The French Influence on the Development of Epidemiology

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You may have concluded from Dr. Eyler's excellent review of William Farr's life and times that England was the birthplace of epidemiology.[1] However, it should be noted that Farr spent two years in Paris at a time when medical statistics received a greater emphasis than previously and the French hygienic movement developed. The amalgamation of these two occurrences, as well as the development of mathematical statistics, made France the anvil of epidemiology, where it was first hammered into shape.

These origins will be examined by answering three questions: (1) What actually occurred in France? (2) Why did it occur? and (3) Why did French epidemiology decline in the 1850s at the very time when English and American epidemiology were vigorously growing?

Although Hippocrates has long been acknowledged to be the first epidemiologist, it was not until the appearance of the post-revolutionary Parisian school of medicine that the origin and growth of modern epidemiologic concepts and methods actually began. In the century prior to the French revolution, several developments occurred which had an important influence on the development of epidemiology.

In 1693, Edmond Halley, of comet fame, produced the first known life-table which presented age-specific probabilities of death; this particular life-table was based upon the Breslau Bills of Mortality, sent to Halley by Leibniz.[2] During the next 50 years, such noted mathematicians as Huygens, De Moivre, Fourier, and Bernoulli were involved with the development of the life-table, or as they referred to it, table of mortality. Most of the individuals involved with the early development of the life-table were also astronomers; we propose that this reflected some underlying philosophy that motivated these astronomers to construct them, that is, the discrete mathematical relationships which governed the

planets and their movements had biological counterparts, which were known as "laws of mortality." Such relationships were the biological manifestation of more general "laws of nature." For in the seventeenth century, when the concepts of probability and inductive logic were developed, both being essential to epidemiology, the Church-Galilean conflict occurred. Sheynin has suggested that the calculus of probability developed in order to differentiate between natural and divine law.[3] Hence, it is conceivable that these mathematical astronomers' work on life-tables was one way to develop and demonstrate probability concepts, thereby indicating the existence of a natural law rather than a divine one. The development of biostatistics throughout the eighteenth century was premised on the notion of natural laws of mortality. Hence, by the early nineteenth century, a philosophical base for epidemiologic endeavors, that is, elucidating such laws of mortality, had been established. Many of these same astronomers also contributed to developments in mathematical statistics.

The major eighteenth-century political event, the French Revolution, was important for eliminating many previously held medical beliefs and by providing the opportunity for many hitherto neglected students of medicine to contribute their ideas to furthering the healing art. Further, a hygienic movement developed in France.[4] Unfortunately, we do not know all of the details of this movement, but it clearly influenced the development of epidemiology.

Into this environment stepped the eclectic physicians who were to dominate the Parisian school of medicine until the mid-1800s. Some of the leaders of this school can be considered among the fathers of modern epidemiology. The most influential leader in this school was Pierre Charles-Alexandre Louis, who played an important role in the founding of epidemiology. For it was Louis who integrated the philosophical and quantitative concepts that had been developed by the nineteenth century and applied them to the study of disease in order to make inferences on their natural history and etiology, that is, the modern "epidemiologic approach."

That medical statistics were used prior to Louis cannot be denied, for several of his predecessors and colleagues had calculated many "death rates." The theoretical advances in probability and statistics by eighteenth-century French mathematicians, such as Laplace, cannot be underemphasized because they also played an important role. Rosen provides an excellent overview of this development.[5] Nonetheless, before Louis, there had not been a vigorous application of quantitative ideas to medicine.

