spots on the extremities, oozings of blood from the mouth and nostrils, and hemorrhage from the bowels.

There are conditions of the sensorium, voluntary powers, and præcordia, no less than of the respiration, pulse, and skin, which mark the progress or decline of such affections with the greatest certainty. If the stupor or delirium continue to increase with an augmentation of the oppression, if the respiration become more anxious, the pulse weaker and quicker, the skin colder, as well as more flaccid, and especially if the stools or urine be passed insensibly, the case will almost invariably terminate mortally. But, on the other hand, if the stupor or delirium should disappear, while the oppression obviously abates, and the respiration becomes easy, the pulse full and regular, with an universally warm skin, a favourable prognosis may generally be given. The abatement, however, of the delirium or stupor, unaccompanied with the other favourable signs enumerated, is not at all to be depended on; for patients sometimes become rational and collected a few hours before death, and that even when the brain is in a state of irretrievable disease, as the two cases and dissections before given may serve to illustrate. It must always be recollected, that in examples of congestive fever, there is a singular disposition to relapse; so that a patient may grow very suddenly and seriously worse, when all the previous symptoms might have led us to form a sanguine opinion. The consideration of this truth should make us pause before we give our prognosis, or at least teach us that, in the severer modifications of congestive fever, the patient is not always perfectly safe, until he is perfectly recovered.

There are comparatively milder forms of the congestive typhus, in some of which the patient walks about for a few days after the infection has begun to operate, and complains little, except of uneasiness of the head, loss of appetite, and languor, appearing rather paler than when in health. If strictly attended to, however, by a medical observer, a change may usually be remarked in his whole demeanour; he cannot so steadily command his attention as before, is not only restless during the day, but watchful at nights, and soon betrays

an absence of mind or loss of memory. At length he becomes garrulous like a half drunken person, or talks inconsistently with his former views and character; after the lapse of another day or two, the mental confusion is most obvious to every one, he begins to be unsteady in his gait, and has a heavy intoxicated cast of the countenance. If carefully examined at this period, his tongue will be found white, his pulse small, quick, and perhaps irregular; his breathing hurried; his bowels slow; his skin rather hot about the trunk, but coolish and damp on the extremities. If the disease be allowed to proceed, without decided interruption, the hands shortly become very tremulous, and the confusion of mind passes into delirium; yet there is still a want of regular excitement, demonstrated by the alternate flushing and paleness of the face, the feebleness of the pulse, the unequal state of the whole circulation, the coolness of the extremities, the partially concentrated heat of the trunk, and the laxity of the skin. Aural and visual deceptions succeed, and force the patient into violent exertions, and every attempt to overpower him by coercion tends to aggravate the delirium, and sink the strength. His tongue grows daily fouler, and his debility greater; he begins to pick the bed clothes, and at last petechiæ and subsultus tendinum appear. About this period, the general turbulence sometimes unexpectedly abates, and he may become so serene and rational, as to give some hopes that a favourable crisis has really taken place; but the calm is most frequently deceitful, being soon followed by an universal collapse, in which death occurs, mostly without much struggling. Several cases, nearly answering to the above description, have fallen under my notice, and I have found, that if opportunely and properly encountered, they may generally be subdued; but that if overlooked or improperly treated in the commencement, they will commonly baffle the best directed measures.

There are yet other forms of congestive typhus, which, after a day or two of lassitude, are usually denoted by chillness, nausea, short, quick breathing with frequent sighing, unpleasant sensations at the stomach,—and also by white tongue, depravation of taste, irregularity of the bowels, dark bilious ex-

