**Puerperal fever : an inquiry into its nature and treatment, with an historical retrospect of some of the chief epidemics recorded under that name, and of the principal theories successively entertained respecting it. With notes of personal observations / a graduation thesis by Sophia Jex-Blake presented to the Medical Faculty of the University of Bern ; and accepted by the Faculty on the report of Dr. Peter Muller.**

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WITH NOTES OF

PERSONAL OBSERVATIONS.

A

## GRADUATION THESIS

BY

SOPHIA JEX-BLAKE

PRESENTED TO THE

MEDICAL FACULTY OF THE UNIVERSITY OF BERN

AND ACCEPTED BY THE FACULTY

ON THE REPORT OF

DR. PETER MÜLLER

*Professor of Midwifery & Gynæcology.*

BERN. *Jan.* 10*th*, 1877. PROF. QUINCKE, M.D., *Dean.*

Dedicated

TO THE

ILLUSTRIOUS UNIVERSITY OF BERN

AND TO

THOSE OTHER UNIVERSITIES WHICH ALONE TRULY MERIT THE NAME,

INASMUCH AS THEY HAVE NEVER SOUGHT,

BY THE FORCIBLE AND ARBITRARY EXCLUSION OF

ONE HALF THE HUMAN RACE

FROM THE HIGHER BRANCHES OF EDUCATION,

TO MAKE EITHER

THE TREASURES OR THE HONOURS OF ACADEMIC LEARNING

THE APPANAGE OF A SINGLE SEX,

BUT HAVE WELCOMED AND FOSTERED THE POWERS

OF EACH INDIVIDUAL MIND,

ACCEPTING THESE AS THE NATURAL AND ONLY LIMIT

TO ITS ACQUIREMENTS,

AND TO

THEIR PUBLIC RECOGNITION.

# PREFACE.

It is notorious that hardly any disease exists respecting which there have been, and are now, such fundamental differences of opinion, with regard both to theory and practice, as in the case of Puerperal Fever; and I have ventured to think that it might be useful, as a contribution to the data on which any ultimate verdict must rest, to collect into moderate compass the leading facts respecting past epidemics that have borne this name, and to recapitulate briefly the theories successively entertained concerning it.

In perusing the literature of this subject, nothing is more remarkable than the disposition of nearly every observer to suppose the type of disease with which he is acquainted to be the only or principal one, and thus to construct a theory which is essentially defective because it rests upon a too hasty generalization, depending on imperfect acquaintance with facts which have not fallen under his own notice. On the other hand we find an almost equal inclination in some quarters to include under this one name a number of distinct diseases which have little in common except the puerperal state of the patient concerned; and from such confusion it is most desirable to clear the question.

It is evident that, in order to arrive at a satisfactory theory respecting Puerperal Fever, it is equally necessary to eliminate all foreign elements, and to embrace all known facts really pertaining to the subject. My object in the present Thesis is to present the various historical aspects of the question as concisely as possible, that, by a comprehensive survey of the whole, one at least of the greatest dangers of theoretical pathology may be avoided.

Bern. *November*, 1876.

# PUERPERAL FEVER.

## I.—An Account of some of the Chief Epidemics of Puerperal Fever.

The first epidemic of Puerperal Fever of which I can find definite record, occurred in the Hôtel Dieu of Paris, in 1664, and is thus related by M. Peu from the report of an eye-witness[1]:—"Un savan médecin (M. Vesou) qui, me faisant l'honneur un jour de s'entretenir avec moi, me dit, qu'en l'année 1664, il fût mandé par M. de Lamoignon, premier Président du Parlement de Paris, et par conséquent premier directeur de l'Hôtel Dieu de cette ville. Il s'agissoit de savoir d'où procédait la mort d'une prodigieuse quantité de femmes, nouvellement acouchées en cet Hôpital. On soupçonnoit, ou du moins l'on craignoit, que cela ne vint peutêtre par la négligence des personnes préposées au soulagement de ces femmes. On remarquait d'ailleurs cette grande mortalité plûtôt en de certains tems, et en de certaines saisons qu'en d'autres. Le nœud de la question fut resolu. Le médecin dont j'ai parlé fit ouvrir plusieurs cadavres de ces pauvres femmes, and ils se trouvérent tous pleins d'abscés. Il en rechercha la cause avec exactitude, qu'il attribua enfin à la situation desavantageuse du lieu, ou plûtôt de la salle d'acouchées, qui étoit au dessus de celle des blesséz; tellement que les vapeurs grossières et infectes qui s'élevoient des plaies et des ulcéres de ces corps blesséz formoient comme une masse d'air impure et maligne au dernier point. Cet air se portant perpétuellement en haut, étoit respiré jour et nuit par les nouvelles acouchées, et elles tomboient dans un flux de sang qui ne les quittoit qu'à la mort. Il en perissoit plus ou moins selon que le nombre des blesséz étoit grand. Le

1 "*La Pratique des Acouchements*," par M. Peu, Maître Chirurgien et Ancien Prevost et Garde des Maîtres Chirurgiens juréz de Paris. 1694. à Paris.

temps humide leur étoit incomparablement plus nuisible que le sec, dans lequel ces vapeurs ne font pas une si forte impression ni dans l'air, ni sur les corps. En un mot ce malheur n'étoit point arrivé du tems que les acouchées étoient dans une salle au dessous des autres. De sorte que toutes ces circonstances sufirent à ce savant homme pour apuier son avis, qui fut que pour obvier ce mal il falloit mettre, s'il étoit possible, les acouchées dans un lieu particulier, où elles fussent exemtes de la communication d'un air si contagieux."

The next epidemic on record occurred also at Paris, in the year 1746, and a more complete and official account of it has been preserved.[1] "Il a regné pendant l'hiver de 1746 une maladie épidémique parmi les femmes en conche. M. de Jussieu a le premier observé cette maladie. Elle commençoit par le dévoiement, ou par une disposition au dévoiement, qui continuoit pendant la couche; les eaux, qui accompagnent ordinairement la naissance de l'enfant, sortaient pendant le travail de l'accouchement; mais, après ce temps, la matrice devenoit sèche, dure, et douloureuse; elle etoit enflée, et les vuidanges n'avoient pas leur cours ordinaire. Ensuite, ces femmes étoient prises de douleurs dans les entrailles, surtout dans les parties qu' occupent les ligamens larges de la matrice; le ventre étoit tendu, et tous ces accidens étoient accompagnés d'une doulour de tête, et quelquefois de la toux. Le troisième et le quatrième jour après l'accouchement, les mammelles se flétrissoient, au lieu qu'elles ,durcissent et se gonflent naturellement dans ce temps par le lait qui s'y filtre alors en plus grande quantité; enfin ces femmes mouroient entre le cinquième et le septième jour de l'accouchement. Cette maladie n'à attaqué que les pauvres femmes, et elle n'à pas été aussi violente, ni aussi commune parmi les pauvres femmes qui ont accouché chez elles, que parmi celles qui out été accouchées à l' Hôtel-Dieu; on a remarqué que dans le mois de Fevrier, de vingt de ces femmes malades en couche à l' Hôtel-Dieu, à peine en échappoit il une:

[1] "*Histore de l'Académie Royale des Sciences*, l'an 1746."

cette maladie n'a pas été si meurtrière dans le reste d l'hiver. MM. Col de Villars et Fontaine, médecins de cet hôpital, nous ont rapporté qu' à l'ouverture des cadavres de ces femmes, ils avoient ou du lait caillé et attaché à la surface externe des intestins, et qu'il y avoit une sérosité laiteuse epanchée dans le bas-ventre ; ils ont même trouvé aussi de cette sérosité dans la poitrine de quelques-unes ; et lorsqu'on en coupait les poumons, ils dégorgeoint une lymphe laiteuse et pourrie.

L'estomac, les intestins et la matrice, bien examinés, paroissoient avoir été enflammés, et il est sorti, suivant le rapport de ces deux médecins, des grumeaux de sang, à l'ouverture des canaux de la matrice. Dans plusieurs de ces femmes, less ovaires paroissoient avoir été en suppuration."

It will be seen that both these epidemics originated in a Lying-in Hospital, and, though in 1746 there seem to have been a few cases of Puerperal Fever among women delivered at home, it is expressly stated that such cases were of a milder character. In 1760 we find the first notice of an epidemic in England, and this also broke out in a Lying-in Hospital, about eleven years after the first opening of such institutions in Great Britain. During the last six months of 1760, twenty-four women died of this fever in the British Lying-in Hospital.[1]

In the following year it again appeared under similar circumstances in London, as will be seen from the following narrative by an English surgeon, Mr. White.[1] "A gentleman whose veracity I can depend on, informs me that he attended a small private Lying-in Hospital in London, in May, June, and July, 1761, during which time the Puerperal Fever was very fatal there ; that to the best of his recollection they lost about twenty patients in the month of June ; that during this period he himself delivered six women in a short time in the Hospital of natural births, and they all died. He was so shocked with the loss that he desired the gentleman who had the care of the

1 "*Practical Observations on the Childbed Fever.*" By John Leake, M.D. 1772.

2 "*On Puerperal Fever.*" By Charles White, F.R.S. Published about 1774.

Hospital to deliver some, which he did, but they met with no better fate. They buried two women in a coffin to conceal their ill success. Several gentlemen of the faculty were invited to the Hospital to enquire into the cause of this great fatality, but I could not learn that they were able to account for it in a satisfactory manner."

In 1767 this terrible scourge made its first appearance in Dublin, and here also it was identified with the Lying-in Hospital, which had only been established about ten years previously. From December 1st, 1767, to May 1st, 1768, it appears 360 women were delivered in the Hospital, and of these sixteen died.[1]

Dr. Leake gives us an account[2] of the prevalence of Puerperal Fever in London in the years 1769 and 1770, when he was himself physician to the Westminster Lying-in Hospital. The mortality seems to have been considerable both in the Hospital and in private practice. In the Hospital, from November, 1769, to May, 1770, "being the epidemic season," sixty-three women were delivered, of whom nineteen had the fever, and fourteen died.

As regards the general public, it appears from the Bills of Mortality that in 1769 the deaths in childbed in London amounted to 185, and in 1771 to 172, while in the intermediate year, 1770, they reached 270. Dr. Leake remarks that in his opinion these figures ought to be increased by one half.

The fever, as observed by Dr. Leake, began, on the second or third day after delivery, with a rigor, and this was followed by headache, restlessness, sickness, and vomiting. There were sometimes hot and cold fits alternately, and a sudden and complete prostration was almost universal. When vomiting abated diarrhœa came on, and towards the end of the disease the stools were extremely fetid. There were pains in the bowels

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1 "*Observations on Puerperal Fever.*" By Dr. Joseph Clarke. From the Edinburgh Medical Commentaries. 1790.

2 *Loco cit.*

and enlargement of the abdomen, with much intestinal flatus. Pressure over the umbilicus could not be tolerated, but there was no tenderness in the pubic region. The secretion of milk was sometimes, but not always, suppressed, and the lochia were usually present in normal condition. When the disease proved fatal it usually terminated on the tenth or eleventh day, but sometimes as early as the fifth, or as late as the fifteenth, from the beginning of the attack.

Several of the bodies were opened after death, and white curd-like pus was found covering the intestines; this pus being, in Dr. Leake's opinion, derived from the destructive suppuration of the omentum. Putrid fluid like whey was found in the cavity of the pelvis, with some admixture of black grumous blood. The uterus was generally properly contracted and quite sound, though its peritoneal covering was sometimes inflamed.

It was in 1770 that an epidemic of Puerperal Fever was first recorded at Vienna, and here also it broke out in the Lying-in Hospital.[1] The disease was regarded as inflammatory, and it prevailed for two years very fatally in the city. There was swelling of the abdomen and pain in the hypogastrium, and on post-mortem inspection several viscera, including the uterus, bore marks of inflammation and gangrene, the intestines being also covered with a false membrane.

The first notice of Puerperal Fever in Edinburgh is found in a letter written by Dr. Young to Mr. White[2] in 1774. From this we learn that the fever first appeared in February, 1774, and that it broke out in the maternity ward of the Royal Infirmary without any previous manifestation in the town. "Almost every woman was seized with it as soon as she was delivered, or perhaps twenty-four hours after, and all of them died, though every method was taken to cure the disorder.

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1 "*Lectures on Midwifery*." By Dr. Robert Lee. 1844.

2 "*On Puerperal Fever*." By Charles White, F.R.S. Published as part of a "Treatise on the Management of Pregnant and Lying-in Women."

To account for this distemper in the lying-in ward, I must acquaint you that it has been a general observation that the surgical patients in the infirmary were more subject to erysipelatous swellings than formerly. I found that the women in the lying-in wards last year did not recover as well as formerly, though scarcely any of them died. This made me think there was a local infection." So writes Dr. Young, and this sensible physician appears to have been the first to set the fashion (which necessity has since made so common) of entirely closing the wards, and submitting them to a thorough cleansing and ventilation. The floors and walls were washed and painted, and explosions of gunpowder were added to other precautionary measures. New bedding was procured, curtains were abolished, and an entire stop was put to the disease, as was proved on re-opening the wards after the lapse of a fortnight.

It appears that for some years previous to 1782 epidemics of puerperal fever had become almost constant at the Hôtel Dieu of Paris, and that the mortality had reached a frightful point, so that, in the official report on the subject, it is stated that till the time of M. Doulcet "la maladie eût été funeste à toutes les femmes qui en avaient été attaquées dans cet Hôpital;" and further, that in four months no less than 200 lives were saved by the new method of treatment. In September, 1782, the above-mentioned report, or mémoire, on the subject was presented to the Royal Medical Society of Paris, and from it the following passages are extracted[1]:—"Est il un spectacle plus dechirant, est il un position plus triste pour le médecin que de voir tous les jours périr, malgré les soins les plus ardens et les plus empressés, un certain nombre de femmes en couche, sans jamais avoir la consolation de sauver une seule? Nous avous vu M. Doulcet, entr'autres, qui est enfin parvenu à guérir cette affreuse maladie, renoncer à soigner ces malheureuses femmes, n'y pouvant plus y tenir, quitter ce département avant

1 "*Mémoire sur la Maladie qui a attaqué en differens temps les femmes en couche à l'Hôtel Dieu de Paris.*" Strasbourg. 1783.

l'expiration de son temps, prier un de ses confrères de la faire à sa place, et, rebuté de n'y pouvoir faire le bien, l'échanger pour le plus pénible de l'Hôtel Dieu." After an explanation that the malady had not sooner been recognized as an epidemic in France because doctors seldom undertook the practice of midwifery, and because autopsies were very rare, the Mémoire proceeds to give the following description of the disease:—"Tout à coup il se declare un fièvre sensible, mais pas très fort; le pouls est petit, concentré, and un peu accéleré; les seins se flétrissent à l'instant, le ventre se météorise and devient excessivement douloureux, sans qu'il y ait aucune diminution des lochies. Les forces sont abattues. A ces symptômes se joigneut quelque fois un frisson plus ou moins violent; des vomissements, ou des simples nausées; un devoiement laiteux et très fetide; les yeux s'éteignent; le visage se décolore; la langue humide est chargée d'un limon blanc assez épais, et quelquefois d'un jaune verdâtre à sa base. Les symptômes s'augmentent d'intensité. Vers la fin du second jour elles diminuent pour même cesser quelquefois tout à fait. Calme perfide! Souvent succède une petite sueur froide et gluante; les évacuations par les selles et les vuidanges sont d'un fétidité insupportable; le pouls est misérable; la tête se perd, and les malades succombeut à la fin du troisième, ou au commencement du quatrième, jour de la maladie. . . . *Autopsie.*—Nous ne nous arrêtons pas à décrire l'etat des parties solides du bas veutre que l'épanchement qui s'y forme altère plus ou moins. Il nous suffira de dire que cet épanchement, jusqu' à deux ou trois pintes, est bien visiblement de nature laiteuse, comme du petit-lait non clarifié; toujours très fétide dans la cavité propre de l'abdomen; qu'on y voit flotter constamment des gros morceaux de lait caillé; qu'on en trouve en grand nombre de collés à la surface externe des intestins, et enfin que la matrice est absolument dans l'état naturel." Among the remedies tried were—"les bains; les saignées du bras et du pied; les vésicatoires; les ventouses; l'application des sangsues; les cataplasmes anodins, toniques, vulnéraires,

antiseptiques; l'allaitement, la succion des mamelons par des jeunes chiens; les douches d'eau froide sur le bas-veutre; enfin l'absence total de remèdes; tout étoit and devoit être également mortel; puisque quand bien même il ne seroit pas au dessous de tous les efforts humains d'opérer la résorption d'un fluide de cette nature, épanché dans la cavité du bas veutre, il seroit toujours impossible d'opérer celle des morceaux de fromage qui s'y trouve en abondance. . . . . Mais il en est moyens capable de prevenir l'épanchement, and tout l'art consiste à le faire. C'est dans cette vue que M. Doulcet, présent un jour au moment même où une femme nouvellement accouchée, ressentit les premières atteintes de cette maladie, qui débuta chez elle par des vomissements, saisit promptement l'indication qui se présentait; la fit vomir à l'instant avec 15 grains d'ipecacuanha, qui lui fûrent donnés en deux doses; and répéta le vomitif le lendemain, ayant alors observé une rémission notable dans les symptômes. Le rémède agit par haut et par bas, et il soutint les déjections par une potion huileuse, avec addition de deux grains de kermes minéral. Il prévint ainsi le dépôt qui menaçait de se former et il sauva la malade. . . . . Par le succès de ce remède près de deux cents femmes ont été rendu à la vie, ainsi qu'il est prouvé par le tableau de celles qui ont été attaquées de la maladie pendant plus de quatre mois; on n'a perdu precisément que celles (à nombre de cinq ou six) qui n'ont pas absolument voulu prendre le remède. Elles ont été ouvertes, et l'on a reconnu l'épanchement laiteux et le lait caillé; les mêmes desordres que chez celles que la même épidémie avoit fait périr les années précédentes. . . . Au moyen du détail exact de ses symptômes que nous venons de donner, la maladie ne sera plus méconnue, et, qu'enfin le traitement qui lui est propre étant rendu public, ou aura la satisfaction de sauver la vie à des femmes vouées auparavant à une mort certaine."

This Report was signed by eight physicians of the Hôtel Dieu, and the following is the official record of its reception by

the Medical Faculty of Paris:—"Le Lundi, le 16 Septembre, 1782, M.M. les Médecins de l'Hôtel Dieu ont demandé à faire lecture d'un Mémoire concernant une maladie depuis longtemps funeste aux femmes en couche, qui en étaient attaquées dans le dit Hôtel Dieu. La Faculté les a accueillis avec empressement, et après avoir entendu ladite lecture, elle a arrêté unanimement, qu'attendu l'importance de ce mémoire, et pour accélerer l'utilité dont il doit être dans la ville et dans les provinces, elle l'approuvait, et ordonnoit qu'il fut imprimé le plus tôt possible, presenté aux premiers magistrats, aux ministres, aux administrateurs de l'Hôtel Dieu, et distribué à chaque docteur; et que M.M. les Médecins de l'Hôtel Dieu, et les autres membres de la Compagnie, soient priés de rassembler leurs observations particuliers, et celles éparses dans les auteurs, pour rendre cette méthode aussi satisfaisante pour les savans que précieuse pour les sujets du roi. Et c'est aussi ainsi que j'ai conclu.—Signé, Philip, Doyen."

In 1775 an account of an outbreak of "puerperal fever" in Derbyshire was given by Dr. Butter,[1] and the object of the writer is to prove that the cause of such fevers had hitherto been mistaken, and that they really originated solely in the stomach and intestines, and arose entirely from indigestion and constipation. This is very likely true of the fever he describes, but it is impossible to believe that this should in truth be identified with real puerperal fever. Dr. Butter thinks the cure a matter of great simplicity, and never failed (when the disease was taken in time) to restore the patient to health by means of rhubarb, cordial confections, diluents, fomentations, and clysters; with the occasional use of ipecacuanha. He says that he met with only a single case where there was any inflammation of the womb, and after a copious bleeding this woman made a good recovery. The disease that he saw seems to have depended entirely on irritation of the gastro-intestinal mucous membrane,

1 "*An Account of Puerperal Fevers as they appear in Derbyshire*," by William Butter, M.D. 1775.

and was characterized subsequently by Dr. Gooch as "a slow remitting fever, not attended by any inflammation of the peritoneum. Its chief symptoms are sleepless nights, depression of spirits, one or two exacerbations of fever daily, a quick pulse, and a very disorderly state of the alimentary canal." Dr. Gooch remarks that he has frequently seen this fever occur sporadically, but never as an epidemic, and he believes that it is never fatal. Dr. Butter's account is chiefly worthy of notice because (like one which I shall subsequently quote from Mr. White) it shows to what very different types of disease the term "puerperal fever" has been applied, without any doubt on the part of the writer that what he describes is really identical with the terrible scourge which has elsewhere proved so fatal.

The first detailed account of an epidemic in Dublin is given by Dr. Joseph Clarke [1] who was Master of the Lying-in Hospital there at the time of its occurrence in 1787 and 1788. Reference has already been made to Dr. Clarke's statement that this fever first appeared in Dublin in 1767, and it seems also to have prevailed in 1774; but after the latter date it was unknown in the town until 1787, when from March 17th to April 17th there were eleven cases of fever (of which seven were fatal) out of a total of 128 deliveries in the Hospital. Prompt measures being then taken, the epidemic was arrested, but it again broke out in November, 1788; and out of 355 women delivered during the next three months, 17 were attacked with the fever, and 14 died. This mortality is very small when compared with that in some of the epidemics previously narrated, but its arrest was doubtless due to the speedy recognition of its endemic character, and to the active measures taken by Dr. Clarke. It appears that in the month preceding the outbreak of fever, February, 1787, Dr. Clarke had noticed the slow recovery of a large number of patients, and had requested the Governors of the Hospital to have it thoroughly cleaned and painted, as he thought it pro-

1 "*Observations on the Puerperal Fever.*" By Dr. Joseph Clarke, 1790.

bable that its condition exercised an unhealthy influence on the patients. As however the necessary funds were not immediately forthcoming, the business was delayed, and before it was begun the fever broke out. Its course was characterized by an initial rigor and by pain in the abdomen, but with only moderate tenderness of that part. The pulse was rapid, from 120 to 140; there was little vomiting and no delirium. The secretion of milk and the discharge of the lochia were not subject to any constant law. At the autopsies it was found that the peritonoum was very vascular and much inflamed, and that the intestines and the ligaments of the uterus were in a similar condition. Fluid, frequently but not always fetid, was found in the abdominal cavity, with coagulated masses of purulent matter. There were intestinal adhesions, but the inflammation did not seem to extend below the surface of the viscera. Dr. Clarke tried bleeding, purges, and emetics, but with very small success, and he remarked that the system seemed to be insensible to the operation of medicines." The prevalence of the fever was however entirely arrested when the wards were successively closed, cleaned, and painted; and the subsequent outbreak in 1788 was speedily terminated by the same means. After this thorough purification, it was noticed that the hospital became unusually healthy, and that during the latter part of 1787 only three deaths occurred in the course of 960 deliveries.

All the epidemics hitherto noticed arose in connection with Lying-in Hospitals, though some cases are reported as occurring beyond their walls, and I have not been able to find any instance of the prevalence of this fever on the continent of Europe where its origin was wholly disconnected with hospital practice. In 1787, however, an important epidemic occurred in Scotland, and spread through the town and district of Aberdeen, and also into the neighbouring rural districts, although no lying-in hospital seems to have existed in the locality at the time.[1] Dr. Gordon

1 "*A Treatise on the Puerperal Fever of Aberdeen.*" By Alexander Gordon, M.D. 1795.

informs us that this disease had prevailed in Aberdeen in 1760, —the same year in which it first broke out in London,—but that it had never recurred in the interval, and that none of the physicians practising in 1789 in Aberdeen had any knowledge of it. During the course of a three years' epidemic Dr. Gordon was himself called on to treat seventy-seven cases of this fever, and of this number twenty-eight proved fatal. The symptoms were an initial rigor, followed by fever, rapid pulse, pain and tenderness in the abdomen, sometimes accompanied by vomiting and diarrhœa. The abdomen subsequently became greatly distended, respiration was impeded, and the dorsal decubitus could alone be tolerated. Death usually occurred about the fifth day after the first attack, and was sometimes preceded by a complete cessation of pain. At the autopsies (which seem to have been only three in number) the peritoneum and intestines were found to be inflamed, and the uterus was imperfectly contracted. There was an effusion of serum and of pus into the peritoneal cavity. It is not a little remarkable that in each case the right ovary was in a state of suppuration, while the left was quite sound; and it appeared in each instance that the right ovary was the one "in which impregnation had taken place." It would be interesting to know how often the observers of more recent autopsies have remarked a similar coincidence.

