University of Edinburgh.

Thesis for the Degree of M.D.

Title: Puerperal Fever - Its Etiology and Prophylaxis.

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Golspie. F.B.
May 21st 1892.
Puerperal Fever.

Its Etiology and Prophylaxis

"...He is a rarely happy Practitioner to whom the subject of Puerperal Fever is not a matter of urgent and personal importance from time to time. There are medical men whose midwifery practice seems an unbroken piece of physiology, who can say that they go on from year to year without witnessing death or even serious illness from the process of parturition. But the rule is otherwise."

Thus writes "the Lancet" in March, 1871. Happily, since then Puerperal Fever has diminished in frequency in this country and abroad, but still its victims are not few. To the ordinary practitioner one fatal case of Puerperal Fever occasions more mental worry and distress than several unfavorable cases of other descriptions, and more especially is this so if he be a young practitioner. So much has been already written on the fevers of childbirth that it is hopeless to attempt to give the various views held by different writers with regard to its nature. Puerperal Fever is a disease, or series of disease, of such paramount importance to every practitioner of medicine, that it is the duty of every man..."
to weigh carefully for himself what has been said regarding its etiology in order that he may be able to lay down for himself definite rules for the prevention as far as possible of the disease.

**Historical.**

Since earliest times cases have happened and have been reported by medical writers in which puerperal women were attacked and carried off by an acute septic disease. (Hippocrates, Galen, Celsius, others).

It was not however until lymphein hospitals had been established that we hear of true epidemics of this disease. The first institution of this sort says Schröder (Geburtsblüte s. 742) was in Paris in the Hôtel Dieu. In 1664 Pen reports a high death-rate among the newly-delivered women. de la Motte also mentions an epidemic which occurred in the year 1678 in the Hôtel Dieu, and speaks of an epidemic which occurred in the beginning of the 18th century in Normandy. Puerperal fever also occurred in an epidemic form in other towns in which maternity wards had been erected, in 1750 in Lyons, 1760-61 in London in the British Lymphée Hospital, 1765-66 in Copenhagen, Gebährans, in 1767 in Dublin, ten years after the erection of the Lymphée Hospital.

In Germany the epidemic form was first
observed in St. Mark's Hospital, Vienna in 1770. In 1772 it occurred in Edinburgh, in 1778 in Berlin, in 1781 in Basel, and in other places. The most fatal form of it seems to have occurred in the Hotel Dieu in Paris where it appeared year after year. In this hospital in the year 1829 out of 2788 deliveries there were 252 deaths.

<table>
<thead>
<tr>
<th>Year</th>
<th>Deliveries</th>
<th>Deaths</th>
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<tr>
<td>1829</td>
<td>2788</td>
<td>252</td>
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<tr>
<td>1831</td>
<td>2907</td>
<td>254</td>
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<tr>
<td>1881</td>
<td>(in one day)</td>
<td>All died</td>
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(see Schröder, Geburtsh. 2:742)

In Vienna (St. Mark's Hospital)

<table>
<thead>
<tr>
<th>Year</th>
<th>Deliveries</th>
<th>Deaths %</th>
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<tbody>
<tr>
<td>1823</td>
<td>Feb. March. Apr. 698</td>
<td>133 (19%)</td>
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<tr>
<td>1842</td>
<td>3287</td>
<td>518 (16%)</td>
</tr>
<tr>
<td>1846</td>
<td>4010</td>
<td>459 (11%)</td>
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<tr>
<td>1854</td>
<td>4393</td>
<td>400 (9%)</td>
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In Dublin, dying in Hospital from 1856 to 1871 the death rate in one year was 1 in 64 and once rose to 1 in 14.

In the old Maternity Hospital, Edinburgh from the time of its foundation up to the founding of the new Simpson memorial hospital, out of 10,043 women delivered in it 184 died, or almost 1 in 50.

In May 1879 the new Maternity in Edinburgh was opened and from that date till the end...
of October 1880, 320 women were delivered
in the building; and of these 320 women
12 died making the mortality 1 in 26.6
or 3.89%. (Crown, Ed. Med. J. Feb' 1881)
These are only given as a few examples
which might be readily multiplied of the
ravages committed by this disease in the
lyeing-in institutions; "and," says the Lancet,
reviewing a paper on Puerperal Fever read
by T. Every Kennedy at Dublin in 1869,
a study of these tables serves to illustrate
what has been long known, viz., that you
cannot aggregate a number of lyeing-in women
under one roof without engendering a terrible
proclivity to outbreak of child-bed fever. The great
fluctuations in mortality have evidently depended
on the presence or absence of this disease; and
as the institution has increased in age so has
the mortality augmented (Lancet II. 1869, p. 620).
Looking at this statement in the light of our
present knowledge and comparing the death-rate
of lyeing-in Hospitals twelve years ago with
the death-rate of the present day, we cannot
but feel thankful that preventive measures have
proved so successful.
In Berlin a commission appointed by Government
several years ago revealed that out of the
38,827,000 births which occurred between
1816 - 1875 about 19 of the women died of Periperal Fever: so that granting that each woman bore say four children, it follows that one woman in every 25 died at one birth or another. Florence Nightingale in her notes on dyspeptic institutions taking the Castle statistics from various countries and cliimates over nearly all Europe found that out of 888,312 deliveries there were 30,394 deaths, that is a death-rate of about 3.4 per 1000. Le Fort calculated that the death-rate of women delivered in their own homes was only 0.7 per 1000. But the late Matthews Duncan showed that in this country at least the death in home practice were about 1 in 125 or 0.8 per 1000.

It was thus shown that the mere attendance of parturient and puerperal women was a source of danger. Parturition though a natural physiological process renders the parturient and puerperal woman peculiarly ready to develop febrile disturbances in intense form, and once fever gained a footing in any maternity it spread with enormous rapidity from one woman to another owing to their proximity. One does not wonder that Florence Nightingale said "unless it can be clearly shown that these enormous death-rates can be abated or that they are altogether inevitable, does
not the whole evidence with regard to special
lycogic hospitals but lead to one conclusion: 
that they should be closed."
Towards the end of last century Denman 
pointed out that sometimes Puerperal Fever 
can be communicated by medical men and 
midwives from a puerperal fever patient to 
a healthy parturient or puerperal woman. 
Jordon, De la Roche & others pointed out 
that not only was that the case but that 
a medical man who was in contact with 
a case of Phleumomous Erysipelas could by 
attending a parturient woman give her true 
puerperal fever. These views gradually gained 
ground; and in his treatise of "Wund- und 
Krebbsfesth" in 1837 Eismann pointed 
out that puerperal febrile disorders arose from 
infection from without. But in spite of strong 
evidence in favour of these views they met 
with much opposition. Oliver Wendell Holmes, 
poet & physician, in 1843 wrote an essay 
on "the obstructions of Puerperal Fever" which 
contributed largely towards the more general 
acceptance of Denman's and Eismann's views.

The Origin of Puerperal Febrile Disorders.

