An inquiry into the various sources of the usual forms of summer & autumnal disease in the United States, and the means of preventing them : to which are added, Facts, intended to prove the yellow fever not to be contagious / by Benjamin Rush, M.D.

AN INQUIRY

INTO

THE VARIOUS SOURCES

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THE YELLOW FEVER

NOT TO BE CONTAGIOUS.

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Fevers

THE following sheets are extracte from the second edition of the author's Medical Inquiries and Observations, in which they are subjoined to the history of the yellow fever as it has appeared in Philadelphia, during the last twelve years, as an epidemic, or in sporadic cases. They are published in their present form in compliance with the advice of a friend, who supposed they would thereby be more generally read by persons who have not been educated to the profession of medicine.

AN INQUIRY, &c.

THE business of the following inquiry is,

I. To enumerate the various sources of the usual forms of the summer and autumnal disease in the United States. And,

II. To mention the means of preventing them.

To render the application of those means as extensive as possible, it will be proper to mention, under the first head, all those sources of summer and autumnal disease, which have been known to produce it in other countries, as well as in the United States. They are,

1. Exhalations from marshes. These are supposed to be partly of a vegetable, and partly of an animal nature. They are derived from the shores of creeks and mill ponds, as well as from low and wet grounds; also from the following vegetable substances in a state of putrefaction.

2. Cabbage. A malignant fever was produced at Oxford, by a putrid heap of this vegetable some years ago, which proved fatal to many of the inhabitants, and to several of the students of the university at that place.

3. Potatoes. Nearly a whole ship's crew perished at Tortola, by removing from her hold, a quantity of putrid potatoes.

4. Pepper.

5. Indian meal.

6. Onions.

7. Mint.

8. Anise and caraway seeds, confined in the hold of a ship.

9. Coffee. "About the time," says Dr. Trotter, "when notice was taken of the putrefying coffee on the wharf at Philadelphia, in the year 1793, a captain of a man of war, just returned from the Jamaica station, informed me, that several vessels laden with the same produce came to Kingston, from St. Domingo. During the distracted state

of that colony, this article, with other productions, had been allowed to spoil and ferment. The evolution of a great quantity of fixed air, or carbonic acid gas, was the consequence; and in these vessels, when opening the hatchways, such was its concentrated state, that the whole of the crew, in some of them, were found dead on the deck. A pilot boarded one of them in this condition, and had nearly perished himself*."

10. Chocolate shells.

11. Cotton which had been wetted on board of a vessel that arrived in New-York, a few years ago, from Savannah, in Georgia.

12. Hemp, flax, and straw.

13. The canvas of an old tent.

14. Old books, and old paper money, that had been wetted, and confined in close rooms and closets.

15. The timber of an old house. A fever produced by this cause is mentioned by Dr. Haller, in his Bibliotheca Medicinæ.

* Medicina Nautica, p. 324.

16. Green wood confined in a close cellar during the summer months. A fever from this cause was once produced in this city, in a family that was attended by the late Dr. Cadwallader.

17. The green timber of a new ship. Captain Thomas Bell informed me, that in a voyage to the East-Indies, in the year 1784, he lost six of his men with the scurvy, which he supposed to be derived wholly from the foul air emitted by the green timber of his ship. The hammocks which were near the sides of the ship rotted during the voyage, while those which were suspended in the middle of the ship, retained their sound and natural state. This scurvy has been lately proved by Dr. Claiborne, in an ingenious inaugural dissertation, published in Philadelphia, in the year 1798, to be a misplaced state of malignant fever. Dr. Lind mentions likewise the timber of new ships as one of the sources of febrile diseases. The timber of soldiers' huts, and of the cabins of men who follow the business of making charcoal in the woods, often produce fevers, as soon as the bark begins to rot and fall from them, which is generally on the second year after they are erected. Fevers have been excited even by the exhalation from trees, that have been killed by being girdled in an old field.

18. The stagnating air of the hold of a ship.

19. Bilge water.

20. Water that had long been confined in hogsheads at sea.

21. Stagnating rain water.

22. The stagnating air of close cellars.

23. The matters which usually stagnate in the gutters, common sewers, docks, and alleys of cities, and in the sinks of kitchens. A citizen of Philadelphia, who had a sink in his kitchen, lost a number of cats and dogs by convulsions. At length one of his servants was affected with the same disease. This led him to investigate the cause of it. He soon traced it to his sink. By altering its construction, so as to prevent the escape of noxious air from it, he destroyed its unwholesome quality, so that all his domestics lived in good health in his kitchen afterwards.

24. Air emitted by agitating foul and stagnating water. Dr. Franklin was once infected with an intermitting fever from this cause.

25. A duck pond. The children of a family in this city were observed, for several successive years, to be affected with a bilious remitting fever. The physician of the family, Dr. Phineas Bond, observing no other persons to be affected with the same fever in the neighbourhood, suspected that it arose from some local cause. He examined the yard belonging to the house, where he found an offensive duck pond. The pond was filled with earth, and the family were afterwards free from an annual bilious fever.

26. A hog-stye has been known to produce violent bilious fevers throughout a whole neighbourhood in Philadelphia.

27. Weeds cut down, and exposed to heat and moisture near a house.

Fevers are less frequently produced by putrid animal, than by putrid vegetable matters. There are, however, instances of their having been generated by the following animal substances in a state of putrefaction.

1. Human bodies that have been left unburied upon a field of battle.

2. Salted beef and pork.

3. Locusts.

4. Raw hides confined in stores, and in the holds of ships.

5. A whale thrown upon the sea shore in Holland.

6. A large bed of oysters. The malignant fevers which prevailed in Alexandria, in Virginia, in 1803, and in Southwark, adjoining Philadelphia, in the year 1805, were derived from this cause*.

7. The entrails of fish. And,

8. Privies. The diarrhœa and dysentery are produced, oftener than any other form of summer and autumnal disease, by the fœtor of privies. During the revolutionary war, an American regi-

* It has been a common practice with many families, in New-York and Philadelphia, for several years past, to lay in a winter store of oysters in their cellars in the fall of the year. May not a part of these oysters, left in these cellars from forgetfulness, or from being unfit for use, become, by putrifying there, the cause of malignant fevers in the succeeding summer and autumn?

ment, consisting of 600 men, were affected with a dysentery, from being encamped near a large mass of human fæces. The disease was suddenly checked by removing their encampment to a distance from it. Five persons in one family were affected with the yellow fever in Philadelphia, in 1805, who lived in a house in which a privy in the cellar emitted a most offensive smell. No one of them had been exposed to the foul air of Southwark, in which the fever chiefly prevailed in the autumn of that year. Three of them sickened at the same time, which obviated the suspicion of the disease being produced by contagion.

There are several other sources of malignant fevers besides those which have been mentioned. They are, exhalations from volcanoes, wells, and springs of water; also flesh*, fish, and vegetables,

* The following fact, communicated to me by Mr. Samuel Lyman, a member of congress from the state of Massachusetts, shows the importance of attending to the condition of butchers' meat in our attempts to prevent malignant fevers.

A farmer in New-Hampshire, who had overheated a fat ox by excessive labour in the time of harvest, perceiving him to be indisposed, instantly killed him, and sent his flesh to a neighbouring market. Of twenty-four persons who ate of this flesh, fifteen died in a few days. The fatal disease

eaten in a putrid state; but these seldom act in any country, and two of them only, and that rarely, in the United States.

The usual forms of the disease produced by miasmata from the sources of them which have been enumerated are,

1. Malignant or bilious yellow fever.

2. Inflammatory bilious fever.

3. Mild remittent.

4. Mild intermittent.

5. Chronic, or what is called nervous fever.

6. Febricula.

7. Dysentery.

8. Colic.

9. Cholera morbus.

produced by this aliment fell, with its chief force, upon the stomach and bowels.

10. Diarrhœa.

In deriving all the above forms of disease from miasmata, I do not mean to insinuate, that sporadic cases of each of them are not produced by other causes.

In designating them by a single name, I commit no breach upon the ancient nomenclature of medicine. The gout affects not only the blood-vessels and bowels, but every other part of the body, and yet no writer has, upon that account, distinguished it by a plural epithet.

The four last of the forms of disease, that have been mentioned, have been very properly called intestinal states of fever. They nearly accord, in their greater or less degrees of violence and danger, with the first four states of fever which occupy the blood-vessels, and in the order in which both of them have been named. I shall illustrate this remark by barely mentioning the resemblance of the yellow fever to the dysentery, in being attended with costiveness in its first stage, from a suspended or defective secretion or excretion of bile, and in terminating very generally in death, when not met by the early use of depleting remedies.

The variety in the forms and grades of the summer and autumnal disease, in different seasons, and their occasional changes into each other in the same seasons, are to be sought for in the variety of the sensible and insensible qualities of the atmosphere, of the course of the winds, and of the aliments of different years.

II. The means of preventing the different forms of disease that have been mentioned, come next under our consideration.

Happily for mankind, Heaven has kindly sent certain premonitory signs of the most fatal of them. These signs appear,

I. Externally, in certain changes in previous diseases, in the atmosphere, and in the animal and vegetable creation.

II. In the human body.

1. The first external premonitory sign that I shall mention is, an unusual degree of violence in the diseases of the previous year or season. Many proofs of the truth of this remark are to be met with in the works of Dr. Sydenham. It has been confirmed in Philadelphia, in nearly all her malig-

nant fevers since the year 1793. It would seem as if great and mortal epidemics, like the planets, had satellites revolving round them, for they are not only preceded, but accompanied and followed, by diseases which appear to reflect back upon them some of their malignity. But there is an exception to this remark, for we now and then observe uncommon and general healthiness, before the appearance of a malignant epidemic. This was the case in Philadelphia, previously to the fevers of 1798 and 1799. I have ascribed this to the stimulus of the pestilential miasmata barely overcoming the action of weak diseases, without being powerful enough to excite a malignant fever.

2. Substances, painted with white lead, and exposed to the air, suddenly assuming a dark colour; and winds from unusual quarters, and unusual and long protracted calms, indicate the approach of a pestilential disease. The south winds have blown upon the city of Philadelphia, ever since 1793, more constantly than in former years. A smokiness or mist in the air, the late Dr. Matthew Wilson has remarked, generally precedes a sickly autumn in the state of Delaware.

3. Malignant and mortal epidemics are often preceded by uncommon sickness and mortality among

certain birds and beasts. They have both appeared, chiefly among wild pigeons and cats in the United States. The mortality among cats, previous to the appearance of epidemics, has been taken notice of in other countries. Dr. Willan says it occurred in the city of London, between the 20th of March and the 20th of April, in the year 1797, before a sickly season, and Dr. Buneiva says it preceded a mortal epidemic in Paris. The cats, the doctor remarks, lose, on the second day of their disease, the power of emitting electrical sparks from their backs, and, when thrown from a height, do not, as in health, fall upon their feet*.

4. The common house fly has nearly disappeared from our cities, moschetoes have been multiplied, and several new insects have appeared, just before the prevalence of our late malignant epidemics.

5. Certain trees have emitted an unusual smell; the leaves of others have fallen prematurely; summer fruits have been less in size, and of an inferior quality; and apples and pears have been knotty, in the summers previous to several of our malignant

* Medical Journal, vol. iv.

autumnal fevers. Dr. Ambrose Parey says, an unusually rapid growth of mushrooms once preceded the plague in Paris.

II. The premonitory signs of an approaching malignant epidemic in the human body are,

1. A sudden drying up, or breaking out of an old sore; fresh eruptions in different parts of the body; a cessation of a chronic disease, or a conversion of a periodical into a continual disease. Of this there were many instances in Philadelphia, in the year 1793.

2. A peculiar sallowness of the complexion. This was observed to be general in Philadelphia, previous to the yellow fever of 1793. Dr. Dick informed me, that he had observed the same appearance in the faces of the people of Alexandria, accompanied in some cases with a yellowness of the eyes, during the summer of 1793, and previous to the appearance of a violent bilious fever on the banks of the Potowmac.

3. I have observed one or more of the following symptoms, namely, head-ach; a decay, or increase

of appetite; costiveness; a diminished or increased secretion of urine; a hot and offensive breath*; constant sweats, and sometimes of a fœtid nature, or a dry skin; wakefulness, or a disposition to early or protracted sleep; a preternaturally frequent pulse; unusual vivacity, or depression of spirits; fatigue and sweats from light exertions; hands, when rubbed, emitting a smell like hepar sulphuris; and, lastly, a sense of burning in the mouth; to be present in different persons, during the prevalence of our malignant epidemics.