A somewhat parallel account is given by Mr Hey[1] of an epidemic that appeared in Leeds in 1809, but in this case it is recorded that (contrary to the experience of Dr. Gordon) the higher classes were quite as much affected as the lower. Mr. Hey also remarks that it is "somewhat remarkable that I have scarcely known an instance in my practice of this disease coming on after preternatural delivery, or even after particularly hard labour; it most frequently occurs after easy and natural labours." The symptoms described are almost identical with those given by Dr. Gordon, with the addition of a profuse per-

1 "*Treatise on Puerperal Fever.*" By William Hey, M.R.C.S. London. 1815.

spiration at an early stage, and a markedly pallid and anxious countenance as the disease progressed.

We find the following account of an epidemic, or series of epidemics, which occurred in the Westminster Lying-in Hospital between the years 1812 and 1820, embodied in a very valuable essay on Puerperal Fever by one of the ablest physicians of the last generation, Dr. Gooch, who was appointed physician to the Hospital in 1812.[1] He relates that he soon found the Hospital to be much healthier at one time than at another, and that sometimes, without apparent cause, cases of illness were constantly recurring. These illnesses were of the nature of puerperal fever, and were characterized by diffused pain and tenderness, with some swelling of the abdomen and a quick pulse, which was generally at first full and vibrating; if small it was still hard and incompressible. As the disease advanced, the belly became less painful but more swelled, and the breathing short; towards the end the pulse was rapid and tremulous, and the skin became covered with a clammy sweat, but the tongue continued moist and the mind clear. Death took place about the fifth day. On opening the abdomen the intestines were found distended with air; the peritoneum was red in various parts and its surface covered with a coat of lymph. The intestines were adherent to each other and to the omentum. Coagulable lymph was deposited on various surfaces, especially in the depressions between the intestinal convolutions, and on the omentum; the cavity of the peritoneum contained several pints of turbid fluid, apparently serum mixed with lymph. In the uterus the morbid appearances were usually confined to the peritoneal covering, but in some cases the disease had penetrated deeper into the tissue, which appeared infiltrated with pus, and sometimes contained small abscesses; the inner surface, especially at the fundus, being black and ragged as if gangrenous. The disease was extremely

1 "*The most important Diseases peculiar to Women.*" By Robert Gooch, M.D. London. 1829.

fatal. If (as happened in the out-practice) the patients were not seen until two or three days after the attack, they could seldom be saved; but in the earliest stages the prognosis was somewhat better. The most successful remedy was bleeding (both general and local), followed by purgatives. Turpentine was valuable as a rubefacient, but useless internally. No statistics are given by Dr. Gooch as to the number of patients attacked, nor as to the percentage of mortality. It is very interesting to learn that a few years later Dr. Gooch had the opportunity of observing and treating another epidemic of puerperal fever which demanded an entirely different treatment and presented very distinct post-mortem appearances, although the symptoms were so similar to those previously described that Dr. Gooch could find no generally distinguishing mark except the greater softness of the pulse. In this epidemic every patient died who was subjected to the large bleedings which had previously proved so successful. The loss of blood, instead of relieving pain as formerly, induced absolute collapse from which the patient did not rally. Those patients, on the other hand, who were treated with poultices, fomentations, and opium, generally recovered. The autopsies showed a complete absence of inflammation or adhesion of the peritoneum, and there was little or no effusion into the abdominal cavity.

A similar account of an epidemic occurring a little later in the same hospital is quoted by Dr. Gooch from his successor, Dr. Ferguson. He relates that between September 11th, 1828, and February 20th, 1829, sixty-two patients were admitted, and that of these twenty-eight (or nearly half) had puerperal fever of the second type described by Dr. Gooch; but that, under treatment with poultices and pulv. ipecac. co., it proved fatal in only seven cases.

It appears that the years 1819, 1820, and 1821, were distinguished by an enormous puerperal mortality in a large number of localties very distant from each other, and with hardly a factor in common except perhaps the general state of

the atmosphere. A terrible epidemic of puerperal fever broke out in the Lying-in Hospital at Dublin in 1819, and continued to rage in 1820 in spite of assiduous ventilation, cleansing, and fumigation. Dr. Labatt, the then master,[1] relates that in the years 1815, 1816, and 1817, the hospital was healthy, and that out of nearly 10,000 deliveries, he had only sixty-six deaths. In 1818 typhus fever was raging in Dublin, and a number of patients came in with this disease, and died immediately after delivery. In this year there were 3,549 deliveries, and fifty-six deaths. It was not however until 1819 that puerperal fever appeared characteristically in the hospital, and during the last four months of the year, out of 1,010 women admitted, 129 took the fever, and 61 died. Every effort was made to exclude patients from the Hospital, and gratuitious attendance was offered them at their homes; "but many wretched creatures still continued to present themselves at our gates, saying that they would rather run the risk of the fever in the hospital, where they would have food and attendance, than remain at home destitute of both." The hospital was then submitted to thorough scouring, fumigation, and white-washing; all possible sources of infection were removed; nurses and servants were charged to observe extreme cleanliness; and the patients and their clothes were washed "when necessary" on admission, and the clothes were sometimes burned. Fumigation with chlorine gas was carried out, and the wards were washed with a solution of chloride of lime; yet, after all, Dr. Labatt was compelled to confess to the Board of Governors that his efforts were unavailing, and that the experience of the next month only proved the futility of his best precautions. During the first quarter of 1820 the number of deliveries was 429, and of these patients 104 took the fever, and 41 died.

In Vienna also an epidemic broke out in 1819, and in the

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[1] "*Essays on the Puerperal Fever.*" Sydenham Society, 1846. See Preface by Dr. Churchill.

course of two months forty-three deaths occurred at the General Hospital. This epidemic was investigated by a committee specially appointed for the purpose, who reported[1] that from the commencement of the epidemic about one death occurred in every five deliveries; and the remark is added that the mortality was very much greater among those who had suffered privations, and who had entered the Hospital only just before delivery. In the wards where paying patients were received only one patient died, out of forty deliveries. The committee then ask: "Has not this disease in respect of its nature, its malignity, and obvious changes in the affected organs, a striking analogy with others evidently contagious,—such as hospital gangrene, typhus, and exotic pestilential disease? Suspicion must at least arise that the malign puerperal fever, though not produced in every case by contagion, was multiplied, and as it were domiciled, in the institution." Special precautions were enjoined, especially with reference to vaginal examinations. The committee were unable to report any effectual method of treatment. This report is signed on behalf of the Committee by the Baron von Matoschek, and to it is appended an account of the antopsies performed by the prosector, Dr. Biermeyer. In all cases the uterus was found imperfectly contracted, and more or less red externally; its substance was flabby and easily broken, and in two cases contained cavities full of fetid blood. The body of the uterus was also often found distended with fetid air, especially in the case of syphilitic women; putrid shreds of placenta and decidua were often adherent to the fundus. The other viscera were frequently quite healthy.

In the same year 1819, there were epidemics of puerperal fever at Prague, Dresden, Wurzburg, Bamberg, Ausbach, Dilligen, Lyons, Stockholm, and St. Petersburg, as well as in several towns of Italy.[1] In 1820 the disease was again prevalent in Edinburgh, both in the Hospital and in the city at large.

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1 "*Med: Jahrbücher, Oesterreiches Staats*, 1822."

2 "*Communication de M. Danyau à l'Académie Impériale de Médicine.*" 1858.

Dr. Campbell states that it also raged at Glasgow and at Stirling in the same year, and was attended with very great mortality.[1]

In 1826 there was a recurrence of puerperal fever in the Dublin Hospital, where it prevailed to an alarming extent. In 1827 the mortality from this cause was slight, but several deaths occurred from typhus fever which was then raging in the city. In 1828 there was again an epidemic of puerperal fever, and twenty-one deaths occurred. In the following year it was still more fatal, and was arrested only by another clearance of the hospital, followed by thorough fumigation with chlorine gas, and washing with a solution of chloride of lime. After painting and whitewashing, the hospital was re-opened, and no recurrence of the fever took place during the remaining four years of Dr. Collins' mastership.[2]

A very severe epidemic occurred in the Paris Maternité in 1829, and the results are given of 222 autopsies.[3] Out of this number traces of peritonitis were found in 193; lesions of the uterus in 197 (with softening of the uterine tissue in 49); and in 62 instances the ovaries were inflamed. In ninety cases there was inflammation of the veins, and in forty of the lymphatics alone. There were evidences of pleurisy in twenty-nine cases; and in twenty-seven the lungs were affected,—viz., by pneumonia in ten cases, by abscess in eight, by tubercles in four, by gangrene in three, and by apoplexy in two. There were purulent deposits in the muscles in fourteen cases, in the joints in ten, and in the pelvic cellular tissue in six.

A continuation of the above history by M. Tonnellé, is given by M. Duplay[4] for the first three months of 1830, during which period 750 women were delivered at the Hospital, and 146 were attacked with the fever. Forty autopsies were made, with results exactly like those of M. Tonnellé.

1 "*Essays on Puerperal Fever.*" Sydenham Society, 1849. See Preface.
2 "*Practical Treatise on Midwifery.*" By Robert Collins, M.D. 1835.
3 "*Archives Générales de Médecine.*" 1830.
4 "*Journal Hebdomadaire de Médicine.*" 1830.

M. Cruveilhier relates that during the two years and a half that he filled the office of physician to the Maternité of Paris (from May, 1830, to September, 1832,) he witnessed no less than "cinq épidémies, extrêmement graves, de 4 à 5 mois de durée chacune." From May to November, 1830, he saw only cases of metritis and uterine phlebitis, which yielded readily to antiphlogistic treatment, such as venesection, purges, and poultices. The pulse was seldom over 120; it was full and hard; and the abdominal pain was limited to the uterine region. "Mais arrive l'hiver de 1830 à 1831, et avec lui l'encombrement de la maison d'accouchement; le nombre de femmes en couche est plus que doublé. Alors apparait cette terrible fièvre puerperale épidémique qui fait tant de victimes. Au début, frisson, dont l'intensité, la durée, et surtout l'époque précoce de son apparition mesurent en général la gravité de la maladie. Douleurs abdominales péritonitiques qui précèdent quelquefois, accompagnent ou suivent toujours, le frisson initial. Décomposition profonde de la face. Petitesse sans résistance, et fréquence extrême du pouls. Les malades succombent quelquefois en vingt-quatre heures. Pour donner une idée de l'énorme gravité de cette maladie je dirai que sur une série de quinze femmes, accouchées dans vingt-quatre heures, dix étaient mortes le cinquième jour. J'ai essayé de toutes les méthodes de traitement rationel et empirique et toutes ont également échoué. Ayant à traiter en même temps (c'etait en 1832) des cholériques, j'etais moins cruellement impressionné par le cholera que par la fièvre puerperale épidémique."[1]

Between the years 1826 and 1836 there seem to have been several epidemics of puerperal fever in Birmingham, both in the Infirmary and in the town. In 1826 an outbreak occurred in the obstetric ward of the Hospital, and sixteen or eighteen women died there in succession, there being apparently no

1 "*Fièvre Puerpérale.*" Communication à l'Académie Impériale de Médicine à Paris. 1858.

single instance of recovery. In 1833, also, thirty-three deaths are recorded from the same cause, and it is noted that in this year erysipelas was very prevalent in the town.[1]

In 1838 there is a record of 71 deliveries and 19 deaths at the General Lying-in Hospital in London, and Dr. Fox states that Sir Charles Locock considered the fatal puerperal fever then raging to be closely allied to typhus.[2] It appears that erysipelas was very prevalent and very fatal in London during the same year. In 1841 there were 117 deliveries at the above Hospital, and 18 deaths.

The following epidemics of puerperal fever are also recorded by Dr. Churchill[3] as occurring in various places between the years 1830 and 1846;—viz. at

Aylesbury, England, 1831.

Vienna, 1833 and 1834.

Dublin, 1834 to 1840. The fever is described as having made "great havoc."

Paris, 1838.

Rennes, 1842 and 1844.

Westminster, London, 1842.

Rouen, 1843.

Dublin, 1845.

Paris (in several hospitals), 1845.

Rouen, 1846.

The epidemics of puerperal fever in the Vienna Lying-in Hospital seem to have been very frequent and very fatal, and it was on observations taken in this hospital that Dr. Semmelweiss founded his theory that cadaveric poison is the chief source of this terrible malady.[4] In the six years from 1841 to 1846, inclusive, there appear to have been 20,042 deliveries in the division of the Hospital attended by medical students who were

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1 *Edinburgh Medical and Surgical Journal.* Vol. 49. Paper by J. T. Ingleby.

2 "*Obstetrical Transactions,* 1861." Paper by Dr. Tilbury Fox.

3 "*Essays on the Puerperal Fever.*" Sydenham Society. 1849.

4 "*Die Aetiologie, der Begriff und die Prophylaxis des Kindbettfiebers,*" von Ignaz Philipp Semmelweiss. Pesth, Vienna, and Leipzig. 1861.

also engaged in anatomical and pathological study, and during this period 1,989 deaths occurred from puerperal fever, or very nearly ten per cent.; this mortality being about three times as great as in the division of the Hospital attended exclusively by midwives; and from these facts are deduced conclusions to which reference will subsequently be made. The year 1842 seems to have been that of the greatest mortality, averaging in this division of the Hospital nearly 16 per cent. on the number of deliveries. The statements of Dr. Semmelweiss are fully borne out by Dr. Routh, who was present during the puerperal epidemic at this Hospital in 1846 and 1847,[1] and who states that during 1846 the deaths in the students' division amounted to 456.

The year 1856 was distinguished by a fatal epidemic of puerperal fever in the Paris hospitals. The number of deliveries and of deaths is thus recorded by M. Depaul in his communication to the Académie Impériale de Médecine in 1858:—

| | | | | |
|---|---|---|---|---|
| La Maternité . . . . . | 2478 | deliveries, | 114 | deaths. |
| La Clinique d'Accouchments . | 630 | „ | 32 | „ |
| L'Hôtel Dieu . . . . . | 1641 | „ | 73 | „ |
| Lariboisière. . . . . | 685 | „ | 26 | „ |

Taking these figures in the aggregate, they give one death in twenty-two deliveries. M. Depaul further stated, on the authority of M. Tarnier, that there were 3,222 deliveries in private practice during this year in the 12th arrondissement, and that 14 deaths took place from puerperal fever, *i.e.* one in 230 deliveries. The accuracy of these latter figures was, however, subsequently contested.[2]

It appears that puerperal fever was for some years very prevalent in the Lying-in Hospital at Zürich, and that in 1863 the mortality reached its maximum, amounting to more than 16 per cent. on the deliveries during the first nine months of the year taken together; while in August and September alone

1 *Lancet*, July 17th, 1875.

2 "*Fievre Puerpérale.*" Paris. 1858.

the deaths that occurred amounted actually to 33 per cent.[1] Nor is this mortality very surprising when we read Professor Breslau's account of the position and condition of the hospital.[2] Its situation was dark and low, and in the immediate neighbourhood of a stagnant cesspool. The walls were damp, there was no ventilation, and most of the rooms were of insufficient size. It was impossible to effect the alternation of wards or beds, or even to get a sick-room entirely distinct from the other wards; the nurses were obliged constantly to pass from the sick to the healthy. It appears also that, as at Vienna, the students were accustomed to go straight from the anatomical and pathological rooms to the obstetric wards. In consequence of the terrible mortality in 1863, certain measures of reform were adopted; the patients suffering from fever were isolated and provided with separate nurses, and an improvement ensued. The mortality, however, was not thoroughly checked until 1868, when more spacious quarters were assigned to the lying-in women, and patients suffering from uterine diseases were separated from those in labour. At this time, also, orders were issued that no student or practitioner should come from the dissecting room to attend, or examine, women in labour. After these measures were taken, the mortality fell to less than one per cent. annually.

## II.—Personal Observations.

I have now to record my own experience of an epidemic of puerperal fever, fortunately on a very small scale, which I witnessed while a student at the New England Hospital for Women and Children, in Boston, U.S.A., in 1866. In doing so, I must apologize for the very incomplete character of my notes, taken at a time when I had only recently commenced

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1 "*Ueber die verschiedenen Formen des Puerperalfiebers.*" Inaugural Dissertation von Susan J. Dimock. Zürich, 1871.

"*Jahresbericht für* 1860."

the study of medicine, and very imperfectly supplemented subsequently from other sources. I venture however to insert the following narrative for the double reason that the experience then gained was the first source of my special interest in this subject, and of my sense of its paramount importance alike to the practitioner and to the public; and that, though wanting unfortunately in many clinical details, the cases in question do illustrate several of the more important points still under discussion.

The first case of puerperal fever occurred at the beginning of November, 1866, and I shall include in the present account a brief statement respecting the patients who were already in the Hospital at the time of the outbreak, and also some mention of all those who entered subsequently until the closure of the obstetric wards a month later; so that the circumstances, character, and influence, of the epidemic may all be duly estimated.

My studies in the Hospital had begun nearly a year before the outbreak of the epidemic in question, and I think I am correct in saying that during that period no death had occurred in the lying-in wards, where the number of deliveries was about a hundred annually. This section of the Hospital was quite distinct from the other wards, and was only connected with the main building by a long and well ventilated gallery on the ground floor. The system of alternation of wards was carried out, so that patients were admitted successively to different floors, and each ward as it was emptied received a thorough cleaning, and usually stood vacant for some days before receiving a new series of patients. In spite however of these precautions, and of very great cleanliness in the nursing arrangements, I find it on record that for some little time before the outbreak of the fever, an unusual number of cases had occurred where more or less gangrene of the vulva appeared a day or two after labour, though I think there was no instance of dangerous illness. On November 3rd, 1866,

there were eight recently delivered patients in the wards, and, of these, four had had symptoms of gangrene of greater or less extent, though all made good recoveries.

On *Friday, Nov. 2nd,* A. S. was admitted to the Hospital and delivered of a female infant, which had apparently died two or three weeks previously; footling presentation. A. S. was a married woman, but exhibited evident signs of syphilis, and to this infection the death *in utero* was probably due. On the following day, Saturday, one of the assistant doctors in the Hospital made a post-mortem examination of the fœtus, removing the uterus and other organs, and being thus occupied probably for some hours.

I. On *Sunday, Nov. 4th,* K. M. entered the Hospital in the second stage of labour. Age 22; unmarried; primipara; vertex presentation; first position. She had had labour pains to a greater or less extent, since the preceding Thursday, and, being homeless and friendless, she had been exposed to great hardships, and had, on the morning of her admission, walked into Boston from a distance, and then wandered about the streets for hours before she was brought to the Hospital. It so happened that on her admission she was received and first examined by the assistant just mentioned, though subsequently delivered by another person. The baby (weighing 9 lbs) was born about 4 p.m., and a severe laceration of the perineum took place.

*Tuesday, Nov. 6th.*—The perineum showed slight symptoms of gangrene, and a yeast poultice was applied to it. In the evening the patient complained of abdominal pain and tenderness, and Ol: Tereb: was applied externally on flannels.

*Wednesday, Nov. 7th.*—Distinct symptoms of peritonitis. The turpentine stupes were repeated and hot fomentations applied. Calomel gr. ij and Pulv. Ipec. co. gr. x were given at 10 a.m. and repeated at noon. At 5.30 p.m. turpentine and castor oil were administered internally, and repeated three hours later. At 9.30 p.m. the bowels were moved for the first time,

and the patient experienced some relief. The opiates were continued.

*Thursday, Nov. 8th.*—The treatment was continued. At 4 p.m. an enema was given containing Ol: Ricini; and calomel gr. x was administered at 5 p.m. A mixture containing Spt. Eth. Nitr: and Mist. Camph: was also given hourly. At 8 p.m. Pulv. Ipec. co. gr. x. At 9 p.m. Tinct. Ferri Perchloridi was ordered in gtt. iij doses hourly.

*Friday, Nov. 9th.*—Died at 8 a.m.

I have thought it right to give as fully as possible all the facts and incidents, whether peculiar to the patient or relating to the Hospital, which could possibly be supposed to influence the result in this case, as this was undoubtedly the starting point of the subsequent epidemic. It will be seen that there were an unusual number of concurrent circumstances which might or might not have a causal relation to the event, and each would be differently estimated by different authorities. The prevalence of slight cases of gangrene before the outbreak of an epidemic has been so often remarked in other instances that one cannot deny its possible importance. The *sectio cadaveris* of a partly decomposed fœtus, and the subsequent examination of a parturient patient, must not be omitted from the record; though I state the facts with considerable reluctance, as the hospital rule in such matters was most rigid, and was in this instance broken by an oversight which never I think occurred, either previously or subsequently, during my three years' stay in the Hospital. The wretched state of the patient herself, both as regards mental anxiety and physical suffering, prior to admission, also presented precisely the conditions most favourable for serious illness and for a fatal issue, and thus formed a third element in the chain of causation of which it is difficult exactly to estimate the force. It is at least conceivable that no one of the factors in question would alone have produced the unhappy result, but it is certainly no marvel that in combination their influence was disastrous.

II. The next patient, B. C., entered the Hospital on *Monday, Nov. 12th*, and the membranes ruptured at 5 p.m. A boy weighing 8 lbs. was born at 4.45 a.m. on the following morning. Primipara; vertex presentation; first position. The perineum was slightly lacerated and symptoms of gangrene appeared the same evening. A yeast poultice was applied, and Pulv. Ipec. co. was administered.

On *Wednesday, 14th*, symptoms of peritonitis appeared on the left side. Calomel and Pulv. Ipec. co. were given every four hours. The perineal laceration was treated with yeast poultices, lotio nigrum, and the occasional application of the fumes of Bromine.

On *Thursday, Nov. 15th*, the patient was somewhat better, and the treatment was continued, with the addition of a teaspoonful of brandy every two hours.

*Friday, 16th*—Treatment continued. Enema of chamomile tea.

*Sunday, 18th.*—Great improvement evident, though some tenderness still remained on the left side. From this time she made steady progress towards convalescence.

*Tuesday, 27th.*—Discharged, well.

III. On *Saturday, Nov. 17th*, A. M. entered the Hospital and was delivered at 8.45 p.m. of a girl weighing 10 lbs.

On *Sunday, Nov. 18th*, she complained of pain in the left ovarian region, and some tenderness and swelling were noticed on the left side of the abdomen. The lochia were arrested; the skin was hot and dry, the tongue coated and the pulse rapid. A hop poultice was applied to the abdomen; and Calomel gr. j and Pulv. Ipec. co. gr. v were given every four hours. At 8 p.m. the skin became more moist and the lochia re-appeared.

*Monday, 19th.*—There was less pain and tenderness, and henceforth the patient steadily improved.

*Wednesday, 28th.*—Discharged, well.

IV. On *Wednesday, Nov. 21st*, E. K. entered and was delivered at 4 p.m. of a child weighing 5½lbs. that only lived one hour. Multipara; vertex presentation; first position.

*Thursday*, 22*nd*.—Pain in abdomen; arrest of lochia; rapid pulse. Ol. Ricini was given, and, after the bowels had moved, Pulv. Ipec. co.

*Friday*, 23*rd*.—Still some abdominal pain and tenderness. Reappearance of lochia.

*Saturday*, 24*th*.—Improving. Brandy and lime water every two hours. From this time she gained steadily.

V. On *Friday*, *Nov.* 23*rd*, K. B. entered the Hospital, stating that the waters had broken on the previous Tuesday. Primipara; vertex presentation; fourth position. On examination the os was found to be rigid, and the vagina dry. Labour made little progress that day, and at bedtime the patient was given Pulv. Ipec. co. gr. iij. It happened that during the following night several out-cases occurred, and all the students were engaged except myself.

On *Saturday*, 24*th*, at 4 a.m., I was summoned to the obstetric wards to take charge of M. M. (whose case follows,) who entered in labour; and I was also directed to watch the slow advance of labour in K. B., though, except in such an emergency, two patients were never entrusted to the same student. For the next six hours, therefore, I remained in charge of both patients, who lay in adjoining rooms, communicating by an open door. I made several examinations, of course, of both patients at intervals, washing my hands carefully in each instance, but not using any disinfectant. During this period K. B. made very little progress, and the vagina remained hot and dry, and the os rigid. At 10 a.m. the charge of this patient was committed to another student, and I remained with M. M. I learned afterwards, however, that labour made no advance in K.B.'s case from 1 p.m. to 7.30 p.m., when forceps were applied, the head rotated to the first position, and delivery took place. There was some rupture of the perineum.

