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A QUESTION

PROPOSED TO THE

EPIDEMIOLOGICAL SOCIETY,

LONDON.

BY

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WHAT IS PUERPERAL FEVER?

PUERPERAL fever has been so frequently the object of medical inquiry, has excited so much controversy, called forth so many monographs, and has baffled so completely the elaborate researches of eminent members of our profession, that one feels no little hesitation in entering upon such a subject. This malady might well have been suffered to remain among the arcana of medical science, were it not that it holds an intimate relation to those sanitary questions which at present so much occupy public attention. For this reason I have ventured again to bring it forward; and if I fail in throwing any new light upon questions connected with this frightful disease, I must only ask some indulgence, which will be, perhaps, the more readily granted, inasmuch as so many of my predecessors have been in a like predicament.

Locke, in his Essay on the Human Understanding, when treating of the use of words, and the necessity of strictness in their application, relates an anecdote in illustration of his argument. He was present when three other physicians were engaged in a warm controversy on the animal spirits (the circulation of the blood was not then acknowledged). In the heat of the dispute, Locke ventured to ask what they meant by "the animal spirits." None could define the terms which they so freely used. Locke thought it would be as well to agree upon what we mean by a term before we argue about it. So it is with puerperal fever. It is very necessary to define what we mean by this expression before we discuss the important questions connected with it, which is the more essential because there is a complete contradiction in the terms used to signify this disease. Some authors adhere to the term "puerperal fever," and describe every form, from the simple inflammatory to the

typhoid or asthenic fever. Others discard this expression completely, and consider it to be an inflammation affecting different tissues; hence the names, "puerperal peritonitis," "puerperal phlebitis," "puerperal arthritis," &c. It is obviously important to determine this preliminary question, because our knowledge of the correct principles of treatment depends very much upon a clear notion of the disease we are endeavouring to subdue. Have we to treat a fever, or to combat an inflammation? Are we quite sure that either of these terms conveys an idea correctly of the essential characters of what might be, perhaps, called, more consistently with facts, the puerperal plague? In order to arrive at a just conclusion, we shall endeavour to prove, by a process of negation, what, at least, puerperal fever is not, although we cannot promise to succeed in establishing the affirmative, and proving what this disease really is.

First, then, we deny the correctness of the term, "puerperal peritonitis," and feel assured that by applying it to this disease we fall into some very serious mistakes.

Peritonitis is not a disease which can *seipso* be communicated; puerperal fever can. Hence, by calling this disorder by a wrong name, our attention is drawn away from its most dangerous—its contagious character. We speak of it as peritonitis: nor is it until we find the peritonitis spreading from patient to patient that we take alarm, and at length discover that we are treating a different disorder. It is treated as peritonitis, and the result proves that our treatment has not the slightest effect. This error also causes great confusion in sanitary reports. Puerperal fever may prevail in a locality where the name is never heard. The Registrar-General tabulates deaths under the heads, "peritonitis," "phlebitis," "arthritis," &c. &c. The proportion of these inflammations is thus increased at the expense of this malady, and his returns are deranged.

Puerperal fever does not agree with peritonitis either in the mode of its attack, in its symptoms, in its morbid appearances, or in the influence of remedial agents upon it. Inflammation of the peritoneum can generally be traced to some obvious cause. If after severe labour, inflammation, which commenced in the passages, may extend to the uterus, and thence to the peritoneum; or perhaps the uterus may become inflamed in its reaction, after the refrigeration and other means necessary to control violent flooding; hence peritonitis, or rather, metro-peritonitis.

But when we find peritonitis appearing quite suddenly, after, perhaps, a perfectly easy labour, when the most careful

attention has been given to the patient, and no possible cause to excite it exists,—when the inflammation advances with a rapidity and an intensity almost incomprehensible, the conclusion is obvious, that the nature of the complaint is something more than inflammation ; the mode of its attack betrays an obvious difference.

The symptoms in parallel cases are not the same. Peritonitis commences in the neighbourhood of the uterus ; the pain is first felt there. The pain in puerperal fever frequently commences in the epigastrium, and the diaphragm may be the first engaged; violent stitches through the ribs are often one of its earliest symptoms, and precede distention of the abdomen. Headach is not a symptom of peritonitis ; it is constantly met with in puerpural fever. The most remarkable difference, however, may be observed in the effect produced on the digestive organs. In peritonitis the action of the bowels is suspended; constipation is the result, and often so obstinate as to resist very powerful purgatives. A violent diarrhœa is frequently the first symptom of puerperal fever. Vomiting may occur in both; but, like diarrhœa, may be a first and most urgent symptom in puerperal fever, which is never the case in inflammation of the peritoneum.

When this scourge is in its maximum of intensity, we are not left to such distinctions as these to determine its nature, because, in some of the very worst cases, there is no symptom of peritonitis at all. A case has fallen under my notice, in which the abdomen was perfectly soft, free from pain on pressure, and not the slightest symptom of inflammation in the peritoneum or anywhere else ; yet this patient was so completely under the influence of this fever, that she died in twelve hours from the first symptom of the attack, and after death the usual sero-purulent effusion was met with in the abdomen. The intestines were covered with the creamy exudation commonly observed.

The *post-mortem appearances* do not agree with those which are the result of pure peritonitis. It is necessary, however, to recollect, the same caution is necessary in determining the *nature* of a disease by post-mortem appearances ; it is sometimes forgotten that these changes are *the results* of the disease, not the disease itself ; that their presence or absence do not of necessity prove the presence or absence of their supposed cause, and that identity of effect by no means proves one and the same cause. Adhesive lymph, and consequent union of parts, are considered as the results of inflammation ; we are now, however, on the way to discover that these changes may take place

without any inflammation. In the very worst forms of puerperal fever, death has taken place without any morbid change in the abdomen, unless, indeed, great distention of the veins be considered as such. In other cases, as in that alluded to, the usual morbid appearances are observed, and yet no corresponding symptoms of inflammation; and again, there are cases in which adhesive lymph, the result of inflammation, and non-plastic lymph, the result of this fever, are so mixed up as to cause great confusion in determining the disease. Patients who have died suddenly of ruptured uterus afforded me the opportunity of witnessing the morbid appearances caused by peritonitis in its first and most active stage, and before their character was modified by those changes which result from the gradual exhaustion of the powers of life. They were nearly as follows:—

A moderate quantity of bloody serum filled the abdomen; the intestines were united to each other and to the uterus by an opaque glutinous medium; when separated, this was drawn out into strings, like glue, the true lymph of inflammation. The intestines were streaked here and there by florid lines of capillaries, and the general appearance of the peritoneum was opaque, having lost its shining character; the intestines were distended with air. If such appearances be compared with those constantly observed in puerperal fever, some doubt may perhaps arise that peritonitis and puerperal fever are one and the same disease. When the abdomen is opened, an immense quantity of lactescent fluid escapes; the intestines are fringed with a cream-coloured exudation, which collects in the angles formed by their folds. This substance dissolves into a fluid like pus. The same exudation is found covering the uterus, the liver, the spleen; nor is it confined to the peritoneum, having been observed sometimes also in the pleura. The intestines present a livid appearance, traversed by dusky red lines of capillaries, very different from their florid aspect in peritonitis. This creamy exudation is not in the least adhesive, but can be peeled off the intestines quite easily, leaving a dusky livid surface. The only points of agreement in the post-mortem appearances are, the absence of a glossy surface, and the presence of tympanitis.

