

Environment and Pathology: Edwin Chadwick's Sanitary Reform Movement in Mid-Nineteenth Century England

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환경과 질병 : 에드윈 차드윅의 공중보건운동과 그 환경주의적 연원

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요 약

에드윈 차드윅 주도로 아래 1842년 영국 왕립구빈협회에서 간행한 「영국 노동인구의 보건현황에 대한 보고서」는 공중보건을 하나의 연대적 개념으로, 또한 학술적 연구의 대상으로, 그리고 공공행정의 책임영역으로 정착시키는 데에 기점을 만든 보고서이다. 이 보고서는 거주환경이 주민의 건강에 직접적인 영향을 끼친다고 주장하고 환경의 관리와 개선은 정부가 맡아 다루어야 될 사항이라고 제창함으로써 공중위생법, 도시계획법 같이 종래의 자유방임주의적 틀에서 벗어난 법제를 탄생케 하는 데에 큰 기여를 하였다.

차드윅의 공중보건운동에 대한 역사적 해석은 주로 산업혁명 이후 급속히 악화되는 도시환경문제와 이에 대한 일반의 인식의 고양, 그리고 의학지식의 발전과 결부시켜 접근하는 것이 통례이다. 그러나 과학사 내지는 사상사적인 분석도 중요한 것으로 판단된다.

차드윅의 보건운동은 불량한 환경이 전염병의 발원과 전파의 원인이라고 보는 「쓰레기 병원설」에 그 이론적 기초를 두고 있다. 공중보건운동의 승리는 결국 「쓰레기 병원설」의 승리불 뜻한다.

「쓰레기 병원설」이 대두하기 전까지는 「접촉감염설」이 가장 지배적인 학설로 의학계를 풍미했었다. 「접촉감염설」에 따르면 병원체는 생성되는 것이 아니라, 물건과 같이 전파되는 것으로 환자와 건강인이 직접, 간접으로 접촉함으로써 병이 퍼진다. 따라서 「접촉감염설」에 따른 전염병에 대한 대처수단은 불량환경의 정비가 아니라 환자의 격리수용이다.

18세기 전반에 걸쳐 이 두 이론은 서로 경쟁관계에 있었으나, 19세기에 들어오면서 차차 「쓰레기 병원설」이 더 우세하기 시작하여 차드윅의 보건운동과 더불어 「쓰레기 병원설」은 지배적인 학설로 등장한다.

현대의학의 입장에서 보면 이 두 학설은 모두 과학적 검증이 결여된 추론에 불과하고, 양자가 모두 부분적으로 옳을 뿐, 특히 한 학설이 다른 학설보다 우월하다고 볼 근거가 없다. 그러나 이 두 학설은 서로 대치되는 사고방식과 지지세력을 배경으로 하였기 때문에 대립되지 않을 수 없었다. 「접촉감염설」은 18세기 기계론적 세계관의 배경을 가졌던 반면, 「쓰레기 병원설」은 유기체론적 사고방식과 장(場)을 중심으로 한 공간관에 뿌리박고 있었다. 결국 「쓰레기 병원설」의 승리와 「접촉감염설」의 후퇴, 그리고 이에 기초를 둔 공중보건운동과 그 이후의 법

세정은 칼 포퍼가 주장하는 과학지식의 발전의 모형으로는 설명될 수 없는 「세계관」 내지는 사고방식의 변동에 따른 결과로서 이해되어야 할 것이다. 특히 이 변동의 기간을 이루는 것이 「환경주의」의 등장이다. 이로써 종래에는 물체가 놓이는 「그릇」으로만 파악되던 공간이 그 자체로서 영향력을 지닌 「장소」로, 또한 그 안에 위치한 생명체의 생명현상을 조건짓는 환경으로서 인식되기 시작한다.

The contribution of the nineteenth century sanitary reform movement to modern town planning is both more tangible and basic than that of the cases discussed in the preceding sections. We find it almost a contradiction in terms for a modern city to be without a constant supply of drinking water, a reliable way of disposing of human and other wastes, or even a system of street cleaning. "Nobler" sides of city life assume the satisfaction of these bare requirements which nonetheless entails complex tasks requiring the concerted cooperation of engineering, sanitary science, municipal machinery and an administrative framework.

Sanitation has long been practiced by society. The history of organized efforts to provide the city with adequate water supply and waste removal is as old as urban civilization itself. Nonetheless, only in the nineteenth century does sanitation become a subject of conscious, concerted and public movements supported by hygienic sciences as well as legislative and administrative measures. The modern theory and practice of sanitation derives from the innovations achieved in this "century of reform," particularly from the work of Edwin Chadwick (1800-1894) and his colleagues on the Royal Commission.

Françoise Choay states that these men achieved works which are "monuments of urban sociology," and credits them as the first to analyze urban phenomena with a "clinical eye," diagnosing the city as a "monstrous deformity" requiring radical surgery" through "clinical" "planning."¹ In the opinion of Leonardo Benevolo, furthermore, the Public Health Law of 1848, one of the direct outcomes of the efforts of Chadwick's group, constituted a direct forerunner of modern town planning legislation; it replaced the antiquated and irresponsible framework based on the concept of public control.²

Edwin Chadwick's enquiry into sanitation had its immediate beginning in 1838, when as secretary to the Poor Law Commission, he initiated a small-scale survey into the relationship between the housing conditions and the health of London's working poor. Performed by three well-known physicians of the day - Drs. Neil Arnott, James Phillip Kay, and Southwood Smith - the survey was published in the same year as an appendix to the Poor Law Commission's *Fourth Annual Report*. From a medical point of view, this brief report, totalling ten pages, was not a major event, the medical opinions voiced in the report having been fairly common place among the leading men of the field around the time. Yet, the report was one of the first instances where the government formally employed medical men to gather factual examples as a prelude to possible parliamentary action.

1) Françoise Choay, *The Modern City: Planning in the Nineteenth Century*, (New York: Braziller, 1969), pp. 9, 10.