*Sunday*, 25*th*.—Symptoms of gangrene having appeared in the perineum, the fumes of bromine were applied, and yeast poultices. About 10 a.m. signs of peritonitis showed themselves,

and Calomel gr. ij., Pulv. Ipec. co. gr. v. was given every three hours, but no improvement ensued. The child died in the course of the day.

*Monday*, 26*th*.—The gangrene extended to the vulva in spite of continued treatment by poultices and the fumes of bromine. The medicines as before. No improvement.

*Tuesday*, 27*th*.—The patient became restless and somewhat delirious, but a motion was obtained from the bowels, and it was hoped that improvement had set in. About midnight, however, she sprang out of bed during the nurse's momentary absence, ran to the closet and refused to return. She was carried back to bed and forcibly retained there. Morphia was given, and she became somewhat quieter.

*Wednesday*, 28*th*.—Kept under morphia. Died about midnight.

This poor woman was also single, and from the state of the vagina and uterus, and also from a wound found in the child's head at birth, it was conjectured that she had endeavoured to procure an abortion by instrumental means at the time of the rupture of the membranes, three days before her admission to the hospital, but she denied this to the last. The child was born in an extremely feeble condition, and seemed somewhat premature. It survived only about 18 hours.

VI. On *Saturday*, *November* 24*th*, M. M. admitted at 4 a.m. Primapara, vertex presentation, second position. It appeared that the waters had broken at 2 p.m. on the previous day, but that she had continued her work, washing clothes in a cold room. It was a rule of the Hospital that, whenever time permitted, the bowels of each patient should be moved on entrance either by a dose of Ol. Ricini or by an enema. As, however, M. M. reported that hers had moved quite recently, I omitted this measure, to my great subsequent regret.

The baby was born about noon on Saturday; the uterus contracted firmly; there was no perineal laceration; the patient seemed well and in excellent spirits.

*Sunday, Nov. 25th.*—Appeared well in the morning, but in the afternoon feverish symptoms supervened, with headache and abdominal tenderness. Ol. Tereb. was applied to the abdomen, and Calomel gr. ij, Pulv. Ipec. co. gr. v. was given. Brandy and lime water were administered every two hours; and Mist. Camph. with Spt. Eth. Nitr. every four hours. In the morning she micturated naturally, but in the evening, and subsequently, required the use of the catheter.

*Monday, 26th.*—I was summoned to catheterize her at 4.30 a.m., and found the urine dark but copious. Remedies continued as before. Poultices were applied to the abdomen in the afternoon; and as the vulva appeared pale and presented a small black spot, it was treated with the fumes of bromine. There was some vomiting and much restlessness during the day, but in the evening she seemed rather better and the abdomen was less tender.

*Tuesday, 27th.*—Increase of fever and of abdominal pain, with nausea. Ol. Ricini was given both by the mouth and as an enema with Ol. Tereb.; and Calomel and Pulv. Ipec. co were also administered, but no stools were obtained, in spite of the repetition of the enema.

*Wednesday, 28th.*—The abdominal pain became very severe, and morphia was administered. Ol. Tereb. and Ol. Ricini. were applied externally to the abdomen, and Pil. Hydrarg. gr. v. was also given. Brandy and milk were given, also whiskey and ice, and lime water as a drink. Spt. Ammon. arom. was prescribed, alternately with a solution of Potass. Chlorat. The bowels were moved slightly, and in the evening green vomit appeared. The breathing became stertorous towards night, and she lost consciousness about midnight.

*Thursday, 29th.*—Death occurred about 9 a.m., and at the moment of decease the patient vomited a quantity of fluid of a deep yellow colour, and passed a liquid stool in the bed. There had been no dejection whatever from Friday, Nov. 23rd, shortly before labour set in, until the afternoon of Wednesday, 28th, when the relief was very small and insufficient.

M. M. was also unmarried, and she had gone through great anxiety and some privation during her pregnancy. It was ascertained after her death that on the night succeeding her delivery she had risen from her bed, and walked with bare feet across the ward to drink cold water at the tap.

VII. On *Sunday, Nov. 25th*, C. P. entered the Hospital in a very excitable state. Primipara, vertex presentation, first position.

*Monday, Nov. 26th.*—Membranes ruptured at 3 a.m., and a child weighing 8½lbs. was born at 9 a.m. The perineum was severely lacerated, and some hæmorrhage occurred. Tr. Secale Corn. was given.

*Tuesday, 27th.*—Very comfortable. No signs of gangrene in the perineum.

*Wednesday, 28th.*—A dose of Ol. Ricini was given and the bowels moved.

*Thursday, 29th.*—Became restless, especially at night. Tr. Hyoscyam. was given.

*Friday, 30th.*—At 4 a.m. she began to complain of abdominal pain, and vomiting ensued. Pil Hydrarg. gr. viij. was given, and Ol. Tereb. applied to the abdomen.

*Saturday, Dec. 1st.*—She seemed better in the morning; the pulse was slower, and the tenderness and swelling of the abdomen had diminished. Morphia was injected subcutaneously. In the afternoon a typhoid condition supervened, with loose yellow stools and frequent vomiting. Delirium came on towards night, and increased in violence.

*Sunday, Dec. 2nd.*—Died at 6 a.m.

C. P. also was a single woman, belonging to a class greatly superior to that of the other patients, and during her illness she showed acute consciousness of her sad position, and of the distress which she had occasioned to her family. She also bore traces of syphilitic infection.

VIII. On *Wednesday, Nov. 28th*, S. O. entered the Hospital, and was delivered the same day.

*Saturday, Dec. 1st.*—Slight abdominal pain came on and continued the following day.

*Wednesday, Dec. 5th.*—All unfavourable symptoms had disappeared.

*Dec. 14th.*—Discharged, well.

After the death of C. P. on Dec. 2nd, it was considered necessary to close the wards; as, out of nine patients delivered during November, four had died. No new cases were therefore received for a fortnight, and during the interval the wards were thoroughly cleaned, fumigated, painted, and whitewashed. When re-opened there was no recurrence of the fever, and the patients who were admitted during the latter part of December and the first week of January all did well, and in only one instance was there even the slightest abdominal tenderness. At the expiration of this period, one more fatal case occurred.

IX. On *Tuesday, January 8th*, 1867, M. O. entered the Hospital, having had labour pains since the previous day.

*Wednesday, Jan. 9th.*—Membranes ruptured at 2 a.m.; but little progress was made during the day.

*Thursday, 10th.*—As the head was in the third position, and no advance occurred, the forceps were applied at 3 p.m., and a dead child weighing 9lbs. was extracted.

At 5 p.m. the patient had a rigor which lasted for twenty minutes, and the pulse rose to 130. Profuse perspiration and slight delirium, with great restlessness. Mist. Camph. and Spt. Eth. Nitr. were given; she became quieter, and slept tolerably.

*Friday, 11th.*—Comfortable in the morning. At 5 p.m. a rigor again supervened, the abdomen became painful and tender, and the lochia offensive; pulse 120. Ol. Tereb. was applie externally, and morphia, gr. $\frac{1}{4}$, given every three hours. She then slept a little.

*Saturday, 12th.*—Pulse 120. Tongue dry and red. Less pain in the abdomen.

*Sunday*, 13*th*.—Again a rigor in the evening. Morphia continued.

*Monday*, 14*th*.—Pulse 120. Abdomen tender. Some delirium during previous night. Dr. Bowditch and Dr. Sparehawk, called in consultation, prescribed Ol. Ricini ℥ss and Tr. Verat. Virid. gtt. v. every three hours.[1] After the second dose of Veratrum the patient vomited, and it was stopped at night. Morphia was given, and mustard plasters applied, but vomiting persisted, with delirium.

*Tuesday*, 15*th*.—Brandy was given freely. The vomiting ceased, and the patient grew quieter. All food was vomited except alcohol. A rigor again occurred in the evening.

*Wednesday*, 16*th*. — Violent delirium in the morning, succeeded by unconsciousness about 1 p.m. Pulse 150 and very feeble.

Death occurred at 5 p.m.

At the autopsy the intestines and omentum were found connected by firm adhesions, and the peritoneal cavity was full of serous fluid mixed with masses of coagulable lymph. The peritoneal covering of the uterus was greatly inflamed and adherent, and the interior was gangrenous throughout. One fallopian tube was also gangrenous.

I greatly regret to find that I have no notes of other autopsies, though I feel sure that an examination was made in at least one of the previous cases, and that the results were similar to those above described.

Careful investigation was made respecting the origin of this last case, but no history of contagion could be found. It was suggested that the cause might lie in the fact that the forceps used in this case had not been employed since the

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1 "Some of our American brethren have latterly been using extensively in febrile, inflammatory, and nervous diseases, a new and potent drug, Veratrum Viride. It is certainly entitled to the strong attention of European practitioners. It is not merely an arterial sedative, but apparently a powerful depurant, stimulating the action of the skin, kidneys, and secretory functions generally."—*Diseases of Women*; by Sir James Simpson, M.D. Edinburgh, 1872.

delivery of K. B. (case V.) on November 24th. As however the instruments had been properly cleaned, and had remained in their owner's private house ever since, the truth of this explanation may be doubted. It seems more likely that the case was truly sporadic, and depended on the long protracted labour, and instrumental delivery; if indeed a new element of causation is not suggested by the marked tendency to periodicity which distinguished this case from all that preceded it. The recurrence of rigors at about the same time, on at least four evenings,[1] is the more remarkable when we find that death ultimately occurred at the corresponding hour on the seventh day. This history certainly suggests the enquiry whether the fever in this instance may not have belonged to a special and somewhat exceptional type,[2] and whether it is not in cases of this class that Cinchona and its alkaloids have won the reputation which is claimed for them by some authorities,[3] while other practitioners have tried them in puerperal fever without any favourable result. Be this as it may, the fever, though fatal, seemed not to be contagious, as no other cases followed.

Two other cases occurred sporadically during the course of 1867 (in May and June); besides one death from puerperal urœmia, which came clearly under Dr. Barnes' definition of "excretory puerperal fever," but which evidently resulted from pre-existing and extensive disease of the kidneys, and not from any local infection. In none of these cases however did there seem to be any contagious character, as no other patients in the

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1 Though I find in my notes no mention of rigors on the Saturday and Monday, I do not think this negative evidence is at all conclusive that they do not occur, because it is probable that at the time I did not appreciate their significance, and, if absent myself from the ward, I very possibly made no enquiry about this point.

2 "Quelquefois, cependant, le frisson revient à des intervalles assez réguliers, et peut simuler des accès de fièvre intermittente ou rémittente pernicieuse. Osiander a décrit une épidémie de fièvre puerpérale intermittente observée par lui en 1781; mais ces faits sont tout aussi exceptionnels que ceux dans lequel le frisson fait complètement défaut." *Communication de M. Depaul à l'Académie Impériale de Médicine*, 1858.

3 See the writings of Dr. Leake, Dr. Kirkland, Dr. John Clarke, and, above all, the statements of M. Beau, at the French Academy in 1858.

house were affected. In the case occurring in May the patient had been three days in labour and was greatly exhausted, and it is probable that the fever was due to this cause, as all the patients confined at the same time made remarkably good recoveries. The second case occurred very shortly afterwards, so that the element of contagion was not wholly excluded, but it is more probable that the fatal result was due to the unsuccessful attempts to procure abortion to which the patient pleaded guilty, and to the state of great mental depression in which she subsequently entered the hospital. It is also recorded that she had caused great compression of her abdomen during pregnancy by extreme tight lacing. The other patients in the house at this time all did well.

It is certainly worth remark that, of the eight patients who took the fever during the November epidemic, three were married and five were single women, and that among the former there was no fatal case, while all the four deaths occurred among the latter. It has been a matter of very frequent observation that mental anxiety and trouble greatly increase the gravity of prognosis during epidemics, and that for this reason single women are much more frequently victims of puerperal fever than those in happier circumstances.[1]

## III.—Successive Theories respecting the Nature and Treatment of Puerperal Fever.

Although Hippocrates does not mention puerperal fever by the special name which it has borne in modern times, it can hardly be doubted that he referred to cases which would now be so designated when he wrote as follows:—"Then, after delivery, the lochia are scanty, sharp pains are felt in the loins, and in the neighbourhood of the genital organs, with symptoms of inflammatory swelling. The women's thighs seem on fire; she has headache, fever and rigors, and her teeth chatter.

[1] See the testimony of Dr. Leake, Dr. John Clarke, M. Beau and many others.

Her belly swells, as does also her bladder, and the secretion of urine is arrested. Her eyes begin to roll, and her sight is affected." And in another place he writes:—"Her alvine secretions are black and fetid like those of mares; their evacuation somewhat relieves her. If evacuation does not occur there is danger of a subsequent violent diarrhœa, with complete suppression of the lochia. If remedies are not promptly applied, the disease grows worse and worse as time advances; all hope of recovery disappears, and the patient dies sooner or later."[1] From the above passages it is clear that in the opinion of Hippocrates the suppression of lochia was not a symptom, but the cause, of the disease, and this view seems to have been shared by other medical authors of antiquity, whose writings it is unnecessary to quote individually.

The earliest account of puerperal fever which I shall quote from the writings of modern authorities, occurs in the works of Dr. Willis, one of the fathers of English Medicine, in the seventeenth century.[2] Dr. Willis enumerates three classes of "Feavers of women in Childbed;" viz., "(1) The Milkie, (2) The Putrid, (3) The symptomatic." With regard to the first class he says that "the cure may be wholly committed to nature." As to the second, which evidently includes the fever now called "puerperal," he thus writes:—"Women lying-in, from fault of an evil affected body, as by the contagion of a received pestilential air, are found to be too obnoxious to the putrid or malignant feaver; but all do not receive the infection, for poor people, labouring women, country women, and others accustomed to hard labour, as also viragos and whores which are brought to bed clandestinely, bring forth without any great difficulty; but more rich women, tender and fair, and most living a sedentary life, as if participating after more grievous manner the divine malediction, bring forth in pain, and then presently are subject

1 Hippocrates, "*De Morbis Mulierum*."

2 "*Medical Works* of that famous and renowned physician, Dr. Thomas Willis, of Christ Church in Oxford." London, 1681.

to difficulty and dangerous chances. . . The type or figure of the disease is perfected almost after this manner. After a previous indisposition, an open feverishness, for the most part with a shivering or horror, constitutes the first assault, which is followed with heat and afterwards a cold sweat; then, the blood being wholly enkindled, the lochia, if not before suppressed, either flow smally, or are wholly stopped. If the disease be acute and of a swift motion, it comes to its height on third and fourth day; then an intense heat, with very troublesome thirst, a vehement pulse and quick pertinacious wakings, and great inquietude of the whole body, that they are continually tossing themselves in their beds hither and thither; a thick and high coloured urine, and other most grievous symptoms are wont to trouble them. There sometimes also follows a phrensie; not seldom a stupefaction and speechlessness; the strength is suddenly cast down; the pulse becomes weak and unequal, and the sick are suddenly precipitated to death. If that perhaps any escape, they hardly recover but of a long time." Dr. Willis ascribes the cause of the disease to "the depraved condition of the blood from the suppression of the monthly flux," and proceeds to aver that "the blood not only swells up, and its sulphurous parts being too much carried forth are rendered more apt for burning; but, besides, the mass of the blood is embued with very fermentative particles." As secondary causes he mentions "ill manner of dyet and the taking of cold." He adds that "although this feaver be somewhat malignant, it is not caught by contagion, and there is no fear of the sicks' receiving outwardly any invenomed taint, but all women in childbed have an innate mine of virulency." Among the remedies for the fever he mentions various decoctions (including some of pearls and of soot), fomentations, and also venesection. He further advises that the "caul of a wether be taken out warm and laid on the bottom of the belly." But after all he concludes that "medicines do but little, though many of every kind be tried." In his third class of childbed

fevers this author includes small pox, pleurisy, and such other diseases as have distinct characteristics of their own, and are only intercurrent in the puerperal state. "Epidemic Feavers" also he discusses in a separate chapter.

It is not a little remarkable that one of the earliest English writers on puerperal fever should speak of it as "putrid feaver," and again as due to the "innate mine of virulency in childbed women;" thus anticipating by nearly two centuries two of the most important theories derived from modern science, viz., those which respectively attribute this malady (1) to septicœmic poisoning,[1] or (2) to the exceptional physiological state peculiar to the puerperal woman.[2]

In the works of Dr. Willis' still more renowned contemporary, Sydenham, we also find mention of a disease that can hardly be other than puerperal fever. "The lochia at first diminish, then cease; and the series of symptoms that follow, unless checked by medical skill, soon prove fatal. Or a frenzy may set in, cause spasm, become day by day worse, and then cause death. . Sometimes this suppression of the lochia may bring on fever, and this may take the character of the prevailing epidemic, or at least be allied to it in origin."[3] Again under the head of "Suppression of the lochia," Dr. Sydenham describes the following symptoms:—"The belly swells, there is a heavy bearing-down pain in the lower belly, and in the groins and loins. The face becomes red, the respiration difficult, the eyes wild. There are chills and fever, fainting, cold sweats, a sense of heat and throbbing in the womb, palsy of the lower limb, and, at times, epilepsy."[4] By way of treatment, myrrh lozenges are recommended, laudanum, and clysters.

M. Peu, from whom I have already quoted a report of the Paris Epidemic of 1664, thus writes in 1694:—"Les suites du

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1 See Semmelweiss, Schroeder, and the German school generally, with many French and English authors.

2 See Piorry, Cazeaux, Farre, Barnes, and others.

3 "*Dissertatio Epistolaris.*" By Dr. Thomas Sydenham, London. 1682.

4 "*Processus Integri in morbis fere omnibus curandis.*" 1693.

travail sont de mauvais présage si l'acouchée se plaint d'être gonflée par la retenue de ses vuidanges; si après sa déliverance elle entre en rêverie et que les convulsions continuent; si l'apellant à haute voix par son nom elle ne répond point, ou fort peu et si bas qu'elle semble perdre la parole; si, immédiatement après être acouchée, elle crie, tempête, ne veut point demeurer en repos, mais au contraire change continuellement de place, et contraint les gens à la tenir ou la lier; si elle tombe en defaillance et qu'elle soit fréquemment atteinte et tourmentée de frissons; si les nausées et les vomissements ne l'abandonnent point, ni ne permette qu'aucun aliment demeure dans son estomac; si elle souffre des douleurs à l'*os sacrum* et aux os des hanches qui empêchent qu'on ne la remue sans faire de grands cris, marque de l'écartement des os, et que les ligaments osseux sont ou extrèmement tendus ou rompus; si enfin son pouls bat lentement et remonte peu à peu pour aller s'ensevelir et s'éteindre dans les sueurs froides parmi les hoquets et les sincopes de la mort."[1]

It appears to have been in the epidemic at Paris, 1746, that notice was first taken of the local inflammation of the uterine organs and abdominal viscera, as described in the narrative already given.[2]

A new theory respecting the origin of puerperal fever appears for the first time, so far as I aware, in the writings of M. Puzos about the middle of the last century.[3] He thus writes:—"Le lait formé par les alimens des femmes nouvellement accouchées roule confusément avec le sang dans toute l'habitude du corps. Il n'est pas étonnant de voir le superflu s'échapper du corps par différentes voies; il coule de leur vagin et de leurs mammelles; leurs urines sont plus louches; leur matière fécale moins brune; les sueurs sont aigres et plus abondantes. L'évacuation par toutes ces voies n'empêche pas que

1 *Loco cit.*

2 See p. 2.

3 "*Traité des Accouchements*," par M. Puzos, Chirurgien de Paris, 1759.

le sang ne soit encore tout laiteux. Le lait est sujet à se cailler dans le corps, ou à se faire des fausses rontes. Il se caillera tous les fois qu'il s'arrêtera dans les réservoirs du corps, ou lorsqu'il se trouvera dans le corps quelque liqueur acide qui, par son mélange avec le lait, le coagulera. Le lait en se caillant, ou en s'écartant de les routes ordinaires, cause une foule de désordres. Le lait répandu puisse se fixer dans tous les viscères; dans la tête, dans la poitrine, dans le ventre; cependant les parties du bas ventre sont le siège le plus ordinaire de ces dépôts laiteux. Le lait s'épanche aussi assez souvent dans la cuisse. Les dépôts laiteux dans la region inférieure du ventre s'annoncent par des tranchées importunes et vagues; par la perte de l'appetit et du sommeil; par une fièvre légère dont les accès commencent par un petit frisson. . . . . J'ai vu périr un grand nombre de femmes, quelque fois en vingt-quatre heures, d'autres au bout de trois ou quatre jours. . . . . Les tranchées qui sont les avant-coureurs d'une maladie aigue sont accompagnées d'une chaleur brulante, de mal de tête, d'altération, de fièvre, et de douleurs vagues dans le ventre et aux reins; la matrice est douleureuse et le ventre est tendu. . . . . Il faut demander une consultation. Employez des saignées, des purgatifs, et des remédes qui portent aux urines et au peau."

It appears that this theory of the "Milk Metastasis" became fashionable in France, for it seems a few years later to had the unanimous assent of all the members of the Société Royale de Médecine, to whose report I shall refer in due order.

In the meantime, the subject of puerperal fever was attracting considerable attention in England, where several works respecting it were published within the next few years. It is, indeed, to an English author, Dr. Strother, who wrote in 1718, that the name now so familiar to us is due.[1]

A very important essay on the subject was published in 1768 by Dr. Thomas Denman, of London, and the careful obser-

1 "*Essays on Puerperal Fever.*" Sydenham Society, 1849. See Preface, by Dr. Churchill.

vation and accurate reasoning which it displays make it a valuable authority even at the present day.[1]

His opening remarks will commend themselves to every true physician. "The frequency of puerperal fever, and the great danger that attends it, render it an object deserving of the most serious consideration. The disease itself hath indeed been described by the most early writers, with accuracy sufficient to characterize it, but evident disadvantage hath arisen from its being described under such various appellations and attributed to such various causes. It has been represented by some writers as entirely owing its existence to the milk, or to a suppression of the lochia, while others have described it as miliary fever. Some again have confidently termed it an inflammation of the uterus, while others have confidently asserted that it was wholly confined to the bowels, and the uterus not concerned. With such different ideas of the causes and seat of the disease, we may conclude that the treatment must have been various and often hurtful. Undoubtedly there is great difficulty in forming a just opinion of a very complicated disease, but in proportion to the difficulty our distinctions should be accurate, that we may be enabled to do good, or at least to avoid doing mischief." Dr. Denman himself lays special stress on the peculiar condition of puerperal women, and on the many sources of disturbance to which they are liable. "In short" he adds "every cause capable of occasioning a fever under any circumstances will at this time be followed by worse consequences; and any disturbance raised in the constitution will affect parts already in a very irritable state." He insists on the necessity of careful attention to health during pregnancy, and advises that labour should be left as much as possible to nature, rather than hastened artificially. He advises moderate diet after delivery, without thinking any very strict regimen necessary. He also recommends due attention to the bowels, and especially warns doctors

[1] "*An Essay on Puerperal Fever*," by Thomas Denman, M.D. London, 1768.

against allowing patients to rise too early from their beds, as he thinks more cases of puerperal fever are caused by too early sitting up than all other causes. The description given of the general type of illness observed by him is so careful and so excellent that I must venture to transcribe it in preference to most subsequent accounts. "The most frequent time of its appearing is on the third or fourth day after delivery, when the patient is seized with a shivering fit, from the violence and duration of which we may generally estimate the danger of the succeeding disease. Before this the patients have often complained of wandering pains in the abdomen, which soon become fixed in the hypogastrium, where a swelling with exquisite tenderness ensues. The whole abdomen becomes affected and tumefied, sometimes nearly to its size before delivery. The woman feels great pains in the back, hips, and groins, and sometimes in one or both legs, which swell, appear inflamed, and are exquisitely painful. She can scarcely lie in any other position than on her back, and the seat of the pain seems changed if she turns on either side. There is usually a nausea, or a vomiting of green and yellow bitter matter. An instantaneous change takes place in the quantity and appearance of the lochia, and sometimes, but rarely, they are almost wholly suppressed. There is a sense of throbbing pain and heat through the parts concerned in parturition. The milk, if secreted, soon disappears or is diminished, and its taste is much altered. The urine is voided often, with pain and in small quantities, and is remarkably turbid. A tenesmus, or frequent stools, come on, as if all the pelvic organs were affected by the disease. Tongue most frequently dry, with thick brown fur, but sometimes not much affected. The patient is seized with immediate apprehensions of danger, and labours under vast anxiety, her countenance bearing undubitable marks of great suffering both in body and mind. The progress of the disease is sometimes extremely rapid. Instances have occurred of death within twenty-four hours of the first attack; I have seen

a few who never grew warm after the rigor. The pulse has almost invariably an unusual quickness from the beginning; it has often the strength and vibration observed in inflammatory disorders, and yet is sometimes exceedingly feeble, which is a mark of great danger. There is often an erysipelatous appearance, of dusky red colour, on the knuckles, wrists, elbows, and knees. This is always a mortal sign, and, in those who have died with this appearance, the disease has been found to affect chiefly the uterus and its appendages." As regards the course of the disease, Dr. Denman remarks that a "looseness immediately upon the attack always lessens the disease, and sometimes proves critical, as does also a spontaneous vomiting or profuse sweat. In some there will be a translation of the disease to the extremities, where the part affected will become inflamed and a large abscess formed. Fresh eruptions of the lochia are always a favourable sign, as is also a subsiding of the belly, with loose stools and a moist skin."

