crepant from what has been denominated the common continued fever, it may be proper next to examine the difference which exists between it and that disease which derives its exciting cause from the accumulation of human beings under certain contingencies.

When a great many persons are confined together in too small a space without proper ventilation, when they allow that space and themselves to be loaded with filth and offensive effluvia, the local atmosphere is so liable to be tainted as to become an exciting cause of fever to those who breathe it ; and its influence will be more extensively felt if those who are surrounded by it should be badly fed or have anxious minds, as these, by debilitating, predispose the body to the operation of the exciting cause. Many examples might be found where a fever seems thus to have been generated, especially in jails and camps in which cleanliness and ventilation had been neglected ; and I have been credibly informed that such have occurred in the holds of ships at sea, though probably they are comparatively rare in those situations from the motion, volume and freshness of the air outside, which must necessarily ensure some ventilation within. The fever which I have seen produced by the combination of circumstances here specified, has a resemblance to typhus, and is often attended with petechiæ from an early period of its appearance ; but it was marked by a most profound prostration of the appetite, while the brain was much less embarrassed than in typhus, and the constitutional disturbance rather indicated a low fever of irritation than of phlogistic excitement. From the agency of fresh air, purgatives, sub-acid drinks, tepid ablutions, and a light diet of bland vegetable liquids, the petechiæ in general rapidly receded, and convalescence was speedily established. Indeed in this as well as in the common continued fever, the disease could very often be cut short by proper treatment at any stage of its duration ; but this is not the case with typhus, which having once existed for a few days will generally hold a determinate course, in despite of every expedient. This fever of filth and noisome effluvia, is not of a contagious nature, at least so far as my limited observation reached : for I

have not known any patient removed into a pure atmosphere infect another person, and this has often occured to me in typhus. A distinction has been attempted to be made between *infection* and *contagion*, and in a certain sense this distinction is assuredly justifiable. An atmosphere may be said to be *infected* when it excites fever in those who are exposed to it without communicating an attribute to that fever by which it can propagate its kind indefinitely from the first to second and third persons. It is thus that the marsh and similar effluvium might be termed an *infection*, and it is also thus, I suspect, that we have many other peculiar states of the air, yet unascertained, states merely the exciting causes of fevers, which do not generate *contagion*, an essence capable of maintaining itself by successive re-productions in those upon whom it operates.

The states of the air just alluded to as the exciting cause of febrile disease may be limited or extensive, as for example in the tainted precincts of an hospital or house in the one instance, and that peculiar constitution of the atmosphere in the other, in which a non-contagious disease rages epidemically and widely. With respect to the former it is well known, that attacks of erysipelas are more common in hospitals than in private houses, so much so in fact, that I have known few patients escape at certain seasons of the year : even in private houses, catarrh will sometimes seize those members of a family successively who had been most confined within doors, while those escape who are much abroad ; and yet both in such cases of erysipelas and of catarrh I have never been able to satisfy myself, that either spread by contagion, but have rather imputed them to some local and common taint of the air. It would indeed be a most important thing if it could be fairly inferred from impartial observations on the sick, that an erysipelas, catarrh, or common continued fever originating from some such ordinary cause as cold, generated in their course specific contagions, which afterwards produced erysipelas, catarrh, or typhus in others ; for then by most attentively noting the circumstances under which an ordinary became a peculiar disease, we might probably prevent the final formation of the contagious principles, by instituting necessa-

