

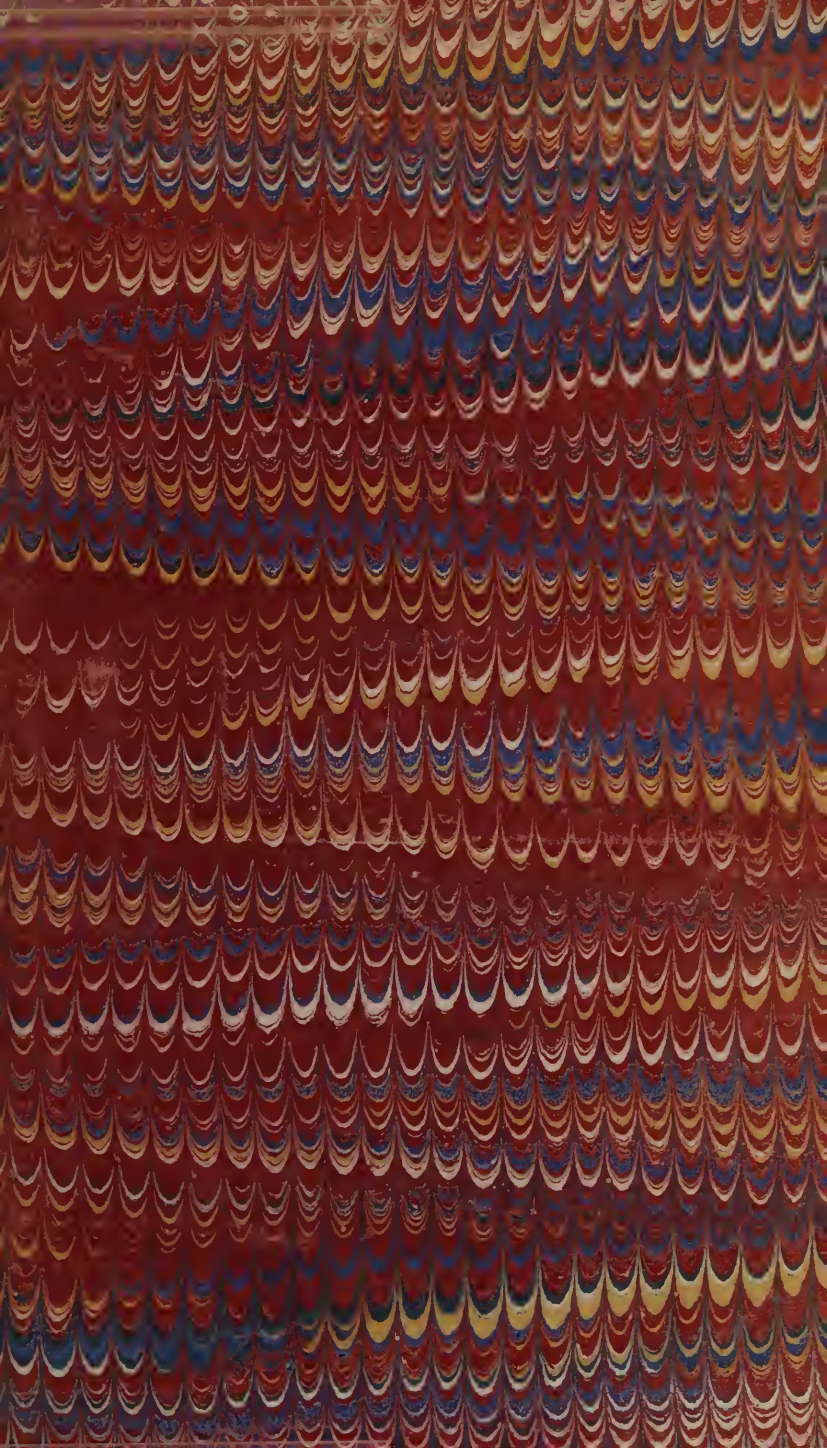
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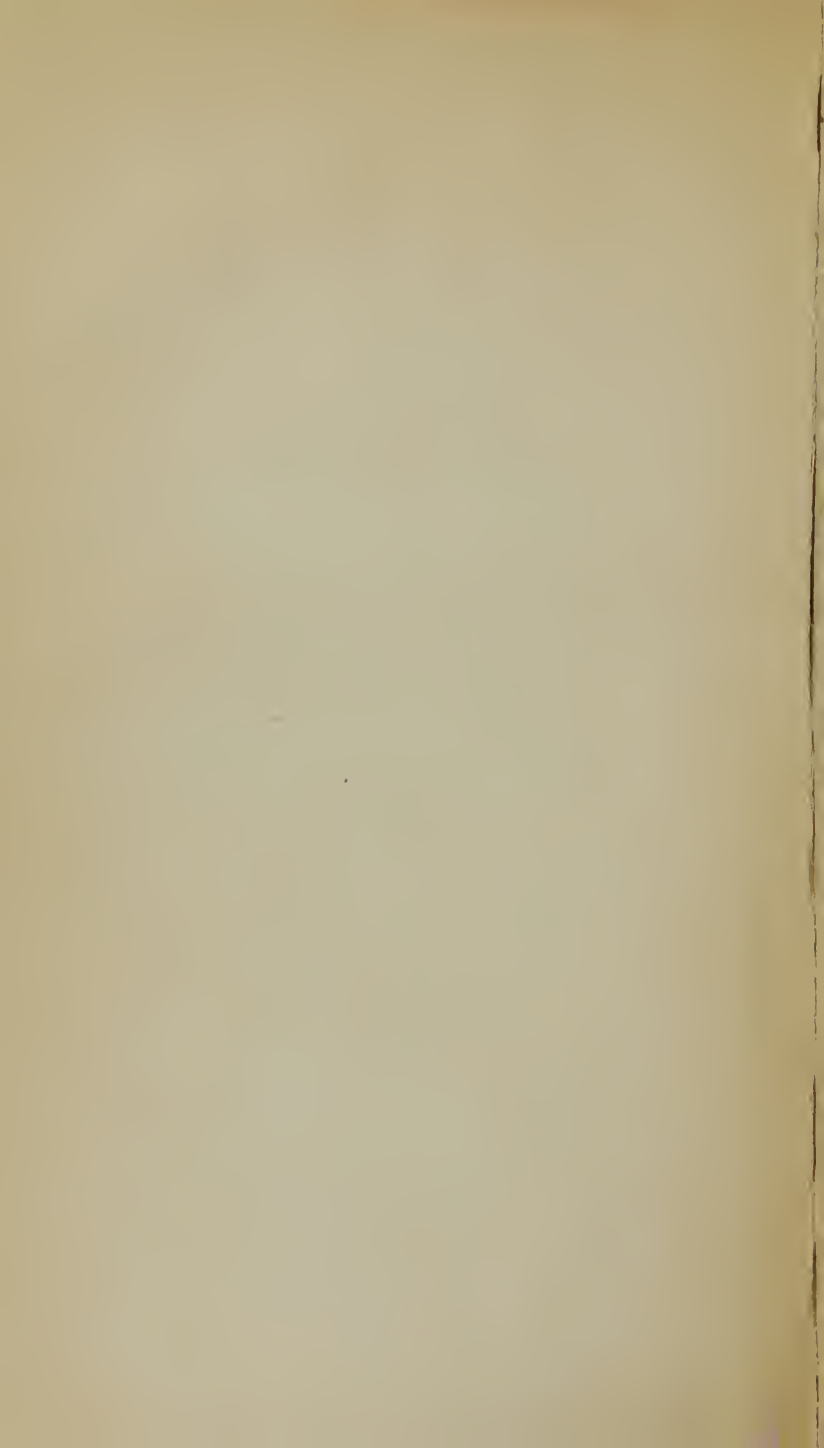
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No. 14066

INDEX





Samuel Baker.

A TREATISE

14066

ON

MALIGNANT INTERMITTENTS.

BY J. L. ALIBERT,

Physician to the Hospital of St. Louis, Member of the School of Medicine of Paris, of the Medical Society of Emulation, Associate of the Royal Academy of Medicine of Madrid, of the Academy of Sciences of Turin, of the Society of Physical Sciences of Gottengen, of the Royal College of Medicine of Stockholm, &c.

THIRD EDITION, REVISED, CORRECTED, AND ENLARGED.

TRANSLATED FROM THE FRENCH,

WITH AN

INTRODUCTORY DISCOURSE, OCCASIONAL NOTES,

AND

AN APPENDIX,

BY CHARLES CALDWELL, M. D. &c.

Medicus, curatione, februm, ut aiunt, methodice instituta, se gerit ut inspector morbi et minister naturæ, curatione vero per Kinam-Kinam, se gerit ut arbiter et instaurator naturæ. TORTI.

PHILADELPHIA:

PRINTED BY FRY AND KAMMERER,
NORTH SEVENTH STREET.

1807.

DISTRCT OF PENNSYLVANIA, TO WIT:

* SEAL. *

BE IT REMEMBERED, That on the twenty-second day of January, in the thirty-first year of the independence of the United States of America, A. D 1807, Charles Caldwell, M. D. of the said dirtrict, hath deposited in this office, the title of a book, the right whereof he claims as proprietor, in the words following, to wit: " A Treatise on Malignant Intermittents. By J. L. Alibert, physician to the hospital of St. Louis, member of the school of medicine of Paris, of the medical society of emulation, associate of the royal academy of medicine of Madrid, of the academy of sciences of Turin, of the society of physical sciences of Gottengen, of the royal college of medicine of Stockholm, &c. Third edition, revised, corrected, and enlarged. Translated from the French, with an introductory discourse, occasional notes, and an appendix, by Charles Caldwell, M. D. &c. Medicus, curatione, febrium, ut aiunt, methodice instituta, se gerit ut inspector morbi et minister naturæ, curatione vero per Kinam-Kinam, se gerit ut arbiter et instaurator naturæ. Torti." In conformity to the act of the Congress of the United States, entitled, " An act for the encouragement of learning, by securing the copies of maps, charts, and books, to the authors and proprietors of such copies during the times therein mentioned." And also to the act, entitled, " An act supplementary to an act, entitled, ' an act for the encouragement of learning, by securing the copies of maps, charts, and books, to the authors and proprietors of such copies during the times therein mentioned,' and extending the benefits thereof to the arts of designing, engraving, and etching historical and other prints."

D. CALDWELL,

Clerk of the district of Pennsylvania

INTRODUCTORY DISCOURSE

BY THE TRANSLATOR.

ON the historical or descriptive and the doctrinal parts of the following treatise, the translator has no particular remarks to offer. The expression of an unqualified approbation of them would be neither interesting nor instructive, and they afford but little room for correction or amendment. It is but justice, however, to observe, that in relation to these points, Dr. Alibert appears to be a distinguished master of his subject, as the work itself very amply testifies. He is perfectly acquainted with the productions of all preceding writers of note on malignant intermittents, and has availed himself of this source of knowledge to its full extent. Hence, without either offending the reader by an ostentation of learning, or wearying him with frequent and long quotations, he has rendered medical literature, both ancient and modern, tributary to the richness and excellence of his treatise.

For the clearness and accuracy of his descriptions of diseases, the correctness of his observations respecting intermittents when prevailing epidemically, and the classical neatness and perspicuity of the general arrangement of his work, Dr. Alibert is greatly superior to

most writers on the same subject, and is certainly inferior to none. In regard to the numerous varieties of the malignant intermittent which he has delineated, his excellent account of the origin and causes of that disease, and his able exposition of its whole philosophy, he is without a rival. In these respects, there is no author either ancient or modern to vie with him in merit.

To the physicians of the United States the principal value of his treatise arises from its exhibiting a more complete and comprehensive view, than any other work, of the various forms which malignant intermittents assume in this country. Indeed no practitioner, who has once read it with attention, can be afterwards deceived by any of the masks and proteiform shapes so frequently put on by the diseases arising from septic exhalations. The translator cannot forbear adding, that a competent knowledge of the principles laid down in this work, would, in the year 1793, have prevented the fatal mistakes into which many of the physicians of Philadelphia fell, relative to the origin and causes of the epidemic of that season. Exchange the intermitting for a continued type, (a circumstance which oftentimes occurs in the course of autumnal complaints) and several of the forms of disease described in the present work will be converted into genuine yellow fever. Yet these diseases were bred in the interior of France, and never suspected either of contagion or of being introduced from tropical climates.

To the treatment of malignant intermittents recommended in the following pages, the translator regrets that he cannot give an unqualified assent. The method prescribed, though no doubt highly judicious and suc-

cessful in France, is not in all respects accommodated to the diseases of the United States. There are two particulars in which the practice of Dr. Alibert differs materially from that necessary to be pursued in similar cases in this country. These particulars relate to the use of the Peruvian bark, and to the employment of evacuants. In the cure of malignant intermittents Dr. Alibert relies almost exclusively on the former of these remedies, calling in the latter only as occasional auxiliaries. But the very reverse of this appears to be more frequently true in the United States. Here, the practitioner, when called to a case of malignant intermittent, must reduce the tumultuous and excessive action, and remove the inflammatory diathesis of the system, before he can venture to exhibit the bark. These ends he can attain only by bloodletting, purging, and perhaps vomiting and sweating. If he venture on the use of the bark in any form, previously to this evacuating process, he never fails to injure his patient. For, to exhibit that remedy during the continuance of an inflammatory state of the system, is, emphatically, adding fuel to fire. Should such practice even succeed in removing the disease, it almost inevitably produces visceral obstructions in its stead.

The translator would be understood as speaking only of *malignant* intermittents, not of those of a *benign* or common character. For it is known that the latter may be certainly and safely cured by the bark, in any country, with very little previous evacuation. But, in the treatment of the former, in the United States, it is as well known, that the bark is admissible only in their more advanced

stages, when the inflammation and violence of action that marked their commencement have been completely subdued. Indeed there occur many cases of the malignant intermittent in this country, in which the bark is not admissible at all. In such instances the practitioner is obliged to rely on those remedies commonly found successful in the treatment of other forms of bilious malignant fever. It is scarcely necessary to observe, that, among these remedies, blistering and sometimes salivating hold a very distinguished rank.

Did not the limits of this discourse forbid the attempt, it would be interesting, and perhaps not altogether useless, to inquire into the causes which produce such a difference between the state of the same diseases in France and in the United State. Nor would it be difficult to assign reasons sufficient to solve this problem in medicine. Indeed when we recollect that the climate of France is mild and equable, while that of the United States is subject to sudden vicissitudes and violent extremes; that in the former country the great body of the inhabitants are obliged to subsist on a scanty vegetable diet, while in the latter they enjoy a plentiful supply of the richest animal food; that the constitutions of the higher orders in France are debilitated by an excess of luxurious indulgences and certain civilized refinements which have not yet found their way into the United States; when, I say, we call to mind these circumstances, with various others of a similar tendency, we discover in them causes sufficient to account for all the difference that exists between the states of disease in the two countries. In the United States, every

thing combines to produce what, in technical language, is termed a *sthenic* diathesis and state of disease; whereas, from the state of society and the modes of living in France, we are naturally led to expect her inhabitants to be subject to diseases of an opposite or *asthenic* character. Such appears to be the true ground of the difference that exists between the practice of Dr. Alibert and that necessary to be adopted in similar cases in the United States.

Philadelphia, January 30, 1807.



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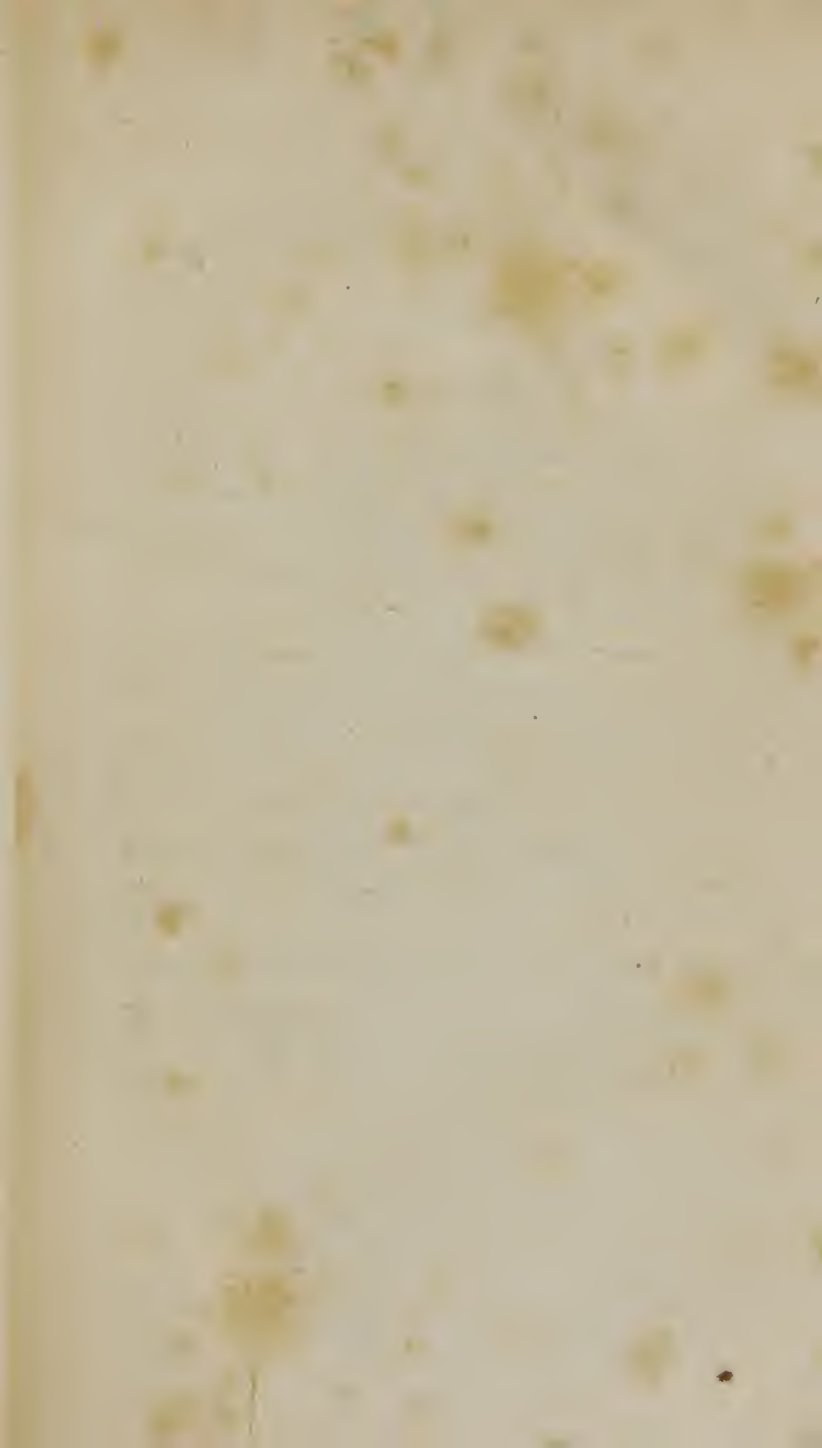
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A TREATISE, &c.

CHAPTER I.

I. THERE are but few diseases which more clearly demonstrate the power of the healing art and the certainty of remedies, than those fevers which constitute the subject of the present treatise. But, in the midst of their various anomalies, and of the numerous forms and aspects which they assume, there is, for the most part, nothing more difficult to unfold than their genuine character. The more ancient practitioners of medicine, therefore, had but an imperfect knowledge of their nature, and were entirely ignorant of the best mode of treating them.

II. To the moderns was reserved the glory of discovering and describing the peculiar type and progress of a disease, which had been hitherto concealed from the eye of the ablest observers.*

* Although the ancients were not thoroughly acquainted with the history of malignant intermittents, it appears notwithstanding that they had some knowledge of them. Morton has improperly assumed to himself the glory of being the original discoverer of these diseases, when he says; “ *Operæ pretium duxi exempla aliquot hujusmodi febrium, quas nuperrime observavi, seligere, scriptis mandare, atque publici juris facere. Atque equidem hoc pensum eo lubentius aggredior, quia nemo adhuc (quantum scio) hęc subjectum*

Among those characters who have made this disease a particular object of research, Mercatus, Heredia, and Morton hold a distinguished place. At a later period, Torti, Werlhof, Lautter, Senac, Cleghorn, and Medicus, have treated the subject in a still more accurate and profound manner. The first of these latter characters, in particular, directed in his inquiry by the light of analysis, has grouped or collected into separate points of view, the leading symptoms, which, under certain circumstances, bestow a sort of peculiar physiognomy on the disease. He has also adverted with great sagacity to its principal metamorphoses or masked forms. But in the present improved state of medical science, his work is not alone sufficient for the purposes of the practitioner. On this interesting point new facts have given rise to new ideas. Besides, Torti has tarnished the lustre and truth of his immortal descriptions by a visionary theory, which must necessarily give place to the more accurate opinions of the present day.

tractavit, cujus cultura ad praxim medicinalem promovendam maximi momenti mihi esse videtur." Not to mention Salius Diversus, Ludovicus Mercatus, and Michael Heredia, who preceded Morton in this pretended discovery, it is unquestionably true that Hippocrates and Cælius-Aurelianus, among the Greeks, and Avenzoar, Averroes, and Avicenna among the Arabians, have manifested a knowledge of these diseases in their writings. It cannot, however, be denied, that the moderns are the authors of the proper treatment of malignant intermittents, which was not understood till the time of Morton and his successors. There are but few discoveries in medicine that have been more obviously useful to mankind.

III. It is known that the celebrated practitioner of Modena has described and considered the malignant intermittent under several varieties or forms, on which physicians cannot bestow too much attention, in order that they may be able to understand them, and clearly distinguish them from each other. Thus, for instance, in the first form, the disease is characterized by bilious vomitings, and a preternatural discharge from the bowels, resembling sometimes that of cholera morbus, and at other times that of dysentery. In the second form there is a hepatic flux, or one which is sometimes of a blackish colour: in the third, a cardialgic affection, or burning sensation in the stomach, accompanied with fruitless efforts to discharge the contents of that viscus: in the fourth, a profuse sweat which affords no relief to the patient: in the fifth, repeated fainting-fits: in the sixth, a continued coldness, which increases by degrees without being followed by any augmentation of heat: and lastly, in the seventh, a deep soporose or lethargic affection, differing but little from apoplexy. To these varieties of the malignant intermittent, being all that were known to Torti, I will add a few others, namely, that which is characterized by the prevalence of a mild delirium, and the existence of which I have myself had an opportunity of witnessing, since the original observations of professor Pinel on the subject; that which is marked by a particular irritation of the Schneiderian membrane; that

characterized by symptoms of an intermitting jaundice ; and, lastly, that which is marked by an exanthematic eruption regularly appearing and disappearing with the exacerbations and remissions of the disease. This last variety fell under my notice in the hospital of St. Louis.

IV. I think it by no means correct to restrict within such narrow limits as Torti does, the number of malignant varieties thus characterized by some one leading and predominant symptom. From the faithful descriptions transmitted to us by Morton, and other physicians whose testimony is not to be questioned, there can be no doubt but this fever may and does mask itself under other affections equally formidable. It has been found in many cases to put on the appearance of pleurisy or rheumatism: it has been observed to be periodically characterized by severe nephritic pains, epileptic symptoms, convulsions, violent cephalic affections, considerable uneasiness and pain in the organs of respiration, and, in one case, even by all the symptoms of hydrophobia; nor have these several affections disappeared till the termination of the paroxysms themselves. The different facts that have been collected on this subject are doubtless sufficient for the establishment, not of new species, but of new varieties of malignant intermittents.

V. That I may proceed with order, and introduce into this work nothing but the clear, correct, and accurate language of physical science, I will first describe malignant intermittents pre-

cisely as they appear in the places and hospitals where they prevail. I will next unfold what seems to be, at present, the best established doctrines, relative to their nature, their diagnosis and prognosis, and to the causes which concur in their production. I will then conclude by a statement of the principles and rules by which their treatment ought to be governed.

ARTICLE I.

The choleric or dysenteric state of the Malignant Intermittent.

VI. This state of fever was evidently known to Hippocrates, where he speaks of the deleterious influence of the autumn in the production of cholera morbus, and of intermitting fevers having assumed a bad character. I have had an opportunity of seeing one case of this variety of the malignant intermittent during a destructive epidemic which prevailed in an hospital; but the patient sunk under the paroxysm in which I first saw him.

According to the observation of Torti, this disease is for the most part a tertian, and very rarely appears under any other type. Its access is characterized by an abundant vomiting or purging of bile of a leek-green colour.

This vomiting and purging is accompanied with an anxiety, and a burning sensation in the stomach, a slight sweat on the forehead, hic-cough, and a sharp, shrill, but sometimes a hoarse,

voice. The tongue is dry and parched, the urine thick and high coloured, and the respiration difficult and laborious. The eyes are sunk, the pulse small and feeble, and the extremities cold and livid: in a word, all the phenomena that accompany cholera morbus occur in this disease. Yet the malignant intermittent differs from cholera morbus in this, that its predominant symptom is even more violent, and, to avail myself of the comparison of Torti, this symptom follows the course and periodical movements of the fever, as the shadow follows the substance. The author just mentioned gives the histories of three cases of tertian fever accompanied with symptoms of cholera, in which this character was uniformly preserved. In one case only the matter evacuated by vomiting and stool was in small quantity, and was not discharged without the most violent efforts.

To these facts I will subjoin a case contained in the excellent work of Comparetti (*Riscontri medici delle febbri larvate, &c.*) That author has followed the footsteps of Hippocrates. The analytic process of the ancient physicians of Greece adds lustre to his writings. A woman at the age of seventy, of a bilio-sanguineous temperament, a slender make, a tall stature, a soft fibre, and a sprightly imagination, had experienced acute pains in the stomach with an enlargement of that organ, as well as of the uterus, although she had never been pregnant: she had also been troubled with melancholy and lowness of spirits.

In the spring of 1789, she was attacked with colic in the left hypochondriac region, which afterwards extended also to the right. This disease was treated by bloodletting, the use of linseed oil, fomentations of the abdomen, emollient clysters, and, finally, during the intermission of the pains she received bark in injections, and also took it internally.

The colic went off gradually, but there remained during the summer a slight pain in the bladder and in the liver, the patient experienced also some difficulty in making water, and in discharging the contents of the bowels, complaints for which the aid of a physician was again solicited.

About the beginning of October, having eaten some vegetables at supper, she was attacked in the night with a considerable vomiting, and a severe purging. She experienced slight irregular chills, and passed a very restless night, although in somewhat of a torpid state.

Next morning Comparetti was called in. He found the pulse small, somewhat frequent and feeble, and at times unequal, the heat of the body mild, the cholera morbus still existing, the urine of a dull red colour, the tongue moist and clean, and the abdomen slightly distended. During the visit of Comparetti, the patient was attacked by a fainting-fit, with deep respiration, eyes closed, and some convulsive movements of the arm. This state of things lasted a few minutes, when there occurred a remarkable al-

teration in the countenance, which now became pale and cadaverous, with loss of speech, and a total extinction of the internal senses. It was understood that she had previously suffered an attack in the night, at the commencement of which she had experienced a tightness in her temples and jaws, and had lost the power of speech. This painful sensation descended and rose at different intervals, sometimes passing to the muscles of the neck and breast, and running from behind forward; it then removed to the limbs; and was finally succeeded by a general lassitude. In this state of things recourse was had to vinegar, and volatile stimulants were applied to the nose; the patient took during the day Hoffman's anodyne liquor, to which a decoction of the bark was added in the evening.

On the second day the fever returned, accompanied by pain in the limbs and other parts of the body; the fainting-fits were more frequent during the night; the patient took the anodyne liquor, and the decoction of bark alternately. The heat of the body began to increase, and at the same time the vomiting and purging to abate. In the morning the pulse was soft, slow, and feeble. At the commencement of the fainting-fit it was confused, became imperceptible, and then rose again. In the course of the day there occurred several attacks of this description. As the discharge from the bowels diminished, the flow of urine became more considerable.

On the third day, the fever appeared suddenly several hours before its usual time. Convulsive motions towards evening and in the night. Decoction of bark with syrup of white poppies.

Fourth day, in the morning there was an evident remission; but the fainting-fits continued, so as to amount to ten in number in the course of twenty-four hours. The liquid laudanum of Sydenham and distilled citron water were substituted in place of the syrup. The patient had some sleep.

Fifth day, the fever returned in the morning before its usual time, with a pulse fuller and less soft. Symptoms less alarming; the decoction of the bark was continued throughout the night.

Sixth day, the fever returned at the same hour in the morning; the fainting-fits ceased, the cold fit increased in strength, as well as the frequency of the pulse and the subsequent heat, which soon abated again. The night was tranquil:

Seventh day, there was no paroxysm; there occurred a partial sweat, with a copious flow of urine.

For some days following there was no fever; it afterwards, however, returned without the cholera, but the fainting-fits also recurred, with spasms in the breast and legs. The bark was again administered under different forms. The fever at length disappeared entirely.

Some time afterwards, the pain in the right hypochondriac region returned: this pain, which resembled the gnawing of a dog, was so severe.

that the patient was obliged to keep her legs drawn up towards her body. On the anterior region of the liver, a swelling, tension, and hardness, were perceptible to the touch. Fomentations were applied; and clysters administered. The patient took oil and magnesia with the bark. While under an attack of the spasmodic affection, she kept her hands immersed in cold water, an expedient which afforded her some relief.

During the different turns of the fever, and the other affections which took place throughout the course of the spring, the patient was troubled with a profuse diarrhœa, which producing great muscular weakness, and a languor of the vital organs, gave reason to apprehend a fatal termination. Under these circumstances, the bark combined with an anodyne effected a cure. This remedy removed at once both the fever and the superabundant evacuation by stool.

At other times the febrile paroxysm is accompanied with a flux of a dysenteric character; that is, the matter discharged by the patient by stool consists of mucus mixed with blood. The discharges are attended with tenesmus and tormina the most excruciating. The matter evacuated is so acrid as sometimes even to corrode the rectum. The stomach is affected with keen pains, as if its membranes were violently pinched or even lacerated.

Torti has, however, remarked, that, in general, this kind of evacuation is accompanied with less

danger, than that which we before described. The fever attending it, though apparently more intense, is less concentrated.*

In the writings of the same author we meet with an account of a malignant double tertian accompanied with a constant evacuation of a bloody mucus, similar to that discharged in dysentery: there was, however, this difference, that the evacuation took place not only by stool, but also by vomiting, a circumstance which does not occur in the latter disease; and although the intestines were not altogether exempt from griping, yet the stomach was the principal seat of suffering.

To the choleric state of the malignant intermittent we may refer a case of true malignant fever mentioned by Fernel, although the circumstances of it are but very briefly detailed.† A man in the prime of life and accustomed to high living, had been for a long time subject to a daily evacuation of bile. This evacuation ceased all at once, and was succeeded by an acute cardialgic affection, accompanied with vomiting and a severe cough. For some time the patient experienced fits of shivering similar to those that usher in

* A fever, when generally and equally diffused throughout the system, though very violent, is accompanied with comparatively less danger, because it does not expend its force on any one organ, and is therefore less capable of producing disorganization and death in any particular part. Hence the greater malignity and danger of *centripetal* forms of fevers, or those determined to the interior parts of the body, when compared with *centrifugal* forms, or such as appear in a state of greater diffusion.

† *De sed. intermitt. lib. 4. cap. 11.*

the paroxysms of common tertians, but more violent, and recurring at certain intervals during the day, without being followed by any other symptom. After about fifteen days had elapsed, fever supervened, marked by the type already mentioned, and terminated fatally in its first paroxysm. On opening the body of the deceased, nearly a pint of green bile was found, diffused principally about the cavities of the liver.

ARTICLE II.

Of the hepatic or atrabiliary state of the Malignant Intermittent.

With regard to *Cholera morbus*, considered independently of the malignant intermittent, perhaps there is no disease better, or more forcibly described in the epidemics of Hippocrates; and among the moderns, Bianchi, in particular, has treated profoundly of the doctrine of the ancients on this subject. (*Hist. hep. tom. I. p. 595.*)

VII. Although this variety has been observed to occur in individuals of robust constitutions, who have survived its attacks, yet it is to be considered as a disease for the most part mortal, unless the ablest medical assistance be procured at its very commencement. The predominant symptom which constitutes it is, a copious and frequent discharge from the bowels of a matter resembling the washings of raw flesh, and denominated by the ancients the *hepatic flux*. This disease, at its first onset, produces, to appear-

ance, no great inconvenience to the patient; but in a short time it prostrates the strength of the system to an extreme degree. The pulse becomes small and feeble; the voice is sharp, and at times is entirely suppressed. There is a remarkable coldness of the body and extremities. The patient has such a tendency to syncope, that that affection occurs as often as he attempts to sit erect in bed. The intellectual functions remain notwithstanding unimpaired. (See the first and sixth cases of Torti, book 4th, chapter I.)

Sometimes the matter discharged from the bowels is a blackish coloured blood, liquid or solid, half coagulated or half dissolved. If the discharge, so often spoken of by Hippocrates, and vulgarly denominated *atrabiliary*, be excessive, it is soon accompanied by symptoms the most alarming, such as an obliteration of pulse, a coldness and lividity of the limbs, the *facies Hippocratica*, &c. (See the 7th and 8th cases of Torti, book 4, chapter I.)

The works of physicians of observation contain many examples of hepatic intermittents. Raymond Restaurand makes mention of one which he cured by the exhibition of Peruvian bark, at a time when that remedy was but little known.*

* *De l'usage du china-china pour la guérison des fièvres*, 1680.

ARTICLE III.

The cardialgic state of the Malignant Intermittent.

VIII. It appears that the cardialgic state of fever was known to the ancients. Comparetti justly remarks, that Hippocrates has described paroxysms of this disease in his treatise *De morbis popularibus*.

The symptom of cardialgia, which constantly characterizes this state of fever, shows itself in general at the beginning of the attack, while the patient is yet in the cold fit, or as soon as the hot fit commences. The patient then experiences a sensation of gnawing at the orifice of the stomach, accompanied with vomiting or nausea; he is also subject to frequent fainting-fits. His pulse is almost imperceptible; his vision is more or less dim; his countenance is pale and cadaverous; his temples are hollow, &c. The sensation of gnawing which constitutes the principal characteristic of the disease, is sometimes so violent as to extort from the patient screams and groans. Torti speaks of a woman, in whose case the symptom of cardialgia rose to such a height, that she compared the sensation in her stomach to that produced by the gnawing of dogs. (See his ninth case, book 4, chapter I.)

It is to this cardialgic variety of the malignant intermittent that we must refer the fever which Forestus denominates *syncopalis*, and which that experienced physician observed in

the case of a woman in the year 1563.* The paroxysms, which followed the tertian period, characterized by a small and slow pulse, crude urine, &c. occurred every day, producing in the stomach the most excruciating pain. Forestus has collected several other facts of a similar nature.

We find in a Latin dissertation by Aurevill † an account of a case of the cardialgic state of malignant intermittent, which was successfully treated by the bark. Its first paroxysm resembled that of a common intermittent, except that the sweat was not sufficiently copious. On the day following, being the day of intermission, the debility was great. The third paroxysm which came on with a slight shivering, was more alarming. It terminated by a very moderate sweat; and the fourth day was not marked by a perfect apyrexia. On the fifth day the fever came on again. The patient, instead of a coldness, experienced only a trembling, to which the hot stage succeeding, she was seized with a sense of violent constriction in the lower part of the chest, causing a suffocation which every instant threatened a fatal termination. There were, besides, a prostration of strength, a disposition to syncope, great anxiety, a clouded countenance; distortion of the eyes and indistinct vision; nausea and fruitless efforts to vomit, or a discharge of only

* *De febr. intermitt. lib. 3, obs. XXIX. nam prius in ventriculo ipsa valde conquerebatur.*

† *Dissert. de febr. intermitt. Malign. 1765.*

a small quantity of bilious matter; and pains extending from the ischium over almost the whole side. The blood drawn in venesection had nothing extraordinary in its appearance; the urine, after a very severe paroxysm, was turbid, blackish, and fetid; it was also observed to have a pellicle on its surface, and to deposit a white sediment. The same author makes mention of a second instance of this variety of the malignant intermittent, which was remarkable on account of the nature of the cause by which it was produced; we shall have occasion to speak of it in the course of this treatise.

The work of Comparetti contains a case of the cardialgic intermittent. This case occurred in a man about forty-five years of age, of a bilious temperament and a dark complexion, and not at all subject to diseases. In the month of August, 1786, he went, for the first time, to Triest by sea; having thus remained for some days in a very changeable air, he lost, in part, his appetite and his sleep: he made urine with difficulty.

He left Triest with the fever on him, and returned again in like manner by sea; his passage was of two day's duration: during this time our patient experienced a constant chilliness, with a sensation of oppression and constriction in the region of the stomach. He arrived at Venice, where he was prevailed on to take some nitrous drinks.

The third day, as soon as he reached home, he took, of his own accord, a dose of cassia, drank lemonade, and bathed his feet in warm water. He passed a restless night; and continues to discharge urine in small quantity.

Fourth day in the morning, the pulse was tense, and the cardialgic pain had become more distressing. A vein was opened in the arm and in the foot; the bloodletting afforded no relief: he took little nourishment during the day, but drank plentifully of water mixed with the juice of oranges. In the evening his pulse was again contracted, and somewhat frequent, and there was a slight increase of the warmth of the skin: a preparation was administered consisting of an emulsion of the oil of sweet almonds, with the seeds of the white poppy. He passed, as before, a sleepless night; the pain of the stomach continued, and the urine was discharged in small quantity and of a high colour.

Fifth day in the morning, the patient took cream of tartar whey, which moved his bowels gently. Towards twelve o'clock the pulse became smaller and more contracted, with a little frequency and a moderate degree of heat. In the evening the pulse was lower, more soft, and less frequent; some degree of nausea and thirst; the tongue was somewhat white and foul. The patient continued to experience pain, and to have a scanty discharge of urine.

Sixth day, he took in the morning a dose of manna, with some distilled citron water; thirst

increased, bowels disturbed by wind, stools liquid, urine more scanty and of a deeper colour, although the patient drank very copiously. In the evening the pulse was much more open and more frequent; pain of the stomach increased, face flushed, cephalalgia.

Seventh day in the morning, symptoms highly alarming. The skin was dark and unsightly, the eyes were closed, the respiration was difficult and laborious, the decubitus oblique, the pulse feeble, the heat diminished, the tongue dry and tremulous, and the urine almost black. Recourse was had to the bark, in doses of two drachms in water, frequently repeated. In the evening, the pulse was more frequent and less soft, the heat was increased, and the pain in the stomach removed. The bark was productive of but little rest during the night, but began to give rise to an increased flow of urine:

Eighth day, there was a remission of the principal symptoms; all the excretions were increased, the pulse was less feeble, more regular, and less frequent, the respiration was free, the skin was warmer and more soft, the tongue more moist, and the urine copious and of a citron colour. The bark was continued in the same doses every two hours. In the morning, no signs of a fresh exacerbation; evening, a striking remission of the fever and all its symptoms. The night was tranquil.

Ninth day, no fever; a return of appetite, and the patient in a state of convalescence. The bark

was still administered twice a day for some time, in consequence of which there was no relapse.

