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# APPENDIX.

## AN ESSAY

ON THE

## PESTILENTIAL OR YELLOW FEVER,

AS IT PREVAILED IN PHILADELPHIA

IN THE YEAR

## EIGHTEEN HUNDRED AND FIVE.

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# AN ESSAY, &c.

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## INTRODUCTION.

THERE are, perhaps, but few subjects in any department of human knowledge, and certainly none in medicine, that have given rise to more controversy than that of pestilential epidemics. Wherever these diseases have prevailed in modern times, one of their constant effects has been, to beget dissention not only among medical characters, but throughout whole communities, relative to their nature and origin. Nor has this circumstance proved to be the least of their concomitant evils. By rousing in the minds of men passions unfavourable to the discovery of truth and the promotion of public good, engendering in them mutual jealousies and distrusts, banishing from public measures that union and harmony which ought to characterize them, and thus throwing obstacles in the way of the best concerted plans of prevention and removal, it has never failed to add to the sum of general distress, and to swell the amount of human mortality. Many persons have regarded these pestilential epidemics as calamities indigenous in the places where they have prevailed, whereas others have strenuously contended for their introduction from abroad. Of these characters, the former have naturally recommended preventive measures founded solely on a proper attention to domestic or internal causes, while the latter have, as naturally and with equal warmth, insisted on the necessity of attempts to attain the same end by closing entirely, or very watchfully guarding, every avenue of communication with certain neighbouring or distant places, from whence the diseases were supposed to have been derived. In the midst of such conflicting opinions and councils, it is no wonder that all endeavours to do good should have generally proved abortive.

Were it necessary to adduce testimony in favour of these remarks, it might be easily drawn from the medical records of most of the countries of the old world. England, France, Spain, Italy, Holland, Germany, and Russia, would be found rich in materials for this purpose. The West-India islands and some of the provinces of Spanish America might be rendered no less tributary to the same end. Even Turkey, Egypt, and the Barbary States, where the very name of science is almost forgotten, furnish numerous facts in verification of what is here advanced. These places have been all occasionally subject to the ravages of pestilence. In each of them have the foreign origin and communicable nature of that disease been positively denied by some, and as positively maintained by others; and in each of them does the controversy appear to have produced injurious effects.

But it seems to have been reserved for the United States to carry this controversy to its highest pitch, and to experience from it the worst of evils it is capable of inflicting. To such an extent has it been pushed, and with such obstinacy has it been maintained, that, besides the loss of human life which it has occasioned, some of our best interests as a people have been nearly sacrificed to it. To the physicians of the United States, therefore, it more particularly belongs to attempt its decision, not only because their country has most at stake on its issue, but because they are furnished with the most ample and the best collection of materials for the undertaking.

Were the subject of the origin and nature of pestilence wholly disconnected with any influence on our welfare as a nation, yet still, as a mere philosophical question, it would be worthy of attention. For the discovery of physical truth, independently of its beneficial and widely diffused effects on mankind, is alone a very grateful reward to the votaries of science.

But when we recollect, that on the final decision of this controversy will depend the nature and permanency of our quarantine establishments at home, as well as of those which may affect us in foreign nations, its importance cannot fail to rise in our estimation as lovers of our country. This consideration will also lay before us in proper colours the necessity of endeavouring to bring the matter to a conclusion as

speedily as possible. For we are daily suffering from the present undecided state of public opinion on this subject.

But this is not all. There is yet another view of this question, from which no inconsiderable share of its importance arises. On its correct decision will depend the measures necessary to be pursued with respect to persons labouring under pestilential diseases. If these diseases be really contagious, such persons ought to be immediately separated from the healthy part of the community, and all access to them, except by their attendants, strictly prohibited. But if they be not, such a step would be unnecessary, cruel, and even criminal. For a removal of the sick from the soothing attentions and tender solaces of friendship, is not only in itself an afflicting privation, but darkens their prospects and reduces their chances of recovery, and should never be practised except under a necessity the most urgent and imperious. But such a necessity can arise only from the public safety being endangered by an active contagion.

Hitherto our domestic establishments, for the preservation of the public health from pestilential diseases, have been founded and administered almost exclusively on the belief, that these diseases are introduced from abroad and propagated by contagion. Such of their regulations and arrangements, therefore, as have an exterior relation, have been rigid to a fault, while their interior department has been greatly neglected. In consequence of this, commerce has been grievously oppressed, those immediately concerned in it oftentimes greatly embarrassed, the aggregate wealth of the community affected, and many individuals connected with shipping reduced to poverty for want of employment.

Nor does the evil terminate here. Several of the nations of Europe, adopting our belief in the contagious nature of our diseases, have erected systems of quarantine similar in principle to our own, and directed their operation in a particular manner against the shipping from our ports. If, say they, the pestilential diseases of the United States be as contagious as the inhabitants of those states represent them, our health and safety are endangered by the freedom of intercourse that subsists between them and us. Their shores are infected, and it becomes us to provide for our security by subjecting their vessels to a suitable quarantine. Thus, both

at home and abroad, our commerce is regarded with an eye of jealousy: it is considered as an inlet to contagion, and is laid under restraints and exactions which cause it to languish.

If, however, the pestilential diseases, which we have lately experienced cannot originate in our own country: if they be necessarily the growth of tropical climates, and of such only, and be introduced among us through the channels of commerce, and afterwards propagated by contagion, our systems of quarantine, instead of being abolished, or suffered to undergo any relaxation in their measures, ought to be continued in force, and even rendered more strict and rigorous. For we have learnt from experience, that, in their present form, they are not sufficient to protect us from pestilence. Indeed, if this disease be introduced among us from the West-Indies and other tropical settlements, it is evident that nothing short of an absolute interdiction of intercourse with those places during a part of the year will remedy the evil. On the same presumption the nations of Europe are perfectly right in adopting the most prompt and decisive means to close a channel, through which such a deadly poison might gain admission to their shores. From this view of the subject, a strict and unrelenting quarantine is a measure justified by, and even growing out of, the great principle of self-preservation. On our part, therefore, it ought to be submitted to without a murmur.

But should it ultimately appear, that our pestilential diseases are neither contagious in their nature, nor peculiar in their origin to tropical climates; should they be found to be the natural offspring of all warm climates, and the occasional offspring of most temperate ones, and wholly incapable of being propagated from one country to another, either by commercial intercourse or through any other channel; under such circumstances what will be thought of the wisdom and expediency of our numerous quarantine establishments? Will not these establishments be reprobated, as having wantonly violated the rights of individuals, burthened commerce without a cause, weakened the spirit of mercantile enterprise, and, to a certain extent, checked the growing prosperity of our country? must they not be regarded, both in their erection and administration, as so many monuments of error and misguided zeal, that should no longer be tolerated in an en-

lightened country? And will not even those nations of Europe, who have viewed us of late as an infected people, with whom it was dangerous, at certain seasons, to hold a free and open intercourse, be led to a discovery of their error, to acknowledge the injustice and injury they have done us, and, finally, to do away their quarantine establishments that are directed against us? From this view of things, may not a similar fate await even the quarantine establishments that have existed for ages in various parts of Europe, for the purpose of excluding from those countries the plague of Asia?

We hope that a few facts and observations calculated to throw further light on these subjects, will not be deemed foreign from the object of the present essay. Though these facts and observations will relate more particularly to the pestilential diseases of the United States and of the West-Indies, yet they will be applicable also to the pestilence of the old world.

We do not mean to hold up the ancients as general guides and instructors for the more enlightened physicians and philosophers of the present day. We know that the moderns greatly surpass them in their knowledge of nature. Yet there are many points on which the opinions of these fathers ought not to be disregarded. For the faithfulness and accuracy of their observations on diseases, as far as they extend, many of them are models which the most enlightened modern need not blush to imitate. Let us, then, take a brief survey, as far as facts have brought them to our knowledge, of the sentiments entertained by the physicians and sages of antiquity, relative to the contagious nature of pestilence.

The earliest account we have of pestilence is contained in the Old Testament. Moses, the first of the Jewish historians, has left some brief notices of the pestilence that prevailed in his own times. That great prophet and leader was not alone an historian and a lawgiver: no doubt can be entertained of his having been also acquainted with medicine; for we are assured by a sacred writer, that he was deeply versed " in all the learning of Egypt," where medical science was certainly cultivated during the vassalage of the Hebrews in that country. It is evident from his instructions to his followers, relative to the mode of cleansing lepers and other

infected persons, that he had, at least, paid particular attention to the subject of contagion. He says nothing, however, respecting the contagion of pestilence. But it is not probable that a phenomenon or property of that disease, so essential and so prominent as this, could have escaped his notice, had it actually existed. Nor would he have declined speaking of it, had it come to his knowledge. It was his province to act in some measure as pastor and guardian to his less enlightened countrymen, protecting them from evil both moral and physical. In conformity to the duties of his station, he apprized them of the contagious nature of leprosy, and instructed them in the method of escaping that loathsome malady. Nor would he have failed to act a similar part with regard to pestilence, had he considered it as a disease that was propagated by contagion. For, as pestilence is much more fatal in its effects than leprosy, no reason can be assigned why he should have been so solicitous to guard the Israelites from the latter complaint, and have left them wholly in the dark with respect to the mode of escaping the former, had he conceived them to be both communicated in the same way. Hence we may infer, that, in the time of Moses, the pestilence of the east was not regarded as a contagious disease. Nor have we any intimation of its having been afterwards considered as such by the Hebrew sages, during their residence in the promised land.

Ancient Greece and the neighbouring islands of the Mediterranean were subject to an autumnal pestilence precisely similar to that which we have lately experienced in the United States. This assertion is founded on various passages in the writings of Hippocrates.* That great physician has delineated the leading and characteristic features of our autumnal pestilence or *yellow fever*, with a degree of accuracy that would not discredit the ablest physician of the present day. But he is totally silent on the subject of *contagion*, nor does he once insinuate, that he even suspected the disease to be of foreign origin. He was accustomed to read nature much more than books, to set a higher value on what he saw himself, than on what he only heard from others, and to

* See the folio edition of the works of Hippocrates, in Greek and Latin, by Anutius Fœsius.

treasure up and record facts rather than opinions. Under the guidance of this true spirit of philosophy, he travelled with a view to improve himself, and to instruct and benefit his country. He appears to have visited many places for the express purpose of studying the origin, nature, prevention, and treatment of their malignant or pestilential diseases. During this tour of inquiry he never failed to find in the climates and situations of these places, in the season of the year, and in the customs and manners of the inhabitants themselves, with other circumstances entirely local, causes sufficient to account for all the complaints they experienced. He does not appear to have suspected these complaints to have been derived from any foreign source, and, as to the term *contagion*, it does not, as far as I have examined them, even once occur in the original of any of his writings. Had the pestilential diseases of Greece been communicated by contagion from person to person, so enlightened, patient, and experienced an observer as Hippocrates, would certainly have discovered the fact; and, having discovered it, he would have deemed it too important not to be put on record. As far, therefore, as negative testimony can be relied on, we have the authority of the father of physic against the doctrine of pestilential contagion. A similar silence on this subject being observed by the other physicians of ancient Greece, gives us reason to draw a similar inference relative to their opinions. They appear to have had no suspicion that the autumnal pestilence of their country was either introduced among them from abroad, or propagated by contagion. Viewing nature with an unprejudiced eye, and having their minds free from the influence of systems and scholastic dogmas, they found the physical causes of their own country adequate to the production of all her diseases. Hence, as often as they speak of any pestilential calamity, they seldom fail to attribute it to some intemperature of the elements, the prevalence of unwholesome winds, the malign influence of the heavenly bodies, or the effluvia arising from large masses of putrid matter. It does not appear, as far as my inquiries have extended, that any eminent physician of the time, considered either of the famous plagues of Athens as a disease introduced into that city by contagion. Nor do even the

Greek historians themselves venture positively to decide on them as such.

Passing on to the time when Rome had succeeded in making herself mistress of the world, we find that imperial city herself and many of her provincial towns, as well as her armies in the field, oftentimes suffering from pestilential diseases. Nor do these diseases appear to have been in any material respect different from those that we have lately experienced in the United States. They were similar in their leading or characteristic symptoms, occurred at the same season of the year, terminated on the commencement of cold weather, and were sometimes even more extensively destructive in their ravages. They appear, from every circumstance left on record respecting them, to have been the genuine *yellow fever* of Rome and her dependencies. Though these scourges were oftentimes declared by the weak and superstitious to have come immediately from the avenging hand of heaven, they were rarely. if ever, supposed to have been derived from a foreign country. Those persons who were most competent to judge rightly on the subject, were uniformly of a contrary opinion. They considered pestilence as a calamity resulting from physical causes, that were constantly in operation in their own country, no less than in others. They oftentimes attributed it to the stench arising from the bodies of the slain, that were suffered to putrefy on the field of battle.

It thus appears that the medical records of ancient Greece and Rome, though they may not expressly oppose it, give at least no sanction to the doctrine of pestilential contagion. Yet many of the physicians of these two republics were eminent for the accuracy of their observations, and their correct histories of diseases. The doctrine, then, of the communication of pestilence from one country to another, and of its subsequent propagation by means of contagion, must be regarded as the offspring of more modern times. By many characters of the present day, it is supposed to have been originally broached by some bold theorist in medicine, and adopted by others without sufficient examination.

But although it is evident that the pestilential or yellow fever has oftentimes prevailed in the south of Europe, especially in the countries bordering on the Mediterranean, and

not unfrequently in higher latitudes, it must be considered as *more particularly* the growth of tropical climates. All tropical climates, however, are not alike subject to its ravages. The West-India islands, and some of the maritime parts of Spanish America, lying in the same latitude, seem to be more peculiarly the hotbed of this disease. In these places, strangers from high latitudes are more or less subject to it at all seasons of the year. Although they are most liable to it when the summer heats are highest and most oppressive, they are not entirely secure from it, in case of the action of strong exciting causes, even when the weather is in its mildest and most salubrious state. Nor is it (as some writers contend) to be regarded as a disease lately introduced into those regions from the shores of Asia or Africa. It is the legitimate endemic of the tropical section of the new world, (more particularly of the maritime parts of it) and has been the constant scourge of strangers who have visited it, ever since it was first discovered by the Spaniards. Columbus, when on his second voyage of discovery, lost, in the island of Hispaniola, a great proportion of his followers, by a disease of such violence and malignity, as he had never before witnessed. From the circumstances under which that disease occurred, the rapidity with which it ran its course, the nature of its symptoms, and the great mortality that attended it, there exists not a doubt of its having been the true pestilential or *yellow fever* of the present day. A yellowness of the skin, dark discharges from the stomach and bowels, and hemorrhages from different parts of the body, were comprised in the dreadful catalogue of its symptoms. In establishing their dominion over the West-India islands and some parts of South America, the Spaniards appear to have found a more formidable enemy in this disease, than in the arms and opposition of the undisciplined natives.

From the first settlement of the Spaniards in the West-Indies, till some of these islands fell a conquest to the arms of Great Britain, we know but little of their true history. That portion of it, however, which has come to our knowledge is sufficient to convince us, that they were oftentimes a prey to pestilential diseases.

As early as the year 1655 the British succeeded in wresting Jamaica from the sovereignty of Spain. During the

course of the war which rendered them masters of that island, they lost, according to the account of their historian, more troops by the pestilential endemic of the place, than they did by the sword of the enemy.

From the conquest of Jamaica by Great Britain till the present time, we have been at no loss for authentic and correct documents respecting the state of that part of the globe. From these documents we learn, that although the different West-India islands have been sometimes more and at other times less afflicted by the pestilential or yellow fever, yet at no time have they been entirely free from it. Strangers from high latitudes have fallen victims to it every year. In 1691 and 1696, it produced uncommon mortality in Barbadoes, notwithstanding the declaration of Dr. Warren, that it was never known in that island till the year 1721.

Some writers have asserted, and many individuals still believe, that the pestilential or yellow fever never prevails in the West-Indies, except during the existence of war, when the nations of Europe pour their fleets and armies into that torrid region. This is certainly a mistake, (though a very imposing one), and admits of the following satisfactory explanation. The pestilential endemic of the West-Indies spares the natives of those islands, as well as foreigners long accustomed to the climate, and confines itself to persons lately arrived from higher latitudes. Sailors and soldiers immediately from Europe fall necessarily under this latter description, and are, therefore, fit subjects for the disease. But these are sent in much greater numbers to the West-Indies during a war than during a peace establishment. They are also much more exposed to fatigue, to the inclemency of the weather, and to other exciting causes of disease. The proper subjects of the pestilential fever, then, being increased in number, and the causes which bring that disease into action being both multiplied and augmented in force, its prevalence and the mortality attending it, cannot well fail to increase in a corresponding ratio. War, therefore, has no connexion with the actual existence, but only with a more extensive prevalence, of yellow fever in the West-Indies. It only feeds the flame of pestilence, and renders it more fierce and destructive, by supplying it with a greater abundance of the most suitable fuel. Another reason why war and pestilence

in the West-Indies are so generally associated together is, that during hostile commotions in that quarter, the eyes of Europe and America are steadily fixed on the scene of action. The natural consequence of this is, that pestilential occurrences, and many other events are then observed and put on record, which, in times of peace, would pass unnoticed.

Yellow fever may be regarded as the vestal fire of the West-India islands. Its spark was implanted in the climate and general state of that part of the globe, by the hand of nature herself, and its flame will never cease to burn and devour, while it can find proper materials to feed on. As long, therefore, as foreigners from high latitudes shall continue to crowd to those torrid regions, whether for the purposes of war or commerce, so long will the ravages of that disease be perpetuated. During certain seasons and periods, however, it rages with greater violence, and produces more mortality among the same number and description of foreigners, than it does during others. This is sometimes owing to a higher degree of irregularity and intemperature in the weather, but more frequently to a peculiar and hitherto inexplicable constitution of the season, coinciding in its action with that of the general state and condition of the atmosphere. The occasional existence of these pestilential constitutions, in climates both tropical and temperate, is an event that has been noticed by physicians of observation ever since the days of Hippocrates.

But, as already remarked, the pestilential or yellow fever is not confined to tropical situations. It occurs also occasionally, during a certain season of the year, in the higher latitudes of the new world, as well as of the old. Whence is its source in these temperate climates? Does it arise in them from the operation of physical causes existing within themselves? or is it introduced into them by contagion from the warmer regions of the south?

To render satisfactory answers to these questions, it will be necessary to inquire, first, into the origin or causes of this disease in intra-tropical situations. Having endeavoured to satisfy ourselves on this head, we will return to some of the more temperate climates of the globe, where yellow fever occasionally prevails, and inquire whether or not during, and previously to, such prevalence, these places experience

the action of the same physical causes, which give rise to the disease between the tropics? If, on such inquiry, we actually find the same causes operating with the same intensity in both regions, we may then fairly conclude, that they must, in both regions be productive of the same effects. Under such circumstances it will be evident, that pestilential fever is as really a native of extra-tropical as of intra-tropical climates, with this difference, that in the latter, it is a perennial evil, whereas in the former, it only springs up occasionally, and is of but short duration.

Upwards of two thousand years ago, Hippocrates laid it down as a general principle, that endemic and epidemic diseases necessarily arise from the *atmosphere* of the places where they prevail, that being the only mediumor instrument, by which nature can act at once on all the inhabitants in common. Nor have modern pathologists been able either to refute the maxim, or to add to its excellence. So manifest and forcible is its truth, that it almost deserves the name of an axiom in medicine. To the atmosphere of the tropics, therefore, must we look for the source of yellow fever, the true endemic of that region.

What, then, is the general characteristic of an intra-tropical, as differing from an extra-tropical, atmosphere? I answer, it is a *high* and *long continued* temperature. Though this is certainly the leading and most essential characteristic, yet it does not of itself produce pestilential fever, by its own immediate action on the human system. It gives rise to this disease indirectly, by means of the poisonous gas which it produces, when acting in conjunction with moisture, on dead animal and vegetable substances. Still, however, it must be regarded as nature's prime mover in the process. It would seem, therefore, that wherever we find an atmosphere possessing a temperature sufficiently high, provided that temperature be long continued, and be aided by moisture in its action on large masses of dead animal and vegetable substances, *there* yellow fever may make it appearance. Let us, by this rule, examine those countries and places in temperate climates, where that disease has occasionally prevailed.

In the north of Europe, where the winters are severe and protracted, and the summers short and cool, yellow fever has, comparatively, seldom occurred. But the case is very

different in other countries within the temperate zones, marked by seasons of a different character, and possessing a different state of atmosphere. I allude more particularly to the United States, where, during a certain portion of the year, our atmosphere is as warm as that of intra-tropical regions.

The ravages of pestilential or yellow fever, particularly in our large maritime and commercial cities, are known to have been frequent and deplorable. But at what season have these ravages commenced? Not during the winter or spring, when our atmosphere was cold or temperate; but towards the latter part of summer, after a considerable continuance, and even during the actual operation, of *tropical heats*. Nor have these ravages ever failed to cease, after our heats had fairly yielded to the approach of winter. The longer our autumnal heats continue, the more protracted is the reign of yellow fever, when it has once made its appearance. This truth was completely established by the occurrences of the year 1793. During that year we experienced a most distressing drought, accompanied by uncommon heat, from early in August till the beginning of November. The consequence of this was, that the pestilential fever then prevailing ran on till the same late period, and was even attended with the greatest mortality during the month of October. During all our other pestilential seasons, the case has been different. Owing to the summer and autumnal heats having been checked at an earlier period, the disease has uniformly experienced an earlier decline.

But our inquiries on the subject must not terminate here. By pushing them further we find, that yellow fever not only does not appear in our commercial cities till after a long continuance of great heats, but that it does not appear in them at all, except during our *hottest summers*. In other words, we do not experience the ravages of that disease, except during those summers, which, in point of atmospheric temperature, bear the closest resemblance to intra-tropical seasons.

The establishment of this fact, which I conceive to be of the utmost consequence in an inquiry respecting the origin of pestilential or yellow fever, is easily effected, by giving a comparative view of the general temperature of those summers, in which the disease has, and of those in which it

has not, prevailed in our cities. This I shall endeavour to do, as far as relates to the city of Philadelphia, from a careful examination of a very accurate meteorological journal kept by a gentleman of this place.

It is necessary to observe, that in intra-tropical countries, particularly in plains and maritime situations, the mean temperature of the atmosphere is about 80 degrees of Fahrenheit. In these places the mercury seldom rises above 90 degrees, or sinks below 70 throughout the year. Accordingly, therefore, as the temperature of our several summers in this place, continues as high as 80 degrees of Fahrenheit, for a greater or less proportional part of their duration, in the same ratio must they be said to resemble, more or less perfectly, real tropical seasons.

It is well recollected by our citizens, that the summer and autumn of 1793 (the year in which yellow fever made its first appearance, and produced the greatest mortality, in Philadelphia) were extremely hot and dry. The state and temperature of the atmosphere were of a character truly tropical. But as I have no actual register of the weather for that season, I cannot include it in my comparative view.

Within the last eleven years, that is, since the beginning of 1796, yellow fever has prevailed in Philadelphia six times, namely, in 1797, 1798, 1799, 1802, 1803, and 1805. In 1796, 1800, 1801, 1804, and 1806, we were exempt from it. Of these eleven years, I have had access to a correct meteorological journal of the summers of only eight, viz. of 1796, 1798, 1799, 1801, 1803, 1804, 1805, and 1806. Out of these eight years, four, as above stated, were marked by the prevalence of yellow fever, namely, 1798, 1799, 1803, and 1805; whereas in the other four, viz. 1796, 1801, 1804, and 1806, that disease did not make its appearance. Let us now, taking the mean of tropical heats, namely, 80 degrees of Fahrenheit, as a standard, compare the temperatures of these eight different summers with each other, the hour of observation being 3 o'clock P. M.

During the whole summer of 1796 the mercury rose to the standard of 80 degrees for only twenty-four days, and we had no yellow fever. During the summer of 1798 it rose to the same standard for as many as forty-one days, and we had yellow fever. During 1799, for forty-five days—fever again.

During 1801, for thirty-two days—no fever. During 1803, for fifty-one days—fever. During 1804, for thirty-two days—no fever. During 1805, for sixty-eight days—fever. During 1806, for thirty-four days—no fever.

