

## APPENDIX.

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*Some additional observations on the origin, nature, and prevention of Typhus Fever.* By JOHN ARMSTRONG, M. D. Physician to the London Fever Hospital, and Lecturer on the principles and practice of physic.

As circumstances have occurred which will delay the publication of an advertised work which I have long been preparing for the press, and as typhus fever has again made its appearance in Ireland, it is incumbent upon me now to lay before the profession the result of my researches, in regard to the origin of that malady; and if the inferences, which I have most deliberately drawn from an extensive collection of facts, be correct on this important subject, they will lead to clearer views respecting the real nature of typhus fever, and to more certain and efficacious means respecting its prevention.

In 1819, I attended a patient labouring under an intermittent fever, which, in its progress, put on a remittent character, and that again assumed the continued character, but with all the most malignant signs of what is usually denominated typhus fever.— This case made a very deep impression upon my mind, and it then occurred to me, for the first time, that intermittent, remittent, and typhus fever, might, possibly, be modifications of one and the same disease, and that, possibly, the strong prejudice of education, and my own inherent pride, might have hitherto prevented me from investigating the primary source of this disease, with that simplicity and purity of mind, which the science of medicine requires. Up to this period, I had firmly believed, that human contagion was the sole cause of genuine typhus fever, but a doubt having been thus excited, I determined, if possible, to leave my mind free from all bias for the future, and then endeavoured to commence my inquiries respecting the origin of typhus fever, as if I had previously known nothing of the subject. Nearly three years have now elapsed, and within that term a very great number of cases of typhus fever has fallen under my observation, and I have spent much time in accurately recording their symptoms, and in endeavouring to deduce legitimate conclusions, not only from them, but from the various circumstances with which they were connected in their rise and progress. This investigation has most decidedly led me to the conclusion, that what the Italians vaguely call *mal aria*, and the English, as vaguely, *marsh effluvia*, is the primary source of typhus fever, and I will now state the substance of the facts upon which this proposition is so confidently advanced.



First, The intermittent, remittent, and what is called continued typhus fever, pass or repass, into each other, as numerous cases in my possession indisputably show; and, secondly; the remittent fever, from *mal aria* or *marsh effluvirium*, has a combination of symptoms exactly similar to those which occur in continued typhus fever, and which, *as a combination*, occur in no two other affections whatever, so far as I have been able to ascertain from the most minute examination. But some remarks will be necessary fully to illustrate this particular and most important point.

The intermittent fever is marked by a successive cold, hot, and sweating stage, followed by an intermission, and occurring again after a certain interval. All medical writers allow, that what is called the marsh remittent fever is a modification of the intermittent, though in the former, the cold stage is absent; and indeed, we so frequently see these affections exchange characters, as to leave no doubt on the subject. The relation between the remittent and the intermittent is not more intimate than the relation between the remittent and continued typhus; so that if I were now obliged to make a nosological arrangement, I should call the disease intermittent, remittent, or continued typhus, according to the type which it assumed. In tracing the history of many of the cases backward of remittent or continued typhus, I have found that they commenced as intermittents, and I have seen many cases of the remittent run into the continued typhus; and on the contrary, I have known the continued typhus become remittent or intermittent. But though the continued, remittent, and intermittent forms of this disease constitute its leading varieties, yet each of these forms is occasionally liable to certain deviations in its course, which cannot be correctly arranged under any systematic divisions of the schools. But at present I shall not allude to these occasional aberrations, as my main object is to establish the identity of marsh remittent, and continued typhus fever, and therefore I shall examine each under the symptoms which they observe in their regular and unequivocal forms.