I could also mention an instance of the cardialgic state of fever, which attacked a girl of sixteen years of age, who lodged in the neighbourhood of a common-sewer near to the street du Four, in Paris. The first paroxysms of this fever being misunderstood and treated by purgatives, were accompanied by an acute and often intolerable cardialgia, a laborious and irregular respiration, and extreme anxiety. A pupil of professor Pinel, who lodged in the same house, recognised the character of this fever, which was checked in the first instance by the bark, in the quantity of two drachms to a dose, given during the time of intermission. In eight days afterwards the disease returned, and was again cured by the same remedy, aided by the use of generous wine.

ARTICLE IV.

The diaphoretic state of the Malignant Intermittent.

VII. This disease is regarded as highly insidious, doubtless because it commences, without any thing threatening in its aspect, by a cold fit and shivering, which are succeeded by a hot fit and early sweats, that induce us to form our judgment of its nature and issue from its first appearance. But the danger of the fever actually increases in proportion as the sweats become more copious and general. The skin appears to be in a state of complete atony.

All the pores being open give vent to sweat which is thick, viscous, oftentimes cold, and which even passes through the bed and bedclothes. The patient dissolves, as it were, into a perfect liquid. This symptom does not show itself, under certain circumstances, till the decline of the paroxysm, but is not on that account the less dangerous. In general the pulse is frequent, small, and feeble; the respiration is laborious; the powers of the system are in a state of great prostration; the intellectual faculties are the only ones which remain uninjured; and the patient feels himself sinking by degrees into a state of dissolution.

In the writings of Riverius, we meet with a case of this variety of the malignant intermittent, which deserves to be related.* A man while at work in his garden, was suddenly seized with a severe pain in the epigastric region. Being unable to stand, he made out to reach his house, which was at no great distance, and went to bed. The fever at first was not very violent; but on the day following the patient's body was covered with a profuse and spontaneous sweat, which afforded some relief to the pains of the diaphragm. This sweat which amounted to an inundation, continued constantly to increase, and refused to yield to any mode of treatment; the strength of the system was gradually wasted, and death supervened, without any other symptom having given cause to apprehend such an issue.

* Observ. Comm. xxviii.

It would be difficult to give a more circumstantial and complete view of the fever of which he treats, than that sketched out by the illustrious practitioner of Modena, from the symptoms which he had experienced in his own person, and on which he meditated with great profoundness. That disease made its attack by two slight paroxysms, which had nothing in them in any measure alarming. It was not till towards the close of the third paroxysm, that a copious sweat began to show itself on the breast, arms, neck and forehead; at first the patient supported this evacuation without much inconvenience; but he was suddenly attacked with so excruciating a pain in his thighs, that it appeared to him as if they had been cut off transversely and that with a single stroke. This sensation continued for some time; the other organs sustained no alteration; the intellect was perfectly sound; the pulse was good, the visage and the eyes retained their natural appearance, and yet the patient believed that he felt the approach of death. His painful sufferings, however, subsided by degrees, the sweat increased, and with it the fever; the pulse became small and frequent, the strength declined; all these symptoms increased in force. The patient manifested great anxiety, and complained of a burning heat about the præcordia, but nothing was more distressing to him than sleep, which, being succeeded by tremors, disquietudes, and an inexpressible uneasiness, induced him to guard against it with the utmost solicitude.

On the decline of this fever, which lasted eleven days, and which was successfully treated with the Peruvian bark, the patient could not rise from his bed without the greatest difficulty. He felt a weight on his legs, as if they had been cased in lead, which made him apprehend a relapse, an event that actually occurred after his first going out. But the fever which took on, at first, the form of a double tertian without much intermission, but unaccompanied by sweats or any other predominant symptom, assumed by degrees a simple character, and yielded to the proper remedies.

It is worthy of remark, that although this patient had been perfectly well for several months, and although he had been engaged in the chase and other laborious exercises, he was nevertheless unable to apply his feet to the floor of his carriage, without experiencing a renewal of the same excessive pain in the middle of his thighs, which he had felt after the third paroxysm of the fever. This laid him under the necessity of keeping his legs continually in a horizontal position.

The exactness bordering on minuteness, with which Torti has noted even the slightest symptoms which he experienced, ought to convince us, that in order to acquire a perfect diagnosis of diseases, we should accurately mark down and remember every thing that occurs during their progress.

Sauvages mentions in his Nosology, that he had twice had an opportunity of seeing this state

of fever. The first case occurred in the person of a man about forty years of age, of a melancholic temperament. He experienced for two days, such profuse sweats, that he was obliged to change his linen nine times in that period. He was constantly in a state of moisture. Purgings and bloodletting were improperly proposed in this case, but the patient refused to submit to them. The subject of the second case was a woman. The fever was accompanied with anxiety, a preternatural appetite, and an extreme degree of debility; the sweat continued for eight hours: the slightest cold caused a return of the paroxysms.

I must not here omit to make mention of a case of comatose intermittent being cured at first by an ounce of the Peruvian bark, but which returned again on the twelfth day under the sweating form, with all the symptoms described by Torti, and was cured a second time by the same remedy. For an account of this case I am indebted to professor Pinel. This example of fever, which, under its two several appearances, ought to be referred, according to nosologists, to two different species, is sufficient to convince us that the different forms which malignant fevers assume, are nothing more than mere varieties of that disease.

ARTICLE V.

Of the syncopal state of the Malignant Intermittent.

VIII. It appears that in the varieties already described, fainting-fits may occur by accident; but, in the present variety, they constitute an essential and primitive symptom. The slightest movement appears to produce them; it is sufficient that the patient attempt to turn in bed, or even to move his arm or his hand. It is necessary that he should be constantly supported by stimulating odours. No part of the body is particularly affected; the patient sinks without any evident cause; nature seems every instant to be ready to decline the performance of her functions; the pulse is small, depressed, and frequent; the forehead and neck are bathed in sweat; the eyes are hollow, muddy, &c.; and the prostration of strength is universal. All these symptoms are, for the most part, highly dangerous, although the time of intermission be passed in tranquillity.

Riverius speaks of a woman being attacked by a double tertian, characterized by frequent fainting fits, which gave rise to an appresension that her life was in danger.* This fever being treated by cordials, proved neither mortal nor of long continuance.

Nothing can better prove the striking advantages produced by remedies properly administered, even in the most desperate instances of this

* Observ. xxxvi. Cent. 4.

disease, than a case of syncopal intermittent, treated by Torti, of which we have a detailed account in the writings of that author.* When he was called in, the patient was lying without motion; the face was of a leaden colour and cadaverous appearance; the eyes being half-closed, nothing but the white of them could be seen; the respiration was stertorous; the strokes of the pulse were unequal and scarcely perceptible. The fainting fits had a constant predominance.

I once saw a case of the syncopal state of malignant intermittent, which terminated fatally, in consequence of the physician mistaking the true character of the disease, and neglecting to administer the bark.

ARTICLE VI.

The algid state of the Malignant Intermittent.

IX. There occurs occasionally a continued coldness, which, instead of disappearing and being succeeded by a hot fit, is prolonged and fills up the greater part of the paroxysm. Besides this primitive symptom, the patient experiences thirst, and anxiety; he utters complaints; his voice is interrupted, and his tongue is rough; his urine is copious and clear, or of a deep red colour and in small quantity; his aspect is cadaverous; several of these symptoms continue occasionally during the time of intermission.

* Therap. spec. lib. 4. capt. 11. fol. 319.

We find, in a collection of cases made by Riverrius, the history of a woman greatly advanced in years, who was subject to a daily attack of the algid state of fever.* The universal coldness which characterized these paroxysms, continued twelve or fifteen hours. The intermission was not perfect, and the prostration of strength was considerable, on account of an obstinate lientery which rendered the disease complicated. These symptoms yielded to the tonic plan of treatment on the eleventh day.

This fever is observed at times at the Saltpetre house. The door-keeper of that hospital, aged about thirty-six years, had evidently an attack of it. In the first paroxysm there were a coldness of the feet and a great prostration of strength. In the second, an increase of the coldness, which extended as high as the knees. The third paroxysm would have probably proved fatal, if professor Pinel had not availed himself of the intermission, to check the fever, by a skilful exhibition of bark and good Bourdeaux wine.†

A similar fact has occurred more recently in the same hospital. A woman, aged sixty-two

* Observ. lvi. Cent. 4.

† Professor Pinel was the less liable to be deceived in the character of this malignant disease, in consequence of having seen a similar case in the person of an old man, in the neighbourhood of Montpellier. A coldness of the feet alone characterized the first paroxysm; the second was characterised by a coldness of the feet and legs at the same time; the third by that of the whole lower extremities. The patient sunk under the fourth paroxysm, in consequence of being unable to procure any bark.

years, was seized suddenly and without any precursory symptom, with an icy coldness of the feet and hands, accompanied by a loss of feeling. After the four first paroxysms of this algid fever, which had assumed the form of a double tertian, the coldness of the feet extended as high as the knees, and that of the hands as high as the elbows: the debility was then more considerable. In the interval between the fourth and fifth paroxysms, the bark was given, two drachms to a dose, mixed with twelve grains of the powder of Canella, to increase its efficacy, and, as a further aid to its action, occasional doses of wine of worm-wood were administered. The next paroxysm was that of a mild tertian, which continued only six days, gradually decreasing during the time; it at length yielded entirely to the use of the wine of worm-wood alone.

M. Lanoix, a physician no less learned than modest, and possessing a peculiar talent for observation, saw two cases of the algid state of malignant intermittent, during the epidemic which prevailed round Pithiviers, about the close of the year X, and during the first months of the year XI. I shall insert them here as communicated by the author.

Case first. Dumain, a gardener, sixty-five years of age, after a few paroxysms of a common tertian, and after a few days of a doubtful convalescence, was attacked by a violent shivering; his extremities became suddenly cold; his perception of things failed him, he threw himself on the

bed, his whole appearance became cadaverous, a cold sweat began to flow, and his eyes remained half-open; deglutition impracticable, tongue dry and of a redish brown colour, respiration free, pulse contracted and scarcely perceptible, urine suppressed.

The man was looked upon as dead. M. Lanoix was sent for in haste. He found the patient in the state just described. This first paroxysm terminated in about twelve hours; the extremities acquired some warmth, and the perception returned; but the voice was so weak that it could not be distinctly heard. The patient suffered extreme oppression: the intermission lasted ten hours.

The four succeeding paroxysms were marked by the same symptoms, and by an icy coldness of the extremities; while the fifth paroxysm was shorter, and not accompanied by a loss of intellect. The fever terminated with the sixth paroxysm: the natural degree of warmth was now restored to the extremities. Sometime afterwards a simple tertian occurred, from which a recovery took place in four months. In this case the patient had scarcely any perception of the sensation of cold, so great was his weakness, and under such depression was his intellectual functions. The bark was given in large doses, combined with confection of hyacinths; the vitriolic ether was administered, frictions of tincture of cantharides and camphor were employed along the vertebral column, and blisters were repeatedly ap-

plied. These remedies rescued the patient from impending death.

Second case. A woman about sixty-five years of age, was attacked as follows; extremities excessively cold, countenance cadaverous, pulse imperceptible, an oppression at the breast, a loss of perception, an obliteration of memory, a total insensibility, tongue black and dry, urine in small quantity. M. Lanoix saw this patient during the third paroxysm. The attendants informed him, that since her first paroxysm, she had never regained entirely the warmth of her extremities, and that this icy coldness continued even during the intervals of the disease. He examined for himself, and was convinced of the truth of this information. The paroxysms continued notwithstanding the use of stimulants both external and internal. Towards the eighth paroxysm, the intermitting type disappeared, and was succeeded by a train of adynamic symptoms, which threatened to prove mortal. The patient was saved by persevering in the use of bark to a great amount, and by submitting to all the external stimulants that were prescribed.

ARTICLE VII.

The soporose state of the Malignant Intermittent.

X. The symptom of drowsiness, which accompanies this variety of the malignant intermittent, occurs sometimes at the commencement, and at other times during the increase, of the paroxysm.

It increases, declines, and disappears with the fever. The intermission is, notwithstanding, oftentimes marked by a kind of propensity to sleep. The memory is almost always impaired or even completely obliterated. The patient suddenly forgets the question just proposed to him. If an urinal be handed to him, he forgets what use he was about to make of it, and falls asleep again. Sometimes he stammers, alters his words in pronouncing them, or changes them one for another, as if his tongue were paralysed. When the comatose affection has gained further strength, the patient becomes insensible to the strongest irritants, such as blistering-plasters, cupping-glasses, &c. and even to the action of fire itself. In general, the danger is greater in proportion as the sleepiness is more profound. The hiccough in particular is an alarming symptom, and when it occurs, the patient sinks about the third or fourth paroxysm.

All the soporose cases observed by Werlhof, were tertians, some double and others single;* the sleepiness came on, for the most part, the fifth day after the commencement of the attack; sometimes it occurred even at a later period. The pulse was frequent in the greater number of cases. It was constantly very slow in one of them, for the space of nine days, when death supervened. When the patients were free from paroxysms, the pulse was natural in some of them; in others it was hard and intermitting.

* *Observ. de febr. fol. 14.*

The patients, besides, being absolutely deprived of the faculty of feeling and moving during the paroxysms exhibited no signs of life except by the process of respiration. This process was performed by many of them, with singultus and a kind of snoring, one of the principal symptoms of which authors avail themselves to distinguish the carus or soporose state of fever from true apoplexy. The patient whose disease Eugalenus, as quoted by Werlhof, describes, resisted every mean that could be devised to awaken him. Now and then he opened his eyes in a slight degree, and suddenly closed them again; sometimes his eyes were half-shut, or they remained open, but immoveable and without the power of vision. These symptoms recurred and disappeared with the paroxysms of the fever. The senses were dull during the time of intermission.

In general, the affection of the head became fatal in proportion as the paroxysms were more numerous. In many this affection proved fatal on its first attack; it was sometimes accompanied with catalepsy, frequent and painful efforts to pass urine, convulsive motions, &c.

Rembert Dodonaeus relates two cases of an intermitting fever accompanied with great sleepiness.* He very properly remarks, that this symptom appeared and disappeared with the paroxysms of the disease, and that it was improper to attempt any remedy for it except during the

* Exemp. med. observ. fol. 7 et 8.

time of intermission. “*Si etenim tempore paroxysmi pleraque temere tententur, non raro in ipsa accessione æger deficit.*” In one of these cases, the memory continued impaired for a long time after recovery.

Charles Pison has also given a very circumstantial account of a soporose case of malignant intermittent, under the name of “*parapoplexia*” or the comatose tertian fever.* A man aged sixty-three years, was seized in the morning, the weather being cold, with a shivering, accompanied with great lassitude, extreme thirst, and imperfect vision. His face became red and almost livid, his urine was abundant, but thin and limpid, like clear water: these symptoms continued the whole day. Towards night, sleepiness, a state of torpor and stupor, loss of motion, taciturnity, loss of memory, and a kind of derangement, came on. The patient opened and shut his eyes by turns, remained silent except when some question was asked him, spoke confusedly, pronouncing one word instead of another, bent himself forward throwing his back into the form of an arch, took a seat at table, and taking up victuals with an unsteady hand, dropt them on the table-cloth instead of placing them on his plate, he was unable to drink as usual, on account of a difficulty and slowness of respiration, and observed an unaccustomed silence during the meal, &c.

Rising from table, he was scarcely able to stand; his gait was slow; he held his hat in his hand,

* *Select. observa. et consil. &c. fol. 78.*

contrary to his custom, let it fall on the ground, and when it was handed to him, it was necessary to remind him to put it on his head, &c.

While those around him were in the greatest astonishment; he awoke and came to himself, but recollected nothing that had occurred. His pulse was then open, frequent, and unequal; thirst great, and a restlessness continued during the remainder of the night.

On the day following, a violent sneezing came on, with coughing and hoarseness; the fever then declined, only to recur the next day. Increase of pulse, extremities cold, urine still copious, but clear; at length considerable heat, &c. The fever retained this character till the fifteenth day.

In one of the recurrences of fever which the patient experienced, there was such a loss of motion, that he appeared to be cataleptic for a whole day in his bed.

The most violent paroxysm was remarkable for a great coldness of the extremities, loss of memory, delirium, involuntary discharge of urine, want of sleep, and a loss of voice and of the senses; the patient had now become so unwieldly that his domesticks moved him with great difficulty. His deglutition was impeded; and he was insensible to all stimulants, even to the action of cupping glasses. Respiration frequent and difficult; the pulse which had been at first open and resisting, was now small, frequent and unequal; countenance flushed; effusion of tears; symptoms continued from noon till nine o'clock

In the evening, when a copious sweat broke out. The patient then became himself again, recognized his attendants, and answered to the questions that were put to him; but he was in a short time seized with a more violent feverish heat. On the morning of the following day, the patient complained of a severe pain in the nates, where a gangrenous affection took place, and he sunk under the fourth paroxysm from that time.

The soporose malignant intermittent is common at the hospital *de la Salpetriere*; but it does not generally show itself with that degree of intensity which marks the descriptions of Torti and Werlhof. We do not find it attended in general by that deep insensibility to external stimulants, that obliteration of vision, hearing, and the other senses, that smallness of the pulse, those traits of the *facies Hippocratica*, and those disorders of the nerves, which so strikingly characterize the affections of the kind described by those two celebrated physicians. Many cases however have appeared to me worthy to be compared with the descriptions which they have transmitted to us. My friend, citizen Richerand, who has so honourably distinguished himself in this school, has preserved the history of a case of cephalic intermittent, the circumstances of which are very curious. The two sides of the body exhibited different symptoms; the right was affected with paralysis; the left with catalepsy. Among the numerous instances of this fever which have fallen

under our notice, we will confine ourselves to an account of the following.

A woman named Morand, sixty years of age, experienced on the evening of the 27th Fructidor, year VI, a violent chill followed by a burning heat, which induced her to enter as a patient into one of the wards of the infirmary. The three first paroxysms were marked by the same symptoms; but on the first day of Vendemaire, the paroxysm commenced with an extreme coldness which continued about an hour and a half; a delirium supervened, and was soon followed by a soporose state. The respiration was stertorous, the tongue dry and brownish; and the pulse irregular and feeble; the heat of the skin excessive, but not increasing by the touch as in bilious fever; the sweats were oppressive, and the prostration of strength very great.

Second of the month, no remission; in the evening there was an exacerbation marked by a loss of intellect, involuntary stools, twitchings of the tendons, and convulsive motions of the lips; the breath was fetid, the countenance disturbed, and the sleepiness more profound.

3d. Same appearances, to which was super-added a paralysis of the extremities.

4th. In the morning, the paroxysm still continues; symptoms somewhat lighter, for the patient could move her hands; she answered to certain questions, though in a vague manner; she swallowed with more ease some wine and water which was handed to her. The heat was less in-

tense; the remission became a little more perceptible, so that between two and three o'clock in the afternoon, it was admissible to give two drachms of the bark and apply two strong blistering plasters to the legs. In the night the bowels were copiously moved, and she experienced a little relief.

5th. About six in the morning, there was a chill followed by a hot fit, but without delirium and without sleepiness. The tongue, hitherto dry and smooth, began to be moist towards the point and along the edges. There occurred, however, pains in the head and extreme lassitude in all the limbs. Some gangrenous blotches appeared on the blistered parts.

6th. Stomach affected, mouth in a bad state, head-ache, pain in the epigastric region, great thirst. In the evening, irregular chills succeeded by flushes of heat and sweats. The gangrenous parts began to separate from the sound; the bottom of the sores had a pale, livid, and lifeless appearance; the extremities began to be œdematous.

7th, 8th, 9th, 10th, and from that to the 15th inclusive, state doubtful; debility great; sharp pains in the sores on the legs, which were dressed with powdered bark; obstinate wakefulness.

16th. A sensation of colic, with an evacuation of a serous nature extremely fetid, pulse small and unfavourable. Ulcerations extend to the *os coccygis*, produced by the patient's lying constantly on her back. These ulcerations re-

quiring frequent dressings, she was conveyed to the surgical ward, where she died of a colliquative diarrhœa, which nothing could check.

In this history, who does not recognize a case of comatose sub-intrant? was it not at the time when the remission, being most considerable, admitted of the exhibition of the bark with some prospect of success, that that febrifuge was administered? but, as the sub-intrant character of the fever had not allowed it to be administered at an earlier period, and the prostration of the system rendered the danger very great, blistering was had recourse to, the action of which is for the most part certain and speedy. The fever was in reality checked; and if, in the course of her convalescence, this woman, exhausted with age and previous infirmities, finally sunk, ought we the less on that account to acknowledge the advantage derived from the administration of the Peruvian bark? this was an example of a perfect crisis, followed by the death of the patient, who was too much exhausted to retain life by any practicable aid.

To the different facts already stated we will add a case of double tertian attended with coma, which professor Pinel caused to be inserted in the thirty-second number of the "*Gazette of Health*," (1805). The subject of this case was a youth of sixteen years of age, who had gone from Paris to Corbeil, which was the place of his country residence. His fever was ushered in by violent shiverings, and intense coldness, which

was felt particularly in the legs. It took place in the night. The severest paroxysms were marked by delirium, burning heat, and great agitation. The lighter ones were accompanied with the same symptoms, but in a lower degree.

The eighth paroxysm began to be characterized by an affection of the head; from this time the symptoms went on increasing, calculating from the day on which the sleepiness took place. On the sixth day from that period, a paroxysm occurred which could not be exceeded in violence; an unconquerable degree of coldness attacked the legs and thighs; the countenance was cadaverous; and the insensibility profound. Yet on the day following there was a return of heat, and a free exercise of the senses. Professor Pinel being called in, declared that the Peruvian bark, given as it had been till then in decoction was insufficient to arrest the fever; he accordingly directed this remedy to be given in powder, to the amount of an ounce and a half. The next expected paroxysm did not occur, and the night was passed in tranquillity. On the day following the patient complained of nothing but great weakness; he was supported by nourishing broths, and a few spoonfuls of good wine. His convalescence was tedious, but his recovery was perfect. Recourse was had to bathing for the removal of pains and cramps which the patient felt in the calves of his legs, and which were troublesome to him in walking.

We have had an opportunity of witnessing a case of the soporose state of malignant intermittent in the hospital of St. Louis, in the person of Pierre Charles Genevriere, aged sixteen years. The paroxysm ushered in by considerable chills and shivering, pains in the limbs, and a spasmodic affection of the great pectoral muscles: to these succeeded difficult and laborious respiration, a slight cataleptic state, subsultus tendinum, pulse very frequent but small, countenance distorted, tongue trembling and drawn backward, pupils dilated, stupor, no answer to questions proposed, and an involuntary discharge of fæces and urine. This state of things continued upwards of an hour; then succeeded a burning heat with a dryness of the skin, a flushed countenance, pulse open and frequent, and the soporose state more strongly marked. The paroxysm continued till a considerable time in the night; at length the symptoms disappeared till the second paroxysm, which occurred on the third day, at the same hour; appearances the same, with a singular tendency to sleep. The administration of the bark in the interval between the second and third paroxysms extinguished all malignity in the character of the disease. I attended this case along with M. Magendie, a very distinguished pupil of the civil hospitals of Paris.

ARTICLE VIII.

The delirious state of the Malignant Intermittent.

XI. We conceive that this name may be given to that variety of the ataxic, in which delirium is observed to be a primitive symptom, and where it accompanies, with some degree of regularity, both the commencement, the increase, and the decline of the paroxysms. We had an opportunity of observing this form of fever in a woman, aged sixty-eight years, in one of the wards of the hospital *de la Salpetriere*. Every paroxysm of this fever, which followed the tertian type, was evidently marked by a derangement of the intellectual functions. The secondary symptoms, such as sweats, an involuntary discharge of urine, parching thirst, heat of the skin, &c. had undergone many variations. On the days of intermission the patient was quite well, and retained no recollection of what she suffered on the days of exacerbation. This fever was gradually cured by the bark in the space of a month. Citizen Landre, who conducts his observations with as much sagacity as zeal, has communicated to me a case strikingly analogous to that which I have just related.

We are the more inclined to admit this new variety of the malignant intermittent, inasmuch as its existence has been still more recently proved by two cases related by professor Pinel, precisely similar to the foregoing. In these two latter cases, there was the same impaired state of

the memory, the same feebleness of pulse at the time of access, and the same relaxation of the sphincter of the bladder, giving rise to an involuntary discharge of urine, but this only during the cold fit. The patients were continually striving to get out of bed; the paroxysms terminated without sweat, and by a kind of drowsiness. This fever, like the rest, yielded to the use of the bark, given to the amount of two drachms at a dose, and aided in its action by wine of wormwood.

Torti has also, in his works, recorded a case of double tertian in which delirium was the predominant symptom. "*Huic nullum erat valde formidandum peculiare symptoma præter delirium aliquod, cum remittente tamen febre evanescens.*"* We shall have occasion to speak of this fact again when treating of ataxic intermittents tending to a continued type.

We must regard as a sub-variety of the foregoing, a case of malignant intermittent with phrenitic delirium, related by Lauttér.

The subject of this history was a man fifty years of age, of a dry temperament, disposed to acute diseases and catarrhal coughs, particularly in the winter; this man having been, on the 25th of January, 1761, exposed for a long time to the action of an intense degree of cold, was attacked towards evening with a general trembling, which was succeeded by a high fever accompanied with

* *Therap. spec. lib. 4. cap. 6. fol. 426.*

great heat, a troublesome cough, and very considerable prostration of strength.

26th of January in the evening, fever without shivering, heat, thirst, cough. The patient lost blood. The blood was covered with what is denominated the *inflammatory* crust.

27th. The patient passed the day tolerably well; but towards evening, all the above mentioned symptoms returned, though with less severity than on the preceding day.

28th. In the evening, after sunset, the paroxysm came on with extreme violence; burning heat, raving during sleep, phrensy, delirium, anxiety about the præcordia, cough very fatiguing. The patient lost blood; shortly afterwards Dr. Lautter was called in; he found the patient with a violent fever, delirious, with a dry skin, parching thirst, and a tongue white, dry, and trembling; finding it impracticable to obtain information sufficient to enable him to determine the character of the fever, he was obliged to pay attention to the most characteristic symptoms; he contented himself with giving as drink, barley-water with oxymel and nitre, and a pectoral decoction, for the purpose of relieving the severity of the cough; epispastics were applied to the feet.

29th. The patient felt himself a little better, the fever and cough were diminished, and expectoration was more free and easy; the matter expectorated was more abundant, thick, and had the appearance of having undergone a degree of

concoction; the respiration did not differ from that of a man in health; yet, perceiving that the urine deposited a lateritious sediment, the physician put further questions to the patient, as well as to those persons who had been with him from the commencement of his disease; in this way he obtained the information which we have just communicated; and was hence lead to suspect the complaint to be a remitting fever, pursuing the type of a double tertian: yet as the paroxysm of the day before had not been well marked, he waited for that which was to follow, in order to acquire a higher degree of certainty. This paroxysm was by far the most violent that Lautter had ever witnessed, for the hot fit having suddenly commenced, the patient went into a complete delirium; he jumped out of bed, and would have escaped from his chamber, had he not been prevented by his attendants; he knew them, abused them, flew into such a rage that he fell down with fatigue; when he arose again, he struck at every one around him, crying out in a vehement and passionate manner; in this state he passed the whole of the night and the day following; his appearance was precisely similar to that which we observe in cases of an incipient phrensy; his pulse, far from being hard and full, was feeble and quick; as the remission was near at hand, bloodletting was not repeated; the patient was confined; that he might not be able to get out of bed; strong-epispastics were applied to the legs; three ounces of syrup of diacodium were prescribed; the pa-

tient took one ounce immediately, the second he was directed to take in the evening, in case his delirium should continue: on the termination of his delirium he was ordered to take half an ounce of the extract of bark, mixed in citron-water, and sweetened with the same syrup of diacodium. The delirium continued during the whole day, and although, in the evening, the syrup of diacodium was administered according to directions, this symptom lasted also throughout the night; it was now the period of the return of the paroxysm, which was weaker, notwithstanding which, the delirium remained extremely violent. Finally, on the first of February, a few minutes after his wife had given him the last ounce of the syrup of diacodium, his eyes began to close, and he slept quietly for the space of two hours; it was in this state that he was visited by Dr. Lautter; the patient awoke while the doctor was by his bed-side, spoke rationally for a few minutes, but soon relapsed again into such a deep delirium, that he could scarcely be kept in bed. As they this day dreaded the return of the paroxysm which had continued to grow more violent, and as it was even possible that the patient might sink under it, in case of its return, the extract of bark was directed to be taken in the dose of four spoonfuls every hour. Hitherto the patient could not be induced to take the medicine, but by means of threats, promises, &c.; yet Lautter prevailed on him to take the four first spoonfuls; he prescribed afterwards an ounce of the

syrup of diacodium, with twenty drops of laudanum, and although the patient might fall into a deep sleep, he directed that he should be awoke, and have the bark administered regularly every hour. After having taken this anodyne remedy, the patient ceased to be delirious; he did not sleep, but he became calm, and could take in the evening all that remained of the extract of bark; the exacerbation that followed was scarcely perceptible, at least in comparison with the preceding ones; the heat and thirst were diminished; the patient coughed much, but expectorated with great facility; he had but a slight delirium, and during the night he enjoyed several hours of refreshing sleep.

On the 2nd of February he had little fever; a slight sweat with a degree of delirium scarcely perceptible; he was extremely shattered by his sufferings. The bark was again prescribed, but at longer intervals; an opiate for the evening, and occasionally some excellent wine, and wine whey for his drink; on the following night the patient slept well, and becoming in a short time convalescent, there remained no complaint but great muscular debility, a weakness of memory, and a slight cough.

Lautter directed the use of a pectoral ptisan and a cordial regimen.*

* *Hist. medic. bienn. morbor. rural. casus xxiv.*

ARTICLE IX.

The peripneumonic or pleuritic state of Malignant Intermittent.

Morton has oftentimes detected the malignant intermittent concealed under this particular mask. That great physician relates among others the case of a man who was seized in the morning with a violent shivering, and a pain in the region of the thorax so severe, that respiration was scarcely practicable; an universal coldness overspread all the limbs of the patient; his weakness was extreme, and his pulse small and creeping. Notwithstanding these symptoms, Morton considered bloodletting from the arm as the proper and necessary remedy for this spasmodic state of the system; he had recourse also to fomentations and appropriate liniments. But when, from the nature and the return of the paroxysms, he detected a fever of a malignant character masked under the appearance of a peripneumony, he made the bark the principal foundation of his treatment, and was successful.*

I will subjoin two other cases which we meet with in the writings of Lautter.† A labourer of Luxembourg, thirty years of age, of a dry temperament, being engaged in threshing corn, was seized, first with a trembling, and then with a

* *Historia xxxi.*

† *Hist. medic. bienn. morb. rural. &c. Casus v. & ix.*

violent coldness, to which succeeded a short hot fit, and great thirst; the principal symptom was an excessive pain in the left side, which considerably impeded respiration. Being obliged to quit his work, he took to his bed; the fever continued nearly eighteen hours in the same state, and then underwent a perceptible remission; on the morning of the day following, the patient was still better. Although he was rather feeble, the stitch in his side continued, and he was certainly in some degree feverish, yet he went to work again; but all the symptoms returning towards evening, he again took to his bed. Lautter was called in; he found his patient labouring under a high fever, his pulse was hard, his respiration laborious, painful and almost suppressed; the pain in the side was extremely acute; there was no cough, nor were there any efforts to cough. From the history of the disease, the physician discovered immediately that it was a malignant intermittent, masked by the predominant symptom of pleurisy; not being able to strike immediately at the root of the disease, because the exacerbation was then at its height, he employed himself in moderating the violence of the symptoms; he drew from the arm of the affected side ten ounces of blood, which was covered with an inflammatory crust, and ordered an emollient cataplasm to be applied to the part where the pain lay, and to be frequently renewed. Internally he administered barley-water with oxymel and nitre: the patient experienced relief, his respi-

ration became easier, and the pain in his side abated; yet he passed a sleepless night, with heat and great thirst.

On the day following, his pulse was indeed less frequent, and was not hard; yet he had a high fever; the pain in the side continued; the urine, which was very high coloured, deposited a lateritious sediment; the symptoms were now much milder, but as they had not altogether disappeared, the foregoing remedies were continued. In the evening, the disease resumed completely its first state and appearance; on the morning of the following day, there was no remarkable change, except that the acute pain in the right side disappeared for a short time, but soon returned again; the urine had undergone no change since the day before, the skin was constantly cold, &c. Lautter discovered immediately the malignant character of the fever; he took advantage of the remission to administer an ounce of the bark in the space of twenty-four hours; the next paroxysm was a very moderate one; and by continuing the use of the same remedy, the disease was radically cured.

A woman sixty years of age, having her system greatly heated by violent exercise, exposed herself imprudently to the coolness of the evening: she was attacked by a cold fit, which was followed by a fever of great intensity. A severe pain occurred in the right side, extending round to the spine; a dry and frequent cough added to its acuteness; the respiration was short and laborious,

and the succeeding night was passed without sleep. Lautter was called in; he found the pulse greatly agitated, full and hard; the tongue white and dry. Taking the disease for a pleurisy, he drew blood from the arm of the side affected, and laid an emollient cataplasm on the part where the pain was situated; the blood was covered with an inflammatory crust. The symptoms became milder.

On the same day, at one o'clock in the afternoon, the shivering returned with a slight degree of coldness; the febrile heat, the cough, the pain, &c. were all augmented; the pulse was as full and as hard as at first; blood was consequently drawn a second time, and exhibited again an inflammatory crust. There was now a remission of the febrile symptoms. On the evening of the day following, the cold fit returned; the pain, the heat, the cough, &c. increased considerably, in consequence of which the patient passed a very bad night.

Next day there was a remission; afternoon, another exacerbation, ushered in by a cold fit. The physician contented himself with repeating the application of cataplasms, and administering cooling drinks. He had no further recourse to bloodletting, because the patient's strength was greatly exhausted, and from the progress of the disease and the copious sediment of the urine, it was easy to discover a double tertian remittent, lurking under the mask of pleurisy. Lautter gave an ounce of a mixture of bark to be taken pre-

viously to the return of the paroxysm which was very near at hand. During the succeeding night, the patient experienced only a great heat; but the cough and pain in the side did not increase; on the day following, the same medicine was continued, and there was scarcely even the shadow of an exacerbation; by the continued use of the bark, the health of the patient was very soon restored.

This same variety of malignant intermittent, has been observed at Paris in the first months of the year IX. A student of medicine was attacked by it after very close application to anatomical researches. We will state the principal symptoms of the case. A dull pain occupied at first the whole pulmonary system, and considerably impeded respiration; this difficulty of breathing was increased by a state of somnolency with which the patient was constantly so much affected, that, to avoid suffocation, he requested his attendants to prevent him from sleeping. Towards the close of the fever, the pain changed its situation, and became fixed in the side of the thorax. Among the symptoms that accompanied this complaint, the most remarkable was an extreme sensibility as to hearing and smelling. The disease was successfully treated by wine and bark.

ARTICLE X.

The rheumatic state of Malignant Intermittent.

A dyer, having been frequently exposed to cold, was attacked, at length, by a rheumatic pain, which he felt sometimes in one part and sometimes in another. This pain having become troublesome and distressing, Morton was called in. That physician observing that the urine of the patient was very high coloured, and that, when exposed to the air, it deposited a lateritious sediment, and having further learnt, that the pains were periodical, and that their return was accompanied with a kind of exacerbation, all these circumstances led him to suspect the existence of an intermitting fever, concealed under the form of rheumatism; one bloodletting, a vomit, but above all the use of the bark, in the dose of a drachm every four hours, and that for the space of sixteen hours, removed the rheumatic spasm, and restored the urine and the appetite to their natural state; there remained nothing but an air of stupefaction, caused without doubt by the laudanum which Morton had used in his practice; the patient was relieved from this affection by the application of blistering-plasters; the rheumatic pain having returned fourteen days afterwards, yielded again, as usual, to bloodletting and the bark.*

* *Morton, Hist. xx.*

ARTICLE XI.

The nephritic state of Malignant Intermittent.

A widow of a robust constitution, was subject, for several years, to an hysterical affection; she experienced also nephritic pains, which recurred after long intervals, and she had even discharged some renal calculi; at the age of forty-four years she was attacked by a suppression which continued a year. About the close of this period, she experienced excruciating pains in the lumbar region; she had spasms, the seat of which she could not refer to any particular spot; she was treated, but in vain, sometimes for a suppression, and sometimes for nephritic pains. As the pains increased in severity, and even the extremities had become cold, it was determined to call in Morton. Not even conjecturing the true cause of this disease, all the remedies he administered failed in producing a favourable effect; but having observed at three different times, that the urine was reddish; and that it let fall a lateritious matter; and, further, during the spasm, the extremities becoming cold, he began to suspect the presence of an intermitting fever; the use of the bark every four hours, reduced the pains considerably in the space of thirty hours, and restored to the urine its natural colour: from this moment the danger was past. Morton prescribed proper remedies for expelling the calculi which the kidneys might contain, and for recalling the suppressed catamenia;

a complete cure appears to have been the consequence.

Lautter also mentions the cure of a man affected with spasms arising from the presence of renal calculi, and accompanied by intermitting fever.*

ARTICLE XII.

The epileptic state of the Malignant Intermittent.

XV. A girl six years old, was seized with a shivering and a cold fit of short duration; to this succeeded a violent hot fit, and a convulsive state of all the limbs. The patient foamed at the mouth, and finally fell down in a profound sleep. When Lautter was called in, he found her awake again, but labouring under considerable fever; she was in a state of extreme debility, and complained much of her head. He treated the affection at first as a true epilepsy; the day following, the young patient was very well; but on the third day, Lautter learnt from the report of her parents, that the symptoms had re-appeared at the same hour, and gone off at the same: he, therefore, changed his opinion as to the nature of the disease, and suspected it to be a malignant intermittent, which had assumed the mask of epilepsy: half an ounce of bark, given in the interval between the third and fourth paroxysms, effectually removed the complaint.†

* *Morton, Hist.* xxviii.

† *Lautter, Hist. med. bienn. morb. rural. Casus ii.*

ARTICLE XIII.

The convulsive state of the Malignant Intermittent.

XVI. This variety is found more particularly among infants. Morton mentions the case of a female child aged thirteen months, where he had occasion to observe this particular form of fever; its convulsive motions were accompanied with many other symptoms no less alarming, such as a considerable difficulty of respiration, an extreme smallness of pulse, &c. The fever assumed, at first, the quotidian type, then changed to a tertian, and yielded to remedies into which the bark in powder entered as an ingredient.

ARTICLE XIV.

The cephalalgic state of the Malignant Intermittent.

XVII. Hippocrates refers to diseases of this description in his *prenotiones Coacæ*, where he speaks of fevers accompanied, at their commencement, with vertigo, pulsation in the arteries of the head, crude urine, delirium, &c. The same author describes in like manner, a cephalalgic state of disease accompanied with irregular chills and fever, pain in the eyes, disordered vision, vertigo, a difficulty of bearing the light, tinnitus aurium, and an intolerance of sounds.

I have had occasion to attend a woman of about thirty years of age, who was seized with a malignant intermittent, in which this symptom pre-

dominated in a very high degree. The disease yielded only to preparations of camomile and bark. Oftentimes the pain occupied but half of the head. Morton has given two instances of this, and was himself the subject of the first case.*

ARTICLE XV.

The dyspnœic state of the Malignant Intermittent.