crements, pain and giddiness of the head, an alarmed or confused state of the mind, paleness of the face, dejection and languor of the countenance, inflation of the epigastric region, and great prostration of strength. An imperfect excitement is gradually developed, which rises and falls three or four times in the course of twenty-four hours. During the slight exacerbations of the fever, the skin is hot and dry in some places, especially about the præcordia; the face flushed; the pulse rapid; the breathing quickened almost to panting; the eye glossy; the countenance agitated; and the mind solicitous. These short paroxysms of fever passing away, the skin grows damp and relaxed, the face pale, the pulse less frequent and more undulating, the breathing slower, the eye duller, and the countenance and mind more serene. After some partial efforts of this nature, the excitement is sometimes fully emerged, and the fever may put on a simple or an inflammatory character; but it more often advances, with frequent heats and chills, as an irregular one of congestion, and, if left to itself, most frequently destroys the patient, within the first two weeks of the attack, by cerebral or hepatic derangement, or suddenly suppresses life, by an unexpected engorgement of the brain, or of some other vital organ. In such affections, there are occasionally distinct remissions, and likewise apparent translations of local oppression from one part to another. The remissions are commonly fallacious, and the translations are always to be dreaded, for, independently of the mischief which they may produce in the viscera affected, they denote a loss of equilibrium, and a general disorder in the circulating system, which are not easily corrected. The remarks which have been made, as to the prognosis in the severer sorts of the congestive fever, are applicable to the forms now described; except that in the latter, delirium is sometimes a favourable symptom when it is of the light imaginative kind, and when it occurs with evidences of returning regularity in the circulation and excitement.

The foregoing are some of the principal modifications of the congestive typhus, which have come within the limits of my observation; and it would perhaps be superfluous to attempt

a more detailed account of them, as all the forms of this variety of fever may be recognized by the depressed state of the heart and circulation; the uneasiness in the head; the anxiety of the præcordia; the peculiar condition of the temperature and skin; the total want of excitement, or its partial and unequal development; the suspended or vitiated secretions; and the local load, and general oppression.

It has been noticed, that a distended state of the venous system exists in the first stage of the simple typhus, yet so slight, as to give way to the occurrence of the stage of excitement, which comparatively equalizes the circulation. It has also been shown, that in the last stage of the same modification of fever there are sometimes certain degrees of venous engorgement about the viscera, resulting from the universally increased action of the arteries throughout the second stage, an action which forms no part of the congestive typhus. The congestive, therefore, differs from the simple typhus, first, because the viscera are far more engorged in the primary stage; and secondly, because, through the continuance of the engorgement, that stage is followed by a general collapse, without the intermediate one of regular and universal excitement, which not only partly characterizes the simple typhus, but which produces the occasional and partial congestions of its last stage.

If then the congestive so obviously differs from the simple, it may be inquired, in what does it differ from the inflammatory typhus? Universal augmentation of heat and excitement, attend the inflammatory, which are not the concomitants of the true congestive typhus, and which may be considered as the principal *external* distinctions between them. But, further, there is in the inflammatory, not only a general excitement of the arteries, but an increased accumulation of blood in the capillaries of the diseased part; whereas in the congestive, the force of the arterial system is not only diminished generally, but the whole venous circulation oppressed and particularly obstructed where the congestion exists. Agreeably to this view, we find that the blood in the inflammatory is almost invariably covered with a buffy coat; but such an

appearance is never observed in the strictly congestive, which seems to denote, that the size found on the crassamentum of venous blood, proceeds from the influence of a local or general change in the blood, originally occurring in the arteries. Moreover, the morbid appearances after death are different, the large veins in the viscera being greatly engorged with black grumous blood, in cases of the congestive; whereas, in those of the inflammatory, the capillary arteries of the membranes which invest the viscera are in general found principally affected, and the redness is diffused, and of a brighter colour. Still, however, it is only candid to confess, that this part of the subject is not altogether free from obscurity; for every experienced practitioner must know, that even in acute inflammations of the viscera, the action of the heart is sometimes so much oppressed, that the general excitement does not at all correspond to the danger and extent of the topical disorder. Possibly something similar may now and then take place in what has been called the congestive typhus, an actual inflammation, or rather perhaps an obstruction of blood in some part of the arterial capillaries, being masked under external appearances of a deficiency of general heat and of arterial tone.

