PART THIRD.

Original Communications.

Art. I.

On the Geographical and Chronological Distribution of some Epidemic Diseases. By Gavin Milroy, M.D., F.R.C.P., &c.

As a preface to the sketch which I propose to give of the course and dispersion of the Oriental plague, yellow fever, and of malignant cholera in different countries since the beginning of the present century, the present paper will be occupied with some remarks on the subject of the chronology and geography of epidemics in general, and on the importance of greater attention being paid to this, as yet most imperfectly explored, branch of medical inquiry.

At the meeting of the International Statistical Congress held in London in the summer of 1860, I had the honour to read a paper—subsequently printed in the 'Transactions of the Congress'—on the importance of instituting a system of international registration of epidemics, by the regular notation and record, from year to year, of some of the chief diseases of this class in the principal countries of both hemispheres. "Hitherto," I then remarked, "but little has been done in the way of observing and registering the geographical and chronological development and distribution of these distempers over extensive regions of the globe. The researches of almost all inquirers having been confined to their own country, and very generally to only one division or district of their country, it is obvious that unless similar researches are being carried on simultaneously in other countries, contiguous and more remote, some of the most interesting problems of epidemiology—such as the migratory course of certain pestilences, their recurrence at irregular intervals, their subsidence at one time and in one locality, and their appearance at and in another, &c.—can never be hoped to be elucidated."

I had long been of opinion that there is probably more connexion between the development of the same epidemic disease in various countries, and also that there is more relation between the successive occurrence of different epidemic diseases, one following the other, than has been generally imagined; and certainly the extensive investigations resulting from the large inquiry into the subject of quarantine

in all parts of the world, recently carried out at the instance of th
National Association for the Promotion of Social Science, have tende
in no small degree to strengthen this opinion. But whatever may
the truth upon these and such-like points, all, I think, will agree th
the establishment of a systematic annual record of the principal ep
demics occurring in the different countries of the world could not fa
to shed much light on the natural history of these diseases, and lead
results useful alike to science and humanity. What has been done
recent years with so much advantage by the synchronous observatio
and record in diverse and distant regions of the phenomena of meteoro
logy, magnetism, and other branches of physical science,* might in a
probability be undertaken with similar benefit, if conducted on th
same plan, in the still more important department of epidemiology.
The points specially deserving to be noted in the history of epidem
diseases were stated to be the following:

1. The period of their commencement and their entire duration
the exact dates of the earliest cases in all fresh outbreaks to be pa
ticularly recorded, also the month or months of their greatest prev
lence and mortality.

2. The total number of deaths—and, as far as possible, of th
attacks also—arranged according to age, sex, and (when there ar
distinct races among the inhabitants) race. In the case of small-po
the influence of previous vaccination would of course be stated.

3. The general sanitary topography of the towns and districts mo
affected, and the more detailed sanitary condition of the localities an
dwellings where the disease first appeared, and where it chiefly pr
vailed. Large public institutions — as prisons, hospitals, lunati
asylums, barracks, poor-houses, &c.—which either suffered severely
notably escaped, should always be stated.

4. The precursory state of the public health for one or two month
or longer, prior to the appearance of the epidemic; also the meteoro
logical condition, especially if this has been at all irregular or di
tempered, and the occurrence of vegetable blights, murrains among
cattle, &c., when such phenomena have been observed.

5. It will always be very useful to ascertain the date of the la

* Professor Willis, in his recent presidential address to the British Association
Science at Cambridge, remarked: "The Association, aided by the Royal Society
effected the organization in 1840 of the system of simultaneous magnetical and meteoro
logical observations, established as well by our own Government as by the principa
foreign Governments, at different points of the earth's surface, which have proved
eminently successful, and have produced results fully equalling in importance a
value as real accessions to our knowledge any anticipations that could have be
formed at the commencement of the inquiry."