XVIII. I give this appellation to that form of fever which the celebrated Dr. Galeazzi denominates *asthmatic*, and which he has endeavoured to establish by the two following cases.† A man seventy years of age, of a sanguineo-bilious temperament, of a habit of body considerably robust, somewhat fleshy, and devoted to wine, was attacked by an intermitting fever, characterized by a difficulty of breathing so great, and a cough so violent, that, not being able to lie, he was obliged to rise up every instant in bed; his pulse was hard and frequent, his tongue dry; his voice feeble and hoarse, and his cough unaccompanied by any expectoration. He lost blood two or three times without any relief; it was only observed that the fever, the difficulty of breathing, and the sleepiness that prevailed, suffered a slight remission in the morning, a circumstance which was attributed to the bloodletting; but in the afternoon all the symptoms increased in violence again, the patient was unable to expectorate, the

* *Hist.* xxv.

† *De Bonon. scient. et art. instit. atque acad. comment. tom. v.*

urine was in small quantity, muddy and red, and there was no sweat, &c. The periodical character of exacerbations that occurred, gave rise to a suspicion that the disease was a malignant, intermittent. From this circumstance Lautter determined to treat it with the bark. The first day he took advantage of the remission of the fever to administer to the patient three drachms of bark in infusion, combined with water of violets; the day following, the same dose was repeated; the patient had scarcely swallowed the second potion, when the fever and difficulty of breathing were relieved; there was now an expectoration of bilious matter mixed with blood, which no other medicine had been able to produce; the use of the bark was continued, but the dose was successively diminished to a drachm, and then to half a drachm. The patient took in the whole about three ounces of bark. The matter of expectoration became more favourable, the urine increased in quantity, and the orthopnoea, with all the symptoms of fever, disappeared.

Galeazzi also relates the case of a woman, forty years of age, accustomed to live in the country, who at first had been attacked by a simple tertian, from which she had been relieved by the bark; but, having neglected to take this remedy afterwards, and having too soon returned to her occupations and laborious mode of life, she was seized with such an obstinate cough, and such a difficulty of breathing, as to be obliged to sit up constantly in bed, or to lie only on one side. In

addition to this she had a considerable fever, the exacerbations of which occurred at night; she expectorated, sometimes with pain, but copiously, a thick matter, resembling pus. Bloodletting, and many emollient, expectorant, and demulcent remedies, were administered to no purpose. There was a great prostration of strength, with an universal wasting of the flesh, so that the physician in attendance took the disease for an incipient phthisis. In this state of things, by the advice of Galeazzi, the Peruvian bark was administered to the woman every morning, at the time most distant from the period of exacerbation, without neglecting those remedies calculated to favour expectoration. The patient had scarcely taken an ounce of the bark, when the difficulty of breathing had considerably abated; the fever and cough became lighter, and at length the patient recovered her health completely, after having persevered in the use of the bark some days after the disappearance of the paroxysms, &c.

M. Boullon, physician at Abbeville, has seen a case of the dyspnœic state of malignant intermittent. That disease occurred in a person, about sixty years of age, of a strong constitution, and subject to no habitual indisposition except the gout. The first five paroxysms of the disease, which occurred daily from the time of its commencement, differed in nothing from those of a common intermittent, and the patient, continuing during the intervals to follow his usual occupations, took nothing but some mild laxatives, and

a decoction of succory. But on the sixth day he went into his garden and was exposed to rain: this accelerated the return of the succeeding paroxysm. This paroxysm was accompanied by an extreme sense of suffocation, which continued during both the hot and the cold stages. The face was purple and the lips livid: the respiration was so distressing, that the patient could not lie in bed. This suffocation was at length relieved by partial sweats, and by a sparing discharge of very high coloured urine. Two days elapsed without another paroxysm. There remained a high degree of debility, and a constant difficulty of breathing. The patient indulged a hope that the fever would not return; but on the third day, at the usual hour, the suffocation returned with increased force, accompanied by a dull pain in the left side of the breast. Dr. Boullon was now called in, and lost no time in applying a blistering-plaster to the seat of the pain. He also determined, with the approbation of a consulting physician, to administer the bark, in the usual mode, notwithstanding the opposition of the patient, who considered himself labouring under an attack of asthma, although he had never before been affected with that disease. Other medicines were exhibited at the same time with a view to promote expectoration. The third paroxysm did not take place; but it happened in this case, as I have myself observed it to do occasionally in the hospital of St. Louis, that is, the predominant symptom still continued, at least to a certain de-

gree. The cough and oppression remained; and the digestive organs did not perform their proper functions. The pulse was feeble, particularly that in the left wrist; and the evacuations by stool and urine were scanty. The prostration of strength became so great, that the patient sunk into an adynamic fever, which called for the application of blisters to the legs, and in a few days for the use of vinous drinks. The patient appeared to become again convalescent; but the affection of the left side was not yet entirely removed. In about two months that whole side appeared swollen; the abdomen took on the same affection, and the patient died of a dropsy.

ARTICLE XVI.

The hydrophobic state of the Malignant Intermittent.

XIX. No writer has heretofore made mention of this variety; we cannot, however, refuse to admit it, inasmuch as it has been carefully observed and attended to by professor Dumas, during the siege of Lyons. The professor has communicated to the medical society of Montpellier, an interesting case of this fever, which we will here relate more at length than was done in our last edition. It would be difficult to mention a more grievous or a more alarming symptom among all those that accompany malignant intermittents. Several physicians have had occasion to notice this symptom in such diseases; but professor Dumas appears to have paid most atten-

tion to its different periods, in the year 1793, at the public hospital of Lyons. We will here exhibit a brief sketch of the picture he has drawn.

The person attacked by the disease under consideration was forty-five years of age. His constitution was nervous, melancholic, and highly irritable; he was of a passionate temper, a spare and dry habit of body, and accustomed to abandon himself to the greatest excesses. Obligated to pass several nights under a soldier's tent, he fell asleep one evening on the damp ground: this happened on the 26th of August. On awaking he was attacked with a dimness of sight, vertigo, severe cephalalgia, and universal anxiety. But it was not till evening that the chill came on in force: heat moderate, but great dejection, and an entire loss of strength.

27th. An excruciating pain in the head still continues; a profuse discharge of greenish matter from the stomach.

28th. In the evening, a fresh chill, heat very intense, great thirst, with an irritation of the throat, which rendered deglutition difficult; slight delirium. From this time mild nitrous drinks were administered.

29th. M. Dumas found the patient in a state of apyrexia; there remained only a particular state of faintness and somnolency, and a kind of stiffness in the muscles of the neck. In the evening, however, there was an irregularity of pulse, and some degree of febrile heat, which were neither preceded by a chill nor followed by sweat. Same remedies continued.

30th. The intermitting character of the disease was now clearly developed: intense heat, maniacal rage, a convulsive agitation of the lips and muscles of the neck, and great difficulty in swallowing; the stricture and spasm of the throat increased by the impression of medicines in a liquid state; tongue dry, black in the middle, and of a lively red at its edges; the paroxysm did not terminate till late at night. Camphorated emulsions, legs fomented by clothes wet with vinegar, leeches applied to the ancles.

1st of September, a state of tranquillity succeeded to these unfavourable phenomena. The patient exhibited, notwithstanding, a peculiar aversion for liquids, and a great difficulty of swallowing: except these there was no other symptom.

But it was on the 2d of September that the disease left no longer any doubt as to its character, and that the true symptoms of hydrophobia appeared in all their strength. The state of things now was, universal convulsions in all the limbs, subsultus tendinum, a violent contraction of the abdominal muscles, deglutition impeded, a furious alienation of mind, great efforts to bite, and a foaming at the mouth. The patient being bound, kept up a constant struggling notwithstanding his inability, gnashed his teeth in a frightful manner, and in his fury ejected saliva on his attendants: but, in particular, he had the most unconquerable horror for all liquids, and obstinately refused to swallow them. The mere contact

of cool water, which he was at first desirous of drinking, to allay his thirst, threw him into an universal trembling, and rendered it impossible for him to swallow a single drop. Further, M. Dumas remarks, that this predominant symptom of hydrophobia increased progressively with all the others, according as the violence of the paroxysm increased, and decreased again as the strength of the paroxysm declined; so that towards the close of the exacerbation the patient was able to swallow a little water, but not without experiencing great anguish.

The 3d of September, there was such a remission as left no longer any doubt as to the character of the disease. There continued, notwithstanding, during this state of apyrexia, a confusion and an irregularity of ideas, together with a considerable prostration of strength. The bark was directed to be taken in the usual mode. In the exhibition of this remedy, a few drops of the anodyne liquor of Hoffman, and of the liquid laudanum of Sydenham, were combined with each dose of it.

The 4th of September, symptoms equally violent; but the paroxysm of shorter duration.

5th. Bark administered in the same dose as on the 3d. There was now an intermission free from suffering and without debility.

6th. The exacerbation came on with a deep coma, which was followed by delirium and all the usual symptoms of fever. In the mean time each of these symptoms was less violent.* Besides, the paroxysm lasted but four or five hours.

7th. The patient was tranquil. The bark was administered in smaller quantity. In the mean time the paroxysm came on, two hours before the time at which it was expected. All the symptoms were lighter, except those of hydrophobia, which still retained their original intensity. Throughout the whole paroxysm, the patient manifested the same desire to bite his attendants, and continued to swallow with extreme difficulty; but he showed more particularly the same insurmountable horror for liquids, a horror which remained with him even when his mind was perfectly calm. This symptom was therefore entirely independent of the delirium.

Advantage was taken of the intermission of the 8th to return to the bark and administer it in large doses; an ounce and a half of this medicine was given in doses of a drachm every hour, the last four drachms being reserved till near the time of the paroxysm: copious sweat, comatose state.

9th. The paroxysm was reduced to a slight fever; the commencement of it, which was very moderate in comparison with the preceding, was followed by sweats and a tranquil sleep.

Lastly, on the 10th of September, weakness, somnolency, great thirst, and but little appetite for solid food. M. Dumas directed again the administration of the bark; but the doses of it were diminished, and given at longer intervals. From this time the patient became perfectly convalescent, and his health was completely re-established by a continuance of the bark.

We find but few cases on record as interesting as the foregoing, or in the treatment of which the principles of the art have been more judiciously applied.

M. Boullon attended also a case of the hydrophobic state of malignant intermittent, during the epidemic of Abbeville. That physician was called to a patient on a very cold winter-day, when the ground was white with frost. The patient had already sustained three paroxysms, in which the symptoms had manifested extreme violence. From the account which he received, the exacerbations had come on without any preceding chill: at first the patient had suffered an insatiable thirst; he experienced afterwards a sensation of excessive heat in the palate, the œsophagus, the stomach, and the whole course of the alimentary canal. "A quick and irregular pulse, great restlessness, hiccough, vomiting of bile, slight delirium, syncope, burning tenesmus, an inability to drink any thing, or even to swallow the saliva without torture similar to that of scalding; a horror of water almost convulsive." M. Boullon examined the patient two hours before the time at which the paroxysm was expected. It appeared that he had neither eaten any thing, nor even swallowed his saliva for four days. Apyrexia complete, but the prostration of strength very great; eye wild and expressive of terror. It was impracticable to give any thing either by the mouth, or by injection. In this alarming state of things, M. Boullon ordered the patient

to be put into a hot bath, and to have frictions applied over his whole body by means of a rough brush. The expected paroxysm did not occur. The patient began at night to swallow his saliva. On the next night, which was passed in tranquillity, terrified by the recollection of what he had suffered, he was unwilling to drink; but M. Boullon having advised him to dilute his saliva with a little luke warm water, the experiment succeeded: from this time the patient took chicken-water, &c. Convalescence more and more favourable. Some days afterwards, manna given as a purgative.

ARTICLE XVII.

The catarrhal state of the Malignant Intermittent.

XX. I have been anticipated by Comparetti in noticing this variety of fever. The symptoms by which it is particularly characterized are, a redness of the face, eyes, and throat, with a dry cough which increases towards evening, a pain in the head, breast, and back, with a disordered state of the tongue; pulse vibrating and quick, respiration irregular, &c. &c. For the further illustration of this description of disease, we will here introduce the following case. The person who was the subject of it, was about twenty-one years of age, of a sanguineo-bilious temperament, of a habit of body moderately full, of a soft fibre, although accustomed to much exercise, and

greatly inclined to sweat. He had been very frequently subject to catarrhal affections.

Towards the end of August, in the year 1791, after a very rapid march, which threw him into a profuse sweat, he began to feel indisposed: the fever came on with a pain in the head, which grew worse towards evening, and continued throughout the night. In the morning a sweat came on, and the pain ceased. It was not till the seventh day of the disease that a dry cough supervened: the patient took linseed oil, and continued to transact business, observing constantly the same kind of life; but the symptoms soon became so much worse as to confine him to bed.

When Comparetti first visited him, he found him with a very troublesome cough, laborious respiration, a fixed pain about the middle of the sternum, a more severe one in his loins, with a frequent and full pulse. Blood was drawn from the arm: the patient continued the use of linseed oil, and drank water sweetened with honey holding nitre in solution.

Second day, as the blood that had been drawn exhibited marks of inflammation, and the pulse continued full and strong, the surgeon opened a vein in the foot. The bowels had been moved several times; the urine was high coloured and not very copious in quantity; the fever increased towards evening with a troublesome heat, a frequent cough, and irregular pains; and during the night, which was restless, there was a slight perspiration.

Third day, the patient took cassia with cream of tartar, which procured several liquid stools; but the fever continued with very little intermission; there was still a troublesome and dry cough, and an irregular sweat.

Fourth day in the morning, three ounces of oil were given without affording any relief to the pain and cough. The oil not producing any evacuation in the course of the day, and the febrile heat becoming very great, the patient took, of his own accord, an ounce of cassia, which operated copiously during the night.

Fifth day, there was a slight remission of the fever, the cough still continuing and recurring in very frequent fits; there was no sweat. The use of the hydromel and nitre was continued. The fever increased towards evening; the patient passed a very restless night.

Sixth day, the cough abated, the sweat returning again; the pulse became very weak and soft; the patient had some inclination to vomit, and the diarrhœa returned without any alleviation towards evening; the alteration in the pulse and in the cough, with some other symptoms, showed the necessity of having recourse immediately to the bark.

In the morning of the seventh day, a very considerable remission occurred; all pain had ceased, the cough had disappeared, and the elevation of the abdomen had subsided. The patient had liquid and black stools; the urine was muddy, no febrile heat, a slight moisture on the skin. Soon

afterwards the fever rose again, with great oppression about the præcordia, and a load at the stomach; the extremities became cold, the senses failed, and strong convulsions took place; the pulse became small, frequent, and irregular, and the skin cold and pale; the face became livid, the eyes projecting and oblique, tears flowed, the jaws were closed, and a hiccough came on. Efforts were made in vain to induce the patient to swallow a cordial mixture. The bark was given by injection; and the whole body was fomented. When nine injections had been administered, there was a discharge per anum; the convulsions became lighter, but the drowsiness remained.

On the eighth day, a mixture was administered containing a few drops of Hoffman's anodyne liquor. The convulsions ceased, but the hiccough and drowsiness still continued. The use of injections was persisted in throughout the day.

Ninth day, the hiccough less troublesome, and the coma less profound; bowels moved. Treatment the same.

Tenth day, eighteen injections had been administered; the attendants succeeded in an attempt to make the patient take a mixture composed of Kermes mineral and camphor. That remedy diminished the coma. After this a few doses of bark were administered by the mouth.

Eleventh day, after having passed a good night, the patient found himself better in the morning; towards evening he began to recover the use of his intellect; evacuations in a favour-

able state; those from the bowels not very copious; motion became free and easy. The patient passed a good night.

Twelfth day, morning and evening, he took the bark in powder, mixed in water. Very nutritive aliment was frequently given to him. His strength began to increase by degrees; the pulse became stronger, less soft, and more equal: the excretions became natural.

Thirteenth day, the fever ceased entirely, the pulse became less frequent, more free, and perfectly equal; the appetite returned. The use of the bark continued.

Sixteenth day, the patient had recovered almost all his strength; he now made use of a decoction of bitter herbs.

Twentieth day, health perfect, and no relapse afterwards.

The catarrhal state of the malignant intermittent has appeared in the hospital of St. Louis. A countryman had worked some time in a tannery not far from the river Gobelins. In the autumn of the year XI, having greatly heated himself, he went home bathed in sweat, and labouring under a sensation of uneasiness to which he had not been accustomed. He went to bed; but during the night, his sleep was constantly interrupted by a very heavy pain in the head, and by fits of coughing, which in a singular manner impeded the process of respiration.

On the day following, he was seized with a violent chill and a violent cough; pulse tense,

and contracted; heat excessive, sweat profuse and troublesome. As the patient had besides an impetiginous affection of long standing, he was sent to the hospital of St. Louis.

Second day, cephalalgic affection heavy and dull; coryza, cough frequent and laborious, fainting fits alarming; irregular chills running over the whole body, delirium, subsultus tendinum, a rapid change and great debility of countenance, and an involuntary discharge of urine.

Notwithstanding these symptoms, I was desirous of ascertaining still more clearly the malignant character of this disease, and, therefore, determined to attend the next paroxysms myself; but the symptoms were so violent, that we were near losing the patient. As soon as the exacerbation occurred, pain in the forehead, anguish about the præcordia, painful respiration, and sensation of tearing in the cavity of the thorax. I had recourse to the bark, after the manner of Torti; the largest portion of this remedy was given as soon as the paroxysm had gone off, and the doses were afterwards diminished.

The next paroxysm was more moderate; there was a slight coma, but without a severe chill, or an intense degree of heat. But the load at the stomach, the stricture of the breast, the cough, &c. still continued.

The fifth and sixth paroxysms passed over like the foregoing, notwithstanding the continuation of the bark. All the symptoms remained, but in a much lower degree.

During the seventh paroxysm, every thing was more favourable ; coma very slight, expectoration free, cephalalgia almost vanished ; from this time the quantity of bark was diminished, and was given only in decoction ; a pectoral medicine consisting of oil of sweet almonds and mucilage of gum arabic was administered at the same time.

ARTICLE XVIII.

The icteric state of the Malignant Intermittent.

XXI. I was unacquainted with this variety of intermitting fever, as it has never been particularly described by any author. I am indebted to M. Gilbert, physician in chief to the armies of France, for having favoured me with an opportunity of witnessing a very interesting case of this description. Having heard that I was particularly engaged on the subject of malignant intermittents, he had the politeness to request me to make a visit with him to a man about sixty years of age, who had returned to Paris after having spent several months in a marshy and sickly part of the country. The paroxysms were long. During the intervals between these paroxysms the yellow colour disappeared. M. Gilbert, whose talent for observation is well known, administered the bark according to the rules laid down, and the health of the patient was soon restored.

M. Louyer Villermay, in an excellent dissertation on jaundice considered as an affection always symptomatic and never essential, has made it appear that there is no disease which may not be complicated with this symptom; M. Batt, a very respectable Genoese physician, has made the same remark (See *Memorie della Societa medica de emulazione di Genova*, &c.) It is not a matter of surprise, therefore, that the same symptom should predominate in a malignant intermittent.

ARTICLE XIX.

The exanthematic state of the Malignant Intermittent.

XXII. M. Comparetti gives an example of this variety of fever which deserves to be preserved. In the month of October of the year 1789, a lady about twenty-five years of age, of a sanguine temperament, and a moderate habit of body, being newly married, was taken with a gaping, a chilliness, &c. These were succeeded by pain, an oppression at the stomach, an occasional vomiting, with thirst, and general convulsions; the skin was cold; paleness, irregular anxieties, frequent sighing; lastly, an eruption of reddish spots on the skin; to these succeeded an universal heat, which relieved the internal pains and the convulsions.

On the third day, when the fever was about coming on, Comparetti was called in consultation with the attending physician, who knew neither the genus nor the species of the disease which he

had to encounter. He arrived during the spasmodic affection, while the patient complained of the most acute pain, of an oppression at stomach, of internal disquietude, with anxiety about the præcordia. Her pulse was small, contracted, and frequent, her face and lips pale, and her skin cold. She was directed to take a few spoonfuls of orange-flower water, with Hoffman's anodyne liquor, and a little diascordium. When the most violent symptoms were relieved, the red spots on the skin disappeared; the pulse rose, became soft, full, and less frequent, the spasmodic action having entirely ceased. The heat increasing gradually, a sweat broke out on the decline of the paroxysm.

Another exacerbation occurred, at the termination of which the bark was immediately given, and thus the fever was brought to a close on the fifth day. Bitter teas were joined to the bark, and no relapse occurred.

A case of the exanthematic state of malignant intermittent appeared in the person of a young woman twenty-two years of age, a mantua-maker by trade, who had been exposed to septic exhalations. She was admitted into the hospital of St. Louis during the autumn of the year X, on account of her being supposed to be affected with scurvy. I saw her during her second paroxysm: all the symptoms were alarming; the skin of the whole body was covered with a reddish eruption: the pulse was small and unequal; the respiration

was interrupted and somewhat stertorous. The patient was delirious, and had a torpor of the tongue; the extremities were cold as ice: and there was a twitching of the tendons. The cold fit had been very long, and the whole system had been affected with an extraordinary trembling. We were apprehensive of a fatal issue: in the mean time a remission took place; we took advantage of this to administer to our young patient a few drops of the tincture of bark; it would have been impossible for her to have swallowed this remedy under any other form. An injection of bark was given, but to no purpose.

On the next day, the paroxysm occurred an hour before its regular time of appearance, with greater violence than the preceding one: cold fit long; pulse imperceptible, the body of the patient covered with large spots of a violet colour, the countenance became altered and unsightly, the respiration short and interrupted, and the patient expired. It was found impracticable to open the body, as the parents of the girl reclaimed it for the purpose of interment.

ARTICLE XX.

Of some varieties of Malignant Fever, not yet perfectly established.

By a careful attention to medical writings consisting of cases and observations, it would be easy to collect materials sufficient to establish many

other varieties of the malignant intermittent. The same remark has been judiciously made by Casimir Medicus, who has contributed in a very eminent degree to the elucidation of this point of medicine, and who would also have elucidated many others, had he continued longer to cultivate an art for which his talents were so peculiarly fitted. We might subjoin to the catalogue which we have just laid before our readers, that form of the malignant intermittent whose paroxysms are particularly characterized by a paralytic affection, which appears only during the exacerbation (*Molitor, Haller, Dissert. ad morb. hist.*) and also that form of the malignant double-tertian, in which a gutta serena marks the paroxysms: this latter form of the disease has been recorded by M. Vacca Berlinghieri (*saggio intorno alle principali et piu frequenti malattie, &c.*) but it will be sufficient to observe in general terms; that physicians ought to be vigilant to detect this complaint under the innumerable metamorphoses that it may assume. M. Gaillard, physician to the hospital of incurables of Poitiers, transmitted, while he was attending it, to the Society of Medicine of Paris, an account of a case of malignant fever accompanied by a spasmodic contraction of the stomach, and a hæmorrhagy which still continued, though in smaller quantity, during the time of intermission. The hot fit succeeded to the cold, without any perceptible abatement in the violence of the other symptoms. Third day from the commencement of the dis-

case, a recurrence of chills, vomiting, and a disorder of the bowels resembling colic, hæmorrhagy increased, great weakness, paleness, tongue whitish, pulse small, contracted, and frequent, with tension and pain of the abdomen. The smallest quantity of drink reproduced the contraction of the stomach, and the uterine hæmorrhagy. To allay this extreme sensibility of the stomach, an anodyne and aromatic plaster was applied to the epigastric region, and the strength of the patient was supported by generous wine diluted with water and sweetened with sugar. Fourth day, the fever and colic returned: a potion was administered, composed of honey, the liquid laudanum of Sydenham, and the anodyne liquor of Hoffman. Fifth day, chills, and very severe colic; the patient discharged by vomiting an abundance of bile; but the hæmorrhagy was suspended: two grains of opium and a little wine were added to the plaster applied to the epigastric region. Same drink continued. Sixth day, the patient had recovered strength, and no unfavourable symptom now appeared; there remained not a single vestige of fever. To prevent a paroxysm on the day following, M. Gaillard directed the patient to take an ounce of bark divided into four doses. During the next night, a slight paroxysm appeared. Seventh day, paroxysm more severe again, with colic and vomiting; but did not last more than four hours. Eighth day, the patient experienced nothing but weakness: the bark was continued till the twelfth day, the doses being gradually

diminished. The health of the patient completely restored. By relieving the spasms of the stomach by means of suitable drinks, M. Gaillard prepared the way for the action of the bark.

XXIV. There is unquestionably cause to deny the existence of the puerperal state of malignant intermittent, which M. Osiander, a learned physician of Gottingen, says, fell under his notice, in the year 1781, and which he would denominate, "*febris puerperalis intermittens perniciosa.*" A brief statement of the symptoms which he describes, is alone sufficient to prove, in an incontestable manner, that his assertion is without the least foundation. That disease, says he, which had been also twice witnessed by doctor Stein, appeared under the following phenomena: it was ushered in by a very severe chill, hands and feet affected with an icy coldness, which was also felt along the spine, great trembling of the limbs and under jaw, pulse small and of extreme frequency; to this coldness which continued about an hour, succeeded a violent state of pyrexia; the pulse became full without losing its quickness, and, lastly, a copious sweat overspread the patient's whole body. Such nearly were the progress and character of the fever which M. Osiander had occasion to observe in a woman of Cassel, who laboured previously under rickets, and a chronic catarrh of the uterus. Her labour had been so tedious and unfavourable, as to render the employment of the forceps indispensable. The fever appeared between the third and fourth day after

her delivery; and in seven days from its commencement the patient expired. On opening the body, marks of inflammation were found on the fallopian tube and ovarium of the right side while the left side adhered to the rectum and peritonæum. The left ovarium was almost entirely destroyed, and its surface was covered with pus. Is any thing else necessary to demonstrate, that this affection bore no analogy to the true malignant intermittent? Will not all physicians of observation consider it as a case of simple suppuratory fever, such as frequently occurs in the hospitals? The pretensions of M. Oslander are still further weakened by his own acknowledgment, that the bark is of no use in this kind of fever, and from his proposal to cure it by an operation. Thus, for instance, he proposes to make an incision into the abdomen of the lying-in patient, on the spot where the pain is felt, in order to give vent to the pus. Such a measure must be regarded as uncertain and dangerous.

XXV. I have thus given a brief and hasty view of the principal forms of fever which it has appeared to me proper to distinguish by some one important and leading symptom that accompanies them, and to which all the others seem to be in some measure subordinate. I do not think it right to view them, with Torti, as forming so many distinct species, but rather as simple varieties of the same disease. The similitude of the causes that produce them, and of the remedies by which they may be cured, is sufficient to convince us of the

identity of their nature. It is, besides, well known (as professor Pinel has very judiciously remarked in his *Nosographie Philosophique*); it is known, I say, that those fevers which appear so different at first view, may, notwithstanding, succeed each other in the relapses which patients so frequently experience. It is thus that we have seen the comatose form of the malignant intermittent, after having been removed by the bark, return again in the diaphoretic form (art. VIII.); and this latter succeeded, in another case, by the delirious malignant form.

XXVI. It is necessary to remark, that these numerous varieties of the malignant intermittent are, in some cases, complicated, and that two or more symptoms may predominate in the same degree. Morton, for instance, gives an account of two women who were attacked by a fever characterized at the same time both by a violent cardialgia and colliquative sweats (*Hist. X et XI.*)

The dissertation of Lautter contains several examples of this predominance of two, three, or more symptoms, which exist at the same time and with the same degree of violence (*Hist. bienn. cas. XII. XIII. XIV. XV. XVI. XXI.*)

ARTICLE XXI.

Of Malignant Intermitents tending to a continued type.

XXVII. Hippocrates is unquestionably the first who has taken notice of the manifest ten-

dency of certain intermittents to a continued type, with a complication of unusual and malignant symptoms.* Torti has considered these as a particular species, under the denomination of *sub-continued malignant fevers*. He remarks that the primitive symptoms, such as cardialgia, syncope, cephalic affections, &c., do indeed show themselves, but in a less striking degree, and that they do not predominate sufficiently to give a particular name to the disease. One of their most prominent and striking characteristics arises from the relative duration of the height of the paroxysm, which is much more considerable than the duration of its access or remission.† Although these fevers are less rapid in their course and less formidable in their ravages than the pure malignant intermittents, yet their symptoms are extremely bad, and they seldom occur without great danger, unless their progress be arrested by the healing art.

The excellent treatise of the practitioner of Modena contains many descriptions of sub-continued malignant fevers, the details of which may be condensed in language more brief and more precise than that of the author.

First Case. The fever was ushered in by a slight chilly fit. Next paroxysm anticipating; an

* *Cholericæ affectiones magis in æstate fiunt et febres intermittentes, et quibus horrores accedunt. Hæ quandoque malignæ fiunt, et ad morbos acutos deveniunt. Verum cavere oportet. Popular. lib. 7. Vander-Linden interprete.*

† Grimaud, *Cours des Fievres*, tom. iii. p. 294.

increase of the symptoms, the principal of which was a comatose state; constant stupor, answers vague and confused; loss of memory; urine high coloured and in small quantity; repeated vomiting; anxiety in the region of the stomach; burning at the præcordia; a rapid encroachment of paroxysms.

Second Case. An intus-susception of paroxysms; pulse small and depressed; tongue dry and rough, but no thirst; urine thin; the faculties of the mind impaired. Third day, the patient got out of bed and lay down on the ground, where he was found asleep, that situation being agreeable to him. Fourth day, having arisen to go to stool, the same occurred again, which was repeated several times afterwards during the course of the disease. There was besides a rapid falling away of the face, joined to many other signs which showed the fever to have taken on a very acute character.

Third Case. A very severe double tertian; paroxysms sub-intrant; delirium deep and predominant; but disappearing during the time of remission; thirst, dryness of the tongue, agitation; heat in the bowels, urine high coloured and in small quantity; want of sleep and other symptoms which bespoke the real tendency of the fever to a continued type.

Fourth Case. State analogous to the preceding; tongue dry and rough; slight delirium; respiration laborious; urine limpid; grievous affection of the head, throwing the patient into a stupor;

trembling of the hands, oppression of the whole nervous system, &c., in a man of an advanced age, and considerably debilitated by previous diseases.

Fifth Case. Symptoms common. The fever showed no disposition to become continued except during the time of its increase.

Sixth Case. Symptoms common. The fever from its commencement tended to a continued form.

Seventh Case. Frequent fainting-fits, with an acute pain in the stomach, a considerable prostration of strength, and a great depression of the pulse; deep complainings, groans, spasms, cold sweats, obliteration of the memory, &c.

Eighth Case. A very severe double tertian in a woman advanced to the fourth month of gestation; colliquative sweats which were not followed by any relief; depression great; urine flame-coloured, and in small quantity, &c.

XXVIII. From a view of those fevers almost always remarkable for the existence of some one great and predominant symptom, it is obvious that the division which Torti has endeavoured to establish of malignant fevers into "*comitatas*" and "*solitarias*," is more specious than solid; or, at least, that it is not applicable to all cases. This tendency of malignant intermittents to a continued type, is a mere accident which cannot serve as the basis of any true distinction, although it necessarily produces some modification in the modes of treatment.

ARTICLE XXII.

Of Malignant Intermittents prevailing epidemically.

XXIX. We would give but a very imperfect history of malignant intermittents, were we to confine ourselves exclusively to a description of such as are seen to occur only sporadically, in seasons and under circumstances favourable to their production, and in the persons of individuals exposed for a longer or shorter time to the influence of sedative causes. But these fevers are accompanied by a train of symptoms still more formidable, when, in consequence of some general and extraordinary causes, they prevail epidemically during certain morbid constitutions of the atmosphere. At such times they are more frequently complicated either with a particular affection of the *primæ viæ*, or with some of those symptoms which belong essentially to adynamic remittents. Professor Fouquet makes mention of a malignant remittent which raged in Batavia with such ferocity, that the sick being suddenly seized with derlirium, sunk most commonly under the first, but always before the fourth paroxysm. The slightest wounds or scratches ran with astonishing rapidity into putrid ulcers.*

We ought here to set before us, as a model of truth and precision, the view which the immortal Lancisi has given of the malignant tertian that prevailed in many parts of Rome in the year

* See his notes to Lind's treatise on fevers and contagion.

1695.* On the fifth day, that disease inclined towards a continued type; on the seventh or the eleventh, the patients died; they seldom lived till the fourteenth day, unless where the disease was converted occasionally into a chronic fever or into a dysentery, which in that case continued during the whole autumn, or even during the winter. The countenances of those attacked became at first yellow; the sick experienced a disrelish for food, and dull pains in the head; these were followed by a severe chill and a discharge from the stomach of a watery fluid, mixed with vitiated bile of different colours. Sometimes small worms were evacuated by the mouth; to these symptoms succeeded considerable heat and thirst.

Oftentimes, after two paroxysms accompanied by profuse sweats, the fever was marked by such a remission, that the sick considering themselves out of danger, not only rose from bed on the fourth day, but began to walk abroad. During this time, however, the urine was saffron-coloured, thick, and turbid. On the fifth day the fever returned, with great anxiety about the præcordia, which completely developed its malignant character; the tongue, besides, was dry and dark coloured; the pulse varied; it was oftentimes small and unequal. The limbs having become cold were agitated with convulsive motions; there were livid blotches on the skin, the face cadaverous, frequent fainting fits, delirium, abdomen

* *De nox. palud. effluv. lib. 2.*

tense and tumified; stools fetid and consisting of dark coloured bile, oftentimes mixed with blood, and containing dead worms at the commencement of the disease; at length came on, great drowsiness, cold sweats, limpid urine, and swellings of the parotids. The patients sunk on the seventh or ninth day; until the proper remedy for the disease was discovered, they seldom survived till the twelfth day.

On opening the dead bodies, great ravages were discovered in the viscera of the abdomen, which were almost all livid; the liver was of a very dark brown; the cystic bile was black; the intestines sphacelated in various parts, contained excrements extremely fetid, and a great quantity of worms. Here and there were discovered several blackish circular spots, in the centre of which could be perceived, as was thought, traces of erosions produced by the worms.

Lancisi has described a second epidemic prevalence of malignant intermittents which lasted for several years; these also put on the tertian type: they were ushered in by a cold fit and a very profuse sweat; in their early stages they intermitted very completely; towards the seventh day, however, they degenerated into continued fevers, and proved fatal to many of those attacked. From the time of their commencement, there appeared bilious vomitings and very copious evacuations by stool; pains in the head and loins; cardialgia; and a tension of the hypocondriac regions and lower part of the abdomen, which

Lancisi regarded as indicating the presence of worms. Although these fevers pursued nearly the same course, the heat increased and the sweat diminished; the debility became at length so great, that the patients growing cold all over, died on the fifth or seventh day.

With these epidemic constiutions of Lancisi, we may class that which prevailed at Turin in the year 1720, and of which Riche has given such an excellent description.* This last exhibits also the fatal effects of the tendency of the malignant intermittent towards a continued form. The danger was the greater in proportion as this tendency manifested itself at a later period. Some of the sick were affected with excruciating pains of the head; others complained of burning heats, and lassitude throughout the whole body. Some were tormented by thirst, and distressed by a constant want of sleep; many were overwhelmed by a deep and unconquerable drowsiness, &c. There was an eruption of petechiæ which made its appearance on the fourth or seventh day; this eruption was first discovered on the back, neck, and breast, from whence it extended along the extremities even to the ends of the toes. It was remarked that few persons who were affected with these spots at an early period of the disease recovered. A soldier who was attacked by them on the third day, died almost immediately.

A circumstance worthy of notice is, that the various kinds of discharges from the bowels,

* *Thom. Sydenh. op. tom. ii. fol. 38.*

which, in most sporadic ataxics, increase with the increased violence of the fever, pursued here a contrary course and alternated with it, in a case related by Riche. Towards the end of that affection, which observed a double tertian type, the patient discharged by stool a vast quantity of black grumous blood, an event which was followed by a real amendment.

The celebrated Ramazzini also mentions having seen at Modena constitutions under which tertian fevers which, with many other writers, he denominates *malignant*, prevailed with the greatest violence.* Towards the fourth or fifth paroxysm, the cold fit was so intense that the patients never became warm again; the whole body was like ice; the pulse was incapable of expanding, and death soon closed the scene.

The history of the diseases of Breslaw contains two descriptions of these fevers, which are no less handsomely and circumstantially related.† The intermission, which was at first sufficiently evident, ceased afterwards to be distinct, but recurred again in the space of a few days; although the diseases were for the most part tertians, they put on occasionally the quartan type. The tongue was covered with a tough mucous stratum; some of the sick were affected with vomiting; others made fruitless efforts to discharge the contents of their stomachs. The former were apt to faint on the slightest motion; the latter were torment-

* *De abus. chinæ-chinæ dissert.*

† *Hist. morb. irratiss. Ann. 1619 et 1702.*

ed by a violent cardialgia. This disease was farther marked by a disrelish for food, and a moderate degree of thirst; severe cephalic affections; obstinate watchfulness; urine natural at the commencement, but afterwards high coloured and turbid; constipation, inconceivable anxiety, &c.

Lautter has very well described malignant intermittents prevailing epidemically, and we have already had occasion to quote several very remarkable cases from that author. These fevers, which had prevailed at Luxumbourg, in the autumn of 1759, appeared again in the month of March, 1760. The illustrious physician of whom we are speaking, was himself attacked by a severe tertian, which in its principles resembled a continued fever, and the particulars of which may be seen in his excellent work: (*Hist. med. bienn. morbor. rural. &c.*) It may not be amiss to remark, that relapses were particularly frequent during this second year; few of the sick escaped them. They occurred principally in pregnant women, where they were attended with great danger. Thus a married woman, twenty years of age, was attacked, in the fifth month of her first pregnancy, by a tertian fever of great violence. She was cured by an ounce of bark, taken in the form of an electuary. It was now the middle of June. Three weeks afterwards, without any apparent cause, she was again attacked and again cured. About the beginning of August she relapsed again; on this occasion the symptoms were light, and yielded to the most simple remedies. A few days af-

terwards, the fever returned once more, with increased force, and under the form of a double tertian remittent. (The patient was now in the eighth month of her pregnancy). The paroxysms, which were ushered in by a chilliness scarcely perceptible, were followed by a hot fit more intense than that which occurs in the most acute fevers. The pain of the head was excruciating, the end of the tongue was dry and parched, and the thirst was unquenchable: the patient experienced an excessive burning in the hypogastric region, and sharp pains in the neighbourhood of the uterus; the fœtus was in such strong and constant agitation, that premature labour was apprehended; the most alarming circumstance was, that the paroxysms, anticipating the stated times of their recurrence, left scarcely any interval of remission between them. Lautter, who was called in at the time of the third paroxysm, finding the patient's respiration greatly impeded, and the pulse very hard, directed bloodletting from the arm; he had an emollient cataplasm applied to the abdomen, and sinapisms to the soles of the feet; he administered cooling drinks, and thus appeased the violence of the symptoms. He then ordered the Peruvian bark to be taken during the remission in the form of an electuary. But as the patient could not swallow it in that way, another paroxysm no less violent occurred; the bark was now administered in mixture, in the quantity of about six drachms; the paroxysms decreased in force, and finally disappeared by the

continued employment of this remedy. In a few days this woman had entirely recovered her strength, and was delivered at the usual period of a healthy child.