These several summers, with their temperatures and effects as to the production of yellow fever, in Philadelphia, may be thus arranged in form of a table, viz.

| | | | | | |
|---|---|---|---|---|---|
| Summer of | 1796, | Thermometer | 80° | for 24 days— | No yellow fever. |
| do. | 1798, | . . . . . | 80° | 41 | Yellow fever. |
| do. | 1799, | . . . . . | 80° | 45 | Yellow fever. |
| do. | 1801, | . . . . . | 80° | 32 | No yellow fever. |
| do. | 1803, | . . . . . | 80° | 51 | Yellow fever. |
| do. | 1804, | . . . . . | 80° | 32 | No yellow fever. |
| do. | 1805, | . . . . . | 80° | 68 | Yellow fever. |
| do. | 1806, | . . . . . | 80° | 34 | No yellow fever. |

This simple statement, as far as it goes, seems to operate with demonstrative force. It sets forth, in a manner the most clear and satisfactory, first, that yellow fever cannot, or, at least, does not break out in our city, except as the consequence of a long continuance of tropical heats; and secondly, that such a continuance of these heats has very seldom, of late years, failed to produce it. It teaches us that if, during the course of the summer, the temperature of the atmosphere does not rise to 80 degrees of Fahrenheit, for more than thirty days, no apprehension need be entertained of the appearance of this disease; but, that if, on the other hand, the temperature attain such an elevation for forty days, or upwards, the public health is seriously endangered.

Notwithstanding these facts and inferences, I am not of opinion that yellow fever is always and necessarily the offspring, either directly, or indirectly, of great heats alone. In several of the hottest parts of the world it is altogether unknown. Long continued droughts seem to contribute at times to its production. But, what has a much more powerful and essential agency in producing it, is, as already observed, a peculiar state or constitution of the atmosphere, which has been very properly denominated pestilential. In what this constitution consists, philosophers have not been able to ascertain. It is sometimes very circumscribed, and at other times very extensive, in its limits. It has been oftentimes confined to a single city or two, and, in other instances, has

extended over a whole country. Some writers have supposed it to be produced, at least, in part, by heat, and partly by the influence of other causes. But, be its nature and origin what they may, the existence of a high temperature of the atmosphere is a "*conditio sine qua non*," of the production of pestilential fever. Hence, that disease, in some form, is a kind of staple calamity of tropical climates, and breaks out in temperate ones only during the hottest seasons of the year.

Indeed from the earliest ages of the world to which history extends, the common observation of mankind, when not perverted or over-ruled by some imposing authority or favourite hypothesis, appears to have uniformly connected great heats and pestilence together as cause and effect. Hence, among the ancients, the *the pestilential rage of Sirius*, or *the dog star*, was a kind of proverbial expression, because that luminary was always associated by them with intense summer heat. Even, at present, the *dog-days* are considered by many as having something in them peculiarly unfriendly to health.

Diodorus Siculus assigns the *uncommon heat* of the season as one of the causes of the second great plague of Athens. This heat, he says, acted on ponds of stagnant water, which had fallen in rains during the preceding winter, and still lay adjoining the walls of the city. This excessive heat he attributes to the absence, during that season, of the Etesian or northerly winds, which usually fanned the states of Greece throughout the summer, and kept the atmosphere in a temperate condition.

Poets, who, though devoted to works of imagination, are justly ranked among the most accurate observers of nature, have in all ages represented pestilential fevers as the offspring of heat.

Thus Homer, with his accustomed sublimity and beauty, ascribes to the agency of Apollo, (*the sun*) the pestilence that prevailed in the Grecian army while encamped before the walls of Troy. The descent of that enraged god from mount Olympus, when meditating vengeance on the Greeks for the insult they had offered him through the person of Chryses, his venerable priest, is inimitably described in the following passage.

" Breathing revenge, a sudden night he spread,
" And gloomy darkness roll'd around his head.
" The fleet in view, he twang'd his deadly bow,
" And hissing fly the feather'd fates below.
" On dogs and mules th' infection first began,
" And last the vengeful arrows fix'd in man.
" For nine long days through all the dusky air,
" The pyres thick flaming shot a dismal glare," &c.

In this beautiful and expressive allegory, the poet, under the figure of Apollo's wrath, evidently points to the intensity of the solar heat, as the cause of the calamity which he describes.

Virgil, whose knowledge of nature surpassed that of most of his contemporaries, represents the excessive heat of the season as the cause of a pestilential disease, which swept off a number of the followers of Æneas in the island of Crete. Of this severe calamity the poet makes his hero speak in the following terms.

" When rising vapours choke the wholesome air,
" And blasts of noisome winds corrupt the year:
" The trees devouring caterpillars burn;
" Parch'd was the grass and blighted was the corn:
" Nor 'scape the beasts; for *Sirius* from on high,
" With pestilential heat infects the sky;
" My men—some fall, the rest in fevers fry."

Lucretius, in an excellent description of a pestilence, contained in the sixth book of his poem " De rerum natura," ascribes that calamity, in part, to the " mortifer Æstus," the destructive heat of the season.

Tasso, in his " Jerusalem Delivered," describes a pestilential fever which attacked the christian army, commanded by Godfrey of Boilloign, before the walls of the holy city. He says the disease prevailed about *midsummer*, and, in the following lines, plainly attributes it to the influence of heat and drought.

" But now, receiv'd in Cancer's fiery sign,
" The sun, with scorching rays, began to shine,
" All nature pants beneath the burning sky,
" The earth is cleft, the less'ning streams are dry;
" Alone the wind from Lybia's sands respires,
" And burns each warrior's breast with secret fires."

Let the impression be derived from whatever source it may, whether from observation, from books, or from the general belief of mankind on the subject, it is certainly true, that we associate the idea of heat with pestilence as naturally, as we do with flame or with solid bodies in a state of ignition. We no more look for pestilence in winter, than we do for snow in summer or sunshine at midnight.

It must, indeed, be admitted that Great Britain and most other European countries situated in high latitudes, have been frequently subject to pestilential diseases. But it must also be admitted, that such diseases have prevailed in those countries only, or, at least, principally, during summers and autumns characterized by unusual heat, and, for the most part also, by excessive drought. Some remarkable irregularity in the seasons has been uniformly observed to precede or accompany these calamities, as often as they have appeared in the northern parts of Europe. I believe it may be laid down as an established truth, that during their regular, and what may be denominated natural seasons, these countries have never suffered much if any from pestilential diseases. For the production and propagation of these diseases, whether in Europe or the United States, the summers must assume a tropical character.

From the facts and considerations laid down in the preceding pages, the following inferences appear to be deducible.

I. Pestilential or yellow fever is not, as some imagine, a disease of recent origin: nor is it peculiar in its origin either to Africa or to the continent or islands of the new world. It was known to the physicians of Greece and Rome long before the discovery of America, and was never suspected by them to have been introduced into Europe either from Africa or any other tropical region.

II. The existence of yellow fever in the West-Indies, is at least cotemporary with the original discovery and settlement of those islands, by the adventurers who followed the fortunes of Columbus. The stories, therefore, propagated by certain writers, and believed by many weak and credulous readers, respecting the introduction of that disease from Siam, Boullam, and elsewhere, into Barbadoes, Grenada, &c., are to be regarded as mere fables, the offspring of ignorance, prejudice, or an intention to mislead.

III. Yellow fever is more peculiarly indigenous in intra-tropical and other very warm regions of the globe. When it appears in more temperate climates, it is always in the summer season, and is then to be considered as the remote effect of inordinate heat, accompanied frequently by excessive drought, and a peculiar constitution of atmostphere, with the nature of which we are not yet acquainted. Were countries situated in such climates always favoured with moderate and seasonable summers, pestilence would cease to be their scourge and their terror. Even in the West-Indies, and other intra-tropical regions, seasons somewhat cooler than ordinary, are generally marked with a partial exemption from this disease.

## OF THE CONSTITUTIONS AND DISEASES OF THE YEARS 1804 AND 1806.

As a further preliminary to an essay on the pestilential epidemic of the year 1805, a brief account of the weather and diseases of the summers of 1804 and 1806 may not be improper. Sketches of the constitutions and diseases of these three successive seasons will form a contrast interesting and instructive. They will show that during the summer of each year, the nature and character of the prevailing diseases corresponded with, and exhibited an affinity to, the temperature and general character of the weather. That mild summers were accompanied by mild diseases, and an intemperate summer by very violent diseases. Hence it would seem to follow, as a natural inference, that the constitution of the weather of each season was the cause of the character which the diseases of that season assumed.

## OF THE CONSTITUTION AND DISEASES OF THE YEAR 1804.

The spring months of the year 1804 were uncommonly cool, in consequence of which vegetation was greatly retarded. The vegetables and fruits of the season did not appear in the Philadelphia markets, till some weeks after the usual time. March and April were marked by a few inflammatory complaints of a mild character, which yielded very readily to the customary modes of treatment. May being wet as well as cool, intermittents and slight bowel complaints began to appear towards the close of the month, particularly in the

out-skirts of the city, while its centre and thickly inhabited parts remained unusually healthy.

The month of June continuing very wet and cool, with a prevalence of easterly and northerly winds, intermittents became more common, intermixed with some remittents, and a few dysenteries, all of them of a mild and manageable character. The cholera of infants began to prevail, but with less mortality than in common years. Comparatively speaking, the practitioner met with little obstinacy in these several complaints.

In July the weather became warmer, though still moderate for the season, but the rains continued to be frequent and copious. Throughout this month the intermittents and remittents were more severe than during the preceding, more dysenteries occurred among adults, and more violent choleras among children.

August maintained the general character of the season, for the moderation of its weather, and the quantity of rain that fell. During the whole month, there were not, perhaps, at any one time, more than two or three dry days in succession. Such frequent falls of rain, succeeded as they usually were by northerly winds, could not fail to preserve the temperature of the atmostphere in a moderate state. Throughout this and the following month, intermittents and remittents increased considerably in number and somewhat in obstinacy. They continued, however, very tractable, were attended with but little mortality, and by the end of October had nearly disappeared.

Taking the whole of this summer together, it was the wettest and coolest that had been experienced in Philadelphia for many years. It bore a strong resemblance to the summers in England, Ireland, and some of the northern parts of the continent of Europe, except that it was marked by more copious, though perhaps not more frequent, falls of rain. Corresponding to this resemblance, its diseases were characterized by that mildness, which is so common to the diseases of high European latitudes. It was a true northern summer, and gave birth to none but northern complaints; for intermittents and remittents are the usual summer diseases of the highest latitudes. A stranger to any continuance of tropical heats, it was wholly exempt from tropical diseases.

In speaking of the *prevalence* of intermitting and remitting fevers, in the summer of 1804, I would not be understood to mean, that these diseases prevailed throughout the city generally. This was by no means the case. During the whole season, they were, except some scattering cases, confined entirely to the outskirts and suburbs. The disease, *in an epidemic form*, did not make its way into the heart of the city. It lay more particularly in the western extremity, adjacent to a number of brick-ponds, and other reservoirs of stagnant water. It was bounded in its extent eastwardly by seventh street, eight street, ninth street, and tenth street, accordingly as the compact buildings and regular improvements of the city extended, in different parts, to greater or less distances from the Delaware. For it did not prevail, except in accidental and insulated cases, in any neighbourhood where the buildings were close and the streets paved.

The profuse rains that fell during this season were injurious to health in the outskirts of the city, but highly serviceable to it in the interior and better regulated parts. In the former places, owing to the unevenness of the ground and the want of proper drains, the water necessarily stagnated and contributed to vitiate the atmosphere by unwholesome effluvia, and to surcharge it with chilling exhalations: but, in the latter, it was immediately as it fell conveyed off by the pavements and gutters, without rendering the atmosphere injuriously humid, sweeping along with it all corruptible and dangerous materials.

Hence it was remarked, not without some surprise, by many of our citizens, that our gutters, sinks, and sewers were uncommonly free from any offensive smell. This exemption from stench in the city, was, no doubt, owing, in part, to the coolness, no less than to the wetness, of the season. Yet I think it probable, that were the same quantity of rain to fall during even our hottest summers, it would, by washing from our streets all putrid filth, prevent the occurrence of yellow fever. For, although in most intra-tropical countries, the wettest are generally the most sickly seasons, yet this is the case only in the neighbourhood of places where the waters that fall are suffered to stagnate. The mere falling of rain, independently of the putrefactive process to which it may contribute, or the noxious vapours which it

may liberate from certain spots of earth impregnated with corrupt materials, cannot be productive of pestilential fever. The occurrences of the summer of 1804 demonstrate, in a manner the most impressive, the importance of a cool temperature of the atmosphere, connected with public cleanliness. They show that much might be done towards the preservation of public health, by *daily* cooling our streets and houses, during the summer season, by artificial showers thrown from hydrants or fire-engines, and by as often cleansing our gutters and sewers, by discharging through them forcible currents of pure water.

It is worthy of remark, that, as the *epidemic intermittent* of 1804 prevailed only in the suburbs and extremities of the city, where the houses stand detached from each other, so the *pestilential epidemics* of hotter and drier summers, have raged only in the more compact and thickly inhabited parts. The cause of the former of these circumstances has been already assigned; that of the latter appears equally obvious. Although the temperature of our summers in the United States is very high, yet the general character of our atmosphere is not in all respects tropical, without the aid of certain adventitious causes. These causes exist abundantly in the closely built parts of our large cities. Here the free circulation of the air is greatly impeded, while the reflection of the sunbeams from the pavements of the streets, and from the windows, walls, and roofs of the houses, raises the temperature of the atmosphere several degrees above that of the atmosphere of the surrounding country. But an atmosphere stagnant and intensely hot, constitutes, in the very worst sense of the word, the atmosphere of intra-tropical regions. No wonder, then, if in the stagnating and heated air of the compact parts of large cities, tropical diseases should break out and prevail, while the outskirts of these cities, and the surrounding country, where the atmosphere is less confined and less heated, are entirely free from them. This is the very result we would be naturally led to expect from such a state of things, were we to judge from first principles alone, without the aid of observation and experience. Air and water are, in some respects, analogous to each other. Stagnant water becomes unfit for the purposes of man; so does stagnant air, and that in a very short time. That they may retain

their purity and wholesomeness, they must both be kept in constant motion. The extremities and thinly inhabited parts of large cities in temperate climates, appear as ill calculated for the production and spreading of pestilential fever, in hot and dry summers, as the compact and well regulated parts are for the production and spreading of intermitting fever in wet and cool ones. Each situation must necessarily favour the production of a disease corresponding to the character and qualities of its atmosphere.

But the year 1804 was marked by the footsteps of another very formidable disease, which ought not to be passed over without some notice, particularly as it prevailed, during a part of the time, with a true epidemic sway. I allude to the casual small-pox, which, in that year, spread more generally and produced more mortality in and around the city of Philadelphia, than it had done during any other equal space of time, since the first introduction of inoculation as a popular practice. This fact offers but little encouragement to the well meant project of those physicians who meditate (I fear with more zeal and benevolence than knowledge and foresight) the *entire extermination* of small-pox by means of vaccination. Indeed if small-pox be capable of breaking out and prevailing as a *true epidemic*, the project of *entirely exterminating* it by any means within the power of man, would seem to border somewhat on Quixotism: it is, at least, too gigantic ever to be accomplished. That the small-pox did prevail as an epidemic during part of the year 1804, is a belief which I am induced to adopt from the following considerations.

I. At the time when it was most general and violent, other febrile diseases were scarcely known. It appeared for a while to have gained such an ascendency in the atmosphere, that all other acute complaints retired from before it. But to reign unrivalled and alone, is a prerogative that belongs only to a true epidemic.

II. Many persons who had considered themselves unsusceptible of small-pox, from having been frequently exposed to it with impunity, were attacked by it this year, without having been subject to any known exposure at all. Three or four instances of this kind occurred in my own practice, and I was credibly informed of several others. A family, in

which there were six children, lived in a neighbourhood where I had been in the habit of inoculating for the small-pox annually for several years previously to the year 1804. These children always escaped the disease, although it was once or twice in the house adjoining that in which they lived, and repeatedly on the opposite side of the street. But, in the year 1804, they were attacked by it, at a time when no person in the neighbourhood was labouring under it, nor could any of them give the least account of the source from whence it was contracted.

III. During this year, small-pox was not only very general in its prevalence, but malignant and mortal in an unusual degree. This was another strong epidemic character: for it is uniformly observed, that all diseases are more obstinate, violent, and dangerous, when they prevail epidemically, than when they occur only in sporadic cases. The reason of this is obvious. When a disease occurs only sporadically or by accident, as it does not, in the first instance, originate from atmospheric influence, there is of course nothing in the general state of the atmosphere calculated to protract its duration, or augment its violence. But the state of things is widely different when a disease prevails epidemically. In this case, the same atmospheric agency which contributed to produce the disease, being still exerted on the systems of the sick, must operate like fuel to the fire of their complaint, increasing its violence, and protracting its duration. It is thus that an intermitting fever, which, in spite of remedies, would run on for months in the unwholesome atmosphere of a low marshy country, the place of its origin, can be cured in a few days, if the patient be removed to an elevated and healthy situation, where the atmosphere of the place is not in unison with the nature of the disease.

IV. In the spring of the year 1804, an instance of true variolous *re-infection* fell under my notice. The circumstances of the case were as follow. I inoculated the sixth child of a woman about thirty-five years of age, who had been herself, when an infant, inoculated with success. Her father, who is still living, recollects that she had several regular and well formed pocks on different parts of her body. In addition to this evidence, her other five children had been successfully inoculated, all of whom she had herself nursed while

under the disease, without experiencing any ill effects from such exposure. The infant which I inoculated for her this season, was yet at the breast. It had a very heavy eruption of pocks on its face, particularly about its lips, with a considerable number in its mouth and on its tongue. The mother's nipples were, at the time, chapped and very sore. About eight or nine days after the maturation of the pock, she complained to me of a red streak running from the nipple up along one of her breasts, accompanied by a small but painful swelling (which I perceived to be glandular) under the arm of the same side. I immediately told her that she was inoculated, and would, no doubt, experience some degree of fever, which would, perhaps, be succeeded by a slight eruption. She laughed at my "*strange fancy*," as she termed it, and proceeded to inform me of what I have already stated, respecting her previous inoculation, and exposure in nursing her other children. Something occurred to prevent me from visiting her again for two days, when she at length sent for me. On entering her chamber (for she was now confined to it) she told me that I had been correct in my opinion; for, that on the evening of the day I had last visited her, she was attacked with a chill, which was succeeded by a fever, head-ache, and pain in the back, and that she had now several pimples about her face and neck, which she believed to be genuine pocks. This was, indeed, the case; for these pimples, as she called them, went through the regular stages and changes of variolous pustules, except that they did not attain quite the customary size. The indisposition, however, was slight, and, in a few days, my patient regained her ordinary health.

From the preceding facts and considerations, it appears, that, in the year 1804, there was in the systems of our citizens an unusually high state of susceptibility or predisposition to small-pox. On what other principle can we account for such a general spread of that disease, for its unusual violence, and for its attacking many persons, who had escaped it all their lives before, though frequently subject to exposures apparently much more hazardous? But whence could such a state of susceptibility or predisposition arise, unless from a *variolous constitution* of the atmosphere? for the atmosphere is the only common medium that can act on,

and produce corresponding predispositions in, the systems of a whole community at once. But the true character of an epidemic disease is, that it arises from or depends on something peculiar in the state or condition of the atmosphere, and attacks a great many persons at the same time. Agreeably to this, the small-pox of the year 1804 appears to have been, in the true sense of the term, an epidemic.

Respecting the final extinction of small-pox, it is and ever has been my belief, that that end can never be attained, either by vaccination, or any other means, until mankind acquire a perfect knowledge of, and controul over, those physical causes, that give rise to morbid constitutions of the atmostphere. For if a peculiar constitution of the atmostphere can greatly facilitate the propagation of a small-pox, it seems but reasonably, that a higher degree of the same constitution should be capable of producing that disease *de novo*. And there are even many facts on record which seem to evince that this is actually the case. But as well may we attempt the extinction of common catarrh, as of any other disease arising like it from atmospheric influence. It is, I think, nearly five years since vaccination became general among the practitioners of Philadelphia; yet we have as many instances of casual small-pox now, as we had before the introduction of that substitute.

OF THE CONSTITUTION AND DISEASES OF THE YEAR 1806.

The constitution and diseases of 1806 bore a strong resemblance to those of 1804, except that the year first mentioned was by far the healthiest of the two, and was not marked by the prevalence of small-pox. During the three spring months, which were unusually cool, windy, and dry, catarrhs and other slight inflammatory complaints were at times so common, that they might be almost said to be epidemic. They rarely, however, required medical aid, and, when they did, yielded readily to the common modes of treatment. They were not in any instance that came to my knowledge, accompanied with mortality, nor even with danger.

Early in June the rains came on, and continued to fall in frequent and sometimes very heavy showers throughout the three summer months. They were very nearly, if not quite, equal in quantity, to those of the summer of 1804.

As a natural consequence of these, the husbandman was rewarded with a plentiful harvest, and with an abundance of all the fruits and vegetables of the season. Such frequent falls of rain, accompanied by a considerable prevalence of northerly winds, could not fail to weaken the force of the solar heats. For it is a characteristic of our climate, that when a shower, but more particularly a thunder-storm, occurs in the afternoon or evening of even the hottest day, the temperature of the atmostphere experiences a sudden and very considerable reduction. It oftentimes falls in a few hours from 80°, 85°, or 90° to 70°, 65°, or 60° of Fahrenheit, and sometimes lower. Nor does it, in general, regain its former height in less than three, and sometimes five days. Frequent showers or gusts, therefore, are incompatible with high and long continued heats.

This sudden change in the summer temperature of our atmostphere, on the occurrence of rain, has never been satisfactorily explained. Some have supposed it to be owing to an immediate and abundant absorption of atmospheric heat, in consequence of the great evaporation of the waters that have fallen: but this cause is altogether insufficient to account for the phenomenon. For the coolness of the atmosphere oftentimes commences even before the rain has begun to fall, and continues, long after the evaporation which it causes has been completed. It is generally accompanied by a very dry instead of a humid state of the air. Besides, it is not unfrequently produced by the mere passage of a thunder-cloud over us, without the precipitation of a single drop of rain.

Others have attributed it to a sudden conversion of a large portion of sensible into latent heat, by some unknown agency of the electric fluid. But this explanation appears to be equally exceptionable with the other. For it is unphilosophical to attempt to account for an occurrence in nature by ascribing to any physical agent or principle, a power which that agent is not known to possess. But it remains yet to be proved, that electricity possesses the power of converting sensible into latent heat. No such effect has ever been produced by it in any experiment in which it has been employed. Besides, the phenomenon sometimes takes place, unaccompanied by any strong electrical appearances. A third opinion is, that this coolness arises from the arrival of a vast body of cold

air from a remote northerly region. The wind, on these occasions, blows for the most part form the north-west. It is supposed that this wind, having traversed a vast tract of country interspersed with lofty mountains, and covered perhaps, in parts, with ice and snow, is the sole cause of the cold we experience.

But this explanation, however plausible, is evidently fallacious. The change which our atmosphere undergoes, on these occasions, is oftentimes too sudden to allow us to search for its cause in a distant region. According to the common velocity of wind, several days would be necessary for a large volume of cold air to travel from the remote place, whence it is supposed to proceed. But the change of temperature oftentimes occurs in the space of a few minutes, although the wind had been previously blowing from the southward for several days. Nor is this all. The phenomenon in question is not only too sudden in its occurrence, but too limited in its extent, to admit of the present explanation. A thunderstorm produces but a very local derangement in the state of the atmosphere. It, perhaps, rarely in any way affects a tract of country more than a hundred miles square. But a phenomenon so circumscribed can have no effect in drawing a body of cold air from a region at the distance of several hundred leagues.

Others again have supposed this change of temperature to be owing to the sudden descent of an immense stratum of cold air from the higher regions of the atmosphere. For it is known that in these regions the cold is severe at all seasons. This stratum, say they, being precipitated either by its own weight, or by some violent commotion in the region from which it descends, displaces or mingles with and cools the wamer and lighter stratum that lies in contact with the surface of the earth.

Though we do not pretend to decide with confidence respecting the cause of the phenomenon under consideration, yet we acknowledge ourselves more inclined to favour the latter explanation, than either of the preceding ones. We think it more probable, because more conformable to the laws and operations of nature in other analogous cases. Falls of rain seldom produce any considerable change in the temperature of the weather, unless they be accompanied by gusts

of wind occasioning a violent commotion in the atmosphere. Hence thunder-storms, in which these gusts and this commotion are most powerful, and which, from the tumult and uproar that attend them, cannot fail to mingle the higher and lower strata of the atmosphere together, produce this change in the highest degree. Gentle showers, in which even a greater quantity of rain may fall, have in general but a slight effect on the temperature of the air.

