

Original Communications.

ON DIPHTHERIA.

By J. WEST WALKER, M.B.Lond., Spilsby,
Lincolnshire.

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Prognosis. The diphtheritic complication manifests itself only during the extensive prevalence of the miasmatic order of zymotic diseases. Extensive prevalence of such diseases is almost invariably attended by great mortality: hence, the presence of the diphtheritic sign is, by a defective process of ratiocination, supposed to have a direct connection with fatal consequences, and is always looked upon as a ground for unfavourable prognosis. Notwithstanding the weakness of the logic by which the conclusion is arrived at, it may for practical purposes be considered sufficiently satisfactory and safe. It is, however, only that kind of questionable safety which is had recourse to by those who, not willing to engage in active scientific warfare, are content to err on the safe side. As in diagnosis, so in prognosis, it is far more satisfactory to analyse each particular case, and ground our opinion upon the indications derived from the formation and upon those derived from the general symptoms, separately and collectively. If we except the fear of septicæmia, supposed in some cases to be brought about by the absorption of putrid matter, almost the sole danger from the presence of the formation is mechanical; and when it appears in the larynx, or shows a disposition to spread into that tube from above, it must ever inspire us with unpleasant forebodings. "The least laryngeal quality in the respiration heard at the bedside is suggestive of danger" (Aitken). Our prognosis, to be derived from the general symptoms, must be grounded on a great diversity of conditions and circumstances. In every case we must take into account: 1. The nature of the general disease; 2. The variety or type; and 3. The condition of the patient, not only with regard to age and the general hygiene of his surroundings, but more especially as to the presence of blood-taint, scrofulous, syphilitic, and the like, which, other things being equal, furnishes a very important item in the calculation of chances for or against recovery. The fact that great prevalence of miasmatic diseases is almost invariably attended, as before observed, by great mortality, requires us during such epidemics to be ever on our guard on the subject of prognosis. We cannot too closely watch our patient; and any symptom or series of symptoms appearing indicative of tendency to death, by either of the well known modes, ought at once to be recognised, and their terrible importance duly appreciated. Symptoms significant of irregularity or of want of power in the heart's action are especially to be looked for—nay anticipated. "An extremely rapid and feeble pulse is of grave import; a very infrequent pulse is of fatal significance," says Dr. Jenner. *Albuminuria*, when present to any extent, must always be esteemed an unfavourable complication; it is, however, highly desirable to ascertain, if possible, whether the presence of albumen depends on merely an altered condition of the blood, or upon granular degeneration of the kidney; for the latter state of things not only renders an individual more amenable to the influence of morbid impressions, but, the excretory power of such an important eliminatory organ as the kidney being im-

paired, greatly diminishes the chances of recovery. In this investigation the microscope becomes our chief aid. A terrible complication—œdema of the glottis—is generally supposed to have an especial connection with albuminous urine. In short, it will almost invariably be found that the general symptoms, when alarming enough to demand an unfavourable prognosis, indicate an abnormal (poisoned?) state of the blood; and it is the symptoms of death beginning with that fluid upon which, for prognostic purposes, we must especially rely—a pathological condition which has been most ably described under the name *neeræmia*, by Dr. C. J. B. Williams, in his *Principles of Medicine* (page 464.)

Etiology. The zymotic theory of the origin of diseases supposes each specific disease to have as its cause a specific though non-cognisable agent; and these agents have received different names according to that of the disease they induce. Diphtheria is thus referred to a peculiar *zume* called diphtherine. When diseases admit of isolation and close definition, this doctrine of cause and effect answers sufficiently well; but when we attempt to apply it to such an ill-defined affection as diphtheria, we encounter much that is antagonistic to its reception. In the first place, we should expect to find a single cause to be attended with some approach to uniformity, with regard to its concomitants and associations; and in the second place, we should look for similarity of effect as the result of identity of cause. No one can for a moment doubt but that each of these conditions lacks fulfilment in the case of the disease under consideration. We find diphtheritic affections to occur under every possible variety of climatic and telluric condition, with faultless as with the most faulty sanitary arrangements—in the open healthy districts of the country equally with the close, badly ventilated purlieus of the town—in localities the most opposite in every way, and answering to every description. Then, as to the effect, it is made up of one constant uniform element—the local symptom—which, it is fair to presume, is the result of a constant uniform cause, together with an inconstant very variable element—the general symptoms—which, it is equally fair to presume, are the result of a multitude and diversity of causes. If this be so, then we have grounds for believing that the cause of the constant is not identical with the cause of the inconstant element; in other words, that the cause of the formation is not one and the same as the cause of the various general diseases, considered either collectively or individually, with which it is seen to be associated.