The distinction pointed out between the post-mortem appearances of puerperal fever and peritonitis is open to the objection that there are certain cases of acknowledged peritonitis which present precisely the characters which have been ascribed to puerperal fever; there is the same lactescent fluid, &c., &c. This may be true; but it may be asked, At what stage

of the inflammation was the examination made? because, if made, as is generally the case, in the second stage, when the patient sinks under the attack, and death does not carry her off in the middle of it, as in ruptured uterus, these appearances may be rather evidences of exhausted power than of inflammation, and thus agree with those produced by puerperal fever; but there is this essential difference, that in the latter this effect is observed *ab initio* in patients who have at once succumbed to the attack, without any evidence of inflammation; in the former, it is only when the constitution gives way in a manifest struggle, well marked by symptoms. In peritonitis there is always adhesive lymph; in puerperal fever frequently nothing of the kind.

The most important difference, however, between these diseases and that which, perhaps, the most concerns us, is the effect of treatment. Let us take, for example, the most popular remedies for inflammation of the peritoneum,—depletion, mercury, opium.

Depletion in puerperal fever is a much disputed question. Some are the warm advocates, others the equally zealous opponents, of the practice, but it is worthy of notice that, in this controversy, those who applaud depletion recommend twenty, thirty, even fifty ounces of blood to be taken,—a quantity which would be fatal in peritonitis, inasmuch as in some of the severer forms of this inflammation we cannot bleed at all.

Peritonitis arising from the escape of fæcal matter into the intestines—from the bursting of an abcess into the peritoneal cavity—from ruptured uterus, or if it should follow the operation of paracentesis in debilitated subjects—will not admit of depletion, because of the depressing influence of the constitutional shock; but in parallel cases of puerperal fever, in which the powers of life are equally prostrate, Mackintosh recommends a large bloodletting, and in order to adapt his theory to his facts, he calls this condition "*latent peritonitis*,"—peritonitis without its symptoms! This inflammation has laid prostrate the powers of the constitution, and depletion, by subduing it, restores them. Such is the theory, but it is obvious that when peritonitis has such an effect, depletion is impossible, and, therefore, we must seek some other explanation of its reported success in the cases quoted by Mackintosh. That which we would suggest is, that the principle upon which depletion is beneficial in puerperal fever is different from that in peritonitis, because they are different diseases.

Mercury is a remedy commonly used to control peritonitis. I have found it perfectly useless in the treatment of puerperal

fever; my experience is confirmed by Drs. Collins and M'Clintock, both of whom tried it extensively in the Dublin Lying-in Hospital. Dr. Collins remarks:—"It is supposed by some practitioners that when we can get the system under the influence of mercury, recovery is certain. This is not the fact, as I have seen in several cases in which death took place under these circumstances"[a]. In his valuable account of the recent epidemic in the Dublin Lying-in Hospital, Dr. M'Clintock observes, that "mercury was tried in a large proportion of cases, and in various doses, but I cannot say that I ever observed any decided improvement to have been traceable to its specific action on the system. In some cases the disease progressed with such frightful rapidity that absolutely there was no time for the drug to make an impression on the constitution; in other cases mercury seemed to produce diarrhœa, and had, therefore, to be laid aside; in two cases death occurred, notwithstanding that ptyalism had been excited"[b].

Opium is most valuable in that form of peritonitis in which depletion cannot be employed. It is probable that in such cases it acts as a stimulant, and restores nervous energy, impaired by shock, to the constitution. It may have a similar effect in puerperal fever, but opium alone is never sufficient; other agents are combined with it, and with this object *camphor* has been given in very large doses. Dr. Copland has given eight and sixteen grains of camphor combined with opium for a dose.

If this comparison between puerperal fever and peritonitis proves that there is an observable difference in the manner of the attack, the symptoms, in the post-mortem appearances, and the effect of remedies, it follows that it is incorrect to call them by the same name. Designating this plague by the gentler epithet, "peritonitis," becomes a most dangerous misnomer, which we regret to observe so very generally employed.

Acute uterine phlebitis resembles puerperal fever much more nearly than peritonitis, because both are blood diseases; hence it is much more difficult to draw an accurate line of distinction between them, yet it seems to me quite possible. Inflammation of the uterine veins is described as a disease of frequent occurrence; I believe it, on the contrary, extremely rare, because the uterine veins are not easily susceptible of inflamma-

[a] Collins' Report, p. 396.

[b] Report of the late Epidemic, 1855, by Dr. M'Clintock, Dublin Quarterly Medical Journal, vol. xix. p. 461.

tion. If such were the case, uterine phlebitis would be the natural consequence of every severe labour, especially in cases where the child perishes and becomes putrid.

The putrid *débris* of the placenta, pus and such like irritants, would soon light up inflammation in these veins, if they were so irritable as is supposed. The uterine differ from other veins in this respect: they consist only of a lining membrane, which is acknowledged by the most eminent pathologists to be scarcely susceptible of inflammation. In other veins its seat is in the cellular and fibrous, not the lining, coats. Hasse remarks:—"In this respect it will appear not unworthy of notice that those portions of the venous system, which are composed exclusively of the internal membrane of veins, with a very scanty provision of the surrounding cellular tissue—like the corpora spongiosa—*are very rarely, and never extensively, the seat of true inflammation*"[a].

I have witnessed numerous cases of puerperal fever in which the uterine veins were chiefly engaged, but very seldom indeed have I met with cases of true uterine phlebitis. The history of one case will serve to illustrate the rest. Some years ago I was called to a case of violent flooding in Tottenham Court Road, refrigeration was employed, with other means, to arrest the discharge. The following day the patient complained of headach, and had a severe rigor; on the third the tongue was dry and furred; pulse 120. On the fourth it was almost black with sordes; skin burning hot, and jaundiced; pulse 140; no secretion of milk; partial sweats broke out all over the surface, and she was delirious. The treatment pursued gradually subdued these symptoms, but as she was recovering, she complained of a great pain in the left leg; a swelling was observed in the neighbourhood of the gastrocnemius muscle, which soon increased, and became extremely painful. It was evident that a deep-seated abscess had formed; this was opened, a large quantity of pus was discharged, and she recovered.

This case may be compared with one related by Dr. M'Clintock in his valuable Report of the recent epidemic in the Dublin Lying-in Hospital. It is described thus:—

"Natural labour; phlebitis; arthritis; death.—B. K. was delivered of her second child, after a short and easy labour, on December 18, 1854. The fœtus was small, about the eighth month, hydrocephalic, and *very putrid*. At the moment of its expulsion a quantity of abominably fœtid gas was re-

[a] Hasse's Pathological Anatomy, p. 11.

marked to escape from the vagina. On the second day she had some slight tenderness over the uterus, without any acceleration of pulse, however. This was removed by a turpentine stupe, and a dose of castor-oil and turpentine.

"*She was very well on the third and fourth days:* the pulse being only 88, and no uneasiness whatever in the uterus. Still, there was but a very scanty secretion of milk, and the tongue was somewhat dry towards its base in the median line. On the fifth day the pulse was 100, but she had no uterine uneasiness of any description, and expressed loud murmurs at not being allowed up. The next day brought no change in her condition, and on the day following she was worse; pulse 110; tongue dry and glazed; no abdominal pain or distress, but complains of a severe pain in the great toe. On examining this, the metatarso-phalangeal joint was found swollen, and the integument of a shining bright red. On moving the toe or pressing the joint, she evinced pain. She only lived to the morning of the eleventh day, notwithstanding that she got wine and brandy freely. For six hours before she died the pulse had entirely ceased in the arms, and the hands were red and cold, *yet she retained entire consciousness*, was fully and acutely alive to all passing around her, and able to move and turn in the bed without any assistance. There was a sort of quickness and excitability in the woman's manner during the last few days of her illness, that is the nearest thing that I have seen to the 'hysteroid excitement' described by Professor Meigs as being a very characteristic attendant upon uterine phlebitis. *This patient had no rigor*"[a].