ry and perhaps now neglected precautions; while the conflicting evidences which have so long agitated the medical world might at last be set completely at rest. Few men have entered upon the question of contagion quite unprejudiced, and many have sought for facts merely to confirm some speculation first framed in the closet; so that it is not likely for me entirely to have avoided a bias which has influenced the opinions of men so superior for talent and attainment. All the observations, however, which I have been enabled to make incline me to believe that a fever is never contagious except it originates from a *specific* cause; and hence I am inclined to doubt the commonly received opinion, that diseases proceeding from an ordinary cause may become contagious in their course, from the influence of internal or external circumstances. Yet I wish it to be distinctly understood, that I do not speak positively respecting this subject, but would rather leave it to be settled by future inquiries, when more minute and extensive facts shall have been accumulated. To assert, as one able author has done, that no combination of external or internal circumstances can generate a contagion which did not previously exist, is surely to pre-suppose, that we are acquainted with all the internal and external combinations which can take place—an extent of knowledge which we do not and shall never possess; and since it is most consonant with the principles of philosophy to suppose, that contagions were originally formed by the combinations of internal or external circumstances, it is but fair to infer that the known ones might at some æras be thus formed anew; as combinations which had once occurred appear to have a greater chance of occurring than not of occurring again, in the circle of ages in which the world may be destined to revolve. No disease has embarrassed me more than what is denominated the puerperal fever, having known it to occur sporadically in some cases where it could not be traced to contagion, in others epidemically where the influence of the atmosphere as well as contagion might have justly been suspected as causes, and again in a third class of cases, in which a tainted state, a mere local infection of the atmosphere which the women breathed, really seemed to excite the disorder. Now if the puerperal fever be defined, an affection of child-bed attended with a general disturbance of the functions, an increase of the animal heat, an acceleration of the pulse, and evident or obscure symptoms of abdominal inflammation, these symptoms might arise from cold or other ordinary cause in one instance, from an epidemical constitution of air in another, and from contagion in the third; for the first operation of each of these causes would be a general shock to the system by which all the functions would be disturbed, and the abdominal inflammation would arise as a common effect of these different causes, because the peculiar state of the peritoneum and attached organs, would in all give a strong tendency for the main force of the ultimate excitement to be concentrated there. Nevertheless if the preceding views be correct, none of these cases in all probability would be propagated by contagion, except that which actually originated from contagion; and from careful reflection on the facts which have come before me I am led to think this conclusion true concerning the puerperal fever, and strongly suspect, that when contagious it is nothing but the genuine typhus modified by the puerperal condition. In corroboration of this last opinion, I could adduce some examples which appeared to be contagious, and which, in combination with the abdominal symptoms, had many of the pathognomonic signs of pure typhus; but this would lead into too long a digression, and I merely throw out these desultory hints, in order that we may be led to ascertain whether typhus ever be identified with any of the modifications of fever occurring in child-bed.

We know little or nothing in regard to the peculiar constitutions of the atmosphere in which certain non-contagious diseases epidemically prevail, nor indeed of those constitutions which favour or suppress diseases actually known to be contagious. Chemists have told us, that the atmosphere of our globe is composed of three ingredients, namely oxygen, carbonic acid gas, and azote; and they have satisfactorily shown us many curious properties of the two first, but they seem to have almost forgotten that to denote the remainder

of the atmosphere by the term azote is a mere covering for ignorance. When we recollect the infinitude of chemical and mechanical changes which are constantly taking place upon the earth's surface, common sense at once informs us, that this azote, this *caput mortuum* of chemists, must necessarily be composed of a vast many things; and it appears to me exceedingly probable, that the various admixtures and decompositions of these things, together with the electric states, heat and density of the air, may be concerned in the production of those atmospherical constitutions in which epidemical distempers rise or decline. At all events, it is desirable, that we should endeavour to analyze that curious compound called azote, by ascertaining the many subtile particles mechanically suspended in it, and the many gaseous effluvia with which it must be mixed, since from such an analysis some new light might possibly emanate. If we also endeavoured to note in conjunction, more narrowly than has yet been done, the fluctuations and influence of the winds, the air's range of temperature and density, its comparative dryness or moisture, with the electric conditions both of the earth and atmosphere where epidemical diseases rage, perhaps we might at last penetrate into some of the secrets of that dominion which the elements exercise over us, and might even be enabled to narrow its influence; as from having ascertained the state of things, under which intermittent and remittent fevers arise, we have lessened their frequency by the draining of marsh land, and even considerably limited the extent of various contagions by having ascertained that their activity depended upon certain circumstances of concentration, and that they might be rendered innoxious by ample dilution with fresh air. Some able authors, however, seem to me to simplify the subject of contagion too far when they assert in unqualified terms, that a person can never be infected from the sick but within the distance of a very few feet; for, notwithstanding what happened long since at certain assizes, I have met with some facts which would prove, that contagion can occasionally pass the narrow precinct which has been imposed, and, like marsh effluvium, maintain its power for a time in a partial current

of wind. Happily for the world contagious diseases cease after a certain period from some unexplained alteration in the air, but unfortunately they seem to leave germs behind them scattered far and wide, which again bring forth their baneful fruits in another and distinct constitution of the atmosphere; and it is only this way, that we can explain the rise and decline of some epidemics constituting epochs as eventful in the physical, as those marked in the politic history of man by the eruptions of war, in which his hopes and his happiness have been alike subject to sudden wreck and desolation.