It is known that deep waters will not freeze during the coldest weather, if they be agitated by violent gales of wind. The cause of this is obvious. Ice is water in a crystalized state; and we know that a certain degree of rest in the fluid is always necessary to the process of crystalization. But this is not all. In very deep waters, the central and lowermost strata are never reduced to the freezing point. This effect is produced only on the superficial or uppermost strata, on which the air has a more immediate influence. But in the commotion which these waters experience from severe gusts and gales of wind, they are disturbed to their very bottom, and all their strata are mingled together. The superficial and colder strata are precipitated, while the lower and warmer ones rise and occupy the surface. This agitation and commixture, while they keep the surface of the water at a temperature above the freezing point, must necessarily render the lower strata of it colder than they would be, during a tranquil state of that element.

So, likewise, in the wild commotion which the atmosphere experiences during our thunder-storms, all its strata are mingled together. The uppermost and colder ones descend to the surface of the earth, while the lower ones ries and communicate their warmth to higher regions. Such appears to us to be the best explanation of the phenomenon in question. Among the inhabitants of alpine countries, it is a fact as familiar as any other, that in stormy weather, the cold air descends from the tops of the mountains, and cools the atmosphere of the vallies. Hence the great and sudden vicissitudes of temperature, which the inhabitants of these vallies oftentimes experience.

Even in tropical climates severe hurricanes are always productive of cooler weather. They have also the effect of arresting, at least for a time, the course of the pestilential

diseases of those regions. This latter circumstance admits of an easy and satisfactory explanation. The tropical pestilence arises, as has been already mentioned, from a contaminated state of the atmosphere. This contamination, however, is confined exclusively to that stratum or portion of the atmosphere which is contiguous to the earth. The more elevated strata remain as pure and untainted as the air of the healthiest climates. This we infer from the extreme healthiness of mountainous situations even within a few degrees of the line. But the hurricanes of the tropics rage with such unbridled fury, as to produce a complete revolution in the atmosphere. They snatch up and whirl aloft the lower and contaminated stratum of air, hurrying down the higher and purer ones to supply its place. Hence the coolness and salubrity that succeed these frighful convulsions of nature. And hence the simplicity of the process by which nature can arrest one of her deadliest scourges.

But to return from this digression. The frequent and profuse showers that fell during the summer of 1806, contributed greatly to keep the atmosphere in a mild and pleasant temperature. Nor was this their only beneficial effect, with regard to the healthiness of our city. They acted the part, and made amends for the negligence, of scavengers, by washing the gutters and sweeping the offals and other putrid matters from our streets. In consequence of this, the atmosphere preserved its purity, and our citizens experienced from the sinks, sewers, docks, and other places where filth is apt to abound, nothing of that stench which proves so offensive in very hot and dry seasons.

If we have respect to the aggregate quantity of heat that occurred, the summer of 1806 was, perhaps, fully as cool as that of 1804. For, though in the first mentioned year there were more days in which the thermometer rose to 80 degrees of Fahrenheit, than there were in the latter, yet these days were greatly scattered, not more than three or four, and in general not more than two, of them occurring in succession at any one time. Besides, in many of them, a heavy shower of rain or a thunder-storm came on in the afternoon, which rendered the remainder of the twenty-four hours cool and pleasant. Such frequent interruptions as these produce a vast diminution in the general quantum of the heat of any given

period. Ten successive days of dry and continued hot weather, during which the thermometer ranges from 75 to 85 or 90° of Fahrenheit, will throw out a greater body of heat, than twenty scattered days, in which, though the mercury may rise, for a few hours, equally as high, yet it suddenly sinks again for the remaining twenty-four hours, in consequence of a shower or thunder-gust in the afternoon. This is a circumstance of which we should never lose sight, in making an estimate of summer heat. Without a strict attention to it, it is impossible to strike a just medium. But, more particularly, without this, we cannot possibly arrive at any correct conclusion relative to the effect of heat on the healthiness of the season. For it will be observed, that it is a continued *succession of hot days*, and not a certain number of them occurring in a scattered and broken manner, that can prove destructive to health. Days are occasionally felt even in the latitude of 60 degrees north, as hot as those experienced beneath the line. But they are few in number, fall out scatteringly, and their heat is never of more than a few hours' duration. Hence they are innocent in their effects on the human system, while the heats of the tropics are fraught with destruction.

Corresponding to the temperature and character of the season, the diseases of the summer of 1806 were comparatively few and mild. The cholera of infants was less general and less fatal than usual. A few intermittents, remittents, and bowel complaints occurred among adults, but they were generally of the most benign and manageable kind. As the summer strongly resembled the summers of the north of Europe, so likewise did the diseases to which it gave origin. The one manifested nothing of tropical fervour, nor did the other partake of tropical malignity.

Though such was the mild state of diseases in general, yet this mildness was not without its exceptions. Various cases occurred during the season, which, though not truly malignant, proved extremely obstinate, tedious, and sometimes fatal. They commenced with the intermitting or remitting form of fever, but assumed after some time the typhus or chronic form. This unfavourable change appeared to be owing to the neglect of early and sufficient evacuations. For, when such evacuations were effected, the change

seldom took place, but the disease was generally brought, in a few days, to a fortunate termination.

From about the tenth or middle of September till near the last of November, these diseases became more frequent and obstinate. Within this period they proved fatal to several very useful and distinguished citizens. It was remarked that they were productive of most mortality under the direction of those physicians, who were most sparing in the letting of blood. Practitioners who made a more liberal use of the lancet, were much more successful in their treatment of them.

This disease assumed in many instances the mask of colic, and proved, under that character, no less obstinate, than when it appeared in its more open and common form. In a few cases that fell under my own notice (and I heard of several others) this colic pursued a true intermitting type, the paroxysm occurring regularly every night. In one instance, however, it came on only every other night, the disease being a true tertian. This might be denominated the *colicky state of intermitting fever*, and subjoined as an additional variety to those states or forms of the disease so ably described by Alibert. It called for bloodletting and cathartics to a very great extent.

Notwithstanding the obstinacy and violence of these diseases, they could not with propriety be called malignant. They still accorded very perfectly with the character and constitution of the season. They were the diseases of a temperate, not of a tropical climate—the diseases of Europe, which are more slow and obstinate, not of the West-Indies, which are more violent and rapid. They bore a strong resemblance to a form of autumnal fever which, though not unfrequent in England, appears to be still more common in some parts of France. They were such as had also been familiar to the older practitioners of Philadelphia, previously to the pestilential fever of the year 1793. A hot and dry summer would have ripened them into true pestilence.

The events of the years 1804 and 1806, when duly weighed, and considered in all their circumstances and relations, are interesting and important in a very high degree. Taken in connexion with those of the year 1805, (of which we will treat presently) they speak a language which the weakest capacity cannot misunderstand, and unfold truths and prin-

ciples of which the inhabitants of the United States should never lose sight.

It will be recollected that in the year 1805, the health-law for the city and county of Philadelphia was precisely and in all respects the same, as it had been in the year 1804. It was also administered by the same officers, and was enforced with equal rigour, as far as respected the quarantine of vessels from sickly ports. But the summer of 1804 was uncommonly *wet and cool*, and *Philadelphia escaped pestilence*. The summer of 1805, on the other hand, was in an equal degree *hot and dry*, and she *experienced that disease in great severity*. In the summer of 1806 the measures of the health-law relative to the quarantine of vessels *were greatly mitigated*, and they were also executed with a *mildness* altogether unknown during the two former years. In the apprehension of many, therefore, a door was thrown open for the admission of pestilence. But the season, again was *wet and cool*, and Philadelphia was again exempt from that calamity.

What was the true cause of the immunity of our city from pestilence during these two wet and cool seasons, and of her heavy sufferings from it, during the hot and dry one? Was not her intercourse with the West-India islands as free, extensive, and direct, during the years 1804 and 1806, as it was during the year 1805? Certainly it was. During the year 1806 in particular it is known to have been even much more so, because the West-India trade was subject to a lighter quarantine. Were not the islands alike infected by pestilential diseases during each of these seasons? It is well known that the difference in this respect, if indeed any difference existed, was very inconsiderable. The exemption of Philadelphia from pestilence, then, in the years 1804 and 1806, was owing neither to the uncommon healthiness of the West-Indies, during these two years, nor to our impeded intercourse with those islands. It arose entirely from the wetness and coolness of the seasons, and from the cleanliness of our streets, in consequence of the frequent and overflowing falls of rain. The pestilence of 1805, on the other hand, was not to be attributed to any unusual freedom of intercourse with sickly places, but to the hotness and dryness of the season, co-operating with the filthiness and impurity of our streets. During each year the diseases corresponded precisely with the na-

ture and character of the summer. In 1804 and 1806 we had cool European seasons, which, as was to be expected, gave rise to mild European diseases. But in 1805 we had a perfect tropical season, of which tropical diseases were the natural consequence. This plain statement sets forth, in the most satisfactory and impressive manner, the importance of public cleanliness with a view to the preservation of public health, while it shows in a manner equally conclusive, the inutility and folly of our quarantine establishments. These expensive and oppressive establishments, have the unhappy effect of burthening and gradually destroying our commerce, without contributing in the smallest degree to the security of our health. During very hot and tropical summers, we will be perhaps always more or less in danger of pestilential diseases, notwithstanding our quarantines, and during wet and cool ones, we will have nothing to dread from such diseases, though these institutions were totally abolished.

An occurrence that took place in Philadelphia in the year 1801, still further confirms the connexion between very hot weather and pestilence.

The three summer months had been cool and pleasent, and the falls of rain, though not very profuse, had been sufficient for all the purposes of nature. Corresponding to this constitution of the weather, the diseases of the season had been mild and manageable. Contrary, however, to general expectation, September commenced with uncommon heats, which continued without abatement till the tenth of the month. Throughout this whole period the thermometer seldom sunk, during any part of the twenty-four hours, below 78° or 80° of Fahrenheit, and it sometimes stood as high as 88°. Not a drop of rain fell, nor scarcely a cloud appeared to intercept for a moment the scorching sun-beams. The consequence of this uninterrupted series of hot and dry weather was, that, about the middle of the month, a pestilential fever broke out near to the drawbridge, and, in a short time, swept off upwards of twenty of the inhabitants. There was no attempt to trace this disease to any other source, than the heat of the weather operating on the filth of the neighbourhood where it appeared. Though it was greatly checked in its course by the cool weather of October, it did not entirely disappear till the beginning of November.

## CONSTITUTION AND DISEASES OF THE YEAR 1805.

The aspect and occurrences of the year 1805 were widely different from those of the years 1804 and 1806. The reader must, therefore, prepare himself for a view of scenes that will form a contrast, not only striking but gloomy and painful, with those of which he has just taken leave. Instead of a mild and tractable, he will here be called to the contemplation of a pestilential and malignant disease, and instead of general recoveries, he will witness frequent instances of dissolution. Though his attention will be still confined to the same spot on which it was fixed during our review of the constitution and diseases of the years 1804 and 1806, yet such an unexpected change will appear in the face of things, as might almost induce him to disbelieve the fact. He might even seem in imagination to have been transported as by magic, from the temperate and healthful climate of Great Britain, to the burning and malignant sky of Hispaniola, and to have exchanged the mild complaints of the former, for the destructive pestilence of the latter region. For such and so great was the difference between the temperature and diseases of the summers of 1804 and 1806, and those of the summer of 1805.

During the first months of the year 1805, the small-pox, protracted from the preceding year, continued still to prevail to a considerable extent. As the spring opened that disease declined, in the course of the summer it became still less frequent, and, on the commencement of the pestilential or yellow fever, of which we will presently speak, it disappeared so entirely, that, during the autumnal months, it became impracticable to procure matter for the purpose of inoculation. This circumstance alone affords strong proof of the small-pox having prevailed as an *actual epidemic:* for it is an invariable and indeed a necessary law of epidemics, that two of them never can prevail in the same place at once, but that one always disappears, on the commencement of the other. Different intercurrent or sporadic diseases, which arise from as many different causes, may exist in the same place at the same time. But as all epidemics have their source in certain morbific states or constitutions of the atmosphere, and as the atmosphere cannot be marked by more than one morbific

state or constitution at once, the co-existence of different epidemics in the same place is altogether impracticable.

The spring months, and till about the 14th of June of the year 1805 were somewhat cool for the season; the prevailing winds were easterly and northerly, and the rains that fell, though not very abundant, were sufficient for the purposes of vegetation. Towards the latter part of this period, intermittents began to prevail, attacking many persons indiscriminately, but more particularly those who had suffered from the same disease during the preceding summer and autumn. Such *annual* attacks of intermitting fever are common occurrences. In this instance, again, the prevailing disease corresponded very accurately with the nature and temperature of the prevailing weather. The season was as yet moderate, and the complaints were, therefore, mild, as if proceeding from the action of weak causes. These circumstances inspired a general hope, that this summer, like the last, would be temperate and pleasant, and would produce nothing but the common diseases of temperate climates. The correspondence hitherto observed between the weather and the existing state of disease, seemed to lay a rational foundation for such a hope. But these prospects proved as fleeting and delusive, as they had been fair and promising. For, in a short time, the whole aspect of nature underwent a change.

On the 14th of June the intense summer heats commenced. These were accompanied by a severe drought, which began on the 20th of the same month, and continued without any intermission, except a few very slight sprinklings of rain that barely moistened the surface of the earth, till the 28th of August. During this burning period, not only the rains, but even the common dews of the season ceased to descend. Except in marshy and humid places, and in the immediate vicinity of streams and other bodies of water, there appeared to be no moisture in the ground to ascend in vapours during the day, and return again in a condensed form during the coolness of the evening. Nor did the heats cease with the termination of the drought. The rains that fell towards the close of August and in the first weeks of September, had (contrary to the usual course of things) but very little effect in reducing the temperature of the atmosphere, which still remained high till near the time of the autumnal equinox.

In the months of July and August, the heats during the day were uncommonly oppressive, and, as there were no falls of rain, they suffered but little abatement even during the night, a circumstance which greatly augmented the general quantum or mass of heat for the season. For, as already observed in another place, during those summers that are accompanied by frequent showers and thunder-gusts, though the day be intensely hot till noon, yet, if one of these showers or gusts occur in the afternoon, it generally reduces the temperature of the atmosphere very considerably during the night, and perhaps for the space of several succeeding days. During such a season, though the weather may be at times extremely hot, yet the quantum or aggregate mass of heat, to which every thing is exposed, must, by these interruptions, be greatly diminished. But no such interruptions occurred during the summer now under consideration. The heat of that season, like the heat between the tropics, was a vestal fire which blazed without intermission.

It is remarkable, that during part of the summer of 1805, even our most cooling winds appeared to have lost their customary effect in lowering the temperature of the atmosphere. On one day, in particular, the mercury rose to 91 degrees of Fahrenheit, while the wind blew from the north-west. This is an occurrence to which but very few parallels can be found, in the meteorological journals of the United States. This, at least, is the case with respect to those years, the journals of which I have had an opportunity of examining. As the summers of 1804 and 1806 were the wettest and coolest, that of 1805, taken throughout, was much the hottest and driest that has been experienced in Philadelphia for many years. Perhaps the oldest of our citizens cannot call to mind its parallel.

Every thing possessing life appeared to languish under the fiery inclemency of the season. The vegetable kingdom was foremost in manifesting the severity of its suffering. The husbandman saw, with painful emotions, the hopes of the year ready to be blasted, and even experienced some solicitude about the means of subsistence. The grass and smaller herbage became sapless and parched, like the leaves of autumn. For several weeks the fields and even meadows exhibited scarcely a shade of verdure, more than they do in the depth

of winter. Indeed the face of barrenness dwelt on whole tracts of country, which but a short time before had been luxuriantly clothed in vegetables.

But it was not the weaker vegetables alone, that suffered from the fierce intemperature of the season. By such a continuace of heat and drought, the fruit and fruit-trees were greatly injured, and even the forest-trees themselves did not escape unhurt. The growth of the Lombardy poplar was less rapid and luxuriant than in common years, and the foliage of most trees, particularly of those that grew on high and dry situations, exhibited a sickly aspect. Such as stood in low and humid places appeared more healthy and vigorous.

Nor did the animal kingdom escape without injury. Besides experiencing that languor which necessarily results from the action of a burning sky, and an arid atmosphere oftentimes filled with dust, many of them were deprived of their customary nourishment. This was particularly the case with such herbivorous animals as black-cattle, and sheep, whose food was not only diminished in quantity, but injured in its qualities, and rendered much less nutritive than when watered by plentiful falls of rain. Owing to the drying up of springs, rivulets, and other watering places, cattle suffered greatly, in many instances, for want of drink. In several parts of the country it even became necessary to supply them food as regularly as if it had been the depth of winter.

I do not know that in the country, domestic animals were affected by any epidemic complaints. But in cities the case was different. It will hereafter appear, that in Philadelphia, besides languishing under the exhausting influence of an over-heated atmosphere, some of our domestic animals suffered from a different and more deleterious cause. They became participators with there owners in the pestilential disease about to be described.

Even man himself, protected by all the improvements devised by his philosophy, and supported by all his fortitude, was ready to sink under the inclemency of the season. While thus oppressed and relaxed by its enervating influence, he ceased to deem incredible the accounts given of the debility and indolence of the inhabitants of certain tropical countries, whose heats are always intense, and whose soil yields without cultivation the means of subsistence. During this extra-

ordinary continuance of heat and drought, the appetites of the citizens of Philadelphia, particularly for solid food, were impaired, while their thirst was rendered excessive and their discharge of perspirable matter preternaturally profuse. In consequence of this, their strength was necessarily more or less diminished, and with it the powers of their systems for resisting the action of morbific causes. They became, therefore, more liable to the attacks of pestilential or other diseases. This liability was in too many instances increased, and, no doubt, in some, converted into actual disease, by the improper use of wine or ardent spirits, taken under a pretext, or perhaps with a real expectation, of supporting or renovating the declining strength.

One or two of the immediate and obvious effects of such a dry and hot season, in the city of Philadelphia, deserve to be noticed. Owing to the extreme dryness of the streets, and the action of a perpetual concourse of foot-passengers, horses, and carriages, the dust was reduced to an impalpable power. The slightest wind, therefore, threw clouds of it into the atmosphere, which was oftentimes so overcharged with it as very sensibly to affect respiration. This inconvenience, though felt by all, was more particularly troublesome to persons possessed of very irritable lungs. By absorbing moisture when taken into the mouth, the dust also contributed to increase the thirst of the citizens; and by making its way into the lungs, and occupying a certain extent of space in the cavities of that viscus, it necessarily lessened the proportional quantity of respirable air taken in at each act of inspiration. The full effect of such a privation on the human system, nothing but a further and more intimate knowledge of the economy of life can enable us to determine. It must certainly, however, be in its nature morbid.

But though extremely troublesome and somewhat injurious, the dust was by no means the most offensive or noxious substance that was mingled with the atmosphere. The intemperature of the season gave great activity to the process of putrefaction, in all places where putrefactive materials abounded. But, unfortunately, there were too many places of this description within the limits of the city and suburbs. Those persons charged with the superintendance of the public health, had their views too firmly riveted on another quarter, to at-

tend to the pressing and obvious duty of domestic cleanliness. The necessity of preventing the importation of disease from the West-India islands, was the only theme on which they dwelt; and, accordingly, infected ships, sickly crews, and forbidden cargoes, haunted their imaginations so incessantly, and so wholly engrossed their time, that they found no leisure for a thought or an action relating to any thing else. Such was their fanaticism on the subject of the introduction of disease from abroad, that they would at any time leave the carcass of an animal putrefying in the street, and filling the air with a poison truly pestilential, to go in quest of a sailor sick only of a last night's debauch, or to meet at the health office, for the purpose of passing a resolution to prevent the most clean and healthy West-India vessel from entering our port.

From these circumstances, together with an entire want of purifying rains, our city became extremely foul, and the atmosphere in a high degree contaminated and offensive. The stench arising from the putrid substances lodged in the gutters, sewers, alleys, and docks, was in many places, to persons unaccustomed to it, quite intolerable. It was, perhaps, more offensive, particularly during the latter part of July, and in the month of August, than any thing of the kind experienced by our citizens in former years. Strangers fresh from the country, where they had been accustomed to breathe an atmosphere pure in itself, and free from any odorous effluvia except those arising from vegetables, could not walk the streets near to the Delaware without experiencing great inconvenience. They even expressed their surprise how the citizens could bear such a stench without complaining, and how they could live any time in an atmosphere so impure, without losing their health.

But, on this subject it is to be recollected, that impressions disagreeable and painful, at first, may by custom be rendered imperceptible or even pleasing, and that the human system possesses such a power of accomodation to circumstances, as to become able to bear for a time, with seeming impunity, the action of poisonous substances, whether in a gazeous, a liquid, or a solid form. Hence it is, that the natives of warm climates, as well as those emigrants from higher latitudes who have long resided in them, very seldom suffer from the pestilential diseases which these climates produce.

From constantly breathing a heated and contaminated atmosphere, their systems become so far reconciled to it, that they experience neither injury nor inconvenience from that heat and those noxious exhalations, which prove so fatal to strangers newly arrived from colder climates. And hence it is, that in Philadelphia, and other large cities of the United States, the old and settled inhabitants are not, *in common summers*, so liable to sickness, as strangers who have just changed a country for a city residence. Indeed it is no uncommon thing for persons of this latter description, like those who emigrate from a temperate to a hot climate, to experience a *seasoning* from such a change.

Soon after the commencement of the heat and drought, in the month of June, the cholera infantum, which had previously made its appearance, became uncommonly prevalent and mortal. Its ravages during part of July were perhaps unprecedented in the city of Philadelphia. Upwards of sixty children fell by it in one week. Had the name of *pestis infantum* been substituted for that of *cholera infantum*, the malignity and mortality of the disease were sufficient to have justified the change. The terrible aspect of this complaint excited in the minds of several physicians serious apprehensions for the fate of the city at a more advanced period of the season. These physicians regarded children as the outposts of the community, destined, from the weakness and susceptibility of their frames, to sustain the first shock of the impending epidemic. For this cholera or rather *pestis* infantum, is nothing but a *febris maligna introversa* of children. It is, in other words, the endemic of the season, determined to the stomach and bowels, from causes peculiar to children of a certain age.

During the summer under consideration, as well as in that of all former years, this disease was confined more particularly to the children of the poor, who are subject to numerous and strong exciting causes. The children of those in better circumstances, being exposed to fewer exciting causes, were much less generally as well as less severely affected, even although they remained in the city during the whole season. Hence cholera infantum is not *necessarily* incident to children in Philadelphia. Were these tender subjects supplied with suitable aliment, and properly guarded from exciting causes,

the prevention of much misery, and an incalculable saving of human life would be the certain effect.

The intermittents that had appeared in the earlier part of the season, ceased almost entirely on the commencement of the extreme heats in June. But they were soon succeeded by another form of disease equally troublesome. Early in July bowel complaints, assuming in a few instances the form of dysentery, but generally that of diarrhœa, became uncommonly prevalent among adults. They were, for a short time, truly epidemic. Nor could their prevalence be attributed to any obvious cause. The atmosphere had undergone no sudden change with regard either to its temperature or its humidity. Yet the sudden appearance connected with the universality of the disease showed it to be necessarily of atmospheric origin. From its attacking, in numerous instances, several persons in the same family, and that in regular succession, it had as much the appearance of being *contagious*, as its pestilential successor, of which we will presently speak. The occurrence of this disease, together with all the circumstances attending it, increased the apprehensions of those physicians who had paid attention to the phenomena and laws of epidemics. These observers of nature had learnt, that, in general, heavier epidemics are preceded by lighter ones. They remembered that in 1793, 1797, 1799, and other seasons, the pestilential fever had immediately followed an influenza, which, though slight, had prevailed very generally throughout the city. From these considerations they did not hesitate to regard the bowel complaint just mentioned, as premonitory of the approach of a more serious calamity.

On some occasions a pestilential fever has been known to be preceded by an unusual frequency of apoplexy, and instances of sudden death from the other causes. This was the case in New-York in the summer of the year 1803. On the ground of these premonitory appearances, Dr. Miller of that city, expressed to me, both in conversation and by letter, strong apprehensions that the constitution of the season would prove pestilential. The events which soon followed, evinced but too clearly the soundness of the doctor's judgment, and his accurate knowledge of the laws of epidemics. Lancisi also speaks of a pestilential fever in Rome having been preceded by a kind of apoplectic disease. Several other instances of a similar nature are on record.