But it was not until 1847 that 
the true origin of the disease was accurately 
grasped by Semmelweis who was then assistant 
in
in the Lying-in Institute (Gebärtklinik) in Vienna. He saw forward and declared that the so-called Puerperal Fevers were caused by infection with cadaveric poison. In 1848-49 many discussions on the question took place in Vienna. The opinions of Semmelweis were strongly opposed by many Obstetricians, and upheld by many others equally firmly. In 1861 Semmelweis's chief work appeared, entitled "Die Ätiologie, der Begriff und die Prophylaxis des Kindbettfiebers." In this work he elaborated his 1847 statement as to the cause of Puerperal Fever and stated that it must be regarded as an Abortion Fever caused by the introduction of decomposed animal matter whether conveyed to the patient (hetero-genetic) or developed within herself (auto-genetic) the latter condition occurring only in rare cases. Therefore, he said, Puerperal Fever is preventable and infection from without can be prevented by seeing that the accoucheur's hands and instruments are free from all decayed organic matter before the lying-in woman is touched. Semmelweis carried this into practice in 1847, for he then recommended to use chlorine water as a disinfectant for the hands, and by this means he did actually lower the Death-rate, (Runge Geburtshilfe p. 443) in the second division of the Lying-in Hospital in Vienna over which he had control, the death-rate dropped from 12.24% to 1.37% - (see Shaw in
in "Antiseptics in Obstetric Nursing." 1890. p. 24)

It is one of the most incomprehensible facts in the history of medicine that so many years passed and so many fierce battles were fought before Semmelweis's views gained the footing which they hold today. For it was not until Lister, in 1870, introduced his antiseptic treatment of wounds that it was generally recognised that puerperal fever was wound infection fever and that antiseptics would be a true method of prophylactic treatment in those as in ordinary wounds. Since then not only have the severe cases of puerperal fever been reduced to a minimum, but there has been an immense reduction in the number of cases which presented slight puerperal febrile symptoms.

But unhappily this doctrine of the origin, propagation, and prevention of Puerperal Fever is still combated by many obstetricians, especially in non-germanic countries, and there is little doubt that on this account in private practice more especially many lives are still sacrificed which might be saved. (Hippelberg: Midwifery. Vol II. 421. Few. Syd. Soc. 's hand. )

The records which have been collected of precipitate labours and labours in which no examination of the woman took place give additional proof of the correctness of this view that Puerperal Fever is due to infection from without (see - Winckel
über die Bedeutung präcoitateten Geburten für die 
pathologie der postpartalen Blutungen. München. 1884.

It might therefore be admitted that, after a
normal labour which has progressed entirely without
interference on the part of the accouché or the
midwife, a disease which any necessary interference
have been accomplished without any infection taking
place, a fatal puerperal fever never occurs.

Besides the fatal cases of puerperal fever
we have severe cases which do not end fatally
and these too must be attributed to infection.
just as the fatal forms are. In support of
this we have the clinical fact that since anti-
septics were introduced the mortality as well
as the morbidity has diminished very much.

Beside this, Böderlein (Archiv. f. Gynek. B. 31. S. 412)
and Czerniewski (Archiv. f. Gynek. Bd. XXXIII S. 73)
have shown that the same microorganisms
are present in the lochia of severe but non-fatal
forms of puerperal fever as they found post-
mortem in cases which had succumbed.

This then leads to the practical conclusion:

That if a normal labour takes place
without any infection, no fatal puerperal
febrile disease occurs nor does any severe
form of puerperal febrile disease follow.

In addition to these fatal and
non-fatal but severe forms of puerperal febrile
disturbance, we have these cases which are
characterized by fever of a mild description and of short duration, and from which the patient speedily recovers.

The explanation offered by Duns With regard to these mild cases of puerperal pyrexia is that they are due to the healing of injuries received by the genital canal during the process of parturition. Every wounded tissue is necrotic at the point of injury. Around this, an inflammatory action begins, this inflammation by means of migrating cells, 

by the production of new vessels assists in getting rid of the necrotic tissue and the cicatrix is thus formed. We may thus have aseptic traumatic fever. (Denzinger Volkmar, See Hufeland, Ueber die Geburt, Sib. Soc. Trav. Vol II, pp. 422-423)

It is likewise urged that retention of parts of decidua may give rise to an elevation of temperature. But these explanations are not so easily accepted as one might, at first sight, be inclined to think. For, although we cannot exactly deny that there may be cases of aseptic traumatic fever, how are we to explain the fact that although in parturition wounds of the genital tract are extremely common, and retention of scars of the membranes by no means infrequent, nevertheless, by means of strict asepsis we can have many consecutive cases in which no perceptible rise of temperature at all takes place.

We can explain this fact I believe, only by,
assuming that the slight as well as the more severe forms of premenstrual febrile disturbance are due to absorption of infective matter from without.

It is likewise asserted that fecal accumulations may be a cause of slight febrile symptoms during the premenstrum. This is explained by saying that the efforts of the large bowel to get rid of the mass of feces produces an irritation and slight inflammation of the surrounding parts and that febrile symptoms occur; or else that absorption of putrefying material lying in the rectum causes febrile disturbance. The latter view seems to me to be the more likely solution of the difficulty. It is quite possible that although in health an accumulation of feces in the rectum causes no rise of temperature—if it did we should find a large percentage of women with febrile temperature it may have quite a different effect on a premenstrual woman. The premenstrum is peculiarly ready to absorb material by the genital tract and as a mass of feces lying in the rectum and pressing on the Douglas's pouch is in as close contact as possible with the genital tract it seems to me that absorption of putrid material may very readily take place. Küster (Zeitschrift für Klin. Med. B.37, 476) suggests that absorption may take place the
more readily from the movements of the rectum, tending to press the fluid material into the lymphatic vessels. Whatever be the true explanation, it is an undoubted fact that in many cases, the emptying of the rectum is followed by a distinct cessation of febrile symptoms.

I have not mentioned in connection with this subject of absorption of infective matter from the rectum what Thiessellberg and Sämper (cf. Thiessellberg, Vol. II, p. 434; Sämper, Archiv: O. Heilken: 92, 119) have shown that it is not correct to regard every case of phlegmon in the pelvis and abdominal cavity of a lymphatic woman as caused by infection. For they say, it is not altogether rare for peritonitis and especially retroperitoneal inflammation to be caused by intestinal ulcers both in the cecum and descending colon the symptoms of which were obscure or but little attended to during pregnancy or perhaps falsely interpreted but which show their well-known effects during the post-puerperal state especially under the influence of fecal accumulation, infusions dripping, or of a mistaken use of purgatives.

In former years, milk fever was supposed to play a most important part as a cause of febrile puerperal symptoms. But the observations were especially of Bücker (Archiv: M. Sensat: 13, 33, 3, 387) go to show that this is not so, and that the puerperal enlargement of the breast under
normal circumstances cause no rise of temperature. It is of course a different matter in a case in which there is a temperature rise of 2.5 degrees Fahrenheit in the sense of mastitis occurs, for upon points out (Lehrk. f. Geburtsh. S. 488) mastitis is caused by bacterial infection.