The absence of rigor and the presence of the hysteroidal excitement of Meigs seem to me rather to negative phlebitis.

This perfect consciousness on the verge of dissolution, the clear intellect of the patient, and her extraordinary power of motion almost in her last moments, her sense of security, and belief in her recovery just before death, are all characteristics of puerperal fever, but not of phlebitis. In order, however, to place the question in a clearer light, I shall briefly quote the symptoms of phlebitis as given by Mr. Arnott in his valuable paper on this subject:—

"The patient has great restlessness and anxiety; prostration of strength and depression of spirits; sense of weight at the præcordia; frequent sighing, or rather moaning, with paroxysms of oppressed and hurried breathing, the patient being

[a] Account of the recent Epidemic in the Dublin Lying-in Hospital, by Alfred M'Clintock, M. D., as above cited.

unable at the same time to refer his sufferings to any specific source; the common symptoms of fever are present; the pulse rapid, reaching 130 or 140 in the minute, but in other respects extremely variable; *frequent and severe rigors almost invariably occur;* the general irritability and deep anxiety of countenance increase; the manner is quick; the look occasionally wild and distracted. When left to himself, the patient is apt to mutter incoherently, but, on being directly addressed, becomes clear and collected; the features are shrunk, and the skin of the whole body assumes a sallow or yellow colour. Under symptoms of increasing debility, and at a time when the local affection may appear to be in a great degree subsiding, secondary inflammation of a violent character, and quickly terminating in an effusion of pus or lymph, very frequently takes place in situations remote from the original injury. The cellular substance, the joints, the eye, have been affected, but it is more particularly under a rapidly developed attack of inflammation of the viscera of the chest that the fatal issue usually occurs. Whether this be observed or not, death is *always preceded by symptoms of extreme exhaustion; a rapid, feeble pulse; dry, brown, or black tongue; teeth and lips covered with sordes; haggard countenance; low delirium*"[a]. This is very different from the hysteroid excitement of Meigs, which cannot be considered as diagnostic of uterine phlebitis, unless, indeed, it be assumed that inflammation of the veins of the womb is quite a different disease from inflammation of veins elsewhere. We have given evidence, however, to prove that it is not so, but is, in its leading characters, exactly similar. Dr. M'Clintock's case is one of blood-poisoning, probably from putrid animal matter; the child was putrid, the discharges from the vagina most offensive; nevertheless she seems to have nearly escaped, because no symptom manifested itself until the fourth day, and then gradually the pulse rose, the tongue became dry, the metatarso-pharyngeal joint swollen, shining red, and painful; depositions of pus, the result of depraved blood, took place in this joint, and the woman might have recovered but that she was in an atmosphere of puerperal fever. It may be considered, therefore, a case of puerperal fever.

There is a very close analogy between the poison of putrid animal matter and that of puerperal fever. The effluvia of Montfaucon and its effects are well known. The Maternité is near to this abattoir, and the presence of puerperal fever or its absence from that hospital seems almost to depend upon the

[a] Medico-Chirurgical Transactions, vol. xv. p. 52.

way the wind blows: if from Montfaucon, there is fever; if towards it, the hospital escapes. This fact shows the alliance between the effluvia of putrid meat and the poison of puerperal fever. Another fact, of which I have had painful personal experience, points to the same conclusion. In the winter of 1842 I was called to see a woman in severe labour; inflammation of the uterus was just commencing; the child was dead, the bones of the cranium loose; the head was perforated, and the child with much difficulty extracted. In two hours after, I was again sent for, in consequence of the placenta being retained; it was adherent. In order to extract it, the right hand was first introduced, then the left, and after some trouble it was brought away, quite putrid.

On the day following some pimples appeared on both arms, which soon formed into pustules, one of them assuming, on the fourth day, a very unfavourable aspect. It was surrounded by a deeply livid base. Mr. Liston cut the pustules through, cauterized, and dressed them with water-dressings. This prompt treatment prevented any subsequent mischief. Exactly at the time that these pimples first appeared, symptoms of puerperal fever were noticed in this patient, of which she died on the fourth day.

This case affords clear evidence of the action of the poison of putrid animal matter, producing on my arm pustules of a malignant character, similar to what have been observed among the slaughterers in the south of France, and causing puerperal fever in this patient. Puerperal fever, however, is not an invariable result. A case which may strictly be considered as blood-poisoning from putrid animal matter is related by Mr. M'Whinnie:—"A case of destructive ophthalmia, with extensive suppuration of the cellular membrane, and severe affection of the knee-joint, occurring after premature delivery."

"In the spring of 1847 Mr. F. Huchison, of Farringdon-street, requested Mr. M'Whinnie to visit Mrs. M., a lady about 40, of spare habit of body, but strong constitution, and active mind. She had been delivered (March 7) of a four-months' child, which had been for some time dead in the uterus, and it was believed that the system was contaminated by the retention of the decomposed fœtus. Much serious indisposition and constitutional disturbance preceded and followed the expulsion of the fœtus. On the second or third day after delivery, the contents of the right orbit became inflamed; we found the globe much more prominent than that of the other eye, and it was apprehended that an abscess might be forming behind the organ. . . . . On the 28th Dr. Fred. Farre

visited the patient, and gives the following account of the affected eye. . . . 'The lids were much swollen and closed; considerable rednesss and chemosis of the conjunctiva, but no suppuration. The cornea was prominent, but rather nebulous; the anterior chamber greatly enlarged; the iris, yellow and disorganized from effused lymph, and inclining backwards, adhered to the capsule of the lens; the pupil was filled with the same effusion, vision was entirely gone.' . . . The right lower extremity became stiff and swollen; pitting on pressure, and accompanied by œdema of the foot and labium of that side. Collections of matter were also found in different parts of the limbs; at first principally in the vicinity of the knee-joint, and under the integuments of the back of each forearm above the wrist; that on the left was dispersed by blisters; the other subsiding spontaneously. The calf of the leg also became swollen and tense, and, fluctuation having been discovered, a large quantity of thick pus was evacuated by incision.

"The abscesses about the knee-joint and others in different parts of the limb were opened immediately on being detected; their contents consisting generally of well-formed pus; the integuments were not naturally discoloured. It was evident that the cellular, adipose, and intermuscular tissues were everywhere loaded with sero-purulent infiltration, presenting, when divided with the knife, a greenish-gray colour. On the 12th April the right knee-joint had become the seat of painful swelling from effusion into its cavity, and its several structures suffered from the effects of the most destructive inflammation. . . . An abscess was opened on the outer side of the joint, and (April 22) Mr. Aston Key opened another above the internal condyle.