Many physicians are familiar with Louis' first research project, reported in 1830, on the efficacy of bloodletting. Louis' conclusion, that bloodletting was not very therapeutic, dealt the deathblow to this method. Yet, for epidemiology, this report was important for its description of Louis' conceptual approach to comparative studies, as indicated in this statement:

> In any epidemic, for instance, let us suppose 500 of the sick, *taken indiscriminately*, to be subjected to one kind of treatment, and 500 others, taken in the same manner, to be treated in a different mode: if the mortality is greater among the first, than among the second, must we not conclude that the treatment was less appropriate or less efficacious in the first class, than in the second? . . . that it is impossible to appreciate each case with mathematical exactness, and it is precisely on this account that enumeration becomes necessary; by so doing the errors (which are inevitable) being the same in both groups of patients subjected to different treatment, mutually compensate each other, and they may be disregarded without sensibly affecting the exactness of the results.[6]

Notable is the term "taken indiscriminately"; does this not refer to random sampling? Though this description dealt with the evaluation of treatments, Louis was also quite able to apply these ideas in the field. For example, shortly after his study of bloodletting, Louis was appointed to a commission to investigate the 1828 Gibraltar Yellow Fever epidemic. Time does not permit a presentation of this study, which reflects an unusual degree of conceptual epidemiologic sophistication.

Louis' interests were very broad. Working not only on therapies and epidemics, but also on specific disease entities, he began the differentiation of typhus from typhoid fever; two of Louis' students, Gerhardt and Shattuck, were to complete this work. His study of phthisis is notable for considering methodological issues in such studies and suggesting a method to determine whether phthisis was inherited; Louis stated:

> The tenth part of the subjects who fell under my observation were born of parents, either father or mother, who according to all appearances, had died of phthisis. But, as this disease might have been transmitted in these cases, or have been developed independently of such influence, and as I knew nothing of the manner of death of the brothers and sisters of these patients, it follows in reality that I have observed nothing decisive in favor of the hereditary character of phthisis. I may remark that the proportion of phthisical patients born of parents who died of tuberculosis, is probably below the truth in my notes; inasmuch as it is far from being always possible to ascertain from hospital patients the nature of the affection to which their parents fell victim. But it is obvious that in order to substantiate the exact amount of hereditary influence, it would be necessary to draw up tables of mortality, by means of which we should have the power of comparing an equal number of subjects born of parents who were phthisical and who were not so.[7]

TABLE 1. Comparison of Annual Rates of Phthisis Among British Troops in Areas with Different Climates*

Area	*Total No. of British Troops*	*Annual Rate of Phthisis per 1,000*
Canada	61,066	6.5
Gibraltar	60,269	6.5
Bermudas	11,721	8.8
Malta	40,826	6.1
Home stations in Britain	?	6.4

*P.C.A. Louis, *Research on Phthisis, Anatomical, Pathological and Therapeutic*, 2d ed., transl. W. H. Walshe (London: Sydenham Society, 1844), p. 492.

It is tempting to speculate that by "the exact amount of hereditary influence," Louis was referring to the attributable risk.

Further, an entire chapter was devoted to the etiology of phthisis.[8] Its organization is very similar to modern epidemiological reports. In attempting to determine the influence of climate and temperature, he presented data on the frequency of phthisis among British troops in areas that differed markedly in climate and temperature (Table 1). He noted that in the Bermudas, with the highest rate, the climate was "mild and equable, while that of Canada is excessively cold, and exposed to great and sudden variations of temperature."[9] He carefully noted that:

> No doubt the accuracy of the facts, upon which these statistical results are founded, may to a certain point be made matter of contestation. But errors in diagnosis, which I find no difficulty in admitting must have occurred, did not take place in any single one only of the British colonies; they must have occurred in all, and in about the same proportions; hence the results are strictly comparable. It follows then, from the evidence now brought forward, that the prevailing opinion respecting the influence of climate on the development of phthisis is, if not completely erroneous, at least of most doubtful accuracy,—and that it is either deficient in support of any kind, or rests merely upon the foundation of facts erroneously understood or too few in number.[10]

Although Louis never held a formal appointment in a medical school, he was among the most influential of medical teachers in Paris. In 1834, he published a book entitled *Essay of Clinical Instruction*, in which the practical and philosophical approaches to medicine are presented.[11] In it, he describes how one should take a case history, and some of the methods and problems found in modern observational studies.

