. In one word— protection. Every union exists primarily for the protection of its own members, not only against employers

[272] The Metalliferous Mines Regulation Act, 1872, the Stratified Ironstone Mines (gunpowder) Act, 1881, the Slate Mines (gunpowder) Act 1882 and the Quarries Act, 1878 and 1891.

[273] Dembe, A. E. (1996). *Occupation And Disease: How Social Factors Affect The Conception Of Work-Related Disorders.* New Haven, CT: Yale University Press. P. 15-6.

> and non-unionist workers, but also against members of other organisations like itself…So too in the mining industry; a long feud was said to have subsisted between the local Unions of South Wales miners and the Mining Federation of Great Britain, in consequence of which the members of the rival bodies refused to work in the same pits.[274]

In fact, even a miner's perception of what constituted an occupational disease differed from place to place. Many miners believed that respiratory problems were irremediably part of the work. Chronic cough and diminishing exercise tolerance occurring gradually were normal events and, for them, did not necessarily define an occupational disease. Moreover, in some areas the machismo of mining crews, led to a denial of any complaints whatsoever, even to the point of refusing to wear masks. In other areas, but especially in Wales, devout chapelgoers, anticipating of the joys of heaven, accepted premature death as an earlier release from worldly travails.

For most of the final quarter of the nineteenth century, the Liberal Party welcomed labor union votes but it was hardly the voice of labor. Those MPs who sought to represent labor were dependent on the sympathies of other politicians much less closely attached to their cause. The 1885 General Election, the first held on the terms of the new franchise, saw the return of thirteen MPs associated with unions and loosely attached to the Liberal Party. After the election of the following year, their number fell to ten, of whom six were miners, including Thomas Burt, who had been a MP since 1874. Another of these so-called "Lib -- Labs", Henry Broadhurst, appointed in Gladstone's third ministry (1885 to 1886), was the first worker to hold the post of junior minister at the Home Office. Even so, ministerial office remained well out of reach of nearly all manual workers, however able.[275] However, with increasing memberships, unions realized their potential for considerable political power, and they became adept at pursuing the welfare of their members directly in Parliament by lobbying and by means of private members' bills outside of Parliament. In 1912, alone, the TUC introduced twenty private member bills.[276] The Labor Party was established in 1900, but it was not until 1903 that it was able to establish a central fund to subsidize its needy MPs. Previously, the only working-class politicians in Britain who stood any chance of reaching Westminster had to be sponsored by a very few well-funded trade unions.

Between 1876 and 1880, a number of Bills directed at overcoming the considerable disadvantages of liability law failed but, in the 1880 general election, it became a pressing campaign issue, largely because unions found themselves able to influence the vote. They were able to garner sympathy by asking that workers enjoy no more than the same right to compensation for accidents as those enjoyed by the public at large. A circular from the TUC Parliamentary Committee urged officers and members of the trade unions to support only those men who were prepared to pledge themselves to active parliamentary backing of their liability proposals. "There is no just settlement short of those proposals," it urged. "Do not accept any compromises." F.W. Evans mobilized the 200 branches of the Amalgamated Society of Railroad Servants (ASRS) to ask each parliamentary candidate in its constituency if he would vote for a

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[274] Royal Commission on Labour, (1892). Digest of the Evidence taken before Group "B" of the Royal Commission on Labour. In H.M.S.O. (Ed.), *London* (Vol. I). c-6795-ii. P. 1-2.

[275] Searle, G. R. (2004). *A New England? : Peace and War, 1886-1918*. Oxford New York: Clarendon Press ;Oxford University Press. P. 131.

[276] Martin, R. M. (1980). *TUC, The Growth Of A Pressure Group, 1868-1976*. Oxford New York: Clarendon Press ; Oxford University Press. P. 111.

second reading of their Liability Bill as opposed to that proposed by the government. Three hundred of the successful candidates (mostly Liberals) sent in favorable answers including especially prominent candidates who were elected and became members of the cabinet such as Joseph Chamberlain, Sir William Harcourt, and J.G. Dodson. The TUC Parliamentary Committee immediately sent a letter to the new Prime Minister, Gladstone, urging prompt action on a employers' liability law which would do away with common employment. In the event, the Scottish miners' leader, Alexander MacDonald, proposed the first amendment of the law on employers' liability.[277]

Both the extension of the franchise in 1884, increasing the number eligible voters from three to five million, and the successful conclusion of an unskilled dock workers' strike in London in 1889, gave further cause for union optimism. At the same time, a large number of new members were added to the lists of the established trade unions and new unions formed to accommodate unskilled workers; these were led by a more aggressive leadership whose power was waxing. Three of these leaders, Keir Hardie, Havelock and John Burns won seats as independents in the Liberal victory of 1892, while a further ten labor supporters were elected as Liberals.

W. J. Parry, a quarrymen's union leader in 1889 expressed the growing awareness of the potential for union power as follows:

> The past cost us something. To the future, we look for repayment. The world is improving for the toiler. Oftentimes it appears very gloomy. Too often to him the world is a house of bondage. But say what you will, slavery is our starting point, and not our destination. Liberty is entitled to higher things after enduring the weight of tyranny. It will not do to live in the past. We have grown out of it. The past cannot take us a step further or higher. But there are in the future possibilities of growth and prosperity beyond the present comprehension of man. Our duty is to believe that, and make for it.[278]

The 1880 *Employers' Liability Act* was an earlier indication that by concerted political efforts unions could overcome even marked employer resistance. The *Act* allowed unions to win a number of punitive cases against employers and gain adequate settlements for their membership. In fact, unions commonly presented checks for damages to the injured worker with much public fanfare. Advertising their success was especially important because employer administered insurance societies were claiming to give workers a voice in matters of liability. In fact, the unspoken aim was to vitiate any worker moves to agitate, leave or strike.[279]

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[277] Alexander MacDonald, the miners' leader and Thomas Burt, a Northumberland miner were elected to Parliament as Liberals in 1874. In 1875 they participated in removing two of the issues the TUC considered most urgent; namely, criminal sanctions on picketing and on a workman leaving his job. This allowed Henry Broadhurst, the stonemason's leader, elected secretary of the TUC in 1875, to turn his attention to workers' compensation Bartrip, P. W. J., & Burman, S. (1983) (1983). *The Wounded Soldiers Of Industry : Industrial Compensation Policy, 1833-1897*. Oxford, Oxfordshire, New York, N.Y.: Clarendon Press ; Oxford University Press. P.125

[278] Parry, W. J. and. Williams, W.J. (1891, 1892, 1893). *The Royal Commission on Labour: The Review of the Evidence of Mssrs. Darbishire, Young and Vivian*. p. 37

[279] Bartrip, P. W. J., & Burman, S. (1983). *The wounded soldiers of industry : industrial compensation policy, 1833-1897*. Oxford, Oxfordshire, New York, N.Y.: Clarendon Press ;

Unfortunately the *1880 Act*, seemingly having promised much, quickly proved cumbersome and a disappointment to labor as well as management and hope for an improved Act had to await the Liberal Party Victory Hope revived following Gladstone's election in 1892.

The *1893 Employer's Liability Bill* was an almost successful attempt at enacting laws of liability in accord with union requests for more than a decade. A major obstacle to the implementation of a state supervised comprehensive system of compulsory insurance to compensate an injured worker was a last minute amendment to preserve *contracting out*. The Conservatives had found in the amendment the means to insure the defeat of a *Bill*, for which they had little sympathy. Even though the Registrar of Friendly Societies had to be satisfied that in *contracting out* Employers' Liability insurance under the *Bill*, management did not offer worse conditions of compensation than those obtainable under it. Nevertheless, *contracting out* remained anathema to unions. Compromise was out of the question due strong labor resistance, fired by old feelings of resentment, and by recent events such as the great coal struggle of 1893. That the *Bill* failed owes much to union intransigence; at this point they had little to fear from *contracting out*. In fact, had unions reviewed Home Office memoranda on employers' liability submitted to *the Select Committee on Employers' Liability in 1886 and the 1890s Royal Commission of Labour*, they would have discovered that there was no established case of workers contracting out without benefit. Probably, no more than twenty-five per cent of workers had ever *contracted out* even under the *1880 Employers' Liability Bill* and mining inspectors, responding to a Home Office query, noted that miners rarely contracted out in the ten districts surveyed. This was the case even though, as unions had predicted, the Home Office acknowledged that charges of coercion were valid and that sometimes *contracting out* was a condition of employment.[280] Later, however, it became obvious that the abuses suffered under a system of *contracting out* were no greater than the abuses suffered early under *universal compensation*. In fact, critics of the unions often charged that their real motive for objecting to *contracting out* was that its leaders were primarily concerned with strengthening their power by extending and consolidating a highly centralized bureaucracy. "They view with impatience and hostility every arrangement that fosters local and sectional independence, and they see in the great insurance scheme, by which large numbers of workers are now protected, nothing but so many obstacles to the assertion of their supreme control."[281] Henry Broadhurst tacitly admitted the justice of the charge when he asserted that *contracting out* would strike at the root of trade unionism. Strong Unions made good propaganda use of *contracting out*, although not necessarily to their advantage. Weak and less provident unions and labor associations generally accepted *contracting out.*

In fact, many workers were not opposed to *contracting out.* It avoided court costs, appearing before biased juries and uncertainty of awards. *Contracting out* guarantied that compensation would be paid, albeit at a somewhat lesser rate than that which the *1893 Employers' Liability Bill* had proposed. For their part, employers were most apt to press for *contracting out* where the risk of accident was greatest. For example, the South Wales' coalfields

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Oxford University Press. p. 163.

[280] PP, 1894, XXV, *Royal Commission on Labour,* Appendix V, Memorandum on the Evidence Relating to Employers' Liability, p. 834 as quoted by Bartrip, P. W. J., & Burman, S. (1983). *The wounded soldiers of industry : industrial compensation policy, 1833-1897*. Oxford Oxfordshire New York, N.Y.: Clarendon Press ; Oxford University Press. p. 161

[280] The Times, February 23, 1893

[281] Hansard, Parliamentary Debates, CCCXXXI, 3rd series, p. 1430

had the worst accident records as a percentage of those employed and it was here that *contracting out* occurred commonly.[282]

Trade unions and their membership even disagreed on other major issues such as compensation. As early as 1877, a proposal for universal compensation for all occupational accidents came before the Trades Union Congress. Henry Broadhurst, a stonemason, feared that a system of insuring management for the costs of compensatory insurance would undercut preventative measures against accidents. Rather, he supported punitive damages against employers for job related accidents as the best means of assuring prevention. This was not a new idea. Chadwick, as early as 1833, had suggested that economic sanctions provided the best means of promoting safety. He believed that the financial burden of accidents should fall to those best able to prevent mishaps, the employer.[283] While compensation became increasingly attractive, nevertheless, as a letter to the United Trades Council, Belfast, July 11, 1893 shows remained an issue.

> Another point they wish to draw your attention to, that the workers are not so desirous of the compensation provided by the Act as they are anxious that every effort and precaution should be made by the employers to prevent accidents, and if by contributing a fixed sum per annum employers may clear themselves of any pecuniary risk in case of accident, there will be no inducement for them to make any outlay in order to bring the possibility of accident to its minimum. [284]

> Would it not be much better to bring all the quarries under efficient Government inspection, and give the union legal power to appear? One of our principal objects in endeavoring to bring all slate quarries under proper Government inspection,– and in which we mean to persevere, –is to protect the lives of the men, and bring the negligent owners and managers before the proper tribunals to be punished for their misdeeds. We trust that the quarries bill, which we hope to see soon will have provisions giving power to the officers of the Union to which the poor man meeting with such accidents belonged, to attend the inquest, to assist in finding out the true facts about the accidents, and secure for the relatives proper and ample compensation.[285]

Quarriers, themselves, had a long history of discontent, particularly aggravated by the strikes of the mid-1880s. Lord Penrhyn, owner of the extensive Dinorwic mines, and his assistants stubbornly refused to recognize any "interference" by unions and unions made much of their obduracy. Penhryn's letter of 4th May, 1885 was read at the proceedings of the *1892-3*

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[282] Bartrip, P. W. J., & Burman, S. (1983). *The Wounded Soldiers Of Industry : Industrial Compensation policy, 1833-1897*. OxfordOxfordshireNew York, N.Y.: Clarendon Press ; Oxford University Press. P. 172-3 and 188.

[283] Bartrip, P. W. J., & Burman, S.(1983). *The Wounded Soldiers Of Industry : Industrial Compensation Policy, 1833-1897*. Oxford OxfordshireNew York, N.Y.: Clarendon Press ; Oxford University Press. P. 17.

[284] Sheldon, R. (1893). *The Annual Report of the Belfast United Trade Unions Council report and Balance Sheet for the Year ending Nov. 1892*.

[285] *The Royal Commission on Labour*. (1893). *Minutes of Evidence. with Appendices, Taken Before Group "A" (Mining, Iron, Engineering, Hardware, Shipbuilding and Cognate Trades of the Royal Commission on Labour*. C. 24,659-24-892

Royal Commission on Labour and often cited elsewhere: "I decline altogether to sanction the interference of any body (corporate or individual) between employer and employed in working of the quarry" to which the union representative replied: "If they do not recognize them in such cases as these, is it likely they will recognize them in the matter of accidents in the quarries?"

In their campaign to include quarries under the Metalliferous Mines Act, unions also used to advantage Mr. Vivian's (manager at the Dinorwic mines) testimony at the *1892-93 Royal Commission on Labour*. Answering a union representative who complained of improper supervision of the pits and the absence of government inspection for open quarries, Mr. Vivian, accused him of ignoring the facts, assuring the *Commission* that management appointed officials who made the most detailed and perfect inspection possible. Indeed, such was the excellence of the arrangements already in play that government inspection was unnecessary. Nevertheless, neither Mr. Vivian nor his employer had any objection to very frequent visits of a government inspector, if the official was competent and "free from narrow-mindedness and fad."[286] Writing to the Secretary of State for the Home Department on February 10, 1893, Vivian stated: "In the large quarries I have under my charge, employing on an average of 2700 hands, I've never hesitated to adopt any suggestion which appeared to me at all likely to secure their safety and effectual working."[287] Contrary to what Dr. Ogle told the *Commission* (see below), Vivian, claimed that his hospital doctor and he agreed that there was not a more healthy life than that of a worker employed by the Dinorwic quarries. Furthermore, Vivian questioned the expertise required in the blasting operation asserting that while demanding a certain special ability, it could be acquired in less than two years. In his opinion, wages were exceptionally high in proportion to the skill required and the amount of labor involved. Vivian also attributed the defection of many men from mining to trade to their having saved enough money to set up in business because some hundreds of Dinorwic workers had been able to invest money in various directions. Union leaders were incredulous. In their view, low wages, hardly allowing for savings accounts, were one cause of their occupational health problems; they wanted some role in determining them:

> If our contention is correct that there exists a close connection between the rate of wages and the rate of mortality among men, we must come to the conclusion that the rate of wages paid the quarrymen at Penrhyn for the second period of five years was much below what it should be. The health of the men should have the just attention of an employer. Let the profit follow. It is unjust and cruel and criminal for any employer to touch a penny of profit until he has first paid his men a rate of wages that will sustain their lives and the lives of their families.[288]

Penrhyn's letter and Vivian's testimony justifiably outraged union leaders. Both had offered union leaders textbook examples of a management mentality clearly hostile to labor, and clearly underscoring the need for government to assure unionization. Both had contributed to energizing the unions politically. In the event, union work on behalf of quarriers contributed to enactment of a *Mining Bill* in 1894. All quarries came under the aegis of mining inspectors. Concurrently, mining unions furthered their reputations as effective agents for miners.

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[286] Parry, W. J. a. W., W.J. (1891, 1892, 1893). *The Royal Commission on Labour: The Review of the Evidence of Mssrs. Darbishire, Young and Vivian*. p. 11-12.
[287] Ibid. p. 41.
[288] Ibid. p. 7.

Quarry owners had tried to impress Parliament that unions never had their confidence and that this was true of most of their workers. The union representative countered that:

> Whenever the men are in trouble with their employers they always come to the Union for advice and assistance. Does this not prove confidence? After the General Election in that year some of the principal quarry proprietors who are extreme Tories, felt that the Union had made the men too independent of them, and determined, and as is believed by the men and others, combined to do all in their power and by all means to stamp it out. Men went about in the quarries holding out hopes to the unionists that they would get better wages, and some of them positions in the quarries, if they gave up the union… Men in this manner were tempted, and deceived to their ruin. The books of the Union, we are sorry to say, will prove the effect which this had. Let the men who stooped to such devices and those who assisted in them, have all the credit for this. We don't grudge them the honour. The men have long ago seen their folly and it will be very difficult to succeed with the same poison again.[289]

Union officials also were outraged that their exclusion from autopsy examinations involving accidental deaths, especially in view of increasingly representing members in liability suits. The presence of union officials at these examinations would have added additional authority to their claims to represent union members and their families most advantageously. This complaint surfaced again in the discussion of the *Quarries Bill*:

> We trust that the *Quarries Bill*…will have provisions giving power to the officers of the Union to which the poor man meeting with such accident belonged, to attend the inquest to assist in finding out the true facts about the accident, and secure for the relatives proper and ample compensation…Is it not a fact, and has it not been demonstrated in our evidence and in Government returns, that the number of accidents in mines have been very considerably reduced as the direct result of Government inspection? And must we not come to the similar conclusion that similar results cannot be secured in slate quarries[290]

Many workers believed that *The 1894 Mining Acts* was not sufficiently punitive to remedy the risk of occupational injury. On the other hand, as Chamberlain had pointed out in 1883, most accidents were fortuitous and unpredictable and, thus, a tough tort law would provide little protection. Though not absolutely convinced that this was the case, unions agreed to support the Conservative-Unionist government's call (1895), for a *Compensation Act for Workmen*, irrespective of cause of accident. The government introduced the *Bill* early in 1897. The Bill retained *contracting out*. Again, trade unions were particularly critical of those workers who did so, despite assurances that workers could not participate in any compensatory plans inferior to those obtainable under the *Bill*. Moreover, they were highly critical of its *serious and willful misconduct clause* (which, following enactment, provoked much litigation). Though strongly resented by the unions, the *Bill* excluded many of the most important trades.

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[289] Ibid. p.7

[290] Parry, W. J. a. W., W.J. (1891, 1892, 1893). *The Royal Commission on Labour: The Review of the Evidence of Mssrs. Darbishire, Young and Vivian*. p. 3.

Additionally, the unions objected to the inadequate compensation awarded to younger men who were permanently disabled. In these cases, compensation was based on past earnings without any consideration of their prospects for the higher earnings they might have achieved. Also, because many would have recovered in two weeks, they objected to withholding compensation for that period after sustaining an accident. Another major source of union concern was the possibility of dismissing workers because of age or physical defects give rise to excessive accidents. In this case, the conservative *Times*, sympathized, with a miner who wrote:

> Owners will fire men maimed, for example, with one eye or one leg. They are more prone to accidents. Who could blame them? In all fairness, some provision should be made to those who will be thrown out of employment which will happen if the Bill becomes law. Mr. Chamberlain ridicules the idea of old men being discharged from their employment because they have greater experience, but agility on the part of a miner in order to avoid accidents is more necessary than experience."[291]

The Daily Chronicle usually sensitive to "labor injustices," commended Chamberlain's efforts on behalf of workers, and found it to be especially impressive that he pursued passage of his *Worker's Compensation Bill* even though as Colonial Secretary he had no need to do so. Sharing workers' enthusiasm for Chamberlain, the paper strongly supported his measures. On May 6, 1897, it quoted Chamberlain's remark that mining was the most dangerous industry in the country and his observation that in 1896 there had been 852 accidents in mines and 1173 deaths, of which 1020 occurred in coalmines. In the same year, 584,000 had been employed in the mining industry, of which 500,000 were working in coalmines. About 45,000 were under 16 years of age.[292] These statistics apparently did not include quarriers nor were the readers informed whether the deaths were caused accidentally or by disease. On May 8, 1897, *The Daily Chronicle* headlined a *Review of Employers Liability: What Ought to Be Done.* Its author, H. W. Wolff, favored the *Bill* as the beginning of fairer treatment of workers suffering occupationally related health problems. He noted that though *The Compensation Bill* had met some severe and searching criticism during the past week, the result had cleared the air sufficiently so that the chosen representatives of the Trade Unions had endorsed its principles.[293] Indeed, the unions were unable to effect any amendments concerning the features that troubled them but the *Bill* was too popular to oppose. *The London Trades Council*, *The Miners Federation* and *The Miners National Union* also supported the *Bill.* Enactment did not gain unions as much as they hoped. Small companies got more freedom to ignore the *Act* and insurance companies gained a lucrative source of cash.

Employers were divided over the 1897 *Workmen's Compensation Act*. During the period I discuss they were not of one mind with respect to social policy though they always preferred private to state plans. "Bismarckian" social control, including control of the labor movement, under the guise of humanitarian concern often motivated those favoring compensation laws. However, toward the end of the nineteenth century, J. R. Hay has suggested that efficiency and cost considerations took precedence over social control. Hay proposed that there were cycles in attitudes toward welfare. In periods when employers find extension of private and state welfare

[291] *The Times*, Issue 35259, column E, Page 7.
[292] *The Daily Chronicle*, May 6, 1897, p. 6, col. 5
[293] *Review of Employers Liability: What Ought to Be Done* by H. W. Wolff in *The Daily Chronicle* on May 8, 1897.

acceptable, they believe it serves both their interests and those of society. During a pessimistic cycle "cost" far outweighs benefits. In his opinion, welfare benefits were considered cost saving from the 1830s to 40s, and the 1890s to 1919. After WWI, costs became the primary concern.[294] Nevertheless, at all times employers were remained edgy about the extent of their future liability, not doubting that it would rise.[295] They were even more of one mind regarding shop clubs, managed by workers having a personal interest in efficient administration, and imposing a severe check on malingering and false claims. The employers were willing to contribute in excess of their statutory liability to these clubs and believed they would provide a spirit of friendly cooperation and closer relation with their workers.[296] Many miners were of a similar opinion and elected not to cover themselves under the *Act* but rather, to participate in joint schemes to which payments were set aside for injuries.[297] By the beginning of the twentieth century, many mining operations, singly or in conjunction with others, had established their own mutual insurance societies, replacing the old clubs formed by employers and employees. Additionally, some employee-owned and employee directed benefit clubs continued on their own despite the *Act*. A respondent to *The Times,* styling himself as *An Old the Employer*, wrote the following:

> Many of the more thoughtful of the Welsh Colliers who have set themselves to master the details of the Bill are now declaring that they prefer being left as they were -- working amiably with their employer in connection with their Miners Provident Fund which promptly relieves a sufferer from all accidents without regard to negligence or otherwise, then having the prospect of more relief pay, with its accompanying wrangles and ill will in proving their claims before arbitration etc. with the certainty that a large proportion of the workman above 55 to 60 years of age, being dismissed and forced to go to the parish.[298]

Another *Times'* letter, speaking for owners, noted that since the *Act* placed the entire burden on employers, it gave the miners no interest in discouraging unjustifiable claims. The writer added that some miners also belonged to other funds supplying such relief and got double support that discouraged them from returning and that physicians were prone to say, "The accident may have contributed to the disability or death," presumably without much justification.[299] In another issue, *The Times* claimed that the working classes were not nearly so deeply interested in what has been done up to the present time as in the parts of the program which have not yet been carried out. The men who had met with accidents too often had to spend all of their compensation in legal fees. Moreover, large employers were worried by having their own and their managers' time taken in defending themselves; the cost to the industry was too great and that, in any event, most accidents were caused by miners themselves accident, who,

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[294] Hay, J. R. (1978). Employers' Attutudes to Social Policy and the Concept of 'Social Control', 1900-1920. In P. Thane (Ed.), *The Origins of British Social Policy* (pp. 107-122). London: Croom Helm London. P. 115-22.
[295] Shadwell, A. (1906). *Industrial efficiency; a comparative study of industrial life in England, Germany and America*. London,: New York and Bombay Longmans Green and co. vol. I, P. 165-7.
[296] Hay, J. R. (1978). Employers' Attutudes to Social Policy and the Concept of 'Social Control', 1900-1920. In P. Thane (Ed.), *The Origins of British Social Policy* (pp. 107-122). London: Croom Helm London. P. 115-22.
[297] Unknown. (1900). Accidents, Insurance and The Workmen's Compensation Act. *The British Medical Journal* (Dec. 1, 1900), p.1616.
[298] *The Times* May 31, 1897, page 12, issue 35217, column F
[299] *The Times*: June 21, 1897: page 20, column C. issue 35235.

if solely responsible because of serious and willful misconduct of the workman himself should be denied any compensation claimed in respect of injury.[300]

Did Medicine Care?