With regard to treatment, Dr. Denman advises hot applications during the rigor, but only a moderate use of stimulants. Subsequently he recommends purgatives and emetics, especially tartar emetic, followed by opium after vomiting and purgation. In the first edition of his Essay he expresses doubts respecting venesection, but in a subsequent edition he states that his experience is now entirely in favour of free bleeding at the outset of the disease; followed, if necessary, by repeated cupping or leeching.

It appears that Dr. Denman made no less than forty autopsies of patients dying of puerperal fever, with the following results:—"The uterus or its appendages were in a state of inflammation, and sometimes mortified. The os uteri and part to which the placenta had adhered had generally a morbid appearance. Small abscesses were formed in the substance of the uterus or of the cellular membrane which connects it to the adjacent parts. The bladder was inflamed. The omentum was very thin, irregularly spread, and in a state of inflamma-

tion. The intestines were inflamed, chiefly in the peritoneal coat, and adhered in many parts and much inflated. Inflammatory exudation and serum extravasated in the cavity of the abdomen have been found in various quantities, but these were in a less degree when the patient had laboured under long continued purging. Large flakes of coagulable lymph were found in the cavity of abdomen, which have been mistaken for dissolved portions of the omentum." The rest of the Essay is mainly taken up with the narration of a number of interesting cases, and with minute details respecting the varieties of type presented by this disease, with the treatment best adapted to each case. Dr. Denman makes the first allusion that I have found to the possible value of vaginal injections, saying that he has seldom tried them, and would advise great caution in their use, but adding that "from the state of the parts and the fetid humour discharged from them, it is reasonable to expect that emollient, or gently detergent, injections might be useful." He seems purposely to avoid committing himself to any elaborate theory respecting the etiology of puerperal fever, but states concisely that, in his opinion, "the uterus is the part principally affected, or at least where the disease most commonly originates." He does not mention ever having seen the disease in an epidemic form.

The next author of note who took up this subject was Dr. Hulme,[1] who was Physician in Ordinary to the City of London Lying-in Hospital. This appointment, however, by no means implied the special, or even ordinary, practice of obstetrics, as would now be the case, for Dr. Hulme expressly states that "the wisdom of that house (*i.e.* hospital) directs that the physician appointed to attend to all the diseases of the women and children shall be a person who hath no connection with the practice of midwifery,"—the delivery of the patients being apparently the exclusive concern of the midwives in charge. I do not know whether it is due to his official position that

[1] "*A Treatise on the Puerperal Fever*," by Nathaniel Hulme, M.D. 1772.

Dr. Hulme begins his essay with a eulogy on hospitals in general, and on his own in particular; but, as we have seen that this disease had already ravaged some of these institutions in London, it is somewhat remarkable to find no allusion whatever to such epidemics throughout his book. He narrates a number of cases, and gives also post-mortem observations, but, so far as we learn, these cases were all sporadic, or at least in no way connected with contagion. His description of the fever is almost identical with that of Dr. Denman, except that he notices that there is great shortness of breath, dependent on fear of dilating the thorax, "while the abdomen, containing the grand seat of the disorder, is at every inspiration squeezed as between two presses, the diaphragm above and abdominal muscles below." He believes that, though hardships during pregnancy, and other causes, may predispose to puerperal fever, it is in truth "a disease *sui generis*, of a nature peculiar to itself, and as simple and regular in its appearance for the most part as any distemper incident to the human body." Dr. Hulme believes the disease to depend on inflammation of the intestines and omentum, which again he attributes to the extreme pressure exercised on them by the gravid uterus during pregnancy, which pressure interrupts the circulation of the blood and causes constipation by partial paralysis of the intestines, their peristaltic motion being interfered with. The retained fæces irritate the intestines till inflammation occurs and fever sets in. He does not, however, explain why the catastrophe occurs only after the cause has been removed by delivery. His remedies are venesection, cathartics, and clysters, with diluent drinks, no stimulants, and complete rest of body and mind. He also recommends that the patient should be kept clean, warm, and dry by frequent change of clothes, and that "in warm or even temperate weather fresh air should be let into her room every day by an opening at the window or door." From evidence subsequently to be narrated, it appears that this very moderate amount of ventilation might then be considered an extreme

and rash measure. The account of Dr. Hulme's post-mortem observations corresponds generally with Dr. Denman's experience, except that Dr. Hulme reports the uterus to have been almost always healthy, and, in speaking of the peritoneal extravasation, he changes Dr. Denman's expression "coagulable lymph" for "small portions of whitish substance, seemingly fat, stuck here and there, as if pasted on the intestines."

In the same year another work on puerperal fever was published by Dr. Leake,[1] who was physician to the Westminster Lying-in Hospital, and also a lecturer on midwifery. In his book I first find a distinction laid down between the epidemic and sporadic types of the fever. He informs us that "during the epidemic season," from November 1769 to May 1770, there were sixty-three deliveries at the Westminster Hospital, and that nineteen of these patients had childbed fever and fourteen died. After this the mortality declined, perhaps partly in consequence of the sanitary measures adopted at the hospital, though a good many of those enumerated would not now be thought very efficacious. The floors were sprinkled with vinegar and water; myrrh and gum copal, with cascarilla bark, were used for fumigation; and "above all the steam of hot vinegar to which lavender flowers had been added with camphire." Reference is also made to Dr. Lind's recommendation of fumigation with burning sulphur, but it is not stated that this was employed at the hospital. Dr. Leake however speaks of limiting the number of beds in a ward, of admitting fresh air, of requiring great cleanliness in the nurses, of frequently changing the patients' clothes, and of exposing the mattresses and bedding to the sun and air, and these measures were no doubt beneficial. In Dr. Leake's opinion puerperal fever depends chiefly on inflammation of the omentum, and he says that any cases previously supposed to be due to inflammation of the uterus must have been very different from those he saw, as on post-mortem examination he always found this

[1] "*Practical Observations on the Childbed Fever.*" By John Leake, M.D. 1772.

organ in a healthy condition, whereas the omentum was always in a state of suppuration. His description of the disease is substantially the same as that of the preceding writers. He discards Dr. Hulme's explanation of the cause of the abdominal inflammation, which he himself attributes to the "sudden change produced in the habit by the effect of delivery, and the alteration in the course of the circulating blood which must then necessarily happen from the contraction of the uterus after delivery." He also mentions mental anxiety and special atmospheric conditions as likely to act as predisposing causes, and expreses his belief that epidemics are always caused by a "noxious constitution of the air," as they suddenly appear without any other evident cause whatsoever. He considers that sporadic cases, depending on accidental causes, are much less dangerous than those occurring during an epidemic. His remedies are early and copious bleeding, (to be stopped if the pulse becomes feeble and unequal,) emetics, gentle laxatives, clysters, and warm baths. He specially recommends the use of castor oil and of tartar emetic. Light and simple nourishment is to be given frequently in small quantities, with large quantities of diluent drinks, and the juice of acid fruits, if the diarrhœa is not excessive. He also recommends effervescing mixtures, and talks of the wonderful antiseptic properties of the resulting "gas sylvestre" ($CO_2$), which he says is reported to have stayed the plague itself at Marseilles, as the disease was suddenly arrested as soon as the vintage began, with its "vapours arising from fermenting new wines."

Another work, containing a lengthy disquisition on puerperal fever, was published about the same time by Mr. White, a Manchester surgeon.[1] Mr. White begins by referring to the opinion of Dr. Willis that the poor were generally exempt from this malady, and remarks that since the establishment of lying-in hospitals this was no longer the case. He ascribes the fever

[1] "*Treatise on the Management of Pregnant and Lying-in Women.*" By Charles White, Esq., F.R.S., of Manchester. Published apparently in 1774.

to a putrid atmosphere in the first place, and secondarily to constipation during pregnancy, to improper tightness of dress, to the crowded state of hospitals, to the heat of the lying-in rooms in private houses, and to the habit of taking excessive quantities of hot stimulants. All these causes contribute, he says, to the putridity of the lochia; and the custom of keeping puerperal women in the horizontal position greatly aggravates the evil, by causing the retention of the lochia and also promoting constipation. Mr. White quotes from previous authors descriptions which undoubtedly apply to puerperal fever, and gives at full length the account of the epidemic in Paris in 1746,[1] as also the letter from Dr. Young which I have already quoted,[2] so that he must certainly have known the character of the disease as seen by others. It seems to me extremely doubtful however whether he himself ever witnessed it, for he expressly says that he never attended a woman in a lying-in hospital, and the cases he quotes from private practice (in all of which recovery took place) do not seem to me to possess any of the more severe characteristics of the true disease; and they yielded to treatment which would hardly have sufficed for cases of puerperal fever as seen by other observers. They appear to have had much more the character of the so-called "miliary fevers," fostered by excessive heat and unhygienic conditions, which have almost entirely disappeared since the value of fresh cool air has been understood. We must certainly give Mr. White credit for being an apostle of ventilation in an unbelieving age, but I fear that open windows, to which he ascribes most of his cures, would not alone suffice to arrest an epidemic of puerperal fever. From the cases he narrates I will give a concise account of the most typical. Mrs. A. had had a good natural labour, and did well for several days, but she was observed to sweat profusely and the lochia were offensive. Then

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1 As given at p. 2.

2 See p. 5. He also cites numerous passages from the works of Dr. Denman and Dr. Leake.

diarrhœa and abdominal pains supervened, and her tongue became thickly coated. Mr. White called in a physician in consultation, and they jointly gave various gentle remedies, and told the nurse not to keep the room so hot. As however the patient grew rather worse than better, on the fourteenth day after delivery the doctors took the husband aside, and obtained I think a sufficient solution of the mystery, which, with the sequence, shall be given in Mr. White's own words:—"Her husband informed us that her mother and another lady, with the nurse and child, had constantly laid in the same room with her since her delivery; that our directions in regard to air and ventilation had never been complied with, for if we opened a door it was shut immediately after our leaving the house. A large fire had been kept in the room day and night (in the months of April and May); that the curtains had been always drawn close round the bed, and that she had not been permitted to breathe any air but what had been polluted by her sweat and excrements, and the effluvia from the breath of so many persons. Several of those who were most with her had got the same kind of putrid diarrhœa, but that he had himself escaped it, probably because he avoided the room as much as possible on account of its heat and offensive smell.[1] . . . . The fire was now taken out of the room, which was gradually cooled, and thoroughly ventilated by frequently opening the door and window. Eight grains of rhubarb were given her in a solution of spermaceti. The next morning she was considerably better." In a few days this patient was quite well. If Mr. White deserves credit for his advocacy of fresh air, he will certainly not be commended by most practitioners of the present day for his urgent advice that the patient should be made to rise from her bed "on the second or third day after delivery *at furthest*," and that she should be made to

1 It is the fashion to boast of the enormous reduction of puerperal mortality by modern science. Does not such a picture as the above suggest that modern hygiene may have something to do with it?

sit up in bed repeatedly even a few hours after delivery, with a view to the evacuation of the lochia. With such practice it seems rather marvellous that Mr. White should be able to record that he had never lost a patient by any of the fevers attending the puerperal state. On the strength of this good fortune he ventures to assure his readers that, if only his directions are obeyed, puerperal fever will never occur in private practice, except perhaps in primiparæ! He does, however, allow that the case may perhaps be different in lying-in hospitals, and adds that in the "malignant endemic form" in which it there appears, he fears no known treatment will stop its ravages. This is almost an admission that the fever thus spoken of is something generically different from that of which he writes, yet his statements are often quoted as if of considerable authority with reference to the true puerperal fever.

The next book I shall quote is one of much greater value, and in many respects its author approaches more nearly than any of his contemporaries, except perhaps Dr. Denman, to the opinions received at the present day, and he takes up for consideration many of the questions which are still matters of debate.[1] Dr. Kirkland begins by asking whether the name, Puerperal Fever, is to be considered to apply to all febrile affections occurring after delivery, or whether intercurrent disorders, depending perhaps on a prevailing epidemic, are to be called by their special names in each case. He gives an instance of great mortality caused among lying-in women, as well as others, by the plague at Constantinople, and asks whether deaths from such a cause are to be attributed vaguely to "puerperal fever." He assumes that all epidemics in Maternity Hospitals belong to the class of zymotic diseases, and proceeds to define true cases of puerperal fever to be "those only which arise from an inflammation of the uterus; from the abdominal viscera being inflamed in consequence of a hasty delivery; from the absorb-

1 "*Treatise on Childbed Fevers, and the methods of preventing them.*" By Thomas Kirkland, M.D. 1774.

tion of putrid blood or other putrid matter from the uterus; from the coming of the milk; from the inflammation of the breasts; from the absorption of acrid milk, and from a retention of excrement." All these causes act, he says, on an abnormally irritable state of the uterus, and this condition of "nervous or inflammatory irritability" predisposes puerperal women to acute and dangerous illness. If the first few days can be safely passed, the woman returns gradually to her normal condition, and is no longer liable to the same risks. If, on the contrary, inflammation sets in, there has been more or less absorption of putrid matter from the uterus or abdomen, and so two things need treatment, viz., (1) the inflammation, and (2) the symptoms of putrescency. As regards remedies, Dr. Kirkland gives the preference to purgatives, though he allows that bleeding may be useful in a very early stage, but adds that, if the inflammation is not subdued by it, the loss of blood will have weakened the patient's powers of resistance.[1] He recommends small doses of saline sudorifics and purgatives, and points out the value of opium and camphor in abating inflammation. It is rather remarkable that Dr. Kirkland, in recommending small doses of purgatives, observes that "a drachm in this state will sometimes give as many stools as an ounce at another time;" whereas another careful observer, Dr. Joseph Clarke,[2] made exactly the opposite remark. When diarrhœa becomes excessive, he recommends "rhubarb and columbo to lessen irritation and carry off any putrid matter lodged in the *primæ viæ;*" and then gives starch and calomel with sweet spirits of nitre to arrest the discharges. As soon as the fever decreases, he considers bark the most important remedy. After giving the above general directions, Dr. Kirkland remarks that this method may probably answer "where puerperal fever arises

1 Respecting this passage Dr. Churchill remarks that the type of fever seen by Dr. Kirkland must have been typhoid, and that here bleeding is neither well borne nor successful; but that when the fever is inflammatory copious bleeding is indispensable.—"*Essays on the Puerperal Fever.*" Sydenham Society, 1849. See Preface.

2 See page 11.

from the blood rushing into the viscera after a hasty delivery; but a much more dangerous fever is the putrid fever, which arises from the retention of coagulated blood in the uterus, which corrupts in a few days and offers every kind of violence to the constitution." Here he deprecates the use of purgatives as well as of bleeding, for the diarrhœa will be already excessive, and he recommends the immediate use of rhubarb and columbo; or "if the fever arises from putrid air," ipecacuanha and either the tartrate or the sulphide of antimony; to be followed in either case by bark.

Next in order to the works of these English authors comes the Report prepared by the Société Royale de Médicine in 1782.[1] From this it appears that the theory of M. Puzos still reigned supreme in France, as will be seen from the following extracts:—"Il semble que cette maladie consiste évidemment dans une métastase qui se fait sur les viscères du bas ventre dans le temps où la révolution du lait devait avoir lieu. Par le traitement de M. Doulcet la guérison s'opère sans que la révolution du lait ait lieu. Les seins ne se gonflent pas, et toute la matière laiteuse est évacuée par les selles, coule avec les vuidanges, et sort par la voye de la transpiration et des urines." After referring to the works of the contemporaneous English writers, without, however, assigning reasons for dissent from their views, the report goes on to speak of two publications, respectively by M. Doublet, of l'Hôpital de Vaugirard, and by M. de la Roche, "médecin de Génève." "M. Doublet divise les fièvres puerpérales en trois espèces: (1) *Ephémérères*, qui sont attribuées au lenteur avec laquelle le lait se porte aux mamelles; (2) *Fièvre Puerpérale*, proprement dite, qui à lieu lorsque le lait ne rempli point les mamelles, et que la métastase est complète sur le bas ventre; (3) *Fièvre Puerpérale tardive*, celle des nourrices où le lait quitte les mamelles dans lesquelles il s'étoit déjà séparé, et se porte sur la cavité abdominale avec tous les

1 "*Rapport fait par ordre du Gouvernement sur le Mémoire lu dans la Séance de la Société Royale de Medicine, le 6 Septembre*, 1782."

symptômes du 2me espèce. M. Doublet à aussi vu des vraies fièvres puerpérales, jugées tautôt par une bouffisure générale d'un blanc mat, qu'il appelle anasarque laiteuse, tantôt par une éruption de même nature, par des sueurs abondantes et des urines remplies d'un sédiment laiteux considérable. Dans ces fièvres il y a des médecins qui ont trouvé la matrice ordinaire-intacte, et des autres qui l'ont vu enflammée. Quant aux matières epanchées dans la cavité de l'abdomen, cette substance caséeuse qui a été décrite dans les observations de 1746, et dans celles faites depuis 1774, comme un véritable lait caillé, a été regardé par d'autres comme une matière vraiment purulente, et c'est ainsi que M. de la Roche l'a vu à Génève. Peut-être dans les maladies moins rapides que n'ont été celles de l'Hôtel Dieu cette matière a-t-elle eut lieu de subir des altérations qui l'ont changée et rendue méconnaissable. . . L'abattement qui caractérise la putridité est donc un des signes les plus facheux de cette maladie, c'est surtout dans les hôpitaux qu'elle a éte observée telle, et elle n'a été nulle part ni si promptement, ni si généralement funeste qu'elle l'a paru à l'Hôtel Dieu dans ces dernières années. Se complique-t-elle alors avec la fièvre de l'hôpital? C'est le sentiment de M. White. Ce sont les médecins qui ont vu la maladie avec le caractère le plus putride que se sont le plus rapprochés de la méthode de M. Doulcet, qui doit donc être employée surtout lorsque l'engorgement du ventre n'est pas encore fixé. Conviendra-t-elle alors dans tous les cas de fièvres puerpérales? Préviendra-t-elle celle qui doit être plus inflammatoire, et plus ardente, aussi que celles qui sont compliquées avec la putridité et l'abattement des forces? L'ipecacuanha doit il avoir la préférence sur les autres vomitifs? Ces sont des questions que l'expérience seule peut décider."

It will be seen that there was at this moment at least one French physician, M. de la Roche, who did not share the opinions expressed by the Royal Medical Society of Paris, and it will be well to record some of his observations on this

subject.[1] "Dès qu'on pénétre dans la cavité de l'abdomen on aperçoit un epanchement très considérable de sérosite jaunâtre, et d'une certaine quantité de pus très épais rassemblé en floccons sur les intestins et le mésentère. L'estomac et les intestins offrent partout des signes très évidents d'inflammation; on trouve souvent leurs membranes épaissées; leurs vaisseaux paraissent gorgés de sang, et on voit les tâches livides et gangrenées. La matrice est généralement contractée, et dans un état parfaitement sain. Il parôit évident que la cause prochaine est inflammation des viscères du bas ventre. Les tâches de gangrène qu'on observe sur les intestins, la grande quantité de pus qui est épanchée dans toute la cavité de l'abdomen en sont des marques non équivoques. Quoique le mauvais air puisse être extrêmement nuisible aux femmes en couche, quoiqu'il paroisse même quelquefois engendrer la fièvre puerpérale, il ne peut cependant pas être considéré comme en étant la cause directe. Cette fièvre est dans sa nature tout à fait inflammatoire; son principe est un inflammation du genre erysipélateux qui a son siège dans les organes extrêmement irritables. L'irritation est augmentée par:—(1) Le changement de tension dans les vaisseaux du bas ventre, lors de l'accouchement. (2) Le froid. Les morts sont plus nombreux en hiver, et dans les pays froids. (3) La constitution épidémique. (4) Les affections de l'âme. La crainte de la mort est funeste. Une femme qui a entendu parler de quelque autre morte en couche se frappe aisément de cette idée. C'est là probablement une des causes de la grande mortalité dans les hôpitaux."

It appears that about the same time wonderful cures of puerperal fever were reported in the practice of Dr. Boër, of Vienna;[2] and it is stated that they were due to the use of an antimonial preprepation (supposed to be kermes mineral) of which the exact formula is not given.

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1 "*Recherches sur la nature et le traitement de la Fièvre Puerperale, par M. de la Roche, de Génève.*" Paris, 1783.

2 "*Abhandlungen und Versuche, von Dr. L. J. Boër, Vienna.*" Quoted by Dr. Gooch in his Essay on Puerperal Fever.

Returning to England, the essay of Dr. Joseph Clarke, to which I have already referred, comes next in chronological order. He states that his reasons for writing are that the great diversity of theories and practice must much perplex a young practitioner, that he wishes to record his own large experience in the matter, and that he particularly desires to draw attention to means by which the progress of the disease in hospitals may be arrested, instead of searching after means of cure "not one of which has hitherto proved even moderately successful." He has little hope that any mode of treatment can be found which will, during an epidemic, succeed in even one case out of five, but he believes that epidemics may themselves be abolished, and that the treatment of sporadic cases is very much more hopeful. He believes puerperal fever to depend on inflammation of the peritoneum, and explains the excessive suppuration of the omentum by the fact that it is a quadruplication of this membrane. In his post-mortem observations he always found great peritoneal inflammation, but no disintegration of the uterus or other viscera. The main object of the essay is to insist on the enormous fatality of hospital epidemics, and the duty of preventing or arresting them. I need not dilate here on the measures recommended, as they have been previously narrated.[1] We cannot be surprised at Dr. Joseph Clarke's strong feeling on this subject, when we learn that, during a private practice of forty-four years in Dublin, comprising 3,847 cases of midwifery, he met with only six cases that could even possibly be termed puerperal fever, while in the hospital he found himself wholly unable to arrest the mortality except by the measures that he so strenuously recommends.[2]

The next work of importance was written about three years later by Dr. John Clarke of London.[3] In this book we find a

1 See p. 11.

2 "*Life, Writings, and Practice of the late Dr. Joseph Clarke.*" By Dr. Collins.

3 "*Practical Essays on the Management of Pregnancy and Labour.*" By John Clarke, M.D. 1793.

more elaborate classifaction of the different kinds of puerperal fever, with their several causes, than we have yet met with. He considers it a great misfortune that the name of puerperal fever has been too often given to every fever occuring in childbed, and remarks that it has hence frequently happened that authors have talked about entirely different diseases, and have accused each other of error when their descriptions did not agree. After enumerating the theories previously maintained, he proceeds himself to define five kinds of puerperal fever, of which four are exclusively what would now be called autogenetic, (and these he expressly states to be non-contagious,) while the fifth constitutes the only infectious and epidemic class, and may be either of autogenetic or heterogenetic origin. His divisions are,—

I. *Inflammation of the uterus or ovaries;* due to
   (*a*) Violence during labour.
   (*b*) Cold.
   (*c*) Too early rising after delivery.

II. *Inflammation of the peritoneum;* due to
   (*a*) Excessive pressure of the fœtal head.
   (*b*) Cold.
   (*c*) Tight binders after delivery.
   (*d*) Abuse of stimulants after delivery.