Those fevers which Lautter thought might be characterized under the name of *malignant*, were very common this year; they differed from the preceding ones in their access, in the symptoms which accompanied them, and also with respect to the diseases which they resembled; the chill, which was at first very short, was afterwards converted into a cold fit so severe and obstinate, that the trunk of the body remained for some hours rigid and immoveable, so that it became necessary to restore it by fomentations, and the application of warm linen clothes; sometimes the lower extremities were of an icy coldness even to the calves of the legs, and the upper extremities to the wrists, while the other parts of the body were of an agreeable temperature (Casus XIII.)

The unfavourable symptoms which accompanied these fevers were, great anxiety about the præcordia, a painful oppression of the breast, a continued and very troublesome nausea, a laborious rejection of yellow and green bile, a vomiting of grumous blood, violent hysterical and convulsive motions, a vehement cardialgia which brought on faintness and at length true syncope. All these symptoms increased and diminished with the paroxysms.

The pulse, at the commencement of the pa-

roxyism, was feeble, small, unequal, and almost obliterated during the faintness and syncope; at the height of the paroxysm, and when there was no longer any faintness, it became hard and tense; in some patients it was strong and full; during the time of remission it was soft and flaccid.

For the same reason, the respiration was sometimes short, quick, full, and then seemed partly suspended; at other times, it was laborious, frequent, and attended with wheezing.

Some of the sick were affected with a fierce delirium, others with a tranquil delirium, and others again had a cataleptic affection; many, sunk into a kind of stupor, were scarcely able to answer the questions that were addressed to them; they talked incoherently, hesitated in their discourse, and even stopped in the middle of a word; some were overwhelmed by such a profound coma, that they never opened their eyes unless when briskly shaken by their attendants, or spoken to in a very loud voice.

So great was the prostration of strength after a few paroxysms, that the sick could scarcely move in their beds. Their eyes were dull and muddy, their countenances cadaverous and livid. The paroxysms were marked, at their beginning, with profuse cold sweats, and sometimes, towards their close, with exanthematous eruptions.

It appeared, said Lautter, that the fevers of the first year of the epidemic, were peculiarly acute and inflammatory, and those of the second,

highly putrid and malignant; they all resembled each other in their most essential characteristic, that is, they were intermittents, and yielded only to the action of the bark. The secondary remedies, however, employed in the treatment of them were necessarily somewhat different. Bloodletting, with which the practitioner could not dispense in the first year of the epidemic, was altogether inadmissible in the second. Tonic, cordial, and stimulating, were now substituted for antiphlogistic medicines.

To these different accounts of malignant epidemics, I will subjoin some historical details of those which have prevailed at Pithiviers, in the department of Loiret, and of which we have already had occasion to speak. These fevers could not fail to be well known; during their prevalence, the School of Medicine of Paris sent thither a select deputation of her pupils. These young medical characters, already skilled in the art of observation, and directed, besides, by the experience of professors Desgenettes and Dumeril, inquired with accuracy into the causes, the nature, and the effects of the epidemic; but, previously to their arrival, M. Lanoix, who does honour to that department by the excellence of his practice, had manifested the most laudable zeal on the subject.

It was towards the close of Thermidor, in the year X, that these intermittents, benign in appearance, broke out in several communes of the circle of Pithiviers. They soon spread with an

alarming rapidity: in the space of a month, they attacked one half of the inhabitants of the boroughs and villages situated on the borders of the river Essone. While they preserved the character of simple intermittents, the inhabitants were only struck with surprise at the number of persons attacked; but, when they began to become mortal, relief was solicited from all quarters:

Public opinion designated, as the principal source of the epidemic, the commune situated to the eastward and southward of the city of Pithiviers. Never did a more afflicting spectacle spread a gloom over the mind; every dwelling appeared to be converted into an hospital. All the calamities that can result from the combined influence of disease and indigence, prevailed in these wretched abodes: adults, old men, women, and children, fell indiscriminately the victims of the disease. The poor, deserted in their deplorable situation, had nothing to afford them comfort or relief in their sufferings, but some bad medicines, more dangerous than useful, and a very scanty and unwholesome diet.

Throughout the city itself, the consternation was general; the rapidity with which the epidemic spread, the unexpected deaths of a great number of old people and children, of some heads of families, and of pregnant women, had occasioned a great alarm, which was daily increased by fresh calamities.

These fevers were true intermittents; their

most prevalent types were, the tertian and the double tertian. Quotidian and quartan types were less common. These different types exhibited, in many individuals, great variety, with respect to the duration of the paroxysms, their occurrences, &c. The disease always came on with extreme debility: a single paroxysm was sufficient to reduce the most robust man to such a degree, as to render him unable to leave his bed. The intermission of the fever did not restore the strength, and the sick were weakened the more, in consequence of the powers of digestion failing, even before the actual commencement of the fever, and for a long time after its termination. Two symptoms were, in most cases, observable during the continuance of the paroxysms: these were severe cephalalgic affections, and pains in the abdomen, which did not always terminate even with the exacerbations, but tormented the patients during the short periods of apyrexia. In general, these epidemics had a strong tendency to rapid changes of their type, and to become alternately remittents, common bilious, continued, or malignant continued fevers.

With regard to the change of these intermittents into continued fevers, it was observed, that in the greatest number of cases, the last paroxysms took place without any perceptible shivering: the patients experienced only a slight degree of coldness: this symptom was almost always a forerunner of the change of the intermittent into a continued type. Sometimes the pa-

roxysms, instead of twelve or fifteen hours, lasted thirty-six hours, and thus prevented the occurrence of any apyrexia.

Such were, in general, the degeneracies of these prevailing diseases; but their most steady and constant form was that of the malignant intermittent: sometimes their attack was sudden; sometimes the malignant symptoms appeared after some symptoms of the benign intermittent, or, while the patients were in a state of convalescence, they were suddenly attacked by a violent chill: in a short time, loss of intellect, aphonia, skin livid, deglutition difficult, respiration stertorous, pulse full and irregular; occasional subsultus tendinum, urine thin and limpid, anxiety, deep sighing, general insensibility, and an entire prostration of strength. The paroxysm lasted fifteen or eighteen hours. At the close of the paroxysm, the senses restored to their functions, respiration less stertorous, pulse more regular and more feeble, urine abundant, and containing a sediment, voice feeble, with an entire forgetfulness of every thing that had passed during the exacerbation; great oppression, apyrexia lasted ten or twelve hours more or less.

The actual cause of the disease under consideration appears to have been an immense volume of marsh miasmata, which, for nearly four months, had contaminated the atmosphere of Pithiviers, and the communes situated on the borders of the Essone. That river was subject, during the year X, to an inundation so extraordi-

nary, that the meadows which lay near to it were covered with water. The stagnant waters, which had formed a temporary marsh, whose miasmata had been evolved by the burning heats of the summer, are sufficient to account for the origin of the epidemic fever which has so long desolated that unhappy country. It belongs to the records of humanity and the voice of national gratitude to do justice to the name of Madam de Neufcarre, whose tender and generous attentions contributed to lessen the horrors of that terrible calamity. The eulogy of this virtuous woman is naturally connected with that of M. Maret, the prefect of the department, who, in the midst of these public calamities, showed himself to be a most zealous and enlightened philanthropist.

Malignant intermittents are also known to have raged with great violence, during the course of the epidemics which ravaged the environs of Abbeville, in the years VIII, IX, X, and XI of the French republic. M. Boullon, who has described them with much accuracy; observes, that their most common characteristic symptom was a lethargy. He adds, that some patients were affected, during their paroxysms, with convulsions, bilious vomitings, dysenteric fluxes, and ferocious or mild delirium: but a phenomenon of which he speaks in a particular manner, was a partial eruption on the skin, oftentimes pale or blackish, which marked the paroxysms of the fever, and which was almost always accompanied by an extraordinary collection of worms in the alimentary canal.

But it is in the works of Cleghorn,* Sarcone,† and a few other observers of equal respectability, that practitioners must look for information respecting the peculiar genius or character of epidemics, such as those of which we are treating. By examining and comparing the faithful accounts given by these authors, they will learn, that nothing so greatly expands our views in medicine, as to join, after the manner of Hippocrates, the knowledge of the nature of places and situations to that of their diseases, to be constantly attentive to the relation between causes and effects, and constantly to compare the resources with the means employed.

XXX. It is probable that there are certain constitutions of atmosphere, which are peculiarly calculated to produce certain varieties of the malignant intermittent in preference to others; and continued researches on this subject might turn out to be equally useful and curious. Le Roy observes, that choleric tertians were epidemic at Montpellier in the autumn of 1765 (*Memoire sur les fievres aiguës*) Sydenham has also taken notice of epidemic constitutions, where intermittents with cephalic affections predominated (*Epist. ad Rob. Brady.*) After all, it is probable, that it is, for the most part, the kind of temperament peculiar to each individual, or the relative debility of the organic systems, which particularly determines the action of the fever to any one given

* *Observations on the epidemical diseases of Minorca.*

† *Istoria, ragionata de mali osservati in Napoli.*

part of the body, and which thus produces, according to such determination, either the choleric, the cardialgic, or the comatose, form of the malignant intermittent.

XXXI. It is difficult to determine with certainty, whether the particular symptoms which thus predominate in malignant intermittents, either sporadic or epidemic, be essential to the disease, or only accompany it in a manner purely accidental. Torti advises us to examine attentively, whether or not these symptoms follow exactly the course of the fever, appearing and disappearing along with it. To me it appears that this consideration alone is quite insufficient, and that it is further necessary to attend very closely to the previous state and the habitual affections of the patient. It may so happen that the remains of some old irritation may be awakened into action by the paroxysm, and that the morbid phenomena which result from thence, prevailing then with greater intensity, may notwithstanding cease to show themselves, as soon as the paroxysm is over, and the living system is no longer in the same state of excitement. This remark, which is too generally neglected by physicians, it appeared to me necessary to make, in order to guard against a multitude of errors in the choice and application of modes of treatment.

XXXII. There is one truth laid down by Senac, which necessarily results from, or is confirmed by, the contemplation of malignant intermittents; it is, that the extreme derangement

of the living functions, and the pains which occur in the different viscera of the body, do not always bespeak an inflammation of the parts where they are situated; for, in masked fevers, or malignant intermittents, the patients appear sometimes furious and phrenitic, and at other times experience all the painful symptoms of peripneumony or pleurisy; at other times again the action of the stomach and intestines is entirely subverted, &c. In a word, the danger appears oftentimes as great as in a high inflammation, a severe wound, or a powerful attack on the very principle of life; and yet all these symptoms, which seem so formidable, disappear, for the most part, in a very short space of time; these circumstances ought to be carefully attended to in the practice of medicine, in order to guard against the most fatal errors.*

XXXIII. Another truth no less important, is, that malignant intermittents, always partake of the character of other epidemical diseases then prevailing. It is thus that, according to the remark of Lautter, the intermitting fevers observed at Luxembourg, in the year 1759, were of an inflammatory nature; they were accompanied by a sharp and pungent heat. The skin and the tongue were dry; the paroxysm, on its decline, was marked by neither sweat, nor moisture; the sick were tormented by a thirst that nothing could allay, by very severe pleuritic pains, and by delirium; the pulse was hard and strong, and the respiration painful; bloodletting was indicated,

* *De nat. febr. recond. cap. 6.*

and the blood when drawn was covered with a white crust; other antiphlogistic remedies were equally necessary. But in the following year (1760,) the malignant intermittents put on the nature and character of putrid or adynamic fevers. This appears evident from the great prostration of strength, the frequent fainting fits, the oppression, the anxiety in the region of the præcordia, the sweats which occurred at the commencement of the paroxysms, the coldness of the limbs, &c. by which these diseases were marked. The countenance was livid and greatly changed, the pulse was small, contracted, and unequal, &c. The cure of the fever was effected by the use of tonics and cordials.*

* *Hist. medic. bienn. morb. rural. &c.*

CHAPTER II.

*Considerations on the nature of Malignant Intermit-
tents.*

XXXV. That we may thoroughly understand the nature of malignant intermittents, it is necessary to consider them in the following order, namely, in relation to their type; in relation to the symptoms that properly belong to and constitute them, the theory of which ought to be explained by the principles of modern physiology; in relation to the rank which they should hold in a nosological table; to their mode of attack; to their relapses, &c. Lastly, it is necessary to pay a due regard to the various points of analogy or difference which approximate them to or separate them from other forms of fevers, and also to their reciprocal complications.

ARTICLE I.

*Of the most common type of Malignant Intermit-
tents.*

Is the intermitting type which we have assigned to these fevers, in reality that which they most frequently assume? Some authors have unquestionably regarded them as being almost always remittents. The obscure and irregular course of their paroxysms in a great number of cases, prevents us from determining positively

how far the assertion of these authors is well-founded. It is certain, however, that they have fallen into many errors, and that their doctrine has been pushed too far. For, as Sydenham and Torti have justly observed, certain effects of the fever oftentimes exist, after the fever itself has subsided. It is not uncommon to see patients reduced to the lowest ebb of exhaustion by the fatigues which they have suffered, remain cold, with a frequent, small, irregular pulse, &c., when at the same time, there is no just ground to regard these symptoms as a real continuation or extension of the paroxysm.

XXXVII. A complete solution of this problem would produce, after all, no remarkable change in the principles which direct the treatment of the diseases under consideration. Experienced practitioners have clearly demonstrated the analogy which exists between intermitting and remitting fevers, and have made it appear, that their only real difference consists in the greater or less activity of the same cause which produces them both.

XXXVIII. Observation has proved, that intermitting fevers marked with malignant symptoms follow, for the most part, the tertian period; we find, however, in the writings of able physicians, many examples tending to prove, that they may assume other types. Bianchi has spoken of a constitution of the atmosphere remarkable for certain quartan fevers, which degenerated into continued ones, marked with characters of the

highest malignity.* Horstius also gives an account of a similar fever, in an individual fifty years of age, of a robust habit, and accustomed to a sedentary life. The pulse was unfrequent, slow, and unequal; the patient was affected with colic and vomiting, &c. An intermittent marked by syncope has been seen to possess the quotidian type.

ARTICLE II.

Physiology applied to the theory of the symptoms which characterize malignant intermittents.

XXXIX. Physicians, struck with the irregularity and astonishing variety of the symptoms which accompany malignant intermittents, have always endeavoured to account for them on certain physiological theories. Thus, for example, the celebrated practitioner of Modena refers them to two very distinct states of the living system, namely, that of *colliquation* and that of *coagulation*. The first state embraces the choleric or dysenteric, the hepatic, the cardialgic, the diaphoretic, and the syncopal forms of the disease; while the second includes the algid and the soporose forms. Grimaud, accomodating these ideas of Torti to another hypothesis, has considered these symptoms as depending, some of them on a prevailing state of condensation or spasm, and others on a state of expansion or atony. Bal-

* *Hist. hepat. pars tert. fol. 751. See also Forestus, lib. iv. observ. xxxix.*

ding, on the other hand, renouncing entirely the spirit of system, and availing himself of the light of modern discoveries, has considered those symptoms expressive of malignity in fevers, as injuries more or less considerable done to the principal vital faculties.* We will follow his footsteps, and, pushing his ideas still further, will apply his method to the study of those phenomena, which compose malignant intermittents.

XL. Adopting, for this purpose, the divisions established by professor Chaussier,† we will consider the spasms, the convulsions, the tremblings, the subsultus tendinum, the hiccoughs, the frequent, tense, or contracted, soft or open state of the pulse, a hurried or slow and stertorous respiration, the closing of the eye-lids, lying in a supine position, black spots, gangrenous sores, &c., a paralysis of the limbs, and more particularly of the sphincters, as the result of an excessive increase or diminution of the principal modes or conditions of mobility; the delirium, the stupor, the defect of memory, the fainting-fits, the cardialgic pains, the impaired state of vision, smelling, and hearing, &c., as severe diseases of the sensibility. Finally, the different alterations that take place in the state of the animal heat are evident from the icy coldness which characterizes the algid state of the malignant intermittent; and, from that burning heat of the stomach, as

* *Opuscula medica.*

† *Table synoptique des propriétés caractérisées et des principaux phénomènes de la force vitale. See also M. Double's memoir on this subject.*

well as from that sharp and pungent heat which occurs in other varieties of the same disease. To be the more fully convinced of the possibility and of the advantages of this application of physiology to the study of diseases (which I am content merely to mention), let any one consider well what passes in the syncopal state of fever. Here the phenomena of mobility, sensibility, and animal heat, appear to be suspended all at once. The entire failure of the tone of the system is manifest from the supple and flaccid state of the skin; the alteration in muscular motion from the flexibility of the joints, and the spontaneous and general interruption of the motion of all the limbs, &c. In the third place, the power of perceiving objects is obliterated and buried as it were under a multitude of resisting obstacles. Finally, the external surface of the body being covered with a clammy sweat, becomes more or less cold.

XLI. By considering even slightly the other varieties of the malignant intermittent, we will perceive that their symptoms arise equally from some degree of injury done to the systems of motion and sensation. The frequent stools of different kinds which occur in the choleric and hepatic forms, evidently arise from spasms and convulsive motions which take place in a part or in the whole course of the alimentary canal. Nothing more clearly proves that the irritability is essentially affected, than that irregular and disordered action of the organ of digestion. Sometimes, and particularly in the hour of death, cer-

tain local paralyses occur, which occasion a general relaxation in every part of this system, or in the sphincters. The glands being weakened or disturbed, cease to secrete; the nutritive part of the aliment, being no longer taken up by the lacteals, passes off with that which is unfit for nutrition, and this mixture sends forth a putrid odour which is always an unfavourable sign.

XLII. If we direct our attention to the diaphoretic form of intermittent fever, where the sick are exhausted by excessive sweats, which continue during the whole paroxysm, so as to produce a kind of diarrhœa of the skin; if, I say, we carefully examine this affection, we will find no difficulty in convincing ourselves, that it arises from a state of universal atony or collapse of the skin. Those who conceive that the action of the exhaling vessels is increased, on the other hand, under the circumstances which we here state, appear to me to be in an error, as may be easily demonstrated by observations made on other diseases. Indeed the sweats which terminate the paroxysms of common intermittents, as well as those which follow convulsion fits, hysterical fits, &c., never take place till the combat between the powers of reaction and the debilitating cause is over, and at the time when the patient is in the most exhausted and debilitated state. Besides, is not this excretion known to be always the result of some sedative impression on the living system? Does not the sovereign efficacy of the bark, which checks these enervating

sweats, furnish an argument in support of the opinion which we here advance?

XLIII. It would be useless to push any further this application of opinions, derived from the physiology of the human body, to the theory of malignant intermittents. Those physicians who are skilled in observing nature, will easily make this application to the different cases which may occur in their practice, and will become convinced that it is by this alone they can succeed in removing from many pathological phenomena the obscurity which surrounds them.

XLIV. This peculiar alteration in the irritability and sensibility of the system in malignant intermittents, has not escaped the notice of Dr. Fodere, as may be seen in his interesting work on the climate and diseases of Mantua. That practitioner remarks, that these two powers are at times entirely destroyed with a rapidity as fatal as it is surprising. "The warriors, says he, of late so terrible, were seen lying on their pallets, their legs and arms hanging down, and oftentimes, if they attempted to rise for any purpose, they fell senseless on the ground. In the month of Prairial, a fire broke out in a chimney of the Hospital, and was likely to extend to a ward in which one of these patients who was on the recovery then lay; the fright destroyed in an instant the small remains of his irritability; he attempted to rise up and make his escape, but he had no sooner attained an erect posture, than he suddenly expired." This injury of the irritability and

sensibility is even so profound, that it continues some time after the paroxysms of the fever have disappeared. The senses of taste and smelling are restored in the convalescents but slowly; the sight remains feeble and languid; the pupil is dilated, and does not contract itself again without difficulty, &c. In other individuals, it is evident that the muscular system is affected no less essentially than the nervous system.

XLV. It is known that certain physiologists distinguish the life of animated bodies into two kinds, a distinction equally ingenious and well founded.* One of these kinds is concerned only in functions purely internal; the other is exercised in the external functions, and serves as the medium of intercourse between animals and the surrounding objects of nature which relate to their wants. Extending our views in conformity to this doctrine, may we not, according to the seat which they occupy, distinguish the varieties of the malignant intermittent, into two orders, perfectly separate from each other? In the first order, we will arrange the choleric, the hepatic, the cardialgic, the algid, the diaphoretic, the pleuritic, the rheumatic, the nephritic, the cephalalgic, the dyspneic, the catarrhal, the icteric, and the hydrophobic forms of the disease, which attack, in a particular manner, those functions in

* See *Inquiries on Life and Death*, by Xavier Bichat, and *New Elements of Physiology*, by Anthelm Richerand. The first idea of the distinction of life into two kinds is to be attributed to Buffon and Grimaud.

which the internal or organizing life resides, such as digestion, the secretions, the excretions, &c. In the second order we will place the syncopal, the delirious, the lethargic, the convulsive, and the epileptic forms, where, in consequence of some injury done more particularly to the nerves or brain, the external and intelligent life, or the life of intercourse, appears to be more immediately in danger.

There is, notwithstanding, such an intimate connexion between all the phenomena or functions of the living system, that the derangements which take place in either of them concur for the most part in giving rise to the same disease, and if the mind attempts to separate these phenomena by analysis, it is only for the purpose of acquiring a more correct knowledge of their character, and of the kind of derangement which they suffer.

XLVI. Those physicians who have most successfully applied our physiological knowledge to the theory of the diseases commonly called *malignant*, have endeavoured in particular to determine the degree of debility, and the mode of alteration, which the radical powers of the living system may experience; they have distinguished the cases where these powers are in some measure destroyed, or annihilated, from those in which they are only oppressed, or embarrassed by some obstacle, which prevents their developement and their action. Professor Barthez, in particular, has pointed out, and dwelt on, this distinction

between powers *destroyed* and powers *oppressed*, in his "*Nouveaux Elemens de la Science de l'Homme*," and has made it appear, that authors have not hitherto bestowed on it the attention which it merits.* But, perhaps no one has carried this idea further than citizen Richerand, in the account which he has given of the first edition of my work,† and I think it necessary to mention in this place the new and important views he has given of it, in applying it to the order of fevers. After having spoken of the necessity there is to characterize, by specific terms, the different states of the power or strength of the human system, considered in all the diseases to which we are subject, he alleges that our language being less rich and fertile in terms calculated to paint and define than the ancient languages, it is from the latter that we must borrow the characteristic denominations, so advantageous, as he expresses it, in a science which has for its object to portray the derangements of our system, in colours the most true, and in terms the most agreeable to nature. The reader will doubtless peruse with pleasure the first table drawn up with so much precision by this physiologist.

“ In febre inflammatoria seu synocho simplici
(angeio-tenica) *Oppressio virium.*

“ In febre biliosa seu ardente (meningo-gas-
trica) *Fractura virium.*

* Page 255.

† *Magasin encycl. des sciences, cinquieme année tome v.*

“ In febre pituitosa seu morbo mucoso (adeno-
meningea) *Languor virium.*

“ In febre putrida (adynamica)
Prostratio virium.

“ In febre pestilentiali (adeno-nervosa)
Syderatio virium.

“ In febribus malignis seu (ataxis) .
Ataxia virium.”

1st. It is easy to perceive that the first term employed by citizen Richerand, expresses with the utmost correctness that particular state of the animal economy, where it is impeded, as it were, by the excess of its own energies, and forced to sink under its own power. The author judiciously conceives that this term may be applied, under suitable modifications, to certain kinds of phlegmasiæ, and to those hæmorrhages which pathologists denominate *active*.

2d. There is no one who has not observed this sense of general contusion and soreness of the limbs, in the fever commonly called *bilious*, an affection so well described by Stoll, and many other writers; but the term employed above, expresses perfectly the state of the energies in this condition of things.

3d. A languor of the powers of the system is a striking characteristic of the pituitous fever, and of all lymphatic diseases.

4th. But in putrid or adynamic fevers, the powers of the system are sooner reduced to a state of real prostration, an expression much used among physicians, and of which false ap-

plications are oftentimes made. This prostration may readily go so far as nearly to destroy, or greatly to injure, all the functions performed by muscular action, such as voluntary motion, respiration, the circulation of the blood, digestion, the discharge of urine, &c.

5th. The term "*Synderatio*," is employed to express the state of the powers of the system in the pestilence of the east, because the sick are *thunder-struck*, as it were, by that terrible disease.

6th. Lastly, in the order of fevers which constitute the principal subject of this dissertation, the phenomena are all irregular. Every thing goes on in an anomalous manner, and there is no consent, or co-operation in the efforts which nature makes to resist destruction; this state of things is very happily expressed by the term "*ataxia*," which is already used by several authors, and of which physicians may avail themselves to express the symptoms belonging to a great number of nervous diseases.

XLVII. M. Double has usefully extended these several points of view, in a work which I have already mentioned. Thus, independently of all those different considerations already stated, he has perfectly ascertained and distinguished, for example, a state of *numbness* in the powers of the system, produced by the deleterious impression of poisons and miasmata; a state of *deviation* of these same powers, arising from an unequal distribution of them, and which so frequently occurs in the course of the fevers now

under consideration; and, in particular, a state of *consumption* of these powers, very deplorable in itself, in which the energy of the organs is weakened and gradually wasted, without ever being restored again. M. Magendie and myself have seen, in the hospital of St. Louis, a man who, a month after the suppression of a malignant intermittent by means of the bark, suffered an alarming emaciation, which brought on death by slow and successive steps. This patient expired without delirium, and without even considering himself in a dangerous situation. This state occurs in hectic fevers, whether symptomatic or primary.

ARTICLE III.

Of the names given to Malignant Fevers.

XLVIII. While treating of the nature of intermittents which are marked by a train of symptoms alarming and rapidly fatal, we must observe, that the denomination of *malignant*, which is commonly given to them by pathologists, is too vague and indefinite, because it is daily applied to diseases of a different description.

The denomination of *Ataxic*, which Selle has already given to fevers of this character, and which professor Pinel has adopted for those now under consideration, has appeared to us more proper to express the confusion, the irregularity, and the conflicting nature of the symptoms which

constitute them. Indeed if the fever be in a high degree nervous, do we not sometimes observe a kind of precipitation in the phenomena of the mobility of the system, which shows itself by strong, frequent, and obstinate convulsions, while the blood vessels experience an apparent though insidious state of tranquillity? Do we not also see a disordered secretion of bile, conjoined with a very regular and healthy secretion of urine? A profound drowsiness succeeded by an obstinate wakefulness, a dryness of the tongue with an absence of thirst, a sharp and burning heat in some parts, with an icy coldness in others, a gay delirium at the time when life is in the utmost danger, and a sudden transition by the patient from a state of indifference respecting his situation, to very gloomy forebodings, which are a constant source of terror to him? But, a circumstance which no one appears to have examined with sufficient attention, is, the incompatibility of symptoms with the remedies which seem necessary for their removal, such as the danger of bloodletting even when the system is in a state of the most inflammatory irritation (Home;) the danger of emetics and purgatives, while the sick are discharging matter of a vitiated character both by vomiting and by stool (Werlhof;) and the danger of acids even when the symptoms denote the most highly putrid state of disease (Ludwig.) What fatal errors might not be committed here by a common physician, too much accustomed to interpret nature from mere outward appearances?

ARTICLE IV.

Principal characteristics that distinguish Malignant Intermittents from other fevers.

L. From the historical detail of malignant intermittents which we have already given, it appears that one of their principal characteristics is, to be accompanied in their progress by a train of symptoms uncommon and rapidly fatal. It further appears, that the danger in those diseases which is always great, consists chiefly in one symptom which always predominates over the others, which make a combined effort against the life of the patient, and attack, at once, the different systems of the body. But it is not by these two characteristics alone, that they differ from common intermittents; they are further distinguished by a want of correspondence and harmony among their symptoms.

It is particularly and very judiciously remarked by Mercatus, that the three periods of the paroxysm take place in a manner less uniform and less regular. The fever disappoints the expectations and calculations of the physician by declining sometimes when it ought to increase; at other times again it takes on a fresh exacerbation, after it has arrived at its height, and when the attendants are looking for its decline; finally, it oftentimes goes off suddenly only to come on again as suddenly.

LI. As intermittents, whether malignant or purely ataxic, have an affinity to adynamic fevers, and as the phenomena belonging to each of them are, in most cases, intermixed and complicated, it is proper to separate them from each other by means of analysis, in imitation of the learned school of Gottingen, in order to preserve a clear and distinct idea of them. Thus we must regard fetid diarrhœas, hæmorrhagies that give no relief, a flaccidity of the limbs and a loss of motion, gangrenes which occur on the extremities, &c. as belonging particularly to the order of adynamic fevers, while restlessness, stupor, subversion of intellect, delirium, loss of memory, confusion of the senses, a sharp and rough voice, tossing of the hands, spasms, convulsions, &c. are the proper and characteristic symptoms of ataxic fevers.* Even the solutions of these two kinds of fever are essentially different, as is judiciously observed by Baldinger (*opuscula medica*) and by professor Pinel (*Nosographie philosophique*). It is known, indeed, that instead of the crises which usually mark adynamic fevers, the ataxic properly so called are sometimes terminated by metastases towards the articulations and glands, by morbid affections more or less permanent of the sensibility of the cutaneous system, or by an impaired state of vision, of taste, of smelling, of hearing, &c. It may be laid down, then,

* For a statement of the symptoms of true malignity in fevers, see a Thesis contained in the collection by Stahl, entitled; *Disput. medic. patholog. pract. de malignitatis præcipuæ febrilis indole, &c.*

as a general principle, that adynamic fevers consist in derangements of the mobility, while ataxic fevers attack and alter more particularly the sensibility, of the system.

LII. Hippocrates in particular has inquired very profoundly into the distinctive signs of these latter fevers, and it would be difficult to mention even a single one that has escaped his notice; symptoms the most slight in appearance, and which but seldom attract the notice of physicians who want experience, such as great dejection, imaginary terrors, a taciturn physiognomy, an air of meditation, tranquillity of the patient contrary to his usual habits, &c. have oftentimes served him as the foundation of an unfavourable prognosis.

LIII. A line of demarcation no less perceptible appears to me to exist between malignant intermittents and ataxic continued fevers, notwithstanding the difficulty there may be in pointing it out. Although these two diseases do not appear to differ, at first view, except in the circumstances of the one being periodical and the other permanent; although they commence with the same symptoms, and are subject afterwards to the same accidental occurrences, it appears notwithstanding that there is not so striking a contrariety among the elements that compose malignant intermitting or remitting fevers. In these diseases the movements of nature are more connected as to the times of the exacerbations and the recurrences of fever, and tend more directly

to overcome the cause of the disease, whatever it may be. However formidable their train of symptoms may be, they are seldom attended with a natural pulse, a circumstance which particularly characterizes certain ataxic continued fevers, and is justly regarded as a very alarming occurrence: it announces, according to the opinion of a celebrated practitioner of the present day, “such a perfect separation or disconnexion of the vital energies in the organs principally affected, that the irritation does not extend at all to the arterial system.”*

LIV. Besides, it is unquestionably true, that the animal economy is less radically enervated in malignant, and even in ataxic intermittents. This fully appears from the efficacy of the Peruvian bark in their treatment, while that article proves very often an uncertain remedy in continued ataxics. It is not, therefore, altogether without reason, that these latter fevers have been represented as furnishing a melancholy testimony of the insufficiency of our art, while those which form the subject of the present treatise, demonstrate in a striking manner its resources and its certainty.

LV. The celebrated Cazimir Medicus has endeavoured to determine the affinities which connect periodical diseases to fevers marked by paroxysms in general, and particularly to malignant intermittents.† He finds those affinities

* *Nouveaux elemens de la science de l'homme.*

† *Geschichte periodische krankheiten, 1764.*

which really exist, 1st, on the sameness of the symptoms which constitute these periodical diseases, and which may at the same time mark malignant intermittents; 2ndly, on this circumstance, that periodical diseases are sometimes converted into fevers marked by paroxysms, and that fevers marked by paroxysms may be converted into periodical diseases; 3dly, on the intervals or intermissions which take place in these two kinds of disease; 4thly, on the urine made by patients labouring under each disease, which deposits a lateritious sediment; 5thly, and lastly, on the circumstance that both diseases yield to the same mode of treatment. But we conceive that Cazimir Medicus has not sufficiently examined this important point of pathology. Indeed he has not noticed the precise difference which distinguishes mere periodical affections from those usually denominated intermittents, or fevers marked by paroxysms. We will, therefore, offer an opinion on this subject, and, that it may be the better understood, we will first unfold some of our theoretical views respecting the nature of fevers, as they will tend to throw light on the point under consideration.

LVI. It appears to us, from every view we can take of the subject, that all those affections of the living body, which pathologists have designated by the name of *fever*, have their seat essentially in the nervous system: and were we to attempt a general nosological arrangement, we would assign them a place in the class Neuroses.

But, as a necessary consequence of the sympathetic connexion which so directly unites the nervous to the vascular system, this latter is almost always secondarily affected, which introduces more or less disorder into the circulation; it may notwithstanding happen, from some cause which we shall not undertake to develop, that the blood vessels do not participate in the primitive affection of the nerves; hence arises a periodical disease simply nervous, which receives different names, or gives rise to different phenomena; according to the different seats which it occupies. It is thus that we observe cephalalgic affections, pleurodynic affections, colics, and a thousand other pains or complaints, which occur regularly at fixed periods, without creating any derangement in the functions of the vascular system.

LVII. But these particular affections, which do not extend to the vascular system, are notwithstanding movements of nature, having for their object the reparation of some secret disorder in the organic laws of the human body; and if this end is but very slowly attained, if these affections are for the most part chronic, it is merely because the vascular system, which appears to be peculiarly instrumental in affecting the crises and solutions of diseases, takes no part here, and therefore the vital resistance is too feeble; what confirms this is, that in the contrary case, the same disease, when influenced by vascular reaction, runs its course rapidly to either a favourable or an unfavourable termination.

LVIII. To sum up the whole, then, and draw an inference from what has been laid down under the head of this article, I am of opinion, that there exists a very great affinity between nervous periodical diseases, and malignant intermittents; that the latter differ from the former only in being more rapid in their progress, and attended with a higher degree of danger. I am of opinion, in the second place, that the rapidity of their progress is to be attributed to the united influence of the affections of both the nervous and vascular systems; and what principally constitutes their danger is, that they contain within themselves alone all the elements and all the symptoms belonging in common to all other nervous diseases; thus, in analyzing them, we find the delirium which appertains to madness, the irregular movements and spasms which characterize convulsive diseases, the lethargy and drowsiness which approximate them to apoplexy, &c. Many other views and considerations might be subjoined to those which I have here unfolded, did not the length of the digression forbid it.

ARTICLE V.

Complications of Malignant Intermittents.

LIX. Having ascertained and pointed out the differences which exist between malignant intermittents and common intermittents, between adynamics and ataxics, between such of this lat-

ter order as are continued and those which are intermittent, and between these same fevers and nervous periodical diseases without pyrexia,* we will now turn our attention to the various complications which malignant intermittents may evidently suffer; for it has been seen from the view which we gave of them in the beginning of his dissertation, that the physician does not always find them in a simple shape. It happens but too frequently, during epidemic periods, for instance, that, independently of the symptoms which constitute their true essence, they assume other secondary symptoms, which belong to the genus of putrid remittents. This appears clearly from the history of those fevers recorded by Lancisi, Riche, &c.

But, to illustrate more completely the nature of these diseases, it is necessary to mention, that the adynamic symptoms sometimes predominate over the ataxic. We will be readily convinced of the truth of this, by calling to mind the epidemic which prevailed at Copenhagen in 1652, an account of which is transmitted to us by Thomas Bartholin.*

In that disease there prevailed a constant delirium, and excruciating cephalalgic affections; but there were also, and that in a very high degree, petechial blotches which appeared during each paroxysm and disappeared during the intermission, diarrhœas extremely debilitating, abscesses, &c. Besides these circumstances, the

* *Hist. anat. rar. cent.* 11. *Hist.* lvi.

stomach and duodenum were found, in the dissection of dead bodies, to be affected with gangrene. A fever precisely similar raged at Leyden in 1669. The nervous affections were but slight in each paroxysm; but Sylvius de Leboe, who gives an account of it, makes mention of livid blotches on the skin, hæmorrhages from the nose and hæmorrhoidal veins, fetid urine, &c.*

From the history of these latter fevers, it is evident, that they were of the adynamic order, with an intermitting or remitting type. Many authors, notwithstanding, appear to confound them with those of the order of which we are treating. Has not Sellius himself arranged malignant intermittents in the same genus with putrid bilious intermittents.†

LX. There is another case of the complication of these fevers, to which I think it of importance to pay some degree of attention, namely, that in which a common intermittent is combined with a fever vulgarly denominated a *putrid-malignant*. There is a case of this kind related by Ruecker, in a Thesis which he defended on that subject.‡

A young man aged about twenty, of a bilious and melancholic temperament, was attacked by a tertian, very regular in its commencement and in its course. It is probable that this disease would

* *Prax. med. append. Tract. x.*

† *Rudimenta pyretologia, fol. 350.*

‡ *De febr. intermitt. complicatione cum maligna casu quodam illustrata.* Christianus Zacharias Ruecker.

have had its usual termination, had it not been for an unfortunate accident which befel the patient, when the hot stage of the fever was at its height, and the sweat was about commencing. This latter symptom continued throughout the night and during the following day, which was the day of intermission. From this time the patient complained of a spasm round his whole body, anxiety about the præcordia, and a great prostration of strength; a delirium supervened; the appetite which had continued tolerably good while the tertian was simple, now failed entirely. Pulse weak, loss of memory, cephalgia, fetid stools, cardialgia, painful respiration. The neck was covered with efflorescences and small blotches of a dark red colour. Blistering plasters were applied; acids and tonics were administered; signs of coction appeared in the urine on the eleventh. The solution of the disease took place on the fourteenth. The tertian fever which had passed regularly through its periods, ceased also at the same time; but this latter having re-appeared some days afterwards, in consequence of some imprudence on the part of the convalescent with respect to regimen, yielded again to the proper remedies.

This circumstance, related by Ruecker, is not so rare as some may imagine. The Hungary fever, described by Sennertus, is nothing, according to Pringle, but a combination of the autumnal with the hospital fever.* Is it surprising

* *On the diseases of the army.*

that this phenomenon should occur in a very marshy country, where nights excessively cold succeed to days excessively warm? These mixed diseases must also occur in our hospitals, or in individuals who, being already affected with intermitting fever, come to reside in another sphere of contagion of equal activity.

It may be seen from hence how advantageous the analytical method is to throw light on that chaos into which our books on fever plunge, at times, both masters and pupils. Stoll whose celebrated name naturally presents itself to me, when speaking of those characters who have contributed most to the improvement of the doctrine of acute diseases; Stoll, I say, has expressly complained of this perplexing confusion. He has perceived that diseases distinguished by the same name, though essentially different from each other, oftentimes deceive physicians by masking themselves under the same common symptoms. He has further perceived, that from treating these diseases in the same manner, the patient has frequently suffered in consequence of the erroneous system of classification.†

† *Methodum enim medendi eandem sæpienumerò divertissimis febribus, sed eodem vocabulo insignitis quasi semper eidem morbo adaptant. Tunc malam docentis divisionem æger immeritus luit. Ratio medendi, pars xi. cap. 10.*

ARTICLE VI.

Of the opinion of those who have considered Malignant Intermittents as contagious.