> Whether we wish to make a summary of the facts observed during the course of clinical medicine, or to deduce general laws from those collected by the authors, we must, in the first place, assure ourselves of the exactness of the facts; remove from our analyses all of those which are not unimpeachable, and analyze the others *without distinction;* for the object is to arrive at exact results; and by proceeding in the manner pointed out, we make a complete enumeration, and thus take a sure means of avoiding great errors. . . . In order then, that the results obtained . . . should be actually true, it is necessary that the facts on which they are based should be very exact; thus, among the cases where a symptom is wanting, we must not count those where it has not been noted, where no mention has been made of it, whatever may be the exactness of the observation in other respects. . . . But to appreciate the value of a symptom in any disease whatever, we should not only know the proportion of the cases in which it presents itself, but also in what other affections it occurs, and in what proportion, in how many cases it is slight or severe. . . . The numerical method is not less useful in the research of the causes of disease, whether in giving us the means of recognizing serious errors, or in enabling us to avoid them.[12]

Louis was not the only epidemiologically-oriented physician in Paris. Andral appears as another leading one, as well as one of the most prominent hygienists; he was one of the founders of the *Annales d'Hygiène Publique*, the major Parisian preventive medicine periodical. On its editorial board were the leading French hygienists.

Others were also involved in epidemiology during this period: Villermé, for example, analyzed differences in mortality rates by social classes.[13] Also, the renowned statistician, A. Quetelet, was in frequent contact with many in Paris. However, Quetelet's statistical theories were definitely not as "refined" as those of today.

By the mid-nineteenth century, epidemiology in France had declined considerably and its center had shifted to London. One wonders how these ideas were transferred to England. Noting that Louis had attracted many students from England, the United States and Switzerland, we propose that the conceptual basis of epidemiology was transmitted by his students to England and the United States, as shown in Figures 1 and 2. His English students (Figure 1) became the leaders of epidemiology in the middle and latter half of the nineteenth century and included the brightest stars of epidemiology and biostatistics in the preventive medicine constellation.

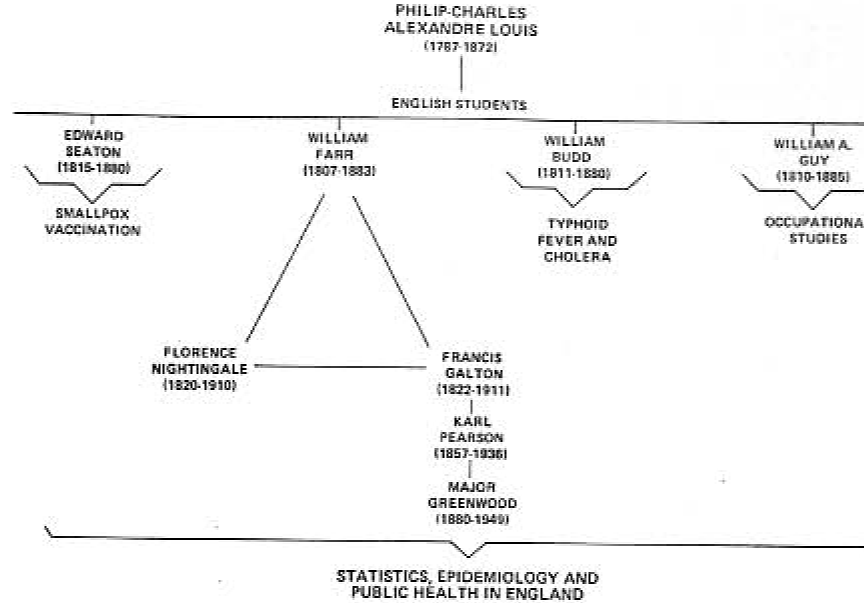

FIGURE 1. The influence of P.C.A. Louis on the development of statistics and epidemiology through some of his students in England.