The venous system is more immediately and chiefly concerned in the phenomena of the congestive typhus, and the arterial system in those of the simple and inflammatory typhus. Though the engorgements may exist in different organs in the congestive typhus, yet the large vessels about the right side of the heart, the veins of the brain and of the liver are the parts most frequently and seriously affected, and next to them, those of the spleen * and lungs. The most violent

* It is well known that the spleen may be extensively diseased without re-acting upon the system, except through its mere pressure on the neighbouring parts. This can perhaps hardly be said of any other internal organ of equal magnitude. Can this viscus be intended by nature as a receptacle for venous blood on those emergencies, which are liable greatly to disorder the circulation? And do its structure and situation seem fitter for such a purpose? The sanguiferous system abounds with precautions against venous congestion, and should the spleen be considered one of them? Dr. Rush, of

forms of the congestive typhus sometimes resemble apoplexy in their symptoms, to which indeed they often have a near affinity in their pathology. The balance between the arterial and venous systems is more or less disturbed in every instance of congestive fever; for there is more blood accumulated in the veins, and of course less contained in the arteries, than in a natural state. This loss of balance is especially observable on the skin, less blood circulating in the vessels of that part than common, while the central organs of the body are greatly engorged. It is perhaps to the preternatural fulness of the larger veins, that the lowness and oppression of the pulse ought to be attributed; at least it generally rises after depletion from the veins, which seems to restore the circulation to an equal state again. From observation and dissection, I am certain that venous congestion exists in many acute and chronic diseases, combined with a deficiency of arterial action; and that in such cases, contrary to the common opinion, a low, feeble pulse generally indicates, in the first instance, the propriety rather of depletion than of stimulation. According to the calculations of Haller, the veins in health contain three-fourths of the whole mass of blood, the remainder flowing in the arteries. The same admirable physiologist has declared, that the blood may actually coagulate, from the slowness of its motion, in the veins of a living person; and he has also pointed out the precautions which nature has used to prevent such an occurrence, by the free anastomoses of vessels, which guard against obstructions, and admit of opposite currents of blood. Probably the anatomist may find, in the peculiar structure of the venous apparatus of the head and of the liver, the cause why these organs should more often suffer in congestive fever than the rest. If we permit ourselves impartially to consider the vast importance of the whole venous

Philadelphia, formerly threw out some hints, in order to show that the spleen was an organ to preserve the system from great excitements of the heart and arteries, but is it not also adapted to guard against sudden congestions of the veins?

system, we shall perhaps be led to conclude, that its morbid states have by no means received sufficient attention; particularly in those modifications of febrile disease, where there is from the beginning an obvious want of tone in the heart and arteries, which has too frequently been mistaken for general debility, but which is often a state of oppression, proceeding from fulness of the venous system. The various modifications of congestive fever may be divided into the regular and the irregular; in the former there is no arterial excitement whatever, in the latter there are very partial arterial excitements, united with a general depression of the system. This discrepancy of character arises from the different degrees of the venous congestion. In the regular congestive fever, the topical accumulations of blood are so great as to overpower the natural energy of the heart; whereas, in the irregular congestive fever, they are not to such an extent, and consequently admit of some re-action, which would appear like an effort of nature to restore the natural balance of the circulation. In the first stage of the simple and inflammatory typhus, there is generally more or less rigor, which ushers in the stage of excitement; but I have hardly ever met with an instance of the true congestive fever, in which the first stage was accompanied with universal shivering. This might lead one to suppose, that the cold shivering fit was intimately connected with the production of the stage of excitement: more extensive observation, however, than I have yet been able to make, would be requisite to confirm this as a general fact.

In the simply excitive, and in the inflammatory forms of fever the action of the heart and arteries is increased, but in the congestive forms it is diminished; and this difference in the action of the heart, together with the high temperature of the two former, and the low temperature of the latter, constitutes the most distinct mark between diseases of excitement and congestion. The first shock, in the congestive forms of fever, seems to be communicated to the nervous system, and the heat of the surface being reduced, the blood retires into the deeper seated veins, and from thence is returned in preternatural abundance to the right side of the