LXI. The rapid and extensive ravages of these diseases, in the seasons and climates where they most readily break out, have led some physicians to suspect them to be contagious. Raymond observes that this opinion is without any solid foundation; for the persons who attend on the sick, who have the closest intercourse with them, and even sleep on the same bed, do not sicken, unless they have already received from without the infection which alone produces the disease. Even women who are attacked by it suckle their infants without endangering their health. Raymond goes on to observe, that what gives rise to this mistake is, that at Middlebourg, for instance; and throughout all Zeland, where these fevers are endemic, the same causes operate on a great number of individuals at once, sparing neither age, sex, nor condition in life, so that whole families falling sick, the individuals of them are scarcely able to afford each other the necessary assistance.*

* *Hoc primo certum est, ut jam monui, morbum non esse contagiosum; nam fœmina lactantes infantem suum durante morbo toto, si modo lactis copia sufficit, sine noxa nutriunt, quod communi apud nos praxi confirmatur; neque qui eodem in lecto cum ægrotis commorari coguntur, aut aliud intimum commercium habent, præter curæ incommoda ullum abinde morbum lucrantur. Jo. Raymond. Dissert. exhib. descrip. febr. intermitt. autum. quotannis Mittelburgi et in vicinis Zelandiæ Bataviæ locis grassantium. 1767.*

ARTICLE VII.

Of relapses in Malignant Intermittents.

LXII. One of the most constant characteristics of ataxic intermittents is, that of exposing the individuals whom they attack to repeated relapses, even when they are treated by means the most energetic. It belongs to experience to confirm by more numerous facts, the interesting and important observation of the celebrated Werlhof, from which it appears, that these relapses occur generally at weekly periods.

ARTICLE VIII.

Of the information respecting the nature of Malignant Intermittents to be derived from the opening of dead bodies.

LXIII. There have been hitherto but very few of the bodies of those who had died of true malignant intermittents opened, for two principal reasons: first, because however formidable those diseases may be, they notwithstanding terminate favourably, when regularly treated by a skilful physician; secondly, when patients fall a sacrifice to a want of skill in the physician, dissection is seldom had recourse to as a source of information. Moreover, the knowledge to be derived from such dissections would be but very little more instructive than that resulting from the

dissection of subjects that had died of ataxic continued fevers. That assemblage of nervous phenomena, that strange combination of contradictory and anomalous symptoms, which rage with violence while life continues, and which are the result of a kind of pathological function, are extinguished for the most part, without leaving behind them any physical vestige of their existence. Besides, there is oftentimes no immediate relationship between the organic injuries found after death, and the morbid signs which had preceded it. It has always appeared, under certain circumstances, that these injuries had a relation to the leading and predominant symptom, which had characterized the malignant fever, and from which its true danger arose. It is known at the present day what opinion ought to be formed respecting those effusions that occur in the cranium in consequence of malignant fevers; and M. Coutanceau, member of the medical Society of Paris, has clearly proved, that the nervous symptoms which exist at the same time with these effusions, may also occur without either them or any anatomical injury of a similar nature. (See his "*Observations sur les épanchemens dans le crane pendant le cours des fièvres essentielles.*")

A man died in the hospital of St. Louis, of an attack of the soporose state of malignant intermittent, in which the bark had been unsuccessfully administered. He had lain in a state of constant somnolency, a tranquil delirium, consi-

derable weakness, and at times a high degree of insensibility: these phenomena terminated in death. We proceeded to open the body, the skin of which was of a citron-colour. On opening the head, we found two ounces of serosity effused between the dura mater and the tunica arachnoidea. This serosity was of a yellow colour and transparent. The cellular membrane that unites the tunica arachnoidea to the pia mater was filled with a liquid similar to that of the effusion. The cerebrum was sound and of a consistence sufficiently firm. About the middle and lower part of the cerebellum there was a slight degree of disorganization perceptible. There was not in this spot any alteration in either the colour or density of the cerebellum, but only a small excavation of a line in depth, and an inch square in extent. In each cavity of the pleura was found about two quarts of serosity perfectly similar to that in the brain. The cellular portion of the heart was also surcharged with serosity, particularly towards its base and apex. Nothing remarkable in the lungs, bronchiæ, or trachia. In the abdomen, the liver was of the usual size, but of a very dark colour; the gall bladder was filled with brownish bile, in which floated a great number of globules of a brown colour, inclining to a red. These globules were scarcely perceptible to the touch, and could be crushed to pieces with the utmost ease. The spleen was large, and in its texture so similar to the liver, that it was impossible to discriminate between two sections of these organs when laid along side of each

other. The rest of the abdominal viscera were in a sound state. The cellular membrane situated immediately under the skin, was filled generally with a limpid yellow liquid, similar to that of which we have already spoken. It appears that most of the organic alterations discovered in the dead body under consideration, had no relation to the primary fever of which the patient died. It is proper to mention that this patient had been previously subject to a quartan ague of more than three months' continuance, which was the cause of that universal œdema that affected him on the invasion of the malignant disease of which he died.

CHAPTER III.

Considerations on the diagnosis of Malignant Intermittents.

LXIV. A knowledge of the diagnosis of malignant intermittents is founded on a certain number of important considerations, which we will endeavour to unfold in the following articles.

ARTICLE I.

Of the diagnosis as derived from the character of the paroxysms.

LXV. It is said, not without reason, that the various aspects which these fevers assume, render it, in general, very difficult to distinguish them, more particularly on account of the tendency which they have to depart from the intermitting type, and to put on a continued form. It is certainly rare for any mistake to be made respecting them, if the disease make its first appearance by a well marked and violent paroxysm, if the two succeeding paroxysms be ushered in by a shivering or a sort of *rigor*, if the urine be ever so little lateritious, &c. But if none of these signs be present, and if the physician has not had an opportunity to observe the fever from its commencement, he ought to suspend

his opinion, and not hasten to define the disease from beginnings which are common to others.

ARTICLE II.

Of the diagnosis as derived from the character of the intermissions.

LXVII. Mercatus has pretended to establish the diagnosis of *malignant* fever, from a sign which appears extremely uncertain. He thinks that a fever ought to be deemed malignant, whenever the symptoms which characterize it do not entirely leave the patient during the days of intermission; as often, for instance, as there remain, during the intervals, any traces of delirium, of a propensity to sleep, of languor, of anxiety, of thirst, &c. But how often, as Lautter remarks, do fevers of a malignant character occur, in which none of these symptoms show themselves during the intervals of the paroxysms? Not only do the sick leave their beds, but even walk out and attend to their business, as if in health, though death may occur on the next paroxysm. Lautter quotes on this subject an observation of Werlhof, which is conclusive. A woman about fifty years of age had gone into the street on the day before her dissolution, to request him to visit her the next day, as she was expecting her third paroxysm; the paroxysm actually took place, but the symptoms were so violent, that she sunk under them. In the sickly situations of Italy, cases similar to this very frequently occur. During the

reign of terror, I devoted myself to the study of diseases in a hospital in the country, where malignant intermittents raged with the utmost violence. The intervals which separated the paroxysms were entirely free from any complaint, and yet unfavourable occurrences, altogether unexpected, did not fail to destroy many patients, at a time when they thought themselves in perfect security.

ARTICLE III.

Analogy of Malignant Intermittents with the soporose state of fever incident to old persons.

LXVIII. To be able to form a certain diagnosis in the study of ataxic intermittents, it is useful frequently to compare the accurate descriptions which we have of them, with such affections as bear a greater or less resemblance to them. It is for want of the assistance of these luminous comparisons, that Morgagni, for instance, appears to have established in his own opinions of things, a perfect similitude between the comatose intermittent described by Morton and Torti, and the soporose intermittent of persons advanced in years; although, from every view of the subject, these two fevers ought to be distinguished from each other. Thus Leroy, directed by the light of his own observations, has endeavoured to determine the differences which exist between them:

1st. *From their nature.* According to that author, the fever commonly designated by the name of the *malignant fever* or the *soporose fever* of old people, is sporadic in all places. The comatose intermittent, on the contrary, is sporadic only in situations that are unhealthy and exposed to the influence of marsh exhalations. Besides, it follows the epidemic periods of intermitting fevers.

2dly. *From the recurrences and paroxysms.* In the soporose disease of old people, the recurrences are marked by a simple coldness of the upper and lower extremities, without any shivering. In the comatose intermittent, the paroxysms are usually ushered in by a shivering.

3dly. *From their progress.* The progress of the first is more rapid than that of the second, and its type has appeared constantly to be a continued one.

4thly. *From the state of the pulse.* In the soporose disease of old people, it is small, unequal, and feeble. In the comatose intermittent it has the same fulness which characterize it in apoplexy.

I am of opinion, however, that this latter sign, taken from the state of the pulse, does not carry with it the same degree of certainty as the preceding ones, since it is well known that in the comatose intermittent, the disorders that occur in the circulation are subject to frequent irregularities, or deviations from rule.

Perhaps the action of the bark, which is acknowledged by physicians to be much more efficacious in this latter fever than in the soporose disease of old people, may form a characteristic which ought not to be neglected.

From what has just been said it plainly appears with what a weight of reason certain writers advise us to draw a line of discrimination between fevers and distinguish them, not only by the symptoms which they manifest, but also by the treatment which they require; and, it further appears, with what correctness a celebrated physician remarks, that the true method of bringing the healing art to perfection is, to enrich it continually with separate or insulated descriptions.

ARTICLE IV.

Signs laid down by Lautter as the foundation of a diagnosis in Malignant Intermittents.

LXIX. Lautter, after having demonstrated, in his account of them, the insufficiency of the signs established by different authors to designate ataxic intermittents, founded his own diagnosis on the following considerations.*

If the fevers, says he, after having made their appearance with but little severity at the commencement of their attack, manifest, on the third, fourth, or fifth paroxysm, some grievous and unusual symptom, such, for example, as a very

* *Histor. medic. bienn. morb. rural. &c.*

deep coma, vomitings, faintings, an obstinate diarrhœa, a great prostration of strength, &c. whether the symptom disappear with each paroxysm of the fever, or continue during the intermission, whether the urine be loaded with a greater or a smaller quantity of sediment, whether the fevers do or do not prevail epidemically, it is necessary to give the bark without hesitation or loss of time; a long delay might prove destructive.

2dly. If, as frequently happens, the disease comes on with a violent vomiting, an excessive diarrhœa, a state of somnolency, a delirium tranquil or furious, fainting fits, or epileptic spasms, and these symptoms suffer a remission, on the day following, or disappear entirely, we certainly cannot, from this single occurrence, announce the presence of a malignant intermittent, unless the urine deposit a lateritious sediment, and there be prevailing at the time an epidemic of this nature; but when, on the third or fourth day, the symptoms just mentioned reappear, and suffer again another remission, the physician need wait no longer to form his diagnosis with certainty; he must administer the bark immediately.

3dly. When these fevers are ushered in under an inflammatory aspect, with an acute pain in the side, a hard pulse, a troublesome cough, and the blood drawn is covered with an inflammatory crust; when the urine is always loaded with a sediment, and there is an epidemic prevalence of fevers of this kind, the physician is inexcusable

if he delays encountering these symptoms by the use of the bark.

4thly. If a man in health be suddenly attacked by a severe apoplectic affection, or a violent cholera morbus, and the day following these symptoms do not show themselves at all, but there remain with him a difficulty in speaking, and a dulness of the senses, if a sediment appear in the urine, and there be at the time a prevalence of malignant intermittents, it is necessary for the removal of these threatening symptoms, to have an immediate recourse to the use of the Peruvian bark.

5thly. Intermitting fevers may also be known to be of a malignant character, when very grievous symptoms, such as vomiting, diarrhœa, dysenteric flux, rheumatic pains, head-aches, &c. torment the sick for a time, without yielding to any, even the most powerful remedies, without the bark, although in other respects, there may be no proper regularity as to paroxysms and intermissions. If the urine deposit a lateritious sediment, and there be, at the same time, an epidemic prevalence of malignant intermittents, these signs are sufficient, and give just ground to suspect the existence of a masked intermittent.

ARTICLE V.

Signs laid down by Medicus as the foundation of a diagnosis in the same diseases.

LXX. Physicians may derive much aid, in their inquiries after the intermitting character of malignant fevers, from the distinguishing signs laid down on this subject by the learned and profound Medicus, in his history of periodical diseases.* They ought to pay the utmost attention, then,

1st. *To the paroxysm itself as it appears.* When any symptom suddenly attacks a person, continues a few hours, and then declines by degrees, or disappears of its own accord, the practitioner of observation ought certainly to apprehend the return of that symptom at no very distant period. Indeed it is scarcely probable that a morbid affection could make its appearance and wear itself out in so short a space of time. The physician of Manheim justly observes, that this sign is of the utmost importance, as it gives warning of the danger that threatens, and directs to the measures necessary for its prevention. May not even the second paroxysm of malignant intermittents sometimes prove fatal?

2ndly. *To the recurrence of the paroxysm.* If the fever return at the same hour and on a stated day, no doubt can be then entertained of its hav-

* *Geschichte periodische krankheiten.*

ing taken on the intermitting type. Physicians can best appreciate this sign and derive most instruction from it in the chambers of the sick.

3dly. *To the prevailing diseases.* This consideration is of the greatest utility (XXX.) Indeed if we take a survey of the descriptions which we have on record of different epidemics, we will be convinced that malignant intermittents prevail most frequently at the same time with other fevers that consist of paroxysms, or in concurrence with other periodical diseases; they are oftentimes even nothing more than the same fevers complicated or redoubled in violence, in proportion to the strength of the causes which produce them.

4thly. *To the lateritious sediment of the urine.* The most celebrated physicians have laid much stress on this sign, from considering it well calculated to disclose the intermitting nature of prevailing fevers. The illustrious Sydenham, in particular, that great observer in medicine, explains himself formally on this subject, in a letter to Robert Brady on the epidemic diseases which had prevailed from the year 1675 to the year 1680. The intermitting fevers of which he gives an account, had assumed the mask of apoplexy. But he detected them principally by an inspection of the urine which was extremely high coloured, and deposited a lateritious sediment.*

* *Hic autem commemorare libet, quod sub primos hujus constitutionis annos, symptoma quoddam insigne febribus intermittibus supervenerit. Nempe earum paroxysmi non cum rigore et horrore, quas*

But as Lautter very judiciously remarks, this sign can give no aid unless it be taken in connexion with several other signs, for it does not always exist in malignant intermittents. The urine is frequently muddy, at other times it is clear, and at other times again not at all changed from its natural state. Besides, although this sign were always to be relied on, it is not always practicable to examine it.

ARTICLE VI.

Opinions of Aurivill and Senac on the prognosis in Malignant Intermittents.

LXXI. Samuel Aurivill is of opinion that the quickness of the changes which take place in the mode of the remission or in that of the recurrence of the paroxysm, is a circumstance well calculated to throw light on the degree of malignity in the character of intermittents.*

postea febris excipit, invadebant, sed æger ùisdem plane symptomatis tentabatur, ac si apoplexia vera laborasset, quæ tamen nihil aliud esset, utcunque hunc affectum æmuletur, quam ipsa febris caput impetens: ut ex aliis signis, ita ex colore urinæ satis liquebat: quæ in intermittibus ut plurimum rubore saturato extat, qualis cernitur in urina eorum qui ictero laborant, ut si non adeo intensé rubet, et pariter sedimentum deponit pulverem laterum fere referens. Sydenh. op. epist. 1 respons. ad Rob. Brady.

* *Ex binis vero accessionibus attentius observatis, haud dubie colligi potest morbi indoles; videlicet ex remissionis modo et novæ pariter accessionis, quarum utraque et subitanea magis, et evidentior, amutationibus lentioribus malorum æque gravium in remittentibus cæteris sese distinguit. Dissert. de febr. intermitt. malign.*

As, according to the observation of Senac, there are few continued fevers which in their cold stage are *homotones*, that is, in which the pulse continues as full and strong, at that time, as it is during the exacerbations and remissions, &c. it is of consequence to determine the signs which separate or approximate remitting and true continued fevers. This the author whom we have just quoted has done with that sagacity which is peculiar to himself.*

He observes first, that there are many points of similitude which unite these two orders of fevers; in continued fevers, the symptoms are oftentimes less violent one day than another; these diseases are also at times marked by four exacerbations in the space of twenty-hours; the intervals between these exacerbations are sometimes longer, sometimes shorter. When the symptoms grow more violent, the disease is dragged along, as it were; in its progress, and pursues no regular course. There are notwithstanding every three or four hours paroxysms which do not fail to renew themselves again, after having declined. In the second place, when two or three paroxysms occur in the course of twenty-four hours they are not all of equal force, one of them always predominating in some degree over the others. Senac speaks of an epidemic prevalence of malignant fevers where this predominance was very striking. There was a remission in the

* *De nat. febr. recond. lib. ii. Chap. viii.* See the American Translation of this valuable work.

morning; but towards ten o'clock, an exacerbation supervened which abated again in the space of three or fours hours. This remission was not of long duration; for about nine in the evening all the symptoms returned, and continued with violence throughout the night. It is impossible then to judge of the symptoms which belong to remitting fevers, either from the times, or from the number of the exacerbations.

LXXII. The febrile movements, however, go on in continued fevers in a manner totally different from that which they pursue in remittents. In general, their paroxysms do not take place at a stated hour. Their remissions are so slight as not to manifest any very perceptible degree of amendment in the patient's situation; the skin does not exhibit that state of moisture which shows the course of the excretions and secretions to be free; the urine undergoes no change, and there is no discharge from the bowels; there is no cold fit, nor even a chilliness felt. The manner in which the exacerbations come on is also very different; they are observed to show themselves gradually; at first there is perceived a certain depression in the pulse, so that the sick appear to be agitated by an internal commotion; and the heat increases afterwards by slow degrees. In remittents, on the other hand, it comes on suddenly; but a principal difference assigned by Senac is, that there is not, in continued fevers, such a striking disproportion between the exacerbations and the remissions, &c.

ARTICLE VII.

Signs showing the tendency of Malignant Intermittents towards a continued type.

LXXIII. The necessity of varying or modifying the processes of the art of healing, as often as the malignant intermittent tends towards a continued type, has rendered it incumbent on physicians to examine with attention the signs which give notice of that degeneration. There is reason to expect it from the following circumstances:

1st. *From circumstances that relate to the first attack of the disease.* If this be made altogether without, or with but an extremely slight cold fit, or if it take place with a sensation of heat.

2dly. *From circumstances that relate to the paroxysms.* If these go on increasing in strength and duration; and if the intervals between them become daily shorter and shorter.

3dly. *From circumstances that relate to the intermission.* If during the intermission there be observable a degree of disorder in the pulse, a parched state of the skin, a dryness of the tongue, an altered appearance of it, thirst, uneasiness, and cephalalgic affections; in a word, all the signs which show the system to be inclined to a state of inflammatory irritation.

4thly. *From circumstances which relate to the excretions.* If the urine be in small quantity, and of a red or saffron colour.

5thly. *From circumstances which relate to the functions of the sensorium.* If the delirium which came on in the paroxysm continue, after the paroxysm, during the remission of the fever.

6thly. *From circumstances that relate to the state of certain organs.* If there appear in the inside of the mouth of the sick, scurfy ulcers which impede deglutition, and if to this circumstance be added, a small pulse, a sharp voice, hiccough, &c.

7thly. *From circumstances which relate to the nature of the symptoms.* All the symptoms which are common in continued ataxics, ought to be regarded as signs indicating a tendency in the disease to a continued type.*

LXXIV. But this conversion of a remitting or intermitting into a continued fever oftentimes occurs in a manner altogether sudden and unexpected: or the disease has oftentimes advanced too far for the physician to be able at first sight to distinguish its true character. Under these circumstances, he ought doubtless to watch with attention even the slightest phenomenon; it is then, as Voulonne observes,† that a simple coldness of certain parts of the body, a paleness of the face, violent fits of coughing that occur unexpectedly, a pulse becoming small, frequent, and confined, yawnings, stretchings, the recurrence of some particular symptom, such as a pain in the head or a burning in the stomach,

* If in intermittents or remittents of a malignant cast, all or any of these seven circumstances occur, they bespeak in them a strong tendency to degenerate into continued fevers.

† *Memoire sur les fièvres intermittents.*

urine depositing a sediment, &c.; indeed that the slightest circumstance may serve to excite suspicion. Sometimes the physician may make up his opinion from the inequality alone that occurs in the progress of the fever, particularly if it be most violent at the time in which it had been accustomed to take place: this remark is of the more importance, inasmuch as it aids in determining, whether or not the bark may be administered with a prospect of success.

CHAPTER IV.

Considerations relative to the prognosis in Malignant Intermittents.

LXXV. We learn from actual observation that malignant intermittents may be characterized by different degrees of violence, a circumstance which renders the study of their prognosis of the utmost importance.

ARTICLE I.

The necessity of attending to the state of the vital powers, in forming our prognosis of Malignant Intermittents.

LXXVI. When theories in medicine shall be founded on a thorough knowledge of the powers of life, the science of prognosis in fevers of this description will become more accurate and more solid. It is therefore of high importance for physicians to acquire a knowledge of all the causes that may weaken or disorder these essential faculties of the living system.

It is more particularly necessary to acquire a perfect knowledge of the state of these powers during the continuance of the paroxysms. If the fever appears under the tertian type, it is requisite, as Leroy observes, to pay attention to the corresponding paroxysms which occur on alter-

nate days. We should not be always in haste to form our prognosis in these fevers; for it oftentimes happens, that the first paroxysms are by no means alarming, while the subsequent ones become dangerous in the extreme.

ARTICLE II.

Of the irregularity of the action of the vital powers as a sign of the principal danger in Malignant Inter-mittents.

LXXVII. The striking analogy which malignant intermittents bear to continued ataxics, ought to determine practitioners to found the doctrine of their prognosis on the same theory, and should convince them that they are the more dangerous in proportion as they are more approximated to these latter diseases in the violence of their symptoms.

But the prognosis in these affections is for the most part very unfavourable, unless the danger be arrested by medical aid. "The injuries done to the organs of the body in a malignant disease (as professor Barthez very judiciously observes) are dangerous and difficult to be removed, because they excite only symptoms that are irregular, and different from those that physicians had a right to expect from the primitive and apparent form of the disease; and because they cannot produce, in a debilitated system, that powerful co-operation of a great number of organs, which

is necessary to bring about natural solutions of such injuries.”*

LXXVIII. It is, then, in the irregular distribution of vital motion, and in the disordered action of certain organs, that the malignity and danger of the diseases of which we are treating consist. To make an effectual resistance, nature ought to concentrate her powers; but she, on the other hand, forms under these circumstances, a great many points of unequal irritation, whence result at all times anomalous symptoms. There is not between the functions, that close reciprocal connexion or intercourse, which is necessary for the establishment of a perfect unity in the efforts of the economy; while some systems or parts make an energetic resistance, others make but a weak and languid one; in a word, the individual life of each of these systems detaches itself from the general life, which no longer pervades them, and which is itself almost smothered even in its central strong-holds where it more particularly resides.

LXXIX. There is another circumstance which contributes materially, to the danger of malignant diseases, and on which physicians do not appear to have bestowed a sufficient degree of attention; it is, that there is oftentimes an increase of irritability, and a diminution of sensibility; but nothing is more destructive than this want of concert between these two faculties, which ought to be always in harmony, and to act in unison with

* *Nouveaux elemens de la science de l'homme.*

each other; for if the action of the contractile power be diminished, and that of the nervous power increased, there will be a change in the relationship of all the functions. This want of a correspondence of action in the powers of the system, constitutes a character of great malignity.

LXXX. I would further observe, that the whole movement of our system, to be regular and conformable to the laws of life, ought to be under the influence of that supreme organ, the brain: but the spasms and convulsions which occur in malignant fevers, are phenomena the more dangerous, inasmuch as they are not excited by the will, the immediate seat of which is in the brain.

ARTICLE III.

The derangement of the sympathies of the system constitutes a great part of the danger of Malignant Intermitents.

LXXXI. Physicians have not yet sufficiently inquired into the alteration that takes place in the sympathies of the living body, and the relations which this alteration may have to the theory of prognosis in acute diseases. Yet, from what has just been said, it plainly appears how fatal it may prove. Indeed in a malignant affection, no one system suffers in consequence of its sympathetic connexion with another, because the principle of life is at once attacked in every point

of organization. Now, as the injuries cannot be propagated from one organ to another, neither are the movements and resistances made in concert. Hence those parts which, in a state of health, are united to each other by a connexion more or less direct, are here, in some measure, insulated, and their connexion at least suspended. This insulation bespeaks a very alarming alteration in the state of the nerves, which are the instruments and means of the natural and reciprocal communication of parts. It is thus that we oftentimes find the danger of malignant fevers to consist in the want of a connecting principle between the moving and the sensitive powers. Sometimes there is a want of sympathy between the nervous and the vascular systems. In these cases the pulse continues regular, notwithstanding the severe affection of the brain. This circumstance was noticed on a former occasion, when speaking of the nature of continued ataxics. At other times, some of the viscera, whose functions are analogous as to their object, have their sympathy or mutual dependence on each other destroyed. The renal system, for instance, detaches itself from the other parts of the digestive system, and the urine is well conditioned, while the alvine discharges exhibit an appearance extremely unfavourable. Lastly, in certain circumstances, the laws of sympathy appear to be broken even in organs which bear the greatest analogy to each other in point of structure: thus, in the same member, certain parts are sometimes extremely

cold, while other parts again are affected with a burning heat. I once saw a patient in whom the sensibility of the auditory nerves was increased to an extraordinary pitch, while that of the nerves belonging to the other senses was almost annihilated, &c. It must be obvious to every one to what a degree the views which I have here very briefly unfolded might be extended by an attentive consideration of pathological phenomena. It is to this subversion of the laws of sympathy, throughout the whole system, that we must attribute, to a certain extent, the inefficacy of so many remedies exhibited with a view to the removal of the symptoms that prevail. We may remark, however, that this subversion occurs less frequently in malignant intermittents than in continued ataxics.

ARTICLE IV.

Of the prognosis founded on the mode of alteration of the properties of life in Malignant Intermittents.

LXXXII. As the science of prognosis rests on a profound knowledge of the causes of death, the phenomena which accompany the destruction of living bodies in different diseases, ought to constitute a principal object of attention with the physician of observation. Thus, for example, in malignant fevers which are approximated to the ataxic, nature always begins the work of death by an obliteration of sensibility; hence

the utmost disorder oftentimes occurs in the brain and nervous system, while the vascular system remains calm and undisturbed: on the other hand, in those malignant intermittents which are approximated to adynamic fevers, death commences his operations by an obliteration of irritability, whence arises constantly some degree of derangement in the circulation, although there may be no delirium: but sometimes, indeed, these two orders of fever are blended together, and confound, in some measure, the phenomena proper to each. I have observed that those fevers in which there occurs a preternatural increase of the sensitive faculty, are less dangerous, and less difficult to be cured, than those in which this faculty is greatly diminished or perverted.

ARTICLE V.

Of the prognosis founded on the consideration of the phenomena of the brain.

LXXXIII. Malignant intermittents are dangerous, when their deleterious effects are determined particularly towards any of the most important organs of the body, such as the brain. Coma arises from a want of action in this organ, and in the whole nervous system: it is therefore a symptom of very bad presage. Hence, lethargic and apoplectic states of fever prove fatal in a very short time; particularly when the affection of the brain is joined to an enfeebled state of the

contractile power in the heart, arteries, &c. A sensation of weight in the head, accompanied with tinnitus aurium, and an increased sensibility of vision and hearing, with stupor, vertigo, &c. are unfavourable symptoms. It is necessary to distinguish cephalalgia with a weak pulse, from the same affection when accompanied with a strong pulse. In the cephalalgic state of fever, a frothing of the mouth, a livid colour, and convulsive motions of the face, are signs of approaching death.

ARTICLE VI.

Of the prognosis founded on the consideration of the phenomena of respiration.

LXXXIV. An oppression of the lungs, manifested by a slow and stertorous respiration, and by a livid turgescence of the countenance, is one of the most dangerous symptoms, inasmuch as it shows that great injury is done to the irritability of the pulmonary system, a system in which, according to the opinion of Galen, the death of the individual always begins.

LXXXV. The hiccough which occurs in the decline of the paroxysms of malignant intermittents, without any sign of solution or crisis, is extremely unfavourable, particularly if it be accompanied with delirium, convulsions and aphonia. Nor is it less so, if it be accompanied with an inflammation of the liver, the diaphragm,

and other abdominal viscera. It is fatal when it succeeds to a sudden disappearance of exanthemata, which, as we have already observed, may sometimes appear in malignant fevers. It is no less so, when it is produced by any great exhaustion, as in dysentery, diarrhœa, &c. The opinions of physicians have varied greatly with regard to the immediate causes of hiccough, a phenomenon which is not so well understood as some people seem to imagine; Stoerzel formerly wrote a thesis on this subject. The congestions which, on the approach of death, take place about the diaphragm, are well calculated to produce forcible contractions of that organ. Hiccough arises oftentimes from affections of the œsophagus and stomach, which frequently occur in consequence of the contiguity of these parts to the peritonæum. Indeed that membrane appears to be a medium of conveyance for sympathetic irritations, as appears from the experiments of Bichat, who produced hiccough by throwing a stimulating injection into the abdomen of a living animal. The communication which exists between the nerves, concurs also in the production of the same phenomenon.

ARTICLE VII.

Of the prognosis founded on the state of the organs of digestion.

LXXXVI. An insensibility of the internal organs, as for example, of the muscles of deglutition, the œsophagus, the intestinal canal, &c. is a symptom of the most unfavourable aspect: it discloses to the observer that life is, so to speak, withdrawn from the interior to the exterior parts of the body, where it exhausts itself by repeated acts of convulsion. When the abdomen is tense and greatly distended, and so painful that the patient is unable to bear the touch of the hand or of the bed-clothes, this is to be considered as a very bad symptom. There is reason to apprehend spasms and congestions in the hypochondriac regions. The alteration of the properties of life in the intestinal canal manifests itself by tension, tumefaction, and elevation of the abdomen, by a sense of weight and oppression of the stomach, and by the formation of different gazes in the digestive organs. When the irritation produced by fever is situated principally in the stomach, the disease is extremely dangerous, in consequence of the sympathy of that viscus with the other organic parts of the body. A cardialgic pain is to be regarded as dangerous, particularly if it appear with a pulsation in the region of the præcordia, with a febrile chilliness and a disposition to sweat. If this affection occur in a person advanced in years, it may become suddenly mortal.

ARTICLE VIII.

Of the prognosis founded on the consideration of the stools and excretions.

LXXXVII. Fetid and colliquative stools give reason to apprehend that the patient is fast approaching his dissolution; they are principally occasioned by slight convulsive motions which prevail throughout the whole course of the intestines; physiologists who have made experiments on living animals, have seen these motions become redoubled in the intestines at the near approach of death. The state of the urine in malignant fevers demands great attention. Thus, a diminution of that excretion, and its assuming a black colour, are very alarming symptoms. M. Boullon, in his account of the epidemic of Abbeville, says that the sick were usually in very great danger, when their urine exhibited a membraniform sediment of a mucous nature, forming a convex covering to a glairy matter placed beneath it: but it would require a multitude of facts to confirm this assertion. The urine presents a sign no less fatal, when it is discharged involuntarily.

ARTICLE IX.

Of the prognosis founded on the state of the pulse.

LXXXVIII. A small and irregular pulse is a bad symptom; an intermitting pulse is likewise

to be dreaded; yet, according to the observation and experience of some authors, it is not always unfavourable, provided it be marked with great frequency. In fevers of every description, it is a very favourable sign, if, during the course of the paroxysm, the pulse remain free and open; while, on the other hand, it is equally unfavourable, if it be weak and unequal. A contracted, quick, and vibrating pulse is dangerous, when it is united to an impeded respiration, and an anxiety in the region of the præcordia; but it is principally in soporose intermittents that such a phenomenon is alarming, particularly if it be observed that the pulse becomes worse each paroxysm, and if, in the mean time, the stupor becomes more profound. Leroy observes, that in such a state of things there is reason to apprehend a fatal termination of the disease. (*Du prognostic dans les maladies aiguës.*) In fevers of this description, a pulse which preserves its natural fulness announces an equal degree of danger.*

ARTICLE X.

Of the prognosis founded on the cold, the hot, and the sweating stages of the disease.

LXXXIX. Cleghorn has observed, that the most formidable paroxysms are those, which,

* When drowsy lethargic symptoms come on, the pulse often resembles that of a person in full health, though the sick is in the utmost danger. Cleghorn, *Observat. on epidem. diseases of Minorca.*

without being preceded by a cold fit, begin with a burning heat. Nothing can constitute a more interesting object of study, than the cold fit of an intermittent. I once saw a woman in the hospital of St. Louis, who brought on this stage of the disease as often as she took any cold drink, but never experienced it when she used tepid drinks; she was then affected with the hot stage only. The cold fit is a phenomenon of fibrous contractility; it is a sudden contraction of the living fibres, which invades the whole cutaneous system. This symptom is particularly formidable in the algid state of intermittents, where there is no subsequent reaction from the hot stage. It sometimes comes on with such violence, as to be almost equal in ferocity to a paroxysm of epilepsy, according to a remark of Wiener, who formerly wrote on this subject, though in a very vague manner. Sweats which are cold, viscous and clammy, and excessive in quantity, are to be dreaded; they constitute the chief danger in the diaphoretic state of intermittents.

ARTICLE XI.

Of the prognosis founded on the consideration of a exanthemata.

XC. The prognosis to be drawn from exanthemata is always favourable, when they are accompanied with a vigorous state, and an increased action, of the natural organs of the body. On

the contrary, an eruption is an occurrence of bad presage, when the fever and the other symptoms which accompany it, increase in violence with its appearance. M. Boullon has seen an intermitting fever in which great danger was always announced by the sudden appearance of a partial eruption during the course of a paroxysm, particularly when that eruption was of a dark colour.

ARTICLE XII.

On the prognosis founded on the consideration of petechiæ.

XCI. Physicians have justly considered the petechial spots, which sometimes occur in the course of malignant intermittents, as highly alarming, because they bespeak a dangerous complication of these fevers with symptoms that are proper to adynamic fevers. It is an error in physicians to regard these eruptions as critical. The sub-intrant tertians or double tertians, which J. L. Apinus had occasion to observe at Herspruch (in 1694 and in 1695) were never more terrible in their ravages, than when this symptom unfolded itself, towards the close of the epidemic. Petechiæ that are livid and irregular in their form, are particularly dangerous; they give evidence of some great injury being done to the irritability, an injury which, in this circumstance, joins itself to all the disorders of the nervous system.

ARTICLE XIII.

Of the prognosis founded on the state of the organs of motion.

XCII. When a person attacked by a malignant intermittent is unable, during the paroxysm, to change at pleasure the position of his upper and lower extremities; when, by being successively moved from his position by jerks and slight convulsive motions, he inclines involuntarily to throw himself out of bed, his debility must be considered as extremely great; catalepsy, in particular, is to be regarded as a precursor of death; it is the last struggle of the flexor against the extensor muscles, the former of which are likely to gain the ascendancy; it shows the entire extinction of the vital powers to be near at hand.

ARTICLE XIV.

Of the prognosis founded on the consideration of the expression of the countenance.

XCIII. It is of the utmost importance to follow the advice of Hippocrates, who expressly recommends to us a strict attention to the expression of the countenance, in forming our prognosis in acute diseases. This is, for the most part, a faithful mirror, because it discloses to us the

state of langour in the moving powers.* An air of dejection and despair in the physiognomy of the sick, bespeaks imminent danger; and a countenance more or less altered in its expression, furnishes, as it were, an epitome of the disease of the whole system. It is above all necessary to pay attention to the particular character of the patient's looks, i. e. the casts of his eyes: I have always observed that a spasmodic contraction of the great oblique muscle of the eye, turning the pupil inward and downward, so as to allow nothing but the white of that organ to be seen, is a very fatal symptom.

ARTICLE XV.

Of the prognosis founded on the consideration of different ages.

XCIV. Perhaps physicians have not paid to the forms of fevers, as they appear in persons of different ages, that attention which the subject deserves. Nicholas Esmarch defended formerly, under the presidency of Michael Alberti a pupil of Stahl, an Inaugural Dissertation

* *Considerare oportet in acutis morbis, vultum agrotantis, sit ne similis bene valentium, et potissimum sui; ita enim optimus erit: si vero quam maximè sibi contrariùs est, malum signum est.* Pred. 3. M. Bourge has read to the society of medicine of Paris an interesting memoir on the subject of physiognomy, which he divides into four principal branches; namely, physiological physiognomy, moral physiognomy, pathological physiognomy, and the physiognomy of signs.

entitled *Febris intermittens lethifera senum*. The part of that dissertation which relates to the treatment of the disease is of no value. It is obvious that the author did not doubt the power of the Peruvian bark, in a similar affection, the theory of which ought naturally to be drawn from that of malignant intermittents. But these latter diseases are more fatal to old persons, in consequence of the failure of the powers of nature in such subjects. Hippocrates very justly observes that decrepitude opens a vast field for diseases. In persons of this description, a morbid increase of the organic motions soon exhausts the sources of life. We have seen in old persons the danger of a malignant intermittent being ushered in and accompanied by a profound sleep, a certain heaviness and confusion of the head resembling intoxication, an unusual compression or stricture of the breast, crude urine of a thick and greasy appearance, of a black colour, and a fetid smell, attended with dysury and strangury; by a certain suffocating and cardialgic pain; by a pulse variable and unequal, being sometimes hard and throbbing, and, at other times, intermitting; and by an uncommon diminution of strength, reducing the patient to a state of stupor. If, says Prosper Alpinus, amidst all the complications that may occur in the malignant fevers of old people, the patients should (a circumstance which rarely happens) escape a sudden death, they cannot expect either to enjoy a long life, or to regain perfect health; for nothing

is more fatal to persons advanced in years, than a malignant intermittent, marked by symptoms of apoplexy. It oftentimes happens that the two first paroxysms pass over without any symptoms calculated to give rise to an unfavourable prognosis; but, on the occurrence of the third paroxysm, it is by no means uncommon to see an apoplexy, or an unexpected suffocation, prove suddenly fatal to the patients.

ARTICLE XVI.

Of the prognosis founded on the form of the paroxysms.

XCV. An anticipating paroxysm is not always a bad sign, nor is a postponing paroxysm always a good sign, as some authors would have it. On the other hand, the first shows that nature still retains strength, while the second demonstrates her weakness. Certain observers consider as very suspicious a malignant intermittent in which the odd days are marked by slight paroxysms or by no paroxysms at all; while very violent ones occur on the even days (Torti and Cleg-horn). Malignant intermittents change sometimes into quartans, and this change is salutary; for an intermission of two days renders the fever less dangerous in itself. This change gives notice only that the disease will be more tedious; but there is then reason to apprehend chronic affections of the abdominal viscera. If the predominant symptom continue to show itself during the

intermission, this is dangerous beyond every thing else; or, which amounts to the same thing, the danger in a malignant intermittent increases in proportion to the tendency of the disease towards a continued type.

ARTICLE XVII.

On the knowledge of the ancients relative to the prognosis in Malignant Fevers.