The medical profession, in contrast to the unions and industry, spoke much more as one voice. For it, the exigencies of medical practice (overcrowding, competition from unqualified practitioners and ill-conceived education) demanded that general practitioners be unified in order to redress their disabilities. During the period I discuss, medical schools had increased their admissions considerably, and in this process, had lowered their standards and graduated more doctors than were needed. Though three quarters of medical school graduates became generalists, medical education spoke to the needs of a small minority of potential specialists. As discussed above, metropolitan specialists found little advantage in applying themselves to the plight of miners. Thus, general practitioners willing to settle in mining communities had little or no training respecting miners' lung diseases and local institutions did not provide for post-graduate education or research.[301] Furthermore, for a substantial part of the latter half of the nineteenth century, even after the Medical Act in 1858, and the creation of the General Medical Council, in 1858, registered doctors continued to find themselves challenged by unregistered and untrained practitioners operating in a medical market in which the public failed to differentiate those properly trained and those who were not. Competition between them was often unprofessional and intense resulting meager incomes for most medical men.[302] As Anne Digby has pointed out, they depended on local positions to ensure their survival and tried to monopolize as many professional appointments as possible, usually achieved by influential social networking.[303] Examples of non-hospital appointments would include employment under the Poor Law, as a public vaccinator, as medical officers of health (MOH), as school doctors, as medical referees, etc. One-quarter of rural doctors' income and one fifth of city and town doctors' livelihood depended on these appointments.[304] Class, ethnicity, gender, religious, political and school affiliations and the make-up of a doctor's practice determined the size of a practice as well as appointments.[305] It is likely that those to whom practitioners owed appointments would have substantially influenced their thinking. Taking on an unpopular cause within and without the profession risked serious economic consequences, and local medical men were rarely in a position to promote safety and compensation against powerful opposition.[306]

By the 1890s, the medical market had reached the climax of overcrowding. Relations between local practitioners and miner patients were amiable and uncomplicated until the end of the century when unions demanded different provisions for services and payment. Medical organizations, in general, were determined to prevent a "cheapening of medical service," and the British Medical Society (BMA), always opposed to fixed salaries and lay supervision, fought the unions vigorously. In an almost continuous series of disputes during the first decade of the twentieth century, doctors who did not adhere to BMA terms of appointment with miners (as

[300] The Times May 27, 1897, page 9, issue 35214, column B.
[301] Digby, A. (1999). *The Evolution Of British General Practice 1850-1948*. Oxford ; New York: Oxford University Press. P. 63.
[302].Ibid. P. 33-34
[303] Ibid. P. 261.
[304].Ibid. P. 80-81.
[305] Ibid. P. 262
[306] Ibid. P. 271.

well as with railway men) found themselves threatened with expulsion and professional blackballing. On the other hand, organized labor attempted to forcefully prohibit 'their doctors' from private practice (as in the Abergwynfi Colliery in 1905), tried to reduce agreed rates of medical remuneration (as in Ammanford in 1907), and to force doctors to set up additional branch surgeries (as in the Llanelli railway men dispute in 1907). The BMA's threat of expulsion and blacklisting of appointments successfully prevented practitioners from acceding to union demands.[307] In this contested relationship, it is likely that medicine viewed any union legislative agenda, including workers' compensation negatively. For their part, unions showed little interest in involving doctors to any extent in their compensation schemes.[308]

Of course, any consideration of compensation cannot exclude medicine entirely. The physician plays a central role in determining an occupational etiology for injury and disease, but, during the early period of liability and compensatory legislation, unions and the government were much more interested in limiting it. After 1906, it became obvious that their opinions were essential and medicine became the primary authority for determining legal responsibility and eligibility. Physicians rendering decisions generally acted as experts on both sides of the issue. That one physician held an "expert" opinion in opposition to another was very often more than a matter of scientific judgment. A need to enhance social or professional status or to further economic interests, whether conscious or unconscious, cannot be dismissed in the decision-making process. Moreover, different forms of compensating the physician very likely affected the type and quality of medical services offered the worker. External social factors may also have affected the physician's perspective on questions of occupational causality. Physicians selected by the employer's insurance carrier may have been reluctant to diagnose occupational diseases for fear of losing future business. On the other hand, the relatively guaranteed reimbursement available through workers' compensation for compensable disorders may have induced other physicians to generously view symptoms as work-related. Government also influenced medical opinions since payment schemes that required diagnoses to be restricted to pre-defined classifications may have obfuscated emerging occupational problems. Media attention, political pressure, and community concern also affected doctors in much the same way that it did workers and employers. Some of the preceding considerations were present from the very onset of occupational medicine, obviously affecting whether or not to support compensatory schemes.

Even a doctor's relationship to the claimant or a siliceous miner's relationship to the medical profession is less than clear-cut. Reporting to a physician or other health care provider for medical attention, transforms a worker into a patient at which time the relationship between patient and physician is subject to the influence of various social, political, and economic factors.

For most of the period I am discussing, the medical profession exerted much of its political energy in establishing its prerogatives, and pushing for economic rewards. Secondarily, though many doctors were prominent in the Health of Towns Association and in sanitation, generally, but their interest in promoting the prevention of occupational injuries and diseases was much less actuve. Very likely, this was the result of internal factors such as the physician's perspectives about the relevance of worker's ethnic or demographic characteristics, place of residence, socioeconomic background, lifestyle, or cultural habits. Inherent class differentiation between physicians and workers made many doctors insensitive to many potential occupational problems. As we shall find, these factors were especially prominent for a large part of our

[307] Digby, A. (1999). *The evolution of British general practice 1850-1948*. Oxford ; New York: Oxford University Press. P. 272-3.
[308] Ibid. P. 87.

period.[309] Sir John Simon was an early exception. He hoped that the *1864 Factory Act* would regulate the ventilation of factories to eliminate injurious gasses, dust or other impurities generated in the process of manufacture. Unfortunately, the Act, at a minimum, failed to address the reluctance of owners and managers to meet basic standards and limited the enforcement power of vigilant inspectors. Even when inspection had become a regular, publicized contrivance of government, there was no apparent interest on the part of the profession [see above] in promoting legislation that penalized owners for not observing safety measures at the factory floor, the coal-face, and in the railway siding. Similarly, this was the case of medicine's relatively late interest in the plight of gold miners on the Rand, and in tobacco legislation until sometime after the problem was widely publicized. This being the case with accident and disease prevention, the medical profession very likely thought it was under even fewer obligations to enter the political arena on behalf of compensation. On the other hand, once compensation was enacted, the profession did not hesitate to lobby for its sole role examining claimants and acting as referees, both positions being amply rewarded.

I have noted that after the *1862-64 Commission,* medical men who had been instrumental to its findings seemed to have lost interest in dust diseases. Indeed, the *Report of the Commission* received so little publicity that those who expressed some interest claimed it had been lost in the blue books. Even when *The Lancet* and *The BMJ* mentioned bills affecting siliceous mines, they rarely noted their enactment, or, if so, what the profession thought about them. For example, six years after the *Report* of the *1862-4 Royal Commission* (1870), the *BMJ* noted the first reading in the House of Lords of a bill introduced by Lord Kinnaird who had been chair of the *Commission*. Kinnaird observed that several *Acts* relating to coalmines, specifically, had passed but that none had addressed the different issues encountered in metalliferous mines. He suggested that metal mining accidents had escaped public notice because of the greater loss of life arising from coalmine explosions. On the other hand, metalliferous mining accidents occurred as the result of geological formations rather than the more dramatic gas explosions. Additionally, Kinnaird had noted, that the mortality figures in the metalliferous mines had exceeded the accidents in the coalmines and that coal-miners lived many years while "the metal-miners died off, like rotten sheep, of decay, at from 35 to 45 years of age." Kinnaird hoped that the owners or workers of mines with the approval of the Secretary of State for the Home Department would prepare special rules based on the recommendations of the *1862-4 Commission.* He also expected agents to write a daily report regarding safety issues in order to insure timely safeguards; he did not mention how enforcement might be achieved [Unknown, 1870 #238].[310] The *BMJ* did not provide any follow-up as to whether this bill passed. Two years later, James Reid wrote a letter to the *BMJ* regarding the *Mines Regulation Bill* in which he referred only to coalmines. He complained that the present system of inspection was inadequate and recommended that a score or so of trustworthy miners, changeable and always moving from place to place, could, without any prejudice or predilection, inspect all the coalmines in the kingdom, and report their findings at frequent intervals to a higher authority. He believed that the cost of such an undertaking would be infinitesimal. The editors responded by thanking the correspondent for his suggestion and commended it to the notice of the Parliamentary Bills Committee of the Association [Bird, 1872 #239].[311] There was no follow-up to Reid's letter.

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[309] Digby, A. (1999). *The evolution of British general practice 1850-1948*. Oxford ; New York: Oxford University Press. P. 19-20.
[310] Medico-Parliamentary Section. *The British Medical Journal*(Feb. 26, 1870), p. 225.
[311] Unknown. (1872). The Mines Regulation Bill. *The British Medical Journal* (March 23, 1872), p. 327.

Few articles in either *The Lancet* or the *BMJ* demonstrate particular concern for the condition of labor on the ground. For example, even Dr. Tremenheere's comments on the accidents suffered at the disastrous explosion in the Darnley Colliery in 1849 were recounted in a summary manner. However, Tremenheere had called attention to the admirable legislation that the Schools of Mines in France, Belgium, and Germany had urged on their countries. He had pointed out that in Germany, the production of coal between the years 1834 and 1844 had increased 20 per cent, the number of workers had increased 17 per cent, and the number of fatal accidents had diminished 15 per cent. No commentary on the subject appeared subsequently. Though hoping to appear politically impartial, the journals never refrained from lobbying efforts directed toward improving the status, power and economic rewards of physicians. The *British Medical Journal* did seem to approve of Farr's address delivered in the Section on State Medicine in Leeds, July 1869, mainly because he had urged creating a Ministry of Health having four main branches–administrative law, medicine, engineering, statistics organized so as to work in harmony with a Council of Health and executive heads.[312] Obviously, such a ministry promised rewards to the profession.

Both journals urged better compensation for MDs whenever the subject came up. Early on, *The Lancet* and the *BMJ* did report on the activity of the mining inspectors and on mining legislation, especially on behalf of women and children working the mine but otherwise they largely ignored mining diseases. The following summary of a meeting of the Metropolitan Poor-Law Medical Officers' Assoc. on March 2, 1867 expresses their real interests; namely, that nearly all the requests of the medical officers had been accepted. At the same time, it urged the Lancet Commission and the Workhouse Association that formed in 1866 to. …

> watch the progress of the Bill through committee; and, if possible, to obtain the insertion of clauses: to secure the life appointments for all Poor-law medical officers and to obtain for all workhouse medical officers a seat at the Board of Guardians, and for all district medical officers a seat at the dispensary committee –without vote–so that they may be a to advise their respective boards upon all questions relating to the medical department. The journals urged providing every infirmary with a visiting as well as a resident assistant medical officer and to secure to medical officers due compensation and a right of appeal in certain cases.[313]

It also urged the *Lancet Commission* (created in 1866) to *lobby* on behalf of a provision for compensation covering out-door medical officers who may have been injured by in the course of their work which was not in their contract and that an appeal should be granted to medical officers for the settlement of the amount of compensation. Obviously, *The Lancet* did not oppose the concept of compensation without exception. In 1872, it criticized the *1872 Metalliferous Mines Regulation Act* because it did not provide for medical examinations of all juvenile applicants. It pointed out that wherever industry flourishes, one or more medical men, experienced in conducting such examinations and in the manufacturing processes of their locality, should be selected by the Factory Inspectors and charged with the examination of all

[312] Farr, W., M.D., D.C.L., F.R.S., etc. (1869). An Address Delivered in The Section of State Medicine, at the Annual Meeting of the British Medical Association, in Leeds, July 1969. *The British Medical Journal*(Sept. 4, 1869), p. 265-267.
[313] Unknown. (1872). The Mines Regulation Bill. *The Lancet* (August 13, 1872), p. 512.

juvenile candidates for employment to judge their fitness for the kind of work proposed. The authors of the "Remarks" section observed that "this organization is ready to hand, brought, so to speak, 'to the pit's mouth,' and immediately available to furnish a complete medical organization for accomplishing the necessary sanitary supervision of labour."[314] Five years later (February 18, 1879), *The Lancet* approved the *Royal Commission to Investigate the Conditions of the Atmosphere in Mines, and to Formulate the Laws of Safety*. The following is a typical example of the profession's self-interest and social bias:

> It is most devoutly to be desired that some practical conclusion may be reached by this inquiry. Apart from the difficulty of enforcing discipline among a class of men who are typically rough and reckless, though animated with many of the most manly instincts and sympathies, there is the general obscurity in which the cognate subjects of ventilation and lighting have been left by previous scrutineers. We have expressed strong opinions and made specific suggestions in this matter, which we trust may not be unheeded by the *Commission*. It is to be regretted, we think, that no practical medical authority is included in the list of Commissioners. This is a matter in which something more than a knowledge of the theories of life needs to be brought to bear on the inquiry. A practical worker in the department of vital chemistry would have been able to deal more directly with much of the evidence which may be expected, than the most profound and expert of philosophic theorists and experimenters.[315]

Who was it that expressed these strong opinions and made specific suggestions in the matter, and where and when did they appear? They do not appear in any of *The Lancet* issues surveyed in this chapter. Once again, the most important issue was the employment of physicians.

Though infrequent, beginning in the 1880s, the medical journals occasionally noticed the extent of occupational accidents and illnesses and of schemes offered to address them. Covering the International Congress on Accidents to Workmen (held in conjunction with the Paris Universal Exhibition in 1889) *The Lancet* quoted M. Linder, the President of the Congress, to the effect that industry was a battlefield strewn with dead and wounded caused by dangers that could be reduced.[316] Shortly thereafter, an unsigned correspondent for *The Lancet* called for accident prevention and for state provision against accidents to workers. The German system drew particular attention because compensation was paid with absolute certainty to the injured workman even when the employer failed in his responsibility."[317] Nevertheless, J. T. Arlidge very likely spoke for the majority of medical practitioners when he wrote in 1892 that occupational disease was inherent not only in the contract between the owner and his laborer but that it was also the result of the character of the laborer. The choice of trade was voluntary, and higher wages were an inducement for a worker to take on hazardous jobs. On the other hand, higher wages attracted chiefly "the reckless, broken-down characters found in the lower strata of society", so that a recklessness of conduct in life and in health matched the hazards of

[314] Unknown. (1872). The Mines Regulation Bill. *The Lancet* (August 13, 1872), p. 512.
[315] Unknown. (1879). Safety in the Mines. *The Lancet* (Feb. 15, 1879), p. 242
[316] Unknown. (1889). Compulsory Insurance. *The Lance t*(Sept., 21, 1889), p. 617
[317] From our Special Correspondent. (1889). The Paris Universal Exhibition. *The Lancet* (Sept. 21, 1889), P. 616.

employment.[318] Arlidge was simply applying to health the liberal market ideology as expressed in the contract model and extending it to accidents and illness related to occupation and to medico-legal jurisdictions, such as employers' liability and, later, to workmen's compensation. Figlio, on this subject, has noted that even when occupation was not particularly injurious to health, it became harmful indirectly, because the worker brought along his social and moral character as background features of his work. Thus, occupational injury and disease reflected not only occupational hazard but also the nature of the social groups that commonly worked the jobs in question. The distribution of illness in society reflected the understood contract between employer and employee, and all other implied contracts of human relations, whose adjudication came within common law.[319]

Thomas Oliver, a founding father of occupational medicine, also took a dim view of social ameliorative legislation. In the following excerpts from *The Lancet* reprint, his lengthy address before the Annual Meeting of the British Medical Association at Newcastle-on-Tyne on July 18, 1894 there is a refrain that the medical profession has echoed through the present. Oliver observed that despite ninety years of unprecedented prosperity, there was an undercurrent of social discontent fueled by an unwillingness to accept the teaching of authority or the influence of tradition. The discontented were calling for increased social as well as industrial benefits. While he doubted that anyone was unmoved by the great social inequalities, especially among those clamoring for larger opportunities or struggling upwards (though seldom rising) he feared that social changes were impending and he was apprehensive that those who believed that labor alone created wealth would press for socialism. For his part, he subscribed to wealth created by the skill and intellect of laboring man, which was not sufficiently recognized. However, he did not believe that untrained labor was capable of any special skill or intellectual accomplishment. Social progress is the sum of the efforts of individuals whose mental and physical inequalities had so far placed them beyond mediocrity that they transformed whatever they touched. No industrial system which insists upon rigid equality can awaken, like individualism, the inventive faculties of man. It is thus that intellect becomes not merely the creator of wealth, but is the only force underlying civilization–it gives life to labour.

Though reluctant to suggest that the medical profession involve itself in questions of how much of surplus production be given to capital and how much be handed over to labor, Oliver recognized that the question of wages was a very important matter to a large number of physicians because it was quite impossible for unskilled laborers whose wages were small, to pay their medical attendant adequately. Formerly, trades' unionism had sought to make provision for their families in sickness and death but, at present, improvement in the conditions of labor had resulted in the demand for increased wages, reduction in the hours of labor, limitation of production and improved sanitation of the industries.

Members of the medical profession actively participating in politics reluctantly admitted that there were certain local matters that required the sanction of its opinion.

> What is so necessary to health should not be doled out by a company whose interest oscillates between dividend and public service. There should be a responsibility which public opinion can reach…If it is the duty of a corporation to

[318] Arlidge, J. T. (1892). *The Hygiene Diseases and Mortality of Occupations*. London: Percival & Co. 2-3.
[319] Figlio, K. (1985). What Is an Accident? In P. Weindling & Society for the Social History of Medicine. Eds.), *The Social history of occupational health* London ; Dover, N.H.: Croom Helm. p. 200-201.

> see to the purity of the air we breathe and the water we drink, it might make proper provision for the housing of the poorer working classes or see that adequate provision is made for them. As regards health and the means of obtaining and keeping it, as regards freedom in education and the fullest opportunities for development, we move in company with the tendency of our time, but until we are convinced of the righteousness of socialism in all its bearings we cannot allow the claims of individualism to be ruthlessly ignored.

Moreover, while praising individual freedom, he excoriated the tyranny of social equality enforced by the State, invoking the social Darwinism of his period as well an older conception that the progress of a nation as dependent on the few who lead while the others followed.

> Leaving, for the present, the socialistic side of this question, we must admit that the particular tendency of the age is towards a democratization of all our institutions. We know how the influence of Parliament is invoked to protect infants, to guard industrial life, and how much it is sought for in matters relating to social purity. Instead of stimulating individual effort and drawing forth the character of men and women, it is expected that all can be accomplished by a parliamentary enactment. Social evolution is too complex a question to be thus regulated. Were the incentives to development all of one particular kind and originating invariably from one particular stratum of society, due simply to education and foreshadowed by events that could be anticipated and utilized, and were they influenced by external surroundings the social organism might be thus controlled.

From generalities as above, Oliver then proceeded to his specific concern, the Eight Hours Bill which threatened to allow workers too much time for atheletic activities, more injurious to their health than their work.

> Parliamentary legislation may make life easier, but physical satisfaction is not mental enrichment…The surmounting of difficulties develops character, and character is power. The tendency of the age is to over philanthropies. There is much to commend the Eight Hours movement to the favourable consideration of legislators for men engaged in laborious or unhealthy occupations, in which even eight hours' toil might be too much, but from the purely medical there is no necessity for it to apply to all our industries…We do not express an opinion unfavourable to a general Eight Hours Bill simply from a comparison of the time spent in manual toil with that of professional men, but purely on physiological grounds. The proof that the young artisan is not overwrought and that he has sufficient time on his hands is an explanation of the excessive athleticism, football playing and cycling of modern days. The effect of these upon the rising generation, when unduly indulged, is much more likely to be prejudicial than the result of toil. It must be your experience, not less than it is my own, that of all the functional derangements that disqualify for life assurance the effects of excessive athleticism upon the heart are the most common. The spirit of the age is one that finds expression in over refinement or excessive culture and in an unwillingness

> to recognize the dignity of manual labour…Never, perhaps, did altruistic feeling run higher than to-day, and yet at no period has there been so much social dissatisfaction. May be it is the result of it…[320]

Both The *BMJ* and *The Lancet* reflected Oliver's criticism of the Eight Hour Bill. *The BMJ* supported an eight-hour day only for workers in laborious or unhealthy occupations. Recognizing that Miners' work was extremely laborious and aggravated by darkness, dirt, damp, foul air and a cramped posture it admitted that the case of the miner was altogether exceptional and urged the claim of the miners, whose calling is the most arduous and dangerous of all to a like measure of protection from the State."[321] In fact, railroad workers had previously claimed the same benefit. Two weeks later, however, Dr. William Hardman (Blackpool) in a letter to *The BMJ* reminded the author of the above that the chief opposition to an eight hours' working day came from the miners themselves, about 100,000, who objected to it because they rarely worked anything like eight hours a day. Their work, being mostly by the piece, allowed them the freedom to work as long or as short a day as they desired. The difficulty was to achieve unanimity on the subject among the miners. There was no mention of reduced work resulting in reduced wages, probably the main reason for miner resistance.[322]

An unknown author in *The Lancet*, wrote that with respect to passing the Eight Hours Bill, subscriptions to medical charities from employers were likely to cease altogether and the "so-called workman" who is only allowed to work for eight hours a day would have to support the hospitals and dispensaries himself which he would not be able to do. Moreover, the aged and impaired worker, whether from physical infirmity or moral propensity, would be discharged. Because trades unions will not allow a man to work for less than the wage that a strong man can earn, and this again will throw more men out of employment for the masters will be only too ready to dispense with their services. It remains to be seen how the great mutual societies such as the Northumberland and Durham Miners' Permanent Relief Fund will be affected. At present both men and masters contribute to this really splendid fund for relief of those accidentally hurt and for aged members. It is more than likely that the masters' contributions will be withdrawn. If so the society will cease to support members injured by accident and will provide old age pensions only for the members. It is certain that some means will have to be devised other than the Poor-law for the advantage of men deprived of work under the Workmen's Compensation Act–men who but for such legislation would have continued at work for some years."[323] Clearly, the above positions on the Eight Hour Bill would not have predisposed the unions to the medical profession.