One such student, William Augustus Guy, forgotten by the medical and statistical worlds, was among the leading biostatisticians of his day. A very active member of the Royal Statistical Society, he served as its president from 1855-1856. In 1854, in one of his epidemiologic studies, he conceptualized what we now know as the odds ratio.[14] William Farr had an astonishing grasp of modern epidemiologic concepts. One interesting accomplishment was his 1837 use of survivorship life-tables, noting:

> The tendency to death or health varies, as the morbid processes themselves vary, every instant from the commencement to the termination of disease. Before examining the intensity . . . of these tendencies, or *forces*, as they are called in physics, it will be well to take a cursory view of the usual succession of phenomena.[15]

The term "intensity . . . of these tendencies" obviously refers to the *force of mortality* usually computed in a life-table. Of course, if the life-table developed as a biological analog to astronomical observations and calculations, this parallel terminology is not unexpected.

Louis' American students taught his ideas in the United States and developed the national vital statistics system so essential to Louis' epidemiologic ideas. These students established two epidemiologic centers in the United States: one in Boston and one in New York. The Boston group included many well-known physicians: George Cheyne Shattuck, Jr., Oliver Wendell Holmes, and Henry I. Bowditch, to name a few. The center in New York resulted from the activities of three of Louis' students; there was Elisha Bartlett, who spent the last five years of his life in New York City, mainly at the Columbia University College of Physicians and Surgeons. Although Bartlett conducted no epidemiologic studies, his understanding of epidemiologic methods was remarkable. Dedicating his *Essay on the Philosophy of Medical Science* to Louis,[16] Bartlett gave examples of both the calculation and use of confidence limits for mortality rates, based on a publication by Jules Gavarett in 1840.[17] Bartlett noted the need for the comparability of study groups:

> The first condition in the establishment of any therapeutical principle or law is this—that the facts or phenomenon, the relationships of which are to be investigated, shall be sufficiently fixed and definite to be comparable. . . . The subjects of the disease, whatever it is, which is to be studied ought to be taken from the same locality and from the same classes of population; and the hygienic circumstances surrounding these subjects, during the treatment of the disease, should be the same. These precautions, it is easy to see, are necessary in order to render the individual cases of the disease *comparable*. . . . There should be no selection of cases. . . . There is one sense in which a knowledge of the normal structure, and the physiological actions of the body may be said to be necessary to a knowledge of its abnormal structure and its pathological actions. We need the former as a *standard of comparison* for the latter.

The latter clearly states a need for a control group.

It is noteworthy that Bartlett was at the College of Physicians and Surgeons at the same time that Elisha Harris and Stephen Smith were students there. They were later to found the American Public Health Association. Also, Harris was the first vital statistics registrar in New York City. The other two students of Louis who taught at the College of Physicians and Surgeons were Francis Delafield and Alonzo Clark. Although not having studied abroad, there was also Austin Flint who had studied at Harvard under Louis' students and upon whom Louis' works had made a considerable impression. Delafield, Flint, and Clark all taught William Henry Welch, interesting him in preventive medicine and epidemiology. Flint was also the teacher of Charles V. Chapin, who became a leading epidemiologist and a pioneer in the public health movement. These relationships are summarized in Figure 2.