XCVI. So skilful were the ancients in the science of prognosis, that they have not failed to record in their writings, as of very unfavourable presage, the following symptoms, viz. a vomiting and purging of bilious matter,* a hepatic† or an atrabiliary flux,‡ cardialgic affections,||

* *Si vomitus exigui biliosique fuerint, malum. Prorrhēt. text. 36. Si-vero vomitio fuerit sarracea aut livida, nigra, quicumque ex his fuerit color, malum esse censendum est. text. 40. Atvi turbata erant biliosis, faucis, meris, tenuibus, mordacibusque et frequenter desidebant. In epid. com. 1. c. text. 25.*

† *Si ex ventre tenuia non sentienti agro exierint, si extrā se non sit, malum; cujusmodi sunt quæ in hepaticis fiunt. Prorrhēt. text. 78. Ventris valdè rubens profluvies, mala in omnibus morbis. Prorrhēt. text. 2. Malum vero, ventris valdè rubens profluvies, eoque magis, si hepatis vitio, ut in hepaticis fit, tales dejiciuntur. In coac. præd. text. 330.*

‡ *Dejectiones nigræ, qualis est sanguinis niger, sponte venientes, sive cum febre, sive sine febre pessimæ.*

|| *In febribus circa ventriculum fortis æstus, et oris ventriculi dolor, malum. Aph. 64, sect. 4. Stomachi dolor, cum hypochondrio contento, dolorque capitis, malignum. Prorrhēt. text. 72. Dolores, qui cum febre, fiunt circa lumbos, et inferas sedes, si præcordia attigerint, inferas relinquentes sedes, exitiales admodum sunt. Progn. lib. 3. Ex lumborum dolore ad os ventriculi recursiones febriles, cum horrore,*

fainting fits,** an icy coldness of the limbs,†† different kinds of delirium,‡‡ soporose affections of the head,||| immoderate sweats,∩ dyspnea,∩∩ severe cephalalgic affections,* &c. Whatever might be the disease in which these phenomena made their appearance, they were regarded by those accurate observers of nature as furnishing ground for a threatening prognosis.

aquosa, tenuia, et multa evomentes, mente aberrantes, voce privati, nigra vomentes, moriuntur. Prorrhēt. text. 58.

** *Qui frequenter ac fortiter absque causâ manifestâ exsolvuntur, derepente moriuntur. Aph. 44, sect. 2.*

†† *Frigebant his multum extremitates, ac vix calor his revocari poterat. Epidem. lib. 1, text. 28. Refrigeratio autem si ita violenta fuerit, ut tota omninò refrigerentur corpora, indurescantque, extinctionis signum existit. Prorrhēt. lib. 1. Galen. in com. 2, text. 5.*

‡‡ *In febribus insanie vehementes silente aegro, sed non etiam privato voce, lethale. In coac. præ. text. 65. Mente ob melancholiam, aberrantibus tremores supervenientes maligni. Prorrhēt. text. 14. Qui jam fractis viribus, delirant, pessimè habent. In coac. præ. text. 101. Extremæ partes undique subfrigida, aliquantùm delirabat, omnium obliviscebatur, quæ locutus esset. In 3 epidem. agr. 13.*

||| *Nullus autem phreneticorum vehementer insanivit, ut in aliis, sed alia quidem veteriosa in somnum delatione capite gravati moriebantur. In 3 epid. text. 20. Qui comate oppressi, ab initio exsudarunt leviter, urinis coctis ardentes citrà judicium refrigerantes, brevibus intervallis, ardore redeunte, torpidi, oppressi comate, convulsione subinde capti, Perniciosè habent. Coac. præ. text. 180. Quemadmodùm somnus in accessionum declinatione, est utilis, si juvet ægotum, ita si ipsum lædat, esse lethalem. Galen. in comm. aphor. Hipp.*

§ *Sudores frigidi cum acutâ febre, lethales. Cum mitiori verò, longitudinem morbi significant. Judicat. §. 8.*

§§ *Collige, magis horrendam esse respirationis, quam pulsus interceptionem, dummodò respiratio non lædatur instrumentorum culpâ, sed facultatis. Stephani Roderici Castrensis syntax. Prædict. medic.*

* *Capitis dolores fortes, et continui, cum febre, siquidem lethalium signorum quid accesserit, perniciosi valdè sunt. Hipp. prænot. § 22.*

CHAPTER V.

Of the direct causes of Malignant Intermittents.

XCVII. No one can be ignorant that, in all ages, the attempts of physicians to discover the proximate causes of fevers, have given birth to nothing but obscure theories. It is to the pride of false science that we must attribute most of what has been written on that subject. "We ought," as Reil says, "to learn to content ourselves with the historical knowledge of fevers, and to study them simply from their signs, their symptoms, and the physical causes which produce them; for every thing further is concealed from our view." Sound medical science must reject every thing that Mercatus has advanced, respecting the thickening, the thinness, the condensation, the congelation, the concretion, and the unequal effervescence of the humours, considered as proximate causes of malignant intermittents. The labours of the learned Heredia to refute or comment on the opinions of Mercatus, have added nothing to science, because, in like manner with his predecessor, he has spoken the language of the schools of his time. The degeneracy of the animal spirits, admitted by Morton, is no less illusory, and even Torti does not appear to have entirely rejected the obscure reveries of the authors that preceded him, respecting

the proximate causes of malignant intermittents. What shall we think of certain modern authors, who, reviving an hypothesis of Willis, which had been long since abandoned, have not hesitated to attribute these diseases to a deficiency, an excess, or certain alterations of the nervous fluid?

That work which admits nothing but what is founded on demonstrative evidence, must reject alike those unmeaning expressions of the increased *tension* and *oscillation* of the nerves, on which many physicians make all the proximate causes of malignant fevers depend. Those terms, which have no definite meaning annexed to them, serve only to impress false ideas of the pathological state of the living solid, and are, besides, the watch words of the systematic writers, who have so greatly retarded the progress of medicine.

Wishing, then, to avoid the devious paths of all those authors, who have sacrificed too much to their prevailing taste for visionary speculations, I think myself authorised to deduce the proximate causes of malignant intermittents, from an alteration, more or less considerable, of the three characteristic properties of vital power, namely, mobility, sensibility, and caloricity. What I have said in applying the physiological opinions already acquired to the theory of these fevers, ought to be regarded as a decisive and irrefragable proof of my assertion.

The whole system of pathology, to be in any measure certain and stable, must rest on a know-

ledge of the phenomena derived from these three properties, which I consider as in some measure the first elements of life. It is to a certain spiritless and negligent manner in which physicians have prosecuted their studies, that we ought to attribute the errors that have so long retarded the progress of the healing art.

XCVIII. Perhaps we are not in possession of materials sufficient to furnish a complete history of all the causes that concur directly in producing the numerous varieties of the malignant intermittent. In general, physicians are not sufficiently in the habit of detailing all the circumstances that had preceded the particular cases of disease which they put on record. The researches already made on this subject, enable us notwithstanding to establish certain general truths, calculated to shed light on so important a point in the history of diseases. It shall be my object on the present occasion simply to state these truths, adding, at the same time, the most material proofs on which they rest.

PROPOSITION FIRST.

It is a fact clearly demonstrated by experience and observation, that marsh miasmata act a conspicuous part in the production and development of Malignant Intermitents.

XCIX. REMARKS. It is unnecessary to expose the fallacy of the opinion of Vanelsacker, who, denying *in toto* the action of external causes, attributes the origin of such fevers to vexation, to

a suppression of perspiration, to a faulty digestion, and a vitiated state of the bile, which, by its acrimony, tends to disorganize the principal viscera of the abdomen. It is evident that such affections ought to be no longer regarded in any other light, than as secondary effects of the morbid influences which I have mentioned. The researches of the immortal Lancisi have already cleared up any doubts that might be entertained respecting my assertion. It will be sufficient to mention in this place, that the malignant intermittents which he had occasion to observe in an epidemic state, always assumed symptoms the more fatal, in proportion as the dwellings of the sick were more contiguous to infected places.* The same author has made it very clearly appear, that the places in Italy, exempt from such diseases, are those which are sheltered from the exhalations issuing from stagnant and putrid waters; and it is known that the draining of marshes, which he caused to be effected in the environs of several cities, rendered those situations healthy.

Zimmerman, in his excellent *Treatise on Experience*, informs us that intermitting fevers prevail very frequently in Switzerland, in the vicinity of lakes, ponds, &c. and that they assume occasionally a malignant character. He adduces the example of a malignant tertian which ravaged a town in the canton of Underwald, in the imme-

* *De noxiis salut. effluv. lib. 11.*

diate vicinity of a marsh, and which terminated fatally in the course of the second paroxysm. He also makes mention of several other similar occurrences. But nothing perhaps, more clearly demonstrates the deleterious effects of such exhalations on the human system, than what Lind has stated, in his *Essay on the diseases of Europeans in hot climates*, respecting a spacious and magnificent hospital, which had been erected in the island of Jamaica. That institution was furnished with every thing requisite for the recovery of the sick.

“It was unfortunately, says he, built near a marsh, upon a most unhealthy spot of ground. The effects of this unhealthy situation were, that when a patient was sent thither with only a mild intermitting fever, this mild disposition was often changed into a malignant fever, a bloody flux, or some other mortal distemper. The yellow fever often reigned there, attended with the most profuse evacuations of blood, by vomiting, stools, and even by every pore of the skin, when no such symptoms occurred in patients whose cases had been similar, and who were permitted to remain in their ships. The recovery of patients in that hospital was observed to be very tedious and uncertain: the least irregularity brought on a relapse. After a flux had been stopped for some days, the eating of any sort of food which had a putrid tendency, such as even a mess of broth, would sometimes in a few hours, bring on a return of the disease, accompanied with all its vio-

lent symptoms. Neither did this proceed from any infection in the hospital, or from its being too much crowded with patients: these things happened even when there was only a small number of patients in it, and those lodged in the best aired and in the cleanest wards. The mortality in this hospital was so great, and the cause of it so obvious, that there was a necessity for relinquishing it: no more sick were permitted to be sent thither; and another hospital, in a better air, is now fitted up for their reception.”

Were I disposed to swell this treatise with a multitude of similar facts, I might draw them from many authors, who, following the footsteps of Hippocrates, have given correct accounts of the influences of air, water, and the situations of places: I might even take a hasty view of the medical topography of the departments of France, and of the physical history of the different countries of the globe; but such digressions would lead me too far from my subject; it would be superfluous to bring to view here what is already introduced into so many works, and to dwell any further on truths which are at present almost universally admitted.

We will only further observe, that the malignant intermittents which prevail at the Salt-petref-house, unquestionably owe their existence to the putrid exhalations of the common sewer, which runs at the foot of the walls, on the north side of the building, and discharges itself into the waters of the Bievre. The physicians who attend that

hospital know, that it is particularly among the women who inhabit that part of the building which I have just mentioned, that the fevers under consideration commit their ravages.

The plan proposed in the time of professor Halle, on the subject of the changes to be made in the disposition of the bed and channels of the river Gobelins, recommends measures well calculated to do away these deleterious influences, and every good citizen ought to be solicitous for its speedy execution.

The excellent projects of Boncerf, St. Victor, &c. would have contributed no less to the art of healing, than to that of agriculture. To conclude, it has been the prevailing sentiment in all ages, that the vicinity of stagnant waters tends to the production of diseases; and nothing could be more wise than that ancient law, which secured an immunity from all taxation to him who was engaged in the draining of marshes.

PROPOSITION SECOND.

Observations have established it beyond a doubt, that the night time, the summer season, and more especially the autumn, are particularly favourable to the action of marsh miasmata in the production of Malignant Intermittents.

C. REMARKS. Lancisi has well observed, that this activity of marsh miasmata increases greatly on the setting of the sun; and he has given an excellent explication of the phenomenon, although

at the time in which he wrote, philosophers as yet wanted the data necessary to illustrate all the causes that favour the reciprocal affinity of air and water, and the ascent of miasmata, of which the first constitutes the vehicle. He alleges, that at that time, these exhalations float in the atmosphere in a more condensed state. Nothing can accord better than this with the opinions of modern physicians. No one at present denies that the point of saturation of the atmosphere (which is continually dissolving the putrid water of marshes) rises or falls in proportion as its temperature is higher or lower. The sudden disappearance of a certain quantity of caloric, must necessarily, therefore, occasion a condensation of the miasmata, and by that means render their influence more powerful.

But, without attempting explanations more extensive, we can assert, that the fact laid down in our proposition is daily confirmed at the Saltpetre-house. Whoever will take his stand at different hours near to the common sewer, where the ordure and filth of that vast dwelling stagnate, will soon be convinced that the stench which it emits is never more offensive than during the night, or I might say during the evening. This observation was long since made by professor Pinel.

Lancisi adds, that sleep which, during the night, sometimes overpowers travellers in unhealthy situations in Italy, renders them particularly susceptible of the impressions of miasmata.

This must arise either from the inactivity of the muscles, or from a less vigorous circulation of the blood, whence necessarily results a certain degree of feebleness in the reaction of the system.

That celebrated physician has also remarked, that the temperatures of the summer and autumn are more favourable to the decomposition of animal and vegetable substances; but it is scarcely necessary to observe, that it appears from the records of hospitals, that it is particularly during these two seasons that malignant intermittents rage with most violence. We will notwithstanding transcribe another passage from the writings of Lind, because it contains demonstrative evidence of the truth of what we have stated.

“ In the year 1766, sixteen French protestant families, consisting of sixty persons, were sent, at the expense of the English government to West Florida. The ground allotted for their residence was on the side of a hill, surrounded with marshes, at the mouth of the river Scambia. These new planters arrived in winter, and continued perfectly healthy until the sickly months, which in that country are those of July and August. About that time eight gentlemen (from one of whom I received this account) went to this new settlement to solicit votes for the election of a representative in the general assembly of the province; by remaining but one night, every one of them was seized with a violent intermitting fever, of which the candidate for the assembly and another of their number, died. The next day

seven other gentlemen came upon the same business to this unhealthy spot; but, by leaving it before night, they escaped the sickness, and all continued in perfect health. Among the French settlers during these two months, the annual fever of the climate proved so fatal on this unwholesome spot, that of sixty persons fourteen only survived; and even those who remained alive, in the September and October following, were all in a very ill state of health." (vid. Lind's Advice to Europeans, &c. pag. 219—221.)

PROPOSITION THIRD.

Marshes situated on elevated spots, exposed to the North, and subject to be acted on by winds, have but a very slight influence in producing and spreading Malignant Intermittents.

CI. REMARKS. It is at present an established truth, that the putrid exhalations issuing from marshes, must, to become really injurious to the health of men, necessarily stagnate in low and unventilated situations, where the moisture is constantly combined with a certain quantity of heat. Among the numerous facts calculated to give support to this truth, I will mention that one which professor Bousquillon relates (in his notes to Cullen's Practice of Physic,) and which is taken from Targioni Tozzetti, an Italian physician. This last speaks of a very mortal epidemic fever, produced by marsh exhalations, which

attacked none but the reapers who laboured in the valley where the disease prevailed, while persons residing on more elevated spots escaped entirely, and even received the sick into their houses with impunity.* Zimmerman, in speaking of the danger arising from marsh miasmata, mentions, that tertian fevers, so common along the borders of certain lakes of Switzerland, are notwithstanding very rare, unless those lakes are in low situations, and provided the wind have free access to them. He adds, that in the Tyrol, when the Adige overflows its banks, the inhabitants escape the deleterious influence of the stagnant waters which vitiate the atmosphere, by retiring to their houses which are situated on the mountains.†

Finally, to speak only of facts which fall under our own notice, we will here repeat an important observation contained in the report of professor Halle, on the actual state of the course of the Bievre‡. That philosopher has made it appear that the deleterious influence of the fetid exhalations arising from that river, is lost in open places where the wind has a free and uninterrupted course.

* *Tome 1. p. 76.*

† *See his Treatise on Experience. vol. ii.*

‡ *Memoires de l'ancienne Societé de Medecine, tome 1.*

PROPOSITION FOURTH.

Marshes, ponds, lakes, &c. contribute less essentially to the production of Malignant Intermittents, by the quantities of water which stagnate in their interior parts, than by the greater or less collections of filth, which, on the retreat or evaporation of these waters, they expose to the action of the atmosphere.

CII. REMARKS. We have already had occasion to speak of the fevers that prevailed at Batavia during the last war. Lind remarks, that they were never more malignant than after the cessation of the rains, when, the ditches having been dried up by the heat of the sun, began to expose naked to the action of the air the putrefying substances which they contained. Every one must be acquainted with the fact recorded by Senac, respecting a city surrounded by a spacious and deep lake, which for forty years had been the reservoir of all the filth of the dwellings and streets. As long as these putrid matters remained covered by the water they were productive of no mischief; but when, by the increase of their bulk, and the diminution of the waters, they were brought in contact with the air, a terrible fever broke out. Its ravages were so great, that there died on this occasion nearly two thousand persons, while in preceding years the annual amount of deaths did not exceed four hundred.*

* See the American translation of Senac, *de nat. febr. recond. lib. 1. chap. 7.*

M. Cassan observes, that the marshes in the Antilles are less injurious to health, in proportion as they are more completely shaded by trees from the action of the sun: the neighbouring inhabitants sustain from them then no other inconvenience than that which results from the vicinity of a very moist atmosphere; but when the trees are cut down, and the earth exposed naked to the immediate action of the solar rays, malignant fevers (of which a superabundant quantity and an exalted state of the bile, appear to be predominant characteristics), begin to rage among all the surrounding inhabitants, and to destroy the greater part of those who had been engaged in clearing the land.

PROPOSITION FIFTH.

The action of the winds greatly promotes, under certain circumstances, the influence of marsh miasmata in the production of malignant fever.

CIII. REMARKS. We are informed by Lancisi that thirty persons of the first distinction in Rome, having been on a party of pleasure, towards the mouth of the Tiber, the wind shifted suddenly to the southward, blowing over some infectious marshes, and that in a very short time twenty nine of the party were attacked by a tertian fever*. Senac speaks of a village where a similar cause gave rise in like manner to obstinate

* *De Nox. salud. effluv.*

fevers; these complaints prevailed more especially when the marshes were disturbed by particular winds. So dangerous were the miasmata which these marshes then threw out, that even individuals in whom the paroxysms had been checked, experienced fresh attacks, after two or three days, or oftentimes sooner. Many who had previously escaped the disease, were now attacked by it.

It is to be wished that physicians would study, more than they have hitherto done, the nature of winds, in relation to the property which they possess of disengaging in greater or less quantities the vapours that may lie concealed in the bosom of the earth. Lind, that accurate observer, remarks, that the intermittents and remittents which prevailed epidemically and to such an uncommon extent in Great Britain, in the years 1765 and 1766, were occasioned in a great measure by the East wind. He assures us, for instance, that this wind carried into that island, not only the sea-fogs, but also the miasmata and impurities of all the marshy situations. These exhalations were oftentimes seen rising in the atmosphere like a thick smoke. "Two fish-ponds in my neighbourhood," says he, "one of fresh, the other of salt water, upon the approach of an easterly wind, sometimes also emit a dense vapour, as from a pot of boiling water.

"In order to view this phenomenon distinctly, the person should stand at about one hundred yards distant from the ponds. If the sun shines, when the wind changes to the east, he will observe

a constant stream of vapours rising out of the ponds, from about five to ten yards height, while the air about him remains serene. As the vapour or fog arising from other places glides along the surface of the earth, and is brought by the easterly wind to the ponds, he will still be able for some time, to distinguish the vapours ascending perpendicularly, out of the ponds, from those which are carried in an horizontal direction by the wind; especially if the sun continues to shine, though faintly.

“ This evaporating quality of the east wind, seems to manifest itself also by its effects, both on the thermometer; and the human body. A thermometer, hung over a damp piece of ground, during the fogs or exhalations arising from it, will often indicate a degree of cold below the freezing point. There is also a chilliness of the body, sensibly perceived in this situation, nearly the same as that arising from the wet floor of a chamber.

“ But winds are not constant in their effects: as we have sometimes warm weather with a north wind, and sometimes very little heat with a wind from the south; so the fogs attending an east wind are not constant; neither is the evaporation which we have mentioned at all times to be perceived.

“ I am perfectly sensible, that there may be a deception in these matters, and that instead of supposing the quantity of vapours exhaled to be increased by an easterly wind, the coldness of that wind may be supposed only to condense

and render visible the vapours in the air at that time. But even this supposition is liable to great objections, as our coldest north winds seldom or never produce such an effect, but are commonly attended by serene dry weather.

“ Let that be as it will, an east wind is usually accompanied by a cold, damp, and unwholesome vapour, which is observed to affect both animal and vegetable health, and in many places to give rise and obstinacy to intermitting fevers, as also to produce frequent relapses.

“ In particular spots of the low damp island of Portsea, the ague frequently prevails, and sometimes the flux, during the autumnal season; in some years they are much more frequent and violent than in others. It is observable, that their attack proves always most severe to strangers, or those who have formerly lived on a drier soil, and on a more elevated situation.

“ The year 1765 was remarkable, not only for the long continuance of easterly winds, but also for an excessive degree of heat, which produced a more violent and general rage of those diseases, than had been known for many years. During the months of May, June, and July, we had seldom fewer at Haslar-hospital than thirty or forty patients, labouring under regular tertian agues, with perfect intermissions. Of these, some were seized on board the guard-ships that lay in the harbour near the mud, but the greatest number were marines, who did duty at Portsmouth.”*

* Essay on the diseases of Europeans in hot climates.

PROPOSITION SIXTH.

Rains which fall in very hot weather, may contribute to the production of Malignant Intermittents, by setting at liberty putrid vapours, which had been confined beneath the hardened surface of the earth.

CIV. REMARKS. During several months in the year, according to the account of travellers, the climate of Sennegal is equal to any other in point of salubrity; but as soon as the rains begin to fall, the Europeans are suddenly seized with a malignant nervous fever of the remitting kind. This disease is ushered in by spasmodic contractions of the stomach and profuse discharges of bile, &c. Nothing then is more generally disastrous than a drought of long continuance in that country. The subsidence of rivers whose waters have abandoned parts of their beds, furnishes, as Lind observes, this hardened earth by exposure to the sun. As soon as the profuse rains begin to fall, the clay is softened, and the ground which was before inodorous, sends forth an insupportable stench. The banks of rivers covered with a putrid slime, and powerfully acted on by the rays of a burning sun, the rice plantations, &c. become alike fatal to health, when wet by the rains after a certain continuance of the heats of the climate.

PROPOSITION SEVENTH.

It is more particularly in hot climates that marshy situations prove injurious to the health of man, and contribute to the prevalence of Malignant Inter-mittents.

CV. REMARKS. We can readily conceive that the heat of the climate, by hastening the decomposition of vegetables, and all other substances susceptible of putrefaction, must necessarily increase in a considerable degree both the quantity and energy of deleterious effluvia. We are also sensible, that the evaporating influence of the sun, which is extremely powerful within the torrid zone, joined to the attractive and dissolving power of the atmospheric air, must greatly promote the exhalation, both of the deleterious gases which result from actual putrefaction, and also of the molecules or effluvia of all decomposed substances, which rise and remain suspended in the atmosphere. M. Cassan, a very respectable observer, says that this effect of the sun was more particularly striking during the winter, which, in countries within the torrid zone, is the season of the year most remarkable for heat and moisture.

He adds, that the exhalations from marshes are peculiarly injurious in hot countries, when the inhabitants are engaged in cutting ditches for the purpose of draining them, and when the ground is opened for the first time by the plough or the hoe. The experience of two centuries has evinced, that the ravages of these exhalations are

at such times as terrible and as rapid as those of the plague; more particularly if the labourers be suffered to pass the night in the fields where they have been at work during the day. When M. Cassan was physician in chief to the military hospitals in the island of St. Lucie, which is considered the most unhealthy of the Antilles, he had an opportunity of witnessing a fatal instance of the effects of which we have just spoken. Twenty-eight soldiers from the garrison of Mourne-Fortune had obtained permission to go and work for two planters who were clearing the land in a very humid and marshy situation, called *grande cul-de-sac*. They had undertaken to complete a certain piece of work for a given sum, and their eagerness to finish it, induced them to labour with a degree of ardour and intensity beyond their strength, and that without considering the danger to which they were exposed. In less than a week these twenty-eight soldiers were without a single exception, carried to the hospital. Three of them died, in a very few days, of *cholera morbus*; five of dysentery, which was accompanied even till death with the most excruciating tormina; four were carried off by an adynamic fever, in which the whole body, having become yellow, emitted such an offensive smell, that no one could approach their beds, without suspending his respiration. The others, after suffering attacks, more or less severe, of malignant fever, at length recovered, but their convalescence was tedious, and their health was not completely

restored till they had recourse to the use of mineral waters. The report which M. Cassan made respecting this melancholy event, had the effect of having an ordinance immediately passed, by which the soldiers were prohibited from labouring any more for the inhabitants of the island.

Malignant intermittents are very common in Egypt, as we learn from the writings of M. Pugnoet (*Memoires sur les fievres pestilentiellees et insidieuses du Levant.*) That physician has clearly established the identity of this disease with that which in the language of that country is called *dem-el-mouia*. It appears that Prosper Alpinus had oftentimes seen these distempers, but that he did not accurately discriminate them. M. Pugnoet has ascertained this by very carefully comparing the observations contained in the writings of that author, with those which he himself had occasion to make in the hospital of Ibrahim Bey.

PROPOSITION EIGHTH.

Habit is capable of weakening, to a certain extent, the influence of marsh miasmata on the living system, and of rendering them less active in the production of Malignant Intermittents.

CVI. REMARKS. This proposition is founded on the observations of all ages, and we know that people reside constantly in marshy countries, without experiencing any bad effects from it. Lancisi further remarks, that those who expose them-

selves for the first time in unwholesome situations, are the more affected in proportion as they have been longer accustomed to a pure air.* Travelers also testify, that the fever so highly malignant, commonly called the *yellow* fever, or the disease of *Siam*, and which is so well described by Lind, Rouppe, Hillary, Bruce, Robertson, Valentin, Volney, &c. seldom attacks any persons but Europeans who visit the West Indies. The native inhabitants are generally exempt from it.

Thomas Raynal, in describing the climate of Lower Louisiana, observes, that that country is enveloped in fogs during the seasons of spring and autumn. Notwithstanding the rains which prevail there throughout the winter, notwithstanding the thick forests which cover the ground and render it inaccessible to the rays of the sun, notwithstanding the multitude of marshy situations, and the immense quantities of stagnant water, the inhabitants suffer but little from diseases. The philosopher whose name I have just mentioned, asks, to what source this salubrity is to be attributed? Whether it is to the storms which so frequently occur in that country, to the nature of the prevailing winds, or to the fires which the people are in the habit of kindling for the purpose of destroying reeds and other vegetables, injurious to the production and growth of useful plants.† But, it appears that this phenome-

* *At vero qui e puro calo ad palustre se conferunt, eo deterius afficiuntur, quò feliciori assueverint, et connutriti fuerint. De nox. salud. effluv.*

† *Histoire philosophique et politique des établissemens et du commerce des Européens dans les deux Indes. tome viii.*

non is to be attributed entirely to the constitutional habits of the people, who are become accustomed to the influence of that atmosphere; what proves this, is, that strangers are subject to all the diseases which we would naturally anticipate from such a situation.

PROPOSITION NINTH.

Marsh miasmata favour an attack of the Malignant Intermittent the more, in proportion as the system has been previously more debilitated by sedative causes.

CVII. REMARKS. Thus the malignant tertians which were observed by Lancisi, and which we had occasion to mention in the beginning of this treatise, were confined principally to the poor, who used unwholesome nourishment, and who had been subject to visceral obstructions previously to the commencement of the epidemic; thus also, according to the account of Dr. Wind, in West Zealand, where double tertians prevail towards the close of August and during the month of September, those persons who commit no errors in regimen, who are well lodged and well clothed, and who make an habitual use of wine, escape the dangers of the season, better than indigent persons who are enfeebled by want, and exposed incessantly to the intemperature of the air. Lind himself has observed, that fevers the most dangerous, attack of choice, so to speak, such persons as are predisposed to scurvy. It is superfluous to repeat in this treatise, that debili-

tating impressions, such as those of fear and sorrow, for example, render the subjects of them peculiarly susceptible of the effects of miasmata and contagion. There are but few epidemics where this phenomenon may not be observed; and a physician of Pergamus, son to the celebrated Andre Pasta, has discovered much sound philosophy, in composing an entire work, the object of which is to set a proper estimate on the influence of courage in the treatment of diseases. Van-Helmont, Gaubius, Willis, Cheyne, Fuller, Werlhof, and many other observers, relate facts which are conclusive on this subject. About seven years ago I was witness to the prevalence of continued ataxics and malignant intermittents among persons whose modes of life had been totally different; namely, ecclesiastic and military characters, most of whom had been prescribed on account of their political opinions. Those who enjoyed the fairest hope of regaining their liberty, were in general least subject to attacks of the disease. The soldiers, being but little affected by fear, were also easily preserved from infection. Every thing concurred to induce in me a belief, that affliction and trouble of mind, produce on the principle of irritability effects which have not as yet been thoroughly understood; and that they directly dispose the human system to be more susceptible of the influence of noxious causes.

PROPOSITION TENTH.

The question which Lind endeavoured to resolve, namely, How long the effects of foul air may remain in the human system without producing fever? is as yet but imperfectly settled.

CVIII. REMARKS. It appears from the observations of Lind on the subject, that some persons have immediately experienced a nausea, or been attacked by a delirium; that others have not felt these symptoms till after a lapse of two or three days from the time of their exposure; that many have been but slightly indisposed for the first five or six days, and that some (though the number of these is certainly small) have remained entirely free from disease till towards the tenth or twelfth day. These facts, according to Lind, have been remarked in many persons who have left their vessels to sleep on shore during the sickly season, and who, in consequence of such exposure, have been the only subjects attacked by disease among the whole crew of a ship that lay at anchor in an open road.*

Citizen Baumes, a professor in the medical school of Montpellier, has been also engaged in this problem. He is of opinion, from facts that have fallen under his own observation, that in subjects affected by marsh miasmata, the fever shows itself within the first fifteen days, parti-

* See Essay on the diseases of Europeans in hot climates.

cularly about the fifth or seventh day in some, and about the twelfth or fourteenth in others.*

But it is probable that, independently of the particular laws of the animal economy calculated to produce fever at a definite period from the time of exposure, the circumstances necessary for the solution of the proposed problem, depend in a great measure on the degree of virulence possessed by the miasmata, or the channel through which it is introduced into the system, and more especially on the peculiar susceptibility of individuals.

PROPOSITION ELEVENTH.

In the present state of science we are unable to determine with certainty the modus operandi of marsh miasmata on the living system, in the production of malignant intermittents.

CIX. REMARKS. Some physicians have alleged that marsh miasmata act directly on the nervous system, diminishing its energy; others have conceived that these miasmata act on the blood and humours, producing in them a septic diathesis; while others, again, fancifully attributing to them a certain affinity to the bile, consider their mixture with that fluid as the source of the mischief they produce. True philosophy cannot admit assertions so vague and conjectural. The true physician, holding himself superior to

* See his memoir, *Sur les effets des émanations marecageuses sur l'économie vivante.*

theories, confines himself simply to the consideration of the phenomena of the disease before him. We will only observe, that the symptoms which show themselves in those places where malignant intermittents rise to the highest pitch of violence, such as sudden delirium, spasms of the stomach with severe vomiting, convulsions, a rapid prostration of strength, a physical alteration of the skin, which, particularly in very hot countries, becomes covered with blotches more or less livid, &c.—these circumstances, I say, afford ground for conjecturing at least, that the first impression made by the miasmata may be immediately on the principle of sensibility and irritability.

PROPOSITION TWELFTH.

We have not yet facts sufficient to enable us to determine, in what degree the phases of the moon, the tides, the electricity of the atmosphere, meteors, &c. may strengthen the influence of marsh miasmata, in the production of Malignant Intermittents.

CX. REMARKS. It is certain that physicians have observed these phenomena to be productive of very sensible effects on the state of the sick, and that they have considered themselves able to predict, from this consideration, the time at which death would be likely to occur. Thus at Bengal, according to the account given by Lind, death frequently takes place about the hour of low water. This remark is more important than

some might suppose it to be: it shows the advantage of administering the bark at the periods of the full and change of the moon.* As to electricity, if it be admitted that it almost always accompanies fogs, and exhalations arising from marshes, that it produces meteors, and is a principal agent in the formation of rain, &c. it cannot then be denied to be worthy the utmost attention of physicians. The celebrated Achard, of Berlin, has published a curious memoir, the object of which is to show the necessity of such attention, with a view to the certainty and advancement of meteorological observations.†

PROPOSITION THIRTEENTH.

The growth of vegetables in places infected by the air of marshes, moderates its deleterious influence, and diminishes its activity in the production of Malignant Intermittents.

CXI. REMARKS. Lancisi is not the first who has recommended the planting of forests, with a view to restore the salubrity of the atmosphere. This opinion was advocated by the earliest observers. Changeux, a respectable physician, remarks, that it is very ancient in Asia, particularly among the Persians, who, for this purpose, cultivate trees especially plantains, both in the environs and in the midst of their cities.‡

* Diseases of Europeans in hot climates.

† *Journal de Physique de l'abbè Rosier, tome xxiii.*

‡ *Ibid. tome vii.*

The experience of the moderns, particularly the labours of Ingenhouz, have thrown light on this subject; but no one has treated it more amply than M. Senebier, in the third volume of his excellent work on the physiology of plants.* We think it right to relate in this place the beautiful experiments he made on the art of purifying the atmosphere, which is likely to become, at a future day, one of the principal means in the healing art.

The leaves of vegetables when immersed in water, and exposed in this situation to the rays of the sun (having been previously freed from every kind of air, by repeated washings in a pneumatic apparatus), send forth numerous bubbles, which may be collected at the surface of the water, and ascertained to consist of oxygene gas. M. Senebier has proved that this gas issues actually from the vegetables, and not from the fluid in which they are immersed; and that it is the result of organic action which goes forward in their own economy. The more completely to establish the truth of this assertion, he began by inquiring into the nature of the air that adhered to the surface of their leaves; having tried this air as collected from the leaves of the peach-tree, and also from cabbage leaves, he found that it was even less pure than the common air of the atmosphere, in consequence of containing a considerable quantity of carbonic acid.

* *Tome iii. page 184.*

The physiologist of Geneva thinks, in the second place, that it is immediately from the green parenchyma of vegetables that the air is obtained when they are immersed in water and exposed to the sun. This he proves by the following experiment: he separated the epidermis from a leaf of house-leek (*sempervivum*) and immersed it in water; from this he obtained no air bubbles; he then immersed the parenchyma of the same leaf from which the epidermis had been removed, and air bubbles were disengaged in abundance. He then proceeded in the same manner with leaves from which he had removed every thing except the fibrous portion, but his experiment did not succeed.

In the third place, the production of oxygen gas by leaves placed under water, appears to be effected through the instrumentality of carbonic acid. The labours of M. Senebier tend to the establishment of this fact. "I was curious, says this philosopher, to verify by experiment the influence of carbonic acid dissolved in water on vegetation. I took four plants of mint, of the same size and similar to each other; I cut off their roots, and left on their branches the same number of leaves; I put them into four bottles of the same form and size; they had necks so narrow as to be almost closed up by the plants that were placed in them; one of these I filled with common water containing a portion of carbonic acid, being careful to replace every twelve hours the water that was absorbed and evapo-

rated; the second one I filled with the same water, which I poured out every twelve hours in order to renew it entirely; the third I filled with water that had been boiled, and made up the deficit or waste that occurred in it with the same water every twelve hours. Lastly, the fourth I also filled with water that had been boiled, which I renewed entirely twice in each twenty-four hours. This arrangement was made about the middle of Prairial, and continued till the end of Vendémiaire. The first and third plants put forth roots in the space of five or six days; the second did not show any till the end of the tenth day, and the fourth till the end of the fifteenth day; but after this, the progress of the second was more rapid and considerable, than that of the others, of which the first was as still very far advanced. The fourth had always a sickly appearance, and the third discovered more vigour, because it was supplied with the carbonic acid by means of the roots, which never could produce so great an effect on the water of the fourth in consequence of its being so often renewed. If the second, on the other hand, vegetated so beautifully, was not this because the renewal of the water occasioned a renewal¹ of the carbonic acid?

M. Senebier further founds his assertion on the quantity of carbon which plants afford. This carbon results from the decomposition of the carbonic acid which enters easily into their substance. Without this how could the carbon be soluble in water?

Other facts concur in support of the theory of M. Senebier. Vegetable products the most elaborate, such as resins, and oils, are also those that contain carbon in the greatest proportion. It is found above all in the colouring part of the leaves of plants. Their cortical substance furnishes it in greater abundance than their ligneous, &c. Were physicians to direct their attention to plants which they had made to grow in water or under water, they would find them to contain almost as large a quantity of carbon as others, although they could derive this principle from no other source than the carbonic acid of the liquid in which they were immersed. It is easy to perceive that the atmospheric air furnishes to vegetables an inexhaustable store of this principle so necessary to their existence; nor are they long in perishing if excluded from a free communication with the atmosphere.

There is an infinite number of plants whose leaves are much more extensive than their roots, such, for instance, as those that are usually denominated mucilaginous plants. They grow and thrive in the most arid situations. When deprived of their roots, they still increase in size for some time, because their leaves, which are large, supply the place of roots, and continue to draw from the air of the atmosphere the carbonic acid gas which serves for their nourishment and growth.

In a memoir, which is quoted by M. Senebier, M. de Saussure the younger, has further de-

monstrated the important influence of the carbonic acid, contained in the atmosphere, on vegetation. The following are the results of his experiments. It appears that plants vegetate with vigour and increase in weight, when exposed to the sun, in an atmosphere containing one-twelfth part of its bulk of carbonic acid. On the other hand, the acid acted on and decomposed by the vegetable organs, undergoes a considerable diminution. Indeed this mixture of common air with carbonic acid, of which we are speaking, becomes at length more pure than common air itself. But the case is otherwise when the plants are kept in the shade: then the smallest quantity of carbonic acid being mixed with common air becomes prejudicial to vegetation. The reason of this, according to the ideas of M. Senebier, is, that when vegetables are placed in darkness, they diminish considerably the proportion of oxygene in the atmosphere, by means of their carbone combining with that principle, as appears from the diminution of bulk which the atmosphere itself sustains.

The necessity of carbonic acid in the atmosphere for the purposes of vegetation, is further demonstrated by the following experiment of M. de Saussure. That philosopher introduced into a large vessel, the inner surface of which was plastered over with lime slacked by distilled water and dried in the air, a branch of honeysuckle, attached to a quantity of earth and not suffered to touch the lime: the vessel was then

carefully closed. Into another similar vessel, the inside of which was not plastered with lime, he introduced a second branch of honey-suckle, and closed the vessel in the same manner. At the expiration of twelve days M. de Saussure found that the branch which was placed in the first vessel had dropped its leaves, and that the lime was saturated with carbonic acid: while the other branch, on the contrary, continued green, and retained its vigour. But this falling of the leaves from the branch which had been introduced into the first vessel, proves very clearly, that they had lost an essential article of aliment in the carbonic acid of the surrounding air, which, in this case, had combined with the lime that adhered to the surface of the vessel.

Does the carbonic acid make its way into the roots and leaves of vegetables in the form of a gas, or does it enter them held in solution by water? The experiments of M. Senebier have induced him to adopt the latter opinion. The circulation then of a gaseous and elastic fluid in plants being very difficult, it is no wonder if they sometimes perish, when exposed to the action of the carbonic acid in a free state, while, on the other hand, the same gas is very friendly to their growth, when dissolved in and conveyed by water, and in that form deposited in their capillary vessels. We can thus assign a reason why a garden supplied with water from Vesuvius should, according to the account given by Della Torre, be so remarkable for the luxuriance of

its vegetation; and M. Senebier alleges, not without foundation, that the waters which descend from that volcano, holding in solution carbonic acid, must be a principal cause of that rich and beautiful vegetation which we behold with such delight at the foot of Mount *Ætna*.