Respecting the 1897 Workman's Compensation Act, *The Lancet* initially hailed it as one of the most interesting experiments in modern legislation. The author of the above was confident that "none will quarrel with the great underlying principle of the measure, that the workman of our country should be in some way safeguarded against the perils of his employment, even

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[320] Oliver, T., M.A. Durh., M.D. Glasg., F.R.C.P., Lond. (1894). *Presidential Address* on Medicine: Its Relation to the Spirit and Tendencies of the Age. Delivered before the Annual Meeting of the North of England Branch of the British Medical Association, Newcastle-on-Tyne, July 18, 1894. *The Lancet* (July 21, 1894). p. 125-8.
[321] Unknown. (1897). An Eight Hours' Working Day for Miners. *The British Medical Journal* (July 3, 1897), p. 39-40.
[322] Hardman, W., Dr. (1897). Notes, Letters, Etc. An Eight Hours Day for Miners. *The British Medical Journal* (July 17, 1897), p. 196
[323] Unknown, *The Lancet* (1898) P.248

against those which obviously arise from his own fault and carelessness.[324] In an editorial dated June 25, 1898, *The Lancet* further approved the *Act* because its administrators could seek the assistance of sound medical advice whenever cases seemed questionable, undoubtedly at favorable fees. At the same time, it cautioned physicians not to appear biased in legal procedures noting that the *Act* that required the referees to be of independent position, and of high standing. For its part, it recommended that professional stature be determined by hospital appointments or by wide experience of accidents and their consequences and cautioned that those medical men having close identification with workers in their medical practice or otherwise be disqualified. Noting that the country abounded in general practitioners (the bulk of its readers) whose skill, experience, reputation and judgment had earned the respect of the profession and the public alike, *The Lancet* urged their appointment but it recognized that most cases would require surgical talent. In the event, almost all of the appointees were Fellows of the Royal College of Surgeons.[325] *The Lancet* also urged the Secretary of State to provide for other specialties in appropriate cases. The Act, itself, encouraged enlisting the opinion of referees on a specific medical question upon request by committees, by arbitrators and by the county court judges (empowered to decide all questions arising in proceedings under the Act). It expected the response to be in writing. It was the intention of Parliament that Committees of Arbitration and single arbitrators should be so far as possible informal and not subject to hard and fast rules, and that it be open to both parties to object to arbitration. However, if a workman accepted the arbitration of a Committee, a court of law would probably not be willing to listen to any complaint regarding the competency of the Committee.[326] While the Home Office correspondence for the early period after inauguration of the 1897 Act rarely includes complaints leveled against medical referees, on one occasion at least, a letter from a physician (possibly disappointed in his request for appointment) urges the Secretary of State not to appoint doctors who frequently take out judgment summonses against workmen.[327] One might wonder how often this was the case.

Both *The Lancet* and *The BMJ* agreed that referees not be examined as witnesses in first instance, but, rather, take on the role of an assessor, an *amicus curiae*. When the settlement of cases was especially difficult, the referee was to attend the proceedings in person. In some cases, the worker, himself, in receipt of an allowance under the Act, was entitled to request an examination by a referee in order to obtain a certificate of his/her condition. In this event, the evaluation became conclusive evidence in the arbitration proceedings. Treasury was to be responsible for paying medical fees][328]. Both journals recognized that rendering an exact decision upon the disabling effects in the present and future of all injuries to workmen in the complicated industries of the United Kingdom would be a task of profound difficulty which ultimately promised more credit to the profession if it was discharged successfully.

Physicians who were appointed referees often requested more specific information from the Secretary of State regarding their function. Either the Home Office was unable or unwilling to provide definite information or to refer them to a more informative department (very likely it did not exist) and, in response issued the following form letter: “The Secretary of State would like to provide every assistance, but he has no authority of opinion in a court of law and

[324] Unknown. (1898). The Workmen's Compensation Act, 1897. *The Lancet* (April 23, 1898), p. 1137-1138.
[325] Unknown. (1899). The Workmen's Compensation Act. *The Lancet* (Feb. 11, 1899), p. 889.
[326] Unknown. (1898). The Workmen's Compensation Act, 1897. *The Lancet* (April 23, 1898), p. 1137-1138.
[327] PRO, HO, 45/10165/B24908
[328] Unknown. (1898). The Workmen's Compensation Act, 1897. *The Lancet* (April 23, 1898), p. 1137-1138.

considers that it is not desirable for him to undertake to advise upon questions of liability under the Act which can only be authoritatively decided by courts of law." Additionally, there were frequent requests for a complete list of medical referees of which none was available, at least, during 1898. Under the circumstances, it would have been difficult for medical referees to form an association that might have addressed their queries. [329]

On October 27, 1900, *The Lancet* printed the views of two correspondents who noted that the Act had resulted in a significant increase in the number of claims upon the public generally. One author advocated the appointment of medical assessors to the courts, capable of taking a comprehensive medico-legal survey. This author expected the physician appointed to weigh carefully both the injured party's present state of health and the opinions of his medical attendants in support of the claim and, also, to consider any mitigating factors which might refute or alter the claim. In this regard, the writer urged that medical schools include special instruction to their students on evaluating injured workers in their forensic medical courses. This author believed that the resident medical officers of local hospitals were not in a position to counsel and direct both employer and employee because the officer's decision might –and in a certain sense should– reflect on the opinion of the treatment by the medical man under whose care the claimant was while in hospital. Furthermore, a hospital would gain no credit from the decision of its officer where everything turned out satisfactorily as regards the future health of the claimant in respect of his late injuries, while it would incur discredit if the reverse were to happen. In addition, the duties of medical officers of public hospitals were heavy enough to preclude further tasks. Recognizing the savings in time and expense that would accrue from referring claims to a single, agreed-upon medical arbitrator, the author acknowledged that it was not in the best interest of the medical profession to assume any role in assessing how much to award for personal damages.

The second correspondent expressed similar views. He also urged medical schools to provide a large number of doctors who were qualified to deal with all questions of accidental injury in their medico-legal aspect. When, there being no legal question, examination by a medical referee of known standing should be sufficient to determine the extent of the injury. However, this writer acknowledged that his advice was for naught since "at the present time the medical referees under the Act are not being used at all.[330]

The Lancet's approval of the *1897 Act* was short lived. Six months after it became operative, it complained: "The services of the official referees are not called into requisition, and so far as that principle is concerned the Act seems to be a dead letter. The number of accidents has very much increased to the manifest advantage of the lawyers and those members of the medical profession appointed by the masters, the men, and the insurance companies to look after their interests." The Home Office, itself, was well aware that medical referees were rarely utilized and stopped filling up vacancies in those areas where there was another referee was within a reasonable distance who could take the work.[331] The following letter from the Home Office is a typical response addressed to a number of unhappy referees: "It is the general experience throughout the country that very few cases have as yet been referred to the Medical Referee under the Workmen's Compensation Act, 1897[State, 1899 #292]."[332]. Under the circumstances, the Home Office correspondences for the years following enactment reveal many

[329] PRO, HO, 45/10165/B24908
[330] Unknown. (1900). The Workmen's Compensation Act, 1897: Two Views. *The Lancet* (April 27, 1900), p. 1227.
[331] PRO, HO 157/3, 30 January 1899
[332] PRO, HO 157/3, 17 March 1899

letters of resignation from unhappy appointees. However, renewed expectations coincident with the debate on the *1906 Act* resulted in a flurry of applications for appointment.

In 1904, representatives of the British Medical Association presented to a Committee of the Home Office the results of an inquiry it had addressed to medical referees. Out of 314 referees, 230 had replied. Only 26 had provided disability certificates. Fifty-one had furnished reports to judges and only seven had sat as assessors with judges. The Home Office acknowledged that the number of referrals had been small. As of December 31, 1903, 199 referees had been appointed in England but there had been only 105 requests for their opinion even though 1,437 cases appeared before the court. [333] The BMA representatives were critical of the judges, who in their opinion were unwilling to call in referees fearing that conflicting medical opinions would obstruct the proceedings. Somewhat surprisingly, they also blamed the workers for being ignorant of the protection offered them under the *Act*. However, they did acknowledge that since workers had to pay the referee's fee, they were justifiably fearful of the cost if their suits were denied. Therefore, they recommended that the fees should be borne by both parties. Additionally, they strongly advised consultation with a medical referee immediately following an accident. In this case, good advice and economics were in accord. The BMA representatives also complained that many of the medical referees had suffered serious loss because they had been required to give up other appointments and to refuse private work which might be prejudicial to their impartiality. They now found themselves without employment..[334]

Writing in *The Lancet*, Dr. Albert Benthall urged amending *The 1897 Act* so that medical referees advised the judges or arbitrators whether a disability was consequence of an injury and not the result of malingering or exaggerating injuries. This is not an easy task. Benthall believed that the *Act* placed a premium on malingering. Without medical input, he forecast that an increase in insurance rates would become a serious burden on trade. In fact he was astounded to find that: "judges who are absolutely untrained in medicine and surgery, who have declined all advice from the impartial medical referees provided by the Act, have hopelessly failed to grasp the often intricate medical points in question…[and] that it is impossible to obtain justice in the interpretation of it."

Additionally, Benthall believed that the Court of Appeal, acting with singular blindness, had altered its whole scope by compensating workers for the effects of any pre-existing disease which may have been slightly and temporarily affected by a trivial accident that would not have produced any disablement in the case of a healthy worker. Indeed, a decision on these matters would tax the assurance of any referees of unquestioned impartiality. By settling cases in this manner, employers were constrained to deny work to the old or disabled, thus burdening the community with their provision even though the workers in question were anxious and willing to work. "On these questions I venture to hope that the profession be solid and that each individual member will use influence with Members of Parliament and others so that the Act may be amended and its dangers avoided."[335]

As reflected in the journals, medical practitioners were ever on the alert for significant abuse of Workman's Compensation. In 1903, *The Lancet* published "Accident or Disease? A Question in the Working of Compensation Acts." The author urged compelling employers to

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[333] Unknown. (1904). Workmen's Compensation and Employers' Liability. *The British Medical Journal* (Sept. 10, 1904), p. 612.

[334] PRO, HO 157/2 Undated (1898), Letters from medical referees under the Act. p. 258/

[335] Benthall, A., F.R.C.P. Edin., M.R.C.S. Eng., M. & L.S.A. LOND. (1900). The Danger to the Community of the Workmen's Compensation Act, 1897. *The Lancet*(Aug. 18, 1900), p. 479-480.

adopt all possible precaution for the safety of their workers in certain trades and occupations. He believed that the widespread system of insurance would enable them to achieve this goal without imposing upon them any significant burden. Nevertheless, the author felt that it was inevitable that operatives and laborers as a class would misuse the laws for their selfish benefit. He noted that while the *Act* prevented tyranny on the part of employers, trade unions had taken to using obstructive tactics with the most pernicious effects on the commerce of the country and referred especially to the Taff Vale incident. Even though he recognized that to date, British labor had not menaced the benefits conferred by the Workmen's' Compensation Act, he warned his readers that abuse was near at hand by citing a recent occurrence in France referred by the Paris correspondent. A glass factory worker had contracted syphilis and had alleged that he had been infected by one of his fellow workers by their mutual use of a glass blower. In fact, upon examination, no trace of syphilis was found. In the author's opinion, had the suit been upheld, his employers would have been justified in dismissing all those in his employ who suffered syphilis. He concluded that:

> Defective social surroundings, speaking in the most general terms, undoubtedly constitute a danger to the health of the workman and may conduce to his breakdown while he is a wage-earner, but such occurrences, though very tragic, cannot be laid at the door of the masters. Certain risks must be taken in all classes of life and it would be equally foolish for a medical practitioner to claim damages from a patient from whom he had contracted an infectious disease, such as scarlet fever, as it would be for a worker in lead or phosphorus to consider lead or phosphorus poisoning as an "accident." The risk of the employment must be considered in the wages and the employees must be made to minimize these risks as much as possible, but the Workmen's Compensation Act was meant to meet cases of genuine accidents.[336] [Unknown, 1903 #255].

While *The BMJ* and *The Lancet* included very few articles concerning the eight-hour day and compensatory legislation and, when they did, they expressed little sympathy in their behalf. However, toward the end of the nineteenth century both journals began to publish an increasing number of articles devoted to occupational diseases and accidents. Arthur Newsome reflected the changed attitude in the following.

> The health of the nation is the crude supply of energy upon which the whole of its activities, its happiness, and its achievements must depend. It represents in a word, its potential wealth. We have seen how this wealth has been increased by the attention which in the last 50 years has been given to public health, and we shall need all the encouragement to be derived from these results when we turn to contemplate the work that yet remains to be done.[337].

[336] Unknown. (1903). Accident of Disease: A Question in the Working of Compensation Acts. *The Lancet* (Oct. 10, 1903), p.1026-7.

[337] Newsholme, A., M.D. Lond.. F.R.C.P., Lond. (1904). An Address on Social Evolution and Public Health. Delivered at the Inaugural Meeting of the York Medical Society on Oct. 21, 1904. *The Lancet*(Nov. 12, 1904), p. 1330-1336.

Dilke mirrored the Liberal Party's increasing interest in compensation but he also signaled the *BMJ*'s changing attitude.[338] While the medical establishment only briefly endorsed the 1897 *Act,* its enthusiasm for the 1906 Act was more sustained. Most importantly, for medicine, was that the authors of the Act recognized occupational diseases as notional accidents (now referred to as "injuries," a term meant to include diseases).

Even so, the major thrust of the journals' interest in the *1906 Act* was the possibility it offered of more employment and better remuneration for physicians. Of the diseases not recommended for addition to the schedule, the Committee noted that some presented diagnostic difficulties because they were encountered rarely. It failed to include the silicosis in the schedule because of the lingering belief that "it was the appearance of tuberculosis which rendered silicosis a disabling disease." [339] In this regard, one of the most respected workers in the field, Haldane, played a significant role in delaying compensation for silicosis. On the other hand, throughout the period I have discussed medical men periodically addressed the problems of disease in an occupational setting. Chadwick, and physicians such as Farr, Simon, Tremenheere, Arlidge, Haldane, Oliver, and Legge come to mind immediately, even though they were unconcerned or against compensatory schemes. Persuading the medical profession and the public that the special risks of occupational diseases to which the employer subjected his workers deserved to be compensated when disease or accidents intervened was a slow process; it had its origins late in the century when occupational medicine was becoming a specialty.

That the medical profession spoke so openly about obtaining a "suitable" income was typical of other members of the middle class during our period and did not necessarily diminish a active interest in providing medical care, at least for those who could afford their fees. One does not sense any embarrassment in assuring medical students that some diseases demanded attention and that others were unlikely to come to their attention for economic reasons. The Victorian period was steeped in paradox. Selfish interests and altruistic efforts existed side by side. Other paradoxes were also evident. One thinks of Greenhow whose scientific work on behalf of miners' lung diseases was invaluable but who did little to popularize his medical findings and stimulate social policy on behalf of miners in the period following the *Commission*. Even Farr represents an inadvertent paradox. Though his reports evince a strong sympathy for laborers trapped in "dangerous trades", the nature of statistics served to marginalize miners into numbers easily ignored by those lacking sympathy or preferring to ignore a sympathetic impulse. One sees this in the statistical summary of Farr's statement on the causes of death in England for 1862 as presented in the section on medical news in the *BMJ* on Sept. 3, 1864. Not only is there a brief and dry presentation of the "facts" surrounding the increase of respiratory diseases

[338] In the same vein, Aug. 12, 1905 issue of *The BMJ* reported Sir Charles Dilke's criticism of the Home Office for not sending more important delegates to the International Conference on industrial diseases. Dilke was especially worried about industrial lead poisoning. Dilke had pointed out that there had been 106 cases in 1904, or a return to the number of cases registered in 1901. This had occurred in spite of the suspension of workers susceptible to the lead. Moreover, the suspension rule often involved great hardship. Compensation depended on a certificate of plumbism that was difficult to prove, especially since lead was often believed to be a contributory factor and not the sole cause of the disease. Dilke was correct in assuming the government's active resistance to addressing lead, and, very likely other pollutants. Shortly before his address, the government had removed a woman inspector to Ireland who had previously requested more inspection and a more earnest search for a leadless glaze as the only means of stamping out plumbism.

[339] Unknown. (1864). Medical News. Causes of Death in England. *The British Medical Journal*(Sept. 3, 1864), p. 288-289.

(without specific reference to miners), there is no editorial comment save "it is a question of great interest, what has led to this recent increase of mortality from disease of the lungs."[340]

Throughout the period I have examined, the medical establishment sought to lobby Parliament in order to enhance its status professionally and economically. During the period I am examining, its power to impose itself on the legislature was limited. On the other hand it never came round to recognizing that a material and a practical interest in forming or joining associations could materially benefit workers as well as medical practitioners.[341] Finally, in 1897 and again, in 1906, labor unions, industry and politicians made workmen's compensation a reality. Medicine only entered the lists when it was profitable to do so.

The Mining Inspectorate: Our Hands Are Tied

Although the mining inspectorate had the potential of enforcing miner safety, in fact, it was a contrivance of the central government for obtaining "impartial" information. Certainly, the inspectors were quite familiar with all aspects of mining and the information they obtained provided Parliament (and, occasionally, the public) with graphic descriptions of the unhealthy and dangerous conditions prevalent in the mines. Wilson and Levy, usually suspicious of any government efforts to relieve laborers believed that workers owed less to the Courts of Justice or to Parliament, or even to Trade Unions, than to the various inspectorates .[342] In this instance however, their assessment seems overly sanguine. It is questionable that the reports of inspectors issued by the Home Office to Parliament were the most persuasive agents in establishing protective and compensatory legislation for laborers. Unfortunately, though sympathetic to miners and often credited with effectively enforcing the *Mines Acts*, they were seriously hampered by insufficient numbers, by management that subverted their assignments and by the prevailing code by which civil servants were restrained from promoting or supporting legislation. A marked disinclination on the part of government to interfere in private business made inspectors relatively impotent despite their zealous inspection efforts. Whatever influence they had on management tended to be moral rather than legally coercive. It seems likely that the inspectorate hoped to be more politically active but in a legal system that hardly favored labor, any efforts on their part to effect legislation in its behalf was seriously hampered.[343] Even in the early days of the inspectorate, when inspectors were allowed to be more vocal about their findings, their role in the legislative process was limited to providing expert testimony to the various commissions and committees concerned with mining. Thus, there is little evidence proving their effectiveness.[344] Nor were inspectors unaware of their helplessness. In 1866, Inspector Evans wrote in his report:

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[340] Bufton, M. W., & Melling, J. (2005). Coming Up for Air: Experts, Employers, and Workers in Campaigns to Compensate Silicosis Sufferers in Britain, 1918 - 1939. *Social History of Medicine, 18* (1).

[341] Moll, A. (2002). *The Body Multiple: Ontology in Medical Practice*. Durham and London. Duke University Press. Page 63-5.

[342] Wilson, A., Sir, M.P., & Levy, H., Professor. (1939). *Workmen's Compensation* (First ed. Vol. 1). London, New York, Toronto: Oxford University Press. P. xi

[343] Bartrip, P. W. J., & Burman, S. (1983). *The wounded soldiers of industry : industrial compensation policy, 1833-1897*. Oxford Oxfordshire New York, N.Y.: Clarendon Press ; Oxford University Press. P.95-6.

[344] Dembe, A. E. (1996). *Occupation and disease : how social factors affect the conception of work-related disorders*. New Haven, CT: Yale University Press. P. 15-6

> At present the inspector is always in his district, ready to receive complaints and investigate them, to inquire into the causes of accidents, and generally to advise on any matter presenting a difficulty. It is impossible to prevent accidents altogether, and if the owner and agent is relieved of responsibility, on whom to visit the fall? Certainly not on the government, unless they undertake the management of the mines altogether, and appoint as many inspectors as there are now agents, with power over expenditure.[345]

The factory inspectorate was the result of the report the early 1830s of, a Select Committee, appointed to study shorter factory hours. Incidentally, the Committee uncovered a high rate of serious accidents. Subsequently, a Royal Commission confirmed these findings, and, in 1833, Parliament provided for a small number of factory inspectors without any safety enforcement authority. Their charge was to secure "objective information" as a basis for legislation, an entirely new concept championed by Edwin Chadwick. Initially textile mills (and somewhat later, the British railways) came under their surveillance. Subsequently several large-scale mining disasters resulted in convening the *1835 Mines Commission*. It half-heartedly supported mine inspection. However, following an explosion at the St. Hilda Pit (1839), the independently organized, albeit influential, *South Shields Committee* concluded, "it is surprising that the coal mines of Great Britain, so vital to her strength and prosperity should be left entirely to the unassisted efforts of individuals without organization, or even supervision of the state." It recommended the appointment of two or three qualified practical inspectors with powers to enter mines and make suggestions for improvements that were provided by Lord Ashley's *Mines Act, 1842*. [346] The *Act's* main concerns were the prohibition of women workers below the surface and the specification of children's' duties and hours in the mines; it failed to mandate any safety regulations. The Home Secretary, Sir James Graham appointed H. S. Tremenheere, a former Assistant Poor Law Commissioner, as inspector with responsibility for enforcement and for reporting upon the general state and condition of the mining population. His assignment was restricted to the surface of the mines and thus, he gained no direct experience of underground work. Nevertheless, rather than blaming the negligence or indifference of the employers for mining accidents, he cited the heedlessness of the miners themselves. He did criticize shoddy ventilation arrangements, and urged the Home Office to provide a sufficiently staffed and scientifically trained mines' inspectorate, which, working underground, would be capable of offering *friendly suggestions* and *diffusing information*.[347]

Nine serious coal mining accidents with 20 or more deaths occurred toward the end of the 1840s and, finally, in 1850, an *Act for Inspection of Coalmines in Great Britain (13 and 14*

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[345] As quoted by Bartrip, P. W. J., & Burman, S. (1983). *The wounded soldiers of industry : industrial compensation policy, 1833-1897*. Oxford Oxfordshire New York, N.Y.: Clarendon Press Oxford University Press. p. 94. from PP 1867 XVI, Report, p. 906

[346] Bartrip, P. W. J., & Burman, S. (1983). *The wounded soldiers of industry : industrial compensation policy, 1833-1897*. Oxford Oxfordshire New York, N.Y.: Clarendon Press Oxford University Press. p.13-18.