2) Leonardo Benevolo, *The Origins of Modern Town Planning*, (Cambridge: MIT Press, 1967), p. 94.

In the year following the report's publication, the government formally charged the Poor Law Commission to undertake a sanitary enquiry on a national scale. The purpose of this new enquiry was to determine, through empirical investigation, the nature of the relationship between sanitary conditions and public health. Edwin Chadwick was given primary responsibility to oversee its operation. Subsequently, Chadwick extended the original metropolitan survey of 1838 to the wider context of England, Wales, and Scotland. His survey included not only the industrial towns, in the context of which the traditional debates on sanitation and public health were waged, but also agricultural towns and villages; indeed, towns of all types and sizes were finally covered in his comprehensive survey. In the course of gathering local data, Chadwick made an extensive and systematic use of the nationwide network of medical and social intelligence controlled by the Poor Law Commission – a body which he himself was instrumental in creating. In interpreting the collected data he consulted widely with the leading medical authorities of his time including the three who produced the 1838 report.

The results were published in 1842 as the *Report on the Sanitary Conditions of the Labouring Classes of Great Britain* under Chadwick's name.³⁾ Though the main purpose of the *Report* was to make a case for governmental action, no concrete results followed its publication until 1848, when the Public Health Act became a law. In the meantime, A Royal Commission was formed to verify its conclusions and to evaluate Chadwick's recommendations. This commission, known as the Health of Towns Commission, and whose key members included Drs. Neil Arnott and Southwood Smith, published two reports in 1844 and 1845, which largely supported Chadwick. While the work of the commission was going on, Dr. Southwood Smith, Lord Normandy and Lord Ashley created the Health of Towns Association to agitate for sanitary reform. An organization with branches in many cities and towns, the Association was very active in propagating Chadwick's ideas, and he himself took an active part in the effort. Besides helping the commission and the Association, Chadwick also worked on another hazard to public health, namely the danger arising from the proximity of burial grounds to urban dwellings.⁴⁾

In 1848, after a period of inaction due to an unfavorable political climate in Parliament, the Public Health Act became a law, thus bringing the ten-year struggle of Chadwick and his colleagues to fruition. Though a far cry from the ambitious plan Chadwick outlined in his *Report* (no comprehensive national system of supervising sanitary, sewage, or public health works) the enactment of the Public Health Law represented a major turning point in the administration of sanitation and public health measures. For the first time in British legislative history, the government recognized the need for central control and a standard of efficiency in urban cleaning, water supply, sewage and waste disposal. The act stipulated the creation of a General Board of Health, and gave it the power to create local health districts and local

3) The *Report* was officially the work of the Poor Law Commission, but the commissioners refused to publish it as such because of differing political views.

4) This was first exposed by G. A. Walker's *Gatherings from Graveyards* (1839), eventually published as a supplement to Chadwick's *Report* of 1842.

boards, either through public petition or in any place with an annual mortality rate higher than a specified norm. The local board of health, in turn, was empowered to exercise large functions in overseeing the management of sewage, drainage, water supply, street and burial grounds as well as in regulating certain noxious trades. Chadwick was named a member of the General Board of Health, along with two others, Lord Morpeth and Lord Ashley.

The public reaction to the Public Health Act was not very favorable. Many, especially the landed class and established corporations, considered the Act to be dictatorial, aggressive, and peremptory. Particularly vocal was the hostile movement organized by Toulmin Smith and supported by Herbert Spencer – a movement which attacked the Act as unconstitutional, contrary to the rights of people, and advocated, instead of centralization, the parish as the sole organ of government.⁵ In criticizing the Public Health Act, Spencer wrote that “suffering and evil are nature’s admonition; they cannot be got rid of; and the impatient attempts of benevolence to banish them from the world of legislation before benevolence has learned their object and end, have always been productive of more evil than good.”⁶ The government yielded to the criticisms and dissolved the General Board of Health in 1853.

As the foregoing historical summary indicates, Chadwick’s sanitary movement became a battleground for many conflicting interests, views, and ideologies, where far more than technical issues were at stake. In the final analysis, however, it was the “sanitary idea” that propelled the movement and defined its battleground – the idea that the sanitary condition was causally connected with the state of public health, and that, if a sanitary program were carried out completely, disease, particularly epidemic, endemic, and contagious kinds which were the main cause of all premature death, would itself die out. Chadwick’s *Report* was in essence an attempt to corroborate this sanitary idea with statistical data, to argue for its general adoption, and to propose a legal and administrative machinery necessary to carry out the idea.

The largest portion of Chadwick’s *Report* was devoted to the task of demonstrating the “sanitary idea.” Chadwick defined his purpose at the outset of the *Report* as showing “in what proportion these causes of death fall upon the poorer classes as compared with other classes of society inhabiting the same towns or districts, and in what proportions the deaths fall amongst persons of the same class inhabiting districts differently situated.”⁷

In the first three chapters, where he deals with residential, public, and work environments in relation to disease, Chadwick presents the sanitary idea as a matter of proven fact, interweaving his presentation with a number of first-hand observations furnished to him by the Poor Law Medical Officers. To give an indication of the axiomatic tone of these observations, I quote two examples from the *Report*. One, from a Mr. Bland, the medical officer of the Macclesfield Union, informs Chadwick that:

5) Elizabeth Hutchins, *The Public Health Agitation, 1833–48*, (London, 1909), p. 72.

6) Quoted by Hutchins, *op. cit.*, p. 98.

7) Edwin Chadwick, *Report on the Sanitary Condition of the Labouring Population of Great Britain*, (Edinburgh: Edinburgh University Press, 1965).