We therefore conclude that all febrile disturbances of the puerreray, with the exception of those quoted by Spiegelberg and Singer (see p. 12) whether simple or severe in their character are due to absorption of infective material from without.

Why then, it might be said, if all forms of puerreray fever are due to infection and infection is said to be preventable by the use of strict aseptic and antisepctic precautions, can we not banish puerreray fever from our practice, from our hospitals, from our institution? Why have we still in our hospital and in our institutions an average of 25 per cent of puerreray rise of temperature? In this I should answer: So long as our lyometric institutions admit students and nurses, who make examinations of the parturient women, so long will we have in spite of the strictest rules for antisepctic precautions, a certain number of cases of abnormal puerreray temperature.
influence which the persons who are allowed to examine have on the temperature - chart of the patients is always an unknown and undefinable quantity" (Chagau. Streitpunkte mit d. Pünkt. fieberpage. p. 7.)

In private practice, on the other hand, results ought to be more favourable, especially in middle-class + higher-class practice. When this is not so I believe it to be due, in the great majority of cases, to want of due aseptic precautions.

Of late years Bacteriologists having proved the intimacy which exists between the several forms of pyreural fever and micro-organisms, have also attempted to prove that the febrile forms are also due to the influence of microorganisms. But although much laborious work has been done in this department the results have been inconclusive. In most cases the doctors of women suffering from the more simple forms of pyreural febrile disturbance were examined but the results do not by any means accord. Witherounge found the lochia sterile. Dobstein on the other hand examined twenty women in the easelities above referred to and found microorganisms in fifteen; and Cerniewski examined 78 cases and in 24 of these failed to discover Bacteria.
the latter asserts that the slight rise of temperature in these cases are to be ascribed to streptococci, for in his 78 cases he found streptococci either alone or united with other microorganisms. In 48 cases, Döderlein on the other hand says that although in severe cases the streptococci are almost always present, he only found them in two of the slightest cases of puerperal dysmaturity of the uterus. So that so far as investigations have been in this direction it is impossible to draw any definite or practical conclusions from them. The observations agree only in this main point that microorganisms abound in the vagina below the uterus, but are rare or absent in its upper part and the uterus.

Falling back on clinical evidence to help us to discover the nature of the slighter forms of puerperal fever of distemper we find that the results in many European hospitals where the strictest antiseptic precautions are taken, are almost ideal. For instance at the Innsbruck Clinicere we have it reported that only 6.1% of the cases had any rise of temperature. (Chazan 56) Mermann reports 200 cases with only 18 rises of temperature [Bundesblatt für Gynäk. 1890. 7. 18]
Leopold of Dresden reports that in the prevalence of 487 women which he observed and which were undisturbed by examination a rise of temperature was observed in only 1.6% (Archiv für Gynäk. Bd. XXX. S. 157), and in the Archiv für Gynäk. Bd. XXXVIII S. 330. Leopold + Paulzner report a series of 1123 deliveries in which the women were left absolutely undisturbed as regards vaginal doucheing or examination of which 90.29% were absolutely free from fever. In his late Prof. Breitney's wards in the Lyngby Hospital in Sierra in 1886 where many students were admitted and where opportunities for examination of the patients were freely given so long as the rules for subjective antisepsis were strictly adhered to, he had for the six months ending the winter session a morbidity of only 11%. Zweifel's results in Leipzig were almost equally good during the four months in 1887 that I had an opportunity of noting them.

All these observations so far to prove that if infection is guarded against the incubation will be normal, speaking generally.

Why then should the series of which the German call "Thet-Birthe" or precipitate labours which have occurred in circumstances under which any examination or interference with the genital
genital tract was impossible, have such a high rate of morbidity?

Winkel estimates it at 41·6%.

Roch " " 40·5%.

Czerniewski " " 33·91%.

Szabo " " 25·0%.

This may be explained by the fact that the vaginal examination is not the only means by which the woman may be infected. Szabo says, "The unfavourable surroundings of a woman who is delivered on the street, viz. the street-dust coming in contact with the wounds of the genitalia, the contact of dirty hands and dirty linen, must be blamed for the frequency with which these women fall ill during the purpera."

So that although no vaginal examination whatever has been needed in these cases, they are by no means protected from infection. It has been observed that the women who were brought in from the street with injured perineum were twice as liable to fall ill during the purpera as those in whom no perineal damage occurred.

I conclude therefore from the evidence adduced above that one is justified in saying that almost all fatal, severe, & simple cases of Puerperal fever are due to infection which has come from without.
The Nature of Puerperal Infection

Although we can say that Puerperal Fever is caused by infection—that it is a wound-infection fever—we cannot by any means satisfactorily explain what the real nature of the infection is. We know that by treating our postpartum cases as surgeons would treat an abdominal section with rigid antiseptic aseptic measures we can in the great majority of cases, ceteris paribus, count as a happy issue. "The disease which we are fighting although called by different names according to the circumstances under which they occur—essentially blood-poisoning due to the activity of living bodies. If the disease occur after childbirth it is called puerperal fever; if after operation it is known as surgical fever; pyaemia or septicaemia." (Shaw: "Obstetric Antiseptics," 1891, p. 8.)

Bryan says "Surgical, suppurrative or haemorrhagic fever: septicaemia, pyaemia, icteraeemia. Puerperal fever may all be considered as so many different names for and manifestations of one condition, blood-poisoning." That Puerperal Fever is not a specific disease is proved by the fact that septic infection may be and has been carried by the attendants on a case of phlegmonous erysipelas.
of any suppurating wound to a lycopernic woman and cause a fatal puerperal fever. Not only so, but observations have been made which showed that nurses who have had slight excoriations of the skin of their hands or who have been in attendance on women suffering from puerperal fever have been attacked by phthisicaneous syphilis of the past. In this connection the relation which Scarlet Fever bears to puerperal infection is most interesting and important.

There are many who still believe that a scarlet fever patient may give to a puerperal woman a disease which appears to be scarlet fever but which is almost identical with puerperal fever. "Nothing perhaps," says Leishman, (Textbook of Midwifery, p. 767) is more clearly recognized in regard to the etiology of the disease than the great danger which a woman incurs who during the puerperal period is exposed to the contagion of scarlet fever. ... She is no sooner delivered than the becomes remarkably susceptible, and when attacked whether the disease be typhus, scarlet fever or even measles, the symptoms often assume the fearful characteristics of puerperal fever. On the other hand Hufeland says "the occurrence of scarlet fever in childbed, at any rate..."
in Germany appears to be very rare. In Breslau, for instance, where a moderately severe epidemic of scarlet fever is still raging, there has for some time no case of scarlet fever has been observed either in the in-patient department of the maternity, and he adds whether the process of the erysipelas state is modified by scarlet fever, or not, is still doubtful. (Spießl, E. Die Inf., vol. III. p. 448.)