* I have once known this breath, in a gentleman who had carried the seeds of the yellow fever in his body from Philadelphia into its neighbourhood, create sickness at the stomach in his wife; and I have heard of an instance in which a person, who left Philadelphia when highly impregnated with the miasmata of the same fever, creating sickness at the stomach in four or five persons who sat at the same table with him in the country. None of the above persons were afterwards affected by the fever. In an anonymous history of the plague in London, in the year 1664, in the possession of the author, it is said, the breath was a well-known signal of infection to persons who were not infected, and that whenever it was perceived, individuals and companies fled from it. The sickness in the above-mentioned persons was similar to that which is sometimes excited by the smell of a sore leg, or a gun-shot wound, upon the removal of its first dressing. It does not produce fever, because there is no predisposition to it.

The means of preventing the different forms of our summer and autumnal disease come next under our consideration. I shall first mention such as have been most effectual in guarding against its malignant form, and afterwards take notice of such as are proper in its milder grades. These means naturally divide themselves again,

I. Into such as are proper to protect individuals.

II. Such as are proper to defend whole communities from the disease. And,

III. Such as are proper to exterminate it, by removing its causes.

I. Of the means of protecting individuals.

Where flight is practicable, it should be resorted to in every case, to avoid an attack of a malignant fever. The heights of Germantown and Darby have, for many years, afforded a secure retreat to a large number of the citizens of Philadelphia, from their late annual epidemics. It were to be wished our governments possessed a power of compelling our citizens to desert the whole, or parts, of infected cities and villages. In this way the yellow fever was suddenly annihilated in Providence, on

Rhode-Island, and in New-Haven, in Connecticut, in the year 1805. But the same power should rigorously prevent the removal of the sick, except it be that class of them which have neither homes nor friends. The less the distance they are carried beyond the infected atmosphere, the better. The injury sustained by conveying them in a jolting carriage, for two or three miles, has often been proclaimed in the reports of our city hospitals, of patients being admitted without a pulse, and dying a few hours afterwards.

In leaving a place infected by miasmata, care should be taken not to expose the body to great cold, heat, or fatigue, for eighteen or twenty days, lest they should excite the dormant seeds of the disease into action.

But where flight is not enforced by law, or where it is not practicable, or preferred, safety should be sought for in such means as reduce the preternatural tone and fulness induced in the blood-vessels by the stimulus of the miasmata, and the suppression of customary secretions. These are,

1. A diet, accommodated to the greater or less exposure of the body to the action of miasmata, and to the greater or less degrees of labour, or ex-

ercise, which are taken. In cases of great exposure to an infected atmosphere, with but little exercise, the diet should be simple in its quality, and small in its quantity. Fresh meats and wine should be avoided. A little salted meat, and Cayenne pepper with vegetables, prevent an undue languor of the stomach, from the want of its usual cordial aliments. The less mortality of the yellow fever in the French and Spanish West-India islands than in the British, has been justly attributed to the more temperate habits of the natives of France and Spain. The Bramins, who live wholly upon vegetables, escape the malignant fevers of India, while whole regiments of Europeans, who eat animal food, die in their neighbourhood. The people of Minorca, Dr. Cleghorn says, who reside near gardens, and live chiefly upon fruit during the summer, escape the violent autumnal fever of that island. The field negroes of South-Carolina owe their exemption from bilious fevers to their living chiefly upon vegetables. There is a fact which shows, that not only temperance, but abstinence bordering upon famine, has afforded a protection from malignant fevers. In a letter which I received a few months ago, from the Rev. Thomas Hall, chaplain to the British factory at Leghorn, containing an account of the yellow fever which prevailed in that city, in the summer and autumn

of 1804, there is the following communication. "Of the *rich*, who live in large airy houses, there died but four persons with the fever. Of the *commodious*, who live comfortably, but not affluently, there died ten. Of the *poor*, who inhabited small and crowded rooms, in the dirty and confined parts of the city, there died nearly seven hundred. But of the *beggars*, who had scarcely any thing to eat, and who slept half naked every night upon hard pavements, not one died." From the reduced and exhausted state of the system in these people, they were incapable, if I may be allowed the expression, of the combustion of fever. Persons reduced by chronic diseases, in like manner, often escape such as are acute. Six French ships of the line landed 300 sick, at St. Domingo, while the yellow fever prevailed there in the year 1745, and yet no one of them was infected by it*.

Where the body is exposed to miasmata, and a great deal of exercise taken at the same time, broths, a little wine, or malt liquors, may be used with the fruits and garden vegetables of the season, with safety and advantage. The change from a full to a low diet should be made gradually. When made suddenly, it predisposes to an attack of the disease.

* Desportes, vol. i. p. 140.

2. Laxative medicines. Hundreds, perhaps thousands, of the citizens of Philadelphia were indebted for their preservation from the yellow fever to the occasional use of a calomel pill, a few grains of rhubarb, or a table-spoonful of sweet, or castor oil, during the prevalence of our late pestilential fevers. Even the air of Batavia has been deprived of its poisonous quality, by means of this class of medicines. A citizen of Philadelphia asked a captain of a New-England ship, whom he met at that island, how he preserved the whole crew of his ship in health, while half the sailors of all the other ships in the harbour were sick or dead. He informed him, that it was by giving each of them a gentle purge of sulphur every day.

3. A plentiful perspiration, or moderate sweats, kept up by means of warm clothing and bed-clothes. The excretion which takes place by the skin, is a discharge of the first necessity. I have never known an instance of a person's being attacked by the yellow fever in whom this discharge was constant, and equally diffused all over the body. Its effects are equally salutary in preventing the plague. So well known is this fact, that Mr. Volney informs us, in his Travels into Egypt, that the common salutation at Cairo, during the prevalence of the plague, is, "Do you sweat freely?" For the pur-

pose of promoting this excretion, flannel shirts or waistcoats worn next to the skin have been found more useful than linen. As the perspiration and sweats, which are thus discharged in a pestilential season, are often unusual in their quantity, and of a morbid quality, clean body-linen or flannel should be put on every day, and where this is not practicable, that which has been worn should be exchanged every morning and evening for that which has been exposed during the previous day and night, in a dry air.

4. Blood-letting. In addition to the authorities of Dr. Haller and Dr. Hodges, mentioned in another place*, in favour of this remedy, I shall subjoin a few others. Dr. Mitchell, in his Account of the Yellow Fever which prevailed in Virginia, in the year 1741, informs us, that it was often prevented in persons who were under the influence of its remote cause, by the loss of a few ounces of blood. It was formerly a practice among the physicians in St. Domingo, to bleed whole regiments of troops as soon as they arrived from France, by which means they were preserved from the malignant fever of the island.

* Medical Inquiries and Observations, vol. iii.

During the short visit paid to this city, in the year 1798, by Dr. Borland, a respectable physician of the British army, he put into my hands the following communication. "In the beginning of August, "1797, 109 Dutch artillery arrived at Port au "Prince, in the Bangalore transport. The florid "appearance of the men, their cumbersome cloth- "ing, and the season of the year, seemed all unfa- "vourable omens of the melancholy fate we pre- "sumed awaited them. It was, however, thought "a favourable opportunity, by Dr. Jackson and "myself, to try what could be done in warding off "the fever. It was accordingly suggested to "Monsieur Conturier, the chief surgeon of the "foreign troops, and the surgeon of the regiment, "that the whole detachment should be blooded "freely, and that, the morning after, a dose of phy- "sic should be administered to every man. This "was implicitly complied with, a day or two after, "and at this moment in which I write, although "a period of four months has elapsed, but two of "that detachment have died, one of whom was in a "dangerous state when he landed. A success un- "paralleled during the war in St Domingo! It is "true, several have been attacked with the disease, "but in those the symptoms were less violent, and "readily subsided by the use of the lancet.

" The *crew* of the Bangalore, on her arrival at " Port au Prince, consisted of twenty-eight men. " With them no preventive plan was followed. In " a very few weeks eight died, and at present, of " the original number, but fourteen remain."

All these depleting remedies, whether used separately or together, induce such an artificial debility in the system, as disposes it to vibrate more readily under the impression of the miasmata. Thus the willow rises, after bowing before a blast of wind, while the unyielding oak falls to the ground by its side. It is from the similarity of the natural weakness in the systems of women, in the West-Indies, with that which has been induced by the artificial means that have been mentioned, that they so generally escape the malignant endemic of the islands.

A second class of preventives of malignant fever are such as obviate the internal action of miasmata, by exciting a general or partial determination to the external surface of the body. These are,

1. The warm bath. I have known this grateful remedy used with success in our city. It serves the treble purposes of keeping the skin clean, and the pores open, and of defending what are called

the vital organs from disease, by inviting its remote cause to the external surface of the body.

2. The cold bath, or cold water applied to the external surface of the body. Ulloa, in his travels through Cuba, tells us the Spaniards make it a practice, when partially wetted by the rain, to plunge themselves, with their wet clothes on, into the first stream of water they meet with afterwards, by which means they avoid taking the fever of the island. Where this cannot be conveniently done, the peasants strip off their clothes, and put them under a shelter, and receive showers of rain upon their naked bodies, and thus preserve themselves from the fever. Dr. Baynard has left it upon record, in his treatise upon the cold bath, that those persons who lived in water-mills, also watermen, bargemen, and fishermen, who were employed upon the river, and in dabbling in cold water, were rarely affected by the plague in London, in 1665, and that but two persons died with it on London bridge. The water carriers at Cairo, Mr. Volney says, uniformly escape the plague; and Dr. Chisholm informs us, that those negroes in Demarara who go naked, and are thereby disposed not to avoid showers of rain, are never affected with the fever of that country.

3. Washing the body, every morning and evening, with salt water. A whole ship's crew from Philadelphia was preserved by this means from the yellow fever, some years ago, in one of the West-India islands, while a large proportion of the crews of several ships, that lay in the same harbour, perished by that disease.

4. Anointing the body with oil. The natives of Africa, and some American Indians, use this preventive with success during their sickly seasons. It has lately been used, it is said, with effect in preventing the plague. Its efficacy for that purpose was first suggested by no oilman having died of that disease during four years, in which time 100,000 people perished with it in Egypt. Oliver, in his Travels into that country, says the men who make and sell butter, are equally fortunate in escaping it.

5. Issues, setons, and blisters belong to this class of preventives of malignant and bilious fevers. Issues, according to Parisinus, Florentinus, Forestus, and several other authors quoted by Diemerbroeck, have prevented the plague in many hundred instances. Paræus says, all who had ulcers from the venereal disease, or any other cause, escaped it. Dr. Hodges owed his preservation from the plague

in London, in 1665, to an issue in his leg. He says he always felt a slight pain in it when he went into a sick room. Dr. Gallaher ascribed his escape from the yellow fever of 1799 to a perpetual blister, which he applied to his arm for that purpose. Dr. Barton favoured me with the sight of a letter from Dr. James Stevens, dated January 12, 1801, in which he says he believed Dr. Beach (formerly of Connecticut) had been preserved from the bilious fever by a seton in his side. He adds further, that Dr. Beach had been called to attend the labourers at the Onandoga salt springs, in the state of New-York, ninety-eight of whom out of a hundred had the bilious fever. Of the two who escaped it, one had a sore leg, the other what is called a scald-head. The discharge from the sores in each of them, as well as from the doctor's issue, was more copious during the prevalence of the fever, than it had been at any other time.

A third class of preventives of malignant fever, are such as excite a general action, more powerful than that which the miasmata are disposed to create in the system, or an action of a contrary nature. These are,

1. Onions and garlic. All those citizens who used these vegetables in their diet, escaped the yel-

low fever in 1793. The greater exemption of the natives of France from this disease, wherever they are exposed to it, than of the inhabitants of other European countries, has been ascribed in part to the liberal use of those condiments in their food. The Jews, it has been said, have often owed to them their preservation from the plagues which formerly prevailed in Europe. It is probable leeks and onions, which to this day form a material part of the diet of the inhabitants of Egypt, were cultivated and eaten originally as the means of obviating the plagues of that country. I have been at a loss to know why the Author of Nature, who has endowed these vegetables with so many excellent qualities for diet and medicine, should have accompanied them with such a disagreeable smell. Perhaps the reason was, kindly to force them into universal use; for it is remarkable their smell in the breath is imperceptible to those who use them.

2. Calomel, taken in such small doses as gently to affect the gums. It preserved most of the crew of a Russian ship at Plymouth, in the year 1777, from a fever generated by filth in her hold. In a letter which I received from Captain Thomas Truxton, in the year 1797, he informed me, that an old and respectable merchant at Batavia had assured him, he had been preserved in good health

by calomel, taken in the way that has been mentioned, during the sickly seasons, for upwards of thirty years. The mortality of the fevers of that island may easily be conceived of, when I add, on the authority of a physician quoted in Sir George Staunton's Account of his Embassy to China, that one half of all new comers die there on the first year of their arrival.