In a part of Town called the Orchard, Watercoates, there are 34 houses without back doors, or other complete means of ventilation; the houses are chiefly small, damp, and dark; they are rendered worse with respect to dampness perhaps than they would be from the habit of the people closing their windows to keep them warm. To these houses are three privies uncovered; here little pools of water, with all kinds of offal, dead animals and vegetable matter are heaped together, a most foul and putrid mass, disgusting to the sight, and offensive to the smell; *the fumes of contagion spreads periodically itself into the neighborhood, and produces differnt types of fever and disorder of the stomachs and bowels.* The people inhabiting these abodes are pale and unhealthy, and in one house in particular are pale, bloated, and rickety.⁸

Another medical officer, this time a Mr. Pearson of the Wigan Union, describes the condition of large classes of tenements in the manufacturing town of Lancashire in the following words:

From the few observations which I have been able to make respecting the causes of fever during the two months which I have held the situation of house surgeon to the Dispensary, I am inclined to consider the filthy condition of the town as being the most prominent source. Many of the streets are unpaved and covered with stagnant water, which lodges in numerous large holes which exist upon their surface, and into which the inhabitants throw all kinds of rejected animal and vegetable matters, which then undergo decay and emit the most poisonous exhalations. These matters are often allowed, from the filthy habits of the inhabitants of these districts, many of whom, *especially the poor Irish, are utterly regardless of both personal and domestic cleanliness, to accumulate to an immense extent, and thus become prolific sources of Malaria, rendering the atmosphere an active poison.*⁹

The above quotations are quite typical of the local doctor's observations which Chadwick employed in his *Report* to underline his thesis; they indicate that the correlation between health conditions and sanitary conditions was commonly taken for granted by physicians. As we shall see later, medical theories attributing the cause of disease to the unclean physical environment was gaining broad acceptance when Chadwick was making his *Report*.

The notion of sanitation receives its most systematic treatment in the fourth chapter the *Report*, of entitled "Comparative Chances of Life in Different Classes." Here Chadwick makes a statistical interpretation of the data brought to him by the Poor Law doctors. Chadwick warned of the danger of error in making generalizations from gross statistics which do not distinguish between the differing circumstances among people of dissimilar social backgrounds; he drew up tables correlating three factors: the condition of health, the social background, and the locality. The condition of health is measured by the average age of death, which Chadwick considers reflects the intensity and frequency of the disease. The social background is classified into three categories: "gentry, and professional people and their children; tradesmen, and

8) *Ibid.* p. 91.

9) *Ibid.* p. 93.

persons similarly circumstanced, and their children; and lastly, other labourers, artisans, and servants and their children." The locality is indexed by Metropolitan districts.¹⁰⁾

The tables convinced Chadwick that the condition of health was indisputably correlated with both social background and the locality of one's residence. "The laboring classes become old the soonest," Chadwick concludes, "and the effects of the unfavorable influences in the adult and adolescent stage is shown in the smallest proportions who attain extreme old age, and also in the periods of the deaths of heads of families of this class, by which widowhood is produced."¹¹⁾ As to the effect of the locality, Chadwick maintains that "on comparing the proportion of deaths amongst all classes between one district and another, as well as between class and class, the general influence of the locality becomes strikingly apparent."¹²⁾ It should be noted, however, that the observed correlation between locality and condition of health was less clear-cut than that between social background and health. Chadwick attributes this to the fact that districts were large, containing mixtures of differing physical situations; he was confident that, once the data were more finely drawn, he would get the "correct" result. Chadwick speculates:

Since the character of the residences of many of the labouring classes, and the condition of their places of work and their habits are known, it is to be considered that where the occupations are duly registered, returns, on the principle of those we have first given of the average age of death among particular classes, will afford the most close approximation to accuracy, or the best indications of the extent to which each of those classes is placed.¹³⁾

Chadwick summarizes his findings in the following words:

... that the various forms of epidemic, endemic and other disease caused, or aggravated, or propagated chiefly amongst the labouring classes by atmospheric impurities produced by decomposing animal and vegetable substances, by damp and filth, and close and overcrowded dwellings, prevail amongst the population in every part of the kingdom, whether dwelling in separate houses, in rural villages, in small towns, in the larger towns - as they have been found to prevail in the lowest districts of the metropolis...

... that such disease wherever its attacks are frequent, is always found in connection with the physical circumstances above specified, and that where those circumstances are removed by drainage, proper cleansing, better ventilation, and other means of diminishing atmospheric impurity, the frequency and intensity of such disease is abated; and where the removal of the noxious agencies appears to be complete, such disease almost entirely disappears.¹⁴⁾

Clearly, the correlation between longevity and social status is not sufficient by itself to conclude that an unsanitary condition is the cause of poor public health. This correlation was well known, but tradition supplied many explanations for it without involving the issue of sanitation. A common tendency was to relate mortality with

10) *Ibid.* p. 220.

11) *Ibid.* p. 227.

12) *Loc. cit.*

13) *Ibid.* p. 232.

14) *Ibid.* p. 422.

morality, and morality in turn with income level. The logic of these correlations was that a lower income brings fewer medical benefits, smaller and inferior (though not necessarily inferior in sanitation) housing, less abundant and healthy food, and less discipline and morality in the regulation of "public and private life" — all factors considered as contributing to a low life expectancy. Many proponents of this economic view of disease causation, particularly those of the Malthusian persuasion, accepted as inevitable the differential morality among social classes; for them, it was a manifestation of "natural check" against overpopulation, a blessing in disguise, as it was Nature's mechanism or weeding out the sick and the weak from society. For Malthus, disease was a Providential instrument of admonishment, a sign telling us that "we have offended against some of the laws of Nature."¹⁵

Chadwick rejects such views completely and advocates the idea that attributes of place, and not of people, are responsible for untimely death. He resorts to two arguments to press his idea.

Chadwick seeks to demolish the traditional view by maintaining that the evidence shows disease to attack people in the prime of their working life, and not when weak and destitute. Citing the statistics of fever hospitals as support for his view, he calls attention to the fact that the greatest number of patients admitted for epidemic, endemic and contagious diseases are all young. He continues:

How erroneous the inferences are in their unrestrained generality, which assume that the poverty or the privation which is sometimes the consequence—is always the cause, of the disease, will have been seen from the evidence as that adduced from Glasgow and Spitalfields, proving that the greater proportion of those attacked by disease are in full work at the time; and the evidence from the fever hospitals, that the greatest proportions of the patients received are in high bodily condition.¹⁶

Chadwick further points out that the average worker earned an income sufficient to maintain minimum sustenance, though much lower than that of other classes. Thus, low wages could not be held as the main cause of disease. He cites several instances of a higher death rate among those people of a comparatively higher income average.