III. *General inflammatory fever* pervading the whole system, and implicating the uterus, ovaries, and peritoneum.

IV. *Inflammation originating from retained placenta*, and affecting the whole system.

V. *The low or epidemic form of childbed fever* connected with abdominal affections. This form may, he believes,
   (*a*) Arise as an original disease.
   (*b*) Be propagated by infection.

In this connection he mentions certain predisposing causes, viz., (1) Overcrowding and dirt.
   (2) Depression of spirits, especially in single women.
   (3) Improper food.
   (4) Epidemic condition of the air.

As regards characteristics and treatment, Dr. Clarke states that in the first class of cases there is little swelling of the abdomen, and that suppuration of the uterus and ovaries will probably be found after death, but little or no abdominal effusion. In the second class the pain is more generally diffused over the abdomen, dyspnœa exists, and only the dorsal decubitus can be borne. Much fluid will be found in the peritoneal cavity, mixed with pus and coagulable lymph. In both cases he recommends treatment by bleeding, with fomentations, mild laxatives, and sudorifics, and especially advises antimony with opium. The third class of fevers is characterized by greater exhaustion, the whole body being involved in the morbid action, and large bleedings would be dangerous. Opiates also may increase the tendency to delirium. Cases of the fourth kind are extremely dangerous, and demand prompt treatment by the removal of placental débris, or, failing that, by the injection of a decoction of bark. Food, wine, and medicine, should be given frequently in small quantities. With regard to the epidemic type of fever the author discusses the influence of weather, but does not express a decisive opinion. He says that, during the epidemic in 1785 and 1786, inflammatory diseases were infrequent, except indeed those of the erysipelatous kind, but ulcerated throats, abscesses, and scarletina, were very common. In this kind of puerperal fever he seldom noticed rigors, and there was little pyrexia, but great collapse and remarkable facial anxiety, with diminished maternal solicitude. The sensibility was diminished, and pain, though sometimes severe, was not constant, nor proportionate to the great abdominal distension. The evacuations became very offensive, and the lochia, if present, were putrid. Vomiting and purging were usual. The brain and nervous system seemed to share in the general collapse, and moribund patients seemed often to fancy themselves only slightly ill. The patient, if roused, was rational to the last; but shortly before death a kind of coma supervened, and there was great un-

willingness to be disturbed. This is the most dangerous of all forms of the disease, and in Dr. Clarke's experience, it proves fatal to three-fourths of those who are attacked with it in hospitals, though in private practice the prognosis is much better. The rapidity with which death ensues is often very great, the malady sometimes not lasting thirty-six hours. On post-mortem inspection there is very great effusion into the abdomen, with a thick coating of lymph over the viscera. The inflammatory appearances are less than in other cases, and are not confined to any special part. The brain has not been found affected.

The experience of Dr. Gordon during the epidemic in Aberdeen has already been narrated.[1] In his work on the subject he does not give any explanation of the first introduction of the fever, but he declares his belief most emphatically that it was subsequently propagated mainly by contagion, and that such contagion was usually conveyed to the patient by the nurse or medical attendant. He gives a large number of instances of the prevalence of the disease in the practice of a single doctor or midwife, and of its introduction into rural districts by the visit of such a person; while, often, closely adjacent parishes remained exempt, if all the women in them were attended by the local midwife who had not been exposed to infection. When first the epidemic broke out, Dr. Gordon lost a majority of the patients attacked by it, but after he inaugurated a method of treatment by large bleedings and powerful purgatives, the mortality in his practice greatly diminished; so that, subsequently, out of fifty cases to which he was called at the outset of the disease, he lost only five patients. He records that when left to nature the women attacked by the fever almost always died, and that an equally fatal result attended treatment by wine and cordials only, without venesection. Though attributing almost all the cases he witnessed to contagion, Dr. Gordon admits that the fever may be produced by

[1] See pp. 11, 12.

cold, by fear, by errors in diet, by too early fatigue, and by the inoculation of putrid matter through the uterus. Whatever the cause, his treatment was the same, and he found bleeding and purging equally successful in all cases. He believed that a great affinity exists between puerperal fever and erysipelas, although he could not assert the identity of the two diseases. He showed however by statistics that epidemics of each "began in Aberdeen at the same time and afterwards kept pace together, and they both ceased at the same time." His book contains very important evidence respecting the contagious property that may attend puerperal fever when quite removed from hospital influences, and for this reason it deserves study at the present day when this point is again a matter of debate.

Mr. Hey, of Leeds, confirms Dr. Gordon's testimony in most respects. "For some time," he writes, "after the commencement of this dreadful malady it proved fatal in every case that came within my knowledge." His first fourteen cases were treated with saline purgatives and opium, but death ensued in eleven instances. He was reduced almost to despair when he met with Dr. Gordon's book just referred to, and in consequence altered his whole method of treatment. He now had recourse to "profuse bleeding, hardly limited except by the removal or diminution of pain," and to repeated purging, without any use of opiates. By the use of such means he succeeded in saving no less than fourteen out of his next seventeen patients, and henceforth he gave his unreserved adhesion to Dr. Gordon's mode of practice. It is worth notice however that while Mr. Hey repeatedly expresses his obligations to Dr. Gordon, and accepts his teaching on all other points, he feels constrained to differ from him respecting the question of contagion. It appears that, out of deference to Dr. Gordon's warning, Mr. Hey did personally adopt very careful precautions, for he writes;—"It was an invariable rule with me never to attend a patient in childbirth in any article of clothing which had been in the presence of one affected with puerperal fever, nor without washing

repeatedly such parts of my person as could have been exposed to infection." He expresses however the most distinct conviction that the fever is at all events not always contagious. "If the puerperal fever of Leeds were infectious, it was so in a very inferior degree, for I have known instances of free communication by the intervention of others between women in labour and those affected with this disease, without any bad consequences. And, on the contrary, in many cases of puerperal fever no channel whatever was discoverable whereby the disease could have been conveyed." He is however quite clear that the disease was truly endemic at Leeds at this time, and is disposed to attribute the fact to some state of the atmosphere. He bears testimony to the fact, mentioned also by many others, that cases occurring during an epidemic are much more severe and more intractable than those which occur sporadically.

The next authority of importance is Dr. Gooch, who expressed a wish to change the name now in use for that of "peritoneal fever," on the ground that such a title would truly record the fact that some affection of the peritoneum is invariably present. He remarked that sporadic cases were always the least severe, and confirmed Dr. Gordon's opinion of the contagiousness of the malady; mentioning cases where the infection was conveyed by means of linen sent to the wash, or by the clothes of medical attendants. Dr. Gooch, who was the first man fortunate enough to see two entirely dissimilar epidemics in his own practice, lays stress on the fact that the accounts given by earlier practitioners certainly do not at all refer to the same type of disease; for example he mentions that Dr. Gordon reports that every patient died who was not bled, while Dr. Lowder bears witness that, in another epidemic, venesection was always followed by death. Dr. Gooch suggests that at least three things are necessary to the history of a disease; (1) the symptoms; (2) the effect of remedies; (3) the post-mortem appearances; and adds that in no one of these points do all the recorded epidemics resemble each other. On the whole he concludes that

there are at least two types of puerperal fever, between which important differences exist. In the first type the affection of the peritoneum is an acute inflammation, accompanied with inflammatory fever, and hot dry skin, a vibrating, hard, incompressible, pulse. For such cases bleeding and purging are the best remedies, and calomel and emetics are also valuable. In the second kind of puerperal fever, there is little inflammation; the pulse is soft and the skin more moist; the appropriate treatment is by aperients, opiates, and fomentations. These cases may be caused by severe after-pains, or by griping purges, and they are most apt to occur in patients who in ordinary health are delicate and nervous. When in doubt respecting the nature of a case Dr. Gooch began the treatment by the application of leeches.

Dr. Gooch's successor, Dr. Robert Ferguson, describes four kinds of puerperal fever,[1] viz.,

I. *Peritoneal;* where the inflammation of the peritoneum is the main symptom.

II. *Gastro-enteric;* where there is much intestinal disturbance, and the general course is that of a common fever.

III. *Nervous;* where the brain and nervous system are mainly affected.

IV. *Complicated;* embracing the lesions of all the previous types, with a tendency to fluid deposits in the tissues.

Dr. Ferguson thinks that one or other of these types usually gives character to each epidemic, and that much confusion has been caused by every author's assumption that the form he has witnessed is the only one. Thus he remarks that Dr. Gordon, Mr. Hey, and Dr. Armstrong,[2] saw the peritoneal tpye; Dr. W. Hunter and Dr. Lowder the complicated type; and Dr. Richter and Dr. Butter the gastro-enteric type. Dr. Ferguson's

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1 "*Essays on the most important Diseases of Women*," by Robert Ferguson, M.D. 1839.

2 "*Facts and Observations.*" By Dr. Armstrong. 1819.

general conclusions are that—(1) The phenomena of puerperal fever originate in a vitiation of the fluids. (2) The causes capable of causing such vitiations are rife after childbirth. (3) The various forms of the fever may be deduced from this one cause. He shows that all the accidents of puerperal fever may be artificially produced by vitiating the blood. "By a comparison of a variety of series of facts I found that in puerperal fever there were two sources at least of blood vitiation—(1) the direct insertion of noxious matter into a vein; (2) mechanical injury to the solid walls of the blood vessels, inducing the products of inflammation, which products, being conveyed into the torrent of the circulation, act as blood infectants. I indicated, moreover, a third source of blood-poisoning, by inhalation." His general conclusion is that puerperal fever is not a fever *sui generis*.

In France, M. Tonnellé expressed an opinion[1] similar to that of Dr. Gooch and Dr. Ferguson, viz., that the type of fever varies in different epidemics, and that the same treatment is by no means suitable in all cases.

M. Voillemier[2] also met with two forms of puerperal fever, the inflammatory and the typhoid. The description that he gives of these agrees in the main with that given by Dr. Gooch, but in M. Voillemier's experience the typhoid form appears to have been the more fatal. There seems to have been little evidence of contagion in either case.

Dr. Collins[1] expresses himself to the same effect in 1835. He believes that the hospital epidemic he describes depended mainly on local causes, but proceeds to say that "the extreme differences of opinion and opposite measures recommended by practitioners, arises chiefly, I am satisfied, from their treating every variety of puerperal fever as one and the same disease, whereas perhaps no other exhibits a greater diversity of character

1 "*Thèse Inaugurale de la Faculté de Médecine de Paris*, 1830." See also "*Archives Générales de Médecine*," 1830.

2 "*Journal des Connaissances Méd: Chir:*" Dec. 1839 et Janv. 1840.

3 "*Practical Treatise on Midwifery.*" By Robert Collins, M.D. 1835.

in different situations, or in different periods. In some cases the fever is accompanied with symptoms of acute inflammation, such as forbid the least delay in the free use of venesection and antiphlogistic measures. This form, which is far the most manageable, occurs generally in private practice. Puerperal fever when epidemic in hospitals is directly the reverse, at least in four epidemics which I witnessed; the symptoms were usually of the lowest typhoid character, the pulse being so feeble and indistinct as to make you dread even the application of leeches."

Dr. Churchill, in editing the Essays published by the Sydenham Society in 1849, expresses his own opinion that the types certainly vary, and that several authors "have made the common mistake of supposing the form of disease which they know to be the only one." He quotes the opinion of Scanzoni that the special causes of puerperal fever depend on the altered condition of the blood, and himself suggests that "it is at least possible that the general element which constitutes the difference between epidemic puerperal fever and simple inflammation of the uterus and peritoneum, may be some deterioration of the blood depending either on atmospheric malaria from without, or absorption of some noxious material within the body."

In 1851 a paper was published by Professor Simpson, of Edinburgh, with the view of demonstrating the analogy between puerperal fever and that occurring after surgical operations, if not the identity of the two affections.[1] This view had already been advocated by M. Cruvellhier twenty years earlier,[2] but seems not to have attracted much attention at that time. Dr. Simpson begins by narrating cases where puerperal fever had originated from exposure to the poison of erysipelas, and also from inoculation by means of medical attendants, who came from patients suffering from puerperal fever, or who had recently handled cadaveric material. He expresses his concurrence in the opinion, common on the continent, that puerperal

1 "*Edinburgh Monthly Journal of Medical Science.*" July, 1851.

2 "*Journal Universel et Hebdomadaire de Médecine.*" 1831.

fever is rarely propagated directly from patient to patient, even when lying in contiguous beds, but usually through local inoculation by means of the nurse or doctor. He gives one instance where 400 women were delivered at their homes by the twelve midwives attached to the Manchester Lying-in Hospital, and sixteen deaths occurred from puerperal fever, all of them in the practice of one midwife, while the eleven others had not a single case of the kind. He also refers to the testimony of Dr, Semmelweiss,[1] and Dr. Arneth, with reference to inoculation with cadaveric matter as a cause of puerperal fever, and expresses his conviction that this fever may be caused by any inflammatory secretion conveyed to the abraded surface of the uterus or vagina, whether such secretions are obtained from a living or a dead body. Dr. Simpson is further of opinion that the disease may be received by inhalation of noxious effluvia, either direct from the patient, or as conveyed by the clothes or person of an attendant, and that in crowded lying-in hospitals puerperal fever is sometimes actually manufactured *de novo*. He also admits an occult epidemic influence such as that manifested almost throughout Europe in 1819 and 1820 ; and believes that many sporadic cases are on the other hand entirely due to the individual circumstances and condition of the patient. A direct connection between puerperal fever and erysipelas seemed proved by the frequent occurrence of simultaneous epidemics, and also by facts establishing the possibility that each may produce the other under certain circumstances ; it being however a very curious fact that erysipelas had sometimes attacked women before labour, and had not been followed by puerperal fever after delivery. In a lecture, delivered at some earlier period but first published in 1859,[2] Dr. Simpson states even more distinctly that he believes "surgical and puerperal fever to be identical in nature, and intercommunicable;" and thinks that both diseases alike

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1 See pp. 19, 20.

2 "*Medical Times and Gazette*," 1859. Republished in "*Diseases of Women*," 1872.

consist of "a combination of co-existing acute fever and acute internal inflammation." He gives tables showing that the lesions in each case are very similar, both in nature and in the relative frequency with which they occur in various organs, allowance being made for the local causes specially determining such lesions in the puerperal state. He believes that, as regards regards both surgical and puerperal fever, the most successful prophylactics will be those which "sustain in their fullest activity the secretory and excretory functions of the system, thus keeping the blood itself as free as possible from any over accumulation of unnecessary and effete materials. The greater accumulation there is of effete matters in the blood, at the time when fever happens to be set up in the system by the imbibition of any septic poison, the greater is the peril attending the febrile action. When such poison enters the body of a woman in the puerperal condition, and consequently at a time when her blood is temporarily overcharged with an unusual excess of organic materials in a state of retrograde metamorphosis, in consequence of the rapid absorption of the involving uterus, the febrile action which supervenes is usually so extreme in its degree as almost always to prove speedily fatal. Hence also smallpox, scarlatina, and measles, are ten or twenty times more disastrous in the puerperal state than in the normal state of the system."

In the year 1858 a very important discussion respecting puerperal fever took place at the French Académie de Médecine, and for nearly five months most of the meetings of the Academy were occupied with this subject; an official report of all that took place being subsequently published, after revision by the speakers themselves.[1] The discussion was begun by M. Guérard, who laid before the Academy questions relating to the three following points:—(1) The nature of puerperal fever; (2) its

1 "*De la Fièvre Puerpérale.*" Communications à l'Académie Impériale de Médecine. Ballière et Fils, Paris, 1858.

mode of propagation; (3) its best treatment.[1]

As to the nature of the disease, M. Guérard himself believed it to be an *ens sui generis*, which was to be carefully distinguished from other intercurrent disease which might affect lying-in women, but which were by no means confined to them; such, for instance, as "(1) l'embarras gastrique; (2) les phlegmasies locales; (3) l'infection putride; (4) l'infection purulente." All these maladies he considered to be entirely distinct from the one in question, as regards alike their cause, the time of their appearance, their symptoms and lesions, and their treatment. The identity of puerperal fever with purulent infection is especially denied, on the double ground that pus is often absent in fatal cases of puerperal fever, and that in other instances, where pus has been found in the blood vessels after death, the symptoms of puerperal fever were not present during life. The diagnosis of the true disease is thus indicated:—"Dès le début de la maladie apparaissent des désordres caractéristiques du côté de la circulation, de la respiration, et de l'innervation. Dans la plupart des cas un frisson intense marque ce début; bientôt le pouls s'accelère et donne 130, 140, et même 160 pulsations per minute; en même temps il est remarquable par sa dépressibilité. La face pâlit, les traits s'altèrent, la respiration s'embarrasse, l'intelligence se trouble." The other symptoms mentioned are nausea, diarrhœa, vomiting, abdominal pains of variable intensity, with "certains douleurs péri-articulaires, ou des muscles, qu'elles accompagnent ou non de rougeurs superficielles de la peau qui les recouvre." It is especially noted that a marked feature of the disease is "la variabilité suivant les épidémies des lésions que les autopsies mettent en évidence, de la formation rapide

[1] As, in the following brief epitome of this very important discussion, it has, of course, been impossible to mention, however concisely, all the arguments employed, my aim has been rather to give prominence to such points as were remarkable either for novelty or for the difficulty with which they could be adjusted to suit one or other of the prevailing theories. The whole discussion, as originally published, will amply repay perusal.

du pus, de la diffusion dans une foule d'organes, et enfin de l'absence, dans quelques cas, de toute altération apparente." The general conclusion of M. Guérard is that puerperal fever is due to some form of poison in the blood, and that such poison is more or less analogous to that which causes death after snake-bite. This poison he believes to be in great measure created by the special condition of the puerperal woman, and to be transmissable by inoculation or by inhalation; and he adopts the statement of M. Depaul that, when present in the blood, it produces the following effects:—"Voici ceux qui ont été consignés par le Professeur Vogel dans le *Manuel de Virchow*. Le sang serait acide, et ce fait serait dû à la présence de l'acide lactique. On y aurait trouvé du carbonate, ou de l'hydrosulfate, d'ammoniaque. Il aurait perdu la faculté de se coaguler. Les globules ne seraient plus aptes à rougir au contact de l'air, et par conséquent ne pourraient plus jouer leur rôle pendant l'acte de la respiration. Ces globules seraient en partie decomposés et dissous dans le sérum, qui offrirait une coloration rougeâtre, ou d'un brun sale."

The general opinions of M. Depaul are to the same effect. He also believed puerperal fever to be a distinct disease, with definite course and essential characteristics. He, however, expresses the remarkable opinion that this malady, though almost identified with the puerperal state, may yet, in exceptional cases, affect women who have not been delivered, and even those who are not pregnant. He records the case of a pregnant woman who died during an epidemic, and whose autopsy presented all the characteristic lesions of puerperal fever. He also vouches for the following circumstance:—"Pendant mon internât à la Maternité, 1839, une épidémie grave de fièvre puerpérale y sévit. Il arriva un soir qu'une élève sage-femme, pendant qu'elle procédait au lavage des parties génitales d'une de ses malades, éprouva instantanément une sensation penible qu'elle rapporta aux émanations qu'elle avait respirées en soulevant les convertures du lit, et elle

déclara qu'elle se sentit très malade. Le soir même elle entra dans l'infirmerie; un frisson intense se déclara; le ventre devint trés douleureux, le pouls petit et fréquent. Il survint des vomissements verdâtres, et de la diarrhée, et tous les autres symptômes de la fièvre puerpérale la mieux caracterisée. La mort survint le troisième jour, et il me fut permis de faire l'autopsie. Je trouvai dans la cavité péritonéale toutes les lésions que présentaient les femmes mortes dans le cours de cette épidémie. Cette élève etait vierge, et n'était pas à une période menstruelle." Two other similar cases are also recorded, and it is curious to find that all these are accepted by M. Guérard, in spite of his protestation that "l'épithète de *puerpérale* doit être exclusivement attribuée à celle de ces affections qui ne se développe jamais que sous l'influence de la parturition imminente, commençante, ou achevée."

M. Paul Dubois expressed himself to the same effect respecting the distinct existence of puerperal fever, and its non-identity with local inflammation, or with the results of putrid or purulent infection. He believed that the presence of pus in the vessels was the effect, and not the cause, of the poison in the blood; and that if decomposing matter in the uterus caused puerperal fever, the latter would be of almost constant occurrence. Alluding to the epidemic of 1664 narrated by M. Peu, and also to Professor Simpson's suggestion respecting surgical fever, he stated his belief that puerperal fever did not originate from the contagion existing in surgical wards, but that "blessés et accouchées étaient victimes de la même influence; à savoir, une condition facheuse, atmosphérique ou autre, dont l'action était probablement encore accrue par l'encombrement des salles dans lesquelles ils étaient placés."

M. Danyau, who (like MM. Paul Dubois and Depaul) was a Professor of the Maternité Hospital, concurred in the views just given. "La fièvre puerpérale est une maladie d'origine miasmatique, dont le miasme générateur pénètre dans le sang, l'empoisonne, et le rend apte à la production de localisations inflam-

matoires." He believed that no adequate explanation of epidemics had yet been given, for, though sometimes traceable to infection, or to over-crowding, they sometimes occurred without any known cause, and then disappeared as mysteriously. "Sans que rien fût changé au régime intérieur de la maison (la Maternité), sans variation sensible dans le chiffre des accouchements, les soins donnés restant les mêmes, l'épidémie paraissait, parcourait ses périodes, et s'éteignait, suivant l'action différente d'une condition évidemment générale, independante des conditions locales ou du moins les dominant toutes. . . . . Il est assex curieux également de voir quelques unes de ces épidémies s'étendre aux femelles même des animaux domestiques ; aux chiennes à Londres en 1787 et à Edinbourg en 1821, ainsi qu'aux vâches qui vêlèrent à cette époque dans plusieurs parties de l'Ecosse ;[1] enfin aux poules pondeuses dans les environs de Prague dans l'épidémie de 1835."

M. Cruveilhier laid before the Academy the account of the epidemics at *La Maternité* in 1830, 1831, and 1832, to which reference has already been made. He believed puerperal fever to be closely allied to surgical fever on the one hand, and to typhus on the other. "C'est à la fois une fièvre et une phlegmasie,— la conséquence d'une cause commune, l'infection miasmatique. Elle ne me paraît être autre chose que la fièvre traumatique des femmes nouvellement accouchées ; acquérant, dans le cas d'encombrement, d'infection miasmatique, les proportions de la gravité la plus considérable, celles du typhus. Or, les épidémies de typhus puerpéral dont j'ai été témoin à la Maternité en 1830, 1831, et 1832, étaient la fidèle image des épidémies de typhus traumatique que j'avais observées à l'Hôtel Dieu en 1813, 1814, lorsque, par suite de l'invasion de France par l'Europe coalisée, la population de cet hôpital ayant plus que doublée, tous les amputés périssaient, ou rapidement dans

1 It is worth remark that Dr. Gooch seems to attribute the fatal illness of one of his patients to her attendance, just before delivery, on "a number of cows, which, after calving, had been attacked by a disease similar to puerperal fever."— *Loco cit.*

un état typhoïde, ou plus lentement par la pourriture d'hôpital. Je n'ai pas vu guérir un seul amputé pendant tout le cours de l'épidémie, et j'étais interne dans le service de Dupuytren!" The only constant lesion found by M. Cruveilhier, "le caractère exclusivement propre à la fièvre puerpérale, c'est la présence de pus dans les vaisseaux lymphatiques de l'utérus et de ses annexes. Cette purulence des vaisseaux lymphatiques coincide presque toujours avec une péritonite purulente, et souvent aussi avec le phlegmon diffus du tissu cellulaire sous-péritonéal."

M. Trousseau's opinion is very similar as regards the analogy to surgical fever, but he denies that puerperal fever is in any way allied to typhus. "La maladie dite fièvre puerpérale ne diffère pas de la fièvre dite chirurgicale, ou de resorption, ou purulente. Dans la presque universalité des cas la plaie placentaire, ou la traumatisme quel qu'il soit, est l'occasion de la maladie. Sa cause efficiente est dans un principe spécifique inconnu dans son essence, connu par ses effets. J'ajoute un peu timidement qu'il n'est pas impossible que dans un foyer épidémique on puisse contracter la maladie sans aucun traumatisme." He points out the rarity of puerperal fever in even the most squalid homes, amid conditions very suitable for the generation of typhus. "Dans ces mansardes où grouillent les mâles et les femelles de l'espèce humaine, que se dispute la vermine, on accouche et on ne meurt pas. Il faut donc une autre cause que l'encombrement et la saleté, que la souillure des pièces par des émanations multipliées,—il faut la specificité. . . Je maintiens que l'assimilation que l'on a voulu faire avec le typhus n'est pas legitime." M. Trousseau also gives evidence to show that the poison accompanying puerperal fever may be fatal to persons who are not in the puerperal state. "En 1856 M. Dubois fait évacuer la Clinique; on reçoit les femmes en couches dans les autres hôpitaux, et la Clinique reçoit les maladies ordinaires. M. Pidoux, chargé de ce service, note qu'il perd ses malades dans une proportion insolite, et pour les affections les plus benignes d'ordinaire. Mais alors elles se com-

pliquent d'érysipèles, d'affections gastriques, et presque toutes succombent."