Our principal dependence should be placed upon those two preventives under this head. There are several others which have been in common use, some of which I believe are hurtful, and the rest are of feeble, or doubtful efficacy. They are,

3. Wine and ardent spirits. They both prevent a malignant fever, only when they excite an action in the system above that which is ordinarily excited by the miasmata of the fever; but this cannot be done without producing intoxication, which, to be effectual, must be perpetual; for the weakness and excitability, which take place in the intervals of drunkenness, predispose to the disease. Agreeably to this remark, I observed three persons, who were constantly drunk, survive two of our most fatal epidemics, while all those persons who were alternately drunk and sober, rarely escaped an at-

tack of the fever. In most of them, it terminated in death.

4. Tobacco. Many hundreds of the citizens of Philadelphia can witness, that no benefit was derived from this weed, in any of the ways in which it is commonly used, in the late epidemics of our city. Mr. Howard says it has no effect in preserving from the plague.

5. Camphor suspended in a bag round the neck, and rags wetted in vinegar, and applied to the nose. These means were in general use in the fever of 1793, in Philadelphia, but they afforded no protection from it. It is possible they had a contrary effect, by entangling, in their volatile particles, more of the miasmata of the fever, and thus increasing a predisposition to it.

A fourth class of the preventives of malignant fevers are certain substances which are said to destroy miasmata by entering into mixture with them. Two persons, who were very much exposed to the causes of the fever in 1798, took each of them a table spoonful of sweet oil every morning. They both escaped the fever. Did the oil, in these cases, act by destroying miasmata in the stomach chemically? or did it defend the stomach mecha-

nically from their action? or did it prevent the disease, only by gently opening the bowels? It is certain the fat of pork meat protects the men who work in the lead-mines of Great-Britain from the deleterious effects which the fumes of that metal are apt to bring upon the stomach and bowels, and that a poisoned arrow, discharged into the side of a hog, will not injure him, if it be arrested by the fat which lines that part of his body.

The vapour which issues from fresh earth has been supposed to destroy the miasmata which produce malignant fevers, by entering into mixture with them. Most of the men who were employed in digging graves and cellars, and in removing the dirt from the streets of Philadelphia, in 1793, escaped the fever of that year. In the new settlements of our country, it is said, the poison of the rattlesnake is deprived of its deadly effects upon the body, by thrusting the wounded limb into a hole, recently made in the earth. The fable of Anteus, who rose with renewed strength from the ground after repeated falls, was probably intended to signify, among other things, the salutary virtues which are contained in the effluvia which issue from fresh clods of earth.

3. There are many facts which show the efficacy of the volatile alkali in destroying, by mixture, the poison of snakes. One of them was lately communicated to the public by Dr. Ramsay, of South-Carolina. What would be the effect of the daily use of a few tea-spoonfuls of this medicine in a liquid form, and of frequently washing the body with it, during the prevalence of pestilential epidemics?

The miasmata which produce malignant fevers often exist in an inoffensive state in the body, for weeks, and perhaps months, without doing any harm. With but a few exceptions, they seldom induce a disease without the reinforcement of an exciting cause. In vain, therefore, shall we use all the preventives that have been recommended, without,

V. Avoiding of all its exciting causes. These are,

1. Heat and cold. While the former has excited the yellow fever in thousands, the latter has excited it in tens of thousands. It is not in middle latitudes only that cold awakens this disease in the body. Dr. Mosely says it is a more frequent exciting cause of that, and of other diseases, in the

island of Jamaica, than in any of the most temperate climates of the globe. It is this which renders cases of yellow fever, when epidemic in our cities, more numerous in the cool months of September and October, than in July and August. For the purpose of avoiding this pernicious and universal influence of cold, the clothing and bed-covers should be rather warmer in those months, in middle and northern latitudes, than is agreeable, and fires should be made every morning and evening in common sitting rooms, and during the whole day, when the weather is damp or cool. They serve, not only to prevent the reduction of the excitement of the blood-vessels, by the gradual and imperceptible abstraction of the heat of the body, but to convey up a chimney all the unwholesome air that accumulates in those rooms during a sickly season. By these precautions, I have known whole families preserved in health, while all their neighbours who neglected them, have been confined by a prevailing autumnal fever.

3. The early morning and evening air, even in warm weather.

4. Fatigue from amusements, such as fishing, gunning, and dancing, and from *unusual* labour or exercise. The effects of fatigue from this cause

have been already noticed*, in the maids of large families being the only persons who die of the fever, in consequence of their having performed great and *unusual* services to those branches of the family who survive them, while nurses, who only exercise their ordinary habits in attending sick people, are seldom carried off by it.

5. Intemperance in eating and drinking.

6. Partaking of *new* aliments and drinks. The stomach, during the prevalence of malignant fevers, is always in an irritable state, and constantly disposed to be affected by impressions that are not habitual to it.

7. Violent emotions or passions of the mind.

8. The entire cessation of moderate labour. This, by permitting the mind to ramble upon subjects of terror and distress, and by exposing the body to idleness and company, favours an attack of fever. A predisposition to it, is likewise created by alternating labour and idleness with each other.

9. The continuance of hard labour. The miasmata which produce malignant fevers some-

* Medical Inquiries and Observations, vol. iii.

times possess so much force, that the least addition to it, even from customary acts of labour, is sufficient to excite the disease. In this case, safety should be sought in retirement, more especially by those persons whose occupations expose them to the heat of fires, and the rays of the sun, such as hatters, smiths, bricklayers, and house and ship carpenters. The wealthy inhabitants of Constantinople and Smyrna erroneously suppose they escape the contagion of the plague, by shutting themselves up in their houses during its prevalence. They owe their preservation chiefly to their being removed, by an exemption from care and business, from all its exciting causes. Most of the nobility and gentry of Moscow, by these means escaped a plague which carried off 27,000 persons in that city, in the year 1771, and many whole families in Philadelphia were indebted for their safety to the same precautions in the year 1793. Confinement is more certain in its beneficial effects, when persons occupy the upper stories only of their houses. The inhabitants of St. Lucia, Dr. Chisholm says, by this means often escape the yellow fever of that island. Such is the difference between the healthiness of the upper and lower stories of a house, that, travellers tell us, birds live in the former, and die in the latter, during the prevalence of a plague in the eastern countries.

All the exciting causes that have been enumerated should be avoided with double care three days before, and three days after, as well as on the days of the full and change of the moon. The reason for this caution was given in the account of the yellow fever in Philadelphia in the year 1797.

To persons who have retired from infected cities, or countries, it will be necessary to suggest a caution, not to visit them while the malignant fever from which they fled prevails in them. Dr. Dow informed me, in his visit to Philadelphia in the year 1800, that the natives and old citizens of New-Orleans who retired into the country, and returned during the prevalence of the yellow fever in that city, the year before, were often affected by it, while all such persons as did not change their residence, escaped it. The danger from visiting an infected city is greater to persons who breathe an atmosphere of a uniform temperature, than one that is subject to alternate changes in its degrees of heat and cold. The inhabitants of Mexico, Baron Humboldt informed me, who descend from their elevated situation, where the thermometer seldom varies more than ten degrees in the year, and visit Vera Cruz during the prevalence of the yellow fever in that city, are much oftener affected by it than the new comers from the variable climates of

European countries. But the habits of insensibility to the impressions of the miasmata of this disease in one country, do not always protect the system from their action in another. The same illustrious traveller informed me, that the inhabitants of the Havannah who visit Vera Cruz, and the inhabitants of Vera Cruz who visit the Havannah, are affected in common with strangers with the fever of those places.

I shall take leave of this part of our subject, by adding, that I am so much impressed with a belief in the general, and almost necessary connection of an exciting cause with a yellow fever, that were I to enter a city, and meet its inhabitants under the first impressions of terror and distress from its appearance, my advice to them should be, "BEWARE, not of contagion, for the yellow fever of our country is not contagious, nor of putrid exhalations, when the duties of humanity or consanguinity require your attendance, but BEWARE OF EXCITING CAUSES!"

In the mild grades of the summer and autumnal fevers of the United States, the means of prevention should be different from those which have been recommended to prevent the yellow fever. They consist of such things as gently invigorate

the system, and thus create an action superior to that which the miasmata have excited in it. The means commonly employed for this purpose are,

1. Cordial diet and drinks; consisting of salted meat, and fish, with a moderate quantity of wine and malt liquors. Dr. Blane says, the British soldiers who lived upon salt meat, during the American war, were much less afflicted with the intermitting fever than the neighbouring country people; and, it is well known, the American army was much less afflicted with summer and autumnal fevers, after they exchanged their fresh meat for rations of salted beef and pork. Ardent spirits should be used cautiously, for, when taken long enough to do good, they create a dangerous attachment to them. A strong infusion of any bitter herb in water, taken upon an empty stomach, is a cheap substitute for all the above liquors where they cannot be afforded. The Peruvian bark has in many instances been used with success as a preventive of the mild grades of the summer and autumnal fevers of our country.

2. An equable and constant perspiration. This should be kept up by all the means formerly mentioned for that purpose.

3. Avoiding certain exciting causes, particularly great heat and cold, fatigue, long intervals between meals, intemperance, and the morning and evening air, more especially during the lunar periods formerly mentioned. Dr. Lind says, the farmers of Holdernesse, in England, who go out early to their work, are seldom long lived, probably from their constitutions being destroyed by frequent attacks of intermitting fevers, to which that practice exposes them. Where peculiar circumstances of business render it necessary for persons to inhale the morning air, care should be taken never to do it without first eating a cordial breakfast.

The *intestinal* state of our summer and autumnal disease requires several specific means to prevent it, different from those which have been advised to defend the blood-vessels from fever. Unripe and decayed fruit should be avoided, and that which is ripe and sound should not be eaten in an excessive quantity. Spices, and particularly Cayenne pepper, and the red pepper of our country, should be taken daily with food. Mr. Dewar, a British surgeon, tells us, the French soldiers, while in Egypt, carried pepper in boxes with them, wherever they went, to eat with the fruits of the country, and thereby often escaped its diseases. The whole diet, during the prevalence of intestinal diseases,

when they are not highly inflammatory, should be of a cordial nature. A dysentery prevailed, a few years ago, upon the Potomac, in a part of the country which was inhabited by a number of protestant and catholic families. The disease was observed to exist only in the former. The latter, who ate of salted fish every Friday, and occasionally on other days of the week, very generally escaped it. In the year 1759, a dysentery broke out in the village of Princeton, in New-Jersey, and affected many of the students of the college. It was remarked, that it passed by all those boys who came from the cities of New-York and Philadelphia. This was ascribed to their having lived more upon tea and coffee than the farmers's sons in the college; for those cordial articles of diet were but rarely used, six and forty years ago, in the farm houses of the middle states of America. I mentioned formerly that the cordial diet of the inhabitants of our cities was probably the reason why the dysentery so seldom prevailed as an epidemic in them.

Another means of preventing the dysentery is, by avoiding costiveness, and by occasionally taking purging physic, even when the bowels are in their natural state. A militia captain, in the Pennsylvania service, preserved his whole company from a dysentery which prevailed in a part of the Ame-

rican army at Amboy, in the year 1776, by giving each of them a purge of sea-water. He preserved his family, and many of his neighbours, some years afterwards, from the same disease, by dividing among them a few pounds of purging salts. It was prevented, a few years ago, in the academy of Bordentown, in New-Jersey, by giving all the boys molasses, in large quantities, in their diet and drinks. The molasses probably acted only by keeping the bowels in a laxative state.

As the dysentery is often excited by the dampness of the night air, great care should be taken to avoid it, and, when necessarily exposed to it, to defend the bowels by more warmth than other parts of the body. The Egyptians, Mr. Dewar says, tie a belt about their bowels for that purpose, and with the happiest effects.

II. I come now, according to the order I proposed, to mention the means of preserving whole cities or communities from the influence of those morbid exhalations which produce the different forms of summer and autumnal disease, and, in particular, that which is of a malignant nature.

As the flight of a whole city is rarely practicable, it will be necessary to point out the means of destroying the morbid miasmata.

1. Where the putrid matters which emit them are of a small extent, they should be covered with water or earth. Purchas tells us, 500 persons less died of the plague the day after the Nile overflowed the grounds which had emitted the putrid exhalations that produced it, than had died the day before. During the prevalence of a malignant fever, it will be unsafe to remove putrid matters. A plague was generated by an attempt to remove the filth which had accumulated on the banks of the waters which surround the city of Mantua, during the summer and autumnal months*. Even a shower of rain, by disturbing the green pellicle which is sometimes formed over putrid matters, I shall mention in another place, has let loose exhalations that have produced a pestilential disease.