Schröder says (p. 800) "scarlet fever in the erysipelas state needs special mention. The disease as a rule begins in the first days of the febrility, the rash appears suddenly but the sore throat is not well marked. I agree with the opinion of A. Martin that endometritis occurs as a complication of scarlet fever. I have myself seen a rapidly fatal case of diphteritic endometritis which arose from a simple attack of scarlatina. He then adds "In my opinion the matter stands thus: Scarlet fever has in itself nothing to do with puerperal fever, but it may attack puerperal women. It may then easily give rise to diphteritic endometritis."

The important points with regard to this question seem to be these:

1. Whether puerile symptoms occurring in a puerperal woman along with a scarlatinal dermatitis...
dysentery but little or no sore throat are to be regarded as true scarlatina or only a peculiar dermatitis scarlatiniform in character which accompanies a certain form of
"3. Whether we can have symptoms of puerperal fever caused by the introduction of the scarlatiniform poison but unaccompanied by any affection of the skin.

We can give fairly satisfactory answers to both these questions. In 1888 Dr. Bozall published in the Obstetrical Transactions reports of an epidemic which occurred in the General Lying-in Hospital of London and which attacked sixteen women. Dr. Bozall found that, as I have quoted from Schröder puerperal women are frequently attacked with scarlatina during the first week of the eruption. He also observed that when scarlet fever occurs during pregnancy the throat symptoms are unmodified; when however it occurs after delivery the throat symptoms are almost always slight sometimes altogether absent at first, but the cervical glands are always always attacked whether sore throat occurs or not. During the lymphangitic period the only effects noticed were diminution or arrest of the milk + slight tenderness over the uterus. Forty other lymphangitic cases were
were exposed to infection although they were not attacked by the disease, and 300 patients were delivered in the hospital during the prevalence of the epidemic. In no one of these cases (540) was any bad effect noticed during the puerperium.

Leopold Mayer (Zeitschr. f. Geb. u. Gyn. 33. x. x.) reports 21 cases of scarlet fever among Lymphai women at Copenhagen. His observations agree with those of Bozali.

During the winter of 1889 and spring of 1890 an epidemic of scarlet fever was prevalent in the district of Glenmore, Argyllshire.

In two cases the patients were Lymphai women. In one case there was no sore throat, in the other it was slight. In both cases the cervical glands were enlarged and the rash well marked. In another case the puerperium unfavourably affected and both women made an excellent recovery. In another case which I observed here, two children suffering from scarlatina were in the same bed as the mother who was about to be confined. The mother had never had scarlatina. She was confined at full time and made an uninterrupted recovery. These observations show definitely that in the great majority of cases if scarlatina attacks the Lymphai woman
now, it gives rise to septicemia and to
nothing else. Septicemia cannot in itself
give rise to premenstrual symptoms.
All this brings us but little further
forward in our attempt to discover the
nature of premenstrual infection. The sources
of the infection are we know, extremely
varied. They are not only the secretions
from women suffering from premenstrual fever,
which are by far the most deadly, but also
the locitia from healthy symptomless women.
Besides the locitia we have cadaverous poison,
discharge from wounds, cancerous glands, etc.
and the poisons of erysipelas and diphtheria.
Now whether one of these sources the
infection spawns the main symptoms especially
in the more severe cases are very similar,
but at the same time we must remember
that we have various sources of infection
so we have a great variety of symptoms
resulting caused by that infection. It
by no means holds good however, that
infection from the same source will give
rise to similar symptoms & similar results
in any two or more cases.
Every freshly wounded surface is a surface which
is ready to absorb infective matter. From every
woman who is in labour or who has passed
Through labour suffer from certain physiological traumatisms. The whole internal surface of the uterus is laid bare, its lymph channels are open and ready to absorb septic material with the utmost rapidity. In fact whenever the uterus begins to retract and the os uteri begins to widen, the danger of infection begins too. Besides all this, in the case of every primipara and also in many multiparae the cervix becomes more or less torn, and wounds of the vagina, suburethrem and perineum are among the common events of every delivery. Even the loss of epithelium which so often occurs at the edge of the softened cervix owing to a somewhat rough and especially a repeated examination, has a very important relation to the disease in question. How common such a loss is will be easily ascertained if a pregnant woman, who has recently been somewhat roughly examined with the finger, is examined with the speculum. (Spriegelberg, Vol II, p. 422.)

We know that a wound which is kept aseptic heals by first intention without causing any general disturbance. But when microorganisms find entrance to the wound, the injured tissue is killed by them and the healing process may be disturbed in various ways. Suppuration of the
the edges of the wound may occur which prevents healing by first intention. The absorption of the wound products may cause traumatic fever, or erysipelas, puerperal or diphteria may attack the wound in the person may die of general blood-poisoning. What holds good of wounds of any other part of the body holds good of wounds of the genital tract in puerperal women. They may heal by first intention, but this is rare unless they occur high up in the parametrum canal. They may leave suppuration provoked in them by putrefactive germs or slight traumatic fermenation or we may have general blood-poisoning caused by absorption from the genital tract in the form of putrid intoxication, or septic infection.

It was urged by Hänselberg that a clearer understanding of the true nature of the puerperal diseases would be obtained were the distinction between putrid intoxication and septic infection kept in view.

Putrid intoxication (saproaemia) is caused by the absorption of these peculiar nitrogeneous bases called by Helmer alkaloids or phosphanies, products of the tissue crape of Bacteria. For a long time surgeons have held the view that putrid intoxication arises as the result of the growth of certain saprophytic fungi on the surface of wounds; these form phosphanies
which are absorbed and set up their poisonous action in the body. Similar phenomena occur in all probability on the wounded surface of the perineal uterus as the result of the growth of saprophytic fungi. (Flüpppe p. 573)

These phenomena once absorbed cause profound constitutional disturbance. Irregular pyrexia sets in, and with it derangement of the digestive organs, vomiting, diarrhoea, often dysenteric in its nature, an extremely rapid small and easily compressible pulse. In such cases no urinoid condition can be discovered post mortem save congestion of various internal organs, small extravasations of blood beneath the serous membranes elsewhere, and tendency to rapid decomposition.

The poisonous action of these alkaloids or products of the saprophytic fungi depends on the presence of dead material. But with septic infection it is otherwise for here we have active microorganisms multiplying in living not in dead tissue, and rapidly diffusing through the body, followed by the development of symptoms much the same as those mentioned above but more rapid and more fatal. Post-mortem innumerable Bacteria reveal themselves in the Blood in the tissues.
For doubt there are cases, which are a mixture of putrid intoxication + septic infections, perhaps as Brunn of Wurzburg suggests the former may lead to the latter since it affords a favorable soil for the multiplication and colonization of pathogenic bacteria.

Although this scientific distinction between septic infection and putrid intoxication is a most important one to keep in mind when considering the etiology of puerperal fever, it cannot as yet be considered from a clinical standpoint, for though we can say that the puerperal fevers are caused by bacteria + their products we cannot say what the particular bacteria are which are to blame nor how they act.