"May 23rd. The condition of the patient had now become most deplorable; she was reduced to extreme weakness and emaciation. In addition to her other ailments, she had cough and diarrhœa, and the integuments over the sacrum and in other parts subject to pressure became tender. . . . . After being some time on the hydrostatic bed, from which most essential advantage and comfort were immediately felt, it was ascertained that in consequence of the pelvis having sunk much below the level of the knee, a very considerable accumulation of matter had taken place, so as to form a projecting tumour on the upper part of the thigh. On dividing the fascia"—by a very skilful surgical operation—"an immense quantity of thick pus was discharged. . . . . From this time may be dated a steady and gradual improvement; the appetite, and with it the strength, increased; the discharge from the nu-

merous and extensive abscesses diminished; the limb regained more of its proper outline, and the muscles their tone and power. The knee, still considerably bent, was in a more quiet condition; the eye, reduced to a third of its natural size, had receded to the back of the orbit; the external tissues had not ulcerated. All inflammation in the globe and surrounding structure having ceased, the former was speedily reduced, by the action of the absorbents, to the same dimensions as if the tumours had, as in other cases, escaped by ulceration of the cornea and sclerotica. Mrs. M. is now (Dec. 1847) strong and well"[a].

This case, although condensed, is given sufficiently at length to prove the true character of blood-poisoning, as distinguished both from phlebitis and puerperal fever. Had it been either of these, the complaint would have gone through its stages in as many days as this occupied weeks; besides that the presence of pus is by no means a proof of pre-existing inflammation. It is now admitted by surgical authorities that in these affections of the joints pus may be present without any inflammation. Mr. Coulson observes that in secondary diseases from blood-poisoning "the bones of the joints are never affected, and the joints often contain a quantity of pus, without any trace whatever of inflammation or other lesion."

If this fact be considered in connexion with another, proved by the able researches of Mr. Henry Lee, a just conclusion may be arrived at on this important point. In his paper on "The Deposition of Fibrine on the lining membrane of Veins," Mr. Lee has proved that the changes generally attributed to the walls of the vein really commence in the coagulum. The jugular vein of a donkey was tied, opened, and emptied of its blood between two ligatures, and filled with wadding: the wound was then closed. The animal was killed forty-eight hours afterwards, and the vein examined. *There was not the slightest trace of inflammation on the lining membrane of the vein between the ligatures.* The lining membrane here was of rather a deeper colour than natural; but in no point did it present any trace of effused lymph"[b]. Had blood been allowed to remain between the ligatures, lymph would have been found on the walls of the vein, clearly proving that this evidence of inflammation was derived from the blood itself, and not from the coats of the vessels. Hence the conclusion, that a coagulum may be formed in a vein, lymph thrown out,

[a] Medico-Chirurgical Transactions, vol. xxxi. p. 65.
[b] Pathological and Surgical Observations, by Henry Lee, p. 99.

and even pus produced, without any previous inflammation in the vein itself. Healthy blood seems to possess this conservative power of securing itself against contamination. If pus be mixed with blood, coagulation instantly takes place; the coagulum becomes adherent to the sides of the veins, inflammation *follows*, and the pus is removed by abscess. If other morbid matters are injected, nearly similar results take place, which are thus described by Mr. Lee:—"If the proportion of morbid matter be large, the whole coagulum will rapidly soften, and present to the naked eye the appearance of pus more or less discoloured. But if the quantity which has become mixed with the blood be small, the coagulum will retain its consistency, and become adherent to the sides of the vessel. Under these circumstances the coagulum will adhere to one side only of the vessel, and, as it contracts, the diameter of the vessel will be restored to its original size. In other cases the outer layer of the coagulum will become adherent to the whole circumference of the vein, and the inner portions, which are always the least consistent, will become softened and broken down. A complete cylinder of fibrin may, in this way, be formed in the interior of a vein, through which (when the fluid portions of the coagulum are removed) the blood will circulate. It is worthy of remark that when plugs of fibrin are thus formed, the adjacent lining membrane of the veins is coloured in exact proportion to the quantity of colouring matter contained in the coagula"[a]. "The opinion that the material found in obstructed veins is derived directly from the blood, is further supported by the fact, that where a coagulum is formed and becomes incorporated with the coats of a vein in one part, the lining membrane of the vessel in its immediate neighbourhood may, nevertheless, present its natural shining appearance[b].

Such are the results of pus or other irritants on healthy blood; but if that irritant be a poison, this conservative force may be completely impaired: the circulation goes on imperfectly, the slightest cause producing stagnation; the blood readily dissolves into pus, which is scarcely circumscribed by the feeble effort at inflammation, and hence large collections of matter are found in almost every tissue where it can form a resting-place. Thus pus, or what is called pus, is found infiltrating the uterus, in the orbit, the joints, inter-muscular tissue, liver, and spleen, and all this without any pre-existing inflammation. Pus in this way produced did not escape the notice

[a] *Op. cit.*, p. 101. [b] *Op. cit.* p. 102.

of Wedl. In speaking of exudations on the inner coats of veins, he remarks:—"The fact that pus in these cases may be formed from stagnant blood, and more especially from its serum, perhaps no longer admits of doubt, since the metamorphosis of the coagulated blood into a puriform fluid *may be traced from the centre of the plug towards its periphery*"[a]. He again states, speaking of the transition from leucœmia into pyœmia:—"In a well marked case of leucœmia with congestion of the lungs, greatly enlarged liver and spleen, the veins in the plexus choroideus of the brain were as completely filled with a purulent fluid as are the veins of the uterus, *in the affection erroneously termed uterine phlebitis*"[b]. On this point he further observes:—"This notion would accord with the fact that in what is termed phlebitis, the collections of pus coincide with a local stasis of the blood. The term 'phlebitis,' however, is improper, since there is no indication whatever of inflammation of the venous coats"[c]. The fact, then, that in cases of puerperal fever, pus may be found filling the uterine veins, forming abscesses in the orbit, joints, or elsewhere, is no satisfactory proof of uterine phlebitis. Such appearances seem to me dependent upon poisoned blood, not upon inflammation. The tendency of inflammation of the veins is to secure the circulation of pure blood; a poison destroys this power, and hence these effects of poisoned blood extend throughout the whole circulation, showing themselves wherever a stasis of the blood takes place. I am not disposed, therefore, to agree in the propriety of the term, "uterine phlebitis," as expressive of one of the forms of the disease called "puerperal fever;" and on the same principle object to the term "arthritis;" but in adopting the name, "puerperal fever," I do so because it is best understood, for the same reason that "Cholera Asiatica" expresses another plague, although the propriety of the expression might be questioned.

It remains to consider what this disease really is, and in what light it must be considered if we hope to lay down correct principles of treatment. In discussing this part of the question we can only point out the path that appears to lead towards the truth; if we cannot succeed in finding it, something, at least, is gained if we avoid wandering into error. We shall examine puerperal fever as the result of a morbid poison; its symptoms, as manifestations of its action; and think it will be found that in every respect it obeys those laws which the late

[a] Wedl, Pathological Histology, p. 233. [b] *Op. cit.*, p. 303.
[c] *Op. cit.*, p. 311.

Dr. Williams has so accurately demonstrated as common to all poisons.

Puerperal fever has a definite and specific action, and selects a tissue for its seat. We know that the action of arsenic is on the stomach, digitalis on the heart, opium and strychnia on the nerves; so also with morbid poisons,—the intestines are the tissues engaged by the typhus poison ; the skin and cellular structure, by erysipelas ; scarlet fever shows its action on the skin and mucous membrane ; and, in obedience to the same law, the puerperal poison selects the serous surfaces and those which are analogous to them. The evidence of its action is found, not only in the peritoneum, but also in the pleura, arachnoid, veins, and synovial membranes. The peritoneum is most frequently engaged, because, after parturition, the most rapid absorption takes place there. This membrane during pregnancy had been gradually distended to its utmost, to keep pace with the enlarging uterus. After delivery, both return to their original dimensions, and consequently the absorbents are in the highest state of activity ; the poison is at once taken up, and produces its effects on the peritoneum and uterine veins. What is that action? I am at once met by this question. Is it not inflammation, although of a specific, or, if you please, of a toxemic character ? In order to give a correct answer to this query, it is very necessary to define this term, "inflammation." We must agree on what we mean by this expression, and the sense in which it should be understood, before we argue about its special forms ; and here a difficulty at once presents itself, not from any want of words to express what it is, but from the almost impossibility of getting rid of the confusion which has arisen from using the term too extensively and too loosely.