heart; but as the power of the heart has been previously oppressed from the primary shock to the nervous system, it cannot completely rid itself of this superfluity of blood, and hence its action continues to be disturbed, and hence the return of venous blood from the brain, liver, and other organs must necessarily be so retarded as almost to stagnate in some places, when the shock has been severe. In examining the bodies of some patients who had died in the most concentrated attacks of congestive fever, I have found the right side of the heart loaded with dark blood; and in reflecting upon the phenomena of all, am now inclined to believe, that their pathology is intimately concerned with the functions of the right ventricle. For when the action of the right ventricle is diminished, and when it is overloaded by too great an accumulation of venous blood, it must by consequence occasion a remora of venous blood in distant organs; and a sufficient portion of red blood not being thereby returned to the left ventricle, its action also must be defective, and its blood perhaps not sufficiently oxygenized for the complete purposes of vitality. But if it be highly probable, that the right ventricle is closely concerned in the pathology of the congestive forms of fever, it is clear that the left ventricle is as much so in the simply excitive and in the inflammatory forms: for in both of these the force or the frequency of the left ventricle is greatly increased, and therefore greater quantities of blood than in health must be driven through the whole arterial system; so that if there be any previous obstruction or disturbance in any part of the capillary arteries, this obstruction or disturbance will now be augmented and become positive disease. It is, in fact, the increased action of the left ventricle, together with previously local obstructions or disturbances, which give rise to most of the topical inflammations which occur in all fevers; and the reason why no inflammation attends the simple forms of fever is, because the increased action of the left ventricle occurs in constitutions, the organs of which had been previously sound. If I had to fix upon any part of the body as more immediately involved in the production and continuance of fever, it should

be the heart ; and yet how little attention writers have paid to this organ pathologically, though almost all the remedies which we employ exert a favourable influence through their direct or indirect operation on the heart.

One striking difference between the congestive, and the simple and inflammatory forms of fever is, that the animal heat is diminished in the former, and increased in the two latter ; and as the heart's action is diminished in the one, and increased in the other, the difference in the degrees of temperature would appear to be connected with the difference in the action of the heart. But is there also a deficiency of electric matter in the congestive and an excess of it in the simple and inflammatory form, upon which the change in the heart's action and in the animal heat may partly depend ? And, if future observation should answer this query in the affirmative, might not the electric or galvanic matter be advantageously communicated to, or abstracted from, the body according to the character of the case ? In some diseases of general torpor attended with venous congestion and a deficiency of animal heat, I have known patients bear an accumulated force of the galvanic fluid with pleasure and advantage ; whereas in diseases of excitement attended with an elevation of temperature, the slightest charge was painful and prejudicial, so that the galvanic fluid became a test whether the system was in a preternaturally torpid or excited state. These facts, therefore, may render the above questions less unimportant than might appear at first sight ; and would not the peculiar, tingling heat on the skin, and the somewhat sulphurous taste in the mouth often seem to indicate, in the simple and inflammatory typhus, that the electric or galvanic fluid was passing out of the system ? It was once imagined, that amber alone contained the electric matter, and hence this science has obtained its name, from the Greek term for that substance : but since this fluid has been found to exist in almost every thing, it is highly probable that it performs an important office in the animate as well as in the inanimate world ; and as our knowledge of physiology and pathology extends, perhaps some great discovery will be made, through

the science of galvanism or electricity, in those yet obscure laws which exist between the nervous and vascular systems. It is a remarkable fact, that the animal heat cannot be long raised above nor sunk below the common standard without destroying that harmony of the system which constitutes health ; and this heat varies in some degree even in health, and it differs in different diseases, and in different stages of the same variety of disease, but after death the body becomes as cold as the objects with which it is surrounded. That within certain ranges of temperature, there is a greater degree of heat in living animals than in surrounding objects devoid of life, is evident to all ; and may not this be accounted for by the vital functions taking up, through the medium of diet and air, as much as may be necessary for the support of the economy ? There is a great difference between the effects which result from the vital operations, and the best constructed piece of mechanism ; yet perhaps the subject of animal heat may be somewhat illustrated by the facts observable in the working of an electrical machine. The whole appendages and body of this machine only contain that degree of electricity according to the respective capacities of each ; but when the machine is put in motion the fluid is much augmented, and part of it may be thrown off as it is formed, and if it be prevented from passing into other bodies, it may be still more increased. Is not this somewhat analogous to the animal body in a state of health, when by its vital movements it takes up and throws off those quantities of heat necessary for the maintenance and exercise of its functions ? Nay, is not this somewhat analogous to the animal body in fever, when the heat, by diminished secretions, is prevented from escaping, and consequently accumulates ? We frequently speak of heat being formed in the system ; but if in this case we mean any more than when we speak of the formation of the different fluids of secretion we surely deceive ourselves. What is it, then, that we do understand by the formation of such fluids ? We understand nothing more than that they are produced from the blood by some unknown operation, and this operation is constantly supplied by diet and air, as the electrical machine is supplied