The appearance of these epidemic harbingers, in an early part of the season, very clearly announces the existence of a constitution of atmosphere unfriendly to health. Under such circumstances there is always great reason to apprehend, that, during the progress and by the influence of the summer heats, which may succeed, particularly if they be very intense, this constitution will be ripened into one truly pestilential. Though we are not able, in the present state of physical science, to trace with accuracy the particular steps by which nature effects this progressive change, yet that she oftentimes does effect it, is a truth which rests on incontrovertible facts. For much valuable and interesting matter relative to the gradual formation of true pestilential constitutions, we refer the reader to Webster's "*History of epidemic and pestilential diseases.*"

OF THE PESTILENTIAL OR YELLOW FEVER OF THE YEAR 1805.

We will now proceed to the immediate consideration of the pestilential or yellow fever, which prevailed in Philadelphia in the year 1805. For the better elucidation of this subject, it will be treated of under the nine following heads. viz.

Section I. Of the rise, progress, and decline of the disease.
Section II. Of the origin and causes of the disease.
Section III. Of the contagious nature of the disease.
Section IV. Of the means of preventing the disease.
Section V. Of the history of the disease.
Section VI. Of the causes of particular symptoms.
Section VII. Of the prognosis.
Section VIII. Of the morbid appearances discovered on dissection.
Section IX. Of the treatment of the disease.

## SECTION I.

### OF THE RISE, PROGRESS, AND DECLINE OF THE DISEASE.

The first cases of this disease that attracted public notice occurred towards the close of July, near to Catharine street wharf, in the district of Southwark. I have said the first cases that *attracted public notice*, because, previously to this, a few sporadic cases had appeared in different and even distant parts of the city, one* of which I had myself visited at the request of the attending physician. This case terminated fatally on the fourth day, with black vomit, and other symptoms of high malignity. *No notice was taken of it by the Board of Health, although two of the members of that body actually visited the patient during her illness.* A few days afterwards the goods of the deceased, including *even the bed on which she had died*, were disposed of at public sale; nor did either the purchasers or any of the inhabitants of the adjoining houses sustain the slightest injury from the event. No other case of the disease appeared in that neighbourhood afterwards during the season.

*Four* cases of malignant fever occurred, in the first instance, in the vicinity of Catharine street wharf, namely, one on the twenty-sixth, one on the twenty-seventh, and two on the twenty-eighth of July. The person who sickened on the twenty-sixth of the month was named John Davis, and lodged in a small tavern kept by John North. He was removed on the thirtieth to the Philadelphia almshouse, where he died a few days afterwards, *with a yellow skin, yellow eyes, and the black vomit.* The case of this patient was never noticed by the Board of Health, for reasons which will be hereafter unfolded. Of the other three persons, two were sent by the Board, on the same day of the month with the above removal,

* A woman named A. Person, who lived in Fourth street, one or two doors below South street, and was attended by Dr. Stuart. She died several days previously to the appearance of the disease at Catharine street wharf. As early as the fourteenth and fifteenth of July of this year, Dr. Hartshorne, of the Pennsylvania hospital, visited three out-patients of that institution, ill of *malignant or pestilential fever*. The names of the patients, together with that of their disease, are recorded on the books of the hospital.

to the Lazaretto, where one of them died, and the other recovered. The third was conveyed into the country, where he also recovered. The reason of my noticing these four cases of disease in so minute and circumstantial a manner, will appear in a subsequent section. I need scarcely add, that the occurrence of them at this critical period of the season, and the indiscreet manner in which three of them were announced by the Board of Health, created great alarm.

For about a week after these removals every thing remained quiet, and the agitation of the public mind began to subside. But this subsidence resembled that of the waves, on the first deceitful pause of the tempest. A more powerful and continued blast was fast approaching to awake a higher and more lasting tumult. The Board of Health, with a want of discernment not very honourable to them, began to fancy that they had actually performed a wonder little inferior to one of the labours of Hercules. They first persuaded themselves, and then endeavoured to persuade their fellow-citizens, that by a single well timed and well devised act, they had completely extinguished the fever for the season, and saved the city from the danger that threatened it. But physicians who viewed the subject through a different medium, and judged of it from different principles, formed a very different opinion. They discovered at a glance the commencement of a pestilential disease, which nothing but the occurrence of cold weather, or some entire change in the prevailing constitution of the atmosphere could check. In conversation with one of the medical members of the Board of Health, I myself assured him in unequivocal terms, that the city "*was inoculated for the season*," and that all his efforts to arrest the course of the disease would be fruitless. He received my declaration with great indifference, except that he was surprised at my want of faith in the preventive powers of the Board. I have no doubt but the gentleman retains a perfect recollection even of my words on the occasion; nor can he, I think, have forgotten the perverted construction which he afterwards very illiberally attached to them, nor the unwearied pains he took to torture them to my injury in the line of my profession.

To Dr. Physic and several other medical characters, who, in consequence of living at a distance from the seat of the foregoing cases, had no opportunity of observing for them-

selves, I also expressed a conviction that the disease would make its way through the city, as in former years, and would be checked only by the usual causes. From the delivery of this opinion I pretend to no discernment or foresight beyond what is possessed by many others, who, placed under similar advantages for observation, would have formed similar views.

The next subjects of the disease were in the house of Mr. Caleb Bickham, who, with several houses intervening, lived at least twenty paces distant from the nearest of the houses occupied by the persons previously attacked, and whose family had never had the least intercourse, either directly or indirectly, with the sick, or with the families, or dwellings in which they had resided.

The next subject again of any note was a young woman, the daughter of Mr. Hosey, who lived at the distance of sixty or eighty paces, in nearly an opposite direction, from the habitations of the persons first attacked. This unfortunate girl had never been near to any of the sick, nor to any thing that had been about their persons or in their houses. She died on the fifth or sixth day of her disease with symptoms of great malignity. It was found, on inquiry, that all these persons had been exposed to strong exciting causes. This indeed is generally the case with those who suffer *first* from epidemic or endemic diseases.

It was now about the 20th of August. From this period the disease began to spread through the neighbourhood in a manner so irregular and desultory, that its course can be neither followed nor described. It did not proceed with regularity either from house to house, or from person to person. It seemed to select, as its proper subjects, those persons, who, from imprudence or necessity, were exposed to the strongest exciting causes. It exhibited none of the characters or phenomena of a disease spreading by contagion. For many persons, constantly confined to the chambers of the sick, escaped unhurt, while others, without the slightest exposure to any supposed source of contagion, became its victims. It is particularly remarkable that none of the nurses of the sick suffered till a considerable time after the commencement of the calamity.

During this period the Board of Health appeared to be wonderfully on the alert, spending a great part of their time

in the sickly neigbourhood. Yet in reality they were doing nothing, except issuing hasty and crude memorials and recommendations to the public, making certain arrangements which they never carried into effect, and disquieting the minds of some of their fellow-citizens by threats of compulsory removal, which they had no power to execute. They at length opened the doors of the city-hospital, and entered on a plan of crowding it with sick, alike inconsistent with wisdom and humanity. But as my own mind recoils from a review of some of their harsh proceedings, I will not give offence to the reader by recording them. I will only add, that these proceedings roused the indignation of those citizens against whom they were particularly directed, to such a pitch, that, from motives of personal safety, the Board of Health were forced to abandon them. Removals, whether of the sick or of the well, were no longer acts of compulsion, but of choice.

As yet the disease was confined principally to Water street and a few adjoining alleys, the air of which seemed best calculated to favour its propagation. A few scattering cases, however, appeared in Front and Second streets. These might be considered as the advanced guard of the enemy, and gave certain notice that the main body was close in their rear. About this time, I myself attended a case of the disease even as far to the westward as Third-street. The subject of it was a child, that had not, for many weeks before, been ten paces from its father's door, nor had it had the least intercourse with any sick person. It recovered, but not without a severe struggle, and some of its symptoms wore a very malignant aspect.

By the middle or twentieth of September, the disease had become epidemic over a large proportion of Southwark, and a small section of the southern extremity of the city itself. Along Water street, in particular, it had extended in scattering cases nearly as far to the northward as Walnut street. It is worthy of remark, that on every occurrence of malignant fever in the city of Philadelphia it has appeared to delight most in the air of Water street, which runs along the *low ground* of the river Delaware. On some occasions, when it was scarcely known in the higher streets of the city, it has prevailed to a very considerable degree in Water street, and

in the houses on the east side of Front-street, which are known to constitute the west side of Water-street, and must be therefore subject to the influence of its atmosphere. This was particularly the case in the years 1799 and 1803. In the former of these years, not a family that remained in the city on the east side of Front-street, between Pine and Spruce streets, escaped the disease, while most of those on the west side immediately opposite continued healthy. The inferences to be drawn from these facts are reserved for a subsequent part of this essay.

At no period did the malignant fever of the year 1805 extend *as an epidemic* in the city, farther from the Delaware than to Second street, nor in the district of Southwark, than to Fourth street. All cases that occurred to the westward of these limits were to be considered as accidental or scattering. Within these limits safety consisted only in flight, or in carefully avoiding every thing that might act as an exciting cause. For, even till the entire disappearance of the disease, some exciting cause was necessary to bring it into action. It must be acknowledged, however, that during the time in which the epidemic constitution of the atmosphere was at its height, that is, during the time in which most people sickened, a very slight cause was oftentimes sufficient for the purpose. Before this constitution had acquired its full force, and after it had passed its meridian and was on the decline, a more powerful cause was requisite to produce the same effect. This is a characteristic of all epidemics. And that epidemic constitution of the atmosphere may be said to be most exquisitely formed, by the influence of which many persons sicken without any obvious exciting cause. Perhaps such a degree of perfection and strength is attained only by that kind of constitution which gives rise to influenza. We are told that in eastern countries an exciting cause is always necessary for the production of the plague.*

By the last of September the epidemic had gained its utmost boundaries. Though it afterwards attacked many persons residing within the area which it then occupied, yet the

* Diseases really contagious occur without any exciting cause, except that of their own poison. This circumstance seems to constitute an essential difference between diseases produced by a morbific constitution of the atmosphere, and those arising from the action of an animal poison.

dimensions of that area did not appear to be in any measure enlarged. This disease has always, in Philadelphia, ceased with the close of September, to extend its limits, except in the year 1793. During that season the whole of October was dry and unusually *hot*. In consequence of this, the epidemic increased not a little both in extent and mortality during that month. This fact very forcibly evinces the necessary dependence of the disease on heat. In 1799 even a cool September checked it, whereas in 1793 a warm October added greatly to its extent and violence.

Early in October the epidemic began to decline, in consequence of a few days of cool weather, accompanied in the country with frost. Though much weakened, it was not yet extinguished. On the other hand, it even revived a little again, on the weather becoming warmer. This temporary declension and revival were twice afterwards repeated from the same causes. With such reluctance did the disease retire, and so difficult was it to dislodge it from its strong holds, that it did not entirely disappear till the close of the month, notwithstanding the occurrence of several frosts so severe as to form ice in the gutters. It evidently withstood, for a time, the action of colder weather than it had done in former years, and contended for its empire with greater obstinacy. In consequence of this many persons were attacked by it, who, relying on the change that had taken place in the weather during the first weeks of October, returned prematurely from their asylums in the country.

After the epidemic had fairly passed its meridian, and was on the decline, its attacks were less malignant and dangerous than they had been at an earlier period of its course. From the tenth of October it was accompanied in general with as little danger, and much less obstinacy, than, a common remittent. But the malignity and danger of this disease were also graduated by its distance from the river. Persons residing about Third and Fourth streets, although attacked when the epidemic was at its height, were in less danger than those who lived in Front and Water streets. I think I lost, during the whole season, but four patients to the westward of Front street, three of whom were, when I first visited them, in such an advanced stage of the disease, that there was no ground to hope for their recovery. The same circumstance

was observed in 1803, as well as in preceding years, and demonstrates the existence of a concentration of the predisposing cause of the disease in the eastern and lower streets of the city. But such a concentration is most likely to occur, near to the principal source or birth-place of that cause. The deleterious effluvia of a putrid body are always most abundant and offensive in the immediate vicinity of that body.

The removals of the citizens into the country, though numerous, were neither so general, nor attended with so much consternation, as on former occasions. Most persons seemed to leave their homes with more than usual reluctance, and to return to them with uncommon eagerness.

From the commencement of the disease, a constant intercourse was kept up between the healthy parts of the city and the sickly parts of Southwark, notwithstanding some strange prohibitory measures, and threatening proclamations of the Board of Health. The citizens did not entertain the same dread of the disease which they had manifested in preceding years, and the Board had, at an early period, rendered themselves too odious to some, and too despicable in the eyes of all, to have any influence either by their remonstrances or their mandates. In consequence of this, many cases of the fever were introduced into central and healthy parts of the city. These cases excited, at first, no small degree of alarm in the minds of the neighbouring inhabitants. But they were found to terminate, sometimes favourably and sometimes unfavourably, without communicating disease either to the families in which the sick lay, or to any individuals who, from motives of friendship or otherwise, had had free access to their chambers. This was observed to be, not an accidental but an uniform occurrence, to which there was no exception; for in no instance did the disease spread from the sick to the well, in consequence of cases being thus introduced into healthy neighbourhoods. The inhabitants of these neighbourhoods escaped uninjured, notwithstanding so many supposed sources of infection being scattered among them. Numerous facts of this description forcing themselves on the observation of our citizens, shook to its foundation the belief of many of them in the old and fashionable doctrine of contagion. But of this we shall speak more fully in a subsequent section.

It might, perhaps, seem from what has been advanced in certain parts of the present section, that in the more northerly and westerly parts of the city, there were no cases of pestilential fever except those that had been introduced from Southwark or the neighbourhood of Water street. Such an inference, however, would betray the reader into an error. Many sporadic cases occurred, even in those parts of the city, in persons who had not been exposed to either of these sources. Such cases were always the result of very powerful exciting causes. Nor does it appear to me improbable, that, during a part of the season, such causes might have produced an attack of fever in some measure malignant, in the person of any one who resided in a closely inhabited part of Philadelphia. I am persuaded that the constitution of the atmosphere of the whole city was of a pestilential nature. This constitution differed in different parts of the city only in its degrees of perfection or strength. In some parts, as in Southwark, it attained such perfection as to predispose the inhabitants on whom it acted to *violent* attacks of pestilence from *slight* exciting causes; whereas, in the more westerly and elevated parts of the city, it was so weak that it predisposed the inhabitants only to *slight* attacks, and that not without the aid of *very strong* exciting causes. I believe the same thing was true with respect to the whole of Philadelphia during most of those years in which yellow fever has prevailed in any part of it in an epidemic form.

I have been unable to satisfy myself either with respect to the number of persons that sickened or of those that died of the pestilential fever in the year 1805. The Board of Health attempted to collect an account of the cases as they occurred; but most physicians actually engaged in the disease refused to report to them, in consequence of the extreme impropriety of their conduct towards the sick. I believe, however, that the disease attacked a greater number of persons, and was productive of more mortality than in any preceding year, except 1793, 1797 and 1798. It appears from a report of the physicians who attended the city-hospital, that, between the twenty-seventh of August and the thirty-first of October, that institution received into its wards three hundred and forty-six patients, most of whom were labouring under malignant fever. Were a conjecture on such a subject ad-

missible, I would say, that the aggregate number of sufferers from this fever could not have been less than twelve or fifteen hundred.

## SECTION II.

### OF THE ORIGIN AND CAUSES OF THE DISEASE.

The subject of this section involves considerations of great moment to the welfare of our country, and should therefore be treated with a degree of attention and a sense of responsibility corresponding to its importance. In approaching it, the inquirer should carefully banish from his mind all prejudices and preconceived opinions. The discovery of truth and the promotion of science and of the public good ought to be the sole objects of his regard. With this intent, facts should be related faithfully without discolouration or concealment, and nothing admitted on the ground of conjecture or hypothesis. Under such impressions do we enter on, and by such rules are we determined to conduct the present inquiry.

We foresee that our principal, probably our only, controversy respecting the origin and causes of the pestilential fever of the year 1805, will be with the Board of Health. Previously, therefore, to advancing our own opinion on the subject, it is right that we should at least pay that body the compliment of stating and examining theirs.

When the fever made its appearance towards the close of July, the Board were extremely anxious to establish the doctrine of its importation from abroad. With this view they adopted a measure, for the craftiness and policy of which they were entitled to some degree of credit. Sensible that the current of public prejudice on this subject ran strongly in their favour, and appreciating, with more than their usual discernment, the importance of first impressions, they immediately declared that the disease had been introduced from the Lazaretto by means of contagion. But as it belonged to them alone to close the gates of that institution, and prevent, during the season, all intercourse between it and the city that might prove dangerous to the health of the inhabitants, it was necessary that they should shield themselves from the charge of any neglect or misdemeanour in office. They proceeded,

therefore, to assert, that the persons who had brought the fever to the city, had clandestinely made their way, by night, to the shipping riding quarantine at the Lazaretto, for the illicit purpose of smuggling coffee: that they had there contracted the disease from an infected vessel, and communicated it to their fellow-citizens on their return to the city.

In examining into the authenticity of this charge, four distinct heads will present themselves to our consideration.

1st. At the time when the pestilential fever appeared in Southwark, was there any infected or sickly vessel riding quarantine at the Lazaretto?

2d. If so, had this vessel any coffee on board?

3d. Had the persons first attacked by the pestilential fever been actually at the Lazaretto?

4th. Had any persons, subsequently attacked by the fever, had an intercourse with those who were primarily attacked?

We will proceed to the consideration of each of these heads, in the order in which they are here laid down.

1st. At the time when the pestilential fever appeared in Southwark, was there any infected or sickly vessel riding quarantine at the Lazaretto?

No, there was not. The only sickly, or to adopt the more fashionable phrase, the only *infected* vessel that had arrived at the Lazaretto, previously to this period, was the schooner Nancy, William Lake, master, last from the city of Santo Domingo. She arrived at the quarantine ground on the twelfth of July, nearly two weeks previously to the appearance of yellow fever at Catharine street wharf. The captain himself and one seaman were the only persons sick on board of her, both of whom were removed, immediately on her arrival, to the hospital at the Lazaretto. The vessel was than cleansed and purified agreeably to the directions of the Board of Health. After having passed through this purgatory process, which was completed in less than three days after her arrival at the Lazaretto, the Nancy could be no longer considered as an *infected* vessel; or if so, it was in consequence of some error, defect, or mismanagement in that part of the quarantine establishment which relates to the purification of shipping, and which it was incumbent on the Board of Health to remedy. But there are two substantial arguments to show, that the Nancy was not now an infected, but

a pure and safe vessel. First, the mate and part of the crew that remained and slept on board during her detention at the Lazaretto, continued healthy: and secondly, some of the members of the Board of Health were themselves on board of her, and even passed through and examined (as they conceived their duty directed) all the most suspicious parts of her, without sustaining the smallest injury. But this could not have been the case, had she still been the repository of a pestilential poison. For surely the members of the Board possess no charter of exemption from the influence of such a poison more than other men.

The persons who were the first sufferers from malignant fever in Southwark, were said to have visited the Lazaretto about *five* days previously to the time of their attack. But at that period, the Nancy could not be viewed in any other light, than as a pure and healthy vessel. Nor was there any other vessel then on the quarantine station, that had been at all suspected of contagion. Even admitting then, that these characters had actually gone down to the Lazaretto, and in a clandestine manner gained access to the shipping at quarantine, what mischief could have resulted from such an event? Did not the members of the Board of Health oftentimes visit these same vessels publicly; and did they not return immediately from them to the city and mingle with their families and friends without either contracting or communicating disease? That they did is a fact notorious to every one. It is not very probable, then, that a single visit to these vessels would infect *three persons*, while *five others* (the number of which the Board of Health consist) escaped during the whole season, notwithstanding repeated visits.

2d. Had the schooner Nancy any coffee on board?

She had not more than *one bag*, as appears both from the manifest of her cargo, and from the testimony of the officers resident at the Lazaretto. This bag was landed with the rest of the cargo, and no attempt was ever made to bring it to Philadelphia in a fraudulent manner. It was part of a private adventure, and did not reach the city till long after the commencement of the fever. Indeed it appears from testimony which cannot be doubted, that there were not more than three or four bags of coffee smuggled into Philadelphia during the whole season. These were taken out of the ship

Louisiana, then lying at Newcastle, and arrived in the city at least *four days after the appearance of yellow fever at Catharine street wharf.* They were conveyed immediately to the Northern Liberties, and the persons concerned in the transaction neither lived in, nor had any intercourse with, the district of Southwark where the disease made its appearance. Should any of these facts be controverted, we are prepared to establish the truth of them by the oaths of respectable and disinterested witnesses.

3d. Had the persons first attacked by the pestilential fever been actually at the Lazaretto?

From the best testimony which can be collected on the subject, it appears clearly that they had not. The names of these persons were, Peter Young, Joseph George, and Tobias Smith. Of these, Peter Young, and Tobias Smith were sent down to the hospital at the Lazaretto, where the former died, and the latter recovered. Joseph George was removed into the country, where he also recovered, but has not since returned to the city. Peter Young during his illness, declared repeatedly to the officers of the Lazaretto, with the solemnity of a man conscious that he lay on his death-bed, that, previously to his sickness he had never had the slightest intercourse either with the Lazaretto, or with any vessel lying at quarantine. Tobias Smith, the surviving patient, when examined on oath by certain members of the Board of Health, answered precisely to the same purport. He has since declared, in my presence and in that of several other gentlemen, that he had never been at the Lazaretto, nor even in sight of it, till sent thither by the Board of Health, after the commencement of his illness. The master of this lad is also willing to declare on oath, that for several weeks previously to his sickness, he had not, at any one time, been long enough absent from home, to have gone to and returned from the Lazaretto, either by land or by water.

Nor is this all. J. Williams, mate, and a seaman whose name, I think, is Samuel Milch, remained constantly on board of the schooner Nancy, while she rode quarantine at the Lazaretto. Both of these men are willing to make oath, that, during the time of said quarantine, no person from Philadelphia or elsewhere, except those concerned in the administra-

tion of the health-law, were either on board, along side of, or even near to the vessel.* Dr. Dorsey, the Lazaretto physician, adds his testimony to the above, and, in strong terms, declares his disbelief of any illicit intercourse between this vessel and the city.

With such a weight of testimony against them, and without a single fact in their favour to counterbalance it, it is not a little surprising that the Board of Health should have publicly declared, that the persons first attacked by yellow fever, had been at the Lazaretto, and that for the purpose of smuggling coffee. Yet such a report was actually propagated by that body, or some of its members, and, unfortunately for the cause of truth, has made a deep impression on many weak and credulous minds. It might seem uncharitable to insinuate, that the Board of Health were themselves the fabricators of a story so weak and unfounded; yet it is no less difficult to conceive, how the glaring fallacy of such a tale could have escaped the discernment of men whose duty it was to inquire into its authenticity. It is left to the members of that body to extricate themselves from this dilemma in such way as they may deem most consistent with truth and their own reputation.

But what will these gentleman say to the case of John Davis, who sickened at Catharine street wharf before either Peter Young, Joseph George, or Tobias Smith, and died shortly afterwards in the alms-house, with *black vomit* and other highly malignant symptoms? Why, truly, they have very prudently chosen to say nothing about it; because they could in no way whatever implicate the subject of it in the charge of having clandestinely visited the Lazaretto or the shipping at quarantine. This man was by occupation a dealer in oysters, and had been assiduously engaged in this business for a very considerable time previously to his attack of yellow fever. I have been able to trace his history for at least four weeks preceding that event, and am prepared to prove, by indubitable testimony, that he had not been at the Lazaretto within that period. It is altogether probable that

* J. Williams, the mate, actually has made oath to this purport. A copy of his deposition is in the possession of captain Eggar, quarantine master, who administered the oath himself, and heard the declaration of the deponent. J. Williams was a man of reputation, and was under no temptation to depart from the truth.

he was *never* nearer to that establishment than the eastern channel of the river Delaware, which is distant from it about a mile. The shipping are known to ride quarantine in the western channel, which is at least half a mile from the eastern.

4th. Had any persons, subsequently attacked by the fever, had an intercourse with those who were primarily attacked?

I have been diligent in my inquiries on the subject of this interrogatory, and am able to reply decidedly in the negative. I dare challenge the Board of Health, and all their adherents to disprove or even controvert my assertion. It has been already observed, that the second class of sufferers from the pestilential fever were in the families of Mr. Caleb Bickham and captain Hosey. But it can be established on the oaths of very respectable characters, that neither of these families had ever had the slightest intercourse with the families of John North, or Samuel Chrissman, where the first cases of the disease made their appearance. There was never, on any occasion, a single visit exchanged between these families. The persons alluded to are still living, and will themselves testify to the truth of what is here stated.