But from what I have observed of the progress of the present epidemic, I should be disposed to believe, that many an epidemical disease hitherto recorded has not simply consisted of one, but of several affections, especially those epidemics which took place in times of public distress when various exciting and predisposing causes would be brought necessarily into operation. Whatever may have been the case in the past periods, certain it is, however, that what is now called *the* epidemic, which has raged in various places for the last three years, is chiefly composed of typhus, the common continued fever, and a low fever of irritation arising from filth and defective nutriment. During most of this term, great depressions have taken place in manufactures and commerce, and the shock has also been communicated to agriculture; so that much physical and moral suffering has existed among the lower orders of people, whose bodies have thereby been rendered exceedingly susceptible of the influence of all those causes, whether specific or common, which produce febrile affections. From the writings of Dr. Cheyne, Percival, and other men of the sister kingdom, whose labours have lately shed so bright a lustre over medical literature, it would appear, that many of the cases in Ireland were not referrible to contagion; and the same has not only been the case in England within the sphere of my observation, but the characters of the different febrile affections, already enumerated, have been so distinctly expressed, that they could not be well confounded when compared together at the bed-side, and besides many could be traced to contagion, and many to ordinary

causes.* Typhus has been distinguished from the common continued fever as well by the contrast of many of the symptoms before mentioned, as by a more profound and protracted relaxation on the subsidence of the excitement: and as for that fever of irritation principally arising from deficiency of food, cleanliness, and ventilation, it has mostly been ephemeral where the patients were early removed into a pure atmosphere, and where it occurred in habits free from chronic disorders or latent weaknesses of the internal organs. These three affections here enumerated having been often blended in one general description by medical writers, it would be highly interesting to mark their peculiarities more particularly, and to trace their treatment as it requires to be modified by the constitutions and situations in which they take place, by the nature of their exciting causes, and by the common and proper effects of those causes; but these points I must leave to the investigation of others for the present, and endeavour to prosecute the inquiry of the common continued fever, for the topical affections with which it is liable to be combined, so far from being limited to the brain, have an extensive range of character, like those of typhus.

Whenever fever is ushered in by any thing like a cold stage, local inflammation is the effect of the subsequent excitement, and its seat is mostly determined by the previous state of the organ attacked; so that if several individuals were exposed to the same general shock, the brain might suffer in one, the lungs in another, the stomach in a third, the liver in a fourth, and so on, according to the respective conditions of these parts at the time when the exciting power was applied. The causes before enumerated in the common continued fever are well known, in the varied phenomena which they produce, to lead to inflammations of the viscera; and if we consider the proximity of the brain to the heart, and its abun-

* From a mistake, all the cases in the Seventeenth Report of the Fever Institution were put down as typhus, whereas it was intended that they should have been put under the denominations of typhus and common continued fever.

dant supplies of blood, we cannot wonder to find it fully as liable as other viscera to inflammation. Indeed if it were not for provisions in its arterial and venous apparatus it would probably be more liable to inflammation. The carotid arteries, on entering the skull through their canal, suddenly change from the perpendicular, and make an almost horizontal turn inwards. After having left the canal, they again change their course, proceeding upwards and forwards by the sides of the sella turcica, and at the anterior clinoid process, make a third turn obliquely backwards and upwards. The vertebral arteries are partly tortuous from some of the holes in the cervical vertebræ not being directly opposite; they enter at the foramen magnum somewhat similarly to the carotids at their canal, and form, with their branches, the circle of Willis, where there must be a collision of currents. These circumstances strongly guard the brain from sudden gushes of blood on great increases of the heart's action. But this is not all in the way of precaution. The branches of the arteries are not, as in other organs, at once ramified through the substance of the brain, but distributed minutely through the pia mater, from which as from a protecting medium they are transmitted, in the form of infinitely fine capillaries, into the proper brain; and, as if still more effectually to provide against the chances of pressure, the brain has numerous convolutions, into which the pia mater conveniently dips, and which of course afford considerable space, without disturbing the brain, for certain degrees of vascular distention in that membrane. The venous circulation of the brain is equally curious, for the veins are not, as in other organs, ramified through its substance along with correspondent arteries, but they are gathered into the pia mater as into an intermediate network, from which they convey the venous blood into the sinuses; and the sinuses themselves are really outside the brain, so that the interior of that organ is most remarkably protected from disorders of venous circulation, which literally only take place in the pia mater, or in the sinuses, where so much room is prepared for temporary disturbances.