2. Impregnating the air with certain effluvia, which act either by destroying miasmata by means of mixture, or by exciting a new action in the system, has, in some instances, checked the progress of a malignant fever. The air extricated from fer-

* Burserus.

menting wines, during a plentiful vintage, Vansweiten tells us, has once checked the ravages of a plague in Germany. Ambrose Parey informs us, the plague was checked in a city in Italy by killing all the cats and dogs in the place, and leaving them to putrify in the streets. Mr. Bruce relates, that all those persons who lived in smoky houses, in one of the countries which he visited, escaped bilious fevers, and Dr. Clark mentions an instance, in which several cooks, who were constantly exposed to smoke, escaped a fever which affected the whole crew of a galley. The yellow fever has never appeared within the limits of the effluvia of the sal ammoniac manufactory, nor of the tan-pits in the suburbs of Philadelphia, nor has the city of London been visited with a plague since its inhabitants have used sea-coal for fuel. But other causes have contributed more certainly to the exemption of that city from the plague for upwards of a century, one of which shall be mentioned under our next head.

3. Desquenette tells us, the infection of the plague never crosses the Nile, and that it is arrested by means of ditches, dug and filled with water for that purpose. Dr. Whitman has remarked, that the plague never passes from Abydos, on the Turkish, to Mito, on the European side of the wa-

ter of the Dardanelles, which forms the entrance to Constantinople. The yellow fever has never been known to pass from Philadelphia to the Jersey shore, and the miasmata generated on the east side of the Schuylkill rarely infect the inhabitants of the opposite side of the river. Many persons found safety from the plague of London, in 1665, by flying to ships which lay in the middle of the Thames, and, it is well known, no instance of yellow fever occurred in those Philadelphia families that confined themselves to ships in the middle of the Delaware, in the year 1793. But three or four, of four hundred men, on board a ship of war called the Jason, commanded by captain Coteneuil, perished with an epidemic yellow fever, in the year 1746, at St. Domingo, in consequence, Dr. Desportes says, of her hold being constantly half filled with water*. I have multiplied facts upon this subject, because they lead to important conclusions. They show the immense consequence of frequently washing the streets and houses of cities, both to prevent and check pestilential fevers. What would be the effect of placing tubs of fresh water in the rooms of patients infected with malignant fevers, and in an atmosphere charged with putrid exhalations?

* Vol. I. p. 161.

Their efficacy in absorbing the matter which constitutes the odour of fresh paint, favours a hope that they would be useful for that purpose. I have mentioned an instance, in the Account of the Yellow Fever in Philadelphia, in the year 1797, in which they were supposed to have been employed with evident advantage.

4. Intercepting the passage of miasmata to the inhabitants of cities. Varro, in his Treatise upon Agriculture, relates, that his namesake Varro, a Roman general, was in great danger of suffering, with a large fleet and army, from a malignant fever at Conyra. Having discovered the course of the miasmata which produced it to be from the south, he fastened up all the southern windows and doors of the houses in which his troops were quartered, and opened new ones to the north, by which means he preserved them from the fever which prevailed in all the other houses of the town and neighbourhood. Mr. Howard advises keeping the doors and windows, of houses which are exposed to the plague, constantly shut, except during the time of sunshine.

Several other means have been recommended to preserve cities from malignant fevers during their

prevalence, which are of doubtful efficacy, or evidently hurtful. They are,

5. Strewing lime over putrid matters. Dr. Dalzelle says, he once checked a bilious fever, by spreading twelve barrels of lime on a piece of marshy ground, from whence the exhalations that produced it were derived*. A mixture of quick lime and ashes in water, when thrown into a privy, discharges from it a large quantity of offensive air, and leaves it afterwards without a smell. As this foul air is discharged into the atmosphere, it has been doubted whether the lime and ashes should be used for that purpose, after a malignant fever has made its appearance.

6. Mr. Quiton Morveau has lately proposed the muriatic gas as a means of destroying miasmata. However effectual it may be in destroying the volatile and foul excretions which are discharged from the human body in confined situations, as in filthy jails, hospitals, and ships, it is not calculated to oppose the seeds of a disease which exist in the atmosphere, and which are diffused over a large extent of city or country. Mr. Morveau ascribes great virtues to it, in checking the malignant fever

* Sur les Maladies des Climats Chauds.

in Cadiz, in 1801, but from the time at which it was used, being late in the autumn, there is more reason to believe it had run its ordinary course, or that it was destroyed by cold weather.

7. The explosion of gunpowder has been recommended for checking pestilential diseases. Mr. Quiton Morveau says, it destroys the offensive odour of putrid exhalations, but does not act upon the fevers produced by them.

8. Washing the floors of houses with a solution of alkaline salts in water, has been recommended by Dr. Mitchell, as an antidote to malignant fevers. As yet, I believe, there are no facts which establish the efficacy of the practice, when they are produced by exhalations from decayed vegetable and animal substances in a putrid state.

9. Large fires have sometimes been made in cities, in order to destroy the miasmata of pestilential diseases. They were obviously hurtful in the plague of London, in the year 1665. Dr. Hodges, who relates this fact, says, "Heaven wept for the mistake of kindling them, and mercifully put them out, with showers of rain."

I cannot conclude this head, without lamenting the want of laws in all our states, to compel physicians to make public the first cases of malignant fever that come under their notice. The cry of fire is not more useful to save a city from destruction, than the early knowledge of such cases would be to save it from the ravages of pestilential and mortal epidemics. Hundreds of instances have occurred, in all ages and countries, in which they might have been stifled in their birth, by the means that have been mentioned, had this practice been adopted. But when, and where, will science, humanity, and government first combine to accomplish this salutary purpose? Most of our histories of mortal epidemics abound with facts which show a contrary disposition and conduct in physicians, rulers, and the people. I shall mention one of these facts only, to show how far we must travel over mountains of prejudice and error, before we shall witness that desirable event. It is extracted from the second volume of the Life of the late Empress of Russia. "The Russian army (says the biographer), after defeating the Turks, on entering their territories were met by the plague, and brought it to their country, where the folly of several of their generals contributed to its propagation, as if they thought by a military word of command to alter the nature of things. Lieutenant-

general Stoffeln, at Yassy, where the pestilence raged in the winter of 1770, issued peremptory orders that its name should not be pronounced; he even obliged the physicians and surgeons to draw up a declaration in writing, that it was only *a spotted fever*. One honest surgeon of the name of Kluge refused to sign it. In this manner the season of prevention was neglected. Several thousand Russian soldiers were by this means carried off. The men fell dead upon the road in heaps. The number of burghers that died was never known, as they had run into the country, and into the forests. At length the havoc of death reached the general's own people: he remained true to his persuasion, left the town, and went into the more perilous camp. But his intrepidity availed him nothing; he died of the plague in July, 1771*."

III. Let us now consider, in the last place, the means of exterminating malignant and other forms of summer and autumnal disease, by removing their causes. These means are,

1. The removal or destruction of all those putrid matters formerly enumerated, which are capa-

* The above disease appears to have been the camp fever, the origin and character of which will be noticed in the next article.

ble of producing fevers. Many of the institutions of the Jewish nation, for this purpose, are worthy of our imitation. The following verses contain a fund of useful knowledge upon this subject.—"Thou shalt have a place without the camp, whether thou shalt go forth abroad; and shalt have a paddle upon thy weapon, and it shall be when thou wilt ease thyself abroad, thou shalt dig therewith, and shalt turn back, and cover that which cometh from thee; for the Lord thy God walketh in the midst of thy camp to deliver thee, therefore shall he *see no unclean thing in thee*, and turn away from thee." Deuteronomy, chapter xxiii. verses 12, 13, and 14. "But the flesh of the bullock, and his skin, and his dung, shalt thou *burn with fire without the camp*." Exodus, chapter xxxix. verse 14. The advantages of thus burying and removing all putrid matters, and of burning such as were disposed to a speedy putrefaction, in a crowded camp, and in a warm climate, are very obvious. Their benefits have often been realized in other countries. The United Provinces of Holland hold their exemption from the plague, only by the tenure of their cleanliness. In the character given by Luther of Pope Julius, he says, "he kept the streets of Rome so clean and sweet, that there were no plagues nor sicknesses during his time." The city of Oxford was prepared to afford

an asylum to the royal family of Great-Britain from the plague, when it ravaged London, and other parts of England, in the year 1665, only in consequence of its having been cleaned, some years before, by the Bishop of Winchester. In a manuscript account of the life of Doctor, afterwards Governor Colden, of New-York, there is the following fact. It was first communicated to the public in the daily gazette of the capital of that state, on the 30th of October, 1799. "A malignant fever having raged with exceeding violence for two summers successively in the city of New-York, about forty years ago, he communicated his thoughts to the public, on the most probable cure of the calamity. He published a little treatise on the occasion, in which he collected the sentiments of the best authority, on the bad effects of *stagnating waters*, *moist air*, *damp cellars*, *filthy shores*, and *dirty streets*. He showed how much these nuisances prevailed in many parts of the city, and pointed out the remedies. The corporation of the city voted him their thanks, adopted his reasoning, and established a plan for draining and cleaning the city, which was attended with the most happy effects." The advantages of burning offal matters, capable by putrefaction of producing fevers, has been demonstrated by those housekeepers, who, instead of collecting the entrails of fish and poultry,

and the parings and skins of vegetables, in barrels, instantly throw them into their kitchen fires. The families of such persons are generally healthy.

2. In the construction of cities, narrow streets and alleys should be carefully avoided. Deep lots should be reserved for yards and gardens for all the houses, and subterraneous passages should be dug to convey, when practicable, to running water, the contents of privies, and the foul water of kitchens. In cities that are wholly supplied with fresh water by pipes from neighbouring springs or rivers, all the evils from privies might be prevented by digging them so deep as to connect them with water. Great advantages, it has been suggested, would arise in the construction of cities, from leaving open squares, equal in number and size to those which are covered with houses. The light and dark squares of a chequer-board might serve as models for the execution of such a plan. The city of London, which had been afflicted nearly every year for above half a century by the plague, has never been visited by it since the year 1666. In that memorable year, while the inhabitants were venting their execrations upon a harmless bale of silks imported from Holland, as the vehicle of the seeds of their late mortal epidemic, Heaven kindly pointed out, and removed its cause, by permitting a fire to

destroy whole streets and lanes of small wooden buildings, which had been the reservoirs of filth for centuries, and thereby the sources of all the plagues of that city*. Those streets and lanes were to London, what Water-street and Farmer's-row are to Philadelphia, Fell's-point to Baltimore, the slips and docks to New-York, and Water-street to the town of Norfolk.

3. Where the different forms of summer and autumnal disease arise from marsh exhalations, they should be destroyed by drains, by wells communicating with their subterraneous springs, or by cultivating upon them certain grasses, which form a kind of mat over the soil, and, when none of these modes of destroying them is practicable, by overflowing them with water.

I have met with many excellent quotations from a work upon this part of our subject, by Tozzetti, an Italian physician, from which, I have no doubt, much useful information might be obtained. The Rev. Thomas Hall, to whom I made an unsuccess-

* A proposal was made to replace the houses that had been burnt, by similar buildings, and upon the same space of ground. Sir Christopher Wren opposed it, and with the following argument: "By so doing, you will show you have not *deserved* the late fire!"

ful application for this work, speaks of it, in his answer to my letter, in the following terms. "It is in such high estimation, that the late emperor Leopold, when grand duke of Tuscany, caused it to be re-printed at his own expence, and presented it to his friends. The consequence of this was, it influenced the owners of low marshy grounds, in the neighbourhood of the river Arno, to drain and cultivate them, and thereby rendered the abode of noxious air, and malignant fevers, a terrestrial paradise."

4. The summer and autumnal diseases of our country have often followed the erection of mill-dams. They may easily be obviated by surrounding those receptacles of water with trees, which prevent the sun's acting upon their shores, so as to exhale miasmata from them. Trees planted upon the sides of creeks and rivers, near a house, serve the same salutary purpose.

5. It has often been observed, that families enjoy good health, for many years, in the swamps of Delaware and North-Carolina, while they are in their natural state, but that sickness always follows the action of the rays of the sun upon the moist surface of the earth, after they are cleared. For this reason, the cultivation of a country should always fol-

low the cutting down of its timber, in order to prevent the new ground becoming, by its exhalations, a source of disease.

6. In commercial cities, no vessel that arrives with a cargo of putrescent articles should ever be suffered to approach a wharf, before the air that has been confined in her hold has been discharged. The same thing should be done after the arrival of a vessel from a distant or hot country, though her cargo be not capable of putrefaction, for air acquires a morbid quality by stagnating contiguous to wood, under circumstances formerly mentioned.