Inflammation is the term applied to every condition of the tissues where redness, swelling, heat, and pain are found in union ; nay, it has been applied to states where these four signs were absent, but in which, after death, certain morbid changes were found similar in appearance to those produced by inflammation. The effects were apparently the same, therefore the cause must be the same ; but inasmuch as there were no symptoms during life to justify the definition, the name "latent inflammation" became a convenient "*locus ignorantiæ.*"

The appearances presented by the lung of the infant at birth and in very early life often accurately resemble those caused by inflammation ; they have even received the names "lobar," "lobular," "vesicular pneumonia." We are indebted to the very simple experiment of Bailey and Legendre for

proof that this was not pneumonia at all, but a perfectly opposite condition. They inflated the lungs with air, and immediately the so-called induration, hepatization, &c., &c., disappeared; these supposed evidences of inflammation being caused by a partial collapse of the lung. It appears to me that similar latent inflammations might be disproved if they were capable of an equally easy and decisive experiment; but when these signs of inflammation are present, are they adequate proofs that inflammation is their cause? When, for instance, cancer is destroying the tissues, we find the changes in their structure accompanied by redness, swelling, heat, and pain. If, therefore, this must be called "*cancerous inflammation*," the expression is most illogical, because it is applied to a condition which has not one property in common with pure inflammation. They are perfectly opposed; and to call things totally different by the same name, as being only varieties of the same thing, is contrary to all rules of just reasoning. The tendency of cancer is to destroy; that of inflammation, to preserve organized structure. The one is a disintegrating process, eating away the tissues; the other, a conservative effort to repair or to prevent an injury to them. If we reflect for an instant on what takes place when any of the tissues are broken or injured, we shall arrive at a clearer idea of what inflammation really is. If a wound be inflicted on a limb, blood is effused, a coagulum is formed, and through this medium the wound may be healed without any inflammation, provided all accidental causes which may interfere with the "*first intention*" of nature are removed. If this fail—and it generally does so—inflammation takes place, lymph called organizable is poured out, pus is secreted, granulations are formed, all having the same object, to protect the injured tissues from causes of irritation. In this process of repair, the irritated capillaries dilate, become gorged with blood, that circulates with difficulty, oscillates, remains stationary, and resolves into its elements, which are exuded—as serum infiltrating the tissues—as fibrin, which is adhesive, and capable of forming new structures; granulations may be formed, and pus secreted, to protect the exposed surface; these gradually contract as new tissue is developed, until ultimately the injury is repaired. The whole of these phenomena have a conservative design, and constitute what we mean by inflammation.

In attempting a definition, therefore, I should prefer such terms as express the object of inflammation rather than those applied to external signs, which it has in common with morbid actions of a precisely opposite character. In this sense, inflam-

mation may be considered as *a local determination of blood, followed by exudation of its elements, an accidental result of the effort of nature to repair an injury or to restore a function.* Such a definition will perfectly apply to simple inflammation, and may also include specific inflammations, if we understand by them the effort to limit the action of a poison. Thus the deposition of tubercle may cause specific inflammation of the lung; the poison of syphilis, specific inflammation of the glans penis. In both cases the term 'inflammation' expresses a series of actions altogether different from and opposed to the action of the poison itself. The tendency of a poison is to destroy a tissue or to suspend a function; that of inflammation is to preserve the one, and to maintain the other.

It is quite possible, however, that a conservative and destructive action may go on simultaneously, and give rise to external characters and morbid appearances well calculated to create confusion; thus the error is often committed of naming the destructive action by a term expressing exactly the reverse. A man is poisoned by arsenic; he is said to die of gastritis. Decomposed animal matter mixes with the blood, and acts as a poison; the case is described as one of phlebitis: although in neither case do the symptoms agree with true inflammation of the stomach or of the veins. The viper-bite is accompanied with redness, swelling, heat, and pain; nevertheless, the cause is so obvious, death is attributed correctly to the poison: but if the same result happen from a dissection wound, the patient is said to die of diffuse inflammation. Such is the confusion which arises from including under the same name, 'inflammation,' morbid actions perfectly opposed, merely because they agree in presenting similar appearances. In speaking, therefore, of the action of the puerperal poison, we must discard the term specific 'inflammation' as designating that action. The distinction between this malady and true inflammation of the tissues engaged has been already pointed out; but, although an essential difference exists, nevertheless, an attempt to limit the action of the poison by inflammation may take place, and just as the deposition of tubercle on the peritoneum excites tubercular peritonitis, so the puerperal poison may cause puerperal peritonitis; but that inflammation is only secondary, and its prominence is inversely as the strength of the poison. The more powerful the poison, the less peritonitis; and the weaker its influence, the more distinctly are the evidences of inflammation observed.

The puerperal poison selects the serous membranes as the seat of its action; the action itself is on the blood. The quantity of

fibrin is increased; the quality deteriorated. A profuse exudation of *morbid* fibrin takes place, which has none of the properties of healthy organizable lymph. It is not adhesive; it dissolves into a creamy substance, which, when fluid, resembles pus, and has been found abundantly in cases where there was not a single symptom of peritonitis. This poisoned fibrin has been found coating the uterus, the intestines, the spleen, the liver, without adhering to them. Creamy fringes border the mesentery; yellow, dissolved fibrin is met with in the folds of the intestines, looking like abscesses; the fluid mixing with the effused serum gives it a lactescent appearance, the "abundant milky serum" of authors. Exudations are not met with in the veins, because, not being adhesive, they are carried along by the circulation; but dissolved, purulent-looking fibrin is met with abundantly, not only in the open mouths of the sinuses, but throughout the uterus, giving it not unfrequently the appearance of a sponge filled with pus. Sometimes soft coagula close the sinuses; and occasionally, but very rarely, a vein may be closed by a firm plug of fibrin, just as true organizable lymph is sometimes met with in the peritoneum. In both instances they are evidences of a feeble and fruitless effort to limit the action of a poison.

The action of the puerperal seems a contrast to that of the typhus poison on the blood, because, while the former increases, the latter diminishes the quantity of fibrin; yet, if the typhus poison be absorbed by a puerperal patient, the result is puerperal, not typhus, fever. It is the same with erysipelas, proving that animal poisons, each observing a distinct and definite law of action, may yet reciprocally excite each other.

The action of the poison is modified by the dose as well as by the temperament and constitution of the patient.

Puerperal fever selects its victims. In the same hospital and in the same ward it will not extend from bed to bed, but be found scattered in different directions. When from any cause nervous energy is impaired, the poison is freely absorbed. In hospitals seduced women are always an easy sacrifice; but, even among the affluent, powerful secret causes of mental depression may act with as much force, and expose them to its influence. Such causes are generally unknown to the physician, and he is puzzled and disheartened by the result; nevertheless, their existence is certain, and must always be appreciated.