M. Senebier examines in his work another question equally interesting to the philosopher. He has endeavoured to determine whether or not the carbonic acid, previously dissolved in water, enters the petiole of the leaves in order to make its way to the leaves themselves. After having made several attempts to solve this problem, he conceived the project of passing into reservoirs full of water charged with carbonic acid, the branches of a peach tree with their leaves, in such a manner, that the ends of some of the leaves might be inserted into an empty bottle, where they were secured with a lute so as to prevent the entrance of the water: he then introduced another branch of the peach tree perfectly similar to the first, into a bottle of water charged with carbonic acid, which he also luted in the same manner. "Every thing, says the philosopher of Geneva, was perfectly similar in the branches themselves, in their exposure to the sun, in the capacity of the reservoirs, &c. At the expiration of ten hours, the sprig situated in the empty bottle had furnished a volume of oxygenous gas equal in bulk to that of 2,535 grains of water; while the sprig situated in the bottle filled with water holding carbonic acid in solution, had

given out a volume of oxygenous gas equal in bulk to that of 4,815 grains of water, having at the same time produced a considerable diminution of the water in the bottle. I have frequently repeated this experiment, and have always procured a much greater quantity of air from the sprig placed in the bottle filled with aerated water, than from that contained in the empty bottle, in proportions differing according to the nature of the waters employed. It is evident, then, that the carbonic acid passes with the water into the leaf along the petiole, whose pores it enters, and that the leaf decomposes it."

In thus giving, in this dissertation, an account of the beautiful experiment of M. Senebier, on so interesting a part of vegetable physiology, we must not forget to mention the objections that have been made to it, and the manner in which he has answered them. I need not inform my readers, that Spallanzani, whose name science has reason to admire and regret, was industriously engaged on this subject during the last years of his life. That great observer had remarked, that certain vegetables, and particularly mucilaginous plants afforded oxygenous gas under water, although that liquid had been previously deprived of all carbonic acid, by means of lime water.

Hence he concludes, that the disengagement of that gas could not be the result of the decomposition of the carbonic acid of the water, when in fact it did not contain any of that acid. He

communicated this fact to the naturalist of Geneva, who began immediately an attempt to verify it, by a great number of experiments of which it would be too tedious at present to give a detailed account. The result of them, however, was, that the oxygene gas afforded by plants exposed to the sun under water deprived of all carbonic acid by means of lime water, or under water that had been previously boiled, came from the carbonic acid contained in the parenchyma of the leaves, a parenchyma that is for the most part of considerable thickness in those vegetables, in which this phenomenon takes place. It is easy to see this carbonic acid disengaging itself, when the experiment is made with lime water under a pneumatic apparatus.

“ This probability is increased,” says our author, “ when we consider, that the quantity of oxygene gas, produced by leaves exposed under water holding carbonic acid in solution, is not in proportion to the quantity of air which they contain themselves, but to a given quantity of carbonic acid gas dissolved in the water; this augmentation of the oxygene gas given out, must therefore have a cause; but as that cause cannot, from experiments, be found, either in the leaf, or in the water, we can look for it only in the decomposition of the carbonic acid. This consideration becomes still more weighty, when we see, that the quantity of air given out by leaves exposed to the sun in water that has been boiled, diminishes each time, on changing the water every four

hours, because the source of the air becomes exhausted in proportion as it issues out. Yet, after having been thus exhausted, it may be renewed again at pleasure, by introducing carbonic acid into the same water, or by introducing the same leaves into water charged with that acid: in either case, oxygene gas is produced again on exposing the leaves to the sun, in the same manner as if its evolution by them had not ceased. Besides, we may observe an immediate influence of carbonic acid dissolved in water, on leaves placed in it in another point of view; leaves for instance that have sunk to the bottom in water that has been boiled, in consequence of their natural emission of air in the sun, or by means of that produced by the air pump, will rise and swim again in a few minutes, when placed in water charged with carbonic acid; but if they now again yield oxygene gas in the sun, is it not highly probable that that which they had yielded at first in water that had been boiled, as well as what they now again yield in water charged with carbonic acid, was the product of the decomposition of that acid, which their leaves contain in abundance in their thick parenchyma? This appears to be still more certainly confirmed by the further consideration, that leaves which have ceased to give out oxygene gas under water that has been boiled, produce it again afresh in the same water, after having been immersed in water holding carbonic acid in solution.

“The kind of leaves which afford most air, have at first a full or swollen appearance, are

free from wrinkles, and float on the surface of the water; they contain when in that state the air which they afterwards give out, i. e. it is combined in the carbonic acid; these leaves, when immersed in water that has been boiled, and exposed to the sun, emit the oxygene which formed a part of that acid; when they have lost all the air they contained, and can no longer regenerate it, an event which soon occurs, they sink to the bottom; but these same leaves, had they been placed in water holding carbonic acid in solution, would have continued to swim on the surface for a long time, although they had afforded air in much larger quantities, because they would have received carbonic acid from the water in proportion as they had decomposed that gas; but even these leaves also sink to the bottom, at last, as soon as they become disorganized, and are then flaccid and wrinkled.

M. Hassenfratz has also controverted the theory of M. Senebier, and advanced several arguments, a knowledge of which may not be altogether useless.* His objections are 1st, that vegetables made to grow in water saturated with carbonic acid, do not, when submitted to a chemical analysis, afford a larger quantity of carbon than others: 2dly, that the pure air which is disengaged, arises rather from the decomposition of the water than from that of the carbonic acid: 3dly, that if in the process of vegetation there were an actual decomposition of carbonic acid, and a dis-

* See *Annales de Chimie*, June 1792.

engagement of oxygene gas into the atmosphere, it would follow that, by placing a plant under a bell-glass, containing a very small quantity of common air, the volume of air in the glass would in a short time be augmented; and yet, on the other hand, it appears from experiment, that this air is neither increased in quantity, nor improved in quality by such an operation.

In reply to the first objection M. Senebier observes, that each plant is capable of combining with only a given quantity of carbone, such a quantity, for example, as is suitable to its particular organization. It is very true that vegetables made to grow in water, afford the same products with those that grow on land; but they are much less vigorous, doubtless because they cannot assimilate to themselves all the elements which they require; they receive of course a smaller proportion of carbone. On the other hand, aquatic vegetables which grow and flourish in the pure water of fountains, and on pure silicious sand subject to perpetual washing, afford, on analysis, the same quantity of carbone, which they could not have received from any other source than the carbonic acid contained in the atmosphere, &c. As to the second objection of professor Hassenfratz, which tends to establish a belief, that there is no carbonic acid decomposed by the process of vegetation, and that the pure air obtained is produced by the decomposition of water, it cannot be readily admitted, because it is founded only on mere conjecture, whereas the assertion of

Senebier rests on solid facts. The third fact brought forward by Hassenfratz has great weight. But the physiologist of Geneva, after many experiments frequently repeated, constantly found, that the air contained in bell-glasses, under which branches of vegetables were placed, became always better after, than it had been before, the introduction of said branches. This air became much more pure, when the branches were renewed, and were not suffered to remain under the glasses during the night, particularly when the sprig introduced into the vessel continued attached to the vegetable.

Not satisfied with these results, M. Senebier proceeded to other experiments. He introduced into reservoirs containing pure hydrogenous and pure azotic gas, several branches of vegetables, and afterwards ascertained to his satisfaction, by eudiometrical experiments, that these gases were rendered more respirable. The first of them, indeed, detonated in the pistol of Volta, and the second caused a wax candle to burn with great brilliancy, circumstances which would not have taken place, if they had not received from the branches of the plants, a determinate quantity of oxygenous gas. These experiments having been made with common air, it was also very perceptibly improved by them.

The illustrious experimenter of Geneva examines, in the same chapter of his work, several other points of vegetable physiology, which we forbear to mention, as they have no direct con-

nexion with the immediate object of our present inquiry. We hasten to the article where he endeavours to ascertain, whether or not the oxygene gas which vegetables are constantly pouring into the atmosphere be in reality one of the means which nature has provided for the purpose of repairing the numerous alterations which she may occasionally undergo. He acknowledges, that he performed at first a great number of experiments, in trying the different gases thrown out by vegetables, both during the day, and during the night, in the shade, and in the sunshine, and that he could not, by the assistance of nitrous gas, discover any very perceptible difference between them. But in his scientific correspondence with Spallanzani, the latter informed him, that, being engaged on the same point of vegetable physiology, he had uniformly found, that the atmosphere of plants exposed to the action of the solar light, was more pure than the atmosphere of those that were situated in the shade, that consequently the air of the night is inferior in its qualities to that of the day.

M. Senebier throws out on this subject some ingenious ideas which it may be proper to mention. He observes that this mean of purifying the atmosphere, is necessarily weaker in its effects during the winter; but at that season, the causes which produce an alteration in the air, are in like manner fewer in number and less energetic. In hot climates, on the other hand, where these same causes are as powerful as they

are abundant, we find a multitude of plants, which, continuing in a state of active vegetation throughout the whole year, are perpetually renovating the atmosphere by the oxygene which they disengage. Even in our own climate, this fruitful resource of nature is far from being exhausted during the winter: our green plants continue even then to give out oxygene gas, as M. Senebier has ascertained by his own experiments. In this number we must reckon the extensive family of grasses that retain their verdure, the mosses, the ferns, the confervæ, and many others.

It is well known that it is to the original inquiries of the celebrated Priestley, that we are indebted, in the first instance, for our knowledge of the purification of the atmosphere by the action of vegetables. The physician Changeux, whom we had occasion to quote in the beginning of this article, does not believe that the phenomenon arises at all times from the cause to which it has just been attributed. He observes that plants whether odorous or inodorous, have a *spiritus rector*, and that their emanations combining with the dangerous vapours which arise from marshes, or which the heat disengages from the ground, are capable of neutralizing their deleterious influence. From his manner of considering the subject, vegetables would seem to act in two ways on exhalations capable of infecting the atmosphere. Odorous vegetables, for instance, act more by their emanations than by absorption.

These emanations mingle with the air which we breathe, and correct its vitiated state by their peculiar qualities. Inodorous vegetables, on the contrary, act more by their faculty of absorption than by their emanations: they free the atmosphere from the vapours which infect it, &c. See the experiment on which Changeux founds his assertion.*

PROPOSITION FOURTEENTH.

All matters susceptible of a decomposition more or less putrid, communicate a deleterious quality to stagnant waters, and render them capable of producing Malignant Intermittents.

CXII. REMARKS. According to the account of Lancisi, Charles Leigh, aided by a microscope, submitted the water of marshes to a very strict examination, and found it to be filled with a mixture of leaves, herbs, flowers, roots, seeds, fruits, &c. insects, and the putrid relicts of different animals.

Although the precise nature of the exhalations which arise from these different plants when in a state of fermentation, cannot be ascertained with that exactness which we might desire, yet a physician who has made some inquiry respecting their effects, finds ground to allege, that they consist of a combination of hydrogen gas, car-

* See *Journal de Physique* tome vi. page 211.

bonic acid gas, azotic gas, and perhaps ammoniacal gas.*

On the other hand, celebrated chemists and physicians have undertaken very important researches respecting the atmospheres of marshes. They have discovered certain differences in the products which they have obtained, according as the bottoms of the stagnant portions of water abounded more with animal or with vegetable substances in a state of putrefaction.† There can

* Professor Baumes. See his memoir on the effects of marsh miasmata, &c. See also *A view of the climate and soil of the United States of America*, by C. F. Volney. That illustrious traveller had an opportunity of observing, that the carbonated hydrogenous gas, disengaged by vegetable and animal substances in a state of putrefaction, is favourable to the production of intermitting fevers in a country covered with marshes, ponds, and swamps, &c.

† The gas that is most naturally disengaged from marshy places, is hydrogen holding carbone in solution, and containing besides something of the nature of an animal oil (Berthollet, *Leçons de l'Ecole normale*, tome v.) This gas has been made the subject of many observations and experiments, by the celebrated Alexander Volta. That physician found that he was able to obtain it at the lake du Majeur, the lake of Comus, &c., by gently agitating the bottom of the water with a stick: on this the gas rose immediately to the surface, in innumerable small bubbles, and could be easily collected, as these escaped, by means of inverted bottles. It was easy to discover by the smell alone that the gas was of an inflammable nature; it burnt slowly, and emitted a flame of a beautiful blue colour. That the experiment may succeed, it is best to make use of wide mouthed vessels. If their mouths be narrow, a lighted taper produces nothing but slight explosions scarcely perceptible. Volta made use of a glass cylinder three or four inches long, and one inch in diameter. Its mouth was half an inch wide.

Volta endeavoured to determine what kind of places were best calculated for the disengagement of this inflammable gas. The soils which emit it in greatest abundance, are those that consist of putrefied vegetables, mixed with a tough, light clay. Stagnant waters vitiated by the putrid relicts of animal and vegetable substances, contain it in large quantities. Volta did not confine him-

be no reasonable doubt but these discoveries, added to others, will, at a future day, prove of the utmost utility to physicians in enabling them to acquire a perfect knowledge of one of the most common causes of malignant intermittents.

We must always include among the exhalations productive of such complaints, those that arise from hemp and flax when put to steep in stagnant waters. Forestus, Salius Diversus, Benedictus, Kirker, Riverius, and many other

self to a mere examination of the different waters: he examined also the muddy soil which surrounded them; he formed, by digging, several small basons, and filled them with water, which, on the slightest agitation, allowed inflammable air to escape. He afterwards drove his cane forcibly into a spot covered with putrid herbs and withdrawing it again suddenly, held a lighted taper to the hole. He mentions that there immediately broke forth a blue blaze, one end of which mounted in the atmosphere, while the other descended to the bottom of the hole which had just been made. When he made hastily a certain number of holes, but a short distance from each other, and held a lighted taper to them; it was, says he, a surprising sight, to see the blaze running and propagating itself from one to another of them, so as, in a short time, to reach them all. This phenomenon explains very readily a fact that occurs in many places, where the contact of a lighted taper produces a flame, which, according to his own expression spreads lambently over the whole surface. Volta has given the name of the *inflammable air of marshes*, to this gas, which usually results from the decomposition of vegetable and animal substances mixed and macerated in a vessel, because it is distinguished from other kinds of inflammable air, whether natural or factitious, by the following characters; namely, by its peculiar smell, which is easily recognised by chemists accustomed to working in the different gases; by the colour of its flame, which is a beautiful azure; and, lastly, by the slowness and gentleness with which it burns. (*For further particulars, see Volta's letters on the inflammable air of marshes, published in the eleventh volume of Rosier's journal de physique.*)

writers, speak of the dangerous effects of these effluvia. The second epidemic prevalence of malignant intermittents mentioned by Lancisi, arose from this source; and Ramazzini, in his *Treatise on the diseases of artists*, has not failed to dwell on the danger attendant on the preparation of these objects of commerce and industry.* A contrary opinion having been advocated by certain physicians, Lancisi endeavoured to reconcile it with the preceding one by observing, that the maceration of these articles is productive of no inconvenience when it is performed in running water.

PROPOSITION FIFTEENTH.

The ideas furnished by the eudiometer now in use, shed no light on those physical qualities of the air best calculated for the production of Malignant Intermittents.

CXIII. REMARKS. We must certainly regard as of great consequence to the further progress of this part of medical science, the labours and inventions of Priestley, Landriani, Magellan, Gerardin, Fontana, Scheele, Gattay, Desaussure, Volta, Achard, Reboul, Sequin, Guyton Morveau, Humboldt, &c. But the means proposed by these celebrated philosophers, for the purpose of ascertaining the salubrity of the air, point out nothing but the relative quantity of oxygene gas contained in the atmosphere,

* *De morbis artificum diatriba. fol. 627.*

as is satisfactorily shown by Jurine and Gattoni; they throw no light whatever on the nature of those putrid corpuscles which float in the same air, and which must be regarded as the source of many diseases. Who knows but even the oxygene gas, deemed the purest portion of the atmospheric volume, which is decomposed on the surface of the body, or in the lungs, may itself serve as the noxious vehicle? How can we, by the assistance of the eudiometer now in use, come to a knowledge not only of the emanations of putrid substances, but still further, of the particular aromas of so many different bodies, of the relicts or rubbish and the seeds of an immense number of microscopic plants, of insects of the same description, &c. which living bodies are capable of absorbing?

We must add, that the air of low, humid, and marshy places, when submitted to the test of the eudiometer, does not afford results in any degree different from those of the air of the most open and healthy situations. This fact is fully established by a very important experiment contained in the memoir of Gattoni, which we will here relate in the author's own words. The experiment was made on the 15th of August, 1779, on the stagnant air of the putrid marshes of Fort Fuentes, at the mouth of the Vatteline.

“Whoever (says our author) ventures to sleep in that situation during the summer season, is sure to be attacked by an intermittent. But the air of that place was compared with the air on

the summit of Mount Legnone, which is always covered with snow, forms a chain with the lofty mountains of the Grisons, and is elevated above the level of the sea, according to P. Pini, the learned professor of Milan, about 8640 feet. On comparing these two portions of air in the eudiometer, with the utmost exactness, the air of the marshes was, contrary to all expectation, found to be two degrees purer than that from the summit of Legnone. Though this experiment was repeated as often as fifteen times, varying all the circumstances of time, season, &c. the result was still the same."

But this first experiment was not confided in alone. A comparison was made between the air of mountains covered with vegetables, and air collected in eleven different places, all of them marshy, or filled with stagnant waters. These latter portions appeared to be of the same degree of salubrity with the former, and quite analogous to common air*. Yet the air of these marshy places has such an effect on the inhabitants who breathe it, as to render them almost all cachectic, and to subject them to the ravages of the most dangerous intermittents, while those who reside on the mountains are healthy and vigorous.

Since it is acknowledged that the salubrity of the air is not generally in proportion to the quantity of oxygene which it contains, it is evident,

* Dessaussure appears to have ascertained that the proportion of azote is greater in the atmosphere of mountains than in that of plains.

that to whatever degree of perfection the eudiometers now in use may be brought, they will never detect that deleterious principle in the atmosphere, to the agency of which malignant intermittents are to be more especially attributed. It is adviseable, then, for physicians to direct their researches particularly to the subject of putrid water, which is constantly entering into combination with the strata of air that are contiguous to marshes. But it would be easy to subject this to experiments at those times of the day, and at that season of the year, when an elevation of temperature has increased the dissolving power of the atmosphere.

We may use, for this purpose, an instrument similar to that delineated in the annexed plate (fig. 1.) the construction of which is equally simple and cheap. It is projected on the same principle with that which the academy *del Cimento* used for the purpose of measuring the degree of humidity in the air, and indeed differs from it in nothing except a greater degree of simplicity. It consists of a glass cone A inverted and hollow, open only at its largest end, the point of which is received in the glass vessel B, and both suspended by the same cord. Or we might use the blunt cone C placed in the cistern D (Fig. 2.) Let either of these cones be filled with snow or pounded ice, and closed at top by a wooden cover.

I need not observe that in consequence of the external surface of the glass being colder than

Fig. 1.

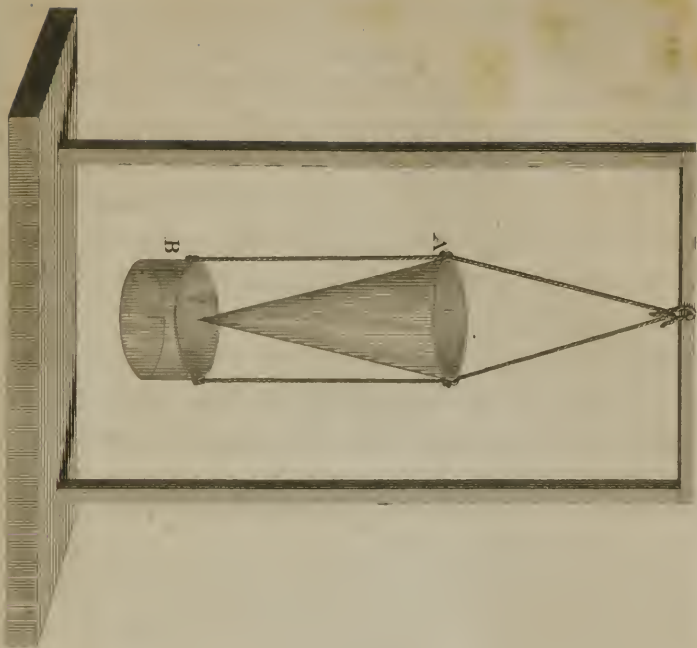
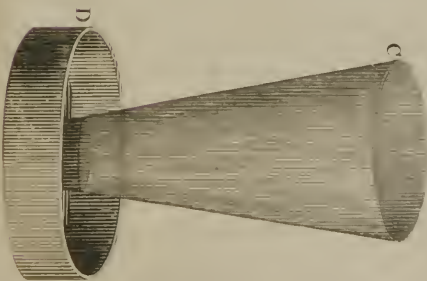


Fig. 2.



the atmosphere, the surrounding humidity will be condensed in small drops, which, rolling down and accumulating by degrees in the receiver, may then be tested by chemical re-agents, or carefully examined by a microscope. Without venturing to promise any great degree of light from *hygro-eudiometers* of this description, I am at least convinced that these instruments will conduct us more directly towards the object of our inquiry, and will disclose to us truths more applicable to medicine. For it is probable, as we have already remarked, that, in the production of malignant intermittents, marshes act less by the different gases resulting from the decomposition of the animal and vegetable substances that putrify in their waters, than by portions of the same putrid substances, suspended, in a state of great minuteness, in the water which the atmosphere holds in solution.

The instrument here described will be no less useful for collecting and analysing the matter of fogs, whose offensive smell oftentimes announces, as Berthollet observes, that they do not consist solely of a combination of air and water, in which the latter principle superabounds, &c.

The apparatus of this instrument might, if necessary, be multiplied, it might be exposed at different heights, on the edges of ditches, ponds, and all other places where the waters stagnate and corrupt, and then, by the means above mentioned, a comparative examination might be made of the contents of the different receivers.

PROPOSITION SIXTEENTH.

Medical observers have established certain signs which serve to point out marshy countries, and such as are calculated to favour the production of Malignant Intermitents.

CXIV. REMARKS. It has been judiciously alleged that quick and sudden changes taking place in the atmosphere, constitute an indubitable evidence of a marshy situation. This phenomenon must necessarily result from the union of heat and humidity. A second sign no less important is drawn from the appearance of fogs, on the approach of night; these are formed by a rapid condensation of the vapours suspended in the air, and rarified by the heat of the day. Fogs so evidently owe their origin to stagnant marshes, that observation and analysis have constantly proved that they partake of their qualities. Professor Pallas informs us that there are few places more unfriendly to health, than Gourief and its environs, and that the fogs which prevail there, as well as the dews, are of a saline nature which is also the case with the neighbouring marshes.*

Insects likewise abound there, and it is known that the appearance of these has been always considered by physicians as a sign of a marshy

* *Voyages en différentes provinces de l'empire de Russie, et dans l'Asie septentrionale. tome i.*

situation. The celebrated traveller, of whose evidence we have just availed ourselves, observes, that the dwelling houses and other buildings of Gourief are greatly infested by woodlice, and other insects, which seem to delight in an atmosphere constantly charged with putrid exhalations.

Lastly, a country must be considered unhealthy, where metals rust, and provisions become spoiled in a very short time. The theory of these phenomena is at present so well known, that it would be superfluous to enter on an explanation of what we have here advanced. I might also speak of the signs that may be drawn from an attentive inspection of vegetables, on which the vapours that issue from marshes produce unquestionably a perceptible effect. But this point of science is not at the present day sufficiently understood. It would be of importance to acquire correct ideas respecting the diseases which plants may contract from the sedative influence of miasmata, &c. Toaldo, professor in the university of Padua, has published a memoir, in which this question is but feebly treated; and all true observers must perceive the necessity of going over the work again, in order to extend it or bring it to perfection.

PROPOSITION SEVENTEENTH.

Vapours arising from the human body, and confined for a long time in the same place, may sometimes, though very rarely, prove productive of Malignant Intermittents.

CXV. REMARKS. Indeed as exhalations of this description have, for the most part, a degree of energy and virulence superior to that of marsh miasmata, the fevers which they produce appear with a continued type; this, however, is not always the case. There can be no doubt but a particular strength of temperament and constitution, in certain individuals affected by contagion, moderates and weakens the sedative action of human vapours. It is at least true, that I have seen malignant intermittents rage in hospitals which had no marshes in their neighbourhood, and where no other infection could be suspected, than that which arose from too great a number of persons crowded into one place.

PROPOSITION EIGHTEENTH.

The experiments of latter years show that acids, particularly the oxygenated muriatic acid, are powerful agents in the depuration of air from infection; they may, therefore, be employed with great advantage in destroying the causes which favour the production of Malignant Intermittents.

CXVI. REMARKS. This is one of the most important discoveries of the age, because it is

calculated to lessen the sufferings of the human race: it will immortalize the name of Guyton-Morveau. As early as the year 1773, that celebrated chemist proposed to substitute muriatic acid gas in the room of different aromatic, resinous, and bituminous substances; which had till that time been used for the purpose of checking the contagion of putrid miasmata, and destroying the effects that result from too great a crowd of men or sick persons in prisons or hospitals. It is known that the first trials which were made in a church and in the prisons of Dijon, were attended with complete success: from that time many enlightened foreigners hastened to adopt, and profit by, this discovery.

Attempts have also been made to employ other acid vapours; from comparative experiments Guyton Morveau is convinced that the muriatic acid gas ought to be adopted in preference, because, being more expansive than nitric gas, for example, it is on that account better calculated to correct a larger volume of infected air; besides this, it acts more speedily and effectually. It may be recollected how strikingly useful this substance was in the vessels that conveyed the French troops to Egypt, as has been remarked and recorded by Berthollet: and perhaps no chemist is better qualified to decide respecting the advantages of such a discovery. (See his *Report to the physical and mathematical class of the Institute*). He there proves, that oxygenated muriatic

gas is, of all acid substances, best calculated to depurate the atmosphere from infection.

Guyton Morveau has rendered his theory as easy of application as it is advantageous, by an ingenious invention of certain vessels, similar to the flasks that contain liquid perfumes. The intention of these vessels is, to contain and preserve the materials which, by their combination, produce the oxygenated muriatic acid gas. These materials are, oxyde of Manganese, and nitromuriatic acid. These vessels may be regarded as a kind of portable furnaces of disinfection, from which the vapours of purification may be discharged at pleasure.

For the purification of spacious hospitals or prisons, the muriatic acid gas is usually disengaged from muriate of soda by means of the sulphuric acid. The best mode of proceeding is, to add fifteen parts of sulphuric acid to twelve parts of marine salt. It will be observed that I confine myself here to a simple account of the process; for directions how to vary it according to circumstances, the extent of the places, &c. we refer our readers to the work of M. Guyton Morveau, on the subject, which is entitled, *Traite des moyens de desinfecter l'air, de prevenir la contagion, et d'en arreter les progres.* Paris, an. XI.

PROPOSITION NINETEENTH.

Although Malignant Intermittents almost always owe their origin to the deleterious exhalations of marshes, yet it appears from indubitable facts, that they may also arise from other sedative causes, such as, impure waters, an excessive degree of cold, or strong affections of the mind.

CXVII. REMARKS. Raymond attributes the malignant intermittents that prevail in Middlebourg and its environs, principally to the quality of the water drank by the inhabitants.* Indeed the island of Walkeren, of which that city is the capital, is below the level of the sea, and entirely destitute of streams and fountains. The only water the inhabitants have for domestic purposes, is the rain that falls, which they preserve in cisterns. Unless the utmost care be taken of this, it soon becomes corrupted, in consequence of the mixture of insects, worms, or other substances of a putrefiable nature. Besides, this water runs, for the most part, from the roofs of the houses, which are covered and impregnated with dust that rises from the yards, streets, roads, &c. Again, the smoke that issues from the kitchens, the exhalations of animals and poisonous vegetables, and the vapours from the sea, may attach themselves to the roofs, and afterwards become mixed with the rains as they fall. The nature of the

* *Dissert. exhib. febr. intermitt. autumn. quotannis Mittelb. et in vicin. Seeland Batav. loc. grassant, &c.*

metallic pipes that carry off the water (being made of lead and copper) contribute not a little to diminish its salubrity.

As to malignant intermittents produced by cold, trouble of mind, &c. cases of this kind being rare, it is necessary for me, on these points, to have recourse to authentic facts. I will adduce only one instance of the cardialgic state of fever, which is mentioned in a dissertation by Aurivill.*

About the beginning of winter a young man attempted to walk across a river on the ice. He fell into the water, but was immediately taken out again: being greatly affected by the cold, and terrified at the danger which he had incurred, he was attacked by a tertian fever, which was ushered in by an oppression, and severe constrictions in the region of the colon. The four or five subsequent paroxysms were not very alarming; but at length the fever came on in the evening with great violence. During the night, the patient was affected with severe cardialgia, raving, a wild countenance, groaning, continual tossing, &c. He fell at length into a profound stupor, and on the second day afterwards expired. On opening the body nothing remarkable was discovered, except a yellowness throughout the abdomen, and small inflamed spots scattered in vast numbers over the mesentery, the epiploon and the intestines.

We have already given, in this treatise, the history of a case of malignant intermittent, which

* *Dissert. de febr. intermitt. malign.*

was produced by an excess of application to anatomical pursuits. It would certainly be a desirable thing to have a collection of all existing facts which tend to prove that malignant intermittents may originate from other causes besides the operation of marsh miasmata.

PROPOSITION TWENTIETH.

The effects of extensive wounds oftentimes communicate a Malignant character to Intermitting and Remitting Fevers during certain epidemic constitutions.

CXVIII. REMARKS. Professor Dumas was the first to ascertain the true nature of that kind of intermitting or remitting fever, which accompanies extensive wounds. He has proved that it possesses all the essential characteristics of the malignant intermittent with which it may be classed. He has given an accurate description of it, setting forth all the principal traits of its malignity. Many circumstances unite in producing this malignity, after any violent commotion, after a deep and extensive wound in a fleshy part, the amputation of a limb, or the loss of a large portion of the soft parts by a cutting instrument or a discharge of fire arms. The fever which supervenes on these occasions shows itself under the following characters.

1st. It is ushered in on the occurrence of each paroxysm by a profound stupor.

2dly. It countervails the process of suppuration, and changes the appearance of the wounds.

3dly. It tends to a continued form.

This disease owes its malignant character to different causes, among which citizen Dumas reckons,

1st. The commotion excited in the whole nervous system.

2dly. The pain of the wounded part.

3dly. The spasm produced by this.

4thly. The disposition of the wounded parts, and the change of their structure.

5thly. The determination of the action of the system, in general, towards the seat of the wound.

The author then states the effect of the treatment which he had been in the habit of pursuing for the removal of the remitting fever accompanying extensive wounds. This treatment, like that employed in malignant remittents, consists in the use of the bark, given in doses sufficient to prevent, as soon as possible, the recurrence of the paroxysms. The author closes his memoir by a series of observations calculated to show the excellence of his mode of treatment over that generally employed at present in similar cases, and the happy effects that may be expected to attend it when reduced to practice. We will here subjoin such of those observations as appear to us the most striking.

Case first. A man received a wound on the anterior and upper part of his leg, from a ball which passed between the ligament of the rotula

and the tibia. Suitable dressings were immediately applied to it. On the eighth day a large abscess was discovered communicating with the wound: this was opened, but not without an incision being made of considerable extent and depth: the patient experienced a slight chill immediately after the operation. There was no appearance of fever till the fifth day, when it occurred, attended with regular paroxysms. On the occurrence of the second paroxysm, the patient sunk into a profound stupor, the intensity of which increasing on the approach of the third, serious apprehensions were entertained for his life. The soporose affection being more deep and threatening during the third paroxysm, and continuing to resist every effort that could be made to remove it, professor Dumas determined to treat the disease as if it were a malignant remittent: he accordingly prescribed the bark in doses of two drachms, to be repeated every four hours. The fourth paroxysm was lighter; there was less stupor; the patient's head was more free; the bark was continued till the ninth paroxysm, which was the last; from the fourth paroxysm till the ninth, the violence of the disease suffered a gradual abatement.

Case second. The subject of this case was a man who had received a considerable wound in the lumbar region from a cannon ball. At first a favourable suppuration took place; but on the ninth day slight symptoms of fever occurred, which on the second paroxysm rose to an alarm-

ing height, with all the characteristic signs of malignant fever. The type of the fever was of the tertian form. From this time the appearance of the wound was greatly altered: after the close of the second paroxysm, the bark was directed to be administered in doses of three drachms. The patient took only one drachm every six hours, until a short time before the access of the third paroxysm, when he took three drachms. As no evident advantage was derived from this treatment, an ounce and a half of bark was directed to be taken during the next interval of remission. This mode of administration proved successful, and was continued till the complete extinction of the fever, which took place after the seventh paroxysm.

Case third. Professor Dumas reports, that in consequence of the fracture of the right parietal bone in a young man twenty-two years of age, by means of a bullet, a paroxysm of fever occurred on the eleventh day after the accident. Another paroxysm occurring on the following day, the bark was administered in large doses, and the fever, which was accompanied with every character of malignity, disappeared after the fifth paroxysm.

Case fourth. The subject of this case also was a young man who had sustained a slight fracture of the left parietal bone from the stroke of a bullet. The wound was nearly closed, when a remitting fever occurred, with the double-tertian type, the paroxysms being alternately more and

less violent, the use of the bark removed the disease in a few days.

Case fifth. The author has derived the greatest advantage from the use of the bark in remitting fevers supervening on gun-shot wounds, both in the head and in the joints.

Case sixth. A man had his elbow-joint shattered to pieces by a ball: amputation was conceived necessary and performed. Seven days after the operation a remitting fever came on; the bark was given between the first and second paroxysms; but as the patient was of a very irritable constitution, professor Dumas found it requisite to administer laudanum along with it; the good effects of this treatment were striking. The dose of the medicine was doubled after the close of the second paroxysm, and was given to the amount of six drachms previously to the commencement of the third; the fever terminated, and the patient was left in a state of perfect convalescence.

Case seventh. The author reports the cure of a case of remitting fever which occurred in the person of a marine, after the amputation of his thigh, in consequence of his knee-joint together with that of his foot having been shattered to pieces by a discharge of fire arms. Five days after the operation the wound became somewhat dry, with an appearance of greyish pus on its surface; the same evening the patient experienced a chill, succeeded by a paroxysm of fever. Professor Dumas had recourse to the use of bark

as in malignant intermittents; the paroxysms disappeared and the patient recovered. Finally, a circumstance which merits the most serious consideration, is, that professor Dumas has always found those cases of wounds to terminate fatally, in which, after remitting fever had supervened, the patients were treated with emetics, purgatives, or bloodletting, &c. (See the *fourth volume of Memoirs published by the Societe medicale d'emulation.*)

M. Marquis, who is no less accurate as an observer than skilful as a physician, has oftentimes witnessed fevers of this description during the time in which he was surgeon in chief to the armies of the republic, more particularly during the siege of Toulon. M. Pontanier, surgeon, in the year VII, to the division Victor of the army of Italy, has also made a collection of cases relating to the same point: I will confine myself to an account of the two following, both of which terminated fatally.

A Polish aid de camp was wounded before Alexandria, in Piedmont, in the upper part of the thigh. While yet on the field of battle, the wound was dilated, the ball extracted, and the wound covered with dry dressings. Taken to the hospital of Alexandria; on my evening visit, found the surrounding part inflamed and swollen; the pulse was full and strong, patient greatly alarmed. The wound was dressed with an emollient cataplasm, and blood was drawn from the arm. Nothing new occurred till the fifth

day, when suppuration had taken place, and a fever came on with alternate sensations of cold and heat.

First day of the fever. In the morning, suppuration plentiful; in the evening, suppuration diminished, alternate cold and hot fits, tongue rough and parched, pulse feeble.

Second day. Suppuration entirely suppressed; wound, which was quite pale, washed with camphorated spirits, and covered with an emollient cataplasm: patient affected with dejection, moroseness, confusion of ideas, and an apprehension of approaching death. Seven o'clock in the evening, deep stupor, sensibility almost extinguished, skin dry and burning, contraction of the lower jaw. (Blistering plasters applied to the legs and over the wound).

Third day. Bottom of the wound gangrenous and its smell offensive: dressed with camphorated spirits and cataplasms: silent delirium, eyes fixed or closed, pulse alternately feeble and depressed, natural, or hard; heat burning, but irregular; respiration sometimes natural, sometimes hurried.

Fourth day. Appearances the same.

Fifth day. Bottom and edges of the wound gangrenous. Patient somewhat calm, in the morning; in the evening, comatose. (Nitric æther in water prescribed.)

Sixth day. State of the wound and dressing the same. Subsultus tendinum, difficult deglutition, cold sweats, and death.

A deputy quarter-master received a stroke of

a sabre on the anterior and upper part of the shoulder, which divided obliquely the deltoid muscle. The wound was closed in the usual manner. Fourth day, the dressings being removed, the edges of the wound were found to be fresh and somewhat tumified. The usual dressings were again applied. For three days, the suppuration was copious and well conditioned. The patient now experienced a pain under the eye, and a tenderness in the epigastric region; his tongue was furred, and his mouth bitter. (Two grains of tartar emetic given in solution.) This remedy produced a copious vomiting of bilious matter, and a few stools: the gastric symptoms now disappeared. The wound went on in the usual course; but the patient having been guilty of excess in eating and drinking, experienced, in the night of the same day in which the excess had been committed, a chill, which was succeeded by a burning heat. On the day following the suppuration was diminished; cephalalgia, and great debility. Third day, the appearances of the wound worse: suppuration almost disappeared: countenance altered, wild look, risus sardonius, confusion of ideas. Fourth day, suppuration gone, smell offensive. Countenance livid, voice inarticulate, pulse frequently varies, trunk affected with spasms. Death occurred on the fifth day of the fever.

It appears surprising that in the two preceding cases, the bark was not administered conformably to the principles of common practice.

CHAPTER VI.

Considerations on the treatment of Malignant Intermittents.

CXIX. In fevers of this description, the indications are founded on the clearest evidence, and the healing art is now reduced to a degree of certainty almost mathematical. The alarming nature of the symptoms forbid delay in the plan of treatment, and the practitioner's first care should be to prevent the return of the paroxysms. Even Mercatus was aware of the necessity of promptness in their treatment. "That physician," says Leroy, "who, in a malignant intermittent, neglecting the use of the bark, waits for the termination of the disease by a crisis either properly so called, or by means of solution; such a physician, I say, would be highly injudicious, and would show himself to be entirely ignorant of the disease."* No motive whatever ought to prevent him from acting with promptness.

CXX. In the second place, most medical observers concur in regarding the bark as the only remedy capable of subduing malignant intermittents. Other remedies are either of no avail, or they answer only secondary indications. Medicine must, therefore, rank among the most

* *Du prognostic dans les maladies aiguës, page 81.*

glorious of her epochs, that which is crowned by the discovery of the bark, and by its fortunate employment in the treatment of malignant intermittents.