We know when putrefying organic matter is introduced into the puerperal wound that the active agents in producing the evil effects are microorganisms. They prevent the wound from healing; they multiply enormously to produce general constitutional disturbances, acting partly in a chemical partly in a mechanical way.

It is now many years since Mayroper demonstrated the presence of a variety of microorganisms in the lochia secretion of women who were suffering from the severe forms of puerperal fever.
In 1869 Lige and Dels demonstrated the presence of microorganisms in the blood of prepucoy fever patients. Waldvogel first proved the existence of microorganisms in cases of para- and peri-metrica. John, described microorganisms which were probably streptococci in similar cases. Confirmation of these early observations has been amply afforded by the later investigations of Bursch, Strehl, Fazier, Fhanke, etc., who have all demonstrated the existence of microorganisms in the bodies of prepucoy fever patients. Although many microorganisms have been found in such cases, the one which is almost invariably present in all the severer forms of prepucoy fever is the streptococcus pyogenes aureus aureus, of Rosenbach. Next in frequency to this one is found the streptococcus aureus albus. More lately Didero and Oszerelecky have shown that not only are the streptococci found in the severer forms of prepucoy fever, but also in most of the cases of slight prepucoy febrile disturbance they are to be found in the locoial secretion.

Might we not be justified then in saying that prepucoy febrile affections are due to an invasion of the body by streptococci? If we do so how can we explain the great variety in the clinical pictures presented by
the so-called infective diseases.
It may be that the various ways in which the infective organisms enter may have to do with the variety in the symptoms. They may enter the lymph streams in one case, the blood vessels in another. Again, the same streptococcus may have widely different effects on persons whose idiosyncrasies differ, and what produces a fatal pyrexial fever in one may only produce a slight febrile disturbance in another.

Allowing all this however it is highly improbable that one streptococcus should in one person be present in the uterus and do no harm, in another case produce a slight disturbance, and in a third case produce a fatal illness. (Chagou. Rep. for. Grape. 3. 15)

It is not impossible that although the streptococci which are supposed to bring about such different results seem to us to be alike they may differ widely from one another in their characteristics. Avarard says ("d'Antisepsie en Gynecol." p. 8.) "From the extreme smallness of microorganisms which stand as it were just within the limit of the visible world, great difficulties present themselves to us in their examination. For we can only recognize them by their contours while
while the details of their configuration and structure escape us. Suppose an enormous giant to exist whose proportions were such that he could only see man with the aid of a microscope. If he had to study the different types of humanity he would perhaps arrive at the conclusion that there were black and white individuals, but he could not distinguish the distinctive characteristics of individuals of the same race or two of which are actually alike. Microorganisms are to us what we have supposed we should be to the giant. But even were we to suppose that the streptococci which seem to us to be morphologically identical were actually so their different effects might be explained by supposing that under certain conditions or environments the same organisms might develop different toxic properties. Bumm some time ago gave it as his opinion that in wound fever and therefore in perineal fever, streptococci depended for their effect on certain surroundings or the help of certain chemical poisons. We recognize that not only local suppurations but also symptoms of general intokcation may be brought about by noxae which are entirely
free of bacteria. (Centralbl. f. Gynäk. 1883 p. 496)
Beside the observation of Rosenberg and Zweifel (Centralbl. f. Gynäk. 1882 s. 486, +
do. do. Bd. xxvii. s. 314) make it probable that
in cases of wound infection the bacteria
are already present in the body and only
develop when the secretion offers them food
soil for multiplication.
On every hand the almost invariable appearance
of the streptococcus is admitted, but the
great clinical variety met with in the
severer forms of puerperal infection present
a marked contrast to the fact that of
the five streptococci which have been
described none of these is distinguishable by
cultivation or microscopically from one another.
But although they are thus scarcely dis-
tinguishable they are remarkably different
in their effect on man and animals.
There are various opinions held by Bacteriologists
as to the identity or non-identity of the
streptococcus pyogenes (Rosenbach) + the
streptococcus erysipelatus (Fellreisen) + the
question as to whether erysipelas can produce
puerperal sepsis since vera is quite
undetermined. Even such authorities as
Fusserm. & Winkel disagree on this latter
point, for Fusserm. denies that such a thing
is
is possible while Winkel asserts that it is possible and supports his plea by experiments made on animals. "The resemblance on the one hand between the various streptococci and the difference in the pathogenic effect on the other hand have been accurately ascertained by Frenen and a series of experiments in which particular care was taken to prevent any possible deceptive or confusion. More especially any possible immunity of the animals as to the cause of the efficiency of the pyogenic and erysipelas streptococci was eliminated because the same animals which had been inoculated with the streptococcus pyogenes without effect, died immediately on being inoculated with the streptococcus pyogenes malignus. From this result we may assume that streptococci of very different virulence occur in the various infective diseases of wounds in man so that the symptoms of result of the disease caused by streptococci are due not only to the mode of invasion in the functions of the organs attacked but also to the specific character of the organism." (Fliitze, Microorganisms, p. 196) Although Bacteriologists are as yet far from being at one as regards the true nature
of puerperal wound infection much valuable information has accumulated from their labors within the past few years. Döderlein and V. Ott examined the locchia of healthy puerperal women and found that while the locchia in the uterus are free from forms the vagina contains innumerable forms of many varieties. These researches were made independently of one another and are therefore all the more valuable. (Archiv. für Syphilis. Bd. xxxi. S. 412. Bd. xxi. S. 436). Winter who made similar experiments agrees with the above (Zeitschrift f. gyn. Bd. xxi. S. 243). Thomas also investigated on the same line and practically agrees with the others. He observed that while microbes are absent in almost entirely so in the uterus as we descend lower down in the vagina they form mere commumemons. (Archiv. f. gyn. Bd. xxxiv) the fact remains that we are not in a position to say that the puerperal febrile disorders are caused by a staphylococcus vivacious. All we can say at present is that in cases of puerperal infection the streptococcus probably plays some part but whether important or not it is quite impossible at present to say. We know as little today of the true nature of
the process which enters this premenstrual
worm as we did many years ago.
But we can at least speak with
some degree of certainty with regard to a
very important practical point; this is
that worms are present in healthy parturient
and lymphaemic women which if transferred
to another healthy parturient or lymphaemic
woman are capable of producing premenstrual
fever in her. This has been abundantly
proved in our lymphaemic institutions and in
the practice of midwives as well as medical
men. In all case, the lochia are the
source of danger. Winter, Führer, Bussan
(‘Zeitschr. f. geburtsh. u. gyn. B. 13, xiv. s. 413. Centrall. u. gynäkol. 1887. s. 444.) have shown that
in healthy pregnant women the organisms
which are present in the vagina have
no pathogenic properties, but evidence goes
to show that once a woman has been
delivered the lochial secretions possesses
peculiarly harmful properties if transmitted
to another parturient or premenstrual woman.
The truth of this is shown by the fact
that among midwives those who are most
infected ("polypragmatic" Führer calls them)
and in consequence of this come next in
contact with lochial discharges have the
worst results.
I knew a midwife who had taken a three months course in one of our big city hospitals and was therefore certificated, whose cases always caused me anxiety and whose results were infinitely worse than those of an old practised country woman whose sole subsistence with cases was limited to three practical points: 1) Supporting the patient's back during pains, cutting the cord and removing the placenta from between the patient's thighs.