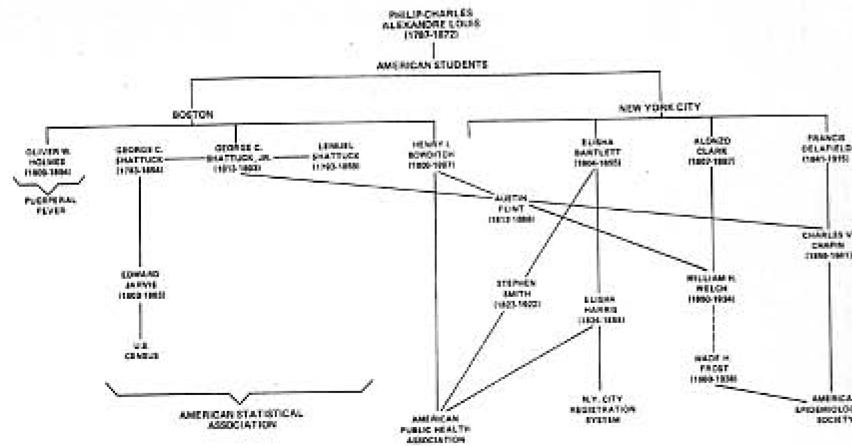

FIGURE 2. The influence of P.C.A. Louis on the development of statistics and epidemiology through some of his students in the United States.

Several parallels exist in the historical development of epidemiology in France, England, and the United States. In France, the underlying philosophy of epidemiology had been developed. Also, the French mathematicians had been active in elucidating various statistical theories, such that, by 1800, a theoretical base for ideas of statistical analysis had been established. Further, an identifiable hygienic movement had developed in France, which was sufficiently significant to warrant comment by British hygienists.

In England, much the same was true. There was an identifiable philosophy of epidemiology, a familiarity with mathematical and actuarial statistics and the development of a well-organized hygienic movement. However, in England, the London Bills of Mortality had been in existence since the late 1500s. Two contradictory reasons have been proposed for their collection: (1) to warn the population of an epidemic so that the populace could leave the city, or, (2) to convince the populace that an epidemic was not so severe for them to leave the city, which would, in turn, disrupt commerce. Several life insurance companies also had been established in England in the eighteenth century and had accumulated a large mass of data concerning their subscribers. Further, the English military had detailed records of troop mortality since the late eighteenth century. Thus, a substantial wealth of statistical data on the morbidity and mortality of various population groups was available in England for analysis. Hence, one difference between England and

TABLE 2. Comparison of Structural Foundations of French, English, and American Schools of Epidemiology

FRENCH	*AMERICAN*	*ENGLISH*
HYGIENE MOVEMENT	HYGIENE MOVEMENT	HYGIENE MOVEMENT
STATISTICAL THEORY	STATISTICAL THEORY	STATISTICAL THEORY
UNDERLYING PHILOSOPHY OF EPIDEMIOLOGY	UNDERLYING PHILOSOPHY OF EPIDEMIOLOGY	UNDERLYING PHILOSOPHY OF EPIDEMIOLOGY
———	VITAL STATISTICS	VITAL STATISTICS

France was the existence in England of population-based statistics, which we shall refer to as "vital statistics."

In the United States, the situation was similar to that in England, except that vital statistics were not immediately available; rather, vital statistics were developed in the United States by Louis' students. It is apparent then, that the major difference between England, the United States, and France is that the first two countries either had or quickly developed vital statistics, while the last had not. We suggest that epidemiology in France declined because of the absence or non-utilization of a vital statistics system, while epidemiology in England flourished because of its presence and utilization. In the United States, epidemiology developed almost forty years after it had in England; but this period was necessary for the development of vital statistics (Table 2).

Hence, we conclude from this examination of the French impact on epidemiology, that one essential component needed for epidemiology to develop and flourish is the existence, maintenance, and utilization of vital statistics, i.e. population-based statistics; although vital statistics represents only one facet of epidemiology. While previous studies of epidemiology's past history have concentrated on when and what, we believe that it is more important to attempt to determine why and how developments occurred. For, it should be remembered that . . . "Whatever limitations are still obvious, let us not forget that men and methods make epidemiology, not statistical significance levels, nor computers, nor inferences, important as these are."[18]

Notes

1. John Eyler, "The Conceptual origins of William Farr's epidemiology: Numerical methods and social thought in the 1830s," *Times, Places and Persons: Aspects of the History of Epidemiology* (Baltimore: The Johns Hopkins University Press, 1980); see above pp. 1-21.