M. Guérin also maintained the analogy between puerperal and surgical fevers. He suggested that the main cause of puerperal fever lay in the non-contraction of the uterus after labour, and the consequent persistence and exposure of the placental site. When normal involution takes place "il ne reste plus dans la cavité utérine d'espace inoccupé, c'est à dire que la plaie utérine s'efface, et se présente avec toutes les conditions de la plaie couverte, fermée. Au contraire dans la condition de l'inertie de l'utérus, la plaie utérine est étalée, les orifices vasculaires restent béants ou remplis de caillots. Le col utérin, plus ou moins ouvert, établit à travers le vagin, flasque et béant, une communication incessante avec l'atmosphère. Les caillots s'altèrent, se putréfient; le liquide lochial s'altère, la plaie utérine suppure. Puis on a le passage de pus et des liquides putréfiés de l'utérus dans les veines et les lymphatiques, et aussi leur passage dans la cavité péritonéale à travers les trompes." From this source he traces the gradual poisoning of the whole system which results in the developement of puerperal fever with its characteristic symptoms, accompanied, as they frequently are, by local gangrene of the genital organs.

Several other members of the Academy attributed puerperal fever to putrid or purulent infection, without, however, laying the same stress as M. Guérin on the imperfect involution of the uterus.

M. Hervez de Chégoin defined two types of this disease, either of which might occur independently of local inflammations, viz, "(1) la fièvre puerpérale putride, (2) la fièvre puerpérale purulente." The first class of cases depend on the putrefaction of placental débris in the uterus, and they may often be arrested in an early stage by the removal of the offending fragments, or by antiseptic injections. The symptoms are "un frisson, ordinairement au troisième jour, la petitesse et la fréquence excessive du pouls (140 à 150), l'agitation, l'insomnie,

la loquacité, le délire léger, le ballonnement rapide du ventre, *sans douleur*, la mort au sixième jour après l'accouchement." The second, or purulent form, follows after local inflammation, ending in suppuration and purulent absorption. The diagnostic marks are the pain which is present from the first, a slower and more feeble pulse, a warmer skin, and an absence of delirium. Subsequently these symptoms may be merged into those of the other type already described. In conclusion, M. Hervez de Chégoin declares that whether the fever be of one form or the other "*morbus totus ab utero procedit.*"

M. Bouillaud also believed puerperal fever to be always of purulent or septic origin, and desired to draw special attention to the predisposition to such diseases common to the puerperal state, "état semi-pathologique," and to the influence of that state in increasing the intensity of any malady, and giving it a tendency towards suppuration. He considered puerperal fever to be so far allied to typhus that in both cases there was a septicæmic infection; in the case of typhus this was "*primitif*," and was the result of atmospheric putridity; in the case of puerperal and other putrid fevers it was "*consécutif*," and resulted from local inflammation and suppuration. "La fièvre puerpérale reconnait évidemment pour cause première une infection septique, ayant pour siége soit l'intérieur de l'utérus, soit les sinus, soit les veines de l'excavation pelvienne." If any cases do not come under this category, M. Bouillaud believes that they may be traced to septicæmic infection of atmospheric, rather than of local, origin.

M. Piorry maintained that the phenomena of puerperal fever cannot be considered as constituting one specific disease, but "un ensemble d'états pathologiques susceptibles de se manifester, de se succéder, de se compliquer de la manière la moins regulière et la plus variée;" and further that they depend to a great extent on the exceptional condition and circumstances of the puerperal woman, and may originate spontaneously where there is no possibility of contagion; or may, on the other hand,

be due to septic influence of various kinds, conveyed either through the respiration or through the circulation.

M. Velpeau believed that the causes of puerperal fever lay in those inflammations which originate in the uterus, "foyer putride, sorte de cloaque traumatique entouré de centres putrides ou de foyers purulents secondaires qui retentissent sur le péritoine. En un mot la fièvre puerpérale est une péritonite, une angeoleucite, une phlébite, ou une infection purulente ou putride, modifiée par l'état puerpéral."

In the opinion of M. Beau, puerperal fever is simply "une fièvre symptomatique d'une phlegmasie, le plus souvent d'une péritonite. Il faut admettre dans l'état puerpéral une diathèse inflammatoire, à laquelle on doit attribuer la production des phlegmasies si nombreuses et si graves qu'on trouve dans cet état puerperal. A côté de cette diathèse il y a une autre influence épidémique, inconnue dans sa nature, mais parfaitement démontrée par ses résultats." He believed that after death from puerperal fever the effects of inflammation are always traceable, and that if these signs are absent the fatal fever was of a different kind. No logical reason could be assigned for making a generic separation between the milder and more curable cases of inflammation, usually called peritonitis, metritis, &c., and those other cases which bore the name of puerperal fever, but which really differed only in respect to the extent and severity of the symptoms and lesions exhibited. "Cette théorie veut la diversité là où est l'identité; elle fait deux maladies essentiellement différentes de deux degrés ou périodes de la même maladie."

The conclusions of M. Cazeaux are very similar. The alteration in the blood common to puerperal women predisposes them to inflammatory and febrile attacks. The disease may be best studied in sporadic cases, for in epidemics "un agent inconnu et insaisissable exerce sur sa marche une influence tellement fâcheuse que nous ne pouvons isoler ce qui appartient en propre à la maladie de la part qui revient à cette action

occulte qu'on appelle génie épidémique." In sporadic cases the inflammatory character of the disease is unmistakable, and its effects are sufficiently explained by the local lesions and by the general condition of puerperal women, without recourse to mysterious theories involving "un ferment, un virus, un venin, une cause spécifique." In M. Cazeaux's experience, the victims of puerperal fever, whether in or out of hospitals, are usually of the lower class, and this fact he explains by the previous privations they have endured, and the unhealthy conditions of their homes. He does not believe that puerperal fever is generated by hospital influences, nor even by over-crowding, although that of course increases the number of its victims. "Je n'ai jamais remarqué que l'encombrement fût pour quelque chose dans la production des épidémies. Avec le même nombre de lits, la même aération des salles, sans que rien soit changé dans les conditions hygiéniques de l'établissement, on voit tout à coup, après un calme de plusieurs mois, éclater une épidémie des plus meurtrières. . . . Ce qu'il faut c'est faire de la bonne hygiène ; il faut s'opposer aux saignées préventives dont on est encore prodigue pour les femmes grosses ; assainir les bas quartiers ; faire disparaître les logements insalubres; faciliter à chacun le pain de chaque jour ; en un mot améliorer la santé du pauvre."

As to the second question—"la mode de propagation,—opinions were almost as much divided as on the main issue. The conveyance of puerperal fever by infection or contagion was by no means so generally admitted as in England or (to a certain extent) in Germany. M. Dubois and M. Velpeau were almost disposed to deny such transmission, and were certain that at any rate the facts had been much exaggerated. M. Dubois stated that, during the epidemic at *La Maternité*, patients lying in adjoining beds were rarely affected, and gave a table showing that successive cases had usually occurred in different wards or in distant parts of the same ward, and that, out of fourteen successive cases in 1853, only two occurred in

contiguous beds. The probability, if not the possibility, of the conveyance of the disease from one patient to another by the medical attendant was also disputed by both these gentlemen, mainly on the ground that, if the alleged facts were real, puerperal fever would become almost universal. Infection by cadaveric poison was also doubted; but the theories thus dismissed were but vaguely replaced by M. Dubois' suggestion that the influence which spread epidemics in lying-in hospitals was "une condition fâcheuse, atmosphérique on autre, dont l'action était probablement accrue par l'encombrement des salles."

M. Hervez de Chégoin admitted the probability that "un grand nombre de femmes accouchées, réunies dans un même local, peuvent devenir un foyer d'infection qui s'opère par les voies de la respiration, produisant même alors des effets plus prompts que dans l'absorption utérine;" but he would not allow that the doctor or nurse is likely to transmit the disease to other patients.

A majority, however, of the other speakers did admit the possibility both of aërial infection and of direct local inoculation; and some agreed with M. Cruveilhier that the fever might be generated *de novo* whenever lying-in hospitals were overcrowded with patients. "Une femme en couches a une puissance d'infection miasmatique bien supérieure à celle d'une malade ordinaire. Parent Duchâtelet arrivait à ce resultat,—qu'une femme en couches produisait quatre à cinq fois plus de miasmes délétères qu'un blessé ou qu'un fiévreux." Very curious evidence was adduced by certain speakers respecting the action of atmospheric influences. M. Depaul quoted the following curious account from an article written by M. Dor,[1] respecting the epidemic at Prague in 1857:—"Le 8 Mars, jour froid et pluvieux, 6 accouchements, 4 cas de fièvre puerpérale. Le temps redevint beau jusqu'au 11; il y eût 4 ou 5 accouchements par jour, et pas une seule femme ne fut atteinte. Le 13,

1 "*Gazette Hebdomadaire*," 26 Fevrier, 1858.

pluie et neige; 3 accouchements, 2 malades. Le 19 et 23, pluie et neige; 11 accouchements, 10 malades." M. Trousseau also refers to the influence of atmospheric conditions:—"Rappelez vous ce que M. Moreau a vu à la Maternité. Un jour 17 femmes accouchent, toutes sont atteintes. Le lendemain 14, aucune d'elles ne prend la fièvre puerpéral. Le troisième jour 12, qui toutes sont prises à leur tour. Il avait donc passé là quelque chose, je ne sais quoi, mais une influence puissante qui était là un jour, et qui n'y était plus le lendemain."

Respecting the treatment of puerperal fever, there was, unfortunately, an almost unanimous agreement that all methods had been tried, and all had proved equally unsuccessful. M. Beau did indeed give a detailed account of certain satisfactory results from the use of quinine, but several of the other physicians had tried the same system without advantage, and they maintained that it was only in the slighter cases, which hardly deserved the name of puerperal fever, that it had succeeded in the hands of M. Beau. M. Hervez de Chégoin and M. Piorry laid more stress on disinfectant injections than on any other remedy. M. Depaul and M. Cruveilhier loudly maintained that the only hope lay not in the treatment, but in the prevention, of puerperal fever, and that for this end the abolition of lying-in hospitals was essential. "Puisque," says M. Depaul, "les ressources de la thérapeutique sont à peu près impuissantes, puisque les nombreuses améliorations introduites jusqu 'à ce jour n'ont pas fait descendre le chiffre de la mortalité, il n'est plus permis de laisser subsister l'état actuel des choses. . . La conclusion logique et forcée, c'est qu'il ne faut plus réunir (même en petit nombre) les femmes enceintes et en couches; qu'il faut les secourir à domicile toutes les fois que la chose est possible; et, dans le cas contraire, les disséminer dans les divers services des hôpitaux ou chez les sage-femmes."

Some years before the debate at the French Academy, Dr. Semmelweiss had published his opinions respecting cadaveric infection, in relation to the great epidemics in Vienna. These

opinions are reiterated and accompanied with voluminous statistics in his work published in 1861.[1] His main propositions are as follows :—

(1) Puerperal fever is a variety of pyæmia, and may occur even before delivery. It is caused solely by the absorption of decomposed animal matter, which in its turn causes disintegration of the blood and consequent exudation.

(2) The internal surface of the uterus, from the os internum upwards, is the usual site of absorption. The remainder of the genital tract does not absorb, unless lacerated.

(3) The poison may be conveyed from outside, either by the hand of the medical attendant, or, after delivery, by the penetration into the genitals of atmospheric air loaded with decomposing animal matter. Such external causes produce epidemics of puerperal fever.

(4) Sporadic cases may occur from self-infection, or absorption of the putrid material of retained placenta, or of gangrenous portions of the uterus.

(5) Puerperal fever, being due to such causes only, cannot be considered as truly as epidemic or contagious, as it does not reproduce itself, as do scarlet fever and smallpox, but may originate from various sources.

(6) The chief sources are *(a)* cadaveric poison, conveyed by the hand of the doctor; this poison being equally injurious whatever may have been the cause of death; *(b)* decomposed animal matter proceeding from living patients, whether or not such patients are suffering from puerperal fever; such poison may be conveyed by bed linen, sponges, or atmospheric air; or may be generated in the patient herself.

(7) Those forms of puerperal fever which are not accompanied by the excretion of decomposing animal matter cannot be conveyed from one woman to another.

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[1] See p. 19.

The facts on which he relies to establish the enormous mortality caused by cadaveric poison in the Vienna Hospital are thus narrated. In the six years from 1841 to 1846, inclusive, there were 20,042 deliveries in the division of the hospital attended by medical students who were also engaged in anatomy; and during this period 1,989 deaths occurred, or very nearly ten per cent. In the midwives' division, during the same period, there were 17,791 deliveries, with 691 deaths, or about $3\frac{3}{4}$ per cent. It was therefore apparent that three times as many deaths occurred among the women attended and examined by students, as among those delivered by midwives who had nothing to do with dissections or post-mortem examinations; and it is expressly stated that almost every woman and child died in the students' division when the labour lasted beyond twenty-four hours, (examinations being presumably more frequent,) while hardly one woman died if delivered out of the hospital and brought in directly afterwards. The mortality among the children in the students' division was also double that in the other department. In proof of the connection between these facts and the theory of cadaveric infection, Dr. Semmelweiss shows (1) that, in 1822, when no anatomical studies were carried on in connection with the hospital, the deaths in childbed were less than one per cent. (2) That in the year when anatomy was introduced the mortality rose to seven per cent., and in 1842 reached the frightful maximum of 15 per cent. in the students' division. It was now resolved that no student should be allowed to enter the lying-in wards without thorough disinfection of his hands by means of a solution of chloride of lime, and the result of this measure was that in the ensuing seven months the mortality in the students' division sank at once to about three per cent.; there being but 56 deaths recorded among 1,841 deliveries. With regard to the second cause of puerperal fever, viz., the absorption of putrid non-cadaveric matter, Dr. Semmelweiss gives a case of uterine cancer in a woman admitted for confinement, and examined by

students who then examined other women without disinfecting their hands, and he states that eleven out of the twelve women delivered in that ward died of puerperal fever. He also mentions a case of caries of the knee-joint with putrid discharge, and relates that the sufferer herself survived her confinement, but that all the other women in the ward died, to the number of sixteen. At Pesth also, he says, women died of puerperal fever in consequence of being placed in sheets soiled by the discharges of deceased patients.

In the same year with the publication of this work, a paper was read by Dr. Tilbury Fox before the Obstetrical Society of London, with a view of proving the identity of puerperal fever and erysipelas.[1] This theory had been incidentally maintained twenty years earlier by Mr. Nunneley in his work on erysipelas,[2] and, at the end of the previous century, Dr. Gordon had adduced statistics to the same effect. Dr. Fox believed that a considerable number of sporadic cases, and also of epidemics, should be attributed to mere local inflammations on the one hand, or to intercurrent diseases, *(e.g.* typhus, remittent, or scarlet, fevers,) but, after eliminating all these, a majority of cases remain, and these he thinks represent true "puerperal erysipelas." His main arguments for the identity of the two diseases are as follows:—(1) These maladies mutually reproduce each other according as the patients are, or are not, in the puerperal state. (2) The character and time of the attack is similar. (3) The lesions are of the same kind. If any eruption appears in puerperal fever it is indistinguishable from that of erysipelas. (4) In each case there is a marked tendency to inflammation of the lymphatics, and to sloughing. (5) Death occurs at about the same period. (6) Both diseases depend entirely on blood changes, aud both are injured by a lowering treatment. Dr. Fox thought that in puerperal fever the erysipelatous poison usually found ingress by some wound in the

1 "*Obstetrical Transactions*, 1861."

2 "*On Erysipelas*." By Thomas Nunneley. London, 1841.

genital tract, and expended itself chiefly on the internal tissues.

In 1864, the Bohemian Diet, before constructing a new Maternity Hospital at Prague, resolved to consult the most eminent German authorities on the subject, and, with this view, submitted to them a series of questions, of which the most important for the present purpose is the first, viz.: "Are the contagious origin and extension of puerperal fever epidemics certain, probable, or possible, according to the present state of science?" To this question the following answers are given.[1] The unanimous opinion of Dr. Oppolzer, Dr. Rokitansky, and Dr. Skoda (all of Vienna) was that—"There is no doubt of the origin and extension of puerperal fever by contagion." The reply of Dr. Hecker (of Munich) and Dr. Schwartz (of Göttingen) was that—"Puerperal fever, like hospital fever, is produced by noxious effluvia." Professor Virchow (of Berlin) replied that—"In the developement and propagation of puerperal fever, the chief cause is a predisposition in the individual to diffuse malignant forms of inflammation; and, except in cases of contagion, puerperal fever arises only from this predisposition. A local specific infection, that is contagion, first makes its appearance when the epidemic has reached a certain height, and the contagious influence a certain degree of intensity. As regards an individual not predisposed, contagion may continue to be inert." Dr. Lange (of Heidelberg) replied that —"Puerperal fever arises from a disease of the blood, produced by infection by means of decomposed animal matter. Infection generally comes from without; more rarely is it autogenetic. The contagiousness of puerperal fever by inoculation of its specific products must be denied; on the other hand, inoculation by means of animal or cadaveric poison may be admitted. Injurious effluvia may also give rise to puerperal fever, as well as to hospital fever." In reply to other questions submitted to these doctors there was a general unanimity of opinion in favour of small lying-in hospitals, and of an additional establishment

[1] Published in "*Monatsschrift für Geburtskünde, August*, 1864."

("wechselhaus") to be used as an alternative hospital in case of epidemics of puerperal fever.

In 1865 a series of lectures on Puerperal Fever was published by Dr. Robert Barnes of London[1] who begins by remarking that more puerperal women die from this cause than from all others put together. He divides all cases into two sections, according to their origin from causes within, or without, the individual economy; with minor subdivisions as below—

I. *Autogenetic puerperal fever*;

(*a*) Toxæmic or Excretory; from failure of elimination. (1) Uræmic. (2) Cholæmic.

(*b*) Traumatic.

(*c*) Thrombotic.

II. *Heterogenetic fever;* due to

(*a*) An animal poison generated by crowding lying-in women together.

(*b*) Bad sanitary conditions; *e.g.* sewage miasms, air of overcrowded dwellings; damp and cold; impure water and unwholesome food; malaria from surgical wards.

(*c*) Exposure, mediate or immediate, to any contagious disease, such as typhoid or typhus fevers, scarlatina, smallpox, or erysipelas.

(*d*) Direct inoculation of cadaveric matter or other animal poison.

The "toxæmic" forms of puerperal fever are mainly dependent on the physiological peculiarities attending pregnancy and parturition. During pregnancy the rapidity of the circulation is increased, in order to supply two organisms with nutrition, and the quality of the blood is altered, as it conveys away the products of retrograde metamorphosis from both. The heart is temporarily hypertrophied to enable it to meet the demand for increased action in diminished space. The excretory organs are overtasked, and failure of elimination may lead to jaundice or albuminuria. The veins are dilated and local retardations of

[1] "*Lancet*." 1865.

blood, and even thrombosis, may ensue. The pressure of the gravid uterus causes hyperæmia of the superior part of the body, and œdema of the inferior parts. Impeded respiration leads to impeded hæmatosis and hence again œdema of the lungs. Such is the condition before delivery; and to this must be added the shock and local violence attending labour, and the subsequent processes of uterine involution and incipient lactation. Surplus material must undergo fatty degeneration, and the proceeds must be absorbed by the blood and excreted from it. The excretory functions are tasked to the uttermost, but, under favourable conditions and with no intercurrent disturbance, they will gradually succeed in restoring the normal balance. The slight "milk fever," so-called, is probably an indication that the required elimination is almost beyond the powers of the system; and, if any extraneous poison comes into action, or if excretion is checked by cold, or bad air, or bad food, or if lactation is arrested, the seeds of mischief will burst into germination, and puerperal fever is developed in one of its worst shapes,—the toxæmic or excretory form. If albuminuria has prevailed during pregnancy, or now supervenes, excrementitious matters will accumulate in the blood, and symptoms of uræmic poisoning will come on, with or without convulsions, delirium, stupor, or puerperal mania. If, on the other hand, it is the liver that fails in its office, cholæmic puerperal fever will occur, with icteric tinge, and often accompanied by special action on the nervous centres, leading to melancholia. These cases are most common among women who have led an indolent or luxurious life, or they may occur when some sudden shock, mental emotion, fear, or grief, instantaneously arrests or perverts the normal function of the liver.

"Traumatic puerperal fever" may arise in consequence of local injury during labour, followed by subsequent absorption of septic matter. Though the recently demonstrated existence of a newly formed mucous membrane over the site of the placenta lessens the analogy to a surgical wound that was

formerly maintained, there are yet always sufficient abrasions in the genital tract to account for septic inoculation. The degradation of the blood explains the tendency to purulent inflammation, and to the effusion of non-plastic lymph. The morbid process may be lighted up by a chill, or by some imprudence, which checks the secretion of the skin, and leaves the rest of the glandular system over-burdened with its task; thus originating internal congestions which may develope into local phlegmasiæ, such as peritonitis or pelvic cellulitis. If there is good systemic power, the septic or pyæmic influence may even yet be overcome, and puerperal fever be arrested at its outset. A third autogenetic variety of the disease may be due to the excess of fibrin in puerperal blood, resulting in coagulation and thrombosis, followed perhaps by *Phlegmasia dolens*. Dr. Barnes expresses some doubt, however, whether this should not more properly be classed as a sub-variety of the excretory puerperal fever. If the obstruction in the veins arises slowly and gradually, we have œdema instead of the ordinary result.

With regard to the heterogenetic forms of puerperal fever, Dr. Barnes discusses the statements of Semmelweiss respecting cadaveric inoculation, but expresses his opinion that this is only one of the causes of puerperal fever, and by no means the most common. He doubts whether the work of the ordinary dissecting room would ever be a source of much danger, but is convinced that the most virulent blood-poisoning may ensue after the performance of autopsies when death has occurred from septicæmia or from zymotic poison. The risk is very greatly increased if the infected hand is introduced into the vagina *after* labour, when lacerations probably exist. Dr. Barnes believes that zymotic contagion is a frequent and dangerous cause of puerperal fever, and that many epidemics on record may really have been of scarletinal origin.

In 1867, Dr. Scanzoni[1] published a new edition of his Treatise on Midwifery, and, in it, modified opinions which he

[1] "*Lehrbuch der Guburtshilfe*," von Friedrich W. Scanzoni. Wien, 1867.

had previously expressed. He now maintained that puerperal fever depends on blood-poisoning, and divided the causes of infection into primary and secondary. The primary cause is animal matter in a state of putrefaction, which may be admitted into the system either through wounds in the genital organs or by means of the respiration. The secondary cause originates in local inflammations of the uterus or its appendages, whence putrid infection is conveyed into the system by the veins, or more frequently by the lymphatics. Where no symptoms of blood-poisoning appear, as in non-pyæmic peritonitis, the name of puerperal fever is not to be given. Dr. Scanzoni does not consider puerperal fever to be highly contagious, but admits that it is manually transmissible, and also that it may, like other epidemics, be propagated by means of the atmosphere. He thinks that the excess of fibrin in the blood predisposes for the reception of puerperal fever.

In a book published in 1870, Dr. Mathews Duncan, of Edinburgh, expresses his opinion that "Puerperal fever, or metria, is a hot bed of false and insufficient hypotheses. I do not believe," he says, "there is any such single disease. The term includes a variety of diseases, and a variety of modifications or terminations of diseases. It is familiarly described as a zymotic disease. It is described universally as occurring in epidemics; not merely as an endemic. I feel certain, and I believe I can prove, that an epidemic of puerperal fever never occurred; that no accepted definition of an epidemic can be made to include metria. . . Doctors and people seem ignorant of the fact that there is a regular and practically constant mortality from puerperal fever all around them. Metria and pyæmia (certainly not very far from being identical) are the chief causes or indices of variations of mortality in hospital, and in private, practice. They are more frequent the worse the general health, the more depraved the constitutions of the patients, the worse and more serious the kind of cases treated, the worse the sanitary arrangements of the patient's bed or home.