Having finished the first division of this section, which was to consist in a statement and an examination of the opinion of the Board of Health, respecting the origin and causes of the late pestilential fever, I shall now proceed to the second division, namely, to lay before the reader, (which will be done with great deference) my own opinion on the same subject.

Under this division I do not know that I shall be able to advance any thing new, as to principles. All I can promise is, to make a fair, candid, and, I hope, satisfactory application of principles already known, to the case in question.

On the origin of the early sporadic cases of the disease it would be useless to dwell, as these were, at most, nothing more than mere specks in the horizon, announcing the approach of the embodied storm. A minute inquiry into this would not, therefore, throw much light on my general subject. On the other hand, if the general subject can be satisfactorily elucidated, there will be no difficulty in accounting for these particulars.

I am one of those who believe the pestilential fever of the year 1805, which made its appearance at the corner of Catha-

rine and Water streets, to have been exclusively of *local and domestic origin, and to have arisen from the poisonous exhalations emitted by a very large bed of putrid oysters and oyster-shells that were suffered to lie on Catharine street wharf.* The purpose for which these substances were thrown on the wharf, is of no consequence. Their existence there, is a fact notorious to all the surrounding neighbourhood, as well as to hundreds who reside in other parts of the city and district.

These oysters and shells lay in that situation from the last of June till within a few days of the close of July. By computation, they were never less in quantity than *one hundred* and sometimes, amounted to at least *three hundred bushels.* The Board of Health or some of the members of it were repeatedly desired by the neighbours to have them removed, but obstinately declined complying with their request, till a very short time previously to the appearance of the fever. One of the members, when somewhat urged on the subject, peevishly replied, " that he knew of no law for the removal of oyster-shells." Had the *wave-washed* timbers or the *tempest-beaten* sails or spars of a ship from Cape Francois, been deposited in the same place, this same gentleman and his colleagues would have passed toilsome days and even sleepless nights to effect their removal. Had no law existed, they would, in the plenitude of their power and self-sufficiency, have immediately made one for the purpose, or, as they did in several other instances, would have acted without a law. But, to have removed offensive oyster-shells, would have been a tacit acknowledgement that such substances might produce sickness, a doctrine which their creed-founders had denounced as heretical. At length, however the clamours of the neighbourhood became general and loud, and the Board, though with much reluctance, were obliged to remove the nuisance.

These oysters and shells were exposed for, at least, four weeks, to a series of the hottest weather that had been experienced in Philadelphia for many years. The consequences of such an exposure need scarcely be mentioned. The mass ran into the highest state of putrefaction, and soon emitted a stench that was quite intolerable. The putrid effluvia extended to a great distance, and were so offensive, that many persons sitting at their doors in the evenings were made sick

by the smell. It will be recollected that no rain fell during this period to wash away or even dilute the corruption. In the meantime, the members of the Board of Health frequently passed by and regarded the scene with as little concern, or apprehension of danger, as if this Avernian mass of putrefaction, had been nothing but a bed of Cyprian roses.

The human race were not the first victims to the pestilential gas, with which these oyster-shells adulterated the atmosphere. Early in July, the cats of the neighbourhood began to droop, and in the course of the month died in considerable numbers. The seat of their disease appeared to be in the alimentary canal, for they were generally affected with both vomiting and purging. No means, I believe, were resorted to for their relief. Nor did some of the other domestic animals of the neighbourhood escape unhurt. Two dogs, one the property of captain Day, and the other belonging to Mr. Jacob Winnemore, were remarked for being very familiar with the bank of putrid oyster-shells. They were said to frequent the place for the purpose of eating stale oysters that were occasionally thrown out of the boats lying at the wharf. These dogs were both taken sick towards the close of July: the former died and the latter recovered with much difficulty. Like that of the cats, their disease appeared to be abdominal, for they were affected with profuse and distressing evacuations both upwards and downwards. Two or three other neighbouring dogs were also indisposed, but in a slighter degree. These circumstances gave rise to a report, that the dogs in that part of the district were poisoned by a gang of housebreakers, which then infested the city, in order that these felons might carry on their nightly depredations without any danger of detection from those faithful domestics. But as the dogs in all other parts of the city escaped, this story was discovered to be without foundation. The dogs were indeed poisoned, but it was by the pestilential effluvia, which they inhaled in its most concentrated state, during their repeated visits to the oyster-bed. At length, in the words of the poet,

" —— The vengeful arrows fix'd in man."

It has been already mentioned, that the first sufferer from the disease was John Davis. This man, from being a dea-

ler in oysters, was constantly about Catharine street wharf, throughout the day, and was therefore, greatly exposed to the septic exhalations arising from the bank of shells. In addition to this, he had, for some nights previously to his illness, slept on the deck of an oyster-boat which lay at the wharf, with no other covering but one of the sails. Thus, did he suffer, perhaps, the greatest possible exposure both to the predisposing and exciting causes of pestilence. For it is well known, that nothing acts with greater certainty in awakening the seeds of such a fever into life, than the influence of the night air on the system, particularly during the languid hours of sleep. Accordingly on the twenty-fifth of July, these causes took effect, though not with such violence as sometimes marks the commencement of a pestilential disease. The patient was removed, from the boat where he had lain, to the house of John North, from whence, on the thirtieth, he was conveyed to the alms-house, where, in a few days, his case terminated fatally with the malignant symptoms already mentioned.

The persons next affected were Peter Young, Joseph George, and Tobias Smith. They all lived in the house of Samuel Chrissman, at the corner of Water and Catharine streets, about thirty paces from the bed of putrid oyster-shells. They were, by trade, house-carpenters, and two of them were somewhat intemperate and irregular in their habits. After being greatly heated by exercise and exposure to the rays of the sun during the day, it was their custom in the evening frequently to recline on benches that were arranged along the side or end of the house, and in that situation, without any covering or shelter over them, to sleep till bed-time. During this time the stench of the oyster-shells was at its height. For, in the summer season, putrid bodies are most offensive in the evening, while the noisome exhalations are undergoing a degree of condensation, but have not yet been entirely precipitated by the cooler air of the night. The exposure of these persons, whether to predisposing or exciting causes, was perhaps but little inferior to that of Davis himself. They accordingly sickened about two days after his attack. The circumstances subsequent to the commencement of their disease have been already stated. It is proper to mention, that the house of Mr. Chrissman was, next to that

of Mr. North, most immediately exposed to the exhalations from the oyster-shells. Judging, therefore, from first principles alone, we would be led to consider the inhabitants of it liable to be next injured by these exhalations. Mr. Chrissman's family had suffered great inconvenience from the stench of the shells.

Two of the next sufferers in order (at least of those who attracted any public notice) were a young gentleman and a lady of the neighbourhood, who had contracted a mutual attachment to each other, and frequently passed their evenings together. The gentleman played delightfully on the flute. On a fine moonlight evening, about four or five days previously to his attack, he went, accompanied only by the young lady, on board of a boat, which he moored at a short distance from Catharine street wharf, and there, in music and conversation, passed the time till about eleven o'clock. In addition to this, he exposed himself considerably by patrolling the streets at night, to assist in apprehending the gang of housebreakers already mentioned. Such causes as these succeeded in producing an attack of fever, which proved fatal in a few days. The young lady did not sicken till after her lover's death. The exciting cause of her disease appears to have been the sight of his coffin, at the distance of at least sixty or eighty paces, as it was borne from his father's house towards the grave. The shock convulsed her frame to such a degree, that she was near sinking to the ground. Symptoms of malignant fever soon afterwards supervened, and terminated her existence on the fifth day of her illness.

Some of the members of the Board of Health have asserted, that this unfortunate girl visited the object of her affections during his sickness, and in that way contracted the disease which destroyed her. This report has no foundation in truth. She never saw him after the commencement of his illness, as his constant attendants during his confinement are ready to assert on oath. It is evident that they both derived their predisposition to disease from the same original cause. And as to the exciting causes, some of them have also been mentioned. We will not attempt to follow the footsteps of this fever any further. We conceive that enough has been already said to establish the fact of its domestic origin; and shall only add, that all the observing men of the neighbour-

hood concurred in attributing it to the same source of corruption. It continued from this time to spread irregularly among those persons who had been most immediately exposed to the deleterious gas emitted by the oyster-shells, till its particular course was at length swallowed up and lost in its epidemic prevalence.

But this is not the only instance where masses of putrid oyster-shells have produced a pestilential fever in our country. Occurrences of the same kind took place in Philadelphia in the year 1803. It will be recollected that during that season, the pestilential fever broke out in two places in the city, or rather in one in the city, and in one in the district of Southwark.

It appeared first in the neighbourhood of the wharf next below Market street, and about a week or ten days afterwards, at Almond street wharf. A great proportion of the intermediate space between these two situations was yet healthy. During that season large quantities of oyster-shells mixed with many damaged oysters, had been thrown on these wharves for the purpose of filling them up and rendering them firm and dry. For some weeks previously to the fever, these animal substances, having taken on the putrefactive process in consequence of the heat of the weather, emitted a very offensive smell. The stench was much complained of by the neighbours in both places, and, when the fever appeared, the putrefying substances were pronounced by many of them to have been the cause of it. These facts were first disclosed to me at the time by persons living adjacent to the wharves, who had listened only to the evidence of their own senses, and who had no preconceived hypothesis to establish. After an attentive investigation of every circumstance, and the most mature consideration of the whole subject, I was convinced that these plain and unprejudiced observers of nature were right in their opinion, and that the first cases of fever, in both places, were to be attributed to the septic gas emitted by the oyster-shells. The events of the year 1805 have contributed still further to the establishment of this belief.

But instances of a similar nature have occurred in other places as well as in Philadelphia. It appears from a neat and correct statement on the subject by Dr. Dick, published in

the Medical Repository of New-York, that the pestilential fever which prevailed in Alexandria in the year 1803, originated from the septic exhalations thrown into the atmosphere by a large bed of putrid oyster-shells. I do not know that any attempt was made to trace that disease to a foreign source. I believe the matter was so clear as to force conviction on the mind of every observer.

In Dieppe, a city of the province of Normandy in France, a pestilential disease was produced in the year 1776, by putrid oysters in the shell. These oysters had lain in a frozen state throughout the winter. On the return of warm weather they were thawed, and soon hurried into a state of deep putrefaction. The stench arising from them became insupportable. The consequence was, a pestilential disease, accompanied with great violence and mortality. Some of its characteristic symptoms were, *a sense of burning in the stomach, a soreness in the epigastric region, and black vomit.* (*See observations on the epidemic diseases and constitutions of France.*)

To men of extensive medical research, these facts will not appear either new or extraordinary. Hosts of similiar ones are to be met with in the writings of both ancient and modern physicians. Indeed there is scarcely any thing more common in medical history than narratives of pestilential diseases originating, in warm climates and seasons, from the putrefactions of large masses of animal matter. What appears most extraordinary is, that, in the very face of such a blaze of testimony on the subject, the competency of these causes to produce those diseases should be called in question. But, in a case where prejudice and passion have usurped the seat of reason and common sense, the greatest absurdities and deviations from truth cease to excite surprise.

Let no one cavil at the statement here given, by alleging that *oyster-shells* are incapable of putrefaction. It is, indeed, true, that the pure calcarious portion of them is incapable of this process: but it is equally true, that this is not the case with respect to the quantity of animal mucus and the numerous worms which they contain, nor with regard to the portion of the oyster itself which always adheres to them. These are substances as susceptible of, and as offensive under, the putrefactive process, as any belonging to the animal kingdom. Besides, the masses of shells mentioned on the present occa-

sion were mixed with hundreds of damaged oysters, which had been thrown on the wharves, as unfit for use. But all speculative reasoning on the subject is a mere waste of words. Facts alone are worthy of our attention. And it is a well known fact, that in each of the beds of oyster-shells, which have been here represented as sources of disease, putrefaction arose to an uncommon height.

The distance around, to which a large mass of putrefying matter may contaminate the air, is altogether undetermined. It must doubtless depend on a variety of atmospherical circumstances, which have hitherto eluded our research. When we recollect, however, the extent of country which is oftentimes rendered sickly by the putrefaction of timber and smaller vegetables in consequence of the erection of a mill-dam, we are compelled to allow a very considerable latitude to the action of such repositories of corruption. The stench of the oyster-shells on Catharine street wharf, in the summer of 1805, extended in great force to Front street. But we have no reason to believe that this stench was a necessary concomitant of the pestilential gas that issued from the same source. This latter aeriform substance was, no doubt, diffused through a much wider extent of atmosphere than the former.

## SECTION III.

### OF THE CONTAGIOUS NATURE OF THE DISEASE.

Under this head of my subject I must necessarily be concise, particularly as I do not know that I have any new facts to offer. Should I succeed in giving a new and more impressive aspect to facts already known, though the measure of my ambition may not be filled up, yet the extent of my present views and expectations will be accomplished. Even in that case, I shall experience the satisfaction of having performed an important duty to my country, by contributing somewhat to the elucidation and establishment of a truth, in which her interest and welfare are deeply concerned.

A knowledge of the contagious or non-contagious nature of a disease, is the result of experience and observation alone. No physician, however sagacious he may be, can tell from the

mere aspect or appearance of a fever, whether it is communicable by contagion or not. There is nothing in the pulse, the countenance, the tongue, the decubitus, the colour of the skin, or the smell of the perspirable matter of the patient, that can possibly lead him to such a discovery. Nor can he see and identify the matter of contagion, as it gradually issues from the bodies of the sick. He must wait, till the question be determined by an intercourse, under proper circumstances, between the sick and the well. If, at every season of the year, and in an atmosphere free from any *common cause* of fever, the attendants and visitants of the sick be attacked by a disease similar in all respects to that under which the sick labour; if this attack occur within a given time after exposure; and if none but persons thus exposed suffer an attack; under such circumstances, there is strong ground to consider the disease as actually contagious. But if, on the other hand, in some one particular season of the year and in that season only, this disease attack, without discrimination, almost every one living in certain situations, whether any previous exposure to the sick have been incurred or not; and, if cases of it when removed from such situations run there course without being in any instance communicated to visitants or attendants; in this state of things, the disease cannot be considered as arising from contagion, but from an atmosphere vitiated by other causes.

We will assume, as examples, the small-pox and intermitting fever, for the further illustration of these several positions. Notwithstanding the singular and striking appearance of the former of these diseases, yet no physician could discover it to be contagious, without having first acquired a knowledge of the fact, either by experience, or through some other channel. I mean, by this, that small-pox exhibits no sign or characteristic naturally and necessarily expressive of contagion, any more than pleurisy, dyspepsia or rheumatism. How, then, do we arrive at a knowledge of this terrible attribute of that disease? I answer, in the following manner.

If small-pox occur in a family where it has never appeared before, whether this family breathe the adulterated atmosphere of a city, or the pure air of the country, and whether the season of the year be spring, summer, autumn, or winter, *all* the individuals of this family will be successively attacked

by a disease precisely similar. Nor does the mischief terminate here. The very same disease attacks also such of their neighbours as kindly visit them in their distress, as well as those who are employed as nurses. But persons in the neighbourhood who keep at a distance, and carefully shun all intercourse, whether direct or indirect, with the sick, retain their health. The immediate atmosphere of the sick, or the atmosphere of some article that has been in contact with them, is the only place in which there is danger. This is, at least, the general course of small-pox.

Under such circumstances it is clear, even to demonstation, that the disease is communicated by contagion from the sick to the well. That is, it is evident that by the disorder prevailing in the systems of the former, a peculiar poison is formed, which, when suffered to act on the systems of the latter, produces a disorder of the same kind. Our only knowledge of the contagion of small-pox, then, is derived from the principles and manner of the spreading of that disease. Were its manner of spreading different, our opinion respecting the cause of its spreading would be also different.

We will now turn to intermitting fever and mark the contrast. This disease appears only at particular seasons of the year, and then principally in low humid situations. It attacks numbers at the same time, or in succession, and that without their having previously had any intercourse with each other. It oftentimes affects only *one or two* in a family, while all the other individuals of that family remain well. If a case of this disease be removed from the flat and damp situation where it originated, to one which is high, dry, and healthy, it terminates without injuring the health of visitants or attendants. The sick subject may be approached by those who are well without the slightest risque. The atmosphere immediately surrounding his person and clothing may be breathed with as much safety, as the atmosphere of a person affected only by a common catarrh. Those persons who keep up the most familiar intercourse with him, retain their health no less perfectly than those who cautiously shun him.

With such facts as these operating on the mind, no one can admit this disease to be contagious. As it is not communicated from the sick to the well, when removed to a high and healthy situation, the universal conclusion is, that

it does not, in the place where it originated, spread by contagion, but by means of a contamination of the atmosphere from some common cause. Did it spread by contagion in one place, it would not, without an essential change in its nature, lose this property when removed to another. But, no such change takes place, inasmuch, as all its symptoms continue the same.

Let us now compare with the foregoing examples, the manner and circumstances of the spreading of our late pestilential fever, and see to which of the two it is most assimilated, small-pox or intermitting fever.

The pestilential fever prevailed during a particular season only, breaking out in July and disappearing in October. It prevailed also in a particular situation, being chiefly confined to the lowest parts of Southwark and of the city. On its occurrence at Catharine street wharf, its earliest victims were characters who had had no previous intercourse with each other. Nor did those who had the most immediate connexion with these sick persons suffer sooner or with more certainty than many others who never approached them. Even the reverse of this was true. For it is a fact, that most, if not all, the attendants and visitants of some of the first subjects of the disease escaped. Throughout the whole season, there were, comparatively, but few families, in which all or even a majority of the individuals sickened. In most families not more than *one*, *two*, or at furthest *three* persons were attacked. Nor did these fall sick in such succession as to furnish any ground to suspect contagion as the cause. They sickened, for the most part, within a few days of the same time. Had the disease spread by an active contagion, it is difficult to conceive how it could have occurred in most families in Southwark and disappeared again, without attacking the greater part or all of the individuals composing them.

In the year 1805, as on former occasions, many cases of the pestilential fever were carried into the surrounding country, were they terminated, without, in a single instance, communicating disease to the nurses or attendants of the sick. There was no more danger in approaching these cases, than if they had been nothing but pleurisy or rheumatism. The immediate atmosphere of the sick was as free from any dele-

terious or febrile poison, as any other portion of the general almosphere.

But this was not all. Many cases of the disease were also conveyed from Southwark into the very heart of the city. These events were, at first, productive of considerable alarm. But this alarm began to subside, when it was found, that such cases uniformly terminated without, in any instance, proving hurtful to those who had even the most familiar intercourse with the sick. Those whose duty confined them constantly to the sick chambers as nurses, and who were frequently in contact with the persons of the diseased, and even repeatedly received their breath warm from their lungs, remained in as perfect health, as those, whose apprehensions impelled them to remain at a distance. Fortunately for truth and, I hope, for the cause of humanity, these occurrences were not lost on the minds of the citizens. Many persons who had, previously, entertained doubts respecting the contagious nature of malignant fever, decided now against its contagion; and not a few, who had formerly been strenuous advocates for its contagion, became, at least, very lukewarm and sceptical on the subject. Indeed, how could the matter be otherwise? It was evident to every one, that cases of this disease when carried from the place where the disease prevailed, into neighbourhoods which were healthy, terminated, like cases of intermitting fever, without being communicated to a second person, and did not, like small-pox, impart a similar disease to all who ventured within the atmosphere of the sick. On the other hand, it was obvious to every one who had an opportunity of making correct observations on the subject, that in the place where the disease did prevail, many became the subjects of it, who had had no intercourse with any sick person previously to their own attack. At least two-thirds of all those who suffered from the disease in Southwark, sickened without any such previous exposure. These circumstances render it evident, that the disease under consideration spread, not, like the small-pox, by means of a morbid poison formed by disordered action in the systems of the sick; but, like the intermitting fever, in consequence of a vitiated state of the atmosphere produced by a cause of greater extent.

But further. At the city hospital, which was a receptacle of the most malignant cases of fever, and to which upwards of three hundred patients were conveyed during the season, no marks of contagion were discovered. This fact, supported also by the experience of former years, is alone sufficient to determine the question. Such a number of patients crouded together into a few wards, could not fail to communicate their disease to physicians and attendants, if indeed that disease were communicable.

In the place where pestilential fever prevails, it spreads by far too rapidly to depend on the gradual and slow operation of contagion. It spreads, for example, much more rapidly than the natural small-pox in the common way. But, when carried into a pure and salubrious atmosphere, it does not spread at all. I am utterly at a loss to know how these circumstances are to be reconciled on the principle of contagion. In one situation, according to the creed of our contagionists, the secreted poison of pestilential fever is more active than the poison of small-pox, whereas in another situation, and that at a very short distance, it is perfectly inert. "There is something more than natural in this, if our philosophy could find it out."

Lastly, on the occurrence of cold weather, the malignant fever, precisely like intermitting fever, was first checked and soon afterwards eradicated. But what effect could the first cold weather of autumn have in arresting the course and destroying the existence of febrile contagion? From every view and consideration of the subject, we are justified in asserting, that it could have no such effect. Cold weather exerts an immediate influence on the external atmosphere, but not on the atmosphere of the chambers of the sick. It is still less capable of producing such a change in the diseased action of the system, as to take from that action the power of forming a morbid poison, provided such a power were before possessed by it. Upon the whole, it may, I conceive, be laid down as an axiom in medicine, that when a disease occurs frequently in any place about the beginning of autumn and uniformly terminates on the commencement of cold weather, that disease, whether it be denominated plague or yellow fever, is a true endemic of the place where it prevails.

and does not depend on contagion either for its original introduction or subsequent propagation.

But it may be asked, if the pestilential fever of the year 1805 was not contagious; if it was produced by septic exhalations issuing from a bed of oyster-shells; why did it continue for nearly three months, instead of disappearing as soon as the source of these exhalations was removed?

At first view this subject seems to be involved in some degree of obscurity. But, when properly considered, this obscurity vanishes. It is not alleged that the identical exhalations proceeding immediately from the oyster-shells, kept the fever in existence during the whole season. They only served at first to kindle and for a certain time to support the flame, which was afterwards fed by similar exhalations from various other sources. But such sources were numerous and copious throughout the whole district of Southwark, as well as in many parts of the city. They existed in all places where putrid animal or vegetable substances were suffered to remain. The constitution of the atmosphere was already, in and of itself, so nearly pestilential, that it was rendered actually so by the admixture of even a moderate share of these putrid effluvia.

Quere. Do the noxious effluvia issuing from a large mass of putrid substances act as a septic ferment on other masses with which they come in contact, and thus accelerate in them the generation and emission of similar effluvia? However fanciful this idea may appear, facts are not wanting to render it probable. Thus we are confidently told, that in places where pestilence prevails, meat and all alimentary substances are found to *putrefy sooner*, than in other neighbouring places, even during the same season, where that disease does not prevail.

## SECTION IV.

### OF THE MEANS OF PREVENTING THE DISEASE.

The means of preventing pestilential fever may be divided into general and personal. The first relate to the police, or municipal regulations of the places where the disease pre-

vails; and the second to the customs and modes of living of the inhabitants.

On this occasion I must necessarily speak in general terms, as a descent to particulars would swell the present section to an improper length: nor does the end I have in view call for a detailed discussion of the subject.

From the first subdivision of this section, namely, that which is to treat of the *general means of prevention*, I exclude entirely all measures and systems of *quarantine*. I am convinced that neither Philadelphia nor any other city in the United States, has ever derived the least advantage, on the score of health, from these burthensome and oppressive measures. They are the offspring of error and superstition, and can never be rendered subservient to the welfare of mankind. It is not against the *purification*, but the *unnecessary detention* of vessels that I here object. No vessel ought to be suffered to enter the port of Philadelphia without being first thoroughly cleansed both of foul air and foul water; for both or either of these substances may prove injurious to health. But this may be accomplished in forty hours as well as in forty days.* Should her cargo or any part of it be damaged, that ought also to be discharged for purification, and not be permitted to be brought into the city in a putrid state. But the vessel herself, when cleansed of her foul air and offensive bilge-water, together with her crew and the undamaged part of her cargo, may be admitted into port with perfect safety, and cannot, therefore, be detained at quarantine without great injustice to the persons concerned in her. I challenge those who may be inclined to oppose me in this sentiment, to point out a single instance in which the health of Philadelphia has been injured by the admission of vessels under these restrictions. I know, indeed, that much has been said about the introduction and propagation of malignant fever among us by infected clothing and crews. But these stories, when strictly examined, have been discovered to have had no foundation in truth. They originated in ignorance, and have been kept in circulation and credit, by prejudice, party spirit,

* The term "quarantine" is derived from the French word "quarante," which signifies forty. In its original acceptation, therefore, it means a lustration or purificatory process which must continue *forty days*, from a superstitious veneration which the founders of quarantine establishments had for that term of time.

and the pride of opinion. Many physicians and other characters of note, adopted and openly advocated them at first, for want of better information, and were afterwards either ashamed or afraid to acknowledge their error.