Having said thus much in opposition to the theory that would connect such a diversity of phenomena as occur in diphtheritic cases with a single cause, let us now consider the subject as under the other headings; let us separate our idea of the so-called disease diphtheria into two elements, and examine the question of etiology, firstly, with regard to the formation, and, secondly, to the general symptoms. By so doing, I hope we shall encounter nothing irreconcilable, but much that admits of harmonious generalisation. Having previously attempted to show that the formation is a substance *sui generis*, and totally different from any of the usual morbid products of the body; that it appears only on such parts as are exposed to the action of the air; that it requires such parts to be undergoing pathological change; and that, when connected with general symptoms, it often appears before the development of such symptoms—I think it reasonable to infer the *ultima causa* of the phenomenon to be atmospheric, proceeding from without rather than from within. So much as to whence the agent comes; but what it is at present, neither chemistry nor microscopy has enabled us incontrovertibly to determine. The atmosphere and morbid

condition of parts exposed furnish two factors; but what the *tertium quid* is, must be left, I fear, quite as much to analogy and inference, as to actual demonstration. The statement previously put forth that "the microscope seldom or never discloses vegetable or other growths," though supported by the highest authorities, must be taken only for what it is worth—it simply supports a negation. There are not a few, who hold the contrary opinion: and in their behalf it must be remembered that, as "there are more things in heaven and earth than are dreamt of in your philosophy," so, doubtless, there are more things organic and inorganic, in and around us, than can in the present state of science be detected by the highest powers of the microscopist, or the most subtle tests of the chemist; and inability to discover microcosms, especially epiphytes, can scarcely as yet, ever be adduced as proof of absence. "It is not to be hastily concluded that a disease is non-parasitic, because a fungus has not been detected in the part where it was suspected to exist. The minuteness of the sporules, and the care required in the investigation, sufficiently explain the very various opinions which have prevailed on the nature of parasitic lesions." (Aitken.) But, in addition to this, we have direct evidence of some of our most trustworthy observers, in whose hands the microscope has been successful in revealing growths in and about the diphtheritic substance. Dr. Carpenter, in the last edition of his work (1863) on the *Microscope and its Revelations*, says: "There are various diseased conditions of the human skin and mucous membrane, in which there is a combination of fungoid vegetation and morbid growth of the animal tissues; this is the case, for example, with the *tinea favosa*, a disease of the scalp in which yellow crusts are formed, that consist almost entirely of mycelium, receptacles, and sporules of a fungus; and the like is true also of those white patches (aphtha) on the lining membrane of the mouth of infants, which are known as thrush, and of the exudation of false membrane in the disease termed diphtheria"; and he goes on: "In these and similar cases, two opinions are entertained as to the relation of the fungi to the diseases in which they present themselves: some maintaining that their presence is the essential condition of these diseases which originate in the introduction of the vegetable germs, and others considering their presence to be secondary to some morbid alteration of the parts wherein the fungi appear, which alteration favours their development. The first of these doctrines derives a strong support from the fact, that the diseases in question may be communicated to healthy individuals through the introduction of the germs by inoculation; while the second is rather consistent with general analogy, and especially with what is known of the condition under which the various kinds of fungoid blights develop themselves in or upon growing plants." Taking, then, all things into consideration, the external position and atmospheric origin of the production, the many points of analogy between it and the products of aphthous and other known parasitic affections, the fact of the great prevalence of parasitic affections in brutes as well as in man, contemporaneously with the diphtheritic epidemic, and, added to these, the heavy weight of Dr. Carpenter's opinion and of those who hold with him, I think it will be conceded that the *balance* of evidence is, notwithstanding the inability of microscopists uniformly to establish it, in favour of those who believe the origin of the formation to be due to the presence of living organisms.