CXXI. When I say that the bark is alone capable of successfully counteracting the danger of malignant intermittents, I would be understood to mean such forms of the disease as are easily distinguished by the extreme violence and rapidity of their symptoms; and not those which, though characterized by the same phenomena, are notwithstanding of a lighter grade, and seem to constitute an intermediate shade between the foregoing and common intermittents, which most medical writers denominate *benign*. This distinction is of importance, because it determines the circumstances and state of things where other remedies may be successfully substituted in the room of the bark.

CXXI. I would further observe, that although the administration of the bark is in general alone sufficient to prevent or arrest the paroxysms of malignant intermittents, yet I do not deny that its action may be increased in efficacy by certain auxiliary remedies, directed particularly against predominant symptoms, such, for example, as great weakness, severe cardialgia, profound stupor, &c. As these auxiliary remedies are of great variety, and act only a secondary part in the plan of treatment, we will not speak of them till after we shall have unfolded the method by which practitioners should be directed in the choice and administration of the bark.

CXXIII. In the first place, it is requisite, that, by the aid of natural history and chemistry, the practitioner should have a competent knowledge of the physical qualities, the principles and component parts of the bark which he employs. This precaution is the more necessary, inasmuch as the want of success in the use of this remedy depends almost always on the remedy having been chosen without judgment. It is only when the bark is excellent in its qualities and certain in its action, that it ought to be employed agreeably to the rules which we are about to lay down on the subject. We will confine ourselves strictly to such rules as are sanctioned by long experience and reiterated success.

FIRST PRACTICAL THEOREM.

The bark in substance ought to be preferred to all other preparations of it, in the treatment of Malignant Intermittents.

CXXIV. REMARKS. For a long time the extract of the bark has been supposed to possess the highest powers: but experience has shown the opinion to be fallacious. Professor Fourcroy attributes this superior activity of the bark in powder to this circumstance, that the extracto-resinous substance not having been altered by the different modes of preparation, and not absorbing any oxygen, retains all its native energy

when conveyed into the primæ viæ, where it undergoes the action of the gastric and intestinal juices.*

Yet there are circumstances under which the bark cannot be administered in this form: it is then necessary to have recourse to the extract, the success of which is always in proportion to the quality of the bark from which it is prepared. The truth of this appears from the numerous observations of Joseph de Jussieu, who has employed it in sea voyages, as well as in France, with very flattering success. It is necessary in these cases (as Torti has very judiciously remarked) for the sick to take as much of the extract of the bark, as would be equal to the requisite quantity of the same medicine in powder.

The same remarks are applicable to decoctions and infusions of the bark, which should never be used in malignant intermittents of great violence, unless the difficulty of swallowing be such as to render it necessary to administer the remedy in the form of injection. Their inefficacy no doubt arises oftentimes, as professor Fourcroy remarks, from the improper mode in which they are prepared. Sydenham and several other physicians direct the bark to be infused some hours before its exhibition in practice. Others again, as Lewis, direct it to undergo an actual decoction of considerable duration. In these two cases professor Fourcroy has shown, that the resino-

* *Annales de Chimie. Fevrier 1791.*

extractive matter becomes less soluble and is at length precipitated entirely, according as it combines with the oxygen of the atmosphere: it is necessary, therefore, to prepare infusions or decoctions of the bark either in close vessels or in such as have narrow mouths: and when the preparations are completed, they should be kept from the contact of the air while the sick are using them, in order that further precipitation may be prevented, &c.

But in returning to the best mode of administering the bark, namely, in substance, we must not forget that Sydenham has declared, that it ought to be given alone, and without any other vehicle than what is necessary to convey it into the stomach. Some writers have alleged that its powers are increased by certain substances with which it has been occasionally united. Thus Hoffman and Galeazzi have successfully combined it with aromatics, such as cascarilla and cinnamon; thus also the celebrated Cazimir Medicus has mixed it with simple astringents, such as alum, &c. (in the malignant dysentery,) and Sarcocolla with opium (in a malignant pleurisy;) some have exhibited it in combination with powdered mustard; and others again with alkalis or absorbent earths, &c.

These different mixtures, which particular circumstances may seem to require, deserve notwithstanding but little attention, when the fever appears with such violence as to threaten a speedy and fatal termination. It becomes necessary then

to have recourse to that mode of treatment which is best calculated to arrest the paroxysms and to prevent their return.

SECOND PRACTICAL THEOREM.

That the bark may produce the wished for effect in the treatment of Malignant Intermittents, it is necessary to give it at as great a distance of time as may be practicable from the commencement of the paroxysm which it is intended to prevent.

CXXV. REMARKS. Cullen, on the other hand, has declared himself of a contrary opinion, and has laid it down as a general principle, that the bark ought to be administered as near as possible to the paroxysm. Even if this error could not be amply exposed by the daily observations of physicians, it would be sufficient to oppose to it the experience of Home,* as quoted by professor Baumes, whose opinion on the subject is similar to our own.

Home, indeed, has found that this febrifuge is never more certain in its operation, than when it is administered immediately after the close of one paroxysm, or forty hours before the commencement of the succeeding one. This point he has established in the cases of five patients, in which the paroxysms were completely suppressed. Eight persons, on the contrary, took the bark immediately before the cold fit, and the fever did not

* *Clinical experiments, sect. 1.*

give way; on the other hand, it gained strength, and two of the patients were affected with vomiting. Home has further observed, that, in three patients who had taken the bark just before the time of their paroxysms, the impending fits were not prevented, whereas the succeeding ones were; a fact which leads to the conclusion that this remedy requires a given time before it can operate.

The same observation has been made by Torti, who with great judgment declares, that small doses of bark, given a considerable time before the paroxysms, act with better effect, than large doses, if given but a short time before them. He adds, however, that this remedy, when administered in the latter mode, may have a favourable influence on the subsequent paroxysms.

THIRD PRACTICAL THEOREM.

The administration of the bark is not generally admissible, except during the period of intermission or remission.

CXXVI. REMARKS. Pressing danger may, notwithstanding, as the illustrious Senac has observed, call for the administration of the bark, during the existence of a paroxysm. In such a case the exhibition of the bark ought not to be deferred, provided the fever be not too violent, but, on the other hand, the pulse be weak, the strength greatly prostrated, and the stomach and

intestinal canal free from irritation, and lastly, provided there be no particular symptom contra-indicative of this remedy.* For, notwithstanding the intermitting type and character of the fever, yet, under circumstances so doubtful, it is difficult to foresee what may be its duration, its termination, and its consequences.

FOURTH PRACTICAL THEOREM.

If a Malignant Intermittent be manifestly a subintrant, or if the paroxysms be so extended as to interlock, it is best to administer the bark during the decline of the paroxysms.

CXXVII. REMARKS. This rule is naturally deducible from what we have already said respecting the necessity of giving the bark when the fever is not at its height, and at a point of time as remote as possible from the commencement of the paroxysm which it is intended to prevent. Voulonne was right in laying it down.

It would be superfluous to spend time in exposing the dangerous nature of the error into which those physicians have fallen, who contend, that the bark may be administered at any time during the course of a malignant intermittent, without respect to intermissions or remissions. Others have certainly with more judgment and

* *De nat. febr. recond. lib. 2. cap. 13.* See the American translation of this interesting work.

wisdom advised, to watch with great attention for the brief intermission, in order to give the bark with the more advantage; but this precept is oftentimes impracticable; for in such cases, the paroxysms by their anticipations, their protraction or intermixture, but seldom afford even a momentary interval of exemption from fever.

The very vague direction given by Reichard, to remove first the causes that lengthen the paroxysms and shorten the intermissions, which he attributes either to a plethora, a supposed lentor of the blood disposing the system to inflammation, a saburra of the primæ viæ, &c. is not applicable in the present instance.*

If, in any case, there be not a sufficiency of time for administering the necessary quantity of bark, that remedy must not be continued during the following paroxysm, but must be omitted till the paroxysm shall be on the decline. (Voullonne.)

FIFTH PRACTICAL THEOREM.

Six drachms, or, at most, an ounce of bark is, for the most part, sufficient to arrest the paroxysms of a Malignant Intermittent when arrived at its height.

CXXVIII. REMARKS. This quantity, which is specified by Torti, has appeared to us to be in most cases sufficient. We suppose the bark to

* *Disput. inaug. med. de peruviani corticis in plurimum generum febribus exhibendi opportunitate. Gottingæ, 1768.*

be always given in substance, the mode of preparation which we consider preferable to all others. Professor Pinel has been oftentimes successful in the Salt-petre House, with even a smaller quantity. Yet Baumes fixes the quantity at an ounce and a half; and Sims has sometimes carried it to five ounces.

Galeazzi has oftentimes found the bark, when exhibited in the quantity prescribed by Torti, insufficient, and even productive of no effect whatever. He has seen fevers in which frequent relapses occurred, unless the bark was given in the quantity of five or six ounces, or even to a greater amount. He mentions the case of a man in which it was necessary to give a pound of this substance, in the space of about forty days, before his disease was completely removed. It is particularly in semi-tertians, in tertian remitting sub-intrants, and in those which Torti calls sub-continued fevers, that Galeazzi has observed the necessity of administering the bark in such large quantities. There is also a description of fevers not mentioned by Torti, which assume at first a continued type, and pass afterwards into malignant intermittents; in affections of this kind, the bark ought to be administered in very large doses, in which case it speedily produces its effect.

SIXTH PRACTICAL THEOREM.

In common cases of Malignant Intermittent, the first dose of the bark, or that which is administered at the point of time most remote from the commencement of the succeeding paroxysm (second theorem), ought to be the largest; it should consist of half the quantity intended to be given during the period of intermission, the remainder of which may be exhibited in doses gradually decreasing, and at longer or shorter intervals, according to the nature of the fever, and the duration of the intermission.

CXXIX. REMARKS. It appears from this theorem, that the success of the bark depends less on its quantity, than on the manner in which it is exhibited. Besides, if, as Torti observes, the approaching paroxysm be very near at hand, and a dose of half an ounce would be insufficient, on account of the dangerous situation of the patient, and the shortness of the intermission, a dose to the amount of six drachms may be administered at once; this mode of practice has been oftentimes successful.

SEVENTH PRACTICAL THEOREM.

The action of the bark is the more powerful in the treatment of Malignant Intermittents, in proportion as a greater quantity of it is administered in a shorter time.

CXXX. REMARKS. Torti has made it appear that those physicians who prescribe the barkeven

in quantities of three or four ounces, derive no advantage from it in their practice, when their patients take it in small doses, so as to be several days using it to that amount. He adds, that it is not only of importance to administer a large quantity of the bark in a short time, but also to administer it in doses proportioned as above directed; because, though two persons may have taken, in the same length of time, the same quantity of bark, yet one of them may recover, and the other die, for no other reason, than because the first has taken it in half-ounce doses, while the latter has taken only a single drachm every three hours, a mode of practice which many physicians pursue. When gradually administered in this latter way, the bark acts too feebly during the first hours of the intermission, that is, during those hours which are most remote from the time of the commencement of the next paroxysm, &c. This was the fault of Morton's mode of practice, who, dividing the whole quantity of bark into equal parts, gave it too near to the close of the intermission.

EIGHTH PRACTICAL THEOREM.

When a Malignant Intermittent is ushered in by alarming symptoms, the bark ought to be administered immediately, without waiting for the operation of any previous preparatory remedies.

CXXXI. REMARKS. In this case the most pressing indication is to arrest at once the progress

of the disease. Lind, in particular, insists on this mode of practice, in consequence of having derived such important advantages from it in the destructive epidemics that prevailed in England in the years 1765, 1766, and 1767. He found, from experience, in his own person, and in the persons of two hundred patients, that as often as he succeeded in arresting the course of the fever by a prompt administration of the bark, its disappearance was attended by no bad consequences. But if, on the contrary, the use of this remedy was neglected or delayed, dropsy, jaundice, habitual head-achs, &c. inevitably succeeded. Lind observes, that it is oftentimes necessary to administer the bark from the time of the first intermission. He speaks of some intermittents appearing with such violence in certain sickly parts of England, as oftentimes to terminate fatally on the second paroxysm.

Torti, however, is one of the first who ventured to deviate from the established custom of purging and bleeding, previously to the exhibition of the bark, and Grant very judiciously remarks, that every fever accompanied with paroxysms ought to be arrested in its course, as soon as it manifests the smallest signs of malignity.*

* *Recherches sur les fievres. tom. 1.*

NINTH PRACTICAL THEOREM.

Although a Malignant Fever may commence with moderate symptoms, yet if any one of these symptoms predominate over the others, and if the nature of the prevailing epidemic gives any cause to suspect danger, it becomes necessary to administer the bark without delay.

CXXXII. REMARKS. This rule is founded on the rapidity with which, under certain circumstances, such intermittents put on a true malignant character. Observation evinces that the danger of these diseases does not increase gradually, but that a fatal paroxysm may succeed to one or more paroxysms, which had been in no degree alarming.

TENTH PRACTICAL THEOREM.

When a Malignant Intermittent appears in the form of a double tertian, there is generally but one of the two sets of paroxysms that is truly malignant; the other is slight and free from danger; it is against the first, therefore, in particular, that we must direct our remedies.

CXXXIII. REMARKS. This rule, however, is not free from exceptions. The memoir of Voullonne contains a case of double tertian accompanied by a soporose affection, in which the subaltern paroxysm was even more violent than the

other. The disease continued without any remission, till the third paroxysm, when it terminated fatally.*

ELEVENTH PRACTICAL THEOREM.

We may, in certain cases, by a feebler mode of practice, change the Malignant character of Intermit- tents, and then remove them gradually by a skilful use of other febrifuge remedies.

CXXXIV. REMARKS. This alterative method which is barely mentioned in the excellent work of Werlhof,† has been greatly improved by professor Pinel. In many patients labouring at different times under the soporose state of the malignant intermittent, and treated by wine of wormwood, and with boluses composed of powdered gentian (*centaurium minus*), chamomile-flowers (*chamæ- melum*), nitrate of potash, and syrup of honey, he has succeeded in first converting severe paroxysms into ordinary ones, or such as occur in benign intermittents, and afterwards in gradually subduing them. But I must observe that these experiments have been made only in the Saltpetre House, where, in general, as was mentioned in the beginning of this treatise, malignant intermittents arise from occasional causes less powerful than in very marshy places, and that

* *Memoire sur les fievrès intermittents.*

† *Observ. de febrif.*

in two of these cases of fever, accompanied with alarming symptoms, the bark was used to the amount only of an ounce. In the treatment of this disease, as in that of many others, a careful attention must be paid to local affections, as these will aid the practitioner in his determination respecting the remedies and their modifications proper to be employed.

I will further add, that this method, however conformable it may be to the laws of nature, can never be put in practice unless by physicians perfectly acquainted with the particular course of malignant intermittents; for the insidious character of these diseases, and the extreme irregularity which marks the increase of their symptoms and paroxysms, might frequently lead the unskilful into fatal errors.

TWELFTH PRACTICAL THEOREM.

When by the most suitable mode of practice the paroxysms of a Malignant Intermittent are suppressed, the best mode to prevent a relapse, is, to persist for some time in the use of the bark.

CXXXV. REMARKS. From similar views, the professor of Modena, advises to give bark as a prophylactic, in doses of one drachm, daily, for three days, and afterwards to give it in doses of half a drachm twice a day, for the same space of time; he further directs, that after discontinuing

the use of the remedy for six days, we should again give half an ounce of it, in doses of half a drachm daily; he adds, that the fever when treated in this way and subdued, very seldom returns again.

Physicians have further observed, that relapses of malignant intermittents which have been cured by the bark, even when they do occur, are seldom attended by that train of formidable symptoms, which characterized their original attack; and that they yield to smaller doses of the bark, or even to feebler remedies.

It cannot be too earnestly recommended to physicians, to endeavour to confirm the important observation of Werlhof, who took notice that relapses recurred, in malignant intermittents, particularly in the third or fourth week, accordingly as the disease was a tertian or a quartan. In this case I cannot agree with that author that we ought in preference to give the bark in that week in which the paroxysm is expected to occur, but rather in the preceding week, because this febrifuge never acts with more efficacy than when it is administered for prophylactic purposes, as we have already shown in our second theorem.

Occasional interruptions in the use of the bark are useful and necessary, because they prevent the system from becoming so accustomed to that remedy, as to be rendered unsusceptible of its action.

Notwithstanding these precautions, we sometimes meet with relapses so obstinate, as to resist

the most assiduous employment of the bark: it becomes necessary, then, according to the directions of Sydenham, to have recourse to other remedies. It is well known with what success Hamilton has administered the salt of wormwood, dissolved in the mineral waters of the Spa, and also what advantages other practitioners have derived from the use of the fixed alkalis, &c.

CXXXVI. We ought to reject, as of no weight, all-objections made generally against the administration of the bark, in the treatment of malignant fevers, whether of the intermitting or remitting type. Ramazzini and Stoll mention, indeed, a few instances where this remedy was used without success. But these celebrated practitioners do not seem to have been sufficiently aware; 1st, that symptoms of malignity may exist, without having any connexion with the intermitting type of disease; 2d, that malignant epidemics, in particular, may be complicated with various affections not of a periodical character, such, for example, as obstructions of the viscera, which oftentimes continue after the febrile paroxysms have ceased: 3d, and that the bark has no effect on those symptoms which grow out of circumstances foreign to the nature of the disease: to these considerations I will add, that the want of skill so often betrayed in the administration of this remedy, has been alone productive of much mischief, as appears from cases of fever having terminated fatally, in consequence of the

bark having been administered immediately before a paroxysm (*Epist. ad Rob. Brady*). It is not then to the insufficiency of the remedy that we ought to attribute the unfavourable issue of certain cases of malignant intermittent, but to a want of skill in physicians, who are incapable of distinguishing, with precision, the circumstances which warrant from those which forbid its administration.

CXXXVII Having thus laid down the principal rules that ought to direct physicians in the administration of the bark, it would be superfluous and contrary to the rigid principles by which we have hitherto been governed, to pretend to explain its manner of acting on the living body, amidst the various hypotheses in which writers have indulged themselves on this subject. Shall we say, with Brown and his ardent followers, that this remedy acts as a strong stimulus, increasing the powers of the system? Why, then, are not other tonics equally powerful, such as strong spirituous drinks, for example, capable of producing the same effects? Shall we consider it as an anti-spasmodic? But ether certainly possesses that power in a much higher degree; yet this remedy would be of little or no avail in the treatment of malignant intermittents. Shall we say, with some authors, that it neutralizes the pretended fomes of the fever, by its saline qualities, or that it acts on the living solid by its power of oxygenation? Or shall we advocate the more probable conjecture of a celebrated chemist, that the fe-

brifuge virtue of the bark resides in the tannin principle, which it contains in great abundance, and that it is to this same principle we must attribute the febrifuge power of some of our indigenous barks, such as that of the oak, the alder, the chesnut tree, the willow? &c.

In the present state of our knowledge, it is unquestionably the wisest plan to confine ourselves to the consideration of the salutary effects of the bark, without endeavouring to ascertain how these effects are produced, until new discoveries shall have thrown further light on the subject.

We cannot close this article, however, without paying some regard to an interesting point of doctrine, in the discussion of which many very respectable physicians have been engaged. Some of these contend, that the bark produces its most salutary effects without exciting any critical evacuation. But Albertini is of a different opinion.* He maintains that he never saw a fever effectually removed by this remedy, without being followed by a crisis similar to that which nature, or, if the idea be more acceptable, which other remedies generally produce. These crises occur even in tedious and obstinate fevers, which yield only to a long continued use of the bark: but they are then more slow and difficult, and can scarcely be distinguished from other excretions. It is true that, in order to be a witness of the crisis, the

* *De Bonon. Scient. et art. institut. atque acad. comment.*

practitioner must not close his observation with the close of the disease. He must watch the patients during their convalescence, and even after the entire restoration of their health.

From this view of the subject, it is easy to account for all those different affections imperfectly cured, in which crises are wanting, or are slow and insufficient, so that the patients do not recover without great difficulty, nor till after a tedious illness; or which are ultimately converted into secondary affections, a circumstance which did not escape the notice of Hippocrates himself. We may explain the accounts given by certain authors of patients, cured by the bark, having, for many nights afterwards, experienced very copious sweats. Others again have observed very copious evacuations of urine after the administration of this remedy. In the practice of Sydenham it appears to have acted at times as a violent cathartic, &c.

Albertini ascribes to the bark the power of producing not only sweat, stools, and urine, but also of increasing the insensible perspiration; and in confirmation of this latter opinion he adduces a multitude of facts. He observes, that if patients, who have taken a certain quantity of the bark, experience no perceptible crisis, they are apt to have a fetid breath, which sometimes even excites nausea, and may be easily perceived by the practitioner whenever he raises the bed-clothes or approaches the bed. This physician strengthens his opinion by the following case. In the autumnal

season, a man was attacked by a sub-intrant double tertian fever, of a very peculiar character. The bark was administered, and the fever disappeared; but, in the course of a few days, the patient began to exhale an odour so offensive, that his friends could scarcely endure it. This odour continued until, after having been a few days out of bed, he experienced a relapse. He had recourse to the bark again, and after having taken it to a considerable amount, was attacked by night-sweats, and finally by a very copious evacuation of urine, which entirely removed his disease.

According to Albertini, the crises that follow the administration of the bark, differ from those that follow the use of other remedies. With regard to other remedies, some of them are regularly productive of sweats, others of urine, others of stools, and others again of expectoration. But the bark produces sometimes one, and sometimes another of these evacuations. In many cases, even these critical evacuations, far from being uniform, run into one another, so that the action of the bark may be said to be determined to every avenue. Nor have they always a stated and regular time of occurrence; they sometimes appear too soon and at other times too late. They occasionally continue till the patient has so far advanced in his convalescence, as to be able to walk out. Albertini mentions his having oftentimes met in the public walks persons affected with critical discharges, a circumstance which first invited his attention to the subject.

Finally, from all the foregoing considerations, Albertini has drawn three leading corollaries, which he has applied to the practice of medicine.

1st. If, after the bark has been administered, a favourable crisis occurs, such as the nature of the disease requires, it is superfluous to push that remedy any further. 2d. If critical evacuations follow the administration of bark, the convalescent may relax somewhat in the strictness of his regimen, expose himself to the air, and take, if necessary, some light purgatives, inasmuch as relapses are less to be dreaded. 3d. It is necessary for patients to take bark more or less frequently according as the crises occur sooner or later, and in a manner more or less suitable. We will add nothing to those particular reflections of Albertini, because they are the result of his own experience, and appear to us worthy to be laid before the physicians of our own day. Perhaps future discoveries may either confirm, modify, or invalidate them.

CXXXVIII. There are auxiliary means calculated to answer all the indications arising out of the symptoms which constitute each variety of the malignant intermittent. Some particular circumstances may call for the employment of such auxiliaries, although the phenomena unfolded by the disease generally, arise from one single principle, and also disappear with that principle, when it has been attacked by the bark at the proper time, and in suitable quantities. The reader may readily convince himself of this, by re-

flecting for a moment on the different cases which are inserted in the beginning of this work.

CIRCUMSTANCE FIRST.

A physician may be called in the middle of a paroxysm characterized by very alarming symptoms, and the patient may be in the utmost danger, in consequence of the bark not having been previously given; in such a case the physician's object must certainly be, to moderate the symptoms, in order to prolong life till the next intermission, and then give the bark in the manner already prescribed.

CXXXIX. REMARKS. If in this circumstance, for example, the patient be cold and cadaverous, if his strength be greatly exhausted, his pulse almost imperceptible, and if he be in a high degree comatose, &c. stimulants and cordials may be used with advantage. The practitioner will therefore have recourse to the application of sinapisms, and blisters; he will direct odoriferous substances to be applied to the nose (if it be a case of the lethargic state of fever;) and (if it be of the algid state) he will prescribe hot spirituous fomentations, &c.

In cases of an opposite nature, where the reaction of the system is great, as in fevers attended with cardialgia, convulsions, &c. the use of opium may be adviseable. Severe cardialgic affections, in particular, yield to this remedy, as J. P. Frank, observes, unless they arise from a state

of plethora; in which case he advises the head to be kept in an elevated position, to be shaved, and to be washed with cold liquids, &c.*

CIRCUMSTANCE SECOND.

Sometimes on account of a particularly irritable state of the stomach, the bark, in whatever dose it may be administered, is immediately rejected by vomiting (especially in the choleric state of the disease.) In such a case, the most pressing indication is, to obviate this symptom by proper remedies.

CXL. REMARKS. This irritation may be relieved, in imitation of the judicious practice of Sarcone, by combining opium with the bark. It is further known, that Stork was in the habit of giving this narcotic in all cases of intermittents, where nervous and convulsive symptoms predominated; and that Hoffman and Riverius employed it with great success, in alleviating that spasmodic action of the stomach, which forbade the use of the bark. It was by this remedy alone that they were able to check those tumultuous evacuations which exhausted nature without relieving her. But perhaps no one has employed opium with more success in the treatment of malignant intermittents, than professor Barthez, and I regret that circumstances have not yet permitted him to digest and put in order the invaluable observations which he had the goodness to promise to communicate to me on this subject.

* *De curand. homin. morb. esitome, tom. i.*

CIRCUMSTANCE THIRD.

Malignant Intermitents may be complicated with such a disordered state of the stomach and bowels, as to render the use of emetics and purgatives necessary, previously to the administration of the bark.

CXLI. REMARKS. Finke mentions a case of this description. It was the soporose state of fever. On the day of exacerbation, says that author, the patient was suddenly attacked by all the symptoms so well described by the celebrated Werlhof. His health was perfectly restored by the bark, but not till after a complete evacuation of the bile.* Senac speaks of an epidemic, in which, at the commencement of the disease, he exhibited vomits after bloodletting, with the happiest effects.

In another epidemic constitution, where the action of the fever was determined principally towards the head, the comatose symptoms were removed by the use of the same remedies. Raymond observes, that in the malignant intermitents of Middlebourg, emetics were strongly indicated at the commencement of the disease, and that they assisted nature in a very striking degree, by facilitating the expectoration of the bilious humour. Ipecacuanha was preferred as an emetic, because it operated with less violence than tartar emetic.

* *De morbis biliosis anomalis.*

CIRCUMSTANCE FOURTH.

If, in consequence of the influence of climate or of a prevailing epidemic, Malignant Intermittents be combined with any other disease, it becomes necessary to join with the bark such other remedies as are suitable to the nature of the different complications.

CXLII. REMARKS. In the climate of Middlebourg, the malignant intermittent is oftentimes united with scurvy. This complication is known from the fetor, the flaccidity, and the erosion of the gums, the deep colour of the urine, the blotches on the skin, &c. In the treatment of it, the bark is advantageously joined with acids, particularly with the sulphuric acid; for, as Raymond observes, the vegetable acids are seldom sufficiently powerful to overcome the tendency of the system to putridity.

CIRCUMSTANCE FIFTH.

A verminous diathesis being sometimes combined with Malignant Intermittents when prevailing epidemically, it has been proposed to have recourse to helminthocorton and to the drastic purgatives used in such cases, for the purpose of subduing this single symptom. But observations have made it fully appear, that it also yields to the action of the bark.*

CXLII. REMARKS. It appears that the bark acts in this instance by re-establishing the tone of the intestinal canal; for, according to the observation

* A kind of marine moss, for which I know no English name: It is much used in France as a vermifuge.

of Boerhaave and many other physicians, a debility of that organ favours in a particular manner the development of worms in its cavity. Hence the verminous affection, which is only a secondary product of the fever, occurs most commonly in the persons of the indigent, who make use of unwholesome food, and bad water. Hence it arises, that the affection in question is so apt to be complicated with malignant epidemics, which almost uniformly produce great debility in the digestive organs.

CIRCUMSTANCE SIXTH.

In Malignant Intermittents which occur on the approach of spring, in vigorous and robust subjects, and which excite great irritation in certain viscera, bloodletting may become necessary to the patient's recovery.

CXLIV. REMARKS. This state of things occurs principally in malignant intermittents that have a tendency to a continued type. Senac speaks of tertian fevers characterized by a pulse so hard, cephalalgic affections so violent, pains in the stomach and intestines so severe, and oppressions of the breast so distressing, that he was obliged to have recourse to repeated venesection. All other means were opposed to these symptoms in vain.* Sarcone mentions also a malignant sub-continued fever, which was determined particularly to the lungs, and in which venesection was necessary in the early stages of the disease.

* *De nat. febr. recend.* (See American translation.)

Medicus has given an excellent description of a malignant intermittent, which was epidemic at Manheim, during an extremely hot summer. That disease, when it proved fatal, terminated by an universal tetanus. During this state of things, deglutition was impeded in some subjects, and liquids ran out of the mouth again, as fast as they were poured in, as if the œsophagus had been shut. In other patients, the fauces appeared to be in a paralytic state; the drink taken in seemed to roll down the passage, or to be received by convulsive efforts, which sometimes carried it downwards, and at other times forced it out of the mouth again. The breast was also violently drawn up towards the throat; and this convulsive state continued even after death. The abdomen was retracted and flattened in a remarkable manner. The intestines were violently contracted, as appeared at first from the difficulty with which injections were retained, and afterwards from the dissection of the dead bodies. The skin was so shrivelled up, that oil which was rubbed on it did not penetrate it.

Medicus having discovered, on examining the bodies of those who had died of this malignant disease, that the stomach and gall-bladder contained a large quantity of black thick bile, which dyed the surrounding parts of a dark colour, adopted the following mode of treatment. He drew blood according to the state of the pulse, and procured the evacuation of the bile with great success by small doses of Ipecacuanha,

which in his opinion produced vomiting as effectually as larger doses, without exciting such convulsions of the stomach as might endanger the production of general convulsions. He then commenced with the bark, of which he gave, every hour, twenty grains with six grains of nitre in milk of almonds.

CIRCUMSTANCE SEVENTH.

When deglutition is impracticable, and the danger is urgent, the bark may be administered with advantage, in certain cases of Malignant Fever, in the form of injection.

CXLV. REMARKS. Comparetti mentions an instance of a catarrhal intermittent, of which we have already spoken, where the bark was administered in this way with complete success. The injections were composed of half an ounce of bark in powder, with four ounces of pure water. The physicians of Montpellier, who have become so celebrated for the excellence of their clinical practice, have made many similar observations.

CXLVI. It will be perceived that these particular cases, which I have just stated, and which are themselves susceptible of great variation, constitute but slight and even partial exceptions to the general theorems previously established, and that they do not in any measure invalidate the authenticity and soundness of the principles which I have laid down.

CXLVII. Many physicians have contended, that the place of the bark may be successfully supplied by other remedies, in the treatment of malignant intermittents. In these latter times, in particular, the followers of the celebrated Dr. Brown have not ceased to recommend the most powerful preparations of opium. They have advised the employment of this remedy even in soporose and apoplectic cases of fever, although Senac has clearly demonstrated its destructive tendency, when administered during the predominancy of such symptoms. Joseph Frank, who has so zealously defended the opinions of the Scottish physician, speaks of a case of malignant intermittent, first reported by Hoffmann, and afterwards mentioned in a dissertation by Wirten-son.* Its symptoms were in the highest degree alarming. Hoffmann poured into the mouth of the patient ninety-five drops of laudanum, which after some time he swallowed. They immediately rose, and all the symptoms became more promising. The second and third paroxysms were moderated by laudanum in the same manner. An infusion of bark in wine being afterwards administered, the health of the patient was perfectly restored.

CXLVIII. Whatever degree of authenticity may be attached to this fact, I conceive that it has been laid hold of with too great eagerness by the Brunonians, in order to be moulded so as

* *Dissert. inaug. demonst. opium vires cordis debilitare, et motum tamen sanguinis augere.* 1774.

to comport with the spirit of their system; and I further conceive, that true practitioners ought still to persevere in the use of the bark, which, in most cases supplies the place of all other remedies, while its place is very seldom supplied by any of them. Perhaps the discoveries of chemistry, when further advanced, will furnish us with the means of extracting from other vegetables, in its pure state, the medicinal substance which resides in such an eminent degree in the peruvian bark of which we are treating; and there is great reason to hope that this will be the case. At that period, and not till then, will we see realized the advantages of a proposition made by M. Marabelli, a very ingenious Italian chemist, who advised physicians to attempt the preparation of an artificial bark, by a proper combination of the elementary principles which enter into the constitution of the native bark of Peru. Several French physicians have attempted the execution of the same project; but such an undertaking calls for further researches on the part of chemists and practitioners.

CXLIX. I here close my observations on the history, the nature, the causes and the treatment of malignant intermittents. I have made choice of this subject for my dissertation in preference to others, because the points of doctrine which it embraces are capable of being demonstrated by the evidence of facts; and because that, without giving a loose to speculations and subtle theories, the subject affords the most authentic testimony

in favour of the power of the healing art, in combating a description of diseases, which were almost always fatal previously to the discovery of the bark. Our knowledge on this head is characterized by such certainty, as to constitute a final answer to the sophisms and vain declamations of the defamers of medicine. For, who would venture to represent it as a doubtful and conjectural science, if, in every case, we could count on the same degree of success from its efforts?

CL. Finally, in executing the plan of this work, as previously sketched out, I have rigidly avoided vague assertions, and deceitful inductions drawn from analogies that still remain doubtful; in a word, I have carefully rejected all those visionary discussions, which serve to amuse the leisure hours of the theorist, but which cannot benefit the practical physician: this I have done from a thorough conviction, that the only works which contribute to the perfection of the healing art, are those into which nothing is admitted that is not the result of sound experience and accurate observation.

APPENDIX.

AN ESSAY

ON THE

PESTILENTIAL OR YELLOW FEVER,

AS IT PREVAILED IN PHILADELPHIA

IN THE YEAR

EIGHTEEN HUNDRED AND FIVE.

BY CHARLES CALDWELL, M. D.

AN ESSAY, &c.

INTRODUCTION.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

OF THE CONSTITUTION AND DISEASES OF THE YEAR 1804.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

OF THE CONSTITUTION AND DISEASES OF THE YEAR 1806.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

CONSTITUTION AND DISEASES OF THE YEAR 1803.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

OF THE PESTILENTIAL OR YELLOW FEVER OF THE YEAR 1805.

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

Section I. Of the rise, progress, and decline of the disease.

Section II. Of the origin and causes of the disease.

Section III. Of the contagious nature of the disease.

Section IV. Of the means of preventing the disease.

Section V. Of the history of the disease.

Section VI. Of the causes of particular symptoms.

Section VII. Of the prognosis.

Section VIII. Of the morbid appearances discovered on dissection.

Section IX. Of the treatment of the disease.

SECTION I.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SECTION II.

OF THE ORIGIN AND CAUSES OF THE DISEASE.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

“ — The vengeful arrows fix'd in man.”

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SECTION III.

OF THE CONTAGIOUS NATURE OF THE DISEASE.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SECTION IV.

OF THE MEANS OF PREVENTING THE DISEASE.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SECTION V.

OF THE HISTORY OF THE DISEASE.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

“ ——— where the greater malady is fix'd
 “ The lesser is scarce felt. ——— ”

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SECTION VI.

OF THE CAUSES OF PARTICULAR SYMPTOMS.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SECTION VII.

OF THE PROGNOSIS.

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

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

1st. *A total defect of urine*, arising, as already mentioned, from a paralysis of the secretory vessel of the kidneys. And,
 2d. *The genuine black vomit*. From neither of these two symptoms have I ever witnessed a recovery. Yet, in many cases, where one or the other of them existed, I think I have seen all the resources of the healing art exhausted for the purpose of saving life. In some instances, indeed, a suppression of the urinary discharge will exist for some time in consequence of the action of blisters, and yet the case terminate favourably. But that *suppression* is intirely different from the

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SECTION VIII.

OF THE MORBID APPEARANCE DISCOVERED ON DISSECTION.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SECTION IX.

OF THE TREATMENT OF THE DISEASE.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

THE END.

Med. Hist.

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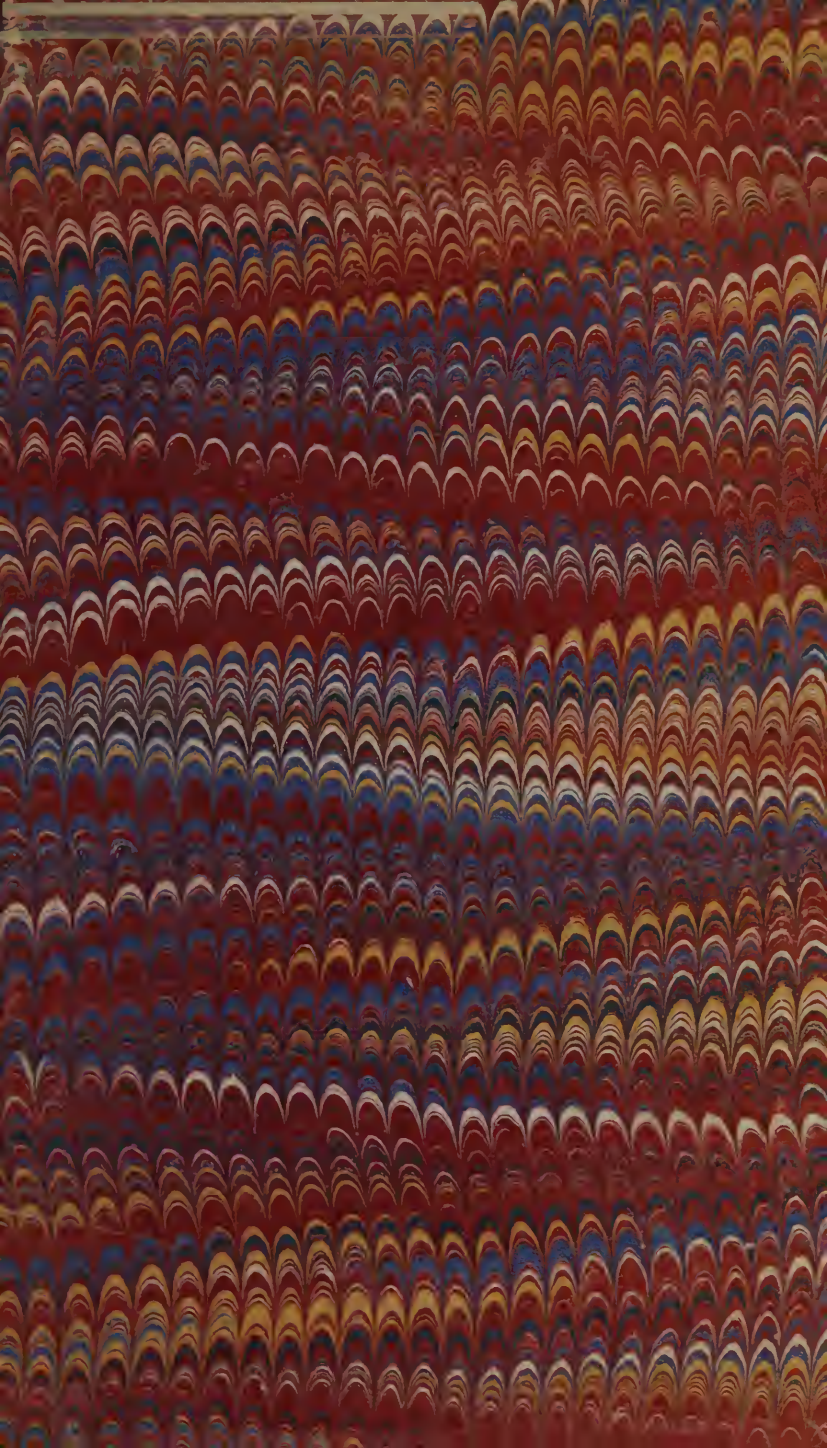
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