[347] Bartrip, P. W. J., & Burman, S. (1983). *The wounded soldiers of industry : industrial compensation policy, 1833-1897*. Oxford Oxfordshire New York, N.Y.: Clarendon Press Oxford University Press. P. 84-5.

Victoria, c. 100) enabled the Secretary of State to appoint two mining inspectors with access underground: Dr. Lyon Playfair and Warrington Smyth, both associates of the Director General of the Geological Survey of the United Kingdom. Playfair and Smyth favored, "a system of inspection–one not over-meddling, but at the same time securing the most effective ventilation and the proper use of lights–should be adopted." The *Act* required that mine owners and managers actively assist them in their investigations.[348] Regrettably, understaffing, poorly framed legislation and a cumbersome legal system hampered effective enforcement. Some coalmines were never inspected and others were inspected very superficially. All the same, inspectors were able to provide the Home Office with potentially valuable information, not necessarily well received by owners or welcomed by lawmakers.

The Command Paper, *Report on Ventilation of Mines, 25 March 1850* by J. Kenyon Blackwell, Esq. and by John Phillips concluded that although many of the mines in the country seemed to be conducted with all due precautions against accidents, the reports issued by them were so exceedingly vague that any conclusions based on them would be liable to error. With very few exceptions, mines kept no accurate registers of the number of non-fatal accidents. Nor did they describe the nature of the accident, a vital piece of information for inaugurating any preventative measures. The authors also noted that inspectors encountered significant resistance to the performance of their duties. Their conclusions urged better reporting of accidents, freer access to mine records, and a better educated and more sophisticated mining personal, making a good case for enforceable legislation to back up their on-site requests and findings. These were not acted upon with any celerity.

Blackwell and Phillips also complained of badly-informed mining managers, noting that those entrusted with the management of mines had "often been scarcely removed in intelligence or requirements from the rank of common workman." Their knowledge was frequently so limited and their curiosity so minimal that improvements occurring in one district were quite unknown in others. In their view, the miner was rarely able to judge of the dangers by which he was surrounded, and consequently, to defend himself by ceasing to work in those mines in which they unnecessarily exist. The authors made a case for an educated class of miners and they saw no obstacle which might prevent the same provisions for education as were contained in the Factory Acts, namely requiring, as a condition of employment, a school certificate, to show a certain daily school attendance on the part of all youths employed in mines, until he shall have attained a specified age.[349]

Herbert Mackworth's *1852 Report* reached the same conclusion. Without education, he had little hope that safety could be legislated. "The greatest misfortune under which the mines of this district labour, both in respect to commercial value and their safe condition, is the ignorance of the managers or overmen." Mackworth took it upon himself to communicate with Dr. Lyon Playfair and the Rev. Canon Moseley, proposing a central mining and trade school at Swansea [Mackworth, 1852 #273] p.184[350]. Despite his efforts, *The 1855 Mine Act* failed to address any educational issues. Education would have had a two-fold advantage. If supervisors educated their

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[348] Bartrip, P. W. J., & Burman, S. (1983). *The wounded soldiers of industry : industrial compensation policy, 1833-1897*. Oxford Oxfordshire New York, N.Y.: Clarendon Press Oxford University Press. p. 87.

[349] Blackwell, J. K., Esq., & Phillips, J. (1850). *Report on Ventilation of Mines*. p. 24-25

[350] Mackworth, H., Esq. (1852). *Report on the Mine Inspection in the Southwestern District, during the half year ending 31st December 1852* (report). London: Presented to Both Houses of Parliament by Command of Her Majesty. p. 185.

workers, it would have lessened owner responsibility by shifting some of it to the supervisors (at least under the legal system then prevalent). But, also, such education could have been complimentary to legal protections as part of a comprehensive plan.

Mackworth's autonomous action in this instance is typical of the independence manifested by other ministry employees at this early stage in the history of bureaucracies. Later, they were compelled to be more circumspect. Even so, inspectors such as Mackworth, Blackwell and Phillips who were more vocal accomplished nothing with respect to legislation nor is there any evidence that they actively attempted to do so. Moral persuasion appears to have been the means that they applied to effect change.

In another instance of moral persuasion, Thomas Wynne, Esq., Inspector of Coal Mines for the Staffordshire, Worcestershire, and Shropshire districts called attention (1852) to a good deal interference with inspection. He noted that "the practice which so generally prevails of keeping the plans at some office miles away from the colliery and where it is quite out of my powers to see them without much loss of time, or what is equally objectionable, inspecting the mines at one time and the plans at another." While, he complimented the several coroners in his district who had allowed him to inquire into the actual cause of death and to the more remote cause that led to it, he regretted the usual absence of proprietors at the inquests where they could hear facts stated on oath with regard to the management of their collieries that did not ordinarily reach their ears. This was a practice he considered essential to preventing accidents of a like nature from recurring. [351] Unfortunately, there was no obligation to report non-fatal accidents until after the passing of the *Coalmines Inspection Act, 1855*. Even then, reports were required only if serious personal injury occurred as result of an explosion. Wynne noted that "the latitude allowed by this word, serious, is differently construed, so that similar accidents are reported by one manager, while they are not by another."[352] Since explosions were not responsible for the majority of deaths, one can assume that a true account of fatalities was missing. Consequently, any assessment of nonfatal accidents during this period remains inaccurate.

As the number of mines under their surveillance extended, mine inspectors increasingly isolated old hazards and fresh dangers arising from new practices. The need for revision of the *1842 Mine Act* became obvious, as did the need for more government supervision. The Hartley Colliery Mine disaster in 1862 provided the impetus for *The Mines Regulation Act* (*1869*) which required ventilation in every coal, ironstone and metalliferous mine sufficient to render gasses harmless. It did not specifically address the problem of dust. It required 30 years after the first *Mine Act* to enact the next major piece of legislation on mine safety. The *1872 Consolidating Acts Covering Metalliferous and Coal Mines* was based on separate investigations including the *1861-4 Commission* during the previous decade. The *Consolidating Acts* represent a high point in efforts to promote safety by means of regulation, inspection, and criminal law alone. They were the first to recognize that the significant differences existed between collieries and metalliferous mines required different legislation. The *Acts* acknowledged the very high incidence of accidents and the much lower incidence of lung disease among colliery workers as opposed to metalliferous mines.

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[351] Wynne, T., Esq., (1852). *Report of Thomas Wynne, Inspector of Coal Mines fro the Staffordshire, Worcestershire, and Shropshire Districts*. London: Presented to Both Houses of Parliament. p. 142.

[352] Bartrip, P. W. J., & Burman, S. (1983). *The wounded soldiers of industry : industrial compensation policy, 1833-1897*. Oxford Oxfordshire New York, N.Y.: Clarendon Press Oxford University Press. p.38-9..

Despite their surveillance, the small cadre of mine inspectors were unable to prevent inaccurate or false reporting. As late as the 1890s, Inspector Courtenay Boyle suggested that a careful analysis and comparison of the figures for work injury appear to show that the railway companies did not report their accidents consistently and he urged greater uniformity and accuracy in the returns supplied by the companies. Misgivings about the accuracy of on-the-job accident statistics persisted well into the early twentieth century. Yet, the Board of Trade was virtually powerless, or, at least, considered itself so, to do anything to stop the evasion. Again, part of the difficulty was the small inspecting staff as well as a working philosophy that precluded meddling in the affairs of private companies. The Board itself admitted that, in lacking other resources, it had no means of checking or completing the returns from companies.[353] The available statistics suggested that none of the legislation had any significant impact on mining accidents.

Mining inspectors were clearly aware of the relationship between *bad air* and miners' lung disease and emphasized the need "to provide a sufficient supply of pure air in order to reduce much disease among the mining population. Phillips and Blackwell, wrote "this evil admits of easy remedy, which it will probably receive when the attention of mining proprietors is called to it."[354] In his 1852 Mine Inspection Report covering the heavily mined South Western District Herbert Mackworth noted:

> In a statistical point of view, this want of atmospheric and pure air is one of the most serious causes of mortality to be found in the kingdom, as 300,000 miners have their years of labour shortened, one third of it, whilst that labour is increased in severity. It is not out of place to allude to this subject, which I have referred to in former reports, as the infections of disease contracted on the surface is small in comparison with the seeds of decay and death inhaled in the mine itself, which can in all cases be removed with actual benefit to the proprietor.[355]

They all recommended periodic measurement and recording of the specific quantity of air in circulation in a mine relative to the number of workers employed in the area surveyed.

Fifteen years later, mine inspector Thomas Fanning, appeared as a witness at the *Accidents in Mines Commission* (1879) held prior to framing the *1880 Employer's Liability Bill*. When questioned on how to diminish accidents, he responded that if "some more safe method of ventilating mining chambers could be obtained…it would no doubt have a beneficial effect, lengthening in the lives of men. I think it would improve their health to have the places well ventilated." When asked if the men were cut off prematurely he responded affirmatively.[356] Asked whether as a rule he had reason to be satisfied with the ventilation of the North Welsh lead mines, he replied, "well, I have had cause to complain. I've also received complaints from miners from time to time, and most of those complaints of turned out to be well grounded, and I

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[353] Bartrip, P. W. J., & Burman, S. (1983). *The wounded soldiers of industry : industrial compensation policy, 1833-1897*. Oxford Oxfordshire New York, N.Y.: Clarendon Press Oxford University Press. p. 41-2.

[354] Blackwell, J. K., Esq., & Phillips, J. (1850). *Report on Ventilation of Mines*. p. 24-5.

[355] Mackworth, H., Esq. (1852). *Report on the Mine Inspection in the Southwestern District, during the half year ending 31st December 1852* (report). London: Presented to Both Houses of Parliament by Command of Her Majesty. p. 185.

[356] HC Deb 1879 vol cc 3976-3977

have been compelled to request the owners or agents to apply the proper remedy; to supply the ventilation by artificial means." Asked whether some of his mines were ventilated by artificial means, or whether they mostly trusted to spontaneous ventilation, he replied: spontaneous ventilation, and continued with a plan of his own for artificial ventilation. Later in the session, he mentioned the following:

> I sent the following letter to the home Secretary, that phthisis causes excessive mortality among the miners employed in those mines is unhappily, too true…the practice common in… mines of boring holes for blasting without putting in water. This produces a quantity of dust of a highly deleterious character, which the two men who are boring, cannot fail to inhaled largely during the deep inspirations attending violent exertion. That is the general result. It has occurred to me, on a further consideration of the subject, whether the diagnosis in the case of the miners who died prematurely does not indicate *miners or grinders asthma rather than phthisis in a pure form* (italics mine)."[357]

Fanning got it right at a time when medical men were getting it wrong. Unfortunately, mining inspectors had little or no substantive role in improving and enforcing mine safety. Indeed, safety conditions at the end the nineteenth century period were very similar to those in 1860, even though commissions and committees frequently requested their opinions. Unfortunately, they were only of political value when the dominant party in parliament chose to include them in their legislative agenda or to satisfy a temporary urge to do something..

Following the passage of *The Metalliferous Mines Regulation Act*, Mine Inspector, Dr. C. Le Neve Foster,[358] in his 1877 Report, admitted, "It may be considered by some people that I have gone beyond my duties by attending to matters which do not appear necessary in the province of an Inspector of Mines."[359] Nevertheless, he hoped that each inspector would modify the *Act* to suit any special conditions that may exist in their districts when experience in their use suggested improvements."[360]

Joseph S. Martin was even more outspoken. In his *1898 Report*, he had the same complaint about poor ventilation in the Southwestern District mines, as did Mackworth in the 1852 and Fanning in the 1879. Obviously all of these men were anxious but unable to effect ventilatory improvements. It almost seems as if the Home Office intended them to be "good will" ambassadors to miners without any intention of effecting their recommendations. In the following, Martin proposed a political decision that he hoped would work in behalf of both miners and owners. It was not his decision to make and it had little effect. In decrying the high death rate among Cornish miners, he complained that the main culprit, ventilation, remained poor.

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[357] HC Deb 1879 vol cc 3976-.4009

[358] Incidentally, shortly before enactment of *1897 Workmen's Compensation Bill* Le Neve Foster suffered an accident while inspecting at the Snaefell Mine that was vividly reported in the Daily Chronicle. I may have caused him to be even more vocal and forceful regarding unsafe conditions in the mines and quarries.

[359] Quoted from PP 1867 XXIII, Report, p. 718 by Bartrip, P. W. J., & Burman, S. (1983). *The wounded soldiers of industry : industrial compensation policy, 1833-1897*. Oxford Oxfordshire New York, N.Y.: Clarendon Press Oxford University Press. P. 95

[360] Letter from C. Le Neve Foster received at the Home Office on 15 August 1894. PRO, HO , B12, 393 H-137, 1894

> The subject is an important and serious one, as, of course, the health and lives of these persons employed have to be safeguarded: but, only because of the severe depression which has existed in recent years, I have not felt that expedient to press the matter as strongly as might be, for fear of arriving at the last straw which would bring about a total collapse of the little mining vitality which remained.

Since the economy had improved, he was now willing to press for essential ventilatory changes. He also urged better educated mine managers.

> When will those who undertake to raise capital and conduct works on behalf of others learn that their own interests, as well as those of the capitalists behind them, will, in the long run, be best served by obtaining thoroughly competent, honest, scientific, and experienced persons. The practical man is admirable, in his place, and no one appreciates it more than I do, but I do not consider that, as a rule, he is in his place as an unguided general manager of a large works needing scientific knowledge and financial and organizing ability. With modern education, he has his place, and is the most important and integral unit in the success of the works."[361]

Foster's willingness to modify the code and Martin's soft-pedaling of safety issues in a bad economy may have been a reflection of Home Office policy; namely, the need to provide practical, consensual solutions which could attract the support of trade unions as well as business leaders. If that was the case, clearly the Home Office had interfered as much as it was willing to do. It adamantly refused to be more than an advisor both in promoting safety as well as in the creation or underwriting of funds to compensate victims or their survivors for occupational injuries and diseases. As far as the Home Office was concerned the risks and costs of occupational disease and injury were the legal province of the industry in which they occurred.

Eventually, Parliament provided the Home Office with legal means to force employers to comply with the law and to make certain that they had insured their employees against present and future risks. At the same time, the Home Office helped employers to identify various schemes under which employers could insure workers without undue strain on the economic well-being of their industry. It also proved of great benefit to insurance companies. Its inspectors, though walking a fine line, were in an enviable position. They uncovered work hazards that required correction, they promoted appropriate safety technology and, at the same time, they attempted to address business fears that the impact of legislation would not diminish their ability to compete in the marketplace.[362]

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[361] Martin, J. S., .H.M. Inspector of Mines for the South-Western District (No. 12). (1898). *Mines and Quarries: Reports of Joseph S. Martin, H.M. Inspector of Mines for the South-Western District (No. 12) Under The Coal Mines Regulation Acts, 1887 to 1896, The Metalliferous Mines Regualtion Acts, 1872 and 1875*. P. 1-2.

Melling, A. M. W. B. J., & . (2005). "A Mere Matter of Rock": Organized Labour, Scientific Evidence and British Government Schemes for Compensation of Silicosis and Pneumoconiosis among Coalminers, 1926-1940 *Medical history. 49, no. 2, (2005): 155, 49* (no. 2), 156-157.

In this chapter, I have attempted to describe how various groups with a primary interest in industrial accidents, liability and workmen's compensation agreed and disagreed with other organizations with similar interests or among themselves. Divisions such as these can always be anticipated when welfare reform becomes a legislative agenda item. Success depends on acceptable compromises and on forging linkages for concerted action, either for agreeing on isolated items or the entire program. Clearly, unions and mine and quarry owners had the most direct interest. That mine and quarry owners were uniformly against liability and compensation legislation based on economic considerations was not the case. However, whether those favoring this legislation were enlisted by other interest groups is unlikely. Unions should have favored compensation but were significantly divided over whether compensation insurance, would diminish employers' resolve to undertake preventative measures. In fact, as Joseph Chamberlain pointed out, this concern was overstated since fifty percent of accidents were unavoidable *acts of God*. Fixing problems of prevention would have saved half, if not more, of the injuries sustained in the mines and quarriers. While this was true for injuries, it was not the case for the incidence of silicosis which could have been greatly reduced by insistence on good ventilation, masks and a change in drilling practices.

The medical profession should have had an interest in prevention, if not compensation. Indeed, attention to public health (including occupational health, diet, living quarters, etc.) undoubtedly achieves more of medicine's interests than the treatment of individual patients. Unfortunately, during the period I have discussed, the medical profession was distinctly uninterested in occupational health and workmen's compensation, largely for social and economic reasons. The interest of medical professional organization waxed appreciably when its remunerative role in deciding whether work was at fault became clear. In this predisposition medical practitioners were not unlike others professionals.

The mining and quarrying inspectors were interested in realizing the full potential of their "assignment", but they were largely gagged by the bureaucracy to which they were subject. Moral persuasion was their only means of attacking unhealthy labor practices, and moral persuasion generally is ignored unless a significantly powerful advocacy group can be organized. The mining inspectorate was not allowed to undertake such an endeavor.

The following chapter describes how workers' compensation was enacted as it applied to mines and quarries. Enactment required changing attitudes and concerns of the dominant interest groups in the shifting contexts of the economy, political climate, as well as a change in the dynamics of class, ideological orientations, rhetorical techniques and technical trends, all of which were occurring toward the close of the nineteenth century.

Chapter 4: How Parliament Created Compensation

The *1880 Employer's Liability Act*, and the *1897 and 1906 Workmen's Compensation Acts*.

The1880 Employer's Liability Act failed to satisfy labor and management. Nevertheless, attempts to reach a solution acceptable to both parties were bandied about until late in the 19th century with the *1897 Workmen's Compensation Act* compromise and its extension, the *1906 Workmen's Compensation Act*. The *1897 Act* indemnified workers for occupational accidents. The *1906 Act* recognized occupational disease as notional injuries resulting in scheduling a few of these for compensation. By that date, the contentious issue of tuberculosis in the elaboration of silicosis had been resolved. Most of the medical community recognized that the significant lung damage occurring among siliceous miners did not require the presence of non-occupationally related tuberculosis. Other issues related to apportionment remained but, clearly, scheduling was imminent.

Both the Liberal Party and, the Conservative Party (to a lesser extent) recognized the past injustices to which workers had been subjected and they sought to enact some form of liability and compensation insurance. Joseph Chamberlain, and less prominently, Herbert Asquith, both played major roles in this endeavor. Their advocacy did not necessarily gain them political advantage since compensation was not a high priority among the larger voting public. In fact, an analysis of the addresses delivered prior to the 1906 Lib-Lab victory shows that workmen's compensation was a less frequent topic than poor law reform, pensions, free trade, amendments to the Education Act, Irish government reorganization, licensing reform, the importation of Chinese labor, and Tory misuse of the 1900 mandate. Very likely, it took second place to unemployment legislation, which, in itself, was fourteenth on the list of topics.[363]

Much of the impetus for restructuring and enacting social policy were among the most conspicuous features of Gladstonian Liberalism such as the growth of probity in government, increasing state regulation, and the expansion of bureaucratic officers who adhered to professional standards and held professional certification.[364] In this evolution, the power of middle class reformers representing organizations such as the National Association for the Promotion of Social Science, shifted to professionals having special expertise and skills. Professionals assisted in framing legislation and undertook investigations related to their field of expertise. They also served as consultants on commissions and committees and found employment to further the agendas of various organizations. In these functions, they provided fundamental economic and political assessments. Whether advising Parliament, industry, labor, etc., they clarified the complexities involved in the relationship between employers and employees, or in the choice of technology, or in production, itself, or the level of production required. Additionally they undertook enforcement of acceptable work methods and the organization of labor as well. However, the fact that all parties appreciated the complexity involved in any writing and social welfare legislation did not necessarily accept the advice of specialists. What was on offer might appeal to some elements in one interest group but be unacceptable to other elements in the same group. On the other hand, these divisions made for

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[363] Searle, G. R. (2004). *A New England? : peace and war, 1886-1918*. Oxford New York: Clarendon Press ; Oxford University Press. P. 36.

[364] Skidelsky, R., *Times Literary Supplement* (June 25, 2004).

unexpected coalitions and compromises and, ultimately, to the Workmen's' Compensation Acts of 1897 and 1906.