All these modes of removing the causes of malignant and yellow fevers, and of promoting strict and universal cleanliness, are of more consequence in the middle and northern states of America, than in countries uniformly warm, inasmuch as the disease may be taken as often as our inhabitants are exposed to its sources. In the West-Indies, a second attack of the yellow fever is prevented by the insensibility induced upon the system, by its being constantly exposed to the impressions of heat and exhalation. After a seasoning, as it is called, or a residence of two or three years in those islands, the miasmata affect the old settlers, as they do the natives, only with mild remittents. Nearly the

same thing takes place at Madras, in the East-Indies, where, Dr. Clark says, the exhalations which bring on bilious fevers, colic, cholera, and spasmodic affections in new comers, produce a puking in the morning, only in old residents. But very different is the condition of the inhabitants of the middle and northern states of America, in whom the winters prevent the acquisition of habits of insensibility to the heat and exhalations of the previous summers, and thus place them every year in the condition of new comers in the West and East-Indies, or of persons who have spent two or three years in a cold climate. This circumstance increases the danger of depopulation from our malignant epidemics, and should produce corresponding exertions to prevent them.

In enumerating the various means of preventing and exterminating the malignant forms of fever, it may appear strange that I have said nothing of the efficacy of quarantines for that purpose. Did I believe these pages would be read only by the citizens of Pennsylvania, I would do homage to their prejudices, by passing over this subject by a respectful and melancholy silence; but as it is probable they will fall into the hands of physicians and citizens of other states, I feel myself under an obligation to declare, that I believe quarantines are of no

efficacy in preventing the yellow fever, in any other way than by excluding the unwholesome air that is generated in the holds of ships, which may be done as easily in a single day, as in weeks or months. They originated in error, and have been kept up by a supine and traditional faith in the opinions and conduct of our ancestors in medicine. Millions of dollars have been wasted by them. From their influence, the commerce, agriculture, and manufactures of our country have suffered for many years. But this is not all. Thousands of lives have been sacrificed, by that faith in their efficacy, which has led to the neglect of domestic cleanliness. Distressing as these evils are, still greater have originated from them; for a belief in the contagious nature of the yellow fever, which is so solemnly enforced by the execution of quarantine laws, has demoralized our citizens. It has, in many instances, extinguished friendship, annihilated religion, and violated the sacraments of nature, by resisting even the loud and vehement cries of filial and parental blood.

While I thus deny the yellow fever to be the offspring of a specific contagion, and of course incapable of being imported so as to become an epidemic in any country, I shall admit presently, that the excretions of a patient in this disease may, by

confinement, become so acrid as to produce, under circumstances to be mentioned hereafter, a similar disease in a person, but from this person it cannot be communicated, if he possess only the common advantages of pure air and cleanliness. To enforce a quarantine law, therefore, under such a contingent circumstance, and at the expence of such a profusion of blessings as have been mentioned, is to imitate the conduct of the man, who, in attempting to kill a fly upon his child's forehead, knocked out its brains.

From the detail that has been given of the sources of malignant fevers, and of the means of preventing them, it is evident that they do not exist by an unchangeable law of nature, and that Heaven has surrendered every part of the globe to man, in a state capable of being inhabited, and enjoyed. The facts that have been mentioned show further, the connection of health and longevity, with the reason and labour of man.

To every natural evil the Author of Nature has kindly prepared an antidote. Pestilential fevers furnish no exception to this remark. The means of preventing them are as much under the power of human reason and industry, as the means of preventing the evils of lightning and common fire.

I am so satisfied of the truth of this opinion, that I look for a time when our courts of law shall punish cities and villages, for permitting any of the sources of bilious and malignant fevers to exist within their jurisdiction.

I have repeatedly asserted the yellow fever of the United States not to be contagious. I shall now mention the proofs of that assertion, and endeavour to explain instances of its supposed contagion upon other principles.

FACTS,

INTENDED TO PROVE

THE YELLOW FEVER

NOT TO BE CONTAGIOUS.

FACTS, &c.

WHEN fevers are communicated from one person to another, it is always in one of the following ways. 1. By secreted matters. 2. By excreted matters. The small-pox and measles are communicated in the former way; the jail, or, as it is sometimes called, the ship, or camp, and hospital fever, is communicated only by means of the excretions of the body. The perspiration, by acquiring a morbid and irritating quality more readily than any other excretion, in consequence of its stagnation and confinement to the body in a tedious jail fever, is the principal means of its propagation. The perspiration* is, moreover, predisposed to acquire this mor-

* The deleterious nature of this fluid, and its disposition to create disease, under the above circumstances, has been happily illustrated by Dr. Mitchill, in an ingenious letter to Dr. Duncan, of Edinburgh, published in the fourth volume of the Annals of Medicine.

bid and acrid quality by the filthiness, scanty, or bad aliment, and depression of mind, which generally precede that fever. It is confined to sailors, passengers, soldiers, prisoners, and patients, in foul and crowded ships, tents, jails, and hospitals, and to poor people who live in small, damp, and confined houses. It prevails chiefly in cool and cold weather, but is never epidemic; for the excreted matters which produce the fever do not float in the external atmosphere, nor are they communicated, so as to produce disease, more than a few feet from the persons who exhale them. They are sometimes communicated by means of the clothes which have been worn by the sick, and there have been instances in which the fever has been produced by persons who had not been confined by it, but who had previously been exposed to all the causes which generate it. It has been but little known in the United States since the revolutionary war, at which time it prevailed with great mortality in the hospitals and camps of the American army. It has now and then appeared in ships that were crowded with passengers from different parts of Europe. It is a common disease in the manufacturing towns of Great-Britain, where it has been the subject of several valuable publications, particularly by Dr. Smith and Dr. John Hunter. Dr. Haygarth has likewise written upon it, but he

has unfortunately confounded it with the West-India and American yellow fever, which differs from it in prevailing chiefly in warm climates and seasons; in being the offspring of dead and putrid vegetable and animal matters; in affecting chiefly young and robust habits; in being generally accompanied with a diseased state of the stomach, and an obstruction or preternatural secretion and excretion of bile; in terminating, most commonly, within seven days; in becoming epidemic *only* by means of an impure atmosphere; and in not furnishing ordinarily those excretions which, when received into other bodies, re-produce the same disease.

I have been compelled to employ this tedious description of two forms of fever, widely different from each other in their causes, symptoms, and duration, from the want of two words which shall designate them. Dr. Miller has boldly and ingeniously proposed to remedy this deficiency in our language, by calling the former *idio-miasmatic*, and the latter *koino-miasmatic* fevers, thereby denoting their *private* or *personal*, and their *public* or *common* origin*. My best wishes attend the adoption of those terms!

* Medical Repository, hexade ii. vol. i.

I return to remark, that the yellow fever is not contagious in its simple state, and that it spreads exclusively by means of exhalations from putrid matters, which are diffused in the air. This is evident from the following considerations:

1. It does not spread by contagion in the West-Indies. This has been proved in the most satisfactory manner by Drs. Hillary, Huck, Hunter, Hector M'Lean, Clark, Jackson, Borland, Pinckard, and Scott. Dr. Chisholm stands alone, among modern physicians, in maintaining a contrary opinion. It would be easy to prove, from many passages in the late edition of the doctor's learned and instructive volumes, that he has been mistaken; and that the disease was an endemic of every island in which he supposed it to be derived from contagion. A just idea of the great incorrectness of all his statements, in favour of his opinion, may be formed from the letter of J. F. Eckard, Esq. Danish consul, in Philadelphia, to Dr. James Mease, published in a late number of the New-York Medical Repository*.

* For February, March, and April, 1804.

2. The yellow fever does not spread in the country, when carried thither from the cities of the United States.

3. It does not spread in yellow fever hospitals, when they are situated beyond the influence of the impure air in which it is generated.

4. It does not spread in cities (as will appear hereafter) from any specific matter emitted from the bodies of sick people.

5. It generally requires the co-operation of an *exciting* cause, with miasmata, to produce it. This is never the case with diseases which are universally acknowledged to be contagious.

6. It is not propagated by the artificial means which propagate contagious diseases. Dr. Ffirth inoculated himself above twenty times, in different parts of his body, with the black matter discharged from the stomachs of patients in the yellow fever, and several times with the serum of the blood, and the saliva of patients ill with that disease, without being infected by them; nor was he indisposed after swallowing half an ounce of the black matter recently ejected from the stomach, nor by exposing himself to the vapour which was produced by

throwing a quantity of that matter upon iron heated over a fire*.

To the first four of these assertions there are some seeming exceptions in favour of the propagation of this fever by contagion. I shall briefly mention them, and endeavour to explain them upon other principles.

The circumstances which seem to favour the communication of the yellow fever from one person to another, by means of what has been supposed to be contagion, are as follow:

1. A patient being attended in a small, filthy, and *close* room. The excretions of the body, when thus accumulated, undergo an additional putrefactive process, and acquire the same properties as those putrid animal matters which are known to produce malignant fevers. I have heard of two or three instances in which a fever was produced by these means in the country, remote from the place where it originated, as well as from every external source of putrid exhalation. The plague is sometimes propagated in this way in the low and filthy huts which

* Inaugural Dissertation on Malignant Fever, &c. published in June, 1804.

compose the alleys and narrow streets of Cairo, Smyrna, and Constantinople.

2. A person sleeping in the sheets, or upon a bed impregnated with the sweats or other excretions, or being exposed to the smell of the foul linen, or other clothing of persons who had the yellow fever. The disease here, as in the former case, is communicated in the same way as from any other putrid animal matters. It was once received in Philadelphia from the effluvia of a chest of unwashed clothes, which had belonged to one of our citizens who had died with it in Barbadoes; but it extended no further in a large family than to the person who opened the chest. I have heard of but two instances more of its having been propagated by these means in the United States, in which case the disease perished with the unfortunate subjects of it.

To the above insolated cases of the yellow fever being produced by the clothing of persons who had died of it, I shall oppose a fact communicated to me by Dr. Mease. While the doctor resided at the lazaretto, as inspector of sickly vessels, between May, 1794, and the same month in 1798, the clothing contained in the chests and trunks of all the seamen and others, belonging to Philadelphia, who had died of the yellow fever in the West-

Indies, or on their passage home, and the linen of all the persons who had been sent from the city to the lazaretto with that disease, amounting in all to more than one hundred, were opened, exposed to the air, and washed, by the family of the steward of the hospital, and yet no one of them contracted the least indisposition from them.

I am disposed to believe the linen, or any other clothing of a person in good health that had been strongly impregnated with sweats, and afterwards suffered to putrify in a confined place, would be more apt to produce a yellow fever in a summer or autumnal month, than the linen of a person who had died of that disease, with the usual absence of a moisture on the skin. The changes which the healthy excretions by the pores undergo by putrefaction, may easily be conceived, by recollecting the offensive smell which a pocket-handkerchief acquires that has been used for two or three days to wipe away the sweat of the face and hands in warm weather*.

3. The protraction of a yellow fever to such a period as to dispose it to assume the symptoms, and to generate the peculiar and highly volatilised ex-

* See Van Swieten on Epidemic Diseases, Aphorism 1408.

halation from the pores of the skin which takes place in the jail fever. I am happy in finding I am not the author of this opinion. Sir John Pringle, Dr. Monro, and Dr. Hillary, speak of a contagious fever produced by the combined action of marsh and human miasmata. The first of those physicians supposes the Hungarian bilious fever, which prevailed over the continent of Europe in the seventeenth century, was sometimes propagated in this way, as well as by marsh and other putrid exhalations. Dr. Richard Pearson, in his observations upon the bilious fevers which prevailed in the neighbourhood of Birmingham, in England, in the years 1797, 1798, and 1799, has the folllowing remark: "In its first stage, this fever did not appear to be contagious, but it evidently was so after the eleventh and fourteenth day, when the *typhoid* state was induced*." As this protracted state of bilious fever rarely occurs in our country, it has seldom been communicated in this way.

It is not peculiar, I believe, to a bilious and yellow fever, when much protracted beyond its ordinary duration, to put on the symptoms of the jail fever. The same appearances occur in the pleurisy,

* Page 13.

and in other, of what Dr. Sydenham calls *intercurrent* fevers, all of which I have no doubt, under certain circumstances of filth, confinement, and long duration, would produce a fever in persons who were exposed to it. This fever, if the weather were cold, would probably put on inflammatory symptoms, and be added, in our nosologies, to the class of contagious diseases.

From the necessary influence of time, in thus rendering fevers of all kinds now and then contagious by excretion, it follows, that the yellow fever, when of its usual short duration, is incapable of generating that excretion, and that, instead of being considered as the only form of bilious fever that possesses a power of propagating itself, it should be considered as the only one that is devoid of it.