Positive statements like these respecting puerperal fever and pyæmia are not of a nature to be disputed by any one, and I believe they may be as nearly proved as is admitted by the nature of the case."[1]

A graduation thesis, written by Dr. Susan Dimock in 1871, gives the views of puerperal fever current at the University of Zurich, with interesting illustrations from the writer's own observations.[2] "In our time," she writes, "we find the fundamental principle firmly established that puerperal fever is to be considered analogous to those processes which result from any poisoned wound; that the puerperal state indeed modifies the process, but does not otherwise affect it essentially. . . . Since the first attempt was made by Kiwisch to divide puerperal fever into different forms on the principles of true pathological anatomy, many classifications have been made and again abandoned. While I accept the following divisions as they are taught in the Midwifery Clinique of Zurich, I do so with the knowledge that they have many opponents, but with the conviction that these classes, imperfect as they are, and as all classifications of medical laws must necessarily be, are still the best and most complete, inasmuch as we can easily and advantageously include in them all the forms of the disease which we find in the text books under a crowd of names more confusing than enlightening. These classes are: (1) *The purely septicæmic form* of puerperal fever, in which an acute decomposition of the blood is set up by an absorption of the septic material which is the immediate cause of death. (2) *The thrombotic form*, in which purulent disintegration of the thrombus takes place, and leads to general infection, sometimes by means of emboli. (3) *The inflammatory form*, in which, either by the extension of inflammatory processes to important parts of the body, or by the re-absorption of the various products of inflam-

1 "*On the Mortality of Childbed and Maternity Hospitals.*" By J. Mathews Duncan, M.D. 1870.

2 "*Ueber die Verschiedenen Formen des Puerperalfiebers.*" Inaugural Dissertation, von Susan J. Dimock. Zurich, 1871.

mation, the disease affects the whole system. This last is the most common." It is further stated that the diagnosis of the third form presents no difficulty, as "the symptoms arising from the nervous system, as well as the peculiarity of the fever-curve, make it very different from non-infectious parametritis, as well as from the acute traumatic peritonitis following difficult delivery."

In 1871 a Manual of Midwifery was published by Professor Schroeder, of Erlangen,[1] and in the chapter on puerperal fever we find the most unmistakable statement that under this head are to be placed those diseases, and those only, "which are caused in puerperal women by the absorption of septic matter through a fresh wound. Through the intact skin or mucous membrane, through the lungs or intestinal canal, septic materials never as a rule enter the body as such, although a long sojourn in an atmosphere loaded with gases resulting from organic decomposition may give rise to chronic illness. Fresh wounds exist, however, in every puerperal woman; in every one some of the maternal blood vessels are opened up by the detachment of the placenta, and in almost all there are slight lacerations of the cervix or vulva. The sources from which infecting matter is derived are chiefly twofold; either it belongs to the infected organism itself, or it is introduced from without. Auto-infection is possible in all cases where parts of the maternal organism decompose during, or immediately after, delivery, or when at the birth of a child there are already decomposed materials:—(1) When a dead fœtus has after rupture of the membranes been long exposed to the influence of the atmosphere; (2) when the pressure on the maternal parts has lasted so long that gangrene sets in before delivery is terminated; (3) when in carcinoma of the cervix the new growth readily undergoes decomposition. Auto-infection rarely takes place when the bruised maternal parts decompose some-

1 "*A Manual of Midwifery*," by Dr. Karl Schroeder. Translated into English by C. H. Carter, M.D. London, 1873.

what later, since the recent wounds have then ceased to be capable of absorption. Infection from without takes place when septic materials are brought to the recent wounds in the genital organs by means of a sponge or linen, or by instruments, and very frequently also by the examining finger. It is possible also that septic substances floating in the air may come in contact with recent wounds, but there are no cogent reasons for such an assumption. The infecting matter is formed wherever organic compounds decompose. Puerperal fever, therefore, is nothing else but poisoning with septic matter from the genital organs; it is quite the same state which is frequently observed in surgical wards and designated as erysipelas, pyæmia, ichorrhæmia, and septicæmia. A specific difference does not exist, though there are modifications in the symptoms, due in great measure to the peculiar place where septic material enters, and in a lesser degree to the changes of the genital organs in the puerperal state." Professor Schroeder argues that "puerperal fever is not contagious, for by a contagious disease is meant one in which a specific poison is produced within a diseased organism, and which, transferred to other individuals, always produces the same specific disease. Although the secretions of puerperal-fever patients transferred to other puerperal women may in them produce puerperal fever, there is yet nothing specific in the secretions, which have only all the characters of the products of decomposing organic compounds, and the phlegmonous inflammation and septicæmia which they produce in any wound exactly corresponds to the puerperal fever of puerperal women. If, therefore, puerperal fever cannot be considered contagious in the usual sense of the word, yet it must be admitted that it is manually transferable." The different forms of the disease are thus given :—(1) Acute septicæmia, where the quantity of septic matter absorbed is so large that the blood produces inflammation wherever it goes. Death takes place too rapidly for extensive post-mortem lesions. (2) The dose of poison may be smaller, and may be eliminated,

or rendered innocuous in the organism, as in the case of animals subjected to a single injection of putrid matter. (3) Local inflammation may be set up, with a tendency to acute inflammatory œdema and diffusion throughout the connective tissue; or the blood may be sufficiently irritative to cause local inflammations in other organs (ichorrhæmia). (4) Thrombosis may occur, and the surrounding inflammation may cause disintegration of the thrombus, its fragments may enter the circulation and cause hæmorrhagic infarcts, with fresh inflammation. With regard to treatment, Professor Schroeder admits that we know of no specific remedy that can neutralize the septic element in the blood, but suggests that purgatives may be expected to be more useful than anything as a means of elimination. By way of prevention he recommends the termination of labour before the formation of putrid discharges, and the use of vaginal antiseptic injections, such as dilute carbolic acid. The most absolute cleanliness is necessary on the part of the nurse and the doctor, and the hands and any instruments used should be washed in disinfecting solutions. By such means he believes that the occurrence and the transmission of puerperal fever may be prevented.

In his great work on uterine diseases,[1] Professor Courty, of Montpellier, alludes briefly to puerperal fever, remarking that "la question ne me paraît pas encore jugée. Toutefois on doit reconnaître que, si des métrites puerpérales ont été englobées dans la description de la fièvre puerpérale, et en ont altéré les traits, il a eté constaté que de nouvelles accouchées peuvent succomber à une fièvre grave qui détermine souvent des altérations dans l'utérus comme dans les autres organes, plus encore que dans les autres organes, mais qui peut aussi ne laisser dans la matrice aucune trace de son passage, comme les autopsies en font foi, et qui n'est par conséquence pas une fièvre simplement symptomatique d'une métrite ou d'une

1 "*Traité Pratique des Maladies de l'Uterus, des ovaires, et des trompes.*" Par A. Courty, Professeur de Clinique à la Faculté de Médecine de Montpellier. 1872.

phlébite utérine. Beaucoup de médecins admettent que la fièvre puerpérale est une maladie essentielle, caractérisée par une altération du sang. . . Du reste il en est sans doute de la fièvre puerpérale comme de l'érysipèle contagieux et de l'infection purulente. Elle peut se développer chez une femme récemment accouchée, par suite d'une phlébite on d'une angioleucite utérine, de la résorption de pus, d'une métro-péritonite suppurée, d'une ovarite, d'un abcès des ligaments larges, d'une infection purulente consécutive. Elle peut se propager ensuite par les miasmes nosocomiaux auxquels elle a donné naissance, et déterminer la septicémie chez des femmes en puerpéralité, ou chez les operées d'un hôpital. Elle peut même se localiser consécutivement sur l'utérus, disposé à cette invasion par un accouchement récent, ou se trouvant déjà lui-même un foyer de suppuration. Elle peut enfin frapper de mort les malades d'autant plus sûrement qu'elle les atteint donblement de septicémie ; (1) par l'infection purulente directe partant de l'utérus ; (2) par l'intoxication indirecte ou épidemique."

In a treatise on puerperal diseases,[1] published in 1874, Dr. Fordyce Barker of New York stoutly maintains the essential and specific nature of puerperal fever, as distinct on the one hand from local inflammation, and on the other from the ordinary zymotic fevers ; and, though he admits the frequent presence of septic elements in puerperal fever, especially in hospitals, he totally denies that septicæmia is identical with puerperal fever itself. "There is" he asserts "a fever which is peculiar to puerperal women, which belongs to the class of zymotic diseases, and results from some unknown blood changes. Its symptoms are essential, and are not the consequence of any local lesions, and it is as much a distinct disease as typhus, typhoid, or relapsing fever. The determining cause of this fever may be either epidemic influences, contagion, infection, or probably nosocomial malaria. Any of the local inflammations

1 "*The Puerperal Diseases.*" Clinical Lectures delivered at Bellevue Hospital, New York, by Fordyce Barker, M.D. 1874.

may occur in puerperal women without puerperal fever, and on the other hand puerperal fever may be so severe as to destroy life without sufficient local disease to account for the symptoms, or explain the cause of death. The specific causes of the exanthemata may develope them with intense malignity in a puerperal woman, but this does not transform the disease into a puerperal fever. Septicæmia may be developed in a puerperal woman, either from autogenetic or heterogenetic infection, without puerperal fever, but this infection may also complicate puerperal fever."

Dr. Barker considers that there are four main indications with regard to treatment. (1) To reduce the excessive arterial excitement. This may be best done by veratrum viride. (2) To allay pain and secure sleep. For this purpose morphia is best. (3) To reduce the pyrexia by quinine, mineral acids, cold sponging, alcohol, and appropriate nutrition. (4) To combat the various secondary lesions by appropriate measures; *e.g.*, by antiseptic injections, by turpentine stupes, by blisters, &c. He believes that venesection should never be resorted to as a matter of routine, but that in a few cases, especially with severe cerebral symptoms, it is clearly indicated and very successful. In such cases urea may probably be found in the blood, or albumen in the urine. The action of emetics and purgatives he thinks dangerous, but occasionally he uses calomel as a laxative where there is evident bilious derangement.

In the course of last year (1875) a discussion respecting puerperal fever occupied the Obstetrical Society of London during four of its monthly sittings, and an abstract of the opinions there expressed may be considered as representative of the present state of English medical opinion on the subject.[1] The discussion was opened by Mr. Spencer Wells, who proposed three main points for the consideration of the society. (1) Whether puerperal fever really existed as a specific entity,

[1] A full report of the debate is given in the following numbers of the *Lancet*;—April 17th; May 15th; June 12th; July 17th, 1875.

or whether all cases called by that name might properly be included either in the category of zymotic diseases, or in that of surgical and erysipelatous fevers. (2) Respecting the infectious or contagious character of puerperal fever, and the modes of arresting its propagation. (3) What probable relation the presence of bacteria might bear to puerperal fever, and what would be the value of antiseptic treatment.

The last question was practically set aside in the discussion, on the ground that sufficient data did not exist at present for its solution. Respecting the other two points there was as much diversity of opinion as at the French Academy. Twenty-seven doctors took part in the debate, and the whole was summed up in an article published by Dr. Priestley, the President of the Society, in the Obstetrical Journal.

The speakers may be broadly divided into two classes: (1) those who believed that puerperal fever is not a specific entity, but depends on one or more causes common to it and to other diseases; (2) those who maintained that puerperal fever is a true *ens sui generis*, and not to be confounded with any other affections, though these might, of course, be simultaneously present.

The first position was maintained by the majority, but its supporters again were divided as to whether puerperal fever might arise from any one of many causes, or whether all cases were of septicæmic or pyæmic origin.

Mr. Spencer Wells was of opinion that the term puerperal fever might be advantageously discarded; and that if, as he thought, every case might be brought under some other denomination, it would be better henceforth to assign it at once to the class to which it really belonged.

Dr. Barnes thought that the name puerperal fever could not be dispensed with, but that it might be held to include all fevers occurring in puerperal women. His classification of such affections has been already given, but it should be added that he now expressed his opinion that the cases designated as

"excretory puerperal fevers" could not be brought under any other denomination, and that they alone constituted the type of essential puerperal fever.

Dr. Leishman believed that a large number of cases of puerperal fever had their origin in pyæmic and septicæmic infection, but he could not agree with those German writers who maintained that this was the sole source of the disease, and that, by admitting this, we might, "where all had been *chaos*, now read *cosmos*." He believed that a second class of cases arose from exposure to one or other of the zymotic poisons, and that a third order originated in local inflammations. In both these latter cases he was himself unable to distinguish the ensuing fever from that which was of septicæmic origin. With respect to cadaveric inoculation, he felt bound to remark that puerperal fever would be much more common than it is, if it was always communicated by students who attended labours while practising dissection.

Dr. Newman thought there was no such thing as a definite puerperal fever, and that all cases might be referred to (1) the contagion of zymotic diseases; (2) pyæmia resulting from local inflammation; (3) miasmatic sewer gases, absorbed by the woman perhaps even before delivery; (4) the action of mental causes of depression, as in cases of seduction. Whatever the cause of the disease, the puerperal state would add both to the severity of the symptoms and to the rapid fatality of the result.

Dr. Braxton Hicks was of opinion that many outbreaks of puerperal fever had assumed an identical character when starting from dissimilar causes, such for instances as scarletina and erysipelas. He had on a previous occasion submitted to the society an analysis of eighty-nine cases of puerperal fever, and had shown that three-fourths of these had been connected with animal poison, including decomposing material from the uterus. Half of these three-fourths were connected with scarletina; the other half seemed to have originated in diphtheritic or erysipelatous infection, or in uterine putrefaction. Of the remain-

ing fourth of the total number, a few must be traced to mental causes, a few to traumatic action, and of the other ten or eleven no definite history could be given. In illustration of the effect of mental causes, Dr. Hicks related the case of a poor woman who, when in the act of delivery, heard of her husband's dismissal from his situation; she became violently excited, and in a few hours rapid and malignant puerperal fever supervened, and proved fatal. In another case a similar result followed after a violent quarrel between the patient and her nurse. The cases which originated in local decomposition might often be arrested by vaginal injections. In many cases, exposure to scarletinal poison seemed to produce puerperal fever in a puerperal woman, and scarletina in her children, and this equally whether they were infected by her, or she by them. With regard to contagion, Dr. Hicks believed that the fever caused by zymotic influence is more contagious than that which is of traumatic origin. He doubted whether puerperal fever was ever created in a lying-in hospital by mere aggregation, though no doubt overcrowding will increase the number of victims.

Dr. Richardson believed that the common factor in all cases of puerperal fever was to be found in the peculiar physiological state of the puerperal woman. The colloidal fluid, or fibrin, is in excess, from 3 to even 8 parts per 1000, so that the smallest disturbance may cause precipitation, especially as there is also a diminution of salts in the blood. A great change has also just occurred in the circulation, from the separation of the fœtus, and a condition of marked nervous reaction is due to the same cause. The woman is in all these respects predisposed to febrile disturbance, and this is sometimes aggravated by an hereditary tendency. Zymotic diseases cannot, in Dr. Richardson's opinion, be identified with puerperal fever, but there are various other poisons which have apparently the power to give rise to it. There are four distinct forms of puerperal fever. (1) The simple surgical fever which is really a "fever of resistance," and which may prove fatal if the pyrexia causes the

deposition of fibrin in the heart. (2) A remittent or bilious fever with more or less jaundice. (3) Septicæmic poisoning, wherein death may occur either from deficient oxidation, or from the stoppage of the circulation by the accummulation of fibrin in the heart. (4) Cases arising from heterogenetic causes of various kinds, such as exposure to scarletina or erysipelas, or inoculation with some morbid material. Dr. Richardson is of opinion that some kinds of puerperal fever are contagious and some not. In conclusion he stated that he believed bacteria to be merely inert coincidences, and that the true action of septic poison was probably analogous to that of certain inorganic bodies, *e.g.*, manganese and black oxide of platinum, which have the power of eliminating oxygen from the blood, and of preventing the combination of oxygen with the blood.[1] He trusted that within ten years science would have discovered some agent which could arrest this septicæmic action, and enable the blood to retain, and to receive, oxygen. It is probable that the partial success of quinine is due to its possessing this property to a slight, though inadequate, degree. So far as antiseptics are of use in puerperal fever it is not mainly because they prevent putrefaction, but because some of them (in common with some other agents) have a certain power of chemically neutralising the action just referred to.

Dr. West was of opinion that little or no advance had been made since Dr. Ferguson laid down the principle that puerperal fever depends on a vitiation of the fluids which is specially apt to arise in the puerperal state. The far more frequent occurrence of this disease in primiparæ shows that it has some

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[1] When I recently had the privilege of discussing this point with Dr. Valentin, the distinguished Professor of Physiology at the University of Bern, I was informed by him that the great objection to this theory is the fact that, after death from puerperal fever or septicæmia, the spectrum of the blood does not present the appearance characteristic of deprivation of oxygen. This appearance (consisting in the substitution of one central "Stokes' band" for the ordinary two lateral bands,) is found to occur whenever blood has been subjected to the action of carbonic oxide or other reducing agents. (See Carpenter's "*Human Physiology*," 7th Ed. Also "*Proceedings of the Royal Society*. Vol. XIII.")

relation to the difficulty of the previous labour. It appears that if a woman is exposed to a zymotic contagion, say of scarletina, she may have scarletina, clearly recognizable as such, or its poison may develope in her the different result of puerperal fever. Dr. Collins recognized the presence of genuine typhus fever in the Dublin Hospital, but he also recognized it on two occasions as the initial factor in an epidemic of puerperal fever. It is clear that in the puerperal state this disease may originate from exposure to cold, from mental emotion, from cadaveric infection, from local injury, or indeed from anything which checks the regular performance of the processes proper to this condition.

Dr. Snow Beck agreed that, if any specific puerperal fever exists, it should be found in the interruption of the healthy puerperal functions, and he thought that no malady should bear this name unless it originated in the uterine system, as when noxious fluids poisoned the circulation through the medium of an uncontracted uterus. He doubted, however, whether even in this case the contamination of the blood differed from what might occur under other conditions. He also doubted whether any malady of such origin could be contagious. Many cases of so-called puerperal fever were in reality zymotic diseases, modified by the puerperal state, but communicated by infection to other persons in their original shape.

Dr. Greene considered that puerperal fever had never been differentiated, and that various affections were included under that name. Such affections might be due to causes which were (1) local and transitory; (2) local and persistent; (3) extraneous. Diseases of the first class arose from decomposing clots, or from habitual constipation, and the causes might be removed by vaginal injections in the one case, or by purgatives in the other. In the second catagory of causes he would place persistently over-heated rooms, or bad hygienic conditions which could not be remedied. An example was given where a mother-in-law persisted in keeping the room at stove-heat, and rigors and

fever supervened, but subsided at the advent of a more intelligent nurse, to return and end fatally when the former régime was resumed in defiance of the doctor's orders. In the third class of cases, forming three-fourths of the whole, the contagion is due to zymotic poison, which produces more formidable effects in puerperal women than in others because their absorbents are in the highest state of activity. It is desirable that the term "puerperal fever" should be abandoned, and each case assigned to its essential cause.

Dr. Routh narrated the events in Vienna to which reference has already been made, and of which he was an eye-witness, and stated his belief that cases of puerperal fever caused by local inoculation were rarely infectious, but that there was clearly another type of the disease which spread with fatal rapidity among puerperal women, and might even be communicated in a modified form to other persons, as was proved by Dr. Storr's evidence that the husbands of the patients were sometimes seized with peritonitis.

Mr. Wallace also bore witness that in his experience cases of pyæmic origin were not contagious, but others which originated in infection from another woman, or after exposure to sewage gases, were contagious. In 1870 he witnessed an epidemic of scarletina, but saw no puerperal fever among his parturient patients, although in some cases children covered with the rash were in bed with the mother at the moment of delivery. He had seen cases where puerperal women had small-pox, and he found the disease not at all modified in their case.

It will be seen that all the foregoing speakers were more or less disposed to include in the term "puerperal fever" almost all the diseases which may occur in the puerperal state. Another party equally denied the existence of the disease as a distinct entity, but desired to identify all cases of puerperal fever with pyæmic or septicæmic infection occurring in a puerperal woman; and most of them considered such cases as closely allied to those of surgical fever occurring after operations.

Mr. Hutchinson thought that the terms "puerperal fever" and "surgical fever" ought alike to be discarded, and each case referred to its proper category. It had been asserted that erysipelas could produce puerperal fever, and might even be identical with it, but, if so, it was an argument against the specificity of puerperal fever, as erysipelas was in his opinion not a distinct disease, but only a special type of local inflammation. He desired to confine the term scepticæmia to cases of autogenetic origin, and said that where there had been inoculation of morbid matter, he believed that it produced septicæmia only through irritating the blood which was probably unhealthy, and thus setting up inflammation. Pyæmia he believed also to depend always on an inflammation of the patient's own tissues, and to be generally connected with phlebitis.

Dr. Brunton was disposed to deny the assertion that puerperal fever was often caused by the conveyance of zymotic poisons through the medium of the practitioner. He was himself constantly in attendance on all sorts of infectious diseases, and yet had seen very little puerperal fever in his midwifery practice. Nor did he think cadaveric inoculation was so dangerous as had been asserted, for, when a student, he, in common with his companions, was in the habit of attending lying-in patients, while working at practical anatomy, and yet he never at that time saw a case of puerperal fever. Again he had repeatedly made post-mortems, and had never seen any evil results. In his opinion puerperal fever was simply autogenetic; beginning in the uterus after hemorrhage, or where there was imperfect contraction, so that clots decomposed, and pyæmic poison was generated. The secretions of a pyæmic patient might convey the disease to another puerperal woman, just as would happen in surgical wards if dressers were allowed to pass from pyæmic patients to others. It was also possible that pyæmic poison might be absorbed by the doctor, and, when exhaled from his lungs, might be a cause of infection.

Dr. Grailey Hewitt believed puerperal fever to depend essentially on blood poisoning, and to be simply a form of pyæmia, as declared by Sir James Simpson. He thought the causes were of two kinds, heterogenetic and autogenetic. In the first case the poison is frequently introduced by the doctor's hand, when he has been engaged in post-mortem examinations, or has recently attended another puerperal case. The poison may also be conveyed by the nurse through carelessness in washing or cleansing the patient, or may be absorbed from bed clothes into which fetid discharges are allowed to soak, especially if there is perineal laceration. With regard to the autogenetic cases he thought they were always closely connected with a want of contraction of the uterus, in consequence of which decomposing matters were absorbed into the circulation. If zymotic diseases had any effect in producing puerperal fever, it was simply because they produced a paralysis of the uterus and arrested its contraction.

Mr. Callender looked on the matter from a surgeon's point of view, and considered that it was little more than a matter of speculation whether puerperal fever was due to septic poison, and, if so, whether that poison was derived from one source or another. He found however practically that septicæmia could be banished from surgical wards by keeping wounds absolutely at rest, cleansing them scrupulously from every kind of discharge, and above all keeping them from all contamination from other wounds, as a patient is more tolerant of decomposition occurring in his own organism than of that imported from elsewhere. By such means he had abolished septicæmia in his own wards, and similar rules might be useful in the lying-in chamber.

Dr. Savage would prefer to call the disease in question by the simple name of septicæmia, and was not aware that the puerperal state in any way altered its character. He had seen cases in surgical wards, and in gynæcological wards, which he could not distinguish from those occurring after delivery. It

was known that septicæmia could be artificially induced in animals, and he could not doubt that it could also be communicated by the finger if charged with decomposing or fetid material. He believed that if septic matters got into the circulation from the uterus it was rather through the lymphatics than the veins.

Dr. Williams maintained that every case of puerperal fever was due to septic contamination of the blood. He thought the word septicæmia should be used, to the rigid exclusion of pyæmia, for laudable pus never killed any one, and was only injurious when putrid. Putrid animal matter might originate in the uterus in three ways. (1) By the decomposition of retained clots or placenta; (2) by the sloughing of vaginal mucous membrane; (3) by conveyance of the septic poison to the discharges of the patient. Certain conditions of the atmosphere greatly promote putrefactive fermentation, as has been pointed out by Sir James Paget in relation to surgical patients. With reference to the possibility of contagion by the medical practitioner, he would suggest that whenever such danger arose from attendance on any case with putrid emanations, the doctor should disinfect himself by means of the vapour of iodine, a few scales being heated over a spirit lamp in a closet, care being taken only to protect the eyes. Dr. Williams had himself demonstrated the antagonism of iodine to septic poison, by showing that septic material, which, when injected alone, would produce septicæmia in a guinea pig, became inert if joined to a few drops of the Tr. Iod. This tincture is therefore also very valuable as a vaginal injection.