An inquiry into the etiology of the general symptoms, involving as it does an inquiry into that of zymotic diseases generally, is, at the same time, one of the most interesting and difficult subjects of medi-

cal study, and one which in the present state of our knowledge can be but imperfectly carried out. That such diseases have specific causes, and that the causal agents, whatever else they may be, are something more than the offspring of bad sanitary arrangements (however much their development and growth may be favoured thereby), is, I believe, generally received; but what they are either as to form or nature, is a problem still *sub judice*. Reasoning from what we know to be the case with small-pox, cow-pox, glanders, hydrophobia, syphilis, and other inoculable diseases, it is perhaps most in accordance with analogy to suppose the origin of zymotic diseases to be dependent on the presence of certain organic principles; but what these principles actually are, in what state they exist (some fixed, others volatile, some both), in what manner they act so as to bring about their effects, are points which science has not as yet enabled us, satisfactorily, to determine (Dr. Herbert Barker); and, as my object is rather to bring forth a particular theory of the nature of diphtheria, and to reconcile it with experience, than to discourse on the etiology of diseases generally, I need not further discuss the subject. All I require is, that the different general diseases which during a diphtheritic epidemic present themselves in connection with the local sign, shall be considered as subservient to a like etiology as when occurring without such complication.

The summary, then, of what has been written on the subject of etiology amounts to this; that, as there are two distinct elements in a diphtheritic case, so are there two distinct causes; and that, in all probability, the origin of the external formation is due to the presence of living organisms, and of the general disease to certain zymotic principles. Before quitting the subject, it may be as well to venture a thought or two on the mutual relation and interdependence of these two exciting causes, which by their composite action produce, what is considered by many to be a specific disease. Two ideas are inseparably (in my mind) connected with the presence of these microscopic growths; 1. That their very starting in active life is the result of the presence of a particular exciting cause; and 2. That, when vitalised, they have a design to fulfil. To apply these ideas to the case under consideration: May not the presence of these zymotic principles in the atmosphere, when existing to an unusual amount, the evidence of which must be judged by the extent of the prevalence and malignancy of their effects—the specific diseases, be the particular excitor into life of these living organisms? And, on the other hand, may not the design these organisms are intended to carry out, be the changing the state of, and thus rendering innocuous, these terribly baneful principles? If this be so, we have but another example of that beautiful system of balance and counterpoise so every where manifest in the world of nature; but, as in the moral world, so in the physical, there is no unmixed good; in the bringing about of these states of equilibrium, certain supplemental or marginal effects are permitted, often detrimental to mankind. Thus, in the beautiful readjustment of meteorological derangement, man sees only the incidental effect—the inclement season, the drought or long continued wet; in the fearful grandeur of the thunder-storm, he loses sight of the marvellous restoration of electrical disturbance, and thinks only of the incidental damage done to man and beast. Or, to take a more homely simile, in the garden he recognises only the trifling mischief of the small bird, and forgets its necessity as an antidote to the still greater ravages committed by insect life; so, in the case of the disease before us, we discern not the mighty good these microcosms effect in destroying pestilential ex-

vitors, and think only of the *blight* they are incidentally permitted to fix on us. But further, according to modern view, these *principles* not only exist externally (epidemic and endemic), but also are reproduced in, and emitted from, bodies undergoing disease (contagious.) In epidemic sore-throat (and the same probably holds good of several other diseases, for "a more or less sore throat is a constant concomitant of all the acute specific diseases"), the pharyngeal region appears to be the site of the local symptoms; here it is that pathological change is going on in contact with the air, and hence it is that we should expect contagia to be emitted. The same reasoning applies to the laryngeal region in croupal cases. Now, where the carcass is, there will the vultures be gathered together; and thus, not content with neutralising poisonous matters external to us, these organisms, in obedience to a splendidly designed scheme, seem, as it were, actually to descend upon the parts whence these poisons would be scattered broadcast, and kill them in the bud. Speculations such as these may be idle and need corroboration, still I hope they are not altogether irrelevant or useless; for, if we are enabled to look from these supplemental effects, these lesser evils, patent to the eye of sense, to the higher order of harmony to be seen only by the mental eye of thought, we are induced to temper our sorrow with gratitude; and, while deploring and bearing as patiently as possible the trials and afflictions permitted to vex us here below, our faith is strengthened in, nay, we are even allowed to enjoy a foreshadowing of, that condition of perfection which shall one day be revealed to us.