The system of extended and continuous observation and record has of late ye
been applied with advantage to various other branches of research, as for ascertainin
the periodical phenomena in the lives of plants and animals depending on meteoro
logical and climatic changes—the direction and force of tides and of winds—the tem
perature of the earth—the recurrence of earthquake shocks, &c. Nor has Governme
shown itself backward in giving countenance and pecuniary aid in conducting vario
scientific inquiries recommended by the British Association or the Royal Society
different occasions—e. g., in the preparation of astronomical catalogues, constructi
of tide-tables, carrying out magnetic surveys, &c.

antecedent epidemic of the same disease or diseases to be now recorded, and the extent and fatality of that invasion, so that a comparison might be made between the two successive outbreaks.

The proposed scheme excited a lively discussion in the section of sanitary statistics at the Congress before which it was brought forward, and all the speakers, both foreign and British, agreed as to the great utility of the suggestion, if it could be carried out systematically and uniformly in different countries at the same time. By no one was it more warmly approved than by the late Dr. McWilliam, than whom certainly no member of the profession was better qualified to judge from the devoted attention which he had so long paid to epidemiological research. "Among other advantages," he said, "that would result from the adoption of the propositions in Dr. Milroy's paper, would be that of assisting us very materially in determining the origin and mode of propagation of certain epidemic diseases, whose qualities in these respects are not as yet clearly understood. Simultaneous observation is the most likely means of enabling us to seize the first cases of an epidemic; and all in any degree acquainted with etiological inquiries know how greatly the whole history of an epidemic hinges upon these cases, whether the epidemic shall have broken out in one locality only, or simultaneously in various localities far distant from each other. The present period appears peculiarly favourable for the investigation of epidemics, as we have of late years seen diseases of that class invading countries and reaching altitudes that had been from time immemorial exempt from them." Dr. McWilliam here alluded to the remarkable geographical range, in respect both of surface, extent, and of altitude above the level of the sea, as well as to the persistence of the yellow fever in the New World, since it first appeared in the Brazils about twelve years ago, from which time it has not only spread over the entire of the Gulf of Mexico, the West Indian Archipelago, and most of the southern and central provinces of the United States, but has also extended to the Pacific side of the Continent of South America, clinging to certain regions and localities with extraordinary tenacity. "This extension," he remarked, "of so fearful a visitant beyond its usual haunts is, humanly speaking, a great and serious calamity; but it may nevertheless help us to a better understanding of the nature and properties of that scourge of hot climates, by enabling us, through *simultaneous observation in different localities*, to grasp in each the occurrence of the first cases, and thus trace the disease in each locality to its origin."

The soundness of these remarks will be appreciated by every one who has considered the subject; they clearly and forcibly express the object of my proposal, the scope of which was at the very same time being illustrated in a striking manner, in another section of the Congress, by the remarks of Admiral Fitzroy on the kindred subject of meteorological statistics. He said:

"Much has been effected during the last two years by *simultaneous observation at many places*, in addition to the registration of atmospherical occurrences sedulously carried on at sea and on land in many

parts of the world. Practically these extensive observations of facts occurring in various climates, and under a variety of conditions, from Arctic or Antarctic regions to those of the tropics, have directly tended to prove the uniformity of those laws by which our atmosphere is governed, and the differences of climates determined. Meteorology, which had been thought a complicated and vague subject, has approached the character of an exact science. It is now by no means difficult to describe the climate of any given place of which the geographical position is known. More than this, however, and more directly valuable is our confirmed knowledge of the laws of storms, and our further acquaintance with the nature and succession of the prevalent or various winds over the earth and ocean. The registers returned from numerous ships, among the finest of merchantmen besides men-of-war, now constitute a mine of valuable maritime and scientific information."