One office of the brain appears to consist in the concentration of impressions from the sentient extremities of the nerves, and therefore general shocks are apt to affect some or all of its functions, often in a manner which we are at present wholly incompetent to explain. In modern times, however, no less than four aspiring authors,* have boldly attempted to solve the difficulties with respect both to certain disturbances of the cerebral functions and to fever, by assuming that inflammation of the brain is the cause as well of the former as the latter; but though it would be as reasonable to place the seat and cause of fever solely in any other viscus, yet certainly the brain is often consecutively inflamed, insomuch that sub-acute or acute phrenitis is frequently found to constitute an important part of the common continued fever. What has been called hydrocephalus internus is generally an inflammatory affection of the brain, and as this affection usually occurs, it may be considered a mere symptom or consequence of the common continued fever; but it may also arise in the progress of many other diseases, and hence I have sometimes found fluid effused into the ventricles of the brain, in measles, in scarlet fever, in typhus, and in hooping-cough. It is a great mistake to suppose, that hydrocephalus internus is confined to children, for I have met with it in patients of all ages, as the result of an inflammatory state of the cerebrum, induced by various causes; but unquestionably this disease happens oftenest in children, because in them inflammation of the brain most frequently does not destroy life until effusion has taken place, whereas in adults inflammation of the brain most frequently does destroy life before effusion takes place. This difference often necessarily modifies the character of the disease as presented in children and adults. Viewing hydrocephalus internus as an inflammatory affection of the brain, it occurs under two varieties, one in which the local irritation is established first in the brain, another in which it is established in the chest, belly, * or even on some external part; and the distant irritation primarily increases the heart's action, which disturbs the circulation of the brain where that organ is at all predisposed to disorder, just as it would disturb the circulation of any other part similarly predisposed. This is the true explanation of most of those diseases, whether chronic or acute, which are technically said to arise from the sympathy of one part with another. If an irritation be established, no matter where, sufficient to disturb the heart's action, that disturbance of the heart in its turn implicates the weakest organs by sending unusual quantities of blood to them, by which their circulation becomes disordered. Those physiologists who would wish to persuade us, that the heart is but little under the influence of the nervous system have only to attend to the phenomena of many diseases to be convinced of their error: for no irritation of consequence can long exist without operating on the heart, and as that is the only moving power in the body, every change in the force or frequency of its action must necessarily influence other parts, with which it is so inseparably connected by arteries and veins; and if the circulation of any of those parts had previously or even simultaneously acquired a tendency to disorder by some interruption, distention, or diminution of tone, there the topical disease will be palpably developed, there the circulation, in fine, will be most signally disturbed.

There is, however, one form of hydrocephalus internus which in not inflammatory, and which cannot be explained on the law which has just been laid down in reference to irritation; and as this form of the disease appears to have es-

* In 1785, Medical Sketches were published by Richard Pew, in which the doctrine is distinctly laid down, that fever depends upon inflammation of the brain. Many years afterwards, in consequence of the publication of Dr. Clutterbuck's able treatise, Dr. Beddoes made us acquainted, that Plouquet had taught a similar doctrine; and latterly, the enlightened Editor of the Journal of Foreign Medicine and Surgery, has shown us, that this was the avowed opinion of Marcus.

* Dr. Cheyne and Dr. Yeats have shown, in their enlightened productions, how often hydrocephalus internus follows disorders of the abdominal viscera, and other practitioners have published many facts illustrative of the same point.