4. Miasmata, whether from marshes, or other external sources, acting upon a system previously impregnated with the excreted matters which produce the jail or ship fever. Mr. Lempriere informs us, that he saw what were supposed to be cases of yellow fever communicated by some sailors who brought the seeds of the ship fever with them to the island of Jamaica. The fevers which affected most of the crews of the Hussar frigate, mentioned

by Dr. Trotter*, and of the Busbridge Indiaman, described by Mr. Bryce†, appear to have been the effect of the combined operation of foul air in those ships, and human excretions, upon their systems. The disease was barely tinged with bilious symptoms, and hence the facility with which it was cured, for the jail fever more readily yields to medicine than the yellow fever. The former was probably excited by some latent exhalation from dead matters in the holds of the ships, and hence we find it ceased on shore, where it was deprived of its exciting cause. It is true, great pains were taken to clean the hold and decks of the Busbridge, but there are foul matters which adhere to the timbers of ships, and which, according to Dr. Lind, are sometimes generated by those timbers when new, that are not to be destroyed by any of the common means employed for that purpose. Of this Dr. Kollock has furnished us with a most satisfactory proof, in his history of the yellow fever, which prevailed on board of the frigate General Greene, on her voyage to the Havanna, in the year 1799. "The air in the hold of the vessel (says the doctor) was so contaminated, as to extinguish lights imme-

* Medicina Nautica, p. 360.

† Annals of Medicine, vol. i. p. 116.

diately, and candles in the cockpit were almost as useless from the same cause. The fish were thrown overboard, and the decks washed and scoured, the ventilator and wind sails put in motion, and every measure of purification adopted that their situation allowed; notwithstanding these precautions disease invaded us. The men were unceasing in their exertions to purify the ship; washing, scouring with vinegar, burning powder and vinegar, old junk, and sulphur, added to constant ventilation, proved unequal even to the amelioration of their calamities, while they were in the latitude of *great heat*. After the removal of the sick, the ship was disburthened of her stores, ballast, &c. cleansed and white-washed throughout; still new cases occurred for nearly two months. Some days, two, three, or four were sent off to the hospital, which would seem to indicate the retention of some portion of this noxious principle, which was lodged beyond the reach of the cleansing process." That this noxious principle or matter existed in the ship, and not in the bodies of the crew, is evident from its not having been communicated, in a single instance, by a hundred of them who were sent to an hospital on Rhode-Island, notwithstanding an intercourse sufficient to propagate it was necessarily

kept up with the inhabitants. Even their nurses did not take it*.

5. A fifth instance in which contagion has been supposed to take place in the yellow fever is, where the exhalation from the excretions of a patient in that disease acts as an *exciting* cause, in persons previously impregnated with the marsh, or other external miasmata, which produce it. The activity of this exhalation, even when it is attended with no smell, is so great, as to induce sickness, head-ach, vertigo, and fainting. It is not peculiar to the exhalations from such patients to produce morbid effects upon persons who visit them. The odour emitted by persons in the confluent small-pox has been known to produce the same symptoms, together with a subsequent fever and apthous sore throat. This has been remarked long ago by Dr. Lind, and latterly by Dr. Willan, in his Reports of the Diseases of London†. That the yellow fever is often excited in this way, without the intervention of a supposed specific contagion, I infer from its sometimes spreading through whole families, who have breathed the same impure atmosphere with the person first infected by the fever.

* Medical Repository, vol. iv. No. 1.

† Page 13 and 113.

This is more especially the case where the impression made by the exhalation from the sick person is assisted by fear, fatigue, or anxiety of mind in other branches of the family. In favour of this mode of exciting the yellow fever, Dr. Otto communicated to me the following fact. In the autumn of the year 1798, it prevailed upon the *shores* of the Delaware, in Gloucester county, in New-Jersey. A mild remittent prevailed at the same time on the *high* grounds, a few miles from the river. During this time, the doctor observed, if a person who had inhaled the seeds of the yellow fever in Philadelphia afterwards came into a family *near* the river, the same disease appeared in several instances in one or more branches of that family; but where persons brought the fever from the city, and went into a family on the *high* grounds, where the mild remittents prevailed, there was not a single instance of a yellow fever being excited by them in any of its members. This fact is important, and of extensive application. It places the stimulus from the breath, or other exhalations of persons affected by the yellow fever, upon a footing with intemperance, fatigue, heat, and all the common exciting causes of the disease; none of which, it is well known, can produce it, except in persons who have previously inhaled the putrid miasmata, which in all countries are its only remote cause. The

city of Philadelphia has furnished, in all our yellow fever years, many additional proofs of the correctness of Dr. Otto's remark. In the months of July and August, when miasmata are generally local, and float chiefly near to their hot beds, the docks and holds of ships, persons who are affected by these miasmata, and sicken in other parts of the city, never communicate the disease; but after the less prepared and heterogeneous filth of our whole city has been acted on by an autumnal, as well as summer sun, so as to emit pestilential exhalations into all our streets and alleys, the fever is now and then excited in the manner that has been mentioned, by a single person in a whole family. The common intermittents of the southern states are often excited in the same way, without being suspected of spreading by contagion. Even the jail or hospital fever is vindicated by Dr. Hunter from the highly contagious nature which has been ascribed to it, upon the same principle. His words, which are directly to my purpose, are as follow: "In considering the extent and power of the contagion [meaning of the jail or hospital fever], I am not inclined to impute to this cause the fevers of all those who are taken ill in one family after the first, as they are all along exposed to the same vitiated air which occasions the first fever. In like manner, when a poor woman visits some of her

sick neighbours, and is taken ill herself, and afterwards some of her children, I would not impute the disease to infection alone; she and her family having previously lived in the same kind of vitiated air which originally produced the fever. If the cases in which the infection meets with the poison already *half formed* be excepted, the disease in itself will be found to be much less infectious than has been commonly supposed*." By the modes of communicating the yellow fever which have been admitted, the dysentery, and all the milder forms of autumnal fevers, have been occasionally propagated, and perhaps oftener than the first-named disease, from their being more apt to run on to the typhus or chronic state. Of this I could adduce many proofs, not only from books, but from my own observations; but none of these diseases spread by contagion, or become epidemic from that cause in any country. A contrary opinion, I know, is held by Dr. Cleghorn, and Dr. Clarke; but they have deceived themselves, as they formerly deceived me, by not attending to the difference between secreted contagions and morbid excretions from the body, produced by the causes which have been enumerated, and which are rare and accidental concomitants of bilious or summer diseases.

* Medical Transactions, vol. iii. p. 351.

6. The last instance of supposed contagion of the yellow fever is said to arise from the effluvia of a putrid body that has died of that disease. The effluvia in this case act either as the putrified excretions mentioned under the first head, or as an exciting cause upon miasmata, previously received into the system. A dead body, in a state of putrefaction from any other disease, would produce, under the same circumstances of season and predisposition, the same kind and degrees of fever.

The similarity of the fever induced by the means that have been enumerated, with the fever from which it was derived, has been supposed to favour the opinion of its being communicated by a specific contagion. But let it be recollected that the yellow fever is, at the time of its being supposed to be thus received, the reigning epidemic, and that irritants of all kinds necessarily produce that disease. The morbid sweats which now and then produce an intermitting fever, and the alvine excretions which occasionally produce a dysentery, act only by exciting morbid actions in the system, which conform in their symptoms to an immutable and universal law of epidemics. It is only when those two diseases generally prevail, that they seem to produce each other.

Thus have I explained all the supposed cases of contagion of the yellow fever. To infer from the solitary instances of it thus excited, is to reason as incorrectly as to say the small-pox is not contagious, because we now and then meet with persons who cannot be infected by it.

From the explanation that has been given of the instances of supposed contagion of the yellow fever, we are compelled to resort to certain noxious qualities in the atmosphere, as the exclusive causes of the prevalence, not only of that fever, but (with a few exceptions) of all other epidemic diseases. It is true, we are as yet ignorant of the precise nature of those qualities in the air which produce epidemics; but their effects are as certainly felt by the human body as the effects of heat, and yet who knows the nature of that great and universal principle of activity in our globe?

That the yellow fever is propagated by means of an impure atmosphere, at all times, and in all places, I infer from the following facts:

1. It appears only in those climates and seasons of the year in which heat, acting upon moist animal and vegetable matters, fills the air with their putrid exhalations. A vertical sun, pouring its

beams for ages upon a dry soil; and swamps, defended from the influence of the sun by extensive forests, have not, in a single instance, produced this disease.

2. It is unknown in places where a connection is not perceptible between it, and marshes, mill-ponds, docks, gutters, sinks, unventilated ships, and other sources of noxious air. The truth of this remark is established by the testimonies of Dr. Lind and Dr. Chisholm, and by many facts in Lempriere's excellent History of the Diseases of Jamaica. Dr. Davidson furnished me with a striking confirmation of their remarks, in the following extract from a letter, dated November 12th, 1794. "I have mentioned (says the doctor) an instance of the remarkable good health which the 66th regiment enjoyed at St. Vincents for several years, upon a high hill above the town, removed from all exhalations, and in a situation kept at all times cool by the blowing of a constant trade wind. They did not lose, during eighteen months, above two or three men (the regiment was completed to the peace establishment), and during eight years they lost but two officers, one of whom, the quarter-master, resided constantly in town, and died from over fatigue; the other arrived very ill from Antigua, and died within a few days afterwards."

In the United States, no advocate for the specific nature or importation of the yellow fever, has ever been able to discover a single case of it beyond the influence of an atmosphere rendered impure by putrid exhalations.

It is no objection to the truth of this remark, that malignant bilious fevers sometimes appear upon the summits of hills, while their declivities, and the vallies below, are exempted from them. The miasmata, in all these cases, are arrested by those heights, and are always to be traced to putrefaction and exhalation in their neighbourhood. Nor is it any objection to the indissoluble connection between putrid exhalations and the yellow fever, which has been mentioned, that the disease sometimes appears in places remote from the source of miasmata in *time* and *place*. The bilious pleurisies, which occur in the winter and spring, after a sickly autumn, prove that they are retained in the body for many months, and although they are sometimes limited in their extent to a single house, and often to a village, a city, and the banks of a creek or river, yet they are now and then carried to a much greater distance. Mr. Lempriere, in his valuable Observations upon the Diseases of the British Army in Jamaica, informs us, that Kingston is sometimes rendered sickly by exhalations

from a lagoon, which lies *nine* miles to the eastward of that town*. The greater or less distance, to which miasmata are carried from the place where they are generated, appears to depend upon their quantity, upon the force and duration of currents of wind which act upon them, and upon their being more or less opposed by rivers, woods, water, houses, wells, or mountains.

3. It is destroyed, like its fraternal diseases, the common bilious and intermitting fevers, by means of *long-continued* and *heavy* rains†. When rains are heavy, but of short duration, they suspend it only in warm weather; but when they are succeeded by cold weather, they destroy all the forms of bilious fever. The malignant tertians, described by Dr. Cleghorn, always ceased about the autumnal equinox; for at that time, says the doctor, "Rain falls in such torrents as to tear up trees by the roots, carry away cattle, break down fences, and do considerable mischief to the gardens and vineyards; but, after a long and scorching summer, they are very acceptable and beneficial, for they mitigate the excessive heat of the air, and give

* Vol. i. p. 84.

† Clarke on the Diseases of Long Voyages to Hot Climates, p. 116.

a check to epidemical diseases*." There are facts, however, which would seem to contradict the assertion that miasmata are suspended or destroyed by heavy rains. Dr. Lind, in his Treatise upon the Diseases of Hot Climates, mentions instances in which they suddenly created fevers. It is probable, in these cases the rains may have had that effect, by disturbing the pellicle which time often throws over the surface of stagnating pools of water, and putrid matters on dry land. I was led to entertain this opinion by a fact mentioned in a letter I received from Dr. Davidson, dated November 4th, 1794. "Being ordered (says the doctor) up to Barbadoes, last November, upon service, I found that the troops had suffered considerably by that formidable scourge, the yellow fever. The season had been remarkably dry. It was observed, a rainy season contributed to make the season healthier, excepting at Constitution-Hill, where the sixth regiment was stationed, and where a heavy shower of rain seldom failed to bring back the fever, after it had ceased for some time. I found the barrack, where this regiment was, surrounded by a pond of brackish water, which, being but imperfectly drained by the continuance of the drought, the surface was covered with a green scum, which prevented

* Diseases of Minorca, p. 8.

the exhalation of marshy putrefaction. After a heavy shower of rain, this scum was broken, and the miasmata evolved, and acted with double force, according to the time of their secretion."