The remittent form, as it occurs in this country, it always attended by a simultaneous affection of the brain, mucous membrane of the air passages, mucous membrane of the alimentary canal, and of the liver; and this peculiar combination of symptoms is accompanied by as peculiar a lassitude of mind and loss of muscular power. The affection of the brain, among other signs, is denoted by a dropping of the upper eye-lids, which, therefore, cover a larger portion of the globe of the eyes than natural; while the eye itself is more glary than in health, and yet it conveys an expression of dulness or indifference of mind, so that there is a remarkable mixture of physical brightness and intellectual muddiness in the expression of the countenance. It is difficult to convey this mixed expression in words, but any practitioner who has once seen it could hardly mistake it again. The affection of the lining of the air passages, is partly marked by some preternatural-

ly purplish hue of the lips, attended with more or less huskiness of the voice, more especially observable when the patient coughs; and the cough is usually slight or severe according to the degree of the affection of the lining of the respiratory passages. The affection of the mucous membrane of the bowels and of the liver, is generally marked by the evacuations from the bowels being mixed with glary mucus and dark bile, which often resembles brown melted resin. There is also frequently some obscure abdominal uneasiness on pressure, especially about the pit of the stomach. The tongue is covered by a dirty whitish fur in the centre, and its edges are usually redder than natural; but in the progress of the disease it often becomes brownish in the centre, and the breath, more particularly in cases of the continued type, has almost always a peculiarly sickly odour.

The lassitude of mind, and the prostration of strength, are closely connected with the state of the mucous membrane of the air passages and the affection of the brain; for the lassitude and languor are always the greatest in those cases where this combined affection is the most strongly indicated. This lassitude and languor are also remarkably indicated by the voice, manner, position, and motions of the patient. The remissions, when distinct, occur under two circumstances. The patient either becomes gradually or suddenly hot; and the hot paroxysm most frequently comes no towards evening, continues through the night, and terminates commonly towards the morning, the skin at that time becoming moist and moderately warm, or quite cool, but not moist; while the pulse in both instances becomes slower, softer, and of less volume than during the hot paroxysms. Now the only difference between the remittent fever and continued typhus fever, is, that in the latter, as it appears in adults, the symptoms are more severe, and the remissions are entirely absent; the skin being hot or warm, and the pulse quicker than natural during the whole day and night, though even in that form, the pulse and heat are highest at the latter period.

The combined affections, then, of the brain, lining of the air passages, lining of the alimentary canal, and of the liver, together with a peculiar lassitude and languor, are the true diagnostic signs of the remittent, and continued forms of typhus fever. Other parts may be and sometimes are simultaneously affected, but, if we except the spinal cord, the affections of those parts are not essential, but accidental occurrences. The continued form of typhus in particular is liable to considerable variety in its expression, as the disorder may predominate most in the brain, lining of the air passages, lining of the alimentary canal, or in the liver; but still an accurate observer cannot fail to recognise the diseases from the coincidence of the above signs, though they may be slight or severe. The morbid appearances also are correspondent to the symptoms, for dissection in mortal cases shows the



remains of some disorder in the circulation of the brain, lining of the air passages, and lining of the bowels, varying considerably in degree; but it is curious, that though the secretions of the liver are so generally disturbed during the progress of the disease, yet seldom any traces of organic mischief are exhibited in that organ. Certainly one of the most remarkable peculiarities of typhus, particularly under its continued form, is the affection of the mucous membrane of the bronchia; and I could show, from many facts, that it is the main cause of the varying degree of heat, of muscular and mental disturbance, and that it not only gives rise, in the advanced stages, to the peculiar dryness and darkness of the tongue, but that it is connected intimately with those symptoms which have been termed malignant, and which the older writers found so difficult to explain on any thing like rational principles. The want of due decarbonization of the blood is the cause of many of the most remarkable symptoms attendant on typhus; but the degrees in which this process is impeded are not always proportionate to the degrees of mucus accumulated in the bronchial tubes, and spread over their lining; for in some instances the secretion on the tongue, and on the fauces, is a sort of sticky varnish, and this same secretion, seemingly, exists occasionally on the mucous membrane of the respiratory passages, when little mucus is, comparatively, accumulated there. Blood, not duly decarbonized, operates more or less as a narcotic on the brain, and tends materially to influence the animal heat and the heart's action; and hence partly arise, in the progress of strongly marked cases of typhus, the muddled state of the brain, the smothered heat of the surface, and the soft compressible pulse, which become its concomitants, however high the excitement may have been for the first three or four days.