from surrounding objects. When we speak, therefore, of the formation of animal heat we can only mean, that it is produced by the modifications which the caloric undergoes when received into the system, and when co-operating with those materials of air and food with which it may have affinities in passing through the body. It is allowed on all hands, that we do receive caloric from the whole of our aliments, and from the air which we inspire, not to mention other probable sources. Now caloric taken up this way, diffused through the whole system, and thrown off by the exhalants, maintains such a constant succession as keeps the quantity of heat necessary for the purposes of life; and when in disease there is too high or too low a degree of animal heat, it will be found an object of the first importance to restore it as nearly as possible to the natural and uniform state, particularly in the simple, inflammatory, and congestive typhus.

Since the first edition of this work appeared, typhus has prevailed in many parts of the united kingdom, and many valuable facts have been published on the subject, strongly confirmatory of the doctrines which I had previously laid down; and indeed one able author, who has seen much of the disease, has done me the honour to adopt the whole of my arrangement, and another has taken the two first divisions as the basis of his pathological principles. Still however it seems to me that there is too great a tendency to consider, like Erasistratus of old, the febrile affection as purely one of inflammation under all its varieties; and some, whose talents and experience claim the highest respect, would limit that inflammation to a single organ. But though I admit that the brain is exceedingly liable to be affected in typhus, yet repeated observations and dissections have as forcibly convinced me, that other parts are apt to be implicated in the inflammatory state; and I have seen thoracic but particularly abdominal inflammation in typhus proceed to a fatal termination, without any inflammatory affection of the brain or even of the spinal cord. Dr. Beddoes, whose anatomical researches have been so extensive in fever, states, as the result of those researches, that the abdominal viscera are more frequently affected than the

rest; and this I believe is peculiarly the case in those fevers which proceed from marsh effluvium, and certainly the same parts often suffer in contagious fevers. But in fixing upon no particular tissue as the seat of fever, in not limiting its character merely to inflammation, but in tracing its effects through all the body under a simple, an inflammatory, and a congestive variety, an approach it is hoped has been made towards a more correct generalization of the leading phenomena of typhus and other febrile diseases, as shall afterwards be more fully elucidated. As typhus, then, has three remarkable modifications, it may not be superfluous, before concluding its pathology, to inquire whether any of these modifications has a natural tendency to terminate on particular days. The doctrine of critical days, notwithstanding it is said to be founded entirely on observation, was probably in some degree connected, as Celsus has hinted, with the Pythagorean philosophy which, attaching so much consequence to numbers, had many followers in the ancient world; and though Celsus was one of those cautious, temporizing men, who seldom venture to give a decided opinion on disputed points, yet in regard to the doctrine of critical days, he has deviated from his usually middle course, and opposed it with considerable decision and ingenuity, in despite of his veneration for Hippocrates. Several of the greatest men, as if to bring themselves to the ordinary level of humanity, have shown much weakness on particular topics; and the emanations of their minds have been often tinged by the surrounding superstitions of their respective ages. By these hints it is not meant to insinuate that Hippocrates could have been wholly mistaken as to critical days; for on the shores of the Mediterranean and similar regions, the common febrile affections are more periodical than in our country, a circumstance fitter to give a strong colouring to his doctrine. It may be noticed in the works of Hippocrates, that the crises in his cases were almost always attended by some evacuation, as hemorrhage, diarrhœa, and particularly sweat. There can be no doubt but each of these evacuations, from whatsoever cause proceeding, are often accompanied with some remarkable change; but that they generally occur