The most important feature, however, of this law is the manner in which the characters of the disease are modified by the quantity of the poison absorbed. When it is in excess, the patient may die of puerperal fever, without any other symptom

than a fluttering pulse, and cold, livid surface. Death takes place so rapidly that there is not time to set up the specific action of the poison. There is an absence of the usual symptoms called inflammatory, and sometimes also no morbid appearances. This is a well-known effect of poisons taken in extreme doses. Arsenic and oxalic acid have caused death without any alteration in the tissues of the stomach. Cholera and typhus have killed before their specific action was set up. Such cases of puerperal fever have been described by Mackintosh under the name of "*latent peritonitis;*" for which he recommended the largest depletion, to relieve, as it were, the incubus of the inflammation which was oppressing the powers of life.

On the other hand, the dose of poison may be so small, and its action so feeble, that true inflammation makes the effort to arrest it, and the case may really be peritonitis, arthritis, or phlebitis.

The contradictions in the opinions and treatment of authors may be explained if attention be given to this law. Those who witness the milder forms of the disease describe and treat it as a local inflammation, while those who witness the plague in its full intensity stand aghast at symptoms which no theory of inflammation could explain.

Dr. John Clark found it to be quite a different disease to any that he had been accustomed to meet. The first cases he quotes occurred in July, 1787: he was astonished to observe the rapidity with which it ran its course, and the very extraordinary manner in which women were destroyed by it. Mr. Hey, of Leeds, observed the same difference:—"He was alarmed by the extreme rapidity with which the disease ran its course, and by its constant fatality, unlike anything which had ever been known in Leeds"[a]. "He thought it approached the nearest to Dr. John Clark's 'low fever of child-bed;' for although it differed from it in some respects, yet it resembled it in its general characters, and *differed far more widely from simple inflammation of the uterus and peritoneum*"[b].

Such is the experience of these highly practical authorities. Dr. John Clark states that the first cases attacked were the worst. The same fact came under my own notice while resident in the Dublin Lying-in-Hospital. When the plague first appeared, we could not save a patient, but afterwards it seemed to yield more to the treatment employed, as if at first the poison was concentrated, and in its maximum of intensity,

[a] Hey on Puerperal Fever, p. 2. [b] *Op. cit.*, p. 10.

which diminished as it became diffused. Puerperal fever also obeys *the law of incubation*; but it is difficult to determine the period accurately.

Two morbid poisons may coexist; this is not a law, but a well-known fact of some importance. Measles may be the companion of hooping-cough. Erysipelas and syphilis are found together, each poison exciting its specific action in the same person at the same time. It need not therefore create confusion, if erysipelas and puerperal fever are met with in the same patient; if we find extensive sloughs in the passages, and morbid fibrin in the peritoneum: but it appears to me, that erysipelas rather precedes and follows puerperal fever than accompanies it.

In the hospital where my experience of this disease had been most accurately formed, erysipelas preceded puerperal fever, disappeared when the latter was in its full power, and returned on its decline. Erysipelas was then prevalent in surgical hospitals, and it is probable that it was taken up by the passages when inflamed after a severe labour, and this poison excited that of puerperal fever.

If it be admitted that puerperal fever strictly obeys the laws of morbid poisons, and is therefore a toxemic disease, it must not be forgotten that one of those laws is,—that the action is *specific and definite;* because other forms of post-partum disease have been enumerated as puerperal fever, although the specific action was absent. Dr. Gooch, in his highly practical paper on Puerperal Fever, describes cases with quick pulse, tympanic and extremely tender abdomen, with great prostration, but in the post-mortem examinations of those who died, although "the intestines were found enormously distended with air, there was neither redness, adhesion, nor effusion of any kind;" the peritoneum was pale and colourless. Dr. Gooch calls this puerperal fever; I cannot perceive any of its true characters, but if we might assume that erysipelas may attack serous membranes, the difficulty might be removed. The coexistence of puerperal fever and erysipelas has led to the belief that these poisons were identical; each, however, observes its specific action; if, however, a serous membrane might be the seat of erysipelas, the fact would explain the tympanic and painful abdomen, the prostration, its epidemic character, and the absence of any traces of its existence after death, and further, might render intelligible, why patients were killed by depletion, and cured with Dover's powder, a medicine which has never yet succeeded in arresting true puerperal fever. Similar cases are related by Dr. Ferguson,

and might be named much more correctly 'puerperoid' than puerperal fever.

The last question in reference to this part of the subject is the class of animal poisons to which puerperal fever should be referred. Whether is it a contagion like hooping-cough or measles, infectious like typhus, or epidemic like cholera? I confess myself a believer in the contagion of puerperal fever. Evidence has now accumulated of instances in which the plague has haunted some unfortunate practitioner from case to case, destroyed all his patients, and ruined his practice. We have also proof that a poison, if not the same, at least perfectly similar in its effects, is contagious. Dr. Routh brought before the profession, some years since, the valuable observations of Dr. Semelweiss on this disease, as observed in the Vienna Hospital[a].

It was there discovered that students coming from the dissecting-rooms communicated the fever to the lying-in women, and that the poison of decomposed animal matter, being brought *into contact* with the passages, produced the disease. The hand was the medium of communication, and the poison absorbed was either the puerperal poison, or called it into action. It is not unreasonable, therefore, to infer that it is a contagion. It is true, there are negative arguments against this opinion, derived from opposite facts. Contact in attendance on patients thus afflicted failed to communicate the disease to others; but negative arguments are always weak, and in this instance especially so, because it by no means follows, that if a poison be a contagion, it must always be communicated. If this were the case, measles, hooping-cough, and such like contagions, would become universal soon after they appeared in a district. We know that obstetric physicians go from lying-in hospitals into private practice without communicating this fever. Practitioners who meet with it in their circle of practice do not of necessity spread the disease, although there are some melancholy instances to the contrary. There are many causes, whether constitutional or accidental, which may promote or resist the absorption of a contagious poison. Plague is the most contagious of all poisons, and yet, even plague has been resisted. De Foe, in his Journal of the Plague, 1665, relates a remarkable instance, which is thus recorded in the quaint language of the time. He calls it—

"THE STORY OF THE PIPER.

"It is said he was a blind piper; but the fellow was not

[a] Medico-Chirurgical Transactions, vol. xxxii.

blind, but an ignorant, weak, poor man, and usually walked his rounds about ten a night and went piping along from door to door. The people usually took him in at public houses, where they knew him, and would give him drink and victuals, and sometimes farthings, and he in return would pipe and sing and talk simply, which diverted the people, and thus he lived. It was a very bad time for this diversion, while things were as I have told, yet the poor fellow went about as usual, but was almost starved, and when anybody asked him 'How he did?' he would answer:—'The dead cart had not taken him yet, but they had promised to call for him next week.'

"It happened one night that this poor fellow, whether somebody had given him too much drink or no . . . . was laid all along upon the top of a bulk or stall, and fast asleep at a door in the street, near London Wall, towards Cripplegate, and that, upon the same bulk or stall, the people of some house in the alley of which the house was the corner, hearing a bell which they always rang before the cart came up, laid a body really dead of the plague just by him, thinking, too, that the poor fellow had been a dead body as the other was, and laid there by some neighbours. Accordingly, when John Hayward with his bell and cart came along, finding two dead bodies lie upon the stall, they took them up with the instrument they used, and threw them into the cart, and all this while the piper slept soundly. From thence they passed along and took in other dead bodies, till, as honest John Hayward told me, they almost buried him alive in the cart, yet all the while he slept soundly. At length the cart came to the place where the bodies were to be thrown into the ground, which, as I do remember, was at Mount-hill (Goswell-street), and the cart usually stopped some time before they were ready to shoot out the melancholy load they had in it.