The manner in which these compromises and coalitions came about adds credence to Dicey's conviction; namely, that success in converting humankind to a new faith, whether religious, or economical, or political, depends but slightly on the strength of the reasoning by which the faith can be defended, or even on the enthusiasm, of its adherents. A change of belief arises, in the main, from the occurrence of circumstances such as, war, famine, a change in the economy, labor unrest, a changing electorate and lesser events that incline the majority or the world to hear with favour theories that, at one time men of common sense derided as absurdities, or distrusted as paradoxes.[365] Of course, once formed legislative opinion may be negative, as well, and operate, not by making laws but by preventing their passage. For example, in the early part of the nineteenth century legislative opinion favored conservatism while at the turn of the nineteenth century it favored innovation..[366]

Because the *Second Reform Act (1867)* made the power of concerted action on the part of the newly enfranchised in any election possible, it played a major part in inaugurating health and safety legislation. Not only did the *Reform Act* reflect radical demands, it also echoed a willingness to redress some social grievances voiced by the extended electorate such as allowing working class leaders to promote actively the safety of the 500,000 employees engaged in almost 5000 metalliferous and coal mining operations. The *Mines Regulation Act of 1869* and the *1872 Metalliferous Mines Act* reflected the changing electorate. The *1869 Act* required adequate ventilation in every coal, ironstone and metalliferous mine to render harmful gasses safe for workers, but it did not specifically identify dust as a culprit. The *1872 Act* was of especial interest because it recognized that differences between metalliferous mines and coalmines were sufficiently great as to preclude legislation applicable to both. During this period, middle class organizations such as *The National Association for the Promotion of Social Science* figured prominently in stimulating social legislation. At a meeting in May 1872, its members had endorsed the concept of compensation. P.H. Holland, invited to the meeting, delivered a paper entitled "On the Civil Responsibility of Employers to those Injured in their Employ." He proposed that mine owners pay compensation for injuries caused by neglect of safety precautions, albeit with a limit on the maximum amount in order to allow owners to self-insure with a degree of expectation of the financial risks they could encounter. Holland believed this would lead to greater safety, as the insurers would insist on inspecting conditions in mines and on raising the premium in the event that precautions were ignored. However, ultimately, Holland hoped a voluntary system of insurance would lead to universal liability insurance. Two months later, a Bill appeared in the House of Commons along the lines suggested by Holland. The *Bill* was withdrawn without debate. A similar *Bill* came up again in 1873 but the fall of the Liberal government early in 1874 prevented passage. During this period, the TUC acted as an advocacy group within the Liberal Party, directing its attention to matters of special working-class interest, and relying heavily on Parliamentary friends.[367] However, its major interest was the

[365] Dicey, A. V. (1914). *Lectures on the relation between law and public opinion in England* (Second ed.). London: Macmillan and Co., Limited, p. 22-3.
[366] Ibid. p. 18.
[367] Names closely associated with later compensatory legislation such as, A. J. Mundella, Thomas Hughes, Samuel Morley, Auberon Herbert, Thomas Brassey, W. H. Smith, Hinde Palmer, Jacob Bright and Charles Hopwood. Moreover, the TUC had friends in Parliament who were union members themselves, Alexander Macdonald and Thomas Burt.

abandonment of *common employment* and *contributory negligence* in deciding compensation awards.

At the same time, union members, Alexander MacDonald and Thomas Burt, became MPs, and in 1880, the TUC secretary, Henry Broadhurst did as well. Broadhurst acted less as an intermediary between the TUC and Parliament than as its direct representative. At this time, the Liberals were affecting respect for their labor allies. This was the case with the Conservatives as well albeit they were even more lukewarm. Their attitude changed somewhat after the Irish storm blew Joseph Chamberlain into their laps.[368] Chamberlain, remained the most energetic advocate for compensation despite his defection from the Liberal Party.

Besides the labor vote, the rapidly expanding railway system proved another impetus for better defining employers' liability. The railroads were the most visible public manifestation of the new industrial age and the epitome capitalist power. Workers were subject to catastrophic accidents, which symbolized the imperfection of the new industrial system and technology's failure to improve general well-being. At a deeper level, railroad accidents stood for a loss of personal control and provoked a sense of imminent threat as large corporations created new industrial organizations and technologies. They became the symbolic agents of these threatening changes, and as such, became early targets for legislating on behalf of victims of railway accidents.[369]

It is ironic, and a measure of the government's bias against workers that, at the onset of this process, injured travelers received compensation but railroad workers did not. This is a startling fact, since in Great Britain, between 1874 and 1876, railroad employees suffered an average of 742 accidental deaths and 3,500 nonfatal injuries annually. The average annual casualty rate for the general traveling public during the period 1857-60 was 28 deaths and 534 injuries per year, rising to 43 fatalities in 1874. As late as 1908, accidents took the lives of 461 railroad employees and disabled a further 20,688. Unfortunately, railroad workers were perceived as the cause of the accidents, a view encouraged by the railroad companies. Moreover, the inaccurate records kept by the railroad companies resulting in gross underreporting.[370] This is consistent with the popular opinion that miners were largely responsible for the injuries they sustained.

As noted in the previous chapter, paramount to easing employee claims for employer liability for accidents, was redressing the legal rules of responsibility for tortuous acts. Three qualifications were particularly offensive to labor. *Common employment* becoming law in 1837 held, as an example, that if a worker in a powder magazine habitually and contrary to orders smoked on that premises, and another worker shared or tolerated this habit, the other worker may well have been responsible for the explosion of which he was the victim. This was the case, even though a spark from his pipe was not at fault. Equally absurd was the situation in which a railway accident occurred through the negligence of the engine driver, every passenger injured could obtain compensation from the railway company, but a guard or a porter, injured by because of their fellow servant, could not obtain compensation.[371] More broadly, if either a

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[368] Martin, R. M. (1980). *TUC, the growth of a pressure group, 1868-1976*. Oxford New York: Clarendon Press ;Oxford University Press. P. 57.

[369] Dembe, A. E. (1996). *Occupation and disease : how social factors affect the conception of work-related disorders*. New Haven, CT: Yale University Press. P. 118

[370] Dembe, A. E. (1996). *Occupation and disease : how social factors affect the conception of work-related disorders*. New Haven, CT: Yale University Press. P. 113-4.

[371] Dicey, A. V. (1914). *Lectures on the relation between law and public opinion in England* (Second ed.). London: Macmillan and Co., Limited, p. 281

fellow worker or a supervisor had engaged in a common service and had been responsible for the injury, the employer was not held responsible for their negligence. It was not easy to define *common employment* with respect to the limit at which work for the same employer ceased to be work in common. It did not depend on difference of grade since the rule considered all those engaged in one business, even managers and apprentices had to come under its aegis. The second qualification, closely related to the above, was the doctrine of *contributory negligence* that held that if a worker suffered an injury, and he had contributed, in any way, to the injury because of his own negligence, the employer was in no way liable. Of course, in this circumstance it was usual to find some grounds for alleging a degree of carelessness on the part of the injured, even though the machinery itself may have been faulty. The third qualification, known as *volenti non fit injuria* held that the worker taking service in a dangerous employment was aware of the risk and the worker's acceptance of the job amounted to an unwritten contract. The effect of this trio of qualifications left the injured worker with very little recourse against his employer. It was rarely possible prove personal negligence on the part of the employer and prior to 1880 very few workmen injured in the course of their employment had any right to compensation especially since workers injured on the job had to sue their employers and prove negligence in order to recover damages.

The first attempt to abolish *common employment* was proposed in Parliament in 1862, before labor was well organized. Acton Ayrton, a lawyer and Liberal MP for Tower Hamlets and Lord Robert Montague, Conservative MP for Huntingdonshire, had joined forces to improve the position of injured workers and their families. Both men had already demonstrated a readiness to act independently of party, and their *Bill* challenged the trend of the courts to increase the scope of the doctrine of common employment. It gave any worker or servant an action for damages against his master if injured. Parliament feared that employers might find themselves liable for very large settlements and the *Bill* failed. Between 1871 and 1874, the Home Office, possibly because of the growth of trade unions, drew up several proposals that were rejected also.[372] Nevertheless, these *Bills* signaled a shift in Parliamentary attitudes by acknowledging, at least, that injured workers had rights. At the same time, the idea of insurance became an increasingly attractive alternative to tort action.

In May 1874, F.W. Evans, the secretary of the Bristol branch of the Amalgamated Society of Railway Servants (ASRS), in return for introducing an *Employers' Liability Bill*, campaigned for Sir Edward Watkin, a Liberal railway director,. Upon election, he introduced a *Bill* calling for the abolition of *common employment* and *volenti non fit injuria*. However, the Parliamentary Committee of the TUC found unacceptable because it contained various qualifications such as limitations on the period for filing a claim (even though it extended the period), the amount of compensation awarded to be determined mutually by the employer and the worker and exclusion of employers having less than fifty workers. The Bill failed.[373]

In response, the Parliamentary Committee of the TUC prepared its own Bill (1874), enlisting the support of the National Association of Miners, the Amalgamated Engineers, the Amalgamated Joiners, and the Amalgamated Society of Railway Servants (ASRS). Members were encouraged to organize public meetings and personal interviews with various members of Parliament. As part of the campaign, the Social Science Association debated E.L. O'Malley's

[372] PRO, HO 45, 9458/72731A

[373] Bartrip, P. W. J., & Burman, S. (1983). *The wounded soldiers of industry : industrial compensation policy, 1833-1897*. Oxford Oxfordshire New York, N.Y.: Clarendon Press Oxford University Press. p.128-9.

report of the TUC parliamentary committee entitled "*On the Bill to amend the law relating to the liability of employers for injuries negligently caused to persons in their employment*." [374] The debate brought together a number of people who figured prominently in subsequent compensatory legislation: Alexander Macdonald, Joseph Brown, Q.C., Henry Broadhurst (Secretary of the TUC Parliamentary Committee), A.J. Mundella (Nottingham manufacturer and a TUC sympathizer), and William Crawford (Secretary of the Durham Miners' Union).

Not surprisingly mining interests feared the expense and disruption that litigation might cause and complained that the TUC *Bill* was so radical and drastic in character that it was likely to destroy the trade of the country. Mr. Pritchard (very likely, Benjamin Pritchard, secretary of the miners of Wakefield), Macdonald and Mundella became members of a Select Committee organized to investigate the question and gave evidence before the Committee to study the proposal. The *Bill* was defeated in the second reading in Parliament.[375] One large mine owner, threatened that if it became law, he would sell his mines for half the present value. Another equally important mine owner on the liberal side of the House threatened to abandon his party forever unless the *Bill* was withdrawn.[376] Lord Randolph Churchill wanted the *Bill* amended in favor of all-inclusive accident insurance as a buffer against undue costs. Both the Mining Association and the Coal Trade Association supported his amendment but most employers preferred insuring themselves. The three Liberal-Labor members at the time, Alexander MacDonald, Henry Broadhurst and Thomas Burt, vigorously opposed all-inclusive insurance. MacDonald, leader of the Miner's National Union, declared that the newborn zeal for insurance was dubious and that real protection required that owners be compelled to pay out of their pockets for negligence. Broadhurst, secretary of the Parliamentary Committee of the Trades Union Congress, also warned against seriously considering supporting Churchill's amendment. The Gladstone government, which had seemed sympathetic to it earlier announced its opposition later. The amendment was dropped.[377]

Finally, an *Employers' Liability Act* became effective on 1 January 1881.[378] It soon became clear, however, that the *Act* failed to address some of the most pressing issues that had prompted enactment, especially *common employment*. The Act restricted recovery for damages to discovery of defects in the conduct, works, machinery or plant connected with the employers' business. It required proof of negligence on the part of the employer or his authorized agents and that the injured worker had not suffered because of their own negligence, contributory negligence, or that of a fellow servant. A minor victory allowed that when a worker exercised the duty of a superintendent, he could not to be considered *commonly employed*. All of the above were difficult to document. The fuzzy language of the *Act*, itself, thwarted most potential claims for injury or death. Moreover, the costs to the worker failed to address the employer's economic advantage over the plaintiff's meager means in any legal suit. At the same time, the *Act* strictly

[374] Report of the TUC Parliamentary Committee (1874) p.8.

[375] Bartrip, P. W. J., & Burman, S. (1983). *The wounded soldiers of industry : industrial compensation policy, 1833-1897*. Oxford Oxfordshire New York, N.Y.: Clarendon Press ; Oxford University Press. P.130-1.

[376] Birmingham Daily Mail, August 20, 1880

[377] Mallalie, W. C. (1950). Joseph Chamberlain and Workmen's Compensation. *The Journal of Economic History, Vol. 10* (No. 1) p. 46.

[378] The Act did not apply to seamen, domestic servants and those employees not engaged in manual work, other than railroad workers.

limited the amount of money recovered for damages and it did nothing to discourage workers' natural disinclination to sue the employer on whom they were dependent.[379]

Despite his desire to see *common employment* abolished entirely, Chamberlain, still a member of the Liberal Party, weighed in heavily in defense of the *Employers' Liability Act*. He was motivated by conviction and by politics; a large number of workers eligible to vote, particularly in Lancashire and Yorkshire, had defected to the Conservative party because of its ready response to their demand for reform of trade union laws. Chamberlain pleaded with Liberals to regain the loyalty of the working class by acceding to some of their demands while rejecting any move to toward an independent electoral representation for labor.[380]

Another issue raised by the *Act* was to plague further liability bills for almost two decades, *contracting out*. *Contracting out* avoided litigation and relieved the employer from the threat very large compensation awards, a threat posed by the *Employers' Liability Act*. *By contracting out* the worker waived claims against his employer under the terms of the *Act* in return for insurance covering all work related accidents whether or not fault be proved. A considerable number of workers chose the small but assured payment for accident provided by their employer's plan rather than risk a larger but less assured award under the *Act*. Most contracting out agreements involved mutual contributions to accident funds, many of which existed prior to the *Employers' Liability Act*. Although unions bitterly resented contracting out, most employers preferred it to insuring themselves against claims of injury. Owners believed that by avoiding the ill will consequent to litigation and by offering workers a financial stake in compensation settlements, industrial relations would improve. Arguably, it gave employers and workers a financial interest in reducing accidents by making both responsible for paying compensation. However, *contracting out* was not necessarily voluntary. Sometimes it was a condition of employment. Sometimes it was an inducement in return for which the employer made or increased a contribution to accident relief funds sponsored by workers themselves. For their part, employer contributions represented how much they believed the scheme would save them in the costs of litigation and awards under the *Employers' Liability Act*.[381]

Chamberlain was not against *contracting out* but Henry Broadhurst (secretary of the Parliamentary Committee of the TUC and the first trade union official to hold ministerial office) sharply criticized it. He claimed that it was seldom, if ever, real or fair, and that workers who opted to do so were readily and cheaply abandoning a law for which they had fought for many years.[382] Other union leaders, especially those representing miners, agreed that by any outside agreement between themselves and the workmen, the employers, in a covert manner, would control the independence of the workmen." Despite his reservations Chamberlain voted for the *1880 Act*, believing it was all that could be achieved. Reflecting on the *Act* some years later, he wrote: "The conditions of these arrangements are not so liberal as we thought–in fact in many

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[379] Dicey, A. V. (1914). *Lectures on the relation between law and public opinion in England* (Second ed.). London: Macmillan and Co., Limited. P. 282.

[380] Marsh, P. T. (1994). *Joseph Chamberlain : entrepreneur in politics*. New Haven Conn.: Yale University Press. P. 74.

[381] Bartrip, P. W. J., & Burman, S. (1983). *The wounded soldiers of industry : industrial compensation policy, 1833-1897*. Oxford Oxfordshire New York, N.Y.: Clarendon Press ; Oxford University Press. P. 159-60.

[382] Bartrip, P. W. J., & Burman, S. (1983). *The wounded soldiers of industry : industrial compensation policy, 1833-1897*. Oxford Oxfordshire New York, N.Y.: Clarendon Press ; Oxford University Press. P. 173.

cases they are singularly inadequate.[383] Chamberlain never wavered in his desire to extend to labor what we would now consider essential benefits. As an industrialist and long before the *1880 Act*, he had promoted the *Workshops Act*, the nine-hour day, and the arbitration of labor disputes. He had also supported organized labor against their mutual antagonists, the small masters known for the mean wages they paid their workers. In fact, in 1874, Chamberlain had even accepted the invitation of Trades' Council to stand for election in Sheffield. He won the approval of a considerable audience by proclaiming "the radical program of the future," namely, his four freedoms: free schools, free labor, free land and a free church and universal adult suffrage, equal electoral districts, and compensation for industrial injuries caused by the neglect or carelessness of employers.[384]

Almost immediately after passage, critics complained that the *1880 Act* did little to reduce the costs of establishing claims, and that it resulted in hearing delays with resultant inequities. All parties involved called for redress of these issues as well as greater accessibility to compensation under a wider and more explicit umbrella. The legal profession complained that the fuzzy language of the *Act* made its interpretation wide open. Even so, it did not provoke a large number of tort cases. Government's role, itself, in implementing the *1880 Employers' Liability Act* was contradictory. British civil servants were concerned to soothe anxieties regarding the impact of compensation cases on any competitive edge businesses may have held. Industry wanted assurance that the outcome would not be detrimental to the economic welfare of industry and that legislation would not replace one hazard with another. At the same time, the civil service was determined that commerce should assume all the risks and the costs for compensation. With respect to prevention, however, Bufton and Melling show that government offered little resistance to legislation on behalf of prevention when there was evidence of work peril, along with the means to obviate the hazards. My analysis of a somewhat earlier period than that which they surveyed agrees that the Home Office was "eminently reasonable and conscientious" in seeking to discover consensual solutions to the complex problem of miners' health. Nevertheless, the professional and ethical conduct of its officials was framed by intellectual and institutional boundaries that obstructed any serious consideration of dust hazards until at least 1919.[385] After the 1885 election, the first in which most miners and many other laborers could vote, the Liberals became more sympathetic to union demands. A select committee organized in 1886 (of which Sir Thomas Brassey, and Charles Bradlaugh, both longtime friends of labor were members) reported in favor of wide concessions to labor. Even the Conservatives, victorious in 1886, somewhat extended the liability of employers. However, *contracting out* remained on condition that the Home Secretary of the Board of Trade certified that the insurance for which the employer paid was equivalent to compensation under the *Act*. The TUC, for reasons which are not entirely clear, advised its Parliamentary Committee to do all it could to defeat the Conservative bill claiming that it was antagonistic to the very people for whom the Conservatives claimed it was intended. Thus most of those union members who had negotiated with the Conservatives withdrew their support. Nevertheless, times were changing. Parliament and the nation were poised to consider compensatory legislation with or without the help of the various interested parties. It appears that this change of heart was not an attempt to

[383] Joseph Chamberlain Papers Birmingham University, Employers Liability, J.C. 6/3/3/13: J.
[384] Marsh, P. T. (1994). *Joseph Chamberlain : entrepreneur in politics*. New Haven Conn.: Yale University Press. p. 69-70.
[385] Bufton, M. W., & Melling, J. (2005). Coming Up for Air: Experts, Employers, and Workers in Campaigns to Compensate Silicosis Sufferers in Britain, 1918 - 1939. *Social History of Medicine, 18*(1). P. 176.

muzzle worker demands for more extensive and potentially revolutionary social reform, as in Bismarckian Germany, but rather to redress grievances now accepted as legitimate and, at the same time, politically expedient.

In 1886, Chamberlain broke with the Liberals and moved away from his earlier electoral alliance between business and organized labor to display an increasing interest in the vast majority of the shapeless but significant working-class electoral body that did not belong to trade unions. He vigorously defended an *Eight-Hour Day Bill* for miners working at the coalface, reminding his conservative associates that no new principle was at stake since parliament had been interfering with the hours of labor for half a century. On the other hand, while most mining constituencies demanded support for an eight-hour day, some most emphatically did not because it would reduce wages. Chamberlain responded by making his measure only applicable to those districts desiring inclusion and he further assured miners that if the eight-hour day reduced production leading to lower wages, they could return to their previous arrangements. At the same time, he was supporting old age pensions for which the trade unions had little enthusiasm; sadly, union officers could tell from their records that few of their members reached the age of 65, the age that he proposed for the commencement of a pension. [386]

Continued dissatisfaction with the *1880 Employees Liability Act* and significant labor unrest in 1889 prompted *The Royal Commission on Labour 1891, 1892, 1892*, charged with the investigation of employer/worker relations, employer/worker organizations, and the conditions of labor, itself, and to determine whether legislation might remedy any evils uncovered. The *Commission* produced a mass of information, proving to be one of the most productive inquiries of the century. Its members such as Balfour, Hicks-Beach, Alfred Marshall, F. Pollock, Samuel Plimsoll, Jesse Collings, Tom Mann and Thomas Bart were experts in their respective fields and demonstrated a wide range of experience. It interviewed 600 witnesses and collected extensive replies to nearly 100,000 questions. Volume I of the evidence dealt with iron, coal and slate mining. The information obtained covered most of the major mining areas in England, Scotland and Wales. The majority of the witnesses were representatives of employers' and employees' organizations–trade unions, miners' friendly societies and mining associations. The *Commission* sought detailed statistical and other information on the mining industry, trade unions and employers' associations (number of members, rules and regulations and activities), conditions of working and employment, contracting and subcontracting, piecework, labour saving machinery and safety regulations, the causes and results of disputes, relations between union executives and men, and the cooperative movements and their effects. The study was especially valuable because there was no central repository of labor statistics. For the researcher, the evidence provides some of the most detailed and realistic description's of working conditions in almost every industry. It documents the views, prejudices and grievances of employers and workers at first hand and, by giving hundreds of on-the-spot accounts of strikes and disputes, is a comprehensive guide to the influence of the labor and trade union movements.[387] In contrast to the above, the conclusions of the *Commission* neither fulfilled the expectations of contemporaries nor were they in keeping with the vastness and thoroughness of the investigations.

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[386] Marsh, P. T. (1994). *Joseph Chamberlain : entrepreneur in politics*. New Haven Conn.: Yale University Press. P. 339.

[387]. *The Royal Commission on Labour 1891, 1892, 1892*. 1st Rep.,, minutes. appendices, digest of evidence, Group A. Vol. I., C. 6708-I}, d XXXIV.

Having bid for labor support, the Liberal Party victory immediately drafted the *1892 Employee's Liability Bill* (and old age pensions). It was a serious attempt to address the numerous inadequacies of the 1880 Act. Framed by Herbert Asquith, in close consultation with the trade unions, the *1892 Employer's Liability Bill* extended somewhat the liability of employers (to servants) but its chief feature was the abolition of *common employment.* It even allowed compensation to workers who failed to notify their employers of defective equipment. On the other hand, it retained the old principle, so fruitful in litigation that the injured man or his representative had to establish fault. No doubt, unions envisioned a prominent role in this process. Additionally, it extended benefits to servants.

For his part, Chamberlain believed that the *Bill* threw the burden of compensation on the employer even when the accident was due to defects for which he was not responsible. Additionally it made him responsible for the negligence of the superintendents whom he had appointed. He agreed that those injured in any accident, to which they have not themselves contributed by carelessness or misconduct, were proper objects of public sympathy, and should receive the most liberal treatment. On the other hand, in the attempt to distinguish between different kinds of responsibility, he found that the *Bill* fostered many anomalies. For example, superintendents incurred liability only when their sole or principal duty was superintendence while a negligent supervisor who only occasionally superintended did not incur the liability of the employer. Because the *Bill* placed the onus of proof on the person asking for compensation, it would be impossible to obtain evidence because the employer had control over the scene of the accident and great influence with the witnesses. On the other hand, it was not always fair to saddle the employer with the responsibility as in the following:

> Take, for instance, the case of an explosion in a mine, caused by the criminal folly of some workmen who has opened his safety lamp to light his pipe, and has thus been the cause of hurrying into eternity some hundreds of his fellow workman. Would it be fair that an employer should be entirely ruined on account of the voluntary action of a man whom it was absolutely impossible for him to control? The only way of meeting the case with any regard to equity is to acknowledge that the cost of providing compensation is really a charge attaching to the business in which the accidents occur. No human care or foresight, no expenditure however a lavish, can entirely prevent these casualties, although they have been reduced, and may be reduced still further, by proper appliances. Let the law then insist on every precaution and every appliance which experiences science from time to time show to be necessary. Let it punish with the utmost rigor any failure to observe the statutory regulations; but as, after all its resources have been exhausted, there will remain many cases of undeserved suffering for which no one can be made individually responsible, let it make the cost of providing for them a charge on production, to be reckoned and ultimately paid for in the price of the commodity produced.[388]

Chamberlain urged the universal right to compensation regardless of fault as the only equitable and logical principle.