Dr. Playfair remarked that the great differences of opinion expressed show how much yet remained to be learnt on this subject. He himself believed puerperal fever to be probably identical with septicæmia or pyæmia, and thought it arose from the contact of septic matter with lesions in the generative tract. He felt, however, that great difficulties existed, especially with regard to the production by zymotic poison of a disease not to be distinguished from ordinary puerperal fever.

He referred also to the theory of Dr. Martin, of Berlin, that diphtheritic patches on the genital organs really constitute the essence of puerperal fever. Dr. Playfair himself had seen a case where the exposure of a young married couple to sewage gas had produced puerperal scepticæmia in the wife and diphtheria in the husband, and both cases nearly proved fatal. With regard to the zymotic poisons, it would be interesting to know whether exposure to them might produce pyæmia in surgical patients.

Dr. Tilt thought it open to question whether many of the cases attributed by Dr. Hicks to scarletinal infection were not really due to some other cause. He believed that puerperal fever was usually autogenetic, and due to the ichor of fetid lochia passing into the lymphatics, and thence into the blood. The action of the zymotic contagion was probably due to its causing fetidity of the lochia, and increasing the virulence of the poison absorbed. He believed that antiseptic injections both into the vagina and uterus were most valuable.

Dr. Griffiths was of opinion that some confusion respecting scarletinal contagion had arisen from the fact that symptoms closely resembling those of scarletina[1] may sometimes occur in fevers of purely toxæmic origin, without any exposure to zymotic contagion. He gave an instance where all the symptoms closely resembled those of scarletina, and all disappeared after thorough disinfection of the uterus and vagina. Septicæmia, however, often occurs with little or no pyrexia, especially when the dose of poison is large enough to be rapidly fatal. It was probable that some intimate relation might hereafter be shown to exist between scarletina, typhoid, and puerperal fever.

Those who maintained the existence of puerperal fever as a separate and specific entity were much fewer in number than their opponents. The strongest supporter of this theory was

[1] In Simpson's "*Obstetrical Works*" a paper occurs showing that a scarletinoid rash is sometimes present in puerperal patients when air has entered the uterine veins at the time of delivery. Professor Simpson suggests that the red rash may be due to the direct oxygenation of the blood in the capillaries by the admitted air.

Dr. Fordyce Barker, whose views have been already given. He especially disputed the identity of septicæmia with puerperal fever, on the ground that the symptoms were quite distinct in the two diseases, and that when they were combined in a puerperal woman it was quite possible to appreciate and describe the modifications caused by this complication. He also thought that the non-contagiousness of septicæmia was quite conclusive against its being considered to constitute true puerperal fever.

Dr. Squire supported the same view. He believed that all the cases of contagion from acute specific diseases might be set aside, and that puerperal fever would still remain to be accounted for. He believed that zymotic diseases could always be recognized as such when intercurrent in the puerperal state, and he gave instances where women immediately after labour had been exposed to zymotic contagion without developing any symptoms of puerperal fever. He was not prepared to identify puerperal fever with any other existing disease, although he thought that there was considerable affinity between it and erysipelas and diseases arising from purulent infection, especially in hospitals. He thought there was considerable danger in the simultaneous practice of anatomy and midwifery, as it was known that a dissector might himself suffer from peritonitis as a result of his work.

Dr. Farre thought that it would be very desirable to compare the observations of the present day with those made by preceding generations, and with this view he advised the study of such valuable works as those of Denman, Leake, Hulme, and Kirkland. He wished to explain that the definition of puerperal fever given in the "Nomenclature of the College of Physicians"[1] was not meant to decide any disputed questions, but merely to furnish the means of identification with a view to correct registration. The Nomenclature Committee were in truth quite at a loss as to the position that should be assigned

1 "A continued fever, communicable by contagion, occurring in connection with childbirth, and often associated with extensive local lesions, especially of the uterine system."—*Nomenclature of the College of Physicians*, 1869.

to this fever, and it found a place of refuge at last at the bottom of the list, after pyæmia and erysipelas, and apart from the list of affections distinctly consequent on parturition. In our present state of imperfect knowledge it is very difficult precisely to formulate facts. Dr. Farre was not able to say that puerperal fever was the result of a special morbid poison (if by that is meant a specific virus), nor that it had a definite course. But he could not consider this disease which occurred in puerperal women as identical with any infectious or contagious disease which might occur in a child or in a man. He considered it impossible to separate the disease from the special circumstances of the woman in whom it occurs. Not merely is she to some extent in the weakened condition of a patient after an operation, but two processes of an entirely exceptional kind are going on within her, lactation and involution. If puerperal fever exists at all as a distinct entity, its origin will be found in the interruption of those normal processes, and perhaps in the creation by that interruption of a distinct form of sepsis which aggravates the exciting blood dyscrasia. Setting aside the eruptive fevers which may be intercurrent in the puerperal state, there appear to be two classes of puerperal fever strictly so called: (1) *Irritative fevers*, including milk fever, slight traumatic fever, and the ephemera generally; (2) *Infective fevers*, other than those of specific origin, where there is a poisonous element in the blood, but without distinct period of incubation. It is probable that while great attention has been bestowed on the septic element in the blood, too little has been given to its influence on the great nerve-centres, and that it is in this direction that we must look for further light on the subject.

In addition to the speakers already quoted, whose views were more or less definitely expressed as to the nature of the disease, there were two or three who offered no opinion on this question, but gave evidence with reference to special points.

Among these was Dr. Huntley, who felt bound to relate that on one occasion he had had a succession of fourteen cases

of puerperal fever, and that of these five proved fatal. The disease was entirely confined to his own practice, and, as he took every possible precaution in the way of ablution and change of clothes, he could not resist the conviction that the poison was in some way absorbed into his system, and reproduced in his breath or cutaneous secretions. In his experience zymotic contagion produced zymotic diseases only, whether in puerperal women or other persons.

Dr. Swaine believed that some men had the power of absorbing and exhaling poisons to a much greater extent than others, and that the most unfortunate were usually those who had moist perspirable skins. He believed that perspiration was a more common vehicle of contagion than breath. He had noticed that some practitioners not only had a run of ill-luck at one time, but that, after an interval, puerperal fever recurred in their practice rather than in that of others. He had known cases where scarletina was very fatal to puerperal women, but again he had seen it occur after delivery with no bad consequences. He thought that doctors ought to guard very carefully against conveying infection of any kind, and he specially recommended to practitioners ablution with carbolic soap, and the use of the Turkish bath.

Dr. Brown bore witness to a number of cases where puerperal women were exposed to scarletinal contagion, but did not take the disease, although they had never had it previously, and they recovered without a bad symptom.

In summing up the discussion,[1] Dr. Priestley remarked that a short time previously he should himself have maintained the existence of puerperal fever as a specific entity, but that he now considered the balance of evidence and of argument to incline to the side of those who believe this disease to be only a form of blood poisoning or septicæmia, not essentially different from that occurring in other patients, though with perhaps a diversity of origin, and a character modified and intensified by

1 "*The Obstetrical Journal.*" February, 1876.

the puerperal state. In his opinion Dr. Ferguson's Essay on Puerperal Fever was the best that had appeared in the present generation, and he pointed out several respects in which it anticipated views that had now become general. Much had, however, been done since then in the investigation of blood-poisoning, by Virchow and others. As the outcome of the Society's debate it might be stated that "puerperal fever, or fevers, which are attended by a high temperature and commonly associated with extensive local lesions, are due to the inception of a morbid poison which vitiates the blood, and which produces a great variety of symptoms, in accordance with the nature and intensity of the virus, the amount of the dose absorbed, the state of the patient, and a diversity of other conditions." Dr. Priestley thought that the part of the problem most difficult to solve was that relating to heterogenetic sources of puerperal fever. Is the poison always identical, or are there several poisons with generically similar results? It certainly appears that several causes may produce the same effect, and it is quite possible that there are several distinct species of puerperal fever, not yet differentiated. Perhaps the best classification at present would be twofold: (1) the ephemeral forms, and (2) the graver class; and the latter again should be sub-divided into the autogenetic and the heterogenetic. In spite of some arguments to the contrary, Dr. Priestley could not doubt that the disease had at times occurred both in the endemic and epidemic form. There can at the present day be little doubt of its infectious or contagious[1] character, though differences of opinion still exist as to the modes of its transmission. It seems certain, however,

[1] A distinction is made by some authors between *contagion* and *infection;* the first term being generally limited to the conveyance of disease by actual contact with the sick persons, or with his excretions or exuviæ, while the second is applied to the transmission of disease through the atmosphere, by inhalation. The majority of writers on puerperal fever have, however, used the two words indiscriminately; and, as Sir Thomas Watson remarks, "since in all cases the disease is conveyed by particles of matter proceeding from the body of the sick," it does not seem worth while to contend for a distinction which rests chiefly on the degree of contact, or the size of the infecting fragment. (See Watson's *Practice of Physic*, Lec. lxxvii.)

that the poison may be conveyed in various ways, and that it may be received through other channels than the genital canal. Apparently the autogenetic forms of the fever are the least infectious, especially when they have something of a chronic character; whereas the heterogenetic cases, which have usually an acute and rapid course, possess an eminently contagious character. At all events it is clearly the duty of medical practitioners to err rather on the side of caution than of laxity, and no precautions could be misplaced in reference to so formidable a disease.

## IV.—Summary.

In the foregoing pages I have attempted to give a candid and impartial, though doubtless an incomplete, abstract of the main facts and theories relating to puerperal fever, and I cannot better express the general impression left by them on my own mind than by quoting the following remarks, made by Dr. W. S. Playfair at the Obstetrical Society last year. "If there is one fact to be gathered from this discussion I think it is how remarkably little reliable knowledge we have about the subject of which we are talking. It seems to me that this is a lesson really of the greatest importance, because I cannot but fancy that a great part of the almost unmistakable confusion that surrounds the whole matter has arisen from the non-recognition of that fact; from the circumstance that, systematically, writers on the subject have thought it necessary to give a complete and full-rounded history of puerperal fever, without recognizing that we are only at the threshold of the enquiry, and that we have to build up all our knowledge by unprejudiced and patient clinical investigation."

Abandoning therefore all more ambitious aims, I shall only attempt to sketch in briefest outline the chief theories now prevalent, and to point out a few of the difficulties that seem to surround many, if not all, of them. Before proceeding, how-

ever, to this task, it seems essential to clear the ground a little, by defining, however roughly, the meaning to be attached to the term "puerperal fever," and eliminating from consideration diseases which may have been described under its name, but which yet have a distinctive character by no means identical with it, or with each other. After a candid survey of the literature of the subject, it is almost impossible to doubt that a number of quite distinct maladies have been aggregated by various writers under the one designation, and that between some of these there is hardly a common factor, except indeed the puerperal state of the patient, and even this must be given up if we are to accept the statements of MM. Guérard and Depaul that there are well established cases where this malady has been communicated, with every distinctive characteristic, to persons who were not, and never had been, in the puerperal state. Putting aside, however, these extremely exceptional cases, the first question really is whether we are to accept Dr. Barnes' suggestion that puerperal fever may mean simply "any fever occurring in the puerperal state," or whether we should endeavour at least to exclude from present consideration those well-known diseases which may be intercurrent in this state, but which have no integral connection with it, and which may occur in any, or all, patients indiscriminately. If we accept the former alternative, we shall indeed avoid many difficulties of definition, and also of inclusion and exclusion, but at the same time we shall lose utterly all the sharpness of outline which alone can make medical terminology of real value, as indicating a specific disease and suggesting an appropriate treatment. It would therefore seem wiser to exclude from the present enquiry all those cases which are manifestly due to intercurrent disease, whether of zymotic character or otherwise, which may appear in the puerperal state, but which run their course in a clearly characteristic form, little influenced, except perhaps as regards severity, by the special condition of the patient in question. It is impossible with existing data to

decide how often epidemics that have raged in lying-in hospitals may have belonged to this category, and it is indeed probable that in some cases it was really a zymotic disease which devastated their wards, as for instance in 1830, when M. Cruveilhier attributed to true typhus fever the terrible mortality in the overcrowded *Maternité* of Paris. In considering the etiology of puerperal fever it is not however essential to ascertain the character of *each* epidemic that has borne this name, if it be conceded that no ordinary zymotic contagion will account for *all* the epidemics that have caused so enormous a mortality. On the other hand, we might, for all practical purposes, leave out of account those processes (although depending on a vitiated state of the blood) which result in fatal uræmia or cholæmia, in local affections like those present in phlegmasia dolens or cardiac embolism, or again in distinct derangements of the nervous system like eclampsia, mania, or melancholia, since none of these are likely to be identified with what is ordinarily called puerperal fever, and in none of them does much question of contagion arise.

After such elimination, there still remains a very large collection of cases, differing in many respects, but yet agreeing in their main features, and constituting in the aggregate that fearful scourge which has, in different ages and under different conditions, gone far to decimate Maternity Hospitals, and which has, even in its sporadic form, proved more fatal to parturient women than all the accidents of labour. For typical accounts of puerperal fever, as thus differentiated, I would refer to the descriptions given of the epidemics in Paris of 1746 and 1782, or to the reports of Dr. Denman in 1768, Dr. John Clarke in 1793, Dr. Gooch in 1829, Dr. Ferguson in 1839, or to the general descriptions accepted respectively by the Medical Academy of Paris in 1858, or by the Obstetrical Society of London in 1875. It is true that between all these accounts there are minor differences and discrepancies, but yet I think the general impression left on the mind is that one and the

same disease, or group of diseases, is in question,[1] and that any satisfactory theory respecting its nature must be sufficiently comprehensive to include and embrace all the varieties which really belong to it, and which cannot be put aside in the category of other independent maladies. Respecting puerperal fever as thus very roughly defined, there have been many and various theories which I shall now endeavour briefly to enumerate and classify.

The most ancient theories are those which attribute this disease respectively to the suppression of the lochia, or to the "milk-metastasis," but, as both these opinions are now entirely obsolete, it is needless to enter upon their consideration.

Of the theories now prevalent the most important may be classified as follows, though the opinions held by different authorities so cross and re-cross each other that it seems almost impossible to tabulate them with absolute clearness.

I. First in order will come the various theories which attribute puerperal fever entirely to autogenetic causes, or to agencies originating in each patient individually. Here again occur certain sub-divisions, according as the primary cause is supposed to be

(*a*) Local inflammation, whether of the uterus and its appendages, of the peritoneum, of the intestines, or of the pelvic vessels and lymphatics.

(*b*) Traumatic action, originating in the partly denuded uterine surface, and more or less analogous to the surgical fever after amputations.

(*c*) Accidental causes, such as sudden chills, too early exertion, mental emotions, or indeed any agency which may operate by checking the normal processes of the puerperal state.

[1] "Dr. Lowder adopted a very good method to form an accurate definition of the disease. He read all the different authors of character who had written on the subject, and noted down the pathognomonic symptoms which they agreed were necessary to constitute the disease; and, on comparing these with his own experience, he found them to be very few,—fever, intense pain in the head, and intense pain in the abdomen."—*The Most Important Diseases peculiar to Women.* By Robert Gooch, M.D.

It is more than probable that many of the sporadic cases which have borne the name of puerperal fever may really be accounted for as above, but in seeking to apply this explanation to all cases we are met by very serious difficulties. As regards the first class of causes, this double difficulty presents itself:—(1) cases of local inflammation are frequently seen and recognized after childbirth, and may run a dangerous and even fatal course, but in the opinion of many experienced observers they can always be separated from those of true puerperal fever,[1] which they resemble on one side only; (2) if these were the only causes in question we should expect them to operate with tolerable regularity, and to affect chiefly those who had undergone difficult labours, or who were specially exposed to other causes of inflammation. It has however been a matter of frequent remark that puerperal fever followed as often as not after an easy delivery,[2] and that no special correspondence could be traced between the labour and the subsequent puerperal fever. It should also be remembered that no one local lesion has been found constantly in all post-mortem examinations, and that therefore no one inflammation can be identified with the cause of death in all cases.

Similar difficulties arise with reference to the second hypothesis. If the theories of certain writers were correct, we should expect the occurrence of traumatic puerperal fever in all cases where unusual local violence had occurred, or where portions of retained placenta underwent decomposition, and especially where involution of the uterus was retarded or incomplete. In point of fact, however, no such regularity of cause and effect has been observed.

With regard to the third class of causes of autogenetic puerperal fever, it will be remembered that Dr. Barnes maintains

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1 See the evidence of MM. Paul Dubois, Depaul, Guérin, and Huet; and also of Dr. Dimock and Dr. Fordyce Barker.

2 Dr. Gordon expressly states that "those who had easy, and those who had difficult, labours, were all equally and indiscriminately affected." See also Mr Hey's evidence, quoted at p. 12.

that puerperal fever, if differentiated from all other diseases, can depend only on the arrest of those processes of elimination and lactation which tax the puerperal woman so severely. He shows very clearly that the physiological conditions attending pregnancy and parturition constitute a predisposition to what he terms "excretory puerperal fever," and that any additional burden imposed, or any intervening impediment, may be as the spark to smouldering tinder to light up a fatal conflagration. It is true that this theory explains perfectly the occurrence of puerperal uræmia or cholæmia, and there is no doubt that a certain number of deaths after childbirth may be referred to these causes; but, in such instances, neither the symptoms during life, nor the lesions found at the autopsy, correspond with those characterizing the cases which usually bear the name of puerperal fever. Still less can such a theory explain the virulent and contagious character of the disease as seen in its endemic or epidemic form, so that at best it would only be the sporadic cases that could be thus accounted for, and these, if not of the least interest, are certainly of the least importance as regards the supreme object of the arrest of puerperal mortality. Nor must it be forgotton that there is abundant evidence to show that every one of the incidental causes referred to may occur without producing the result of puerperal fever, or indeed any other serious illness.

II. The next proposition is that puerperal fever may be caused by any one of several poisons or miasmata, which would in other persons produce various results, but which in puerperal women have this special effect. Among these miasmata are those of the various zymotic fevers, including erysipelas; if this last is to be taken as a separate and distinct disease *sui generis*. It is suggested that, when a puerperal woman is exposed to the contagion of a zymotic disease, it may not be developed in her in its proper character, and yet may be the starting point from which originates an illness practically indistinguishable from ordinary puerperal fever; while other persons, exposed to the

same influence, may have the characteristic malady from which the contagion sprang, whether this be scarletina, erysipelas, diphtheria, or the like. It is also suggested that sewer gases, absorbed by a woman before or during delivery, may cause puerperal fever to occur in her, while the ordinary type of typhoid or diphtheritic disease may be developed in another non-puerperal person. The chief objections to this theory rest on the fact that a great many cases are on record where no such mysterious transmutation occurred; where puerperal women when exposed to zymotic contagion did contract the special and characteristic disease, which ran its course with little or no modification from the puerperal state;[1] or, on the other hand, where no effect at all was produced, even in puerperal women not protected by a previous attack of the malady in question.[2]

III. The next theory to be considered is that which regards puerperal fever as depending on a distinct poison, virus, or miasm, *sui generis*, quite independent of the influence of any other disease, or any merely local affection. Some of those who hold this opinion believe that this poison may be generated *de novo*, by the mere aggregation of obstetric patients in the same building, independent of (though of course aggravated by) insufficiency of cubic space for each person. Others think that the miasm depends on certain atmospheric conditions, as yet unexplained, but of which the existence is demonstrated by almost universal epidemics, such as those of 1819-20 throughout Europe, and also by the curious facts narrated at the French Academy respecting the infection of all women delivered on one day, and the immunity of all delivered on the next. I am not aware whether those who maintain this doctrine are able satisfactorily to account for sporadic cases,

1 See the evidence of Dr. Squire, Dr. Huntley, and Dr. Swaine;—*Lancet*, May 15th, 1875.

2 See the evidence of Dr. C. S. Richardson; *Lancet*, May 8th, 1875.
Also of Dr. Brunton; *Lancet*, May 15th, 1875.
Also of Dr. Williams; *Lancet*, June 12th, 1875.

where the possibility of contagion is excluded, but it is clear that the theory contemplates chiefly the epidemic form of the fever, and that, even as regards that, it fails to explain the apparently arbitrary occurrence of the fever in one person, and the complete exemption of another who may have been delivered on the same day and may occupy the very next bed, as testified by M. Paul Dubois.

IV. The last, and perhaps the most prevailing, theory respecting puerperal fever is that which identifies, or at least closely connects, it with septicæmia, and the allied diseases of toxæmic origin. There are, however, great and important differences of opinion among those who, in one form or another, support the septicæmic theory. The extreme school is represented by Professor Schroeder, who not only ascribes all cases of puerperal fever to septic infection, but insists that the septic poison enters neither through the lungs nor through the digestive tract, but exclusively through abrasions in the uterine organs. "Puerperal fever," he says, "is nothing else but poisoning with septic matter from the genital organs." This is also substantially the opinion of Dr. Semmelweiss, though he does not absolutely exclude the possibility of infection through the lungs. Many other authorities believe that in the great majority of cases the uterine tract does form the channel of contagion, but also admit the possibility of the septic contamination of the blood by other means. Some of those who admit the possibility of infection through the lungs and skin are of opinion that it may be conveyed by almost any medium, either directly from patient to patient, or by the interposition of a third person, who may, by his clothes, his breath, or even his cutaneous secretions, become the means of transmission; while others would doubt, if not deny, one or more of these modes of infection. Great stress is laid by some writers on the uncontracted state of the uterus in many cases of puerperal fever, and they assert that in this condition lies the explanation of septic infection. Others, again, aver that the uterus may contract

quite firmly, and may present a perfectly healthy appearance after a death resulting from undoubted puerperal fever;[1] while in other cases the involution of the uterus may be very imperfect, and yet no sign of puerperal fever may appear.

With regard then to the manner in which the septic poison finds entrance there is great diversity of opinion, and it is probable that this varies in different cases, and cannot be limited to a single mode. That septicæmia in the restricted sense in which it is used by some authors cannot explain all cases of puerperal fever is plain; and this is the more evident when we remember that those who connect puerperal fever exclusively with poisoning through the genital organs are also those who maintain it to be not in the ordinary sense a contagious disease,[2] whereas it is certain that the element of contagion cannot be omitted in the consideration of what is usually meant in England by the term puerperal fever.

In conclusion however it may be stated that an increasing majority of modern writers concur in believing that the essence of puerperal fever does lie in some toxæmic condition of the blood, leading to disturbances in the whole system. Whether this alteration of the blood is more or less closely allied to that which prevails in erysipelas, scarletina, typhus fever, or any other zymotic disease, is as yet uncertain. It seems probable that a single common factor may be present in a number of conditions due to a variety of causes, and that in that factor lies the essence of puerperal fever. It may be that almost every theory now advanced possesses a germ of truth in so far as it relates to a possible source of toxæmic infection, though its supporters have erred in endeavouring to exclude other causes producing a similar result. It is at least quite conceivable that local inflammation, traumatic action, arrest of elimination, miasmata of various kinds, the presence of zymotic

1 See the Mémoire presented by the Faculté de Médecine de Paris in 1782; and also the evidence of M. De la Roche, and of Drs. Hulme, Leake, and Joseph Clarke, and of Professor Courty.

2 See especially the works of Semmelweiss and Schroeder.

poisons, pyæmic and septic infection, may all in turn produce, under certain conditions not yet understood, a definite vitiation of the blood which is in truth the essential element of puerperal fever. The exact nature of that toxæmic factor has not yet been satisfactorily defined, and it is to the laboratories of the physiologist and of the chemist that we must probably look for a solution of the problem. If once the essential factor can be isolated and analysed, or if its exact action upon the blood can be clearly specified, we may venture to hope that the appropriate antagonistic agent may also be found, and that, instead of the thousand and one conflicting and ineffectual remedies which have been the *opprobrium medicinæ*, some one substance may be discovered which, by its chemical and physiological action, can counteract and nullify the toxic principle, and thus arrest the terrible mortality which has so long resulted from Puerperal Fever.

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