2. Edmond Halley, "An estimate of the degrees of mortality of mankind, drawn from various tables of the births and funerals in the city of Breslau with an attempt to ascertain the price of annuities upon lives," *Trans. Roy. Soc. London*, 1693, *17:* 596-610.

3. O. B. Sheynin, "D. Bernoulli's work on probability," *RETE*, 1971, *1:* 273-300.

4. Ann La Berge, "Public Health in France and the French Public Health Movement, 1815-1848," Ph.D. dissertation (Ann Arbor, Michigan: University Microfilms, 1974).

5. George Rosen, "Problems in the application of statistical analysis to questions of health: 1700-1880," *Bull. Hist. Med.*, 1955, *29:* 27-45.

6. P. C. A. Louis, *Researches on the Effects of Bloodletting in some Inflammatory Diseases, and on the Influence of Tartarized Antimony and Vesication in Pneumonitis.* Translated by C. G. Putnam (Boston, Hilliard, Gray, 1836), pp. 59-60.

7. P. C. A. Louis, *Researches on Phthisis, Anatomical, Pathological and Therapeutical.* 2nd ed. Translated by Walter Hayle Walshe (London: Sydenham Society, 1844), pp. 483-484.

8. Ibid., pp. 477-508.

9. Ibid., p. 492.

10. Ibid., p. 493.

11. P. C. A. Louis. *An Essay on Clinical Instruction.* Translated by Peter Martin (London: S. Highley, 1834) pp. 20, 23, 24.

12. Ibid., p. 27.

13. Louis René Villermé, "De la mortalité dans les divers quartiers de la ville de Paris, et des causes qui la rendent très différente dans plusieurs d'entre eux, ainsi que dans les divers quartiers de beaucoup de grandes villes," *Ann. d'Hyg. Pub.*, 1830, *3:* 294-341.

14. William Augustus Guy, "Contributions to a knowledge of the influence of employments upon health," *J. Roy. Stat. Soc.*, 1843, *6:* 197-211.

15. William Farr, "On the law of recovery and dying in smallpox, Article II," *Brit. Ann. Med.*, 1837, 1: 134-143.

16. Elisha Bartlett, *An Essay on the Philosophy of Medical Science* (Philadelphia: Lea and Blanchard, 1844), pp. 99, 159-161.

17. Jules Gavarret, *Principes généraux de statistique médicale* (Paris: Beche Jeune et Laube, 1840).

18. David E. Lilienfeld, "The greening of epidemiology: Sanitary physicians and the London Epidemiological Society," *Bull. Hist. Med.*, 1978, *52:* 503-528.

Discussion

Caroline Hannaway

Modern epidemiology is greatly dependent on the use of statistical methods to analyze its data. Looking back in history the development in the nineteenth century of statistical and numerical techniques in the study of population trends, disease incidence, and mortality rates was critical to the rise of modern epidemiology. In their paper, the Lilienfelds have focussed most of their attention on certain aspects of these methodological advances seeking to locate their origin and trace their diffusion in the medical sphere. In my comment I wish to suggest, however, that there was more to the French contribution to the statistical study of disease in this period than the refinement of mathematical techniques and the introduction of concepts used in modern epidemiology—important though these were. We should also ask ourselves what prompted a statistical approach to disease in the first place; what data was thought relevant; and what sort of results or explanations were sought from the analysis of such information. In seeking answers to these questions we may learn much about the historical, medical, and social context in which modern epidemiology arose; and conversely, how a study of the history of epidemiology can both illustrate and illuminate major historical transformations in society.

To illustrate my point I wish to examine trends in French epidemiology over a slightly longer time period than that discussed by the Lilienfelds. I will begin with a discussion of epidemiology in France in the eighteenth century, prior to the Revolution, and then pass on to the period of the post-Napoleonic era dealt with by the previous speakers. The intended effect of this juxtaposition will be to highlight contrasts, although I am aware that transitions could be suggested.