[388] Hansard, Parliamentary Debates, XX (4th Ser.), 3-57, 1639 ff] p. 52.

> The consumer would scarcely appreciate the additional cost. His proposal was a deliberate attempt not to injure employers, who would recoup themselves in every case from the consumers. The community would not suffer because in one way or another — as a matter of charity, or as an obligation under the poor law – it pays the cost; and it would completely meet the claims of the working classes to whom accidents bring not merely personal pain and disfigurement, but the suffering attendant on want and destitution. He understood that some trades unionists protested strongly against allowing employers to ensure against the cost of compensation believing that security from laws would take away the necessity for care and watchfulness in order to avert accidents. However, most accidents were costly to the employer, even if he had no compensation to pay. Moreover, if the employer was not allowed to insure, and if the trade had the potential for injuring a great number of workers, the cost could be ruinous. "Accordingly, a condition of this kind would either be evaded under the limited liability law, or the men of property would go out of the business, leaving it to those who would be willing to assume a liability which they know they cannot discharge; and in either case the sufferers by an accident would have no redress at all.[389]

The German experience strongly influenced Chamberlain. Germany had inaugurated a system of State worker's insurance in 1883 that comprised principles of compulsory contributions from the workers (*compulsory thrift*), State aid and employers' liability. When disabilities were permanent, it provided for maintenance and when death occurred, it extended assistance to widows and orphans. When disablement through accident was temporary, it offered a means of medical treatment and recovery of lost wages. Remarkable for this period, it also covered temporary incapacity from sickness, and, finally, in 1899 Germany provided for those permanently incapacitated by old age or chronic infirmity.[390] German law granted compensation in every instance as a public right arising out of the natural obligation of the employer to compensate every worker injured in his service. Chamberlain used German statistical information to support his argument that most occupational accidents were Acts of God since only 19.76% of serious accidents were attributable to employers. A further 25.64%, were due to workers, and might be compensated for by employers, if the doctrine of common employment were abolished. Only 7.73% were partly attributable to employers and partly to workers. All together, these compensable cases comprised approximately 53.13%. On the other hand, 43% accidents were not attributable to either worker or masters but were inherent in the work itself. There was no accounting for a further 3.47%. On this basis, he argued that abolition of the doctrine of *common employment*, alone, would still leave entirely out of consideration the victims of nearly half the accidents that take place.[391]. He believed the trade unions were shortsighted in this matter. They wanted employers to be legally compelled to pay compensation for injuries to workers in all those cases in which the doctrine *of common employment* limited the liability but failed to reckon on accidents not attributable to masters or employees.

Asquith's *Employers'Liability Bill* passed in the House of Commons. Lords, however, strongly influenced by the numerous petitions offered by insurance societies, by the London and

[389] Chamberlain, J. (1892). "The Labour Question,". *Nineteenth Century, XXXII*, P. ff. 671
[390] Shadwell, A. (1906). *Industrial Efficiency; A Comparative Study Of Industrial Life In England, Germany And America*. London,: New York and Bombay Longmans Green and co. P. 147-9.
[391] Chamberlain, J. (1892). "The Labour Question," *Nineteenth Century, XXXII*, P. . 693-6.

North-Western Railway, and by miners' insurance societies, proposed an amendment allowing contracting out if the employer contributed to the laborers insurance fund for all accidents and if the scheme was approved by a majority of the workmen and by the Board of Trade.

Chamberlain sought a compromise, when the amended Bill was returned to the House of Commons but Gladstone's claim that contracting out was harmful in that it reduced the independence and self-sufficiency of the worker with respect to his employer assured defeat. This was also the position of the Trades Union Congress. Asquith's *Bill* was the last employer's liability bill to ever be submitted to Parliament in place of compensation bills.[392] Contracting out remained a significant issue for labor and Lib-Labs until the *1897 Workman's Compensation Act*. However, union claims to the contrary, the statistics labor representatives, themselves, presented, failed to prove, when carefully analyzed, that contracting out increased accidents. Even so, it failed to gain a foothold where unions were strong. [393]

No doubt, rivalry between Chamberlain and Asquith played a part in the failure to enact the *1893 Bill*. Significantly, during the debate Asquith forcibly asserted that he could find no logical distinction between injuries to health (disease) and injuries to limb and that he did not think the Bill as written ought to be confined to the latter, an argument that assumed increasing importance. Chamberlain believed such a consideration would bypass the instructions of the House, and that it would open the question of whether compensation be granted for deaths that might have been hastened by the operation of industrial conditions upon an original constitutional weakness, creating problems of unlimited extent. On a more personal level, Chamberlain's letter to Mr. Sullivan, editor of the *Birmingham Mail* reflects the rivalry between the two men "I just told Asquith that he made a great mistake and lost his seat at Hereford. He was very cross and denied absolutely that the *Employers Liability Bill* had anything to do with the matter. All my reports are to the effect that it undoubtedly changed a number of railway votes."[394]

The defeat of the *1893 Bill* was a near miss. The only mining legislation to come out of the brief Liberal hold in Commons was the *1894 Quarries Act.* The provisions of the Metalliferous Mines Regulation Acts, 1872 and 1875 provided for deeper quarries (more than 20 feet deep in which mineral was obtained above or below ground) and all works for preparing and manufacturing quarried mineral for sale at a distance not exceeding one mile from the quarry. All of these operations were believed more dangerous than shallow ones and the 1872 and 1875 Acts provided them with mining inspectors under the *Mines Regulation Acts*.[395] The provision for depth automatically excluded a large number of quarries, in some areas as much as fifty per cent, because they were shallow. Many of these quarries employed large numbers of people (at least as many as 800). Thus, a great many workers remained under the aegis of factory inspectors who had little time for or knowledge of quarry surveillance. As early as 1886, more than 5000 shallow quarrymen had presented a petition to Parliament setting out the case for the special inspection of slate quarries.[396]

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[392] Mallalie, W. C. (1950). Joseph Chamberlain and Workmen's Compensation. *The Journal of Economic History, Vol. 10*(No. 1), 45-57

[393] Ibid, p. 46-47.

[394] *Birmingham Mail* August 17, 1893.

[395]*Mines Regulation Acts* , 1894 *The Royal Commission on Labour 1891, 1892, 1892*. 1st Rep., minutes. appendices, digest of evidence, Group A. Vol. I., C. 6708-I}, d XXXIV.

[396] *Mines Regulation Acts* {, 1894 *The Royal Commission on Labour 1891, 1892, 1892*. 1st Rep., minutes. appendices, digest of evidence, Group A. Vol. I., C. 6708-I}, d XXXIV. p. 4.

Although the Quarry Committee had concluded that worker neglect or recklessness caused most of the accidents, Dr. William Ogle had informed it of the large numbers that had succumbed to lung disease. Ogle had recently served as Superintendent of Statistics at the General Register Office. His statistics revealed that the quarryman had more to fear from disease than from accident. Their mortality from accidents approximated that of coal miners (not insignificant). On the other hand, the quarryman's life was remarkably shortened by phthisis and other diseases of the respiratory organ. He attributed the excessive death rate mainly to the inhalation of dust. On his testimony, the Committee recommended the protection of quarryman against any influences.[397] The abstract of the Census Returns of 1881 and 1891 indicates the large numbers exposed to siliceous dust, employed in deep and shallow quarries. In 1881 there were 37,388 working the Slate Quarries and 15,760 working in stone quarrying including Limestone. There were 53,074 clay workers, including brick makers and 3,641 Plaster and Cement workers. The total thus employed was 115,653. Ten years later (1891) there were 46,865 persons engaged in stone quarrying including limestone, 14,654 slate quarriers, 54,356 clay workers including brick makers and 5,762 plaster and cement manufacturers, bringing the total to 121,637 {Quarry Committee of Inquiry: F. N. Wardell (Chairman), 1893} P.2.[398] Based on the above, Asquith, anxious to regain the labor vote after the *Liability Bill* debacle, was able to manage passage of the *Quarries Act.*

The *1894 Quarry Act* was a significant achievement, offering much improved protection to workers engaged in getting slate, stone, coprolites, or other minerals and to others engaged in industries productive of large amount of siliceous dust: limestone, slate, clay, brick making, plaster, and cement. However, it did little to restore confidence in the Liberal government's ability to address labor needs and, by 1894, the Liberal party was in disarray. Chamberlain made the most of worker dissatisfaction by reminding them of the *Employers' Liability Bill* fiasco. He successfully ensured a sweeping Unionist victory in 1895 convincing working class voters not to follow their supposed leaders.[399] True to his platform pledges, Chamberlain continued to push for no fault compensation for injuries. He knew what he wanted and he stubbornly pursued his goals. Later, when he was serving as Colonial Secretary during the particularly difficulty years of South African conflict and the campaign for tariff reform he maintained his promise. Moreover, he persuaded Arthur Balfour sufficiently so that on the eve of the 1895 elections, he was able to admit, "Social legislation…is not merely to be distinguished from Socialist legislation, but is…its most effective antidote."[400]

However, the Conservative government returning in June 1895 had to make good on its promises to provide compensation. Home Secretary, Sir Matthew White Ridley needed to be convinced. Tactfully ignoring Ridley, Chamberlain and Lord James prepared a Bill for passage the following year. Adroit at influencing public and parliamentary opinion, Chamberlain convinced *The Times* of the Bill's merit and enlisted the enthusiastic support of H.W. Massingham of *Daily Chronicle,* a paper with strong labor sympathies. Additionally he sent anonymous memoranda to sympathetic business leaders in branches of industry which the bill would affect to sound out opinion. Having shaped this bill in the light of these inquiries,

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[397] Quarry Committee of Inquiry: F. N. Wardell (Chairman), 1893] #270 P.4 and 5.
[398] Quarry Committee of Inquiry: F. N. Wardell (Chairman), 1893, P.2.
[399] Mallalie, W. C. (1950). Joseph Chamberlain and Workmen's Compensation. *The Journal of Economic History, Vol. 10* (No. 1) p.54.
[400] Quoted by Martin, R. M. (1980). *TUC, the growth of a pressure group, 1868-1976*. Oxford New York: Clarendon Press ;Oxford University Press. P. 63.

Chamberlain lobbied manufacturers among the government's supporters in the Commons. Before the end of January 1897, he could report that so far, "without a single exception — I have got them all in my side." His powers of persuasion, command of the subject and gentle threat to override Ridley (presenting his Bill to the Cabinet without Home Office consent) were such that he turned Ridley into a "bemused but loyal adjutant." The following letter to Ridley is a respectful exposition of his proposals. I quote it in full as an example of Chamberlain's political adroitness.[401]

Colonial Office
February 11, 1897

My dear White Ridley,

I am very obliged to you for your letter and criticism. We are both seeking what is best for the party as a whole and I most heartily appreciate the loyalty and frankness with which you have dealt with my proposals. You may be absolutely assured that the more freely you express your views the better I shall be pleased. The subject of discussion is a difficult one as there is much to be said on both sides. Let us thrash it out therefore and perhaps we shall reduce the points of difference–or at least agree to differ in the most friendly spirit.

I will take up your points 'seriatim'. You say that the general compensation will put for the first time in this or any other country an enormous liability on employers, without any machinery to meet it. I gather that the stress is in the last words because a greater liability is now imposed on Employers, both in Germany and Austria, than any contemplated by the draft Bill. In Germany the average charge is £1.6.8. per £100 – in some dangerous trades it is as high as £4 per £100 of wages. I do not believe that the charges under the draft Bill will amount to more than £1.5.0. in any case and the average will not exceed 15/-. Sir Alfred Hickman has given me statistics of his Coal Mines (the most dangerous employment we have to deal with) and the cost worked out from his figures will not exceed 18/3 per £100 of wages.

I do not know what machinery is required outside the Bill. Of course, the German system is more complete, but it would require a Bill of 200 clauses and would involve too much interference with private management. I have no doubt that in Committee we might accept amendments which it would be impolitic to put in the original Bill – but even without them the Bill would work, and no objection can be taken to it which does not equally apply in to Asquith's Bill. I propose the draft as an alternative to Asquith's Bill and by excluding shipping I get rid of the objectors who have naturally most weight with Forword.

As regards the existing mutual arrangement, I find very little real enthusiasm for them among our men. The conditions of these arrangements are not so liberal as we thought – in fact in many cases they are singularly inadequate. In the Miners Relief Fund for instance many employers only contribute 10% which is disgracefully insufficient.

[401] Marsh, P. T. (1994). *Joseph Chamberlain : entrepreneur in politics*. New Haven Conn.: Yale University Press. P. 397-400.

As to litigation, I agree that the prevention of this is all-important. Every employer says that he would willingly accept a liberal compensation scale if he could be assured against litigation. But I hope (and I think Jenkynes agrees) that I have provided against this. It is true that cases of dispute may arise under Cl.1 se.2.b. but they will be submitted to arbitration under Cl.1.se.3 – and the arbitration is simple, final and must be cheap.

Suppose, however, that the difficulties which you have mentioned and many others that we can both anticipate are considered to be insuperable, what is the alternative? I gather that you could adapt Asquith's Bill, with a contracting out clause limited to universal compensation.

I do not believe such a Bill would have a ghost of a chance of passing. We should be stunned with Harcourt's triumphant demonstration that we had stolen the Radical clichés; and even our friends would denounce us for putting them in an infinitely worse position than Asquith's Bill, while giving them nothing to say on a political platform. This last point is important. Up to the present time, the Govt. policy cannot be said to have any popular attraction. We have thrown sops to sections, but we have established no principle and, above all, we have not justified the claim for the Conservative Policy that it has always been the first in social reforms. We have now a great opportunity and, if it is not taken, I confess I hardly see how I, at any rate, could show my face on a public platform again.

However, this is in the first instance a matter for the Cabinet to settle. I think the best plan will be for me to circulate the draft Bill with the account I have drawn up of the opinions gathered from members on our side, and with a short memorandum which I will prepare.

I hope you will also put your views in the form of a memo and I will keep mine back till you are ready so that they may go out together.

For this purpose I return the Bill (the only copy I have) and beg you to make any use you think necessary of it. I mean of course, in the way of taking confidential advice from your officials, as I have not shown it to any private members, and it would, of course, be most inadvisable that the details should leak out beforehand. I did not intend, however, when I gave it to you to limit your use of it, if you desire to have the advantage of the criticism of the experts in the Home Office, or Jesse Collings, or any of your colleagues in the Government.

If you agree in this course please let me know, and I will get my memo printed and wait till you are ready to circulate. I am getting rid of my attack of gout which has left me rather weak, but I shall I believe be perfectly recovered next week.

Believe me,
Yours very truly,
J. Chamberlain[402]

On January 29, 1897, Chamberlain announced the Government's intention to enact Workmen's Compensation within the year because

[402] Chamberlain Papers at the University of Birmingham, JC6/3/3/16, 1897

> I believe that of all the sections or classes of the community which are now deserving of the consideration of the Parliament, and of the sympathy of their fellow countrymen, there is no class or section more claimant than those who in the course of their employment are struck down by the accidents which are beyond the control of these wounded soldiers of industry who deserve, and, I believe, will receive the sympathy of the community.[403]

Though the *Bill* introduced was in the charge of the Home Secretary, Chamberlain was mainly responsible for its authorship.[404] Chamberlain designed the Bill for parliamentary passage. He kept it lean to reduce controversy, and left some controversial clauses for introduction in committee and he did all that he could to expedite the date for enactment, playing the part of an impartial statesman pursuing fairness between employer and employee. More often he was the vigorous man of affairs "arbitrating, conciliating, reconciling warring interests, and stamping the whole proceedings in the house with that spirit of clear and precise bargaining, which", according to the *Daily Chronicle*, "has always been Mr. Chamberlain's note in politics". He had made more concessions than he liked to neutralize conservative critics. His *Bill* obviated the unlimited liability to which businesses might have been susceptible under the Liberal bill though Conservatives had insisted on including contracting out. However, the Bill gave little away because separate business schemes were required to be at least as generous as the national one.

Matthew Ridley introduced the Bill to Amend the Law with Respect to Compensation to Workmen for Accidental Injuries Suffered in the Course of their Employment on May 3, 1897. The Bill conferred upon a large class of workers, compelled to seek employment in certain specified dangerous occupations a right to claim compensation. It sought moderate and limited compensation for the loss of such wages incurred because of accidental injury. All that was required was mere proof of the accident and its resulting loss, irrespective of its cause. Another object was to impose the obligation of providing such statutory compensation upon those to whom good sense would naturally point as the fittest persons to bear it, and to define for the convenience of the injured workers seeking compensation the persons from whom they are entitled to claim it.[405]

During the debate on the Bill, Asquith again raised the question of whether an occupational disease was an injury. While labor generally supported the concept, it also recognized that, if enacted, those with health problems as well as those with injuries chanced dismissal because of the high risk of having to compensate them in the future. Chamberlain was refused to consider occupational diseases as a notional injury fearing the onslaught problems of unlimited extent. In fact, diseases were not scheduled until 1906. Trade Unions were certainly not of one mind with respect to a Workman's Compensation Act, itself.[406]

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[403] Unknown, *The Times*, January 29, 1897, Issue 35119, p. 8.

[404] Unknown.). *The Times*, May 15, 1897, Issue 35194, column F, p. 9.

[405] Cf. Cooper and Crane v. Wright, [1902] A. C. as quoted by Wilson, A., Sir, M.P., & Levy, H., Professor. (1939). *Workmen's Compensation* (First ed. Vol. 1). London, New York, Toronto: Oxford University Press. P. 65.

[406] The Acts of 1900 and 1901 which insured agriculture and gardening laborers (1900)and ship workers, and to those loading, unloading or coaling outside docks and away from the wharf or quay, even loading in a river or harbor (1901). These Acts signaled the recognition that coverage needed to be extended beyond the "dangerous industries."

Like many of his union leader supporters, Asquith was lukewarm about no fault compensation, fearing it might curtail efforts at prevention. However, opposing the *Bill* would have proved politically ruinous and Asquith and the Liberal Party hoped to get what they wanted by way of amendments. Indeed, his lukewarm response to Chamberlain's plan prompted the following editorial in the liberal *Daily Chronicle*. One suspects that Chamberlain's sponsorship played some role:

> We confess to a sense of disappointment that this measure of pure justice and mercy receives such a chilly reception at the hand of Mr. Asquith. Mr. Asquith's position reveals a certain sterility of mind that surprises us. Take the phrase about prevention. Who doubts it? All of us have written that prevention is better than cure. Of course, it is better that we should have no accidents at all. That now we should be spending time catching up on the wreck's turned out by our factories and mines. But it is no good to the injured man that our hope is in prevention. Mr. Asquith can hardly imagine that if he had passed his own Bill [1893] this question of providing for the wounded would not still be with us. There are something like 6000 men killed and a quarter of a million injured every year in our industrial services. What proportion of these accidents would his Bill have prevented? ... We have a clear issue of justice and humanity to face and it will be a bad day for progress if the Liberals interest themselves behind their ledgers, or swear that compensation shall come out of the workman's pocket. We have only one or word to say at present. We take note of Mr. Chamberlain and Mr. Matthew White Ridley's declaration that the line of prevention is to be sought in the development of the Factories and Mines Acts and in the application of the criminal law to cases of willful negligence.[407]

Chamberlain also successfully limited opposition from those who were likely to oppose the Bill by excluding an industry altogether or by persuading an industry after careful cost analysis. Though he had hoped for a universal private scheme, he kept the shipping industry, agriculture and domestic service out of the *Act*, all of which had previously brought him to grief. These exclusions amounted to at least half of the labor force. Chamberlain frankly defended this arrangement as a matter of expediency rather than logic, assuming that, if his measure proved successful, extension would follow. Industrialists generally, and coal masters (because coal mining was a notoriously dangerous occupation), particularly, feared that the responsibilities imposed by the Bill would ruin them. After carefully calculating both the cost and the distributive effect of insurance, he was able to enlist Sir Alfred Hickman, a coal master and conservative MP in his cause and with his backing, he successfully fended off protests from the Mining Association of Great Britain. They were reassured additionally by placing ceilings on the level of compensation: no more than £300 in case of death, no more than half the preceding weekly wage in case of incapacity weekly and no payment for the first two weeks of disability.

By establishing a sort of compulsory system of insurance against accident, the *Act* gave a worker the right to compensation independent of the question of any default on the part of the employer. It made the employer liable without accusing him of breach of contract or negligence on either his part or on the part of those working under him. In other words, it assumed that the employer was in default and that his negligence or the reverse should not enter into any

[407] Editorial *Daily Chronicle*, May 5, 1897

consideration of his legal liability to the injured person.[408] In this, *The Workmen's Compensation Act, 1897*, effected 'a revolution in the branch of law which concerns the relationship between employer and workman…It set up an entirely new doctrine and provided rights and imposed obligations which nowhere fitted into the existing scheme of jurisprudence.[409] William Beveridge, the designer of the welfare state created after the Second World War, regarded the scheme of Workmen's Compensation established by Chamberlain as the pioneer system of social security. He had avoided offending the canons of a Gladstonian political economy, canons that continued to make old age pensions impossible. The *Act* did not require any significant increase in government expenditure while simultaneously passing the employer's cost of insuring privately on to the consumer as a tiny increase in prices.[410] The only responsibilities placed on the Home Office were to appoint medical referees and collect statistics.

The *Act* singled out certain especially dangerous employments and of these, statutory regulation had applied previously. It immediately insured workers accidently injured in mines, quarries, factories and railroads. Also covered, were workers in or about any constructions exceeding 30 feet in height or buildings in the process of repair by means of scaffolding or on machinery powered by steam, water or other mechanical devices for construction, repair or demolition. The *Act* assumed that in certain occupations, there were special risks that benefited the employer. In these cases, it expected the employer to provide compensation for injuries incurred. There was no liability for injuries which did not disable a workman for at least two weeks from earning full wages, a subject of great dissatisfaction on the part of workers. In all cases, the workers' previous earnings determined compensation. In the event of death, such compensation took the form of a lump sum to their survivors. In the case of incapacity resulting from injury, the *Act* provided for a weekly payment for the duration of the injury not to exceed 50 percent of the average weekly earning. The injured worker or his spokesperson was required to give his employer notice of an accident as soon as was practicable. At that time, the employer had the right to require the worker to submit to a medical examination by a registered, duly qualified physician provided by and reimbursed by the employer. The examination was not necessarily final and either party could request other consultants for the sake of corroboration or correction. Medical participants received payment in advance of the examination or had to ascertain that the employer had requested it and was aware of his obligation.[411]

The *Worker's Compensation Act* allowed the injured worker to pursue damages under the *Act* or under the 1880 *Employer's Liability Act* ("when the injury is caused by the personal negligence of the employer or of some person for whose act or default the employer is responsible"). Indeed, a very large number of cases proceeded under the Employer's Liability Act because Workman's Compensation did not award damages other than those that affected the ability to work. Thus, a badly disfigured employee did not receive damages under the Workman's Compensation Act unless it affected the worker's earning capacity. Miners, however, rarely resorted to the Employer's Liability Act.