Contagion. Perhaps there is no subject in connection with diphtheria so unsettled and unsatisfactory as that of contagion. By some the disease is believed to be eminently contagious; by others, to a limited extent; by others, again, not at all. By adopting the specific disease theory, some of these views must necessarily be wrong; by adopting the theory hoped to be substituted, they all may possibly be right. The contagiousness of the local sign is not, so far as I am aware, supported by a single fact which cannot quite as readily be placed to the score of its undoubtedly epidemic character. Capability of inoculation, in Bretonneau's sense of the term, is, I believe, generally discarded. That the substance, if placed in contact with a part of the body undergoing disease, might help to bring about the production of a like morbid product, admits of easy comprehension; but that it could induce anything like a disease of the general system, we have certainly no evidence to lead us to suppose. The contagiousness of the general disease is often so intermingled with, and bears such a direct proportion to, its epidemic character, as to be not always readily made out. We may not be able satisfactorily to diagnose such general disease, owing to the absence of positive signs; still, knowing the fact of extensive epidemic prevalence being invariably associated with more or less contagious properties, we have grounds for considering such diseases always, to a greater or less degree, contagious. I would suggest, then, that the contagiousness or not of a diphtheric case depends mainly on the contagiousness or not of the general disease; and, knowing such diseases to be most various, we can, by adopting this view, understand how any particular case may have this property to a great degree, slightly, or not at all. I am glad to be strengthened in this opinion by Daviot, who concludes a masterly summary on the subject of contagion as follows: "I repeat the proposition which seems to me to reconcile conflicting opinions, that we cannot regard pharyngeal diphtherite as contagious when it exists alone and independent of all eruptive fevers; but I think

that, when it is complicated with those evidently contagious affections, it may become so, but in an indirect manner." (*Syden. Soc. Memoirs*, p. 361.)

[To be continued.]

ON IMPETIGO CONTAGIOSA, OR PORRIGO.

By W. TILBURY FOX, M.D. Lond., Physician to the Farringdon General Dispensary.

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III. Our third query was this: Does vaccination give rise to impetigo contagiosa? and, if so, in what manner? The solution of this question, of course, supplies the positive answer of the first question—viz., the nature of the disease.

We must consider the following features of the disease.

1. The special aspect of the eruption—the depressed centre, the consecutive crop, the purulent contents (their aplastic character), the isolation of the spots, etc.
2. The character of the subject attacked is that produced by the action of bad hygiene and low social position.
3. The peculiar obstinacy of the disease.
4. The tendency to the occurrence of unhealthy inflammation.
5. The peculiar dull red tint about the circumference of the sore; the same tint forming an almost diagnostic feature in the healing of the part after convalescence.
6. The adherent character of the scab.
7. The implication oftentimes of the mucous surfaces, which take on an unhealthy inflammation.
8. The contagious and inoculable character of the disease.
9. Its frequent occurrence after vaccination.
10. The links between apparent modifications of vaccinia and impetigo contagiosa.

Will it satisfy the requirements of the above propositions, to regard the disease as a form of impetigo developed in a strumous subject? We may be certain of one thing; that it is a *specific* inflammation, dependent upon a *specific* cause; and that *specificity* resides in, or is possessed by, the contents of the pustules. Now the history of scrofulous inflammation does not warrant us in saying that a scrofulous form of skin-inflammation is contagious. We are led to believe that there exists an intimate relation between impetigo contagiosa and vaccinia, from many data; not only from those already adduced—viz., the frequent occurrence of the disease after vaccination, and the similarity between it and "bastard vaccinia"—but also from the fact that impetigo contagiosa possesses spots oftentimes exactly resembling vaccinia, and yet occurs in such a way and at such times as to preclude altogether the idea of direct connexion with any such cause. Assuredly, the best description that one could give of some of these cases, would be to state them as instances of ordinary impetigo modified by the vaccine virus—a compound affair, in which there are complete and intimate connexion, mutual action, and subsequent modification. A strumous form of inflammation (impetigo) modifies vaccinia, and the umbilicated pustule breaks out into unhealthy superficial ulceration. Most decidedly, a good many cases start from the period of vaccination; and indeed, in adult life, the disease may frequently be traced to direct contagion with children.

The contagiousness, the specific character, the possibility and probability of tracing the origin of the disease to vaccination, are arguments that well de-