It might be interesting to know, why in one person typhus assumes an intermittent, in another a remittent, and in a third a continued character. Perhaps this may depend upon two circumstances; first, upon the degree of concentration in which the poisonous miasm is applied, and, secondly, upon the condition of the body at the time of its application. If the miasm be applied in a low degree of concentration, or if it be applied to a subject whose internal organs are sound at the time, it seems to produce an intermittent fever; but if it be applied in a very concentrated form, or especially if it be applied to a subject whose internal organs are weak, then it puts on the remittent, or the continued character; for I have ascertained, beyond doubt, that the remittent and continued form of typhus are complicated with internal inflammation, separately or combinedly, in one or other of the four parts before specified, the inflammation being more intense in the continued than in the remittent typhus. Internal inflammation, then, is probably the immediate cause why typhus puts on the remittent, or continued character. In large towns, but

particularly in London, the *mal aria*, or marsh effluvium, as it is too vaguely called, is probably applied in a much more concentrated state than in country districts, owing to the close, crowded, dirty, and ill-ventilated state of the habitations of the poor. The poor themselves in London, too, on account of their more dissipated habits, and the more anxious condition of their minds, have very often latent weaknesses about the internal organs: hence, when they are exposed to the influence of this *mal aria*, or marsh effluvium, the subsequent shock most frequently gives rise to some visceral inflammation, and hence the disease so very often assumes the remittent or continued type in the metropolis; though I have facts to shew that the intermittent form of the disease is more common than many practitioners imagine.

The only objection, which has struck me, to this view is, that the miasma which produces the intermittent form may be originally human, and not marsh miasma, because the ill-ventilated habitations of the poor will as certainly confine the effluvium of the human body as it will marsh miasma. But after the immense body of evidence which Dr. Bancroft has collected, to shew that human effluvium, however concentrated, does not produce typhus or contagious fever, it seems much more philosophical to conclude, that it is the concentration of marsh, and not human miasma, which originally produces this disease. Besides, it is an important fact, that if the earth be bound up for some days by a hard frost, typhus fever ceases to exist in districts where it before prevailed, though the people are then as much, or even more crowded together, which shows that something is necessary for the generation of the cause of this peculiar disease, different from human effluvium.

The intermittent form of the disease, too, arises in situations where there is no reason whatever for suspecting the existence of human contagion, as, for instance, the well-known places in various parts of England. The same remark as forcibly obtain in regard to the remittent form of the disease, which abounds in some places where the poisonous exhalation of the earth is known to prevail; and as the continued form of the disease is only an aggravated one of the remittent, as it has all its peculiar, pathognomonic, distinguishing signs, which do not, combinedly, exist in any other disease, the identity of the continued with the remittent form of the disease appears to me satisfactorily established.

It is, I know, a common opinion, that what is called, in general terms, fever, varies so much in its expression, that its characters cannot be delineated so as to present kindred and cognizable features: but all the observations which I have made respecting disease, lead me to the conclusion, that the same causes always present similar results under similar circumstances. Only, for example, ascertain the various forms which small-pox assumes, and the various circumstances under which those forms occur, and it



will be found that they observe certain and regular laws. It is so with respect to all other diseases, but particularly so with respect to typhus fever, the symptoms of which are as strikingly uniform, in its leading varieties, as those which occur in small-pox, or in any other disease known to proceed from one specific source.