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[408] Shadwell, A. (1906). *Industrial efficiency; a comparative study of industrial life in England, Germany and America* (Vol. II). London,: New York and Bombay Longmans Green and co. P. 164.

[409][Holman Gregory Report, p. 7 as quoted by Wilson, A., Sir, M.P., & Levy, H., Professor. (1939). *Workmen's Compensation* (First ed. Vol. 1). London, New York, Toronto: Oxford University Press. P. 64.

[410] Incidentally, one of Chamberlain's brothers, Herbert was in the business of providing the requisite insurance.

[411] Unknown. (1901). Medical Men and the Workmen's Compensation Acts. *The Lancet*, P. 1487-1488.

The *Workman Compensation Act* won Chamberlain both admiration and criticism among Conservatives. Always unsure of him, some Conservatives were now comparing him to Disraeli. He had renewed the Disraeli tradition of social reform and now, like him, was championing Empire.[412] As a matter of fact, Lord Louderry, President of the Northern Union of Conservative Associations, at a meeting in Berwick (October 15, 1897) regretted, "the subordination of conservative principles to the dominating will of the Colonial Secretary (Chamberlain) whose radical views on home politics we have always regarded with disapproval, however much we may admire him as an imperialist."[413] Louderry believed that the Bill diametrically opposed the true conservative principle of dealing justly with all classes of the community. He did not see why only particular industries were covered and he challenged the government to show that there had been any demand for it on the part of the miners of Yorkshire Northumberland Durham and other districts.[414] Not replying directly, Chamberlain agreed that it was illogical to exclude agriculture, shipping and other industries and other industries but promised to address those issues shortly thereafter (Agriculture was included by the Unionists in 1899). Despite its deficits, Unionists made political capital out of the *Act* claiming it as one of the most important measures for the benefit of the working classes ever adopted in the UK.[415]

Even the labor leaning press editorialized favorably on the *Act*. The *Daily Chronicle*, which commanded a very large readership:

> The government has at last made an attempt -– a serious and strenuous attempt, as we believe – to regain the long list of their social pledges. The Bill for dealing with workman to accidents which the Home Secretary introduced yesterday [Matthew White Ridley] is so far as we understand its provisions a bona fide effort to deal with a shockingly neglected department of our working life. It marks a new phase, a great and striking advance in the treatment of the whole population.

Daily Chronicle noted that universal compensation for all accidents was the bedrock of the new legislation. The procedure was simple and governed by an arbitration tribunal, mutually agreed upon by employer and by a worker or appointed by the State. It admitted that the *Act* virtually annulled the *contracting out* controversy by providing that no scheme outside of Worker's Compensation could be effected unless the Registrar of the Friendly Societies certified that the workman would be as well provided for as under the Law. The *Daily Chronicle* editorial did regret that certain classes of workers were left out, "especially the seamen who have been treated with a certain refinement of cruelty ever since the *Employers Liability Law* was heard." However, the author was satisfied that the essential features of the *Act* provided the inclusion of all accidents and great simplification of the compensation process. In these matters, "the Government had followed the policy advocated in our column and preached for years by Mr. Chamberlain up and down the country."[416]

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[412] Marsh, P. T. (1994). *Joseph Chamberlain : entrepreneur in politics*. New Haven Conn.: Yale University Press. P. 397-400

[413] Unknown. (1897). The Workmen's Compensation Act, address delivered by Lord Louderry at the Northern Union of Conservative Associations on October 15, 1897. *Annual Register,* pp. 201-202

[414] *The Times*. July 21, column A, issue 35261, page 9.

[415] Unknown. *Hansard, Parliamentary Debates*, XLVIII (4th Ser.), 1433-41.

[416] Daily Chronicle editorial May 5, 1897

Admittedly provisional when enacted in 1897, the Home Secretary, Mr. Akers-Douglas, convened a parliamentary commission to investigate its efficacy in 1904. It was charged with proposing amendments and extensions to the *Act* based on their discoveries. Only two of the appointed members were especially knowledgeable regarding welfare and compensation: A. H. Ruegg, considered an outstanding legal authority on workmen's compensation and E. W. Brabrook, the author of *Provident Societies and Industrial Welfare* (1898) and a former Chief Registrar of Friendly Societies and Benefit Societies. The Committee invited Thomas Legge[417] the Chief Inspector of Factories of Mines and some other members of the British Medical Association to testify.

Although the *Workers Compensation Commission of 1904* uncovered many grievances, its recommendations remained cautious and, as customary in all matters relating to compensation, re-tooling the 1897 Act inched forward. Surprisingly, however, the *Commissioners* felt that 1897 *Act* worked to the employers' advantage, especially when claimants, without labor affiliations, sought redress on their own. Even though it overlooked the number of cases settled without recourse to the courts, the *Commission* found awards to be inadequate and on terms even favorable to the employer. Injured workers were reluctant to bring cases against their employers and defending them in Court was an ordeal for which they had neither the knowledge, time, nor money. Rarely, the average worker may have considered employing a solicitor, but since insurance companies were expert in resisting claims, the contest between them and the uninformed worker was ludicrously lopsided. Insurance companies whittled down thousands of claims annually for a small, but tempting lump sum without any recourse to legal aid or proceeding in Court. In addition, the *Commission* failed to consider that the relatively small number of cases coming before the courts might be proof that both the law and/or the mechanism of justice were at fault; nor did it adequately address whether the expectations of the workers had been satisfied. The *Commission* believed that complaints from workers had less to do with awards than with the difficulty in pressing claims due to the cost, delay and injustice in applying the Act. However, it did not interview workers to establish whether they were satisfied with the *Act*, but counted largely on Home Office generated formal letters from Workmen's Associations. It did note that some trade union officials made much of their role in settling cases out of court but it failed to mention that only a small minority of workers (then about 2 million) were union members, or that many unions could not afford to provide legal aid. The Commission regretted that the *Act* had imposed legal obligations on employers who formerly had offered voluntary assistance, and thus that it had interfered with very satisfactory relations between employers and workers. This was a sanguine opinion, indeed! Had employer-employee relations be so satisfactory, legislation might not have been proposed.

Awards were inadequate, but he *Commission's Report* chose to acknowledged that the *Act* had created some uniformity in compensation awards and that it had provided security for their payment. On the other hand, it substantiated fears that that claims were increasing and that ultimately excessive premiums would result. However, as of 1904, the *1897 Act* had not placed an excessive economic burden on employers. In fact, the General Accident Assurance Corporation Ltd. testified that the financial burden cast upon employers was by no means so

[417] Legge had served as the first Factory Medical Inspector at the Home Office. In 1900, he reported on the high mortality among ganister (a silica rich fire clay) workers from extensive pulmonary iron grey nodules associated with symptoms characteristic of workers in other industries and in the mines exposed over long periods to concentrated silica dust. Both Legge and Haldane were convinced that tuberculosis was the lethal complication, transforming silicosis into a prolonged fatal illness [Bufton, 2005 #266] p.64.

great as some people assert, but definitely greater than the Right Hon. Joseph Chamberlain and other statesmen anticipated at the time the Act was passed. Additionally, more than a few of the witnesses were convinced that insuring against liability made the employers more careless about safety but The Commission believed the evidence in this respect was inconclusive. [418]

The *1906 Workman's Compensation Bill* attempted to redress these deficiencies More importantly, it was the first of many successive *Bills* to provide compensation to workers suffering occupational disease. Once again, critics feared the cost of compensation insurance would restrain British industry.[419] Insurance companies, however, quickly realized that they had much to gain from enactment of the *Bill.* Shortly after passage, the Mining Associations complained of the rising cost of premiums and by the beginning of the twentieth century, many mining operations, singly or in conjunction with others, had established their own mutual insurance societies, replacing the old clubs, formed by employers and employees. Additionally, some employee-owned and directed benefit clubs continued on their own, not particularly affected by the above.[420]

Parliament enacted the *1906 Bill* with little opposition although the Labour Party complained that it did not offer fair compensation. As far as possible, the *Act* attempted to protect the employer from State interference or supervision but it did not incorporate "no fault" compensation. Rather, it retained all the inherent difficulties of determining degree of negligence or fault of the employer or his agent and of apportionment. Most importantly, it recognized Asquith's claim that occupational disease was a notional accident. Moreover, in the wake of the *Act*, all occupational and industrial accidents and diseases were to become liable and compensable, including domestic servants, shop assistants, clerks, sailors, hospital employees, theater workers, church staffs, State and municipality employees, musicians, teachers, nurses and others. Of course, many of these might run no greater risks than many people incur every day. Finally, regardless of the specific site of employment, the *Act* provided protection during the whole period of employment, even if work had not begun or had ceased there. Its enactment effected a significant change in coverage and in the circumstances allowing for compensation. Sir Charles Dilke regretted that it did not mandate compulsory universal insurance that Joseph Chamberlain had advocated thirteen years previously. Nevertheless, the public, the press, the legal profession, and a large percentage of recognized experts in the field welcomed it. Not only Labour but also many Liberals and socially conscious Conservatives agreed.

The *1906 Act* scheduled thirty industrial diseases including anthrax, lead poisoning and miner's nystagmus. Silicosis did not make the cut. However, long after Ramazinni had described the ravages of dust diseases and long after the *1862-64 Commission* had confirmed their findings, the *Report of the Committee on Compensation for Industrial Diseases, May 1907 and October 1908* officially recognized that silicosis was a definite and sufficiently discernible occupational disease. It did not recommend scheduling, however, "owing to the slow development of the disease, great difficulty would be experienced in the case of the workmen who had changed their employment. The Committee was also concerned that employers might be tempted to avoid possible liability by discharging any workmen showing symptoms of

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[418] Wilson, A., Sir, M.P., & Levy, H., Professor. (1939). *Workmen's Compensation* (First ed. Vol. 1). London, New York, Toronto: Oxford University Press. P. 84-7.

[419] This had certainly not been the case in Germany, which offered far more inclusive insurance than that offered in the UK.

[420] Wilson, A., Sir, M.P., & Levy, H., Professor. (1939). *Workmen's Compensation* (First ed. Vol. 1). London, New York, Toronto: Oxford University Press. P. 68-70.

respiratory weakness."[421] Unions generally held that diseases related to the ordinary occupation of a worker should be included in the compensation acts and that workers were unjustly excluded if they suffered a disease which could be related equally to his employment or contracted outside of it. Not surprisingly, employers and legal experts emphasized that extending compensation for diseases not specific to employment would involve them in endless and costly litigation which rarely would favor the worker. Wilson and Levy argue that though it provided "some further protection" for injured workers, the *Act* achieved little more than extending, amending and improving earlier legislation. In fact, it significantly extended compensation to many occupations.[422] The previous Acts covered about 7,250,000 workers while the new one included 15,000,000. Unions favored compulsory State insurance believing that the State would not have the same stake in bargaining and profit as private insurers and remained as antagonistic to private insurance companies or, even, employers' associations as they had been about contracting out. Union's less than aggressive stance may be explained, in part, by the following remarks of a representative of the National Sailor's and Firemen's union: "So long as the men keep themselves in benefit with their Unions, and consult their local secretaries before committing themselves to agreements, there is little danger of those being taken advantage of, either wittingly or unwittingly, by insurance companies.". Yet another representative, this time on behalf of the National Union of Railway men, made the same point: "A workman with no assistance can be easily misled when having to negotiate with a private firm or when the private firm intercedes in regard to his insurance and attempts negotiations with the injured workman, which is frequently done."[423] These are typical instances of unions advertizing their ability to win compensation cases in spite of legislation that favored employers. As I have observed union success in gaining awards for their members as opposed to non-members, was a good reason for belonging to them; their very accomplishments in this arena may have blunted the zeal with which they pursued universal compulsory compensation insurance administered by the State which, presumably, would prove less motivated by profit.

Unions and the Home Office did attempt to monitor how well or poorly the *Act* functioned and tried to remedy many of its defects by urging a number of minor enactments designed to quell major controversy. Most of these related to problems that came out of World War I and it was not until fourteen years after the War that significant changes were favored by a public geared, in Lloyd George's words, to making England a place "fit for heroes."[424]

Sir Leo Chiozza-Money, looking back on the period between the *Act of 1897* and the *Act of 1906* found that very little had changed with respect to injured workers. Writing in *Insurance versus Poverty* (1912), he pointed out that only a small proportion of injured workers had been in a position to learn how to proceed under the law.[425] Rather, if anything, it aggravated the problem of accepting a lump sum instead of weekly payment. Since there was no compulsion to

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[421] Wilson, A., Sir, M.P., & Levy, H., Professor. (1939). *Workmen's Compensation* (First ed. Vol. 1). London, NewYork, Toronto: Oxford University Press. P. 68-70.

[422] Wilson, A., Sir, M.P., & Levy, H., Professor. (1939). *Workmen's Compensation* (First ed. Vol. 1). London, New York, Toronto: Oxford University Press. P. 102.

[423] Wilson, A., Sir, M.P., & Levy, H., Professor. (1939). *Workmen's Compensation* (First ed. Vol. 1). London, New York, Toronto: Oxford University Press. P. 153.

[424] Wilson, A., Sir, M.P., & Levy, H., Professor. (1939). *Workmen's Compensation* (First ed. Vol. 1). London, New York, Toronto: Oxford University Press. P. 134.

[425] Wilson, A., Sir, M.P., & Levy, H., Professor. (1939). *Workmen's Compensation* (First ed. Vol. 1). London, New York, Toronto: Oxford University Press. P.76.

insure, he found that the personal liabilities of companies were paramount in insuring payment but employers ignored revealing their liabilities whenever possible. He agreed that those companies undertaking the responsibility for compensation seemed little inclined to address prevention of accidents. Indeed, A. F. Young, the author of a study of British policy in 1964 respecting industrial injury insurance in the twentieth century noted that Parliament had never seriously considered legislating insurance premium rewards by favoring companies with good safety records and penalizing those with poor records, a form of economic deterrence. "This omission seems to have been due to reliance on statutory regulations enforced by inspection. Yet, … the inspectors themselves favored financial incentives to assure safety and had hoped that the *Workmen's Compensation Act, 1897* " would have encouraged such incentives[426]

I have attempted to show that liability and worker's compensation for occupational injuries and diseases were difficult to achieve. Of course, different organizations represented groups who were at odds with legislative attempts to interfere with their interests and they delayed legislation as best they could. Moreover, it was not always clear to interested organizations, themselves, how best to operate on behalf of the groups they were representing. Indeed, these intra-organizational conflicts proved as culpable in delaying liability and compensation legislation as the views of groups that were decidedly against it on any grounds.

One would not have anticipated factory and mine owners to welcome this legislation. However, because a sympathetic government refused to endanger profits, owners were much less resistant to it than expected and one does not find that management mounted a full-scale propaganda effort to defeat it.

On the other hand, powerful unions generally voicing support for compensation retarded the legislative process over "contracting out", which, as I have pointed out, was a non-issue as early as 1893. Smaller, less powerful unions often acceded to owners in supporting "contracting out" and non-union members often "contracted out," of necessity. In all instances, union political power was diminished. An equally fallacious argument on the part of unions was whether indemnified management would ignore addressing preventative measures. In addition, Chamberlain's insistence that approximately fifty percent of injuries could not be prevented was, very likely, the case, and may have assuaged the conscience of management. Nevertheless, this did not relieve owners of their responsibility. That fewer accidents than supposed were preventable could have made unions less "blood thirsty" for highly punitive awards for injuries and their position less divisive re management.

There were some aspects of compensatory legislation that unions may have viewed as detrimental to increasing their membership. Unions were winning awards for their member under the *Employer Liability Act, 1893*. This may have been viewed as a highly influential inducement to join unions and, as I have pointed out, unions were aware of this. On the other hand, the *Worker's Compensation Acts of 1897 and 1907* were sufficiently complicated as to require an ombudsman, which powerful unions provided easily.

Mining inspectors were generally sympathetic to miners, but the bureaucracy to whom they belonged strongly limited their ability to influence the public or politicians.

The medical profession shied away from supporting compensatory law. Its relationship with labor was uneasy and its role in prevention and compensation legislation was ambiguous at best. While publicizing occupational diseases, the political sympathies of the leaders of British

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[426] Bartrip, P. W. J., & Burman, S. (1983). *The wounded soldiers of industry : industrial compensation policy, 1833-1897*. Oxford Oxfordshire New York, N.Y.: Clarendon Press; Oxford University Press. P. 214

Medical Association were biased against workers. As I have discussed, their arguments against the eight-hour day is a case in point. Additionally the battle with unions over who should determine fees certainly alienated both parties. Very likely, the economic difference to both was not great as great as they thought. Ultimately, it was a battle that the profession would lose. Would it have been better to have been more willing to compromise? While not favoring legislation assisting workers, the medical profession was zealous in pursuing important decisive and remunerative roles for doctors in cases involving occupational accidents and diseases. The long battle over the primacy of tuberculosis also delayed compensation for silicosis until after World War I and later. The facts had been present for a long time but were ignored while the specious arguments of some of the most prominent medical scientists (Haldane) favoring tuberculosis were accepted without question.

The role of public opinion in urging legislation for worker's compensation is also ambiguous. The public was fickle. Dramatic industrial accidents incited public sentiment but these incidents were not sufficient to sustain sympathy and enthusiasm on behalf of threatened workers. Nor did newspapers attempt to sustain public sentiment. If one looks through *The Daily Chronicle*, predisposed to labor, or *The London Times*, predisposed to business, during the period of legislating these matters, the reader does not find continued sympathy or a consistent opinion regarding how to deal with industrial accidents, much less than how to deal with occupational diseases.

How then did liability and compensation legislation evolve? Unions, owners, inspectors, the medical profession and the public do not appear to have been dominant in promoting it. While not directly addressing the *longue duree* between the elaboration of silicosis, the disease, and compensatory legislation, A.V. Dicey writing in the early twentieth century had a convincing argument for how new concepts are articulated and, finally, embodied in law or as a code of behavior. He theorized that someone of originality or genius or one of their followers embraces a new idea with fervor that impresses his friends with its importance and its truth (one thinks of Darwin and Huxley or to a much lesser degree, Chamberlain). Gradually taken up as an article of faith, supporters with sufficient authority convince the public directly or convince an eminent personage, perhaps a leading political leader to proselytize ordinary people and win the support of the nation. . One champion remained steadfast in his desire to effect compensation for injuries, Joseph Chamberlain. In our case, Chamberlain played both roles. He embraced workmen's compensation for injury with fervor and possessed sufficient charisma to win over eminent personages and ordinary people to his cause even though among voters compensation for industrial accidents or disease was of rather low priority in their political wish list.

Chapter 5: Conclusions

Early in the nineteenth century, Parliament enacted laws designed to improve the condition of women and children working in factories and mines. Since the incidence of occupational accidents and disease was rising with the rapid pace of industrializing Britain, further legislation favoring miners and others engaged in dangerous trades seemed likely. Unfortunately, this was not the case. Many of the industrial health problems, which the nation was encountering, were not new. Medicine had recognized occupational predispositions to disease since the time of Hippocrates but, until this period, agencies and groups concerned with regulation of the industrial environment were non-existent. Under these new conditions, public

health became a subject for discussion and action. During the first third of the century, public health did not distinguish itself from occupational health. In fact, many of public health's concerns would be identified later as occupational health problems, as if they were not public. This division came to reprioritize occupational health in favor of public health, or, as it came to be known, sanitation. A great historian of public and occupational health, George Rosen, did not address the early unity of public and occupational health, nor did he mention that, after 1832, the sanitary movement forced occupational health into a subsidiary role.[427] W. M. Frazer, in his *A History of English Public Health*, also completely ignored occupational health during the 1850s and 60s, mentioning only that in 1861, Lord Shaftesbury moved for a fresh inquiry into the conditions of employment for children and young persons not regulated by law. The *Commission* that was appointed sat for several years, and from time to time issued reports which "left the country in no doubt as to the extent of the evil which had to be remedied." In addition, Frazer never mentioned that the *Commission of the Condition Of All Mines In Great Britain To Which The Provisions Of The Act 23 & 24 Victoria Do Not Apply* (coal mines) was sitting at the same time, though he cited, in passing, John Simon's reports on the health of industrial and mine workers.[428] Paul Weindling was aware that "occupational health in the nineteenth century was really a part of public health" but he did not discuss how and why it became a lesser subsidiary in the public health system.[429] I contend that neither the interests of administrative rationalization nor greater efficiency subordinated occupational medicine to sanitary health. Rather, its inferior role in all the iterations of the departments of public health (the General Board of Health 1854, then at the Privy Council (1858) and finally in 1871, the Ministry of Health), were a conscious move, initiated by Edwin Chadwick, that seriously hampered efforts to improve the health of workers. Subordinating occupational medicine to public health provided a pretext for the government to listen without hearing.

C. T. Thackrah's *The Effects of Arts, Trades and Professions, and of Civic States and Habits of Living, on Health and Longevity: with Suggestions for the Removal of many of the Agents which Produce Disease, and Shorten the Duration of Life* (1832) was the first English work on the relationship of disease to occupation. At the same time of its publication, Edwin Chadwick, and a small coterie of second-generation utilitarians, changed the focus of public health from occupational disease to sanitation.[430] Though very likely not anticipating the tenor of his statistical work, Chadwick was also responsible for the nomination (1838) of William Farr to the General Registry (GRO). At that institution, Farr and his successors statistically documented the shocking early mortality and morbidity of siliceous miners and quarriers.

Chadwick believed that sanitation was health. Good sanitation required the removal of foul smelling waste. It was an engineering problem that did not require the efforts of medical science, for which he had little esteem. Nevertheless, he did rely on a few medical doctors who shared his enthusiasm for sanitation. He also encouraged studies that revealed a great disparity in health and longevity among the population such as Edward Headlam Greenhow, M.D.'s *Papers relating to the Sanitary State of the People of England: being the Results of an Inquiry into the*

[427] Rosen, G. (1958). *A history of public health*. New York,: MD Publications. P. 272.
[428] Occupational health during the nineteenth century was really a part of public health. In the twentieth century up-grading of occupational medicine into a postgraduate specialism has been achieved by emphasizing scientific priorities." Weindling, P. (Ed.). (1985). *Self Help and Medical Science by Paul Weindling in The Social History of Occupational Health.*: London ; Dover, N.H.: Croom Helm P. (Eds.). (1985). P.12.
[429] Frazer, W. M. (1950). *A history of English public health, 1834-1939*. London,: Ballière, Tindall and Cox. P. 103.
[430] Thomas Southwood Smith, Sir James Phillips Kay-Shuttleworth, Seventh Earl of Shaftesbury

different proportions of Death produced by certain Diseases in different districts of England. Greenhow paid especial attention to dust diseases involving the lungs.