By making inferences on the basis of these statements, Chadwick concludes that poverty is not the cause of disease, and that the latter is not the mechanism of a "natural check," as Malthus' followers wanted to believe; he holds that disease, especially contagious disease, is caused primarily by unsanitary conditions, and that indeed disease is the cause of pauperism, and not vice versa. "Noxious physical agencies" sap the nation's economic health, he contends, since they weaken her vital labor strength: they produce the younger population "inferior in physical organization and general health," and the adult population "short-lived, improvident, reckless, and intemperate, and [even] with habitual avidity for sensual gratification."¹⁷ For Chadwick, then, filth and overcrowding are not symptoms but causes of economic, social,

15) Quoted by Glacker, *Tarces*, p. 647.

16) Chadwick, *op. cit.*, p. 243.

17) *Ibid.*, p. 423.

and moral malaise. This diagnosis made Chadwick optimistic about the possibility of genuine social improvement. Because unsanitary conditions are brought about by men, they can be removed by men; what governs the condition of society is inherently governable. While the traditional sanction of moral agencies has but a remote chance of success in the task of social improvement, sanitary improvement is sure to bring about broad benefits. Stressing that the amelioration of the unhappy sanitary condition is the responsibility of public authority, Chadwick calls for a radical reconstruction of the existing administrative and legal machinery which he considers inherently inefficient because it lacks a centralized, concerted system of control.

Having considered some of the central features of Chadwick's *Report*, let us now turn to an examination of the medical theory on which his sanitary idea was based. This theory of disease causation provided Chadwick's argument with a certain scientific credence, giving it a cutting edge and thereby helping its general acceptance by the public. The theory claims, as we have seen, that disease is caused by unknown agents in the atmosphere acting upon the gases from animal and vegetable decomposition given off, for example, by a hidden, stagnate water sewer, an overcrowded churchyard, a slaughter house, or a tanner's yard. By a kind of spontaneous generation, according to this theory, this admixture might produce an outbreak of typhus, or perhaps – since this promiscuity of filth brought forth an uncertain progeny – of typhoid or cholera.

We have already noted that this theory was not uniquely Chadwick's but was shared by many people; Chadwick accepted it and worked out its practical implications in unprecedented ways. But, his claims notwithstanding, the theory was not fully corroborated by his voluminous statistics. Finding a correlation between locality and health is one thing, but singling out lack of sanitation, let alone "atmospheric impurity," as the cause of disease is quite another. Looking back from the vantage point of twentieth century etiology, we know that this theory was only half true, given that bacteria, and not filth or impure air, engender disease. But, of course, bacteria were not to be discovered for the another twenty years after *Report*, and Chadwick could not but rely on the medical theory available to his time. Thus he held steadfastly to the "impure air" or "filth" theory even when the data showed this to be less than clear-cut. To be precise, then, Chadwick's *Report* was a documentation allegations; his sanitary idea was an extension of the medical theory he espoused *a priori*.

This "filth" or "impure air" theory of etiology is known in medical science as "pythogenic" or "miasmatic" theory. While the two are not identical, they were used interchangeably in the nineteenth century, as filth was believed to be the cause of impure air. In the following I shall use the term "pythogenic theory" generically, unless the distinction is required.

The localization of "zymotic" or infectious diseases in the narrow courts and alleys of the poor had frequently been noticed by the eighteenth century physicians whose

sympathies brought them to practice in the towns' lower quarters. The observation that outbreaks of fever were somehow correlated to unsanitary conditions gave rise to the pythogenic theory. Pythogenic theory had become, in Chadwick's time, an influential, though still controversial, theory among leading medical professionals.

One of the theory's leading proponents was Dr. Southwood Smith, one of the three doctors who contributed to the Poor Law Commission's first report.¹⁸⁾ Already in 1825, he had published an article, "Contagion and Sanitary Laws," showing that epidemic disease was due to unsanitary conditions, and that it was not communicated from one person to another, as the traditional "contagion theory" supposed, but had its origin in the bad influences peculiar to certain places. In the *Westminster Review* of the same year, he wrote:

The room of a fever patient, in a small and heated apartment of London, with no perflation of fresh air, is perfectly analogous to a stagnant pool in Ethiopia full of the bodies of dead locusts. The poison generated in both cases is the same; the difference is merely in the degree of its potency. Nature, with her burning sun, her stilled and pent-up wind, her stagnant and turning marsh, manufactures plague on a large and fearful scale, *Poverty in her hut, covered with her rags, surrounded by her filth, striving with all her might to increase the heat, imitates Nature but too successfully*; the process and the product are the same, the only difference is the magnitude of result. *Poverty and ignorance can thus, at any time and in any place, create a mortal plague.*¹⁹⁾

Dr. Southwood Smith played a leading role in propagating the pythogenic theory; he helped to create and operate the Health of Towns Association, which published numerous articles and held many public lectures in an effort to enlighten the general public of the "true" cause of disease and its attendant miseries.

As a theory of causation of disease, particularly the "zymotic" kind of disease, the pythogenic theory was relatively new, though it did have, as we shall see shortly, certain similarities to the Hippocratean theory of the influences of lands and waters. At the time of the pythogenic theory's emergence, most medical theorists held to the "contagion theory." The pythogenic theory was raised as a conscious alternative to the contagion theory, and the two remained the subject of heated controversy among medical men until the discovery of bacteria in 1860 finally disproved both.