The effects of *mal aria*, when connected with fever, are according to my observation, as uniform, as the effects of the peculiar matter of small-pox, when that disease is connected with fever; and this identity of regular effects is as strong a presumption of the identity of the cause in the one as in the other. If it were taken for granted, by way of argument, that the peculiar matter of small-pox, like the peculiar matter of typhus, primarily arose from a source entirely external to the human body, it then might be urged, that as the former still produces the same regular effects when it has passed through one body to another, so something similar ought to occur in regard to *mal aria*, if that be the primary source, not only of intermittent and remittent, but of continued typhus fever. That *mal aria*, as a morbid exhalation of the soil, produces intermittent, remittent, and continued typhus, I have abundant facts to shew, which shall be given in detail at a future period; and as I have met with the distinctly remittent and continued form of the disease, in persons who had been, to all appearance, decidedly infected from others labouring under continued typhus, the parallel between small-pox and typhus would still seem to hold good, even under such a point of view. Since my attention, however, was fully awakened to the primary source of typhus fever, the unequivocal cases in which one patient appeared to me, unquestionably to infect another, have not been very numerous, and if they had, I think it probable that some of them would have put on even the intermittent type, if I might form an opinion from what I have remarked of those cases which primarily arose from the *mal aria* of the soil.

Both the peculiar matter of *mal aria* and the peculiar matter of small-pox produce a greater diversity of symptoms than systematic writers have described, because the effects of both are influenced by circumstances which those writers have not taken into account, and which still afford an ample field for investigation; but I here only wish to reason from the more constant and regular effects of each, as they have been presented to me in this climate, since these effects are the most obvious, and, therefore, the best fitted for the purposes of the present exposition.

The causes of all acute diseases are common or peculiar; and if we accurately trace the effects of those which are peculiar, we may always select and arrange some which constantly arise from each peculiar cause, and which thus enable us to ascertain the existence and operation of that cause with great precision.

From the explanation which I have given of the origin of typhus fever, it is natural to inquire whether or not it be conta-

gious. With respect to this circumstance, I also resolved to be entirely guided by the facts which came before me; for as soon as I satisfactorily discovered that I had formerly fallen into an error respecting the primary source of typhus fever, it became quite necessary to guard myself against that enthusiasm which so often makes converts pass from one extreme to the other. On mature reflection, however, I could not help perceiving, that what I formerly considered as decisive or probable proofs of the contagious nature of typhus, had not really the force which I then ascribed to them; for example, when I saw one person attacked with typhus who had visited another labouring under that disease, or when I saw person after person attacked in the same house or situation, I imagined that this circumstance formed a strong, nay a decisive evidence, in favour of the disease propagating itself from person to person; but it must be apparent, from what has been said, that this particular circumstance meets with as satisfactory a solution on the principle that the persons thus affected had been, in their turn, exposed to the *mal aria*, or marsh effluvium, by which the first had been affected. Indeed I have every reason to believe, that great numbers are actually affected in this manner who live in the same house or district, as the disease so often commences with the intermittent or remittent form; but, at the same time, it is right to confess that facts have fallen in my way which have led me to conclude, that the disease, under some circumstances, does propagate itself by contagion. Speaking from my own observation, I could not take upon me to say confidently, that the distinctly intermittent or remittent form are contagious; but I have met with cases, where the continued form of the disease, in which the secretions are the foulest, certainly appeared to propagate itself by contagion.

Among others which I could adduce, I will mention one instance for the sake of illustration. A very respectable woman, who performed the office of a nurse to some patients labouring under typhus, was assisting one of them from the night chair, and she became sick at the stomach, and faintish, from the offensive odour of the evacuation which he had just passed from the bowels. From that time she drooped, and in a few days afterwards had a severe attack of continued typhus, characterized by its peculiar combination of symptoms. This is a striking instance, and I have met with some others which were equally, or even more striking. The probability is, that its contagious or non-contagious nature is dependent, first upon the quantity, or concentration of miasm thrown off from the body; and, secondly, upon the closeness or openness of the situation in which the patient may be placed; at least the result of my observation would go to prove that its propagation by contagion, or non-propagation, is almost entirely dependent upon surrounding circumstances.

Several cases have come before me which have appeared to