After mentioning various practical results of high value to navigation which have already been obtained from the system of accurate and extended observation now pursued, Admiral Fitzroy showed that all great disturbances or distempers of the atmosphere are preceded by barometric and thermometric indications, which to the watchful and intelligent observer serve as prognostications of what is approaching, and as suggestive warnings of what should be done in the way of precaution and defence. These atmospheric vicissitudes are not, as it used to be imagined, sudden and precipitate in their occurrence; but they take place gradually, and, so to speak, progressively, and it needs but the diligent notation and recording of appreciable signs and phenomena to follow their development, advance, and decline. The barometer affords almost infallible indications; and, by noting at the same time the states of the thermometer, the direction of the storm or of the quarter whence it comes may usually be predicted. The shape and character of the clouds, and the colour of the sky at morning and evening, also serve to assist the observer. Moreover, a knowledge of the state of the weather for some days previously gives much aid in foretelling any great or violent changes. When the indications of bad weather exist a long time beforehand, the gale will probably be of some duration; when they appear suddenly and at short notice, the storm will generally be short also. It is only by due attention to not one, but all the signs derived from the sky, from the past and present state of the weather, and from the indications afforded by scientific instruments, that an accurate foreknowledge of coming atmospheric disturbances is to be looked for.

Now, surely all this cannot but be of significant interest to those who seek to promote the successful investigation of other and not dissimilar departments of physical research. When we are told that within the last few years only meteorology has, from being not much better than a heap of guesswork and mere conjecture, now risen, in the hands of Maury, Fitzroy, and others, to such importance as to be a recognised branch of accurate scientific inquiry worthy of the support of great nations like Great Britain and the United States—con-

tributing as it has done, not only to the improvement of navigation, and thus greatly shortening the length of voyages between distant parts of the world, but also to the saving of much life and valuable property, by providing the mariner with, so to speak, a system of signals by which he may forecaste the weather, and thus be prepared against storms before they reach him—may we not reasonably entertain the hope that, in the other fields of allied inquiry, similar results might be obtained by following a like comprehensive method of scientific investigation? It must, I fear, be confessed that epidemiology is still very much in the position in which meteorology stood not many years ago, consisting mostly of detached facts and statements, which are too often very imperfectly recorded, and apt to be mixed up with mere speculation and conjecture. There have been few attempts at anything like continuous and connected observation over a sufficiently extensive area, and the result is that as yet but little progress has been made in the firm establishment of large general truths. Much of the difference and discrepancy of opinion that still prevail among medical writers on various points connected with the rise and spread of many epidemic diseases is doubtless traceable to the common practice of reasoning from insufficient data gathered from a very limited field and over a very short period of time. And certainly it is not very creditable to the profession to find that in medicine, as in some branches of purely speculative inquiry, there is every now and then a tendency to something of a cyclical revolution of doctrine on questions which may be brought within the domain of accurate observation and strict logical induction. We may be assured, from the analogy of all the other departments of physical inquiry, that there is far less irregularity and variableness in the occurrence and movements of epidemic diseases than is generally imagined, that there are manifold links between them of which as yet we have no idea, and that all the seeming disorder and confusion in their course and career are due much rather to our purblind ignorance than to anything inherently fortuitous or accidental in their distribution. True, there is indeed "a maze, but" it is "not without a plan;" and sound philosophy will, it may be safely presumed, one day point to the same great truth which simple faith receives, that—

> "All Nature is but Art unknown to thee,
> All Chance, Direction which thou canst not see." *

By briefly noticing one or two points in the history of some epidemic diseases, it will be seen, I think, that there are sufficient grounds

* Not only has it been shown that there is an "art"—i. e., design and order in the course of many phenomena of Nature which were once deemed to be "chance" and irregular, but some most unexpected coincidences between the occurrence of certain cosmical appearances, between which no one could have conjectured any probability of agreement, have been discovered by the patient and continuous observation of independent inquirers. A remarkable instance of this is afforded in the case of magnetic storms, which have been shown to observe regular periodic intervals, while certain of these intervals have been found to coincide exactly with the periodic phases of increase and decrease in the spots observable on the disc of the sun.

for the expectation now expressed. And first as to the circumstances which ordinarily attend their manifestation.