The contagion theory literally posited that disease is not created by anything, but exists as a kind of entity traveling from the body of an afflicted person to that of a potential victim through bodily contact. The contagion theory too was a relative newcomer in medical history.²⁰⁾ Under the classical system of Hippocratic medicine, the notion of contagion had been largely suppressed, though for many centuries it remained a powerful influence among practitioners of folk medicine. The medieval experience

18) Thomas Southwood Smith (1788-1861) was Bentham's friend and ardent supporter. Influenced by Bentham's thought, he wrote "The Use of the Dead for the Living," in which he called for legalization of the use of corpses for medical research. This had been barred by Christian custom and hindered anatomical as well as physiological research. It was rewarded by the Anatomy Act which became law in 1832.

19) Quoted by Hutchins, *op. cit.*, p. 89, my italics. Hutchins describes the contributions of Dr. Southwood Smith to sanitary reform on pages 87-113.

20) Particularly informative on the history of modern medical ideas is R.H. Shryock, *The Development of Modern Medicine*, (Philadelphia: University of Pennsylvania Press, 1947).

with leprosy, and particularly the "Black Death," once again brought the theory to the surface, and it began to gather influence. Popular belief in the contagion theory further strengthened in the seventeenth century by the renewed occurrences of the plague and the knowledge of Near Eastern practice of smallpox inoculation. The success of vaccination by Jenner at the end of the century strengthened even further its already widespread influence.

As the pythogenic theory supported and invited sanitary reform as the means of preventing epidemic disease, the contagion theory was intimately connected with quarantine as the favored method of protecting public health. Because under the contagion theory disease was thought to spread through contacts between the healthy and the sick as well as through contact with objects exposed to the sick, it was surmised that the logical method to prevent the spread of disease was to impose isolation of persons who actually "carried" or were suspected of "carrying" disease.²¹⁾

Thus the two theories contrasted sharply in their respective views of epidemic disease and of the practical schemes for disease control. Later in this chapter, I shall argue that the source of their divergence is philosophical rather than scientific; that their contrasting views derive from their differing conception of man, his environment, and their relationship. I shall also argue that the ascendancy of the pythogenic theory, and of the concomitant sanitary ideas, was a symptom of the rising environmental way of thinking in the nineteenth century. But this is to anticipate. At present let us focus on medical history and trace the transition in etiological ideas. The transition is an unmistakable fact of history; it is borne out by an examination of the leading opinions of the medical establishment from the eighteenth century to the mid-nineteenth century. In the following I shall concentrate on the recommendations of the successive Boards of Health, created by the government at times of epidemic threats.²²⁾

In 1720, an outbreak of plague in Marseilles threatened England with a renewed invasion. In devising a plan to prevent the invasion, Parliament sought advice from the leading medical authority of the time, Dr. Richard Mead of St. Thomas Hospital in London. His recommendation was based on the contagion theory, calling for an

21) The Board of Health of 1805 recommended the following plan to prevent the spreading of yellow fever: "As soon as anyone is confirmed to be infected, the rest of the inhabitants shall be removed immediately to some place of observation, where they shall be examined twice a day by physicians, in order that any of them who sickens may be immediately removed; others shall be prohibited from all intercourse for twenty days. The suspects being removed, the sick person shall continue to reside in the house where he was taken ill and shall not be permitted to quit until twenty days from the date of his complete recovery, or longer in cases where doubtful symptoms continue. The patient is allowed to have any one of his family or friends who may be willing to attend him as a nurse. The attendant must not leave the house until the patient is completely recovered or dead; in this case, he must perform a quarantine of twenty days and submit to the regulations prescribed for the purpose of purification. Those who are removed from the sick house must give the Magistrate a correct list of articles they take with them, which shall be subjected to purification and other measures such as those used in Lazarettos. To prevent any illicit communication, watchmen or guards should be placed constantly at the door of the infected house as well as at the house of observation, to prevent all ingress or egress. Any physician, surgeon, or apothecary who attends the patient must confine his practice entirely to that part of the town. He is also required to carry a wand or other mark of distinction, and to avoid all communication with the people as far as possible. The family residing with such a person is considered suspect. Both he and his family should perform a quarantine of twenty days subsequent to their latest exposure to infection." C. Frazer Brockington, *Public Health in the Nineteenth Century*, (Edinburgh: E. & S. Livingston, Ltd. 1965), p. 35.

22) Materials for the analysis are contained in Brockington, *op. cit.*

adoption of strict quarantine and isolation in "pest houses." Parliament quickly accepted Dr. Mead's recommendation and passed an act to institute quarantine measures.

The same belief in the contagion theory and quarantine prevailed in the Board of Health of 1805, which was formed by the Privy Council on the threat of a yellow fever epidemic known as the "Gibraltar scare." A yellow fever epidemic had broken out in North Africa, and soon crossed the Mediterranean to ravage the southern parts of Spain. The following note sent by the 1805 Board of Health to the Privy Council well expresses how unchallenged an authority the contagion theory enjoyed at this time, and conversely, how absent pythogenic ideas were.

We the president and Fellows in His Majesty's Royal College of Physicians in London, having maturely weighed the information contained in the various documents transmitted to us by His Majesty's Most Honorable Privy Council...are...of opinion that the disease is contagious, and that the propagation of it has arisen from its contagion-nature...In further confirmation of the infectious nature of the disease, we observe that *the towns that have suffered from it are not such as are considered as unhealthy from situation, but, on the contrary, some of them are remarkably healthy*, such as Medina, Cadiz, Sidonia and Gibraltar, in all of which, nevertheless, the disease has made great havoc, at the same time that other towns, much less healthy in point of situation, have remained free from sickness...Being, therefore, of the opinion that the disease is both highly malignant and contagious...we would recommend that the Laws of Quarantine be put in the most strict execution upon all ships coming from Cadiz, Gibraltar, Marga, Cathagena, Alicant, or Leghorn, all of which places are known to be infected...We beg leave to observe that *we have the most perfect confidence, that the careful and diligent enforcement of the quarantine laws will secure the country.* The disease being supposed...to have got into the country, the town or neighborhood, in which it shall appear, should be immediately placed under a set of regulations approaching nearly to Martial Law, by which the Magistrate and the Military should assist in carrying out the execution of the measures adopted for cutting all communications, between the sick and the well.²³

As many as 100,000 died of yellow fever in Cadiz, and despite quarantine measures, the disease crossed and reached Gibraltar, leaving numerous victims. It also entered Malta, killing one third of the island's 15,000 people. In its attempt to control the administration of quarantine, the Board of Health became entangled with the Office of Customs and Excise, which had controlled such operations since Elizabethan times. The Board was abolished in 1806, despite its hope of becoming a permanent institution.