The whole of the general means of prevention that are within the power of man, may be comprehended under the single term of *cleanliness*. Filth in sufficient quantity, and weather sufficiently hot and dry, when acting in concert, are adequate to the production of malignant fever. Without the agency of such causes, neither sickly crews, nor vessels from the West-Indies on board of which persons had died, would be at all dangerous to the people of the United States. Hence such vessels arrive at Philadelphia in the winter season, without doing any mischief, because then the weather is cold; and hence such crews are accommodated in the summer season without danger in the country, because there filth does not exist in sufficient abundance to vitiate the atmosphere. But neither of these causes acting separately, that is, neither filth nor hot and dry weather, is alone capable of producing this effect. As, therefore, we cannot direct the course of the winds, call down friendly showers from the clouds, nor controul, in any measure, the temperature of the season, our only alternative is the preservation of cleanliness.

We do not contract pestilential diseases immediately from the ground on which we tread, nor from the water which we drink; but from the air which we breathe. The state of the atmosphere is, therefore, the best test of the purity of any situation, so far as that purity is connected with the health of the inhabitants of the place. An atmosphere impregnated with a putrid and offensive smell, can never be otherwise than injurious to the health of those who are compelled to breathe it. It is loaded with a poison inimical to life. The preservation of cleanliness consists in removing or destroying all such sources of filth, as contribute to produce this dangerous impregnation.

The preservation of cleanliness and purity in a large and populous city, like Philadelphia, requires great vigilance, industry and firmness in those persons to whom the business is entrusted. Such are the nature and circumstances of the city, that there is a daily regeneration of filth in all parts of it. To prevent, therefore, undue and dangerous accumulations

of this nuisance, daily removals of it are absolutely necessary during the summer season. The mode of effecting these removals must be accommodated in all cases to the nature of the noxious materials. No substances capable of putrefaction should be suffered to lie exposed even a single hour in the streets, on the wharves, or in any part of the city, in hot weather. But double attention should be paid to the cleanliness of Water street, and the space of ground that extends from it to the river. This constitutes literally the low ground of the Delaware, where all filth has a tendency to accumulate, and where yellow fever has always made its first appearance in an epidemic form. In all parts of the United States the low grounds of large rivers are infested in the autumnal season with bilious fevers, sometimes of a highly malignant character. These fevers uniformly commence on the flats immediately adjacent to, and nearly on a level with, the beds of the rivers, and extend in their progress to the higher and more distant grounds. They are always most malignant in the lower situations. The draining and cultivation (which amounts in fact to a purification) of these flats, never fails to make them more healthy. Though these measures may not prevent the disease entirely, they render it much less general and much less malignant.

In like manner, our pestilential fever appears to be nothing else than the autumnal endemic of the low ground of the river Delaware, heightened by the circumstances connected with a large and populous city. By removing, therefore, particularly from Water street, and the adjacent wharves and docks, all putrid and offensive substances, this disease, though it might not be entirely prevented, would be rendered much less frequent and general. This cleansing process would resemble, in its nature and effect, the draining and cultivation of low marshy ground in the country. But the higher parts of the city ought not to be neglected. For, though the fever originates, in its epidemic form, from the septic exhalations that issue from the immediate vicinity of the river, yet similiar exhalations arising from other and higher situations, serve afterwards to spread and nourish the destructive flame.

Pure water seems to be nature's handmaid, in the great work of purification throughout the globe. Without this cleansing element, many places, even of great extent, would

be soon converted into scenes of pestilential corruption. I need not add, therefore, that streams of water passing constantly along the gutters, and through the sinks and sewers of the city, would contribute greatly to cleanliness and health. Pestilential fever can neither originate nor spread in the country, because, there, the atmosphere is uncontaminated by septic effluvia. When the police, therefore, is such as to remove from a city, as far as possible, whatever may tend to render its atmosphere less pure than the atmosphere of the country, every thing practicable is done, on the score of general regulations, for the prevention of pestilence. A confined atmosphere vitiated by putrid substances is the true fomes of this disease. Water thrown, during warm weather, into the air by engines, and made to fall in the form of rain on the houses and streets, tends to cool the atmosphere, and may somewhat retard the progress and prevent the baleful effects of putrefaction.

Perhaps the greatet individual nuisance, of constant standing, in the city of Philadelphia, is, the docks, in their present foul and neglected state. The remedy for this evil is plain and practicable. Let these repositories of filth be kept constantly cleansed to such a depth, that their bottoms may be at least twelve inches beneath low water mark. Being thus uniformly covered with a body of fresh water, they will cease to vitiate the atmosphere by their pestiferous exhalations.

Another nuisance, highly injurious indeed to ourselves, but which threatens to be still much more so to posterity, is, our public burying-grounds. The continuance of these immense laboratories of corruption in the very heart of our city, excites the surprise of all enlightened strangers. And well it may; for it is a circumstance disavowed alike by reason and humanity. Notwithstanding the feeble defence set up for it by some, on the score of sentiment, and regard for the relicts of our friends, yet the very best feelings of our nature are arrayed against it. What can be more painful and shocking to us, than to reflect, that after death, our festering bodies may send forth a poison to destroy those whom, in life, we held most dear, and that even at the time when they are affectionately bedewing our memory with their tears? Yet such may be the fatal posthumous effects of our bodies on our best friends, if buried in the vicinity of their dwell-

ings. If the contemplative Hamlet could, without considering the matter "too curiously," trace the noble dust of Alexander till he found it "stopping a beer-barrel;" or that of Cæsar till he detected it, "patching a hole to expel the winter's flaw;" by a much shorter and more natural process may we discover the relicts of the dead in Philadelphia, turned into a pestilential poison for the annoyance of the living.

My second subdivision of the means of preventing pestilential fever, relates to customs and modes of living. This disease, as already remarked, is a native of the warmer regions of the globe. In such regions, general temperance is emphatically a virtue. Excess in eating and drinking is peculiarly injurious, by predisposing to pestilential and other inflammatory diseases. Animal food and strong liquors should be either wholly avoided, or taken with great sparingness, during the summer and autumnal heats. During the winter and spring, their use is accompanied with less danger: yet immoderate indulgence in them, even then, unfits the constitution for bearing with impunity the heats of the approaching season.

Perhaps there is no people in the world, whose modes of living are so ill adapted to the nature of their climate, as those of the inhabitants of the United States. We have derived not only our birth, but also our modes of living, as a people, from Great-Britain and other countries situated in high European latitudes. Certain kinds of food and drink which are proper and salutary in those temperate climates, are highly improper and injurious, particularly during the summer and autumn, in the fervid regions of our own country. I am convinced that a much more moderate indulgence in the use of animal food and stimulating drinks, would prove beneficial to the inhabitants of Philadelphia, on the score of preventing pestilential fever. We are told that by means of temperance alone, Socrates walked in security amid the devastation of the plague of Athens.

There is one custom, in particular, very general among the inhabitants of Philadelphia in the summer and autumn, which I cannot forbear to mention with disapprobation, because it is peculiarly injurious to health. It is that of sitting at their doors in the evening, exposed to the coolness and humidity of the atmosphere, without any other clothing than what they

had worn during the heat of the day. In many places such a custom is safe and allowable; but in Philadelphia it certainly is not, in consequence of the great difference between the mid-day and the evening temperatures of the air. Perspiration is frequently checked, the whole cutaneous system disordered, and severe fevers produced by such imprudent exposure to this change of temperature. Were the citizens only to *walk* in the evening air, or could they be persuaded to dress themselves, while sitting, in warmer clothing, the custom, which is certainly a pleasant one, would probably be attended with no bad effects. But when, to this exposure to external coolness, is added, as is frequently the case, the internal use of ice-creams, and certain refrigerating drinks, the evil is carried to a very hazardous extreme. Yet such are the dangerous customs and luxuries in which many of our citizens are in the habit of indulging themselves. In pestilential periods, I have known them frequently to act as the exciting causes of the disease.

Promote, by every practicable measure, personal and general cleanliness; cultivate strict temperance, in all things, particularly during the summer and autumn; and avoid all unnecessary exciting causes. Such, in brief, would be my advice to the citizens of Philadelphia, as to the best mode of preventing pestilence.

## SECTION V.

### OF THE HISTORY OF THE DISEASE.

This disease spared neither age, sex, nor colour. Very old persons, however, were not so liable to it as those who were younger, and it was less malignant in children than in adults. Women did not suffer so generally nor so much from it as men, in consequence, probably, of being exposed to fewer and less violent exciting causes. Persons of African descent, considering their numbers in the places where it prevailed, suffered nearly as much from it as the descendants of Europeans. Other circumstances being alike, it was most fatal to persons in the bloom of life, that is, between the ages of fourteen and twenty-five or thirty years. Habitual drunkards, when attack-

ed by it, were its most certain victims. I do not recollect to have either seen or heard of, a single recovery in a patient of this description. Persons who had had the disease in former years, were not so liable to be affected by it again; and if they even did experience it a second time, their attack was generally very light. I knew of but one death from a second attack. This occurred in the case of a young man who had suffered from the disease in 1797, but had since revolutionized his constitution by the excessive use of ardent spirits. He was to be included in the class of habitual drunkards. I witnessed but two instances in which a second attack was experienced during the same season. In each case the last attack was very mild. In both of these instances about three weeks intervened between the first and second attacks. Relapses never took place, except as the consequences of great imprudence. They were, therefore, extremely rare; for the apprehensions and actual weakness of convalescents rendered them very cautious. In addition to this, the susceptibility of the system to the predisposing stimuli was greatly exhausted by the action of the febrile poison. Owing to these several causes, only one relapse fell under my notice, during the whole season.

As in former years, Creoles and persons long resident in, and perfectly seasoned to, tropical climates, escaped the disease. The pestilential constitution of the atmosphere did not acquire sufficient strength, to produce any morbid effect on systems that had been long accustomed to the impressions of a similar constitution in other quarters of the globe. For the liability of strangers to pestilential fever, in some parts of the West-Indies, during every season of the year, evinces the constant prevalence of a pestilential constitution of the atmosphere in those places.

In compliment to the good sense of the inhabitants of Philadelphia, it deserves to be mentioned (and the present is not an improper place to do it) that preventive amulets were almost entirely abandoned during the prevalence of the fever. Vials of *the vinegar of the four thieves*, bags of camphor suspended from the neck, bundles of tarry rope, and such like trumpery, formed no longer the superstitious badges of those whose business called them into sickly neighbourhoods. The citizens in general were convinced that the use of these odoriferous substances could be of no avail in guarding them from

the action of a poison, which was afloat in the atmosphere, and which they were, therefore, inhaling at every breath. A few physicians, however, belonging to the school of Dr. Meade, the great apostle of contagion, though I believe they did not actually carry preventive amulets about them, still continued to observe in sick rooms what they *very wisely* denominated *the necessary precautions*. These precautions consisted in the following strange and indecorous behaviour: viz. Always to take their position on the windward side of the bed; to spit on the floor, into the fire-place, or elsewhere, every minute during their stay in the room; to blow the nose repeatedly in the pocket-handkerchief; to stand at a distance from the patient and stare at him, as if afraid to approach him; or, if they ventured to examine the pulse, to do it with the arm both of the physician and the patient extended to its full length, the physician's face being turned away in the opposite direction to avoid the patient's breath; to request a sight of the tongue of the sick, at such a distance, as not to be able to distinguish either its colour or state; to put, in a hasty manner, a few questions to the nurse, without, perhaps, attending with calmness to her answers; and, lastly, to run out of the room, should the patient make an effort to vomit, particularly if he should discharge from his stomach, a fluid of a dark colour. On some occasions these *necessary precautions* have been carried still further. The wary disciple of contagion has either made his inquiries and given his directions through a window from the street, from the foot of the stairs, or has just ventured to take a peep into the sick room, though not "*behind the curtain*," and in that situation has made a mockery of ministering to the relief of his patient. This is no exaggerated picture, but a true representation of scenes that have occurred in the city of Philadelphia, to the great terror, not to say, the inevitable destruction of many sick persons. I could name the places where, and the physicians by whom, these "pranks, enough to make high Heaven weep," were actually played. But to return from this digression.

The disease was generally, but not always, ushered in by an impaired appetite, a languor, a heaviness, and certain unusual feelings, of one or more days continuance. At the end of this time a chilliness came on, accompanied occasionally

by some degree of tremor. In most cases, however, no tremor was experienced, and the chilliness was often compared to a stream of cold water running down the back, and branching out in various directions round the body and along the limbs. During this time, a general paleness of the surface of the body, a shrunken countenance, and cutis anserina, manifested the existence of a *spasm of the skin*. For, though I do not agree with the disciples of Hoffman, in considering a spasm on the surface of the body as the *cause* of fever, it is unquestionably one of its earliest symptoms. The respiration was less free than in health, and the pulse, though preternaturally frequent and quick, was small and contracted. This state of things frequently continued for a whole day, the patient considering himself too slightly indisposed to be confined to bed, yet too ill to venture out.

To these symptoms succeeded a burning fever, accompanied by a severe pain in the head and back, extending in many cases to the lower extremities, and sometimes affecting the hands and arms. The pain in the head ran across the forehead, a little above the frontal sinuses. The pain in the back, but more particularly in the limbs, approached at times the severity of rheumatism. The pulse was now frequent, full, and tense, and was still marked by a quickness in its stroke. The stomach became disordered, sometimes with a burning sensation, and a puking of a fluid tinged with bile oftentimes ensued. In some cases there was a great soreness of the scrobiculus cordis. This symptom, however, which was a very unfavourable one, seldom came on till a more advanced period of the disease, and was generally accompanied with frequent sighing.

The skin, though hot, was now soft and moist, evidencing in the system a disposition to perspiration. This symptom furnished, as will appear hereafter, an excellent indication relative to the treatment of the disease. In this respect the pestilential fever of 1805 differed somewhat from those of preceding years, except that of the year 1803. Patients seldom suffered much from thirst.

Though costiveness was a common symptom, it was not so obstinate as in former years, particularly in the years preceding 1803. Mild purgatives were sufficient for its removal.

The urinary discharge was not much affected as to quantity, and its appearance was so various as to forbid description. Nor, as far as my experience went, could any useful practical inference be drawn from an attention to the state of this fluid. An entire suppression or rather deficiency of urine, arising as I conceive from a paralysis of the kidneys, and which fortunately occurred but very seldom, was always a fatal symptom. I do not recollect to have ever witnessed a recovery in any case of yellow fever, where this symptom appeared. I think the same remark, has been made by other writers.

The appearance of the tongue was very various. In some cases it was nearly natural. In others it was natural from the top to the distance of about two inches downwards, and from thence to the root covered with a thick crust of a buff colour. In other instances a streak, of the same colour ran along on each side of the tongue, nearly to the tip of it, while its centre was either entirely clean and of the natural colour, or marked with a browish streak. But the most common appearance was a crust, of a buff colour, spread uniformly over the tongue, lighter towards the point, and deeper as it approached the base. I think I generally observed the affection of the stomach, and the general severity of the disease, to be somewhat in proportion to the thickness of this crust. I have frequently anticipated danger from a very thick covering of the tongue alone, when other symptoms were not unpromising. Subsequent events generally proved, that my apprehensions were not unfounded. The tongue was for the most part moist. A dry and dark coloured tongue, such as we meet with in typhus fever, was a very rare occurrence. When it did take place, I am inclined to believe that it was always the result of neglect or injudicious treatment, which had suffered the disease to assume something of a typhous form. In a few cases of extreme malignity, I have seen the tongue of a livid cast, as if actually verging towards mortification. I need scarcely add that the termination of such cases was always fatal. In many instances the tongue was affected with a tremor, when the patient put it out for the inspection of the physician. This also was an unfavourable symptom.

The crust which covers the tongue is a morbid secretion, evidencing a state of excessive and disordered action in the

vessels of the part. It resembles the inflammatory membrane formed in the trachea in cases of croup. It is always of the same colour with the size or coagulating lymph of the blood. If the size of the blood be buff coloured, the crust is buff coloured, and if white, the crust is white. Hence we are justified in believing, that the crust is derived from the coagulating lymph, by the disordered action of the secreting vessels of the tongue. Is the internal coat of the œsophagus and stomach ever lined with a similar crust? I have not heard of any dissections having been made with a view to determine this question; but, were I to judge from first principles alone, I should think the affirmative most likely to be true. The subject is well worth investigation, both as a matter of science, and a point of practical utility.

There was something (not easily described) in the aspect and general appearance of the patient, which, to an experienced practitioner, served to discriminate this disease at first sight, as well as to indicate the degree of danger that accompanied it. A physician who had seen and attentively examined five cases, must have been dull indeed, if he could not have discriminated the sixth and all subsequent ones, at a single glance.

The countenance was flushed, sometimes of a slightly livid, and at other times of a light mahogany colour. The eyes were red, watery, and heavy, or of a muddy cast, their colour consisting of an intimate mixture of red and a dull white. There was frequently a frown on the brow, indicating a want of ease and serenity within. Indeed the whole expression of the countenance was that of a kind of hebetude and distress, accompanied with some degree of moroseness.

The patient was oftentimes uneasy, tossing from one side of the bed to the other, without being able to assign any cause for his restlessness. This was an unfavourable symptom. At other times he lay quiet, complaining of nothing, but answering, when interrogated, that he was well enough, except that he was weak. This also was a terrible symptom, as it indicated an almost entire extinction, or at least a very depraved state, of feeling. Most persons were affected with a giddiness, or, as they termed it, a lightness of the head, when they attempted to sit up or stand erect. With some patients this was almost the only complaint. In an early

stage of the fever, delirium, though an occasional, was by no means a common symptom. This disease was seldom accompanied with a cough. On the other hand, I have known it to suspend, for a time, an habitual cough in old persons, and even the hooping-cough in children. For

> " ——— where the greater malady is fix'd
> " The lesser is scarce felt.———"

The reader will understand, that the foregoing description is applicable only to those cases, in which the character of the fever was completely formed. In cases of a lower grade, which occurred in considerable numbers, the state and aspect of things were materially different.

Such were the course and appearance of the disease, till about the third or fourth day, when a sudden and very remarkable change occurred. All the febrile symptoms disappeared, and nothing but their effects remained behind. The temperature of the skin sunk below its natural state, and the pulse below its natural force. In point of frequency the pulse did not now deviate much from its healthy state. The eyes became yellow: a yellowness also appeared first about the angle of the lower jaw, and on the neck, and spread gradually over the face, and the whole body. All acute pain was now at an end, and the patient oftentimes fancied himself nearly well. But this flattering delusion was of transitory duration. It arose from a morbid and fallacious state of sensation, or, perhaps, I might say, from a want of sensation, in consequence of the disorganization of certain parts of the system. It certainly discovered the utmost derangement in the nerves. A more melancholy train of symptoms was soon to succeed. It was now that the mind became the sport and wreck of an unconquerable delirium. Sound sleep was exchanged for perpetual watchfulness, or for broken slumbers even more distressing than watchfulness itself. The patients became so restless and ungovernable that they could not without difficulty and even force be confined in bed. In many instances they walked about their rooms till within a few minutes of their dissolution. There is, perhaps, no disease in which the patient lives so long after his skin has become cold, and the artery at his wrist has ceased to pulsate, as in this. I have known a

person to survive nearly three days, when entirely pulseless, and with his extremities as cold as marble. During this state of things, the temperature of the surface of the thorax retains its warmth, and the action of the heart is strong and convulsive.

But this secondary stage of the disease was oftentimes marked by more disorder of the stomach, than of the intellect. In these cases, soon after the febile symptoms had subsided, the patient was attacked by an obstinate vomiting. At first, nothing was discharged but the drinks that had been taken in, mixed with a quantity of mucus. This mucus became by degrees more abundant, and assumed somewhat of a flaky and brownish appearance. This brownish colour grew deeper and deeper, till it terminated finally in *black vomit*, a symptom from which I never witnessed a recovery. The evacuations by stool, were at the same time equally black, and of a tarry consistence.

The preceding symptoms of the secondary stage, were oftentimes attended in their course by others, no less distressing and dangerous. These were hæmorrhages from the nose, mouth, anus, and other parts of the body. Blisters and old sores were not unfrequently marked by obstinate oozings of blood. The puncture made by the lancet in blood-letting, has been known to become troublesome from the same cause. The blood discharged through these channels was never capable of firm coagulation, an evidence that its vitality was nearly extinguished, and that the system was fast approaching to dissolution.

Death, when it occurred, generally took place sometime in the course of the second day, from the commencement of the second stage of the disease, and on the fifth or sixth day, from the time of attack. Some patients died in apparent ease and composure, while others, in their last hours, appeared to suffer great agony. I have witnessed some cases, towards the close of which every act of respiration was accompanied with a kind of short groan. I ought to have mentioned previously to this, that the disease is marked by frequent and deep sighing, particularly after the commencement of its secondary stage, when the action in the extremities of the system has become very feeble.

The pestilential fever might be briefly characterized in the following manner, viz. a disease of warm weather, arising from septic exhalations, and marked by high febrile symptoms for the first three or four days. These symptoms then disappear, and are succeeded by great debility, preternatural coolness of the surface of the body, preternatural weakness of the pulse, a yellowness of the eyes and skin, obstinate vomiting, sometimes of a black matter, delirium, and hæmorrhages from various parts of the body. Though death is not a necessary concomitant, it too often brings up the rear of these symptoms. The crisis happens most frequently on the fifth or sixth day.

Such is the general course of the disease; but, like all other general rules, it is subject to many exceptions. Anomalous cases not unfrequently occur, different from any thing here laid down. The disease sometimes attacks suddenly, and with such violence as to prostrate the vital energies of the system, and completely paralyse the powers of reaction. In such cases, no febrile commotion occurs. The pulse, skin, and tongue are nearly natural, and the patient complains of nothing but weakness, giddiness, and sometimes a dulness of vision. All the mental powers, but particularly the memory, are greatly impaired. The patient can scarcely recollect your question long enough to return a pertinent answer. He speaks incoherently, and either remains still in bed, or saunters about his room, while able to walk, in an unmeaning manner. These cases generally terminate fatally on the third, or at the farthest the fourth day, with hæmorrhages, petechiæ and sometimes black vomit. They are attended throughout with an alienation of mind.

Other cases are still more violent and rapid in their course. I knew of one person dying in nine, one in twenty-four, one in twenty-seven, and another in about thirty-six, hours illness. In these instances, the subjects of disease had been addicted to frequent intoxications. They were delirious from the commencement of their several attacks, till the hour of their dissolution.

In other instances, the disease has lingered on in a slow and very insidious manner, for the space of two weeks, and then terminated fatally. I was called to visit a patient on the fourteenth day of his disease. He had walked out daily,

from the commencement of it, and even when I first saw him was walking in his room. I found him actually in a dying state. His skin was yellow, his eyes muddy, marked with a mixture of red and yellow; his extremities were cold, he was without a pulse, and complained of great soreness in the epigastric region, particularly when pressure was made on the part. In a few hours black vomit came on, and in the evening my patient expired. Had this case of disease been properly treated at first, it might have been cured with as much certainty as a case of common catarrh. I say, with as much certainty, though perhaps not in so short a space of time; for I attended several cases of a similar description, from the second or third day after their commencement. In these, though they were not dangerous, I had great obstinacy to encounter. They required more blood-letting than any other form of the disease, notwithstanding the pulse was never very high. One of these cases was not brought to a favourable crisis till the fourteenth day.

It appears from the particulars of the foregoing history, that the epidemic of 1805, consisted of at least three varieties or forms of disease, differing from each other in their degrees of violence.

The first had its crises on the third or fourth day, and was mostly fatal in its termination. This form approached or perhaps equalled in malignity the Asiatic plague. It was the result of strong exciting causes, or of a strong predisposition of the system, or of both. It occurred most frequently among the intemperate, and the poor who dwelt in confined situations, and lived on a scanty and unwholesome diet.

The second had its crisis on the fifth, or from that to the seventh day, and when attended to in time was a manageable disease. This was the most common form of the epidemic. It occurred among persons in better circumstances, and was produced by causes of less violence. It included perhaps seven-eighths of all the cases of the disease.