The excellent results which have followed the rule that in hospital any nurse who attends a parturient woman must be neither in attendance on a sick prepuce nor on a sick prepuce nor a sick prepuce woman, so far to support the opinion expressed that the discharge of any prepuce woman even though she be absolutely healthy if transmitted to a parturient woman may give rise to symptoms of prepuce fever.

Another practical point which has been raised is whether under certain circumstances prepuce noxa increase in virulence by repeated transmission. Sanders has shown (Chagau, P.F. p. 241) that the secretion from a case of prepuce which has been caused by chemical substance...
can by repeated transmissions become so violent that a septic peritonitis follows. So it has been shown that in epidemics of puerperal fever the longer the epidemic lasted the more numerous did the severe and fatal cases become, and the less the number of cases which recovered.

The Mode of Infection.

The mode in which puerperal infection occurs may be divided into the following heads:

1. Hands and Instruments.
2. The Atmophere.

1. Hands and Instruments.

This is by far the most prevalent mode of infection. It has long been known that the more prolonged a labour case was, the more that interference by examination and instruments were rendered necessary the less likely was the patient to have a good puerperium. It was not however until antiseptics came into use that the full importance of the hands as carriers of infection was fully recognised. Once that was established it became clear that instruments, cloths, sponge, etc. which came in contact with the patient's external genitals...
or penile canth might also be meant of conveying the harmful material.
It has been shown that instruments may be rendered absolutely sterile by boiling, and this is a simple and eminently practical method.
With regard however to sterilisation of the hands the matter presents more difficulties. 
It is believed by some that if proper precautions are taken the transmission of infection material by the hand can be absolutely prevented.
On the other hand Schröder says that an absolute disinfection is an extremely difficult matter. Zweifel of Leipzig says that not even after the most thorough disinfection can one be certain that all septic organisms are destroyed. Credé remarks that an omission is overlooked in the process of disinfection is always possible and therefore one is not justified in saying that all operations on the patient of a surgeon or a surgeon sono can be undertaken with impunity. The fact remains however that to the ordinary physician in practice a careful disinfection of the hands and arms yields excellent results. So such an accocenlear case of purerenal fever are extremely rare and if they do occur the cause may very likely be found to have existed apart altogether from his hands.
But it has been shown that the nature of the antiseptic and the strength of the solution used to disinfect the hands are not the most important points to be attended to, but that the preliminary washing and scrubbing of the hands in warm water and brushing with a nail brush are absolutely necessary to a good result.

The most important memoir which has been published on this subject is that of Fürbringer (Untersuchungen in Vorschriften über die Disinfekts der Häute der Arzte, Wiesbaden, 1867.)

In these experiments the author took several friends who disinfected their hands after their ordinary occupation. They afterward dipped them into a medium of cultivation — the results were as follows: —

**Sr. A.**

Fails medium length. Hands washed in a 3% Carbolic solution, nails brushed. These preparations lasted about five minutes.

Occupation previous to experiment — examination of patient.

The anterior surfaces of the nails were scraped — on stiining the debris into a medium of cultivation 3500 colonies were obtained.

**Sr. B.**

Fails very long. Cleaned with a penknife —
The hands were soaked & immersed with a solution of copper sublimate (1:1000) duration of preparations 5 minutes.

Occupation previous to experiment - work in a chemical laboratory.

Result - 2000 colonies.

Date 1.

Nails very short - same procedure followed.

Result - 2 colonies.

Date 2.

Nails long - cleaned with penknife, then well-soaped. Afterwards plunged into a 1:2000 solution of sublimate - not dried.

Occupation previous - examination of urine.

Result - 23 colonies - the majority of the microorganisms being of the nature of those which produce turbidity in the urine.

Führbräger himself (1st experiment.)

Nails moderately long - cleaned by means of the other hand while he washed with soap and water, then soaked in 3% carbolic lotion afterwards dried.

Occupation previous - examination of patients.

Result - 500 colonies - some of which were the streptococcus pyogenes aureus Führbräger himself (2nd experiment.)

Same procedure except that instead of cleaning the nails by means of the other hand the usual
Then well, and afterwards employed a 2% instead of a 3% carbolic solution.

Result - 20 colonies.

Fürbriger (3rd experiment.)

The same - except that the carbolic was replaced by corrosive sublimate solution - 1:1000.

Result - 9 genus.

Dr. E.

Nails moderately long. Cleaned by means of a penknife. Hands then washed in soap warm water for five minutes - then steeped in corrosive sublimate solution (1:2000) for five minutes - then dipped in a 1:1000 sublimate solution.

Previous occupation - attending a labour case.

Result. The cultivation mediums remained sterile.

The conclusion to which these experiments lead us are plain:

a.) The number of genus cultivated depended on the length of the nails i.e. the longer the nails the more numerous were the colonies cultivated.

b.) A solution of corrosive sublimate seems to be more efficacious than a solution of Carbolic Acid. But neither corrosive nor carbolic have the wished for effect unless the hands have been previously washed & steeped in soap warm water.
To prove this the following experiments were made.

The left hand of the experimenter was simply washed in lukewarm water, then two fingers were steeped in carbolic solution 3%, and the three others in sublimate solution (1:500). The result was that hundreds of colonies were produced.

The right hand was steeped for a quarter of an hour in hot water. Then two fingers were washed in carbolic solution (2%) and the other three in sublimate solution (1:1000).

Result - cultures remained sterile.

The steeping of the hands in hot water and washing with soap is therefore extremely important, and their importance seems to lie in this fact that they allow the antiseptic of whatever nature it may be, to come into immediate contact with the skin and the germs lying there. For the microorganisms do not lie isolated under the nails or in the wrinkles of the hands, but are contained in the accumulation of greasy matter which so readily takes place on the hands under the free edge of the nails. If these parts the hands are merely dipped in an antiseptic solution even though it be one of considerable strength the effect is a superficial one altogether.
and although a person may tell you he has washed his hands in an antiseptic solution, he may nevertheless possess a hand which is far from antiseptic. The essential point in the efficient use of an antiseptic is that it may have immediate access to the parts containing the microorganisms. In actual practice the presence of the smallest amount of greasy peroxidated matter under the nail may be of dire importance.

For although in performing laboratory experiments such a finger or hand might possibly be dipped into a material for culture it is not improbable that a very small part of the noxious material might be left on the surface; whereas if the same finger were used to stretch a rapid os or to remove a placenta the very manipulation employed at the heat of the vagina or uterus might so loosen and free this greasy matter that the infection of the patient would be an easy matter.