An epidemic outbreak, at least of those diseases to which attention will be specially drawn in subsequent papers, is not, as has generally been imagined and often confidently asserted, a sudden or unheralded event. It is usually preceded by various signs or phenomena which the careful observer will seldom, if ever, fail to discover. The meteorological conditions are often irregular and distempered. There is, too, a greater amount of sickliness of different kinds than usual, and the common maladies frequently exhibit anomalous and peculiar characters. Generally, the prevailing sickness is only a milder and less developed form of the approaching pestilence. Thus the cholera has usually been preceded by epidemic diarrhœa of a choleraic type; the yellow fever by irregular and unusually severe forms of endemic malarial fever, often associated with troublesome bowel disorder; and the plague has almost universally been ushered in by typhus, which so gradually lapsed into the more malignant and dreaded disease, that it has been impossible to determine with accuracy when the earliest developed case of the latter took place.

As to the spreading of epidemics, all evidence seems to show that their diffusion is mainly affected through atmospheric agency, although other and more partial agencies may certainly aid in their dissemination. The diffusion by the atmosphere appears to take place in a twofold manner. Pestilences have often been migratory upon a great scale, travelling on from the country where they sprung up to other and distant lands, and this too by successive although irregular marches, very much after the similitude of the progression of insect swarms from one region or continent to another. In former times, the plague, as the "black death," steadily advanced from the confines of China—as epidemics of influenza have been known to do so in more recent times—across Thibet and Persia to Southern Russia, and thence spread itself over almost every country in Europe, extending even to Iceland and the shores of Greenland. In our own days, the pestilence from the delta of the Ganges has been seen to follow nearly the same track, and with like desolation; and within the last few years, as mentioned above, the yellow fever of the New World has exhibited a diffusive energy unknown before, extending its ravages from the thirtieth parallel or so of southern latitude to the fortieth degree of north latitude, and from the seaboard of Brazil to the western coast of South America along the shores of Chili and Panama. These wide migratory movements must be due to an impelling power present in and acting on the atmosphere, but which has hitherto eluded our knowledge. Is it, however, unreasonable to suppose that if accurate registers were kept of the exact dates of the development of the disease in various localities in the different countries visited, together with a reliable record of the simultaneous meteorological and other physical phenomena, some connexion might one day be traced between them, and some approach be made to the discovery of a law of epidemics, as there has been of recent years to the discovery of a law of storms?

All is certainly a mystery at present, from the utter want of trustworthy data respecting the phenomena in question, even upon the most limited scale, far less over a wide geographical area.

When the epidemic poison has reached a large district or region, its mode of atmospheric diffusion appears generally to be by a larger or smaller number of nearly simultaneous or quickly successive scattered spots of infection, or as it were of fermentative action,—these spots being at first irregularly detached and separate from each other, but gradually enlarging and extending by the development of new and more numerous spots, until at length they more or less completely coalesce, and the atmosphere of an entire district, or of a large portion of it, become the seat of morbific activity. The very accurate investigation, instituted by the General Board of Health, and conducted by Dr. Parkes, of all the early cases of the cholera when the pestilence appeared in London in the autumn of 1848, fairly leads, as it seems to me, to such an explanation of its mode of spreading over the metropolis upon that occasion; and the table of the dates of its appearance in different parts of England and Wales during 1848 and 1849, given in the Registrar-General's valuable report on the epidemic, seems to point to the like conclusion. If we possessed many such reliable data and documents as these in respect of this and other diseases of the sort, we should not be so ignorant as we really are about the usual mode of the development of epidemics.

But besides the two modes now indicated of general diffusion through the medium of atmospheric agency, a pestilential disease is endowed with the property of increase and multiplication in the bodies of the sick, and of being, under certain favouring conditions, communicable from the sick to healthy persons around them,—these latter often becoming, under similar circumstances and conditions, the instruments of a wider propagation. This property is usually known by the term "contagion," hitherto a most fruitful theme of controversy and dispute among medical men, owing in a great measure to the defect of exact information as to the particulars of each case or set of cases, and also to the field of observation being in many instances far too partial and insulated. This subject, like many others, cannot fail to have light thrown upon it, when the topographical and geographical course of diseases, in connexion with their chronological appearance in different localities, comes to be more attended to. It was incidentally introduced into the discussion which followed on the reading of my paper at the International Congress, and on that, as on almost all other occasions, the great want of a comprehensive examination of the subject was but too obvious. Individual instances are apt to be regarded as general occurrences, and occasional and conditional phenomena to be exalted into facts of universal application.