4. It is completely destroyed by frost. As neither rains nor frosts act in sick rooms, nor affect the bodies of sick people, they must annihilate the disease by acting exclusively upon the atmosphere. Very different in their nature are the small-pox and measles, which are propagated by specific contagion. They do not wait for the suns of July or August, nor do they require an impure atmosphere, or an exciting cause, to give them activity. They spread in the winter and spring, as well as in the summer and autumnal months: wet and dry weather do not arrest their progress, and frost (so fatal to the yellow fever), by rendering it necessary to exclude cold air from sick rooms, increases the force of their contagion, and thereby propagates them more certainly through a country.

5. It is likewise destroyed by intense heat, and high winds. The latter, we are sure, like heavy rains and frost, do not produce that salutary effect by acting upon the bodies, or in the rooms of sick people.

It is worthy of notice, that while the activity of miasmata is destroyed by cold, when it descends to frost; by heat, when it is so intense as to dry up all the sources of putrid exhalation; by heavy rains, when they are succeeded by cool weather; and by high winds, when they are not succeeded by warm weather; they are rendered more active by cool, warm, and damp weather, and by light winds. The influence of damp weather, in retaining and propagating miasmata, will be readily admitted, by recollecting how much more easily hounds track their prey, and how much more extensively odours of all kinds pervade the atmosphere, when it is charged with moisture, than in dry weather.

It has been asked, if putrid matters produce malignant bilious fevers in our cities, why do they not produce them in Lisbon, and in several other of the filthiest cities in the south of Europe? To this I answer, that filth and dirt are two distinct things. The streets of a city may be very *dirty*, that is, covered with mud composed of inoffensive clay, sand, or lime, and, at the same time, be perfectly free from those *filthy* vegetable and animal matters which, by putrefaction, contaminate the air. But, admitting the streets of those cities to abound with the filthy matters that produce pestilential diseases in other countries, it is possible the

exhalations from them may be so *constant*, and so *powerful*, in their impressions upon the bodies of the inhabitants, as to produce, from habit, no morbid effects, or but feeble diseases, as was remarked formerly, is the case in the natives and old settlers in the East and West-Indies. But if this explanation be not satisfactory, it may be resolved into a partial absence of an inflammatory constitution of the air, which, I shall say presently, must concur in producing pestilential diseases. Such deviations from uniformity in the works of Nature are universal. In the present instances, they no more invalidate the general proposition of malignant fevers being every where of domestic origin, than the exemption of Ireland from venomous reptiles, proves they are not generated in other countries, or that the pleurisy and rheumatism are not the effects of the alternate action of cold and heat upon the body, because hundreds, who have been exposed to them under equal circumstances, have not been affected by those diseases. There may be other parts of the world in which putrid matters do not produce bilious malignant diseases from the causes that have been mentioned, or from some unknown cause, but I am safe in repeating, there never was a bilious epidemic yellow fever that could not be traced to putrid exhalation.

It has been asked, if the yellow fever be not imported, why does it make its first appearance among sailors, and near the docks and wharves of our cities? I answer, this is far from being true. The disease has as often appeared first at a distance from the shores of our cities as near them, but, from its connection with a ship not being discovered, it has been called by another name. But where the first cases of it occur in sailors, I believe the seeds of it are always previously received by them from our filthy docks and wharves, or from the foul air which is discharged with the cargoes of the ships in which they have arrived, which seeds are readily excited in them by hard labour, or intemperance, so as to produce the disease. That this is the case, is further evident from its appearing in them, only in those months in which the bilious fever prevails in our cities.

It has been asked further, why were not these bilious malignant fevers more common before the years 1791, 1792, and 1793? To this I answer, by repeating what was mentioned in another place*, that our climate has been gradually undergoing a change. The summers are more alternated by hot and cool, and wet and dry weather, than in former

* Medical Inquiries and Observations, vol. i.

years. The winters are likewise less uniformly cold. Grass is two or three weeks later in the spring in affording pasture to cattle than it was within the memory of many thousand people. Above all, the summer has encroached upon the autumn, and hence the frequent accounts we read in our newspapers of trees blossoming, of full grown strawberries and raspberries being gathered, and of cherries and apples, of a considerable size, being seen, in the months of October and November, in all the middle states. By means of this protraction of the heat of summer, more time is given for the generation of putrid exhalations, and possibly for their greater concentration and activity in producing malignant bilious diseases.

It has been asked again, why do not the putrid matters which produce the yellow fever in some years produce it *every* year? This question might be answered by asking two others. 1st. Why, if the yellow fever be derived from the West-Indies, was it not imported every year before 1791, and before the existence, or during the feeble and partial operation of quarantine laws? It is no answer to this question to say, that a war is necessary to generate the disease in the islands, for it exists in some of them at all times, and the seasons of its prevalence in our cities have, in many instances,

had no connection with war, nor with the presence of European armies in those and in other sickly parts of the globe. During the seven years revolutionary war it was unknown as an epidemic in the United States, and yet sailors arrived in all our cities daily from sickly islands, in small and crowded vessels, and sometimes covered with the rags they had worn in the yellow fever, in British hospitals and jails. I ask, 2dly, why does the dysentery (which is certainly a domestic disease) rise up in our country, and spread sickness and death through whole families and villages, and disappear from the same places for fifteeen or twenty years afterwards?

The want of uniformity in the exhalations of our country in producing those diseases depends upon their being combined with more or less heat or moisture; upon the surface of the earth being completely dry, or completely covered with water*;

* In the Account of the Yellow Fever of 1793, the different and opposite effects of a dry and rainy season in producing bilious fevers are mentioned from Dr. Dazilles. In the autumn of 1804, I have elsewhere remarked, after a summer in which there had fallen an unusual quantity of rain, the bilious fevers appeared chiefly on the high grounds in Pennsylvania, which were in a state of moisture, while scarcely a case of them appeared in the neighbourhood of

upon different currents of winds, or the total absence of wind; upon the disproportion of the temperature of the air in the day and night; upon the quantity of dew; upon the early or late appearance of warm or cold weather; and upon the predisposition of the body to disease, derived from the quality of the aliments of the season. A similar want of uniformity in the annual operations of our climate appears in the size and quality of grain, fruits, and vegetables of all kinds.

But the greater violence and mortality of our bilious fevers, than in former years, must be sought for chiefly in an inflammatory or malignant constitution of the atmosphere, the effects of which have been no less obvious upon the small-pox, measles, and the intercurrent fevers of Dr. Sydenham, than they are upon the summer and autumnal disease that has been mentioned.

This malignant state of the air has been noticed, under different names, by all the writers upon epidemics, from Hippocrates down to the present day. It was ascribed, by the venerable father of physic,

marshes, or low grounds, owing to their being so completely covered with water, as to be incapable of generating, by putrefaction, the miasmata which produce those forms of disease.

to a " divine something" in the atmosphere. Dr. Sydenham, whose works abound with references to it, supposes it to be derived from a mineral exhalation from the bowels of the earth. From numerous other testimonies of a belief in the influence of the insensible qualities of the air, altering the character of epidemics, I shall select the following :

" It is certain (says Dr. Mosely) that diseases undergo changes and revolutions. Some continue for a succession of years, and vanish when they have exhausted the temporary, but secret cause which produced them. Others have appeared and disappeared suddenly ; and others have their periodical returns."

The doctor ascribes a malignant fever among the dogs in Jamaica (improperly called, from one of its symptoms, hydrophobia), to a change in the atmosphere, in the year 1783. It was said to have been imported, but experience, he says, proved the fact to be otherwise*.

" This latent malignity in the atmosphere (says Baron Vansweiten) is known only by its effects, and cannot easily be reduced to any known species

* Treatise upon Tropical Diseases, p. 43, 44.

of acrimony." In another place he says, "It seems certain that this unknown matter disposes all the humours to a sudden and bad putrefaction*."

Dr. John Stedman has related many facts, in his Essay upon Insalutary Constitutions of the Air, which prove, that diseases are influenced by a quality in it, which, he says, "is productive of corruption," but which has hitherto eluded the researches of physicians†.

Mr. Lempriere, after mentioning the unusual mortality occasioned by the yellow fever, within the last five or six years, in the island of Jamaica, ascribes it wholly "to that particular constitution of atmosphere upon which the existence of epidemics, at one period rather than another, depend‡."

Not only diseases bear testimony to a change in the atmosphere, but the whole vegetable and animal creation concur in it, proofs of which were mentioned in another place. Three things are re-

* Commentaries on Boerhaave's Aphorisms, vol. v. p. 226, 230.

† Page 135.

‡ Vol. ii. p. 31.

markable with respect to this inflammatory constitution of the air.

1. It is sometimes of a local nature, and influences the diseases of a city, or country, while adjoining cities and countries are exempted from it.

2. It much oftener pervades a great extent of country. This was evident in the years 1793 and 1794, in the United States. During the same years, the yellow fever prevailed in most of the West-India islands. Many of the epidemics mentioned by Dr. Sims, in the first volume of the Medical Memoirs, affected, in the same years, the most remote parts of the continent of Europe. Even the ocean partakes of a morbid constitution of its atmosphere, and diseases at sea sympathise in violence with those of the land, at an immense distance from each other. This appears in a letter from a surgeon, on board a British ship of war, to Mr. Gooch, published in the third volume of his Medical and Surgical Observations.

3. The predisposing state of the atmosphere to induce malignant diseases continues for several years, under all the circumstances of wet and dry, and of hot and cold weather. This will appear, from attending to the accounts which have been

given of the weather, in all the years in which the yellow fever has prevailed in Philadelphia since 1792*. The remark is confirmed by all the records of malignant epidemics.

It is to no purpose to say, the presence of the peculiar matter which constitutes an inflammatory or malignant state of the air has not been detected by any chemical agents. The same thing has been justly said of the exhalations which produce the bilious intermitting, remitting, and yellow fever. No experiment that has yet been made, has discovered their presence in the air. The eudiometer has been used in vain for this purpose. In one experiment made by Dr. Gattani, the air from a marsh at the mouth of the river Vateline was found to be apparently purer by two degrees than the air on a neighbouring mountain, which was 2880 feet higher than the sea. The inhabitants of the mountain were notwithstanding healthy, while those who lived in the neighbourhood of the marsh were annually afflicted with bilious and intermitting fevers†. The contagions of the small-pox and measles consist of matter, and yet who has ever discovered this matter in the air? We infer the existence of

* Medical Inquiries and Observations, vol. iii. and iv.

† Alibert's Dissertation sur les Fievres Pernicieuses et Attaxiques Intermittentes, p. 185.

those remote causes of diseases in the atmosphere only from their effects. Of the existence of putrid exhalations in it, there are other evidences besides bilious and yellow fevers. They are sometimes the objects of the sense of smelling. We see them in the pale or sallow complexions of the inhabitants of the countries which generate them, and we observe them occasionally in the diseases of several domestic animals. The most frequent of these diseases are inflammation, tubercles, and ulcers in the liver. Dr. Cleghorn describes a diseased state of that viscus in cattle, in an unhealthy part of the island of Minorca. Dr. Grainger takes notice of several morbid appearances in the livers of domestic animals in Holland, in the year 1743. But the United States have furnished facts to illustrate the truth of this remark. Mr. James Wardrobe, near Richmond, in Virginia, informed me, that in August, 1794, at a time when bilious fevers were prevalent in his neighbourhood, his cattle were seized with a disease, which, I said formerly, is known by the name of the yellow water, and which appears to be a true yellow fever. They were attacked with a staggering. Their eyes were muddy, or ferocious. A costiveness attended in all cases. It killed in two days. Fifty-two of his cattle perished by it. Upon opening the bodies of several of them, he found the liver swelled and ul-

cerated. The blood was dissolved in the veins. In the bladder of one of them, he found thirteen pints of blood and water. Similar appearances were observed in the livers of sheep in the neighbourhood of Cadiz, in the year 1799, during the prevalence of the yellow fever in that city. They were considered as such unequivocal marks of an unwholesome atmosphere among the ancients, that they examined the livers of domestic animals, in order to determine on the healthy or unhealthy situation of the spot on which they wished to live.

The advocates for the yellow fever being a specific disease, and propagated only by contagion, will gain nothing by denying an inflammatory constitution of the atmosphere (the cause of which is unknown to us) to be necessary to raise common remittents to that grade in which they become malignant yellow fevers; for they are obliged to have recourse to an unknown quality in the air, every time they are called upon to account for the disease prevailing chiefly in our cities, and not spreading when it is carried from them into the country. The same reference to an occult quality in the air is had by all the writers upon the plague, in accounting for its immediate and total extinction, when it is carried into a foreign port.