The third had its crisis from the ninth to the fifteenth day, and was never fatal except from neglect or very gross mismanagement. It approached the character of a common remittent, although it had no regular exacerbations. It appeared most frequently in persons under twelve years of age. I do not recollect to have met with it in more than two or three

adults during the whole season. I believe it always occurred at a distance from the river. It was evidently the result of the weakest exciting and predisposing causes, that were capable of producing the disease.

## SECTION VI.

### OF THE CAUSES OF PARTICULAR SYMPTOMS.

UNDER this head of my subject there are four symptoms, in particular, that deserve to be mentioned. These are, 1st. A suppression or entire defect of urine. 2d. The yellowness of the eyes and skin. 3d. Hæmorrhages from different parts of the body. And 4th. The black vomit. These shall be briefly considered in the order in which they are here enumerated.

1st. *A suppression or entire defect of urine.* It is fortunate that this symptom but rarely occurs, for it is, as already mentioned, of the most fatal import. It must arise from a paralysis of the kidneys, for there appears to be no urine secreted in those cases where it occurs. With the immediate cause of this paralysis we are unacquainted. In most cases of the fever there is a pain in the lumbar region, which manifests a determination of the disease, either primarily or by sympathy, to the kidneys or adjacent parts. As inflammation in the kidneys disorders the stomach, may not an inflammation of the stomach produce a similar effect on the kidneys? But, whether the affection of the kidneys be primary or sympathetic, the same cause or impression which produces pain in them may, by being increased in force and violence, completely paralyse them, both as to sensation and motion. It is thus that a moderate shock of electricity produces pain, whereas a very violent one destroys the power of feeling by giving rise to a temporary paralysis of the part. I do not know that any vestiges of actual inflammation of the kidneys have ever been observed in the dissection of pestilential subjects.

2d. *The yellowness of the eyes and skin.* This symptom is erroneously attributed by many to the absorption of bile and its subsequent diffusion through the system. It occurs as frequently in cases where the bowels are open, and the bile freely

and copiously discharged, as in those where no such discharges take place. Nor is the yellowness of the pestilential fever of the same cast with that of jaundice. Though the difference between these shades cannot be easily described, it can be very readily distinguished by the eye of an experienced observer. Besides, the yellowness in jaundice comes on gradually and slowly, whereas that of pestilential fever frequently takes place in a much shorter space of time.

This symptom appears to arise entirely from a morbid state of the blood. In what precise kind of alteration or derangement in the crasis of the blood this morbid state consists, we cannot determine. It is produced, however, by diseased vascular action, and has no connexion with absorption of bile from the liver. During this yellowness of the skin, the blood is always in what physicians call *a dissolved state:* that is, it is in a state of greatly diminished vitality. For a dissolution of the blood is nothing else, than a want of a sufficient quantity or degree of life in that fluid, to enable it to coagulate or contract, when drawn from a vein and exposed to the stimulus of the atmosphere and of the vessel into which it is received. In the disease arising from the bites or stings of venomous serpents, or insects, a similar yellowness takes place from the same cause; or, perhaps, from the immediate action of the poison of the serpent or insect, on the blood itself. Certainly, however, the yellowness in such cases can have no connexion with any preternatural absorption from the hepatic system. There are other instances where an alteration in the crasis of the blood gives a yellow colour to the skin. Thus, when a severe contusion is received, the blood effused into the cellular membrane of the part becomes first blackish; but previously to its being taken up by the absorbents, it undergoes such a further change as to communicate to the skin a greenish, and then a yellowish cast. The vitality of the blood is here lost.

3d. *Hæmorrhages from different parts of the body.* This symptom is attributed by many to a dissolved state of the blood. That fluid, say they, becomes so thin and subtle that in the course of circulation it percolates or oozes through the fine mouths of the capillary vessels. Nothing, however, can be more truly erroneous and unmeaning than such an explanation. While circulating in the arteries and veins, what is called dissolved blood is no thinner than blood in the highest

state of health. It appears thinner when drawn out of the veins, only because it is incapable of contracting, or coagulating as it is termed, while healthy blood soon takes on that process, and becomes a solid mass. Were there no disease in the solids of the body, the blood could not make its way through them by percolation, if it were even as thin as water.

It is in the condition of the blood-vessels themselves, that we must look for the cause of the hæmorrhages under consideration. A dead animal fibre is known to be much more easily lacerated than a living one. It is one of the properties of the vital principle, whatever that principle may be, to act as a strong bond of union between the constituent parts of the body which it animates. A muscle, when dead, cannot support, without laceration, one fourth part of the weight which, while living, it is capable of raising, without the least injury, by simple contraction. An athletic man can, by the action of certain muscles of the arm, raise a body weighing several hundred pounds. But these same muscles, when dissected after death from the arm of the strongest man, are incapable of supporting a body weighing fifty pounds.

But if such is the weakening influence of actual death on animal fibres, an approach towards death must produce, to a certain degree, a corresponding effect. In other words, a weakened state of the vital principle must be accompanied by a weakened state of cohesion between the particles of animal fibre. In an advanced stage of yellow fever every thing bespeaks a great exhaustion and debility of that principle. In consequence of this, the component parts of the several organs of the system are held together by a very feeble tie. In such a state of things, the minute and tender vessels of the gums, schneiderian membrane, and of the internal coat of the rectum, give way, on the smallest violence being offered to them, and allow the blood to escape through their lacerated extremities. Nor is there left any ground of hope that this hæmorrhagy will be readily checked.

When a rupture of one or more blood vessels occurs during a healthy state of the system, a hæmorrhagy more or less copious always ensues. But there are two principles, or rather two modifications of the same principle, on which this hæmorrhagy at length ceases. The blood coagulates in the

mouths of the ruptured vessels, closing them up like so many plugs, and the mouths of the vessels themselves contract, rendering their diameters considerably smaller than natural. Both these phenomena take place in consequence of the activity or vigour of the vital principle, and the blood necessarily ceases to flow. But no such salutary efforts of the system occur to check the spontaneous hæmorrhagies in the advanced stage of pestilential fever. The blood neither coagulates in the mouths of the ruptured vessels, nor do the mouths of the vessels themselves contract. The vital principle is in too feeble a state to effect such purposes. The consequence is, that the extremities of the ruptured vessels continue patulous and the blood remaining fluid, continues to flow without interruption. The true indication for checking these hæmorrhagies is, to add vigour to the vital principle, a measure which we are too seldom able to accomplish. The hæmorrhages in question, then, depend on an enfeebled state of the animal fibre, and a want of the power of contraction or coagulation in the blood.

4th. *The black vomit.* The matter of black vomit has been considered as the result of disordered hepatic action. As far as my inquiries have extended, this was the general opinion, till as late as the year 1798. In the month of May of that year, Dr. Stuart, of Philadelphia, published an Inaugural Dissertion, in which he gives a different view of the subject. He derives the matter of black vomit, to use his own words, from "an altered secretion from the arteries of the stomach, which, in a healthy state, are wont to secrete mucus and the gastric fluid." This ingenious Thesis is contained in the second volume of "Medical Theses" published by Thomas and William Bradford.

Some time after this, Dr. Physick published in the Medical Repository, vol. 5, page 129, a very valuable and interesting paper on the same subject. In this communication the doctor delivers it as his opinion, that the matter of black vomit is "a secretion from the inflamed vessels of the stomach and intestines." This opinion he appears to have derived from numerous dissections made at the city hospital, during the time in which he acted as physician to that institution. If I comprehend correctly the doctor's meaning, he considers the secretion of the matter of black vomit as a sign of approach-

ing death in the stomach, but not of actual gangrene. For he observes, "This colour (*the colour manifested by the internal surface of the stomach*) differs very much from the dark purple of a part in a state of gangrene."

To the opinion of these gentlemen I have nothing to add, having never myself made the origin of black vomit an object of particular research. Independently of the evidence of actual dissections in their favour, there is nothing at all improbable in their opinion. On the other hand, it has numerous analogies to support it. We find the lungs, kidneys, and other glands, capable, when diseased, of secreting a matter of a black colour. Why, then, may not a matter of the same colour be discharged from the secretory vessels of the stomach? Even the matter of perspiration secreted from the skin, has been observed on some occasions to be of a dark colour.

## SECTION VII.

### OF THE PROGNOSIS.

As the unfavourable import of several symptoms of malignant fever has been already mentioned, the present section will consist, in part, of a repetition, in a more condensed form, of what may be found scattered through some of the preceding ones. It may not be improper for me to state, that all the prognostics, which I shall here attempt to lay down, will be drawn from what has fallen under my own observation. It is possible, perhaps I might say, probable, that the experience of other practitioners may have been different.

I know of but two symptoms of malignant fever which I have had reason to consider as necessarily fatal. These are,

1st. *A total defect of urine*, arising, as already mentioned, from a paralysis of the secretory vessel of the kidneys. And,

2d. *The genuine black vomit.* From neither of these two symptoms have I ever witnessed a recovery. Yet, in many cases, where one or the other of them existed, I think I have seen all the resources of the healing art exhausted for the purpose of saving life. In some instances, indeed, a suppression of the urinary discharge will exist for some time in consequence of the action of blisters, and yet the case terminate favourably. But that *suppression* is intirely different from the

*defect* of which I here speak. The former affection is common to all diseases in which blisters are applied; whereas I have met with the latter only in malignant fever. I do not, however, positively say, that it never occurs in any other form of disease.

There is also a discharge of a dark coloured matter from the stomach, in pestilential fever, from which recoveries are by no means unfrequent. But this discharge generally occurs early in the disease, and appears to consist of vitiated bile. Some practitioners even welcome it as a favourable omen. It is essentially different both in appearance and in import, from the true flaky, coffee-ground black vomit, which takes place in a more advanced stage of the disease.

*A yellowness of the eyes and skin*, is considered by some practitioners as a favourable symptom, provided it occur early in the disease. In the epidemic of 1805, this was not the case. At whatever period of the disease that symptom occurred, it denoted great danger, though not certain death. Indeed how could the case be otherwise, since this yellowness plainly bespeaks a dissolved state of the blood? Throughout the whole epidemic, I learnt, from painful experience, to tremble for the fate of my patient, as soon as a yellowness of the surface appeared.

*Hemorrhages from different parts of the body.* From the explanation given of this symptom, in the preceding section, it evidently foretels great danger, but is not necessarily fatal. I have had the pleasure of witnessing numerous recoveries from it. I think I have observed these hemorrhages to be accompanied with least danger when they proceed from the nostrils, and from the vagina. Like a yellowness of the surface, they also denote a dissolved state of the blood.

*Dissolved blood.* When the blood drawn in venesection is incapable of coagulating, or contracting into a firm mass; when it throws up a thick but very tender covering of yellow size, while the cruor beneath remains perfectly fluid, this symptom furnishes ground for an unfavourable prognosis. Yet recoveries do occur in cases where the blood exhibits this appearance. The number of these, however, is proportionally small. I think a dissolved state of the blood is less dangerous in an early, than when it occurs in an advanced, stage of the disease. In the former case, I have seen the

blood, by repeated venesections, restored from its dissolution and rendered capable of vigorous contraction; but, in the latter, I have very seldom been witness to such a result. I have at this moment (January 4th, 1806) two cases of disease under my care, which, in September last, would have been called decided cases of yellow fever. In one of these cases, I have employed venesection twice, and in the other three times. In each of them, the blood first drawn was in a *high state of dissolution*, but exhibited much less of this appearance on the subsequent repetitions of the operation. I have now the pleasing prospect of a favourable termination to both of these cases. Dissolved blood bespeaks, as formerly mentioned, great exhaustion of the vital principle, and cannot, therefore, do otherwise than denote danger.

The tongue being generally and deeply covered with a very yellow crust, whatever may be the state of the other symptoms, is always a sign of some degree of danger. I have found it necessary to watch very closely every patient whose tongue exhibited this appearance.

So much for the import of single symptoms. But it is also necessary to speak of certain combinations of symptoms which occur in the progress of pestilential fever.

In the commencement of common cases of this disease, it is difficult for the practitioner to form a prognosis, in any measure satisfactory even to himself. So much depends on a variety of incidental circumstances, over which he can have no controul, that the issue is necessarily involved in great uncertainty. But as the disease advances, this uncertainty becomes less and less, till, at length, a tolerably correct estimate can be formed respecting its termination. To the eye of an experienced practitioner, the third, or at farthest the fourth day, seldom fails to disclose the certain issue of the disease.

A red or muddy eye, a countenance expressive of moroseness, or silent anguish, with sighing and great jactatio, are bad symptoms, at whatever period of the disease they may occur. But if they exist on the commencement of the secondary stage, and be accompanied with delirium and a soreness of the epigastric region, the case may be considered as almost hopeless. Under such circumstances the approach of black vomit is greatly to be apprehended. A burning sensa-

tion in the stomach, and a flatulency, either with or without vomiting, are unfavourable symptoms, inasmuch as they denote the actual existence of, or a strong disposition to, inflammation. Hiccough is dangerous for the same reason. By proper treatment, however, these affections may be oftentimes removed. To speak in general terms, any irritation of the stomach, in an advanced stage of the disease, under whatever form such irritation may appear, is to be regarded with apprehension, whereas a tranquil and settled state of that organ is always favourable.

What are called *walking* cases of the disease, where the patient is sometimes in bed, and sometimes sauntering about his room, complaining of nothing but debility, and exhibiting a dull and listless countenance, a watery eye, and a complexion almost of a mahogany colour; in such cases the termination is for the most part fatal. The patient not unfrequently walks about, and exhibits, at intervals, marks of considerable muscular strength, even after the radial artery has ceased to pulsate.

When a coma or partial apoplexy ushers in the disease, the utmost danger is to be apprehended. This symptom denotes great derangement in the brain or stomach, or both. In such cases, as well as in those marked by high delirium, the brain is only secondarily affected. The original seat of the disease is in the stomach, or some part of the alimentary canal. The brain suffers by sympathy with the organs first attacked. I conceive it impossible for the poison of yellow fever to make its first impression either on the brain or the arterial system. It acts first on the stomach, in the same manner as arsenic, or an over dose of corrosive sublimate.

A weak, depressed, and shattered pulse, with but little preternatural frequency, in the beginning of an attack, accompanied by a moderate temperature of the skin, a frequent sighing, and a tongue of a pale buff colour, or of an appearance nearly natural, are symptoms which mark a disease of great danger and malignity. They bespeak a prostration or an exhaustion of the system, which leaves the practitioner but little to act on.

We will now turn to the more pleasing side of our subject, and enumerate a few of those symptoms and circumstances which promise a recovery.

In the lighter attacks of the disease, such as I would rank under the third variety, the prognosis is always favourable. Such cases never terminate fatally, except through neglect or extreme mismanagement.

In common cases, or those of the second grade of malignity, a full, free, open and active pulse is a desirable symptom. It denotes a vigorous state of vital energy, which gives the practitioner room to work. If it be accompanied by a tranquil state of the stomach, and a condition of the bowels capable of being readily moved by medicines, the patient may be pronounced in but very little danger. In the epidemic of the year 1805, a disposition to a free perspiration was always favourable.

On the commencement of the second stage of the disease, if, with a remission of the febrile symptoms, the stomach remained tranquil and the mind free from delirium, and if to these symptoms were added a gentle perspiration, a pulse somewhat expanded, and an equable state of heat over the whole system, the patient might be considered as out of danger.

A change of the countenance from a clouded and frowning, to a pleasant and serene, and of the eye from a red or muddy to a clear and bright appearance, were favourable symptoms. I might speak in more general terms, and say the same thing of a return of the patient's natural countenance, aspect, and habits. This latter, however, is true with respect to all diseases. A patient is never free from danger, who is rendered, to use a common expression, "unlike himself," either in countenance, speech, or behaviour, by an attack of fever. A loss of this "unlikeness," and a return of his natural appearance, natural tone of voice, and natural habits, is always a symptom of favourable promise.

A plentiful discharge from blisters was a flattering symptom. It bespoke a centrifugal tendency in the disease, which had the happy effect of saving the vital organs. The same thing might be said of a return of this discharge after it had for some time ceased, and also of severe pains in the limbs and a general soreness of the flesh. These also denoted a centrifugal state of action in the system, and were therefore favourable signs. In one or two instances I saw a salutary crisis produced, or at least accompanied, by an eruption on

the skin. In a few cases, the first mark I discovered clearly expressive of amendment was, the tongue becoming free from crust about the tip and edges. I always regarded this symptom as an earnest of a happy issue.

A return of reason after delirium, of a clear and active after a dull and palsied state of intellect, and of tranquillity after great restlessness, were propitious omens. The same thing was true with respect to the occurrence of a copious flow of urine, after a scanty secretion of that fluid, and a return of natural warmth after a preternatural coolness of the skin. A protraction of the disease, under almost any circumstances, beyond the ninth day, opened a door of hope. Mortal cases were seldom lingering ones. The seventh day was mostly their utmost boundary.

An incipient disappearance of the yellowness of the skin and eyes, and a general cessation of hæmorrhages, were to be regarded as signs of an approaching favourable crisis. So was a return of appetite for any article of diet, of which the patient had been particularly fond during health.

Such are a few of the favourable and unfavourable appearances in yellow fever; I mean, particularly, as it prevailed in Philadelphia in the year 1805. When taken together, they must be acknowledged to form but an imperfect outline: for a complete prognosis of this disease is a subject which words are not made to communicate. After all that can be said respecting it, there is a certain indescribable something in the *tout ensemble* of the patient, which the practitioner can learn only from experience and observation. This *je ne sais quoi*, this something which language cannot impart, is communicated to the experienced practitioner by the eyes and other features of his patient, by the general expression of his countenance, his mode of speaking and breathing, his decubitus, and by almost every circumstance connected with sensation and life. It is from this general state of things, that the most safe and satisfactory prognosis is to be derived.

## SECTION VIII.

### OF THE MORBID APPEARANCE DISCOVERED ON DISSECTION.

THOSE parts of the system which claim more particularly the attention of the anatomist, in his dissections of bodies that have died of malignant fever, are the brain, the lungs, and the abdominal viscera. Indeed as the cranium, the thorax, and the abdomen, contain all the organs that are essential to life, one or more of these cavities must constitute the principal seat of most diseases that prove mortal.

There are but few, if any cases of pestilential fever, which terminate fatally, without being marked, particularly towards their close, with some degree of delirium. Judging from this circumstance, we would be naturally led to conclude, that the brain must necessarily exhibit, on examination, something of the ravages or effects of inflammation. Experience, however, in this instance, as in many others, exposes the fallacy of our reasoning, and teaches us that the case is otherwise. I know of no dissection performed, during our late epidemic, in which the brain exhibited any unequivocal marks of inflammation. The appearance of that organ was found to be natural, or very nearly so, in every case of which I have been able to procure satisfactory information. Such, I believe, was the uniform experience of Dr. Physick, on similar occasions, in former years. In no instance, I think, was he able to discover marks of inflammation in the brains, of those who had died of malignant fever, notwithstanding the degree in which their minds had been previously shattered by delirium. Hence it is obvious, that this most distressing symptom can be nothing but a sympathetic affection.

Nor is this circumstance by any means peculiar to yellow fever. In many other cases delirium is to be regarded as a sympathetic or secondary affection, proceeding from a primary affection of the stomach. The following very remarkable instance of the kind, fell under my own notice, in the summer of the year 1802.

A labourer had fatigued and over-heated himself, by working on board of a vessel, during a very hot day. A

bucket of fresh pump water was handed to him, of which he hastily swallowed upwards of a quart. In less than five minutes he was perfectly delirious, and in less than twenty a corpse. In this case the delirium must have been sympathetic, for it came on too suddenly to admit of an explanation in any other way. A vein was opened in the patient's arm, and the blood which was drawn, was completely dissolved; in other words, it was *perfectly dead.* This appears to be the case in all instances of sudden death, occasioned by blows or other violent impressions on the stomach. The fact demonstrates, in a very striking point of view, not only the close connexion that exists between the brain and the stomach, but also the immediate and powerful influence which this latter organ exercises over the life of the whole system.

*The lungs.* This viscus suffers but little, except by sympathy, in pestilential fever. Dissections generally exhibit it in a sound state, at least, in a state of freedom from any unequivocal marks of inflammation. When such marks appear, they are to be attributed to a pre-existing affection, or to some irregularity in the course or character of the disease. The lungs, therefore, are not to be regarded as the seat of yellow fever.

*The abdominal viscera.* Some of these viscera, particularly the stomach and small intestines, were always found in a state of high disease. The coats of the stomach were sometimes thickened, and that organ itself diminished by contraction to less than half its natural size. On its internal surface were marks of inflammation, and in its cavity more or less of the matter of black vomit. This, however, was not always the case. In a few instances, even where this matter had been discharged during the life of the patient, none of it was found in the stomach after death. The same dark coloured fluid was detected occasionally in the intestinal tube, though in smaller quantities.

The small intestines exhibited, in general, the strongest marks of inflammation. Their blood vessels were enlarged, their coats were thickened, and they were sometimes bordering on a state of gangrene. The gangrenous disposition was most evident on their internal surface. This inflammation was communicated from the intestines to the mesentery

and the omentum, and extended in some cases along a portion of the peritoneum.

The appearance of the gall-bladder was various. It was sometimes filled with black, sometimes with green, and sometimes with natural coloured bile. At other times it was found almost empty. The biliary duct was but rarely obstructed. Hence there was no ground to consider the yellowness of the skin as resulting from morbid hepatic absorption.

The appearance of the liver was, for the most part, natural, unless when altered by a pre-existing chronic affection. It was observed, that the livers of drunkards exhibited, in general, marks of disease. This was, no doubt, owing to the previous action of ardent spirits, and other stimulating drinks on that organ. It does not appear to be true, therefore, as has been alleged by some, that the liver is a principal sufferer in yellow fever. Nor is it by any means true, as asserted by others, that a deficiency of bile is even a common, much less a necessary symptom of that disease. On the other hand, the complaint is generally accompanied by very profuse discharges of that fluid. Perhaps the copiousness with which the bile is secreted and discharged, constitutes the principal cause why the liver so rarely suffers from inflammation. Such a discharge performs on that viscus the office of local depletion.

The existence of *intro-susceptio intestinalis* was the only actual *discovery* made by the knife of the anatomist, during the epidemic of 1805. This affection was confined to the small intestines, and was found to exist in several cases of the disease. I believe the discovery was first made by Dr. Stuart, in private practice, and afterwards by Dr. Parish, at the city hospital. I do not know that these gentlemen had had any intercourse or communication with each other on the subject, previously to the phænomenon having been observed by both of them. Dr. Stuart has published an account of one of his dissections, accompanied with a plate, in the Medical Museum, vol. 2, page 299.

The course of the introsusception was always from above downwards, the upper portion of the intestine being the *receiver*, and the lower portion the *received*. The following remarks are offered in explanation of the manner in which this affection appears to take place.

A tonic spasm or permanent contraction occurs in a portion of the intestine, greatly diminishing its cavity and circumference, and suspending entirely its peristaltic motion. The portion of intestine immediately above this is free from spasm, and retains its peristaltic motion. Perhaps this motion is even increased by the action of some purgative medicine. When such a state of things continues for any length of time, the event likely to result from it is sufficiently obvious. The upper portion of intestine, forming by its natural action a fold at the place where the permanent contraction commences, passes down over the lower portion, and receives it completely into its embrace. But as the natural direction of the peristaltic motion is from above downwards, so long as the contraction of the intestine remains permanent, its lower portion will necessarily continue to be invested by its upper one.

The modus operandi in the process of introsusception may be illustrated by the manner in which some people take off their stockings. These persons turn down the head of the stocking, and by pulling this, invert the whole stocking, and thus draw it off the leg. In this case, the lower portion of the stocking, like the contracted or lower portion of the intestine, remains stationary, while the upper portion is forced over it, so as to receive it completely within itself.

I am aware that objections have been made to the explanation which I have here attempted. Some physicians contend that during the formation of introsusception, the intestines are under the influence of a compound movement, or rather of two movements running in opposite directions. These characters allege, that the upper or receiving portion of the intestine, moves downwards by its natural peristaltic motion, while the lower or received portion, moves upwards by an inverted or preternatural motion. But this explanation, besides being more complex than that which I have offered, is liable to other insurmountable objections, which will readily present themselves to the mind of the reader.

Although the discovery of the existence of *introsusceptio intestinalis*, is interesting in itself, yet I am sorry to add, that it has shed no new light on the treatment of the disease. We are even unable to enumerate any particular set of symptoms, which, during the life of the patient, give satisfactory

evidence of the presence of this affection. It belongs, as yet, to the knife of the anatomist, and to that alone, to discover its existence after death. Could the existence of introsusceptio be clearly ascertained during life, perhaps bleeding the patient *ad deliquium animi*, would be the most likely way to remove the inflammation and spasm, which constitute it.