Among the many other topics of epidemiological inquiry that still await authentic and accurate illustration, may be enumerated the usual duration of epidemic invasions in a district, a country, or over a still wider region—the ordinary intervals of time between epidemic invasions of the same disease—the synchronism or the sequence of different

epidemic diseases, with the view of ascertaining if there be any inter-relation between their occurrence; the connexion, if any such really exists, between epidemics in man and epizoötic and epiphytic distempers in animals and in plants; the disappearance for lengthened periods or the total cessation of some diseases, and the increase and aggravation of other diseases; the occasional up-springing of entirely new or of long absent maladies. These, together with the geographical range and limits of different epidemic diseases, the influence of race, age, and sex, as well as of all external or physical agencies, in connexion with climate, locality, habitation and mode of living, food, &c., all require to be far more scientifically investigated, and on a wider and ampler field than has yet been attempted. Let me briefly allude, *en passant*, to the intervals between epidemic outbreaks of a disease in different countries. These intervals have doubtless varied much in duration at different times and epochs, but from the want of anything like exact information, we are unable to speak with any precision. Sometimes these intervals have been not more than three, four, or five years; more frequently, they seem to have been from ten or twelve to fifteen or twenty years. Occasionally, the intervening periods between successive visitations appear, judging from the very imperfect records of such events, to have been much more lengthened, as from eighty to a hundred years, and even more. Such was believed to have been the case with the visitations of the plague at Malta prior to the last outbreak of the fever in that island in 1813, and also with the outbreak of the yellow fever in Brazil before its reappearance in that country twelve or thirteen years ago. But in reference to these and such-like statements, we should ever keep in mind, that just as the date of the first-published description of a disease is by no means to be regarded as the true date of its first and earliest appearance in a country, so the want of any published record of subsequent visitations is far from being anything like a positive proof of its complete absence. Nevertheless, from the analogy in the history of blights in the vegetable world, and of other occurrences in physical geography, it seems not unlikely that occasionally very lengthened intervals may elapse between the recurrence of some epidemics.

The subsidence and cessation of certain diseases in countries at one time infested with them,—as, for example, of the sweating sickness in England, although it continues to exist to a partial extent in other and adjoining countries,—is a subject manifestly of importance to all persons, and should be one of surpassing interest to the physician, whose duty it is sedulously to examine into all the antecedent and concomitant circumstances with the view of discovering the causative relations of so notable an event; for that the agencies which have produced it are discoverable, we cannot reasonably doubt. In many instances, the cause or causes of the decline or total disappearance of a disease from a district are readily recognizable, as of dysentery, ague, and other allied maladies from wet and marshy localities after the thorough cleaning and drainage of the land, and the dietetic amelioration of the inhabitants; and also in the equally conspicuous case of

typhoïd and typhus fevers from the foul and crowded lanes of large cities, prisons, workhouses, and ships after the due sanitary improvement of their condition. And, doubtless, what has been effected for the subjugation of these maladies, is capable of being done in respect of various other endemic diseases, which enfeeble and destroy the health of the people in every region of the world, and occasion nine-tenths of the physical wretchedness, and not a little of the intellectual and moral degradation among the working classes. In other instances, on the contrary, and this remark applies more especially to the class of the exanthematous fevers and some allied maladies, but little, if any, progress—save in the all-important matter of vaccination for the control of small-pox—has yet been made in the discovery of prophylactic or preventive remedies.