"As soon as the cart stopped, the poor fellow awaked, and struggled a little to get his head out from among the dead bodies, when, raising himself up in the cart, he called out, 'Where am I?' This frighted the fellow who attended about the work, but after a pause, Hayward, recovering himself, said, 'Lord bless us, there is somebody in the cart not dead.' Another called to him, 'Who are you?' 'I am the poor piper.' 'Where are you?' says Hayward. 'Why, you are in the dead cart, and we are going to bury you.' 'But I aint dead, am I?' They lifted the poor fellow down, and he went about his business."

He did not take the plague, perhaps because he was drunk, and thus the most contagious of all poisons was resisted. Those

occasional instances where contact fails to communicate puerperal fever are no proofs that it is not contagious.

The symptoms of this disease have been so accurately described by numerous authors, that it is only necessary to refer to such of them as will explain the principles of treatment. Every author has noticed varieties in the mode of its attack. Vomiting is sometimes the first symptom, or it may begin with diarrhœa; more frequently a rigor, followed by a violent shooting pain through the epigastrium, ushers in the attack, and this is followed by swelling and extreme tenderness of the abdomen. Lastly, there are cases more progressive, in which tenderness is first observed in the neighbourhood of the uterus, extends to the abdomen, is accompanied by a firm wiry pulse (never the case in the former instances), and presents many of the characters of true peritonitis; the bowels are constipated, and vomiting occurs at a later period.

The manner in which the constitution is first affected by this poison is of importance as a guide to treatment. Douleet thus discovered the value of emetics. He observed in his cases, that vomiting was a first and most urgent symptom, and, so far from checking this, he sought means to promote what appeared to him a natural effort to throw off the disease. His ipecacuanha emetics had the most marked success. The same treatment was tried by others, and failed altogether, because the epidemic was of a different character.

Gordon, Hey, Armstrong, and Mackintosh, observed in their cases a rigor followed by the greatest prostration; nevertheless, they boldly employed the largest depletion, and saved their patients. Gooch met with cases of a different kind, in which true peritonitis was a more prominent feature; he found a more moderate bloodletting, together with local depletion, equally serviceable; and lastly describes another subsequent epidemic, in which bleeding killed his patients. This difference can only be explained by assuming a difference in the manner of the attack. Gordon's cases differed from Gooch's in the extent to which the poison was absorbed; while the cases in Gooch's first and second epidemic differ from each other so completely, as to lead to the doubt whether the latter was puerperal fever at all.

This difference in the mode of attack will perhaps also explain the cause of success in the various remedies employed, each of them claiming the most marked success, and each of them quite different in their actions. The moment this poison is absorbed, an effort is made to get rid of it through the ordinary channels: hence the vomiting and purging; the effort ge-

nerally fails, and poisoned blood accumulates at the centres of the circulation, causing a rigor of greater or less severity. The skin, and I believe also the kidneys are excited to remove the poison from the blood. The practitioner who aids this effort succeeds: thus, Douleet succeeded with ipecacuanha; Denman with tartar emetic; Boer with Kermes' mineral; Armstrong with salts and senna. I have been informed also of the value of nitrate of potash as a diuretic in some forms of this malady; but when the effort failed, and a rigor gave evidence of the accumulation of poisoned blood at the central vessels, Gordon and Hey relieved this at once by taking twenty or thirty ounces of blood, and succeeded in a sufficient number of cases to prove the correctness of their practice and the nature of the disease. Depletion to such a large extent could not be explained on the principle of combating peritonitis; but is intelligible as relieving the liver, spleen, and central organs from the mass of poisoned blood. When so employed, it should immediately follow the rigor, because, if time is lost, nervous power is paralyzed, and the very same treatment only hastens dissolution.

Another class of remedies has also been warmly advocated, and has met with considerable success. Many years ago, Dr. Brenan, of Dublin, used oil of turpentine both internally and externally with great advantage. Dr. Copland approves of this practice, and from his experience of a severe epidemic in the Queen Charlotte's Hospital, he came to the conclusion that "there is certainly no remedy so efficacious as a decided and judicious use of spirits of turpentine."

Dr. Copland also found camphor in doses of from eight to sixteen grains extremely serviceable. These remedies are altogether different in their character and in their action from the former; they are not only stimulant, but anæsthetic; both are hydrocarbons, and possess the common properties of these bases; they are useful, not merely in stimulating the constitution against the attack, but by diminishing pain they lessen nervous exhaustion. Nothing relieves the extreme tenderness of the abdomen so much as turpentine fomentation; taken internally, it relieves the tormina of flatus. Camphor also assuages the intensity of neuralgic pains. Reasoning upon these facts, it seemed probable that chloric ether might be serviceable, at least in relieving pain: the following case will explain its effect.

In 1855 I was called to see a woman who had been seized the day before with puerperal fever. She was lying on the bed with her knees drawn up; the abdomen distended and

extremely painful; the extremities cold; and pulse, 150. I did not think she would live till the next day, and ordered thirty minims of chloric ether with twenty minims of tincture of opium every second hour, merely to give some relief to the intensity of her suffering.

The following day I found that the pain had been completely removed, and she was then comparatively comfortable; but there was no change in the pulse. She, however, rallied so far as to continue in this easy state for nearly a week; but the poison had done its work, the vital powers could not recover themselves, and she sank after this protracted struggle.

Very lately two other cases came under my notice. In the first, the woman had been two days ill. She was propped up in the bed, suffering intense pain, and gasping with painful respirations; the same means gave her immediate relief; but she was too far gone to have any hope of saving her. In the second case, this treatment was carried out so successfully that the woman recovered. I am, therefore, strongly inclined to the opinion, that anæsthetics would be found most useful agents in aid of other remedies. They cannot be depended upon alone, because pain may be relieved, and the disease still makes its progress, but that relief greatly assists any means which may be used to combat this malady.

General rules for the treatment of puerperal fever can scarcely be laid down, so much depends on the character of the epidemic and the quantity of the poison absorbed. If the dose be a maximum, it is impossible to save the patient; if in such quantity that the constitution can make an effort to get rid of it, much of our success will depend upon a close observation of the manner in which the effort is made : and it is here that promptitude is attended with so much success. Prompt depletion immediately after a rigor has saved many a patient; emetics, purgatives, diaphoretics, and even diuretics, have proved their value when given with promptitude and decision. Depletion has had the most success, because, in the majority of cases, a rigor is a well-marked and early symptom. If the dose be a minimum, just sufficient to excite peritonitis or phlebitis, the treatment must be directed to subdue these inflammations, and the danger consists in the nature of the tissue inflamed. Such cases are met with in hospitals on the decline of the epidemic, or are scattered through a district on the outskirts, as it were, of the poison.

Those authors who have adopted the term "puerperal fever" have made classifications of its varieties. Tonnelle describes the inflammatory, adynamic, ataxic forms; Ferguson,

the peritoneal, gastro-enteric, and nervous fevers; Gooch, the inflammatory and typhoid: but these terms only signify degrees in the dose of the poison, not any essential difference in the fever itself; and the remedies to meet these several conditions are successful in proportion as they may remove or neutralize the poison absorbed, or support the constitution against its influence.