Chadwick, Greenhow and a number of others were active members of societies devoted to social science, pathology, epidemiology and statistics. In the course of these meetings, siliceous disease was a recurrent subject. Members of all of these societies presented papers or held discussions, many of which implicated siliceous dust as the etiologic cause of miners' lung disease. Unfortunately, political views, religious interpretations and scientific constructions such as miasma, hampered any concerted movement to improve the condition of miners. Adding to controversial alternative explanations, miners, their unions and proprietors and their associations were also at odds between and among themselves regarding how to address the problem of dust (not all agreed that dust was the problem) in the mines.

Greenhow's study was sufficiently compelling to prompt the *Commission of the Condition Of All Mines In Great Britain To Which The Provisions Of The Act 23 & 24 Victoria Do Not Apply* (coal mines) that sat from 1862-64. Numerous specialists presented the *Commission* with convincing evidence that microscopic rock particles with a large concentration of free silica, encountered in many mining operations was the offending agent. All agreed that improved ventilation could reduce its concentration significantly. Unfortunately, having spent so much time listening to and reviewing the compelling evidence, the *Commission's* final recommendations tepidly reflected the expert opinion it had solicited. Ultimately, though preserved in a blue book, the minutes of the *Commission* proved a forgotten repository for much valuable information, a destiny which its organizers may have intended from the start.

Chadwick's successor was John Simon, a surgeon, became Chief Medical Officer of the Medical Department at the Privy Council. No other medical doctor had previously held such a high office. He hoped to transform health administration into "state medicine," and he undertook the medical administration of the sanitary idea.[431] However, he only had the power to inquire and report into health conditions.[432] During his tenure, medical men assumed most of the important functions of the administration of the "sanitary idea." This was not the case with respect to the mining and factory inspectorates. Until late in the century, the inspectorates were administered by lay people. The *1875 Public Health Act* unified the medical department of the Privy Council and the poor law administration in the newly formed local government board. Dorothy Porter has noted, "The subsequent period in disease control has been characterized as an era of "preventive medicine." This was a much broader movement than state medicine but it did not include occupational health within the purview of prevention. Preventive medicine was outside the central corridors of power and beyond the elite provinces of the medical and scientific communities. Its practitioners (Medical Officers of Health) relinquished the treatment of illness in individuals and lost touch with practicing physicians. Though the public health doctors communicated through journals and conferences, they were increasingly restrained from any action or opinion not sanctioned by their departments.[433] The factory and mining inspectorate were at a greater disadvantage. They were not public health doctors, and they had even less access to power and enforcement.

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[431] Porter, D. (1999). *Health, civilization, and the state : a history of public health from ancient to modern times.* London ; New York: Routledge. P. 121.
[432] Ibid: P. 125.
[433] Porter, D. (1999). *Health, civilization, and the state : a history of public health from ancient to modern times.* London ; New York: Routledge. P.138-9/

Some of the best early evidence for the etiology of silicosis occurred during the sessions of the *1861-4 Metalliferous Mining Commission*, just before practitioners and medical officers of health embarked on separate paths. The minutes of the *Commission* clearly indicate that the medical elaboration of silicosis was an early event relative to legislative moves to prevent it and to compensate for it. The "experts" who served the Commission were highly observant amateurs on the brink of specialization. None pursued the elaboration of silicosis in any depth thereafter, or sought to publicize their generally convincing findings, which instead languished in blue books. It took almost fifty years to reach the same conclusions, albeit, scientifically updated.

Part of the delay was due to the medical interests of those who belonged to the elite colleges and dominated the medical societies, the medical journals and the teaching establishments. They were not interested in miners' diseases. For most of the others, professional overcrowding and meager incomes were the most pressing issues. Those who provided medical services for the poor employed by a network of sanitary services, especially, poor law doctors, were overworked and underpaid. Appointments went to those willing to work for the lowest wages and thus often went to unqualified practitioners and to those who had failed in private practice. Lobbying for better working conditions, higher incomes and, a professional examining and licensing system were of greater importance to medical professional organizations than health related matters.[434] August bodies such as the royal colleges distained any political involvement as beneath the dignity of gentlemen. Even the Provincial Medical and Surgical Association created in 1832 (in 1856, it became the British Medical Association) to represent less favored doctors, very reluctantly overcame the studied political neutrality of the others. [435] Henry Ekstein notes that in this endeavor, *The Lancet* and the *British Medical Journal*, designed for general medical readership, carried on constant warfare with the BMA because of its unwillingness to enter into political disputes. Of course, by not seeing a problem in political terms, the elite professional organizations did not seek political remedies. Rather, their medical views served to support the establishment. The social relationships implied by deferring to the establishment led members to emulate the tutelary paternalism of the landowning gentry of the past. It provided the anxious affluent middle classes a politically safe medical discourse with which to wrestle with the disturbing spectacle of urban suffering and squalor amid their own guilty prosperity. To them, inadequate wages were not the source of poverty. Rather, disease and/or ignorance were the culprits. The personal habits of patients, rather than their economic or social conditions or, siliceous dust were responsible for the state of their health.[436] On the other hand, the profession, even the elite political neutrals, had no qualms about exercising a political role for its economic benefit. It was quite vocal about becoming the paid arbiter in compensation cases.

With medical training directed by elite cosmopolitan doctors it is not surprising that the goal of most medical students, then as now, was to remain in urban centers close to teaching hospitals and generally more profitable areas in which to practice. Miners' lung disease was not a cosmopolitan problem. The paucity of information on miners' lung disease in *The Lancet* and *The BMJ* attests to a lack of interest on the part of most of their readers as well. For the most part

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[434] Digby, A. (1999). *The evolution of British general practice 1850-1948*. Oxford ; New York: Oxford University Press. p. 326

[435] The BMA represented half of all doctors, mostly general practitioners, on the medical register by 1901.

[436] Bryder, L. (1985). Tuberculosis, Silicosis and the Slate Industry in North Wales. In P. Weindling (Ed.), *The Social History of Occupational Health*. London, Sydney, Dover, New Hampshire: Croom Helm. P. 118-9

they did not practice in mining districts. On the other hand, both journals reported rarer diseases. Miner's lung disease was not exotic, and its treatment was ineffective with little promise of a rational therapeutic intervention. Moreover, the remuneration for its care was minimal, a set of circumstances not conducive to curiosity.[437]

In view of the subsidiary position of occupational health in the public health system, the disinterest of most practitioners and other parties with a presumed stake in addressing miners' lung disease, the present study addresses how silicosis, especially as it occurred in mines and quarries gained the attention of medical scientists, politician, and regulators even at a comparatively late stage.[438] Among those who have addressed occupational diseases and their compensation in nineteenth century Britain, P.W. J. Bartrip's and of S. B. Burman's work stands out. I am largely in agreement with them that occupational diseases lacked the cachè of tuberculosis and of epidemic and sexually transmitted diseases. Along with them, I also find that the socio-economic status of those suffering occupational diseases was the major deterrent to more medical and legislative attention.[439] However, my study differs from theirs in that I only examine silicosis, the major and most devastating occupational disease affecting nineteenth century British laborers. In that regard, I examine more extensively than they did, the role of medicine in delaying the etiologic recognition of a disease and its missed opportunity to become "general purpose social experts, the healers of this disease." Very likely, as Christopher Hamlin points out, social expertise was not a professional goal for most of the nineteenth century, and, even if it were, medicine was "a poorly united, overcrowded and squabbling set of professions" incapable of lobbying to become social experts. Whether, as Hamlin suggests, "they sacrificed a great deal in failing to take this opportunity" is more questionable. More than likely, many doctors were not dissimilar to those to whom they became subservient, "even the most boorish vestries."[440] Whether early acceptance of the etiological significance of siliceous dust would have made a difference in assisting miners, is moot. I doubt that, even in that case, the profession would have agitated for legislation, nor do I believe there was much medicine could have done to enhance its prestige in the early period examined in this study. It is also the case that even when the medical profession was largely in agreement regarding the etiology of silicosis, it did very little to encourage legislation to prevent disease or mining injuries, or to compensate for them.

Until the latter part of the nineteenth century, doctors thought of themselves as clinicians, not medical scientists. They were contemptuous of technological tools, taught bedside skills and rarely made any important scientific discoveries.[441] I. Burney Yeo, in an address, pointed out that a large body of influential medical men had an aversion "almost amounting to hostility, to the idea of any thing being a 'specific' nature, either in pathology or in therapeutics." Greenhow's lectures exemplify the distillation of his bedside findings in private practice rather than any research on his part, and his subjective assessments regarding etiology. Neither

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[437] Pickstone, J. V. (2001). *Ways of knowing : a new history of science, technology, and medicine*. Chicago: University of Chicago Press. p. 112-13

[438] Bartrip, P. W. J. (2002). *The Home Office and the dangerous trades : regulating occupational disease in Victorian and Edwardian Britain*. Amsterdam ; New York: Rodopi. P. 2.

[439] Bartrip, P. W. J., & Burman, S. (1983). *The wounded soldiers of industry : industrial compensation policy, 1833-1897*. Oxford Oxfordshire and Bartrip, P. W. J. (2002). *The Home Office and the dangerous trades : regulating occupational disease in Victorian and Edwardian Britain*. Amsterdam ; New York: Rodopi.

[440] Hamlin, C. (1998). *Public health and social justice in the age of Chadwick : Britain, 1800-1854*. Cambridge England ; New York: Cambridge University Press. P. 49.

[441] Bryder, L. (1985). Tuberculosis, Silicosis and the Slate Industry in North Wales. In P. Weindling (Ed.), *The Social History of Occupational Health*. London, Sydney, Dover, New Hampshire: Croom Helm. P. 118-119

Greenhow nor his peers were neutral "experts" in relation to the conflicts or the confusion they were asked to solve. They were more likely to be a part of them.[442] However, during the last quarter of the century, a new paradigm demanding the recognition of sophisticated advances in pathology, histology, bacteriology and statistics challenged older clinical traditions. The laboratory was becoming a legitimate source of medical knowledge. But challenging "experts," who vigorously resist loss of influence, requires an upsurge of public support and this takes time to develop. Such was the case in the elaboration of silicosis. By the end of the century, talented students aspired to analyze experience differently, and, a few early medical scientists achieved salaried posts as anatomists, physiologists or pathologists in medical schools. One new form of medical analysis, bacteriology, particularly appealed to public health doctors, establishing a linkage with government that was to become characteristic "of technical analysis and social management." [443] Finally, in that setting, Thomas Arlidge, J. S. Haldane, Thomas Oliver, Edgar Collis, Thomas Legge, A. J. Lanza and A. Meilklejohn made pertinent scientific advances concerning silicosis. Even so, they showed little interest in legislation on behalf of miners and quarriers.

On the other hand, the specificity of the laboratory was also part of the problem of delay. Detailed histological studies of the lungs revealed pathologic variations that caused many researchers to error on the side of another sort of confusion, that caused by multiplicity. They assumed that every alteration in appearance represented a distinct characteristic of a separate lung disease. Thus, diagnostic designations such as caseous pneumonia, scrofulous pneumonia, etc., resulted in further obfuscation of diagnostic terms. In fact, many of these distinctions represented different stages of the same disease. Yeo had urged a useful terminology that incorporated much more than the anatomical analysis of morbid products since the inferences drawn from them produced nosologic entities that had pushed erroneous results to an extreme. Yeo recognize that a specific illness dictates many different findings in many fields of observation and perceived differences in findings in the laboratory, the operating arena or at autopsy room may represent aspects of the same disease. [444]

While Farr and his assistants at the GRO and members of widely dispersed metropolitan and provincial statistical societies were in advance scientifically of the other medical establishments, they did not always further the cause of investigation. M. J. Cullen has shown that many members of the statistical societies were influential industrialists as well as medical doctors. They were in pursuit of empirical evidence to confirm their belief that urbanism and public ignorance, not industrialism, were to blame for proletarian poverty. Their solution was to assist the deserving non-pauper poor by inaugurating locally devised measures to promote sanitation, hygiene and public education. This suited the medical profession, employers, and other local worthies whose economic interests harmonized with those of industrialists and propertied notables.[445] Simon Szreter maintains that the GRO, especially later, assumed a thoroughly political role that informed all its analytical work. Its flow of published reports and statistics seems to have promoted its own institutionalized practices and to have reinforced a particular set of reforms. It denied any possible assistance when profits seemed threatened. In

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[442] Mol, A. (2002). *The body multiple : ontology in medical practice*. Duke University Press. P. 97-8.
[443] Yeo, I. B., M.D., F.R.C.P. Lond. (1897). An Address on the Pathology of Pulmonary Phthisis: A Retrospect. Delivered before the Torquay Medical Society. *The Lancet*(July 24, 1997), p. 182-184.
[444] Pickstone, J. V. (2001). *Ways of knowing : a new history of science, technology, and medicine*. Chicago: University of Chicago Press. p. 112-13.
[445] Cullen, M. J. (1975). *The statistical movement in early Victorian Britain : the foundations of empirical social research*. Hassocks Eng. Harvester Press; New York Barnes & Noble. P. 43.

this, it was not alone. Any threat to profits was a major consideration in all agencies. On the other hand, it is also true, that the statistical department geared its studies to providing ammunition for those forces it approved in the battle for the social conscience.[446]

In addition to the medical establishment, lawmakers, bureaucrats, miners and their unions, proprietors and the public shared in delaying public policy regarding silicosis. My survey confirms Bartrip and Barman's findings that, except proprietors, all parties agreed on the necessity to prevent accidents. Legislating for more stringent and punitive employers' liability laws promised to reduce accidents without increasing government involvement and expense. However, updating employers' liability so that workers would receive fairer treatment required revocation of the negligence laws.[447] These were odious and grossly unfair to workers but quite satisfactory to employers. The *1880 Employer Liability Act* failed to resolve all the contentious issues. Neither the proprietors nor the workers were satisfied.

Unfortunately, the one agency that was unequivocally sympathetic to miners, the mining inspectorate, had its hands tied. Their personnel were limited. As with other as civil servants, the inspectors were not allowed a public voice. In addition, a policy that sought to protect proprietors against economic hardship limited the inspectors' ability to enforce the mine and quarry statutes. This approach failed to propitiate owners who frequently employed obstacles to inspecting mines and quarries.

The medical profession dithered over the etiology of silicosis, and was generally adverse to compensation. The legislature dithered over liability. Early union leaders dithered over compensation but not over highly punitive liability law. Unions were fearful that if owners were insured, their interest in pursuing preventative measures would diminish. In addition, they worried that mine owners, fearful of future litigation, would dismiss the elderly and those with a history of illness, especially respiratory. It was also the case that unions were winning suits for compensation under employers' liability laws. In these instances, rewards were greater than promised under workers' compensation laws. Such victories were a powerful inducement to applying for union membership.

During the period, I discuss employers were not of one mind with respect to social policy favoring safety and compensation. Generally, however, they preferred private to state policy. Those in favor viewed it as a means of achieving Bismarckian social control and restraint of the labor movement under the guise of paternal care. At the same time they believed compensation insurance would improve employee efficiency and diminish costs. This attitude varied from place to place-to-place and time-to-time and cannot be examined in any unitary fashion. After WWI, there was more unanimity among employers against state policy in the face of failure of all their aspirations.[448]

Toward the close of the century, rampant silicosis among South African miners returning to the UK to die prompted investigators to re-examine what was known about the disease while shocking the populace.[449] A new generation of union leaders viewed compensation much more

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[446] Szreter, S. (1996). *Fertility, class and gender in Britain, 1860-1940*. Cambridge, England ; New York: Cambridge University Press

[447] Bartrip, P. W. J., & Burman, S. (1983). *The wounded soldiers of industry : industrial compensation policy, 1833-1897*. Oxford Oxfordshire. P. 94-5.

[448] Hay, J. R. (1978). Employers' Attitudes to Social Policy and the Concept of 'Social Control', 1900-1920. In P. Thane (Ed.), *The Origins of British Social Policy* (pp. 107-122). London: Croom Helm London.

[449] The list of these workers included "nailors" and "stone-cutters," "tool grinders," "French mill-stone makers," "stone-masons" Sheffield knife makers," "fish hook makers, "potters (esp. with the use of china clay and flint)" "Portland cement," "glass cutter and polishers, ganister miners, phthisis.

favorably. Proprietors were attracted to Chamberlain's plan for no-fault insurance and the public seemed more amenable to addressing worker pressure for a safer environment and for compensation. These became a somewhat popular element in political platforms.

The *Workmen's' Compensation Acts* finally inaugurated in 1897 and 1906, did not include silicosis, but their passage assured that scheduling them was inevitable. The substance of these *Acts* is operative even today, which is not to say that there is no room for revision. The initial *Acts* were not necessarily the work of well-wishers, but rather represented the efforts of seasoned, pragmatic politicians, and the major political parties. None were as enthusiastic as their campaign rhetoric may have suggested. Nevertheless, they did mobilize public sentiment (especially Chamberlain) in favor of compensation either out of conviction or as a sop for enacting other measures about which the public was less than enthusiastic.

World War I halted social legislation but during that period silicosis was firmly established as an occupational disease on its own, only predisposing to tuberculosis and not dependent upon it for its malign effects . In the event, silicosis was scheduled as an industrial disease under the Workmen's Compensation Act in 1918. The Refractory Industries, those handling not less than 80 per cent, total silica, became subject to special regulations in 1919. As I have noted, silicosis is not the sole province of metalliferous miners. Workers in various siliceous industries were scheduled sequentially for the occupational diseases associated with them. Scheduling was a slow process. For example, silicosis in coal mining, though recognized in 1909 had to await enactment of the Various Industries Schemes. Silicosis associated with abrasive soap powder factories, the sandstone industry, the granite industry, slate quarrying and dressing, the pottery industry, tin-mining, hematite Iron-ore mining, also awaited scheduling under the Various Industries (Silicosis) Schemes, 1931, 1934 and 1935. With respect to coal mining, it is remarkable that Prof. J. S. Haldane, largely responsible for the conflation of silicosis and tuberculosis (see below), could find no evidence that any class of work in coal-mining was subject to risk from silicosis except under very exceptional and preventable conditions.[450]

Writing about asbestosis, T Morris Greenberg called attention to the fact that there was ample evidence prior to 1930 that should have led to earlier effective control. For this, he blamed the manufacturers, workers' representatives, the Factory Inspectorate and scientists involved in the relevant research.[451] The same argument applies to silicosis in the 19th century. P. W. Bartrip has countered that the introduction of formal regulations requires understanding that when a process or a material give rise to significant harm, removing it may involve further harm (e.g. unemployment, the introduction of unsafe alternatives, or the destruction of a vital industry).[452] Certainly these may be legitimate concerns and they were voiced in my period, but there is little evidence that decisions were based solely or even largely on that basis or that they would have been justified had they been. The following incident, which was not isolated, is more characteristic. In 1875, Dr. Edward Ballard, a medical inspector for the Local Government Board, initiated a three-year study of the health effects of "industrial effluvium nuisances" on industrial workers and the community at large. Utilizing contemporary knowledge, he was able

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[450] Quoted by Wilson, Arnold, Sir, M.P., and Levy, Hermann, Professor. Workmen's Compensation First ed. Vol. 1. 2 vols. London, New York, Toronto: Oxford University Press, 1939 from Haldane, Silicosis and Coal-Mining, pp 8-9, Inst. Mining Engineers, 1931 (reprint). p. 81-87.

[451] Greenberg, M. (1994). Knowledge of the Health Hazard of Asbestos Prior to the Merewether and Price Report of 1930. *Soc Hist Med, 7*(3), 493-516.

[452] Bartrip, P. W. J. (2002). *The Home Office and the dangerous trades : regulating occupational disease in Victorian and Edwardian Britain*. Amsterdam ; New York: Rodopi. P. 284.

to demonstrate in detail that "almost all businesses could reduce their offensive aspects to a degree which would make them "tolerable or even trivial". He also reported that the manufacturers seemed willing and cooperative. John Simon said the report was without equal in its field. Obviously, the report led nowhere without any discussion as to feasibility. As late as 1890, Simon complained "the valuable body of information in the reports, published in the form of appendices to annual reports, was not readily accessible to manufacturers."[453] Incidentally, in a period of rationalizing bureaucracies, the medical departments of the Local Government Board and of the Medical Office of the Privy Council were handicapped because their research, such as it was, concerning industrial diseases could not be coordinated between the medical office of one board and the medical departments of the others.[454] This account tests A. V. Dicey's opinion that the Nineteenth Century Victorian State successfully harnessed its faith in reason, economy, efficiency, utility and responsibility to create a highly efficient and effective bureaucracy sufficient to dismantle inefficient structures and refashion others. [455]

The lag between identification and an action to address a problem is not specific to occupational diseases. It is the *modus operandi* of a good many social problems. How, then, did change finally occur during our period? The present endeavor would agree with M. Savage and A. Miles that national political structures were largely independent except that they required inaugurating programs relevant to the audience whose vote they were soliciting.[456] It may also be that some programs were made relevant as a feint to displace censure from other agendas that promised less popular support. Because the goals and strategies of the interested groups being solicited were not necessarily in agreement, the creation of policy and its promotion among the varying constituencies was very complicated indeed. It was more often than not crucially dependent on inciting enthusiasm and capturing the organizational and interpretive skills of the local political activists, a skill at which Chamberlain was particularly adept.[457]

My work suggests the following conclusions. First, when available solutions to social problems are resisted by those with power to act on them, the justifications are always multiple. Moreover, these justifications shift through various configurations over time without positive result until a reconciliation of various social and cultural differences becomes possible. Perhaps most surprising, that reconciliation may occur when the contributing motivations and justifications are merely coincidental and even contradictory.

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[453] Brand, J. L. (1965). *Doctors and the state: the British medical profession and government action in public health, 1870-1912*. Baltimore: Johns Hopkins Press. P. 78.
[454] Ibid. P. 82.
[455] Huch, R. (1985). The National Association for the Promotion of Science: It Contribution to Victorian Health Reform, 1857-1886. *Albion, 17*(Fall). P. 279-99
[456] Savage, M., & Miles, A. (1994). *The remaking of the British working class, 1840-1940*. London ; New York: Routledge.
[457] Savage, Michael, and Miles, Andrew. The Remaking of the British Working Class, 1840-1940. London ; New York: Routledge, 1994. pp.19-29

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