The next major threat to public health came from Asiatic cholera. While it had been endemic in India for centuries, beginning in 1830, it became pandemic, invaded Russia, and once started, followed an itinerary laid down by the trade routes, entering England in 1831. The mystery of its origin, its frequent termination in sudden death, and its irresistible advance across continents and seas, made cholera the most feared of all diseases—not without reason, known as "the scourge of nations." (In Paris 7,000 deaths occurred in eighteen days.) The world universally turned to the physicians for some means of fighting the disease and once again, in England the

23) *Ibid.*, p. 20, my italics.

government formed the Central Board of Health, drawing people from the Royal College.

This time, neither the Privy Council nor the Board of Health was so certain of the effectiveness of quarantine against cholera. In its instructions (June 21, 1831) the council directed the Board to give its attention to the "two points which are the most important in this enquiry: First, whether the disease is communicable from person to person. Secondly, whether it is communicable by inanimate matter of any description."²⁴ The Board's answer to the Council was ambivalent. The doctors on the Board still felt that cholera was communicated, like plague, through personal contact, and therefore, the old method of quarantine would be effective in checking its spread.

At the same time, however, there was also some feeling that the disease was somehow associated with unsanitary conditions. Dr. Thomas Walker, the medical observer sent by the Board to cholera-ravaged St. Petersburg, reported to the Board that the question of the etiology and communication of cholera was a very difficult one, as "the disease has manifested the same caprices in its progress in Russia that it showed in India, missing occasionally places that lie directly in its apparent route."²⁵

Having voiced his uncertainties about the traditional contagion ideas, however, the doctor felt obliged to defend them nonetheless. He added in the letter that "it [is] more probable that [cholera] is carried by men, somehow or other, although it has not been ascertained in what way."²⁶ The postscript to the same letter expressed the same ambiguity. It reads: "I find the expressions I made use of here (concerning the validity of the contagion ideas) have appeared to others not to convey quite the meaning I myself attached to them. I intended to say that I am *convinced* of the contagious nature of the disease, but that the *proofs* of its transmission from one individual to another are not quite perfect as yet."²⁷

Not certain of the cause of the genesis and propagation of the disease, the 1831 Board adopted a more careful approach this time; it recommended both quarantine and sanitary measures. On the one hand, the Board insisted that "the best means of preventing the spreading of infection are the immediate separation of the uninfected from the sick, by their prompt removal."²⁸ At the same time, however, the Board also called for the sanitary measures of white-washing, fumigating, and cleansing the place of infection, conceding to the apparent association between the outbreak of the disease and the absence of cleanliness. These recommendations were promptly put into effect. Despite this, however, the epidemic went on, killing 5,000 persons in one year. The Board of Health was subsequently dismantled, and a new Board was formed. This time, the new Board was composed of custom and quarantine officials, who, compared to the academic physicians that made up the 1831 Board, had more

24) *Ibid.*, p. 103.

25) *Ibid.*, p. 109.

26) *Loc. cit.*

27) *Ibid.*, p. 11.

28) *Ibid.*, p. 104.

direct experiences of the disease and disease control.²⁹

By the time Chadwick's *Report* was published, the contagion school had been reduced to a minority view, and the pythogenic theory had gained greater influence. The General Board of Health – the organization whose creation was indebted to Chadwick's *Report* and the concomitant Public Health Act of 1848 – made its belief in pythogenic ideas unequivocally clear in its 1849 Report of Quarantine. In it, the Board assessed various arguments advanced for and against quarantine and finally came to a complete rejection of the system. The reason given for the rejection was clear: the Board stated that “epidemic diseases were not contagious but have their primary and essential condition in an ‘epidemic atmosphere’ which may exist over a thousand square miles and yet affect only particular unwholesomely kept localities.”³⁰ On the basis, the Board proposed to abolish altogether the quarantine system and to trust the protection of public health to local sanitary reform.

Thus the pythogenic theory finally arrived as the dominant theory of disease causation in the midnineteenth century, and with this, the sanitary idea came to enjoy a widespread and enthusiastic acceptance. Despite all the fervor for sanitary reform, however, the victory of the pythogenic theory was not to last long. Pasteur's discovery of bacteria in 1860, and the subsequent development of bacteriology and etiology, established that the pythogenic theory was neither accurate nor incompatible with its rival, the contagion theory. As far as such diseases as cholera, yellow fever, and typhus were concerned, the new development showed, the villain was not miasma or filth but rather tiny organisms that inhabit certain kinds of environment. To the extent that it confirmed the localization of disease, the new knowledge upheld the pythogenic hypothesis. Yet, by showing that disease was caused and propagated by the transfer of microbes, it reaffirmed the contagion theory, though not in its, old, mechanical form. In a way, what it showed was that, while both pythogenic theory and contagion were incorrect as scientific theories, they could each be considered reasonable approximations.

The new etiology also showed the error of classification that was common to both theories. In the light of bacteriological discoveries, no such categories as “pestilential disease,” “fevers,” or “contagious disease,” which generations of physicians used freely, were justifiable. For some cases, like water-borne cholera, dysentery, and yellow fever, the sanitary control of water supplies is by far a more effective means of prevention than quarantine; for others, such as diphtheria, sanitation is useless

29) The medical profession in the midst of a major epidemic seemed so unreliable that it was suggested that prayers be held for the prevention of epidemics. Sir Arthur Newsholme in *Evolution of Preventive Medicine* reports a Presbytery of Edinburgh who wrote to Lord Pabverston, then Home Secretary, suggesting that “in the circumstances a national fast should be appointed on royal authority.” William M. Frazer, *A History of English Public Health*, (London, 1950).