From what has been laid down in this section, it appears, that the primary and deepest ravages of malignant fever, are confined entirely to the abdominal viscera. This is the strong hold of the disease, where it carefully concentres all its powers. Though the other parts of the system suffer greatly, they appear to suffer only through the medium of sympathy. They tremble from the shock impressed on these organs so essential to life. It is thus that the branches of a tree wither, when a deadly canker invades its roots.

## SECTION IX.

### OF THE TREATMENT OF THE DISEASE.

The epidemic of the year 1805, though highly malignant in many instances, and productive of great mortality, was not in itself an unmanageable disease. There were but few cases in which it was *necessarily* fatal. It was rendered so by neglect, terror, indigence, or bad treatment; sometimes by all these causes combined. When early application was made for medical aid, and when that aid was skilfully and attentively administered under favourable circumstances as to nursing and accommodations, it was less obstinate, and, in most cases, I think, less dangerous, than peripneumony. During the course of the epidemic I attended about two hundred and fifty patients. Of this number I lost but five to whom I was called on the first day of the disease. Of these, two were children, who had been previously much debilitated by hooping-cough: two of the remainder were drunkards, and the fifth had the misfortune to be without a good nurse. Under the most favourable circumstances, however, this last case would have probably terminated fatally, for it was one of the most malignant I ever witnessed. The system of the subject of it appeared as unsusceptible of the action of medicine as a block of marble. The impression made by the dis-

ease was so strong, as to preclude or swallow up every other.

But when no medical aid was called in, as was too frequently the case, till the third or fourth day after the commencement of the attack, the prospect of a favourable issue was very faint. In this state of things, the disease had already run, perhaps, two-thirds of its course, and produced such derangement in some vital organ as nothing could remove. The physician had then too often to undertake the painful task, of engaging in a combat, where victory had already declared for his adversary. For it is during the course of the first three or four days, while the febrile action runs high and is determined to some of the abdominal viscera, that the disease generally aims its fatal blow. Unless the physician has an opportunity of warding off this blow, or breaking its force, it is too apt to reach the life of his patient. In other words, inflammation of the stomach or some other organ essential to life, has advanced so far, that nothing can arrest its progress, or prevent it from proceeding to a fatal issue.

When called in on the first or second day of the disease, my chief reliance was placed on *bleeding*, *purging*, *sweating*, and *blistering*. These were my four cardinal remedies. When skilfully managed, they very seldom failed to bring the disease to a favourable termination. We will treat of them in the order in which they are here enumerated.

1st. Of *blood-letting*. It is scarcely necessary to observe, that this remedy was admissible only in the earlier stages of the disease, while the vascular action was yet excessive. It was not requisite in every case, nor did I find it expedient to repeat it more than three, or, at most, four times, in any case. When the pain in the head and back were violent, particularly if they were accompanied by much sickness at stomach, this remedy was indispensable. From forty-eight to sixty ounces of blood, constituted the full amount of what I drew from any one patient. In general, one or two moderate blood-lettings, on the first and second days of the disease, were sufficient. I seldom prescribed this remedy after the fourth, and never, I think, after the seventh day. The repetitions of it, however, as well as the quantity of blood drawn,

were to be regulated entirely by the circumstances of the disease. No general rule could be laid down, as applicable to all cases. The judgment of the physician must be the arbiter of his practice with respect to this important remedy. It will be perceived from what is here stated, that the epidemic of 1805 called for less blood-letting than that of some former years.

The appearances of the blood drawn in pestilential fever deserve some notice. This fluid is seldom covered with that firm buff-coloured size, which so generally occurs in other inflammatory diseases. When it is, the symptom is a favourable one, as it denotes the existence of nothing but common inflammation. I never lost a patient in yellow fever, whose blood exhibited this appearance.

In general, the blood is almost as florid as if it came from an artery. It coagulates, indeed, but not firmly. The coagulum remains soft and friable, with but very little serum around it. The cause of this appearance is obvious. The vitality of the coagulating lymph (the only vital portion of the blood) is so much weakened by the febrile action, that it is rendered incapable of contracting sufficiently to press the serum out of the general mass. For, in the coagulation of blood, the serum is forced out from among the coagulating lymph and the red globules, on the same principle, that the whey may be squeezed out of curds by the pressure of the hand. This loose coagulation of the blood, then, is the first step towards a dissolution of it.

But there is another appearance or state which is still worse. It is that, in which the blood throws up a very thick but tender covering of coagulating lymph, of a yellow colour, leaving the cruor beneath in a state of dissolution, that is, without any of the coagulating lymph among it. This appearance occurs very frequently in the cases of persons addicted to intemperance. It bespeaks a second step towards a complete dissolution of the blood, and has been already ranked among the unfavourable symptoms.

The third appearance is that where the blood is so perfectly dissolved, as to remain in the state of a dark cruor, with a stratum of coagulating lymph floating on its surface, and possessing the consistence of soft jelly. This denotes the

death of the blood, and the approaching death of the whole system. If recoveries from this symptom ever occur, they are extremely rare.

Blood-letting, though indispensable, was not of itself a real *curative*, but only a *palliative*, remedy. It moderated excessive action, weakened the force of morbid determinations, and thus prevented the destruction of organs essential to life, till these irregular and morbid determinations could be done away, and the general action of the system equalized by the influence of other remedies. In addition to this, it greatly promoted the operation of these remedies, by rendering it much easier for them to arrest or turn aside the currents of wrong action, by which the abdominal viscera, the brain, and other important organs were threatened or oppressed. For a stream or current can be much more readily turned aside or obstructed, if it move with an impetus equal only to one, than it can if it move with an impetus equal to two. So can a wrong determination in the system, when urged but weakly onward, be more readily checked than when it is urged on with greater force. Blood-letting, therefore, was to be regarded rather as a preparative, or predisposing, than as a curative remedy; as preventing death, rather than as restoring health. In cases where a strong determination to the head was evidenced by violent head-ach, a throbbing in the temporal arteries, or an obstinate delirium, the application of leeches and cups to the temples was oftentimes attended with very happy effects. So was a similar application to the epigastric region, when the scrobiculus cordis was sore to the touch, or the patient was affected with an obstinate vomiting, or complained of a burning sensation in the stomach.

2d. *Of purging*. It may be laid down, I believe, as an axiom in the practice of medicine, that purging is an indispensable remedy in all diseases, where there exists an inflammation of, or an undue determination to, the abdominal viscera. It acts on these organs in a manner somewhat similar to the action of topical blood-letting on external parts, when labouring under inflammation or congestion. It not only removes the morbid stimulus of the fæces, but also that of a part of the fluids with which the diseased viscera are over-

loaded. It may be compared to a plentiful suppuration and discharge in removing the inflammatory state of an abscess.

In the epidemics of some former years the bowels were in such a torpid state, that they could not be moved except by the most powerful and drastic purgatives. Hence calomel and jalap, gamboge and scammony, were in common use. In the epidemic of 1805 the case was different. Here the milder purgatives, such as castor oil, an infusion of senna and manna, Glauber's salts, cream of tartar, and, in some cases, even magnesia, were found to be sufficient. In the administration of these, I was governed more by effects than by quantities. I was never satisfied, particularly during the first days of the disease, unless my patient had at least five or six plentiful evacuations, within each space of twenty-four hours. I directed, therefore, some one of the foregoing purgatives to be exhibited at certain intervals, till the desired effect was fully produced. Purging might almost have been denominated the Alpha and Omega of my practice; for it was frequently my first and my last remedy. Towards the close of the disease, however, it was necessary to exhibit purgative remedies with a more sparing hand. At this period, the strength of the system could not bear, nor did the state of the disease require, such copious evacuations.

In a few instances, the torpor of the bowels was such, that calomel was used in considerable quantities, in aid of other medicines, before the wished for effect was produced. In two or three cases, a slight mercurial affection of the mouth was the consequence of this practice. No sooner did that affection appear, than every symptom of danger was at an end. In this particular the epidemic of 1805 corresponded with that of preceding years.

In the early stages of the disease, bilious evacuations, whether dark or green, were considered as favourable, inasmuch as they denoted a freedom both from hepatic obstructions, and hepatic paralysis. For, in some cases, there was a defect of bile from a paralysis of the liver, no less than a defect of urine from a paralysis of the kidneys. I need scarcely add, that an entire torpor or paralytic state of any large and important viscus, is at all times a symptom of great danger.

A free and open state of the bowels had a tendency to relieve that irritation of the stomach and obstinate vomiting, which constituted, at times, a very troublesome and dangerous symptom. That distressing symptom was also, in some instances, removed by mint tea, or a mixture of magnesia in sweetened water. I think this latter remedy was more generally efficacious than any other I employed, in relieving that burning sensation in the stomach, and that sickness and vomiting, which so frequently occur, and produce such distress, in pestilential fever.

As long as the stools continued of a dark colour, the use of purgative medicines could not be omitted with safety, although the disease might be in a very advanced stage, and the patient already reduced to a state of great debility.

Worms were frequently discharged from the intestines by persons labouring under the yellow fever. This circumstance might be explained on a twofold ground. First, the morbid and inflammatory action which oftentimes existed in the intestines, rendered them a very uncomfortable abode for the worms. In consequence of this, these animals were induced to attempt an escape from their labyrinth, which they sometimes effected in a living state. Secondly, the copious use of purgative medicines by sweeping off the mucus of the intestines, in which they lay embedded, and increasing the force of the peristaltic motion, rendered it impossible for the worms to keep their ground. They were, therefore, evacuated along with the general mass of fæcal matter. To these two causes perhaps a third might be added. Many patients took little or no nourishment for several days. This circumstance deprived the worms of their accustomed food, and compelled them to emigrate in search of a region of greater plenty.

In a few instances, I administered a mixture consisting of a solution of tartarized antimony and Glauber's salts. The effect of this was a copious vomiting and purging, or an artificial cholera morbus. Besides effectually cleansing the stomach and bowels, it had the additional effect of determining to the skin and contributing, not a little, to the perspiratory process. This mixture, when exhibited at the very commencement of the attack, arrested on one occasion the progress of the disease, and was, in every instance, in which I

employed it, a useful remedy. Frequent injections were used in aid of purgative with great advantage.

I cannot close this article without observing, that purging does not appear to me to be duly appreciated as a general remedy in the treatment of diseases. There are many complaints, and those of a very serious and alarming nature, which may be greatly relieved, if not entirely cured, by this remedy alone, when carried to a proper extent; and there are few, if any, in which it is not highly useful. Diseases of the head are particularly under its influence. Hence, among the ancients, it was principally relied on for the cure of insanity. In dropsy, hysteria, and indeed in the whole tribe of what are called nervous diseases, it is highly beneficial. As these complaints are almost always attended with costiveness, purging may be considered as the most natural remedy for them. To have its due effect, however, it must be oftentimes carried so far as to deserve the name of an *artificial diarrhœa.*

3d. *Of sweating.* Bloodletting and purging were excellent preparatives for this remedy. They weakened or removed the spasmodic affection which frequently exsited on the surface of the body, and thereby contributed to the process of cuticular secretion. I seldom, therefore, attempted to throw my patient into a perspiration, till after his bowels had been plentifully evacuated.

The stomach being generally tender and irritable, it was of great importance to produce a sweat by the mildest and least irritating means. Accordingly, my only internal remedies, for this purpose, consisted of warm drinks, gently stimulating, such as vinegar whey, lemonade, or teas made of sage, balm, chamomile, or mint. These were taken in such quantities, and at such intervals, as the stomach could bear, and were assisted in their operation by the application of the steams of vinegar to the surface of the body. This application, which was of great efficacy in relaxing the skin, was made in the following manner, the simplicity of which was one of its highest recommendations, as it rendered it universally practicable. Four or five bricks were heated in the fire, to as high a degree as the hand could bear: these were wrapt up in pieces of flannel, which was then plentifully moistened with vinegar. The bricks thus prepared, were placed under the bedclothes,

close to the feet, legs, and hips of the patient, and renewed as often as circumstances required.

By this external and internal application of heat and gently stimulating moisture, a copious sweat was generally produced, and that in a very short time. But it was necessary that this evacuation should be continued for many hours. I have had it kept up from ten or twelve to eighteen or twenty hours, with the happiest effects. Instead of being debilitated, my patient was even invigorated by it, inasmuch as it removed entirely his febrile symptoms and reduced his pulse to a natural state. When properly conducted, it was certainly of all remedies the most perfecly equalizing in its operation. The state of action which it produced was altogether centrifugal, and salutary to the viscera in general. It was particularly successful in stoping the vomiting which so frequently occurred, and in relieving the stomach from all irritation.

If, as was sometimes the case, the process of sweating did not appear sufficient to reduce the pulse to the standard of health, I never hesitated to draw blood, even during the continuance of it. It is an error to allege, that blood letting has a tendency to check the cutaneous secretion. On the contrary, it is certainly calculated to promote it. The sweat seldom failed to flow more freely after blood letting than it had done before it, and, in no instance, did it flow less freely. The duration of the process must be determined entirely by the judgment of the practitioner. I seldom had it continued less than ten, or more than twenty hours. I need scarcely observe, that it was necessary, the perspiration should go off very gradually, and the patient's bed and body linen be changed after its termination. Such change became necessary, at times, even during its continuance, and was not attended with any bad effects. In many instances, the perspiration tinged the linen of a yellow colour. This, however, was to be regarded as a bad symptom of bad and generally protracted cases.

By what *modus operandi* is sweating produced, by the foregoing warm drinks used for that purpose? Does it depend on their entering the lacteals, passing into the general circulation, arriving at the secretory vessels of the organ of perspiration, and, by their actual and formal presence excit-

ing them into action? We presume it does not. It seems to arise from their immediate operation on the stomach, affecting the skin through the medium of sympathy. The effect is oftentimes too instantaneous to be explained in any other way. When the body is heated, a draught of cold water will excite a copious perspiration in less than two minutes. But surely no one will contend, that this fluid could have travelled the whole round of the circulation in so short a space of time. In like manner, a draught of vinegar whey or sage tea will produce a perspiration in a much shorter time, than would be requisite for it to pass through such a circuitous and tedious route. Sweating must be, therefore, regarded as a sympathetic process.

4th. *Of blistering.* The proper period for blistering was, a short time previously to the commencement of the second stage of the disease, that is, a little before the febrile action had entirely subsided. I have frequently prescribed this remedy, and that with great advantage, even before the sweating process had been brought to a close. The object in blistering was, to produce excitement on the skin, in order to keep up as much as possible, a centrifugal state of action, and thus preserve the stomach and other viscera essential to life.

The places on which blisters were most frequently applied were, the wrists and ankles, the insides of the thighs, and the epigastric region. Blistering on the latter situation was frequently of singular service, in removing the disordered action of the stomach. As the intention of this remedy was, to keep up external excitement, the blisters were ordered to be dressed occasionally, if necessary, with epispastic ointment. By this practice, the action in, and the discharge from, them, could be readily continued for any requisite length of time. Blisters were, in some cases, applied on the head, and in others on the back of the neck. The effect of these, however, was, with me, very doubtful. I certainly derived but little if any advantage from them in my own practice. In consequence of this, I relinquished them entirely, long before the epidemic had disappeared.

Much has been said of the extreme caution with which blisters ought to be applied in yellow fever, lest the irritated parts should become gangrenous. But such apprehensions are

visionary and unfounded. During the course of the epidemic, I probably prescribed blisters for two hundred patients. In only one case did a disposition to gangrene occur in the irritated parts, and in that it was fortunately checked by the use of wine, bark, and cordial diet. Notwithstanding what is here said, I have, in some cases, thought it adviseable to allow the first blisters to heal up, and then, apply others at a little distance from them, rather than to have irritation continued for too great a length of time on the same spot.

In many instances blood oozed from the blisters in considerable quantities. This, though an unfavourable, was by no means a fatal symptom. I witnessed probably not less than twenty recoveries from it. I was affected with it myself, in a violent attack of yellow fever, in the year 1797. A much worse symptom than this was, a sensibility or soreness of the blisters, so exquisite, as to compel the patient to cry out as often as they were touched. In many cases that terminated fatally, this extreme, and as I my call it, preternatural soreness, particularly of the blisters on the wrists, constituted a very striking symptom. I ought to have mentioned it when treating of the prognosis of the disease. Recoveries from it in my practice were very rare.

The serum discharged from blisters was in all cases very yellow. This evinced a strong disposition to a dissolution of the blood, even where it did not actually take place. Indeed it is evident to me, that such a disposition is a never-failing characteristic of pestilential fever. Whence does this disposition arise? from the mixture of the febrile poison with the blood, or from its immediate action on the stomach? I am of opinion that it arises from the latter source. The blood of persons who die suddenly, from a blow on the region of the stomach, or in consequence of drinking cold water, when greatly heated, is always dissolved. Yet in such cases, there is neither any thing mixed with, nor any morbid impression made immediately on, the general mass of the blood.

I have thus given a very brief outline of the common, and successive use of the four *cardinal remedies* in pestilential fever. It must not, however, be supposed that they were all necessary or even admissible in every case of the disease.

In many instances moderate purging and sweating, with a low diet, and confinement to bed for a few days, were alone sufficient for its cure.

When the physician was not called in till a late period of the disease, bloodletting was in general inadmissible. His principal reliance then was on purging, sweating, and blistering. These he employed, at discretion, according to the strength of his patient, and the indications of cure. One or the other of them was suited to every period of the disease, though blood letting was in general useful only in its early stage.

There were other remedies of inferior note, calculated more especially for the relief of particular symptoms, which were occasionally employed with much advantage. A few of these deserve to be mentioned.

Intense pain in the head was, as already mentioned, sometimes greatly relieved by cups or leeches, applied to the temples. The same end was attained by wetting the forehead with cold vinegar and water, or iced water, or by surrounding the whole head with bladders filled with ice. These applications, by absorbing heat, contributed to diminish excessive action in the vessels of the brain. Washing the extremities with cold vinegar and water, was grateful to the patients, and, when it did not improperly interfere with the process of sweating, was a useful remedy.

The burning in the stomach and inclination to vomit, so distressing to many of the sick, were greatly relieved by the use of magnesia. That medicine, aided by mint tea, and sometimes by new milk, constituted a principal remedy against these painful and alarming symptoms. Other practitioners derived much advantage, in cases of obstinate vomiting, from the use of spirits of turpentine, a remedy first proposed by Dr. Physick. The doctor appears to have taken the hint, in this instance, from the efficacy of that article in preventing gangrene from severe burns. His object was to prevent black vomit, and the death of the stomach from excessive inflammation. I am sorry to add, that in my hands, that remedy was not productive of those happy effects which are said to have attended its use in the practice of other physicians. This burning and sickness at stomach were, in some instances, relieved by injections of cold water, as well

as by the application of leeches and cups to the epigastric region. This latter remedy I employed several times, with evident advantage. As I do not know of its having been used by any one but myself, I cannot venture to recommend it without diffidence. I hope its effects will be further tested by the experience of others.

Injections calculated and intended to irritate the rectum, and even to produce a degree of inflammation in it, appeared to be on some occasions successful in diverting inflammation and death from the stomach. This remedy acted by revulsion, in the same manner as a blister applied to the epigastric region. It was founded on the general doctrine of sympathy, which teaches us, that morbid irritation in one part of the system, oftentimes relieves morbid irritation in another. It was admissible only after the febrile symptoms had subsided. These injections consisted of brandy either alone or rendered more highly stimulating by a slight admixture of pulverized pepper or mustard, spirits of wine, spirits of turpentine, or a weak solution of corrosive sublimate. As the remedy was both active and severe, it was necessary to use it with great caution, and that only in cases where the usual remedies had been employed without effect.

One or two cases of obstinate hiccough were relieved by assafœtida, both given in pills, and administered, in an aqueous solution, in the form of injection.

Repeated friction of the part with sweet oil contributed somewhat to the relief of a soreness of the abdomen. I tried the same remedy, but not with the same success, in that soreness or rather pain of the lumbar region, which occurs in the beginning of the disease.

In protracted cases of the epidemic, which had assumed something of a typhous form, wine, particularly claret and other light wines, constituted an excellent remedy. These were administered either alone, with water, or mixed with panado, gruel, sago, or other articles of diet. I saw but few cases of the disease, in which the bark could be borne, and in none of them did it appear to be productive of any benefit.

In the fever of 1805, I did not salivate more than two or three patients intentionally, although in the epidemics of former

years, that remedy constituted the sheet anchor of safety and hope.

In a few protracted cases of the disease, where the debility was extreme, accompanied by a coldness of the skin, and a general defect of action throughout the system, great advantage was derived from the use of warm brandy, gin, or spirits and water, sweetened, and given at short intervals in such quantities as the stomach was capable of bearing. I attended one case, in particular, in which the recovery (certainly a more extraordinary one than I had ever before witnessed) was, I think, to be ascribed principally to the use of this remedy. It occurred in the month of October, not long before the disappearance of the epidemic. The subject of it was a young man, about twenty-seven years of age, of a robust constitution, and what is generally denominated a sanguine temperament. From the fifth till the eleventh day of his disease, he was insensible to every thing around him, and did not articulate a single word. His skin was cold, and his pulse barely perceptible; at times, I fancied it not perceptible at all. He had hæmorrhages from his mouth, nose, and anus. That from the latter part was so profuse as to pass through the bed on which he lay; for he was for a time incapable of being moved. His breath was more offensive than the smell of a carious tooth. Notwithstanding his chamber being kept as clean and pure as possible, I was unable to remain in it a greater length of time than was barely necessary for me to feel his pulse, examine his countenance, put a few questions to the nurse, and give her a few directions. Nor could I even have done so much, had not the fetor been corrected by impregnating the air with the steams of hot vinegar. The only circumstance which furnished a ray of hope was, that my patient was still capable of swallowing liquids in small quantities, and what he did swallow was not thrown up again. In this desperate state of things, I prescribed brandy and gin diluted with water and sweetened, in such quantities, and at such intervals as they could be received and retained. The nurse was faithful and persevering. The result was the perfect recovery of my patient, who now enjoys his usual health.

From this case and some others which I attended, and of which I have received information, I am of opinion, that

during the epidemic of 1805 there was a greater number of recoveries from states of the disease apparently hopeless, than occurred in former years. Whether this was owing to something peculiar in the character of the fever, or to the employment of a more skilful mode of treating it, I cannot venture to determine. It was at least highly gratifying to the friends of humanity, and tended to alleviate the distresses of the time.

It is common for practical writers to give a catalogue of tonics, or chronic stimulants, calculated to restore the strength of convalescents. In convalescency from the malignant fever, I employed in general no medicine of this description. The usual and best tonic in my practice was, aliment and drink, gently stimulating, grateful to the stomach, and easy of digestion. In the commencement of this regimen, porter and water, oysters and weak chicken broth, constituted common and very useful articles. The patient returned by degrees to the use of wine, and other kinds of animal food. Nor did I ever experience the least inconvenience from this neglect of the fashionable tonics of the shops. It is in a state of convalescency from chronic or protracted forms of fever, that such tonics are more particularly useful. In yellow fever, I am convinced they are seldom or never necessary, provided the complaint in its early stages be treated in such a manner, by proper evacuants, as to remove all inflammation and congestion from the internal viscera, and to restore an equilibrium or equal diffusion of excitement throughout the system. The same thing is true with respect to most other acute forms of disease. Provided the early treatment of them be such as to prevent them from running into a chronic state, medicinal tonics, or chronic stimulants are seldom requisite during a state of convalescence from them. In such diseases, these remedies are rendered necessary only by the neglect or mismanagement of patients, or by a want of skill on the part of practitioners. Suppose a physician were called to the relief of a person reduced to extreme debility by a long abstinence from food, what would be his prescription? Would he administer peruvian bark, chalybeates, elixir of vitriol, or preparations of any of the bitter tonics? I conceive he would not. At least I am sure such treatment would be improper.

The only thing necessary or admissible in the case would be, such mild alimentary articles as might be suited to the state of the stomach and system in general. But a patient in a state of convalescence from a well treated case of yellow fever or other acute disease, is in a state analagous to that of a person greatly debilitated by a long want of food. All congestion and preternatural action in particular organs are removed, and the excitement throughout the system is equable and free. Nothing, therefore, is requisite, but proper aliment and drink, and a prudent use of the *non-naturals*, to restore the convalescent to his usual health and vigour.

THE END.

Caldwell, Charles
... An essay on the pestilential or yellow fever ...

This book is the appendix to Alibert, J. L. A treatise on malignant intermittents. Philadelphia, 1807. The complete book is ~~in Washington, and is not~~ in the HMD collection.