It is well to remember what was said by Landsberg ("Zur Disinfektion der menschlichen Haut", 1889, p. 437) that while sterilisation of the hands is certainly possible, absolute certainty with regard to it is an individual matter. In other words, it has been experimentally proved that although two individuals, even the same
precautions with regard to cleanliness, the
stench of the one may be almost aseptic while
the stench of the other may contain numerou
microorganisms, i.e. - the skin of certain in-
dividuals affords a better resting place for
aseptic material than does the skin of
others. It is probable that this may explain
why two men equally careful as regards
disinfection of themselves may have such
different results in practice. (Chagall. Oeuvres
plebe, page. s. 22.)

From what has been said above it is clear
that although by means of antiseptic precautions
the accoucheur can render his hands sterile
or almost so, he cannot say with absolute
certainty that his hand is aseptic. All
he can say is that having taken the
almost precautions in his power, the
chances of his conveying septic matter
to his patient are immensely lessened.
More than this he cannot count on. If
therefore believes him to make it a rule
in his practice that in particular women
a vaginal examination is only to be undertaken
when there are indications that it is
necessary, and even then as seldom as is
possible. It has always seemed to me that
accocheming in this country depends far too
much
much on the internal examination starts to little on the external. The better method is of extreme value, presents no difficulty whatever, and after a little practice enables the practitioner to give as definite an opinion as regards the progress of the case as if he has made a vaginal examination. The great majority of cases need no more than one vaginal examination, sometimes even that might be safely dispensed with. If the symptoms indicate anything abnormal of course the internal examinations must be at once proceeded with. Otherwise it is better omitted. During the past year I have attended among others 25 women in labour in whom no internal examination were made, whose puerperia ran a perfectly normal course.

The only drawback to this method seems to me to be the loss of time for the physician. Where one is called to a case by a midwife, it is almost impossible, especially if one is pressed for time, to do anything less than make a vaginal examination. But in all ordinary cases one examination ought to suffice with subsequent examinations be external. Leopold is simply in favor of the external examinations, (Archiv f. Gyndkol. B. xxxviii. 8.330.)
and says that in normal cases it ought to take the place of the internal examination. I agree with him so far as I believe the external examination should take the place of the internal as far as possible; but in a busy private practice it is impossible to do away with the vaginal examination. While in hospitals we have to consider the training of students and nurses, the longer and more tedious a labour is, the stranger as a rule does the inclination of the attendant become to make repeated vaginal examinations in order to satisfy himself and the patient which progress is being made. This ought not to be so. One thorough vaginal examination during and after a pain ought to suffice. The rest should be external unless special need arises.

II. The Atmosphere.

The part which the atmosphere plays as a barrier of septic infection has been long a disputed point. Latterly so much has been made clear with regard to the carrying of infection by means of the hands that the effect of the atmosphere is disregarded by many. — Winkel hel believes that superficial usace seldom
seldom or never are conveyed by its means. Ruge says "Infection is almost exclusively caused by contact. In extremely rare and much disputed cases infection is said to have been conveyed by the atmosphere. (Geburshilfe, 5. 448).

The statistical wards of the Hospital in Vienna are enclosed on two sides by wards of the general hospital, into these wards are admitted all kinds of infectious diseases. In front are immense military barracks with numbers of stinking cesspools; behind is the military hospital. In close contiguity lies the huge post-mortem department and anatomical institute. "Under this huge hospital says Dr. Küchler "runs a large sewer in parts of which its contents must overcome gravity and traverse uphill. And as if this were not sufficient the site of the hospital was once a cemetery. It would seem as if humankind with direct allusion to the severe epidemic, tetanic and atmospheric influences upon this huge hospital in which over 9000 women are confined annually, and in which 500 to 800 puerperal women are crowded winter and summer, often more than twenty in a single room, almost every woman before or during labour being examined by several midwives or students. Under such circumstances..."
circumstances the yearly mortality is less than 1%, often only .5%. These results are obtained for years in the same building where before Semmelweiss' time a mortality of 10% was not very uncommon, whereas it has reached 15% - 20% or even higher now. One will be surprised at my scepticism when I hear that atmospheric or telluric influences in this, that or the other lying-in hospital have caused puerperal fever.

But, it has been asked, if atmospheric conditions are not to be included as a cause of puerperal fever how can we explain the enormous difference which exists between the mortality of one lying-in hospital and another. Even two hospitals in which the antiseptic and aseptic precautions taken are alike, how can we explain the differences in mortality which so frequently occur, unless this atmosphere is the cause? Feldeine says (Archiv. f. Gynakol. Bd. XXXII. S. 427) it is a matter of common observation that often after weeks or months without a single case of puerperal fever disturbance in a lying-in hospital suddenly a string of fatal cases occurs in spite of the fact that the antiseptic precautions were not in the slightest degree relaxed. Therefore he argues, since no other cause can be discovered...
discovered for this increase in mortality, we must hold that it was due to impurity of the air. But reasoning in this way may be fallacious. For it is perfectly possible that though the same precautions were supposed to have been taken, an omission may have been made by one of the physicians or attendants. However conscientious an attendant may be, it is always possible that if he or she is tired or sleepy or "out of sorts" he may make his toilette prior to touching a patient or a woman with less exactness than he ought to. He may not be conscious of it, still it may occur. The case he attends thereafter may progress quite favorably; therefore he himself has any doubt as to the thoroughness of his disinfection; they would be alleged by the fact that the patient did well. Another case occurs; he takes the same precautions—suddenly a rise of temperature takes place. This is explained by the influence of an imperfect atmosphere. He does not consider that no man can be absolutely sure of the acceptability of his hands much less of those of the attendants who work under him. Besides, these cases of febrile disturbance occurring as I have stated above are not favorably affected by improved ventilation.
ventilation and pure air, but are of little avail if the attendants are changed or the antiseptic precautions are not rigidly enforced. It is a matter capable of demonstration that where the transmission of septic matter is systematically prevented, the worst constructed hospitals may be the most healthy, whereas when such precautions are omitted, a hospital however well constructed may be most unwholesome. It does not matter whether this or that quantity of cubic space is allowed per patient, whether this or that mode of ventilation is in vogue; the one essential question is whether sufficient antiseptic measures are used to maintain a continuous prophylaxis to shield those women who are still in good health. (Spreckels, Vol. II. Rev. Syd. Soc. Trans. p. 432.)

It has long been recognized both in lunatic asylums and in private practice that primiparas are often attacked by febrile symptoms than are multiparas, and it has been suggested that the explanation of the fact that Erysipelas is 2½ to 3 times more frequent in primiparas than multiparas (Winckel, Hupenberger Arch. f. Gynäkol. Bd. xiii. S. 413) lies in this fact. The primiparous woman is the external genitals are much more common than in multiparas and therefore the permeated air has
has free access to may cause infections.