Then, again, in regard to another curious and highly-interesting topic of inquiry—viz., as to the possible inter-relation, or, in other words, the connexion in point of sequence, of the epidemic invasions of different diseases, what a large field for investigations is still unexplored! The first visitation of cholera to Europe in 1830–31 was immediately preceded by a memorable epidemic of influenza, and on the second invasion in 1848, a like antecedence again occurred; but then this seeming connexion was not observed in 1853–54; and, moreover, epidemics of influenza have repeatedly taken place without being followed by any form of choleraic distemper. On several occasions, an epidemic of small-pox has followed immediately upon the heels of epidemic cholera, as in the visitations of this pestilence in Jamaica and in several other West India islands, and also in the Mauritius and elsewhere. It has been stated of recent years that at New Orleans and various other countries where yellow fever is apt to prevail, epidemic outbreaks of that disease have been far more frequently preceded by epidemics of scarlatina than of any other exanthematous fever; but whether this antecedence has been only incidental and fortuitous, or whether there be any connexion whatever in the prevalence of the two maladies, it is at present impossible to say. That measles and hooping-cough very often go together, or follow immediately one upon the other, is of common remark; and the same thing may be said in regard of these diseases and of the various forms of cynanche. Prior to the introduction of vaccination in Scotland, epidemics of small-pox are said to have been usually followed closely by measles, which was then very generally more fatal than when it appeared under other circumstances.

Whatever doubt there may be as to the synchronous or sequential connexion of different epidemic disorders, there can be none as to the frequent antecedence of a sickly state of the general health in a district or country before the developed appearance of certain pestilences. Outbreaks of continued fever in this country have, over and over again, been preceded by an unusual prevalence of diarrhœa and other forms of intestinal disturbance, with or without the concurrence of catarrhal ailments. This point is frequently mentioned in the history of epidemic fever in Ireland, and also in the medical Reports of the army in connexion with the sickliness of certain regiments and of particular

barracks and cantonments in different places; and, what is highly interesting, the very same remark has frequently been made in respect of the yellow fever of hot climates, whether it occurs among a population on shore or on board of ship—viz., that, before any severe outbreak of this deadly disease, bowel disorders have generally been observed to prevail among the inhabitants or the crew for some time previously. In the carefully-observed epidemics of this fever at Bermuda in 1843 and in 1854, this fact was markedly observed. The strikingly-increased prevalence of diarrhœa in London and in England generally, for several years prior to the epidemic of cholera in 1848–9, was ably pointed out by the late Dr. Southwood Smith; and without mentioning other illustrations of a like nature, I will only allude to the notable change, within the last thirty years or so, in the general constitution or basis of disease to a more decidedly asthenic type than previously existed in many countries on the continent as well as in Great Britain, ever since the first European visitation of the malignant cholera. Whether this change in the prevailing type of disease had been noticed prior to that remarkable epidemiological event, we have not the means of ascertaining. It would be a matter of no small interest if we knew with any degree of precision the state of the public health, more especially over the Eastern portion of Europe, as in Poland and the adjoining provinces of Russia, from 1827 to 1830, during the lull for two or three years in the onward westerly march of the great epidemic from the plains of Asia.

From these and such like considerations it will be obvious, I think, that it is not possible to form anything like accurate opinions on the principal features or attributes of a spreading pestilence from the experience, however large, obtained in one locality or district alone, and that error can scarcely be avoided by him who endeavours to build up a doctrine on data derived from his own limited sphere of observation. The commander of a regiment may narrate more accurately than any other person the operations in a battle where his own men were engaged, but then he is apt to attach undue importance to what came under his own immediate notice. The staff-officers who were moving to and fro, and were thus acquainted with what was going on in almost every part of the field about the same time, will better appreciate and more truly describe the bearings and results of the various movements upon the general issue. And so it is in a great measure with the history, to be correct, of an epidemic invasion. The disease requires to be seen in different localities, districts, and countries, among the different classes of society, and under the numerous differences of local peculiarity. It is indeed most necessary for the advancement of scientific truth that a careful examination be made, and recorded at the time, of the facts connected with the origin and spread of the distemper in the individual spots where it appears; but it is no less necessary, before any generalizing deductions are hazarded, that the observer should know what was taking place about the same time in different places, whether adjacent to or more remote from the spot where he was placed; otherwise he will almost infallibly be misled in forming

his conclusions, just as the hydrographer would be who should attempt an account of the tides in a particular harbour, without any reference not only to their rise and fall at other points on the same and neighbouring lines of coast, but also to the general currents of the great ocean streams. There must therefore be a system of accurate geographical, as well as of topographical, record established before epidemiology can attain to the position of a true branch of physical science.