That epidemics were in some primitive sense statistical phenomena was accepted in both these periods. An epidemic continued to be defined as a disease which affected a large number of people with the same symptoms at the same time. The first attempt in France to give quantitative substance to this definition took place in the last quarter of the eighteenth century under the agency of a body of which I have made a special study, the Royal Society of Medicine of Paris.[1] Called into being specifically to investigate epizootic and epidemic diseases, the Society, as an instrument of the State, sought to mobilize the governmental bureaucracy in support of its endeavors. The physicians of the Society looked to the intendants of the some thirty-four généralités, or districts, of ancien régime France to transmit to them the relevant data for their investigation. This use of the intendants was viewed as a natural extension of their political function: these important provincial figures were not only the implementors of central administrative policy but had as part of their responsibility the reporting of significant statistical information about the population and resources of their districts. In eighteenth-century terms, the intendants were the political arithmeticians of the State.

But what data did the physicians deem relevant to their investigations? The controlling element here was the prevailing medical view of the causative factors in epidemic diseases. In the eighteenth century these causes were considered to be climatic and environmental, that is natural phenomena. The notion that atmospheric conditions, the state of the weather and topography were related to the occurrence of epidemic diseases, was of course a legacy of the ancient Hippocratic corpus, but it had been reformulated in the seventeenth century by the English physician, Thomas Sydenham, in the form of the concept of the "epidemic constitution." What rendered this concept amenable to attempted quantification in the course of the eighteenth century was the increased availability of meteorological instruments such as the barometer, thermometer, and hygrometer. As the science of the atmosphere became quantified so did eighteenth-century epidemiology. Instruments and charts were dispatched to the provinces to enable tabulation of the prevailing meteorological conditions and to record the outbreaks of disease. This was preeminently viewed as a collective endeavor, the final objective of which was the correlation between climatic (and topographical) conditions and the incidence of disease. It was believed that if sufficient data was collected and analyzed some "natural" laws of epidemics would emerge behind the apparent contingencies of the weather and the ailments of the populace.

The actual computation of such correlations among so many variables was beyond the analytical methods available in the eighteenth century, even if the principles which stimulated the attempt had been well founded. But what is worth noting in the attempt itself was the effort to locate the causes of disease in nature—it was natural phenomena that were being quantified and analyzed. Dominant in eighteenth-century epidemiology was the notion of man as a product of nature and his natural environment. It is also worth noting the link that was seen between epidemic diseases among humans and epizootic diseases among domesticated animals, for this was part of a program of public health conceived in terms of an agrarian society.

When we turn to the later period around the 1830s in France, we become conscious of different preoccupations. This is the creative period of the French hygienists' movement and contemporaneous with the developments discussed by the Lilienfelds. The new focus is urban; the approach consists of the analysis of the occurrence of disease in delimited locales, instead of being national in scope; and the correlations sought are in terms of social and economic status. The natural and climatic theory of epidemiology has yielded to a theory cast in social terms. The primary quantifiable data for this approach no longer relate to natural phenomena, but to vital statistics, mortality rates and economic data.

A characteristic example of this new outlook is the work of Louis-René Villermé, one of the most prominent figures in the French public health movement, whose activities have been detailed in a valuable dissertation on this subject by Ann La Berge.[2] Villermé's discussion on epidemics with respect to medical statistics and political economy in the *Dictionnaire de Médecine* of 1835 represents, as he says himself, a new way of approaching the subject and does in fact contrast markedly with the more traditional account of such diseases given by Guillaume Ferrus in the first section of the article under the heading of epidemics.[3] Villermé believed that as civilization developed, the frequency and intensity of epidemics had diminished. The poorer classes or those in need were more often attacked by epidemics and, in consequence, were more often victims of them than the wealthier classes. He laid emphasis on the social and economic causes of such disease incidence. In his many studies on conditions in Paris, Villermé based his conclusions on the data collected and organized by Villot, archivist of the Seine district, and Fourier, the noted mathematician and statistician, into the summary known as the *Recherches statistiques de la ville de Paris*. By statistical analysis from such sources, Villermé concluded that poverty and affluence were the main determinants of disease and death. Climate, water supply, location of housing, even population density—the explanations so often previously cited—did not explain the difference in mortality rates between the two groups.