The prophylaxis of this malady is a question of even more importance than its treatment. The means of arresting its progress, or expelling it from a locality, may save many lives; the best directed treatment has sometimes scarcely saved one life in ten. In this, as in other toxemic diseases, *ventilation* plays an important part; and much of the mischief caused by this scourge has arisen from our ignorance of the principles of ventilation. The Continental hospitals are remarkable instances of neglect of these principles; their mortality varies from 1 in 13 to 1 in 20, chiefly in consequence of puerperal fever, the result of imperfect ventilation. Until lately, our own hospitals were liable to a similar objection; but the General Lying-in Hospital in the York Road, built on the marsh of the Thames, is an evidence of the value of an improved knowledge of this subject. The puerperal fever which so often poisoned its wards is, I believe, now totally expelled.

Another very fertile source for the production of animal poisons is, bad or imperfect drainage, which may baffle the best directed ventilation. *The sewerage* of the metropolis is now becoming the subject of animated discussions; and we have learned that there are a multitude of cesspools carrying on their "fæcal fermentations" with an activity which the best ventilation could not remove. It is not surprising, therefore, that puerperal fever should be found scattered through London, even in houses where one could hardly expect it. It is to be hoped that the attention now given to this subject will be the means of destroying such a source of infection. But something more is required than emptying cesspools. It is equally important that the putrescency removed be not brought back again. Some years ago a part of the Edgeware Road was under repair, and a quantity of Thames mud was laid as a foundation for the pavement. In three days afterwards, five cases of cholera occurred in that district; and if there had been any cases of labour, puerperal fever might as easily have been produced, to spread through the neighbourhood. A law is required to regulate the movements of certain manufacturers, builders, and paviors, lest they undo what the public are endeavouring to accomplish. Nay, we would venture to hint that

such a law might be of great value if it prevented a more important personage establishing a gigantic cesspool at Erith, where fæcal fermentations may be carried out on a scale of sufficient magnitude to bring back the plague itself. Several methods have been proposed for overcoming this difficulty, but there is one which, in a medical point of view, I think well worthy of attention. Mr. Dovor has discovered a process of deodorization, which I have witnessed, and have been surprised at the result. By this method the refuse of the most offensive sink has been rendered perfectly devoid of smell or taste; the stinking sewerage has been converted into water nearly pure, and a residuum perfectly inodorous, but still valuable as manure. The agents employed by Mr. Dovor are hydrochloric acid, proto-sulphate of iron, and chloride of sodium : proto-sulphate of iron, because it is the best salt for fixing ammonia; and chloride of sodium, because of its chlorine. With the same object, Sir William Burnett and Mr. Morell have used concentrated solutions of chloride of zinc as disinfecting agents.

Chlorine is well worthy of attention as a prophylactic; its powers as a disinfectant had been known long before this experimental proof of its efficacy. When Dr. Collins was appointed Master of the Dublin Lying-in Hospital, puerperal fever was rife; he expelled it completely by the extreme strictness with which cleanliness and *chlorine fumigations* were carried out. Each lying-in ward, the moment it was empty, underwent a process of fumigation and cleansing, which continued for a fortnight, when it was opened again for patients. The result was, that of 10,785 patients delivered in the hospital, only 58 died, which is nearly in the proportion of 1 in 186 : the lowest mortality, perhaps, on record in an equal number of a similar class of females[a].

Dr. Semelweiss has proved its value in the Vienna hospital, where from 250 to 300 women are delivered monthly. The wards are arranged in two divisions. In the first, about thirty medical students and eight midwives attend; in the second division there are twenty-eight midwives, and no students. The mortality in the first division varied from 30 to 70 per month; while that in the second (the midwives' department) was only from 7 to 9 per month. In one year, the mortality in the first division varied from 30 to 70 per month; while in the midwives' department it was only from 4 to 7 per month. In one year the mortality in the first division amounted to 500 ! while, in the worst period, it did not ex-

[a] Collins' Reports, p. 390.

ceed 40 in the second division. Dr. Semelweiss was at a loss to explain this extraordinary difference; he could not admit superiority of skill in the comparatively ignorant midwives: the only difference he could think of between them was, the dead-room. The students were always making post-mortem examinations; the midwives never entered it. He assumed from these facts that the cadaveric contagion was communicated to the lying-in women, and excited puerperal fever. With this conviction, he employed *chlorine* as a disinfectant. Students in attendance on patients were required not to handle dead animal matter. Those who had done so were not allowed to examine patients until the following day, and, before doing so, were obliged to wash their hands, *and especially their nails*, in a solution of chlorine. Dr. Semelweiss was gratified to find that by this means he arrested the disease; the mortality fell at once to 7 per month, the same as in the midwives' division[a].

These facts prove that chlorine is not only a deodorizer, but a disinfectant, and suggest some important questions. Is smell a proof of the vitality of a poison? If the smell be removed, is the poison destroyed? Every dissecting-room student knows the tenacity of the cadaveric effluvia. Washing will not remove the smell of his occupation from his hands; he uses every precaution lest his habiliments should betray him; the ammoniacal odour, if he is not cautious, may accompany him in his amusements as well as his studies; he, therefore, employs every means in his power to avert such a catastrophe: hence the value of chlorine, which Dr. Semelweiss has proved destroys equally the odour and the poison.

Mr. Dovor finds chlorine valuable as a deodorizing agent; and, as it is also used as a disinfectant, we may assume that if putrid effluvia be destroyed, the poison to which it belongs became inert. If this view be correct, it has a very important relation to puerperal fever, because it is always accompanied by a peculiar odour. The effluvia of the lying-in ward is well known to those who attend lying-in hospitals; but the odour of puerperal fever is different: it is faintly acid, very difficult to describe, but easily recognised by those who are accustomed to the disease. I believe that it is equally tenacious as the cadaveric odour, and will accompany the practitioner unless he is strictly on his guard against it. Chlorine will destroy this effluvia; does it destroy the poison producing it? If so, may it not be used internally, as well as externally? Hydrochloric acid, chlorate of potash, chloride of sodium, as a purgative, are

[a] Dr. Routh's paper, Medico-Chirurgical Transactions, vol. xxx. p. 36.

at least worth a trial. I offer these suggestions with diffidence, because I have not yet had an opportunity of testing them by experiment.

Anæsthetics are agents which seem to have a prophylactic power. The drunken piper who escaped the plague will illustrate my meaning. Drunkards are less under the influence of poisons, because the susceptibilities of the nervous system being blunted, as it were, by their potations, the activity of the absorbents is proportionately diminished. On this principle, chloroform, so far from being a cause of puerperal fever, seems to me a preventive; and if this scourge were raging in a district, or decimating an hospital, I should certainly take advantage of its power, as a security against the attack.

In the review which has been made of this perplexed subject, the object has been to remove from it what seemed unnecessary difficulties, caused by the terms employed to designate this disease. The correctness of naming it an inflammation of one or other of the tissues engaged was questioned, because such inflammations were only accidents, which may or may not be present, and do not constitute the essential character of the malady. Hence, the correct principle of treatment is, the employment of such means as will remove or destroy a poison, not such as are intended to combat an inflammation.

Lastly. At the present time, when so much attention is given to sanitary measures,—when the old bills of mortality have been succeeded by a most valuable system of registration,—it seems to be a very grave error to call a morbid poison by a wrong name ; and if in their returns the profession send in cases of puerperal fever under the names of "peritonitis," "phlebitis," "arthritis," they not only deceive themselves, but the public. Those precautions which are necessary when poisons are present are neglected, because it is believed to be, and is called, a simple inflammation ; and it is only when the so-called inflammations are flying from house to house or from bed to bed, that alarm is taken,—just when it is too late. The Registrar-General receives a return unintentionally false, and puerperal fever may be raging in a district where the name is never heard : but the period is remarkable, because of the number of post-partum inflammations which have had a fatal termination.

THE END.