In speaking of the influence of an inflammatory constitution of the atmosphere in raising common bilious, to malignant yellow fevers, I wish not to have it supposed, that its concurrence is necessary to produce sporadic cases of that, or any other malignant disease. Strong exciting causes, combined with highly volatilized and active miasmata, I believe, will produce a yellow fever at any time. I have seen one or more such cases almost every year since I settled in Philadelphia, and particularly when my business was confined chiefly to that class of people who live near the wharves, and in the suburbs, and who are still the first, and frequently the only victims of the yellow fever.

It has been said, exultingly, that the opinion of the importation of the yellow fever is of great antiquity in our country, and that it has lately been admitted by the most respectable physicians in Britain and France, and sanctioned by the laws of several of the governments in Europe. Had antiquity, numbers, rank, and power been just arguments in favour of existing opinions, a thousand truths would have perished in their birth, which have diffused light and happiness over every part of our globe. In favour of the ancient and general belief of the importation of the yellow fever, there are several obvi-

ous reasons. The idea is produced by a single act of the mind. It requires neither comparison nor reasoning to adopt it, and therefore accords with the natural indolence of man. It, moreover, flatters his avarice and pride, by throwing the origin of a mortal disease from his property and country. The principle of thus referring the origin of the evils of life from ourselves to others is universal. It began in paradise, and has ever since been an essential feature in the character of our species. It has constantly led individuals and nations to consider loathsome and dangerous diseases as of foreign extraction. The venereal disease and the leprosy have no native country, if we believe all the authors who have written upon them. Prosper Alpinus derives the plagues of Cairo from Syria, and the physicians of of Alexandria import them from Smyrna or Constantinople. The yellow fever is said to have been first brought from Siam (where there are proofs it never existed) to the West-Indies, whence it is believed to be imported into the cities of the United States. From them, Frenchmen and Spaniards say it has been re-shipped, directly or indirectly, to St. Domingo, Havanna, Malaga, Cadiz, and other parts of the world. Weak and absurd credulity! the causes of the ferocious and mortal disease which we thus thrust from our respective ports,

like the sin of Cain, "lie exclusively at our own doors."

Lastly, it has been asserted, if we admit the yellow fever to be an indigenous disease of our cities, we shall destroy their commerce, and the value of property in them, by disseminating a belief, that the cause of our disease is fixed in our climate, and that it is out of the power of human means to remove it. The reverse of this supposition is true. If it be an imported disease, our case is without a remedy; for if, with all the advantages of quarantine laws enforced by severe penalties, and executed in the most despotic manner, the disease has existed annually, in most of our cities, as an epidemic, or in sporadic cases, ever since the year 1791, it will be in vain to expect, from similar measures, a future exemption from it. Nothing but a belief in its domestic origin, and the adoption of means founded upon that belief, can restore the character of our climate, and save our commercial cities from destruction. Those means are cheap, practicable, and certain. They have succeeded, as I shall say presently, in other countries.

From the account that has been given of the different ways in which this disease is communicated

from one person to another, and from the facts which establish its propagation exclusively through the medium of the atmosphere, when it becomes epidemic, we may explain several things which belong to its history, that are inexplicable upon the principle of its specific contagion.

1. We learn the reason why, in some instances, the fever does not spread from a person who sickens or dies at sea, who had carried the seeds of it in his body from a sickly shore. It is because no febrile miasmata exist in the bodies of the rest of the crew to be excited into action by any peculiar smell from the disease, or by fear or fatigue, and because no morbid excretions are generated by the person who dies. The fever which prevailed on board the Nottingham East-Indiaman, in the year 1766, affected those forty men only, who had slept on shore on the island of Joanna twenty days before. Had the whole crew been on shore, the disease would probably have affected them all, and been ascribed to contagion generated by the first persons who were confined by it*. A Danish ship, in the year 1768,

* Observations on the Bilious Fevers usual in voyages to the East-Indies, by James Badinach, M. D. Medical Observations and Inquiries, vol. iv.

sent twelve of her crew on shore for water. They were all seized after their return to the ship with a malignant fever, and died without infecting any person on board, and from the same causes which preserved the crew of the Nottingham Indiaman*.

2. We learn the reason why the disease sometimes spreads through a whole ship's crew, apparently from one or more affected persons. It is either because they have been confined to small and close births by bad weather, or because the fever has been protracted to a typhus or chronic state, or because the bodies of the whole crew are impregnated with morbid miasmata, and thus predisposed to have the disease excited in the manner that has been mentioned. In the last way it was excited in most of the crew of the United States frigate, in the Delaware, opposite to the city of Philadelphia, in the year 1797. It appears to have spread, from a similar cause, from a few sailors, on board the Grenville Indiaman, after touching at Batavia. The whole crew had been predisposed to the disease by inhaling the noxious air of that island.

† Clarke on the Diseases of Long Voyages to Hot Climates, p. 123, 125.

The same reasons account for the fever expiring in a healthy village or country; also for its spreading when carried to those towns which are seated upon creeks or rivers, and in the neighbourhood of marsh exhalations. It has uniformly perished in the high and healthy village of Germantown, when carried from Philadelphia, and has three times appeared to be contagious near the muddy shores of the creeks which flow through Wilmington and Chester.

3. From the facts that have been mentioned, we are taught to disbelieve the possibility of the disease being imported in the masts and sails of a ship, by a contagious matter secreted by a sailor who may have sickened or died on board her, on a passage from a West-India island. The death in most of the cases supposed to be imported, in this way, occurs within a few days after the ship leaves her West-India port, or within a few days after her arrival. In the former case, the disease is derived from West-India miasmata; in the latter, it is derived, as was before remarked, either from the foul air of the hold of the ship, or of the dock or wharf to which the ship is moored.

Many other facts might be adduced to show the yellow fever not to be an imported disease. It has

often prevailed among the Indians remote from the sea coast, and many hundred cases of it have occurred, since the year 1793, on the inland waters of the United States, from the Hudson and Susquehanna, to the rivers of the Mississippi. In South-America, Baron Humboldt assured me, it is every where believed to be an endemic of that country.

These simple and connected facts, in which all the physicians in the United States who derive the yellow fever from domestic causes have agreed, will receive fresh support by comparing them with the different and contrary opinions of the physicians who maintain its importation. Some of them have asserted it to be a specific disease, and derived it from the East and West-Indies; others derive it from Beulam, on the coast of Africa; a third sect have called it a ship fever; a fourth have ascribed it to a mixture of imported contagion with the foul air of our cities; while a fifth, who believed it to be imported in 1793, have supposed it to be the offspring of a contagion left by the disease of that year, revived by the heat of our summers, and disseminated, ever since, through the different cities of our country. The number of these opinions, clearly proves, that no one of them is tenable.

A belief in the non-contagion of the yellow fever, or of its being incommunicable except in one of the five ways that have been mentioned, is calculated to produce the following good effects:

1. It will deliver the states which have sea-ports from four-fifths of the expences of their present quarantine laws and lazarettoes. A very small apparatus, in laws and officers, would be sufficient to prevent the landing of persons affected by the ship fever in our cities, and the more dangerous practice, of ships pouring streams of pestilential air, from their holds, upon the citizens who live near our docks and wharves.

2. It will deliver our merchants from the losses incurred by the delays of their ships, by long and unnecessary quarantines. It will, moreover, tend to procure the immediate admission of our ships into foreign ports, by removing that belief in the contagious nature of the yellow fever, which originated in our country, and which has been spread, by the public acts of our legislatures and boards of health, throughout the globe.

3. It will deliver our citizens from the danger to which they are exposed, by spending the time of the quarantine, on board of vessels in the neigh-

bourhood of the marshes, which form the shores of the rivers or coasts of quarantine roads. This danger is much increased by idleness, and by the vexation which is excited, by sailors and passengers being detained, unnecessarily, fifteen or twenty days from their business and friends.

4. It will lead us to a speedy removal of all the excretions, and a constant ventilation of the rooms of patients in the yellow fever, and thereby to prevent the accumulation, and further putrefaction of those exhalations which may reproduce it.

5. It is calculated to prevent the desertion of patients in the yellow fever, by their friends and families, and to produce caution in them to prevent the excitement of the disease in their own bodies, by means of low diet and gentle physic, proportioned to the impurity of the air, and to the anxiety and fatigue to which they are exposed in attending the sick.

6. It will put an end to the cruel practice of quieting the groundless fears of a whole neighbourhood, by removing the poor who are affected by the fever, from their houses, and conveying them, half dead with disease and terror, to a solitary or crowded hospital, or of nailing a yellow flag upon

the doors of others, or of fixing a guard before them, both of which have been practised in Philadelphia, not only without any good effect, but to the great injury of the sick.

7. By deriving the fever from our own climate and atmosphere, we shall be able to foresee its approach in the increased violence of common diseases, in the morbid state of vegetation, in the course of the winds, in the diseases of certain brute animals, and in the increase of common, or the appearance of uncommon insects.

8. A belief in the non-contagion of the yellow fever, and its general prevalence from putrid animal and vegetable matters *only*, is calculated to lead us to drain or cover marshy grounds, and to remove from our cities all the sources of impure air, whether they exist in the holds of ships, in docks, gutters, and common sewers, or in privies, gardens, yards, and cellars, more especially during the existence of the signs of a malignant constitution of the air. A fever, the same in its causes, and similar to it in many of its symptoms, that is, the plague, has been extirpated, by extraordinary degrees of cleanliness, from the cities of Holland, Great-Britain, and several other parts of Europe.

The reader will perceive, from these facts and reasonings, that I have relinquished the opinion published in my account of the yellow fever in the years 1793, 1794, and 1797, respecting its contagious nature. I was misled by Dr. Lining, and several West-India writers, in ascribing a much greater extent to the excreted matters in producing the disease, than I have since discovered to be correct, and by Bianchi, Lind, Clark, and Cleghorn, in admitting even the common bilious fever to be contagious. The reader will perceive, likewise, that I have changed my opinion respecting one of the modes in which the plague is propagated. I once believed, upon the authorities of travellers, physicians, and schools of medicine, that it was a highly contagious disease. I am now satisfied this is not the case; but, from the greater number of people who are depressed and debilitated by poverty and famine, and who live in small and filthy huts* in the cities of the east, than in the cities of the United States, I still believe it to be more frequently communicated from an intercourse with sick people by the morbid excretions of the body, than the yellow fever is in our country. For the change of my opinion upon this subject, I am

* M. Savary, in his Travels, says, two hundred persons live in Cairo within a compass that accommodates but thirty persons in Paris.

indebted to Dr. Caldwell's and Mr. Webster's publications upon pestilential diseases, and to the travels of Mariti and Sonnini into Syria and Egypt. I reject, of course, with the contagious quality of the plague, the idea of its ever being imported into any country so as to become epidemic, by means of a knife-case, a piece of cotton, or a bale of silks, with the same decision that I do all the improbable and contradictory reports of an epidemic yellow fever being imported in a sailor's jacket, or in the timbers and sails of a ship that had been washed by the salt water, and fanned by the pure air of the ocean, for several weeks, on her passage from the West-Indies to the United States.

It gives me pleasure to find this unpopular opinion of the non-contagion of the plague is not a new one. It was held by the Faculty of Medicine in Paris, in the beginning of the eighteenth century, and it has since been defended by Dr. Stoll, of Vienna, Dr. Samoilowitz, of Russia, and several other eminent physicians. Dr. Herberden has lately called in question the truth of all the stories that are upon record of the plague having been imported into England in the last century, and the researches of Sir Robert Wilson of the British army, and of Assellini, and several other French phy-

sicians, have produced the most satisfactory proofs of its not being a contagious disease in its native country. A discovery more pregnant with blessings to mankind has seldom been made. Pyramids of error, the works of successive ages and nations, must fall before it, and rivers of tears must be dried up by it. It is impossible fully to appreciate the immense benefits which await this mighty achievement of our science upon the affairs of the globe. Large cities shall no longer be the hot-beds of disease and death. Marshy grounds, teeming with pestilential exhalations, shall become the healthy abodes of men. A powerful source of repulsion between nations shall be removed, and commerce shall shake off the fetters which have been imposed upon it by expensive and vexatious quarantines. A red or a yellow eye shall no longer be the signal to desert a friend or a brother to perish alone in a garret or a barn, nor to expel the stranger from our houses, to seek an asylum in a public hospital, to avoid dying in the street. The number of diseases shall be lessened, and the most mortal of them shall be struck out of the list of human evils. To accelerate these events, it is incumbent upon the physicians of the United States to second the discoveries of their European brethren. It becomes them constantly to recollect, that we are

the centinels of the health and lives of our fellow-citizens, and that there is a grade of benevolence in our profession much higher than that which arises from the cure of diseases. It consists in exterminating their causes.

FINIS.