While Villermé and his associates in the public hygiene movement of the 1820s and 30s were highly critical of the inadequacy and lack of methodological sophistication in contemporary French statistics, they made the best use possible of such resources as were available, as their numerous articles in the *Annales d'Hygiène Publique* attest. What characterizes the work of most members of this school, however, is their underlying ideological commitment to the beneficial effects of what they termed civilization in the sphere of public health. The political and economic context of this notion was provided by economic liberalism and the rise of industrialization. This stands in contrast to the physiocratic and agrarian outlook of those who sponsored the investigation of epidemics in the eighteenth century.

This focus on the part of the French hygienists tended to lead them away from the study of epidemics per se into the field of occupational diseases produced by industrial and working conditions. While recognizing the hazards to health of specific working conditions, the majority of the members of this group retained an optimistic outlook on the long-term effects of industrialization and economic growth in providing a better standard of living for all with a consequent reduction in disease.

What I have attempted here is to provide something of the context of the statistical approach to disease in France from the late eighteenth through the early nineteenth century. It is against this background that we must set the methodological innovations noted by the Lilienfelds in their paper. While not wishing to diminish the influence of Louis and his teaching contributions, which arose primarily it should be noted in clinical medicine and were contingent upon developments in that area, to lose sight of the larger picture would be to diminish the French contribution to epidemiology in this period.

Notes

1. Caroline Hannaway, "The Société Royale de Médecine and epidemics in the Ancien Régime," *Bull. Hist. Med.*, 1972, *46:* 257-273.
2. Ann La Berge, "Public Health in France and the French Public Health Movement, 1815-1848," Ph.D. dissertation, University of Tennessee, 1974.
3. "Epidémies sous le rapports de la statistique médicale et de l'économie politique," *Dictionnaire de Médecine*, 2e ed. (Paris, 1832-46), vol. 12, pp. 145-172. Villermé

Epidemiology and the Statistical Movement

Victor L. Hilts

During the cattle plague epidemic of 1866 William Farr wrote what eventually became a famous letter to the *Daily News* predicting that, fears to the contrary, the plague would soon come to an end.[1] This prediction was not based upon any previously established patterns concerning the typical course of rinderpest epidemics, but rested upon a somewhat daring mathematical calculation; noting the gradual slowing of the successive ratios of increase in deaths that had already occurred, Farr extrapolated to the time when the epidemic would peak, and then began to decline. His calculations met with scant respect in the medical community, and the *British Medical Journal* wrote that "Dr. Farr will not find a single historical fact to back his conclusion that in nine or ten months the disease may quietly die out, may run through its natural course."[2] Nevertheless, Farr had the satisfaction of reprinting his letter several weeks later with the observation that the plague had apparently reached its maximum. Eventually the cattle plague did run its course, not exactly as Farr had predicted but nevertheless roughly as hypothesized.

In an excellent "Historical Review of Epidemic Theory" published in 1952, Robert E. Serfling traced the major landmarks in the development of mathematical models in epidemiology and with one exception was able to confine himself to those who did their major work in the twentieth century.[3] The one exception was Farr's letter to the *Daily News*. "Four decades," wrote Serfling, "elapsed between Farr's work of 1866 and the next consequential publication."[4] According to Serfling the next significant publication was that in 1906 by William Hamer.

One cannot fail to be interested in such an historical discontinuity. If Farr's letter of 1866 really had no influence of consequence until after 1900, it would seem that this neglect might afford a case of scientific blindness parallel to that which greeted Mendel's experiments on peas.