Now the question comes to be, how should this desiderated information be sought for, and what existing machinery is there in this country by which we can most readily and most usefully do our part in the great scheme of an international registration of epidemics? From the statements of Dr. Berg and of Dr. Neumann, the delegates from Sweden and Prussia at the Statistical Congress, it would seem that much more attention is paid in these countries than in our own to the regular registration of epidemic diseases; and the same remark holds true of France also, where a systematic investigation of all severe outbreaks of these disorders has long been practised. But none of these countries possesses anything like the facilities for the work and for the prosecution with advantage of this important part of natural science as Great Britain; and this, too, in respect not only of its own people, but also of foreign lands, and indeed of every part of the world. Through the machinery of the parochial medical officers dispersed through the United Kingdom, it would be most easy to establish a system of accurate notation and record of all domestic epidemics. It was stated by M. Quetelet, the distinguished statistician of Belgium, in presenting to the Congress a proposition from Captain Maury, a proposition for instituting a still more extended observation of meteorological phenomena in different countries than yet exists, that there were more than two hundred observers conducting such investigations throughout England alone, and that the results obtained by a large number of these gentlemen were regularly transmitted to the Registrar-General, and published at the expense of Government. Moreover, there is at the Board of Trade an established meteorological department or office, under the direction of Admiral Fitzroy, and with assistants under him, for the express purpose of utilizing for the public good the information obtainable from systematic and sedulous attention to the ever-shifting phenomena of the atmosphere.* Now, why should there not be some arrangement of the kind for the observation and record of epidemic phenomena in the manner and through the machinery indicated above, and in connexion either with the Poor-Law Board, which has the general supervision of all the parochial medical officers, or, if deemed better, with the medical department of the Privy Council, entrusted as it is with the care of the public health of the

* "In 1854, in consequence of representations originating with the British Association, our Government created a special department in connexion with the Board of Trade, under Admiral Fitzroy, for obtaining hydrographical and meteorological observations at sea, after the manner of those which had been for some years before collected by the American Government, at the instance and under the direction of Lieut. Maury."—Professor Willis, loc. cit.

country? That a vast amount of public good would be effected by the early discovery of zymotic disease in different localities, and by determining with precision the districts of the kingdom where they most prevail, will not be questioned by any one in the present day, when the importance of prophylactic and preventive medicine is so generally acknowledged. It is thus alone that the surest means for the mitigation and diminution of much pauperizing sickness and fatal disease among the working classes of the community can be reached; and on this ground alone, apart from other considerations, the subject well deserves the earnest attention of our governmental authorities.

Then as regards the opportunities possessed by Great Britain in acquiring reliable information respecting the prevalence of epidemic disease in foreign and distant countries, how readily and promptly they might be had through the medium of our consuls located in every land, and of the governors of our numerous colonies dispersed over every region of the globe. It requires but directions to be given by our Foreign and Colonial Secretaries of State to these functionaries to add to their annual reports sent home on the trade, commerce, &c., of the place or country, and on the general condition of their populations, a short statement from a resident medical man as to the public health, and the principal diseases which have prevailed during the preceding twelve months. That such information would be willingly given, and that our consuls and colonial governors would themselves feel an interest in procuring it, was shown by the large amount of most valuable materials procured in this way by the Quarantine Committee of the National Association; and the plan is now being followed in the comprehensive inquiry into the subject of leprosy by the College of Physicians, at the request of the Government. In addition, too, to these varied sources of authentic information, foreign and domestic, the annual health reports of our army and navy, such as no other nation in the world possesses, will be found to afford much highly interesting knowledge respecting different epidemics. From such manifold channels, what an amount of precious raw material for scientific elaboration might readily be had; and with such information in hand, how easy it would be to construct charts and maps illustrative of the diffusion and course of a set of cosmical phenomena which as yet have scarcely been thought of!