30) *Ibid.*, p.58. At this place, Frazer also notes one incident indicative of the almost religious faith in the doctrine of an “epidemic atmosphere” that became dominant among medical professionals in the mid-nineteenth century. A medical officer wrote: “...an emigrant ship, put into port, having cases of cholera on board in August of 1852. In the ship were 100 passengers, nearly all steerage. The voyage lasted for twenty-seven days and during that time fourteen of the passengers and crew became ill with cholera, and of these, thirteen died. The passengers ascribed this outbreak to the crowded state of the steerage passengers sleeping on deck; while the medical officer of Health thought it probable that *the ship had passed through a stratum of atmosphere charged with the cholera poison*”[my italics].

while isolation is all important. On the whole, pythogenic theory was found too exaggerated, as few dangerous microbes were discovered in the air.³¹⁾ At the same time, sufficient evidence was accumulated to show some validity to the contagion theory, which, together with its quarantine measures, was consequently reinstated, though in a form modified by the bacteriological discoveries. The "Contagious Diseases Act" was passed in 1878.

The foregoing brief excursion into developments after Pasteur was to highlight the point that the pythogenic theory's ascendance over the contagion theory occurred in spite of the absence of empirical evidence to justify it. In the light of modern medical knowledge, the two theories were equally erroneous, and they were so to a comparable degree. What prompted, then, we are led to ask, this scientifically unwarranted transition in medical ideas? How are we to interpret the ascendance of the pythogenic theory and the concomitant sanitary idea?

As one would expect, the criticisms historically advanced against the contagion theory were lacking in scientific specificity, tending to be general, indirect, and speculative. Often the target of these criticisms was quarantine rather than the medical theory on which it was founded. One recurrent argument – one that drew a particularly strong support from ship-owners and foreign traders – was that quarantine was injurious to the nation's economic health: that quarantine was not only expensive to operate but disruptive of the nation's trade. There was also a moral argument; quarantine was censured for restricting an individual's freedom and for blunting "the ordinary feeling of humanity, destroying all sense of propriety and decorum." Some critics charged that quarantine was counter-productive and that it increased, rather than decreased, mortality. Since quarantine restricts access to the means of subsistence and discourages attendance of the sick, these critics insisted, it forces many people to die unnecessarily and, even worse, to go unattended. Furthermore, it was argued, quarantine obliges the sick to remain in the infected place and thereby exposes them to the hazardous "influence of the atmosphere," which is the real cause of disease. Also ridiculed was the idea that disease could be retained and communicated by inanimate articles. A doctor Maclean, one of the tireless pamphleteers in favor of the pythogenic theory, wrote:

...is it not the height of human absurdity to suppose that infection, as such, and by virtue

31) The fallacy of the miasmatic theory was dramatically shown by the "Great Stink Scare" of 1858, when the Thames stank so badly. Frazer quotes a contemporary account of the event by William Budd, "In the hot summer months of that year, the combination of an unusually long duration of low atmospheric pressure and the high temperature raised the stench of the river to 'the height of an historical event' The river had ironically already been polluted by the sewer introduced by the new system of water closet. Indeed, the smell was so foul that, it is said, the river steamers lost their accustomed traffic and travellers pressed for time often made a circuit of many miles rather than cross one of the city bridges. For months on end the topic almost monopolized the public press, filled with the prediction of a major calamity through pestilence. Both professional sanitarians and medical men, along with members of parliament joined in this gloomy prediction. Five million pounds were voted by a heavily taxed community to provide the means for its abatement. Meanwhile, the hot weather passed, and the returns of sickness and mortality were made up. The results showed not only that the death rate was below average, but also that there was a remarkable diminution in the prevalence of fever, diarrhea, and other forms of disease commonly ascribed to putrid emanations." Frazer, *op. cit.*, pp. 354–55.

of its inherent powers, can pass from the living body to inanimate matter; upon which the air cannot be presumed to have a similar influence, and that, after residing for some time in this inanimate matter, it can re-pass, still retaining its infectious qualities, into the living human body?³²

It is easy to recognize that much of what has been said against quarantine (its cumbersomeness, high cost, and even its immorality) could be, and actually was, said about its alternative, sanitation. And, while it was true that quarantine measures did not work well for a cholera epidemic, that alone was not a reason to expect a new theory to ascend; as the history of science witnesses, persistence in the face of theoretical or empirical anomaly is a manifest tenet of the theoretical turn of mind. Furthermore, there was no reason to expect, without the discovery that cholera is indeed water-borne, sanitation would do better than quarantine. In the final analysis, then, it was on the strength of the unqualified belief that the pythogenic theory gained its influence.³³ In their effort to affirm pythogenic theory and lend it credence, some proponents of this doctrine even drew authority from the classic environmental theory of Hippocrates, which takes the causal role of noxious air or filth for granted. Just as Dr. Walker was "convinced of the contagious nature of disease" despite the lack of "proofs of its transmission," many proponents of the pythogenic doctrine were equally undaunted by the absence of firm empirical corroborations. The same doctor who called the contagion theory "the height of human absurdity" was perfectly willing to separate on the effect of noxious air:

... general qualities of atmospheric air, whether these qualities be determined by the course of velocity of the winds; the nature of soil; the vicinity of marshes, woods, minerals, metals, salts, volcanoes; the breath of animals; vegetable exhalation; animals putrefaction; the influence of earthquakes, comets, and planets; or other circumstances, which, although to us unknown, are perfectly in the ordinary course of nature.³⁴

To return to our question: if the transition from the contagion theory to the pythogenic theory did not in any real sense represent an "inevitable" scientific progression brought on by some objective discovery of new facts, what is the meaning of this transition? What factors contributed to it? My contention in this connection is that the transition is not an isolated affair but an integral part of broad transformations in the way of conceiving man, his world and the relationship between them. More specifically, I believe that this transition was a symptom reflecting the growing influence of the environmental mode of thinking.

32) Charles MacLean, *Summary of Facts and Inferences*, (London: Dubuque, 1820), p. 470.

33) The dispute between the supporters of the contagion theory and the proponents of the pythogenic theory continued even after bacteriologists gave specific evidence supporting neither side. Max von Pettenkofer (1818 - 1901), the well-known founder of the German public health field, denied the evidence of bacteriologists in favor of the old sanitary idea. In order to settle the issue, he made his magnificent gesture of drinking a whole glass full of cholera bacilli without suffering any harm. In Germany it was left to the Hamburg cholera epidemic of 1892 to put an end to the continuing religion of pythogenic theory. During this epidemic, Hamburg and the neighboring city of Altona used infected water supplies. The latter, however, escaped the disease because it was already equipped with a filtering system which eliminated the cholera bacilli, Frazer, *op. cit.*, pp. 80 - 81.

34) MacLean, *op. cit.*, p. 455.

The essential difference between the two theories lies, I submit, in the fact that one associates disease with locality, the other with people. In the pythogenic system, disease is conceptualized primarily in association with the unfavorable characteristics attributed to certain places: gases arising from open sewers, smells emanating from ill-ventilated alleys, and the like. In this theory, the connection between an individual and the disease is incidental compared to one between certain kinds of places and disease. Man contracts disease by exposing himself to the dangerous influence of the environment; he remains a passive receptor while the noxious environment remains a potent causal factor. By contrast, in the contagion theory, the relationship between a disease and its victim is intimate and inseparable. Disease, as a kind of entity, resides within the body of the sick, and is communicated among people. In the pythogenic theory, disease is not a "thing" which can be given and received, so to speak; it is a collection of symptoms or processes (chemical combustion) of the body reacting to forces emanating from the contaminated environment, and thus is separate in origin from one who reveals the given symptoms. In pythogenic theory, the importance of the material environment is paramount as far as public health is concerned; in the contagion theory, on the other hand, the material environment plays hardly any role; it is like the empty space of the Cartesian world of kinematics, where the only reality is a set of self-contained bodies moving only through mutual contact.

There is another dimension in these contrasts between the two contending theories. The spread of disease in the contagion theory takes place between self-contained individuals; in this view, separation and individualization are normal states, whereas association is a potentially pathological one. The entire system of quarantine is based on this premise of separating and individualizing the sick and the suspected. By contrast, disease in the pythogenic theory is collective in its origin. As Chadwick repeatedly emphasized, the unsanitary environment is supra-individual; it originates in the decisions of many people, and is as beyond the control of individuals as weather. As the cause of disease is social or collective, therefore, the effective means of controlling it — sanitation — also needs to be a collective effort.

Yet another aspect of the separation of disease and the patient in the pythogenic theory is the tendency to take a materialist, positivist attitude towards it; because the theory connects disease with de-personalized, objective, and collective environmental conditions, it is possible to dissociate disease from its traditional associations with morality, personal habits, income, and the like — characteristics of a person with which traditional Christian philanthropy was concerned.

Seen in the light of the above, the historical transition from the contagion theory to the pythogenic theory is an isolated and technical incident in medical history only at one, and perhaps a superficial, level. At other levels, the transition involves a major modification in the collective conceptual tradition, signalling the emergence of the environmentalist way of conceiving, describing and explaining material phenomena in the world. The medical ideas of pythogenic theory were founded on non-medical premises which emphasized the importance of the physical environment as a causal factor in man's well-being and, therefore, the responsibility to ameliorate the inade-

quate environmental conditions. The ascendance of pythogenic theory and sanitation indicates the rising consciousness that man depends on a certain range of the physical environment for the sustenance of his life, and that, when the former deteriorates, the latter suffers. It also represents the growing willingness to move away from a tradition of *laissez-faire*, and to accept the fact that the individual alone cannot enhance an environment, which by definition is collective both in its origin and in its mode of operation.

Edwin Chadwick's sanitary reform is, then, both the product of and a contributor to this large transformation of the collective conceptual tradition: his works helped to institutionalize ideas of sanitation and public health and their underlying environmentalist beliefs; at the same time, without the availability of the environmentalist ideas and associated conceptual framework, his practical contribution could not have been sustained. The historical significance of Chadwick's work lies in its connection with the rising environmentalism. Through Chadwick's sanitary efforts, modern planning received not only a functioning legal and administrative framework, but also an environmentalist orientation, which, by offering problems, hypotheses, solutions, was to provide a strong conceptual guidance for the subsequent development of planning.

By claiming that the medical ideas underlying Chadwick's practical works were integral parts of a larger collective conceptual framework that was coming to dominate the field of discourse, we have not as yet answered the question of why or how this framework emerged at that time, whether it arose autochthonously, or whether its ascendance was itself a consequence of other developments. To begin with, the evidence presented so far suggests that the outbreak of cholera epidemics helped to heighten certain difficulties inherent in the traditional contagion/quarantine theory and, thus, indirectly open a way for the acceptance of the alternative pythogenic theory. Also, it is undeniably true that the unprecedented growth of urban concentration and its attendant overcrowding and squalor inevitably attracted people's attention to the problems of sanitation and public health. In light of this, it would seem that the actual conditions cried out for a form of environmentalism, and that the rise of the pythogenic theory was an automatic response to conditions in a period of time which clearly had pressing environmental problems. Though true to a certain extent, we should be careful not to accept this interpretation too prematurely. There is no logical reason why this particular theory had to be devised; after all, unsanitary conditions, overcrowding, and repeated visitations of epidemics were not confined to the time in question.

What seems to be a more plausible description of the genesis of environmentalist ideas at this time is that the material conditions were only catalysts, that they do not dictate the form and content of specific theory. Just as much as the external world conditions the choice of a conceptual orientation, so too does the choice of a particular conceptual outlook mould external reality or, at least, its conceptualization. Thus, it is through the concepts, categories, and hypotheses provided by the environmentalist medical theories that the external world is examined, analyzed, and acted upon, as much as the latter encourages acceptance of the former.