It seems to me, however, that the fact that as a rule nurse-principals are so much more handled than multipares - in that the prevention which is so often wanted is almost invariably in contact with the attendent hands - affords a sufficient explanation of the morbidity in these cases.

The variations in the frequency of pneumonic fever which are associated with the season of the year are said to afford another proof that infection depends on atmospheric conditions. But this too may be explained by the fact that during the cold winter months, and it is then that the pneumonic fever rate is highest, attendants are more likely to be careless with regard to the cleaning of their hands than they would be in spring or summer.

As regards hospitals the fact may be attributed to their being much frequented during the cold season of the year, to the more frequent clinical instruction which is given during winter, and to the greater difficulty of strictly attending to hygienic precautions during the late autumn and winter months. (Spiegelberg - Vol. II. p. 432)

This assertion of Spiegelberg's as to the part played by clinical instruction is supported by the observations that during an epidemic of
Fever in which there were fatal cases of severe illness, upon the internal examination of parietal women being completely suspended the cases became less urgent. No more fatal cases occurred. Very shortly thereafter there was a complete cessation of febrile symptoms.

This however, has not always been so for it has been also observed in an institution where internal examinations were for the time suspended that serious fatal cases of fever occurred in spite of this precaution (see Chagard, p. 818 page 8.28.) Are these cases to be attributed therefore to atmospheric infection? Not necessarily, for as has been pointed out internal examination is only one method by which direct infection may take place, and even though that is suspended we have necessary manipulations about the premises external genitals, especially in confinement, when the head of body are passing, by means of which septic infection might possibly be conveyed to the parietal woman.

There is no doubt that local surroundings do sometimes have an influence in the spread of fever. Pilans Dufeuillay in the Hospital of St. Louis relates the following: "32 fever cases were removed from the lying-in wing to the ward for skin disease, and at the same time the patients in the latter were
were transferred to the wing just vacated by the funereal women. *Erysipelas* of great virulence broke out among the skin patients.

Hugenberger (Arch. f. gynek. s. 389. Bd. X) says the bigamia Institution in Moscow, is divided into two parts, one being the chief building built of stone, the other being an addition built of wood. In the years 1876 and 1877 4,644 women were delivered in this stone-building, of whom 178 or 3.9% had serious puerperal febrile attacks, 79 or 1.29 died.

2,892 women were confined in the wooden building. Of these 71 or 2.4% had serious puerperal febrile attacks, 24 or 0.6% died. During this time 15 cases of *Erysipelas* occurred. Of these 14 were in the stone building and the remaining 1 in the wooden building.

Playfair (Vol. II. Micropy) says: I saw a case a few years ago where patient, who had been confined, within a week had all the symptoms of an intense attack of *Septicaemia*, but none of a *diphtheritic* character, while her husband and lay in an adjoining room suffering from a diphtheritic sore throat. Here the waste pipe of the latter was found to communicate directly with the sewer. Despite of her intense illness I had this patient removed to another house. From that moment she began to improve.
These examples seem to show conclusively that atmospheric conditions were to blame for the puerperal fever erysipelas which arose. But accounts are so conflicting that it is difficult to draw any definite conclusion. Winkel relates how a woman delivered in a bed which lay between two others in which two women affected with puerperal fever symptoms recovered without a single rise of temperature. Feiling in the other hand tells how women who were delivered in a room in which a puerperal woman with staling locia lay were all seized with feverish symptoms notwithstanding the fact that each woman had separate utensils and a separate nurse. (Chazan p. 32).

In some cases where septic symptoms appear not immediately after birth but several days later in which the patient has not been interfered with since the birth of the child it would seem that the admission of pus laden air would afford an easy explanation. For were the symptoms due to direct infection they would have appeared sooner unless the septic poison has a much more lengthened incubation period than we at present suppose. We know, as is beautifully shown...
shown in Hurl's section of the vagina (see Hurl and Benham's speech, p. 26) that under ordinary circumstances the vagina is a mere slit, but that the vagina of a woman dying with her legs together and with an unquietened perineum offer so enhanced to the surrounding air. But if under the influence of emotions the woman sighs deeply or cries, there is suction of air into the vagina following on the contraction of the abdominal muscles. Twenty years ago Heber pointed out that this might possibly be a means of infection (Arch. F. Soc., Bd. IV, S. 532). This may possibly be the explanation of three cases of smallpox fever which are attributed to emotion. Dr. C. West says, "I remember the case of a lady who progressed perfectly well after an easy labour for ten days; but after some violent scene of domestic strife with her husband she was seized almost immediately with symptoms of smallpox fever at a time when no such disease was prevalent, and of that disease she died."

It has often been remarked that promiscuous who are delivered of illegitimate children are more frequently attacked with smallpox fever than married promiscuous. May not the
explanation of this fact be that the unmarried and seduced women in these circumstances as a rule are prone to fits of emotion, sighing, crying, sobbing, in this way may become infected by the air in the immediate vicinity of the vulva.

Sprüödörff (Vol. II. p. 429) says: "We cannot altogether dismiss the possibility that air may carry the wound poison, but if so, it is only the air which immediately surrounds the individual concerned, but operates not through the respiratory organs but by the access of air of the poison so contained in it to the injured femoral organs. But even in the cases in which we might suspect such a mode of transmission there are so many other possible means of transmission to persons at a distance that this view that air is the carrier seems rather farfetched."

But it seems to me that a foul atmosphere may induce febrile symptoms without direct wound infection. When a patient has been exposed to any exuviae air, it has been observed that the fevers are characterized by the same form. This is possibly due to the fact that the exuviae material was absorbed by the blood, therefore transition of
by the mucous membrane of the intestines.

I believe that a pure, wholesome atmosphere
is a most important factor in the manner
which we have to secure a healthy pregnancy.
But it does not matter so much what cubic
space is given to a lying-in woman in which
particular methods of ventilating her room
is employed. If it did, our results in a
village such as we have here in the west
of Ayrshire would be anything but good.
For here we have a village about 2 ½
miles in depth with 1400 inhabitants
living mostly in one-roomed houses. Confinements
are frequent; all natural labours are
managed by the midwives as the medical
officer is only called in a case of
difficulty; most of the beds are straw;
the rooms are small, damp, difficult
to ventilate, yet噘peral complications are
almost unknown. The midwives are taught
to wash their hands well with soap
before tending the patient. When
a vaginal examination is necessary
they use a little carbolic oil for
their fingers; the placenta is removed
by expression - never by the head and
traction on the cord. I know however
that these instructions are not always
fully
followed out, yet an ordinary case never goes wrong. This is due undoubtedly to the abundant supply of ozone-bearing air which we receive from the Atlantic; for for nine months out of twelve we have westerly and south-westerly winds.

In considering the question of pure + impure air, its relation to parliament + menstrual women. The important point is not the danger of impure air entering the genital tract, but the fact that impure air is more difficult to keep the hands + instruments aseptic than in a pure atmosphere. So that the whole matter resolves itself into the one-material question — which means are necessary to render the hands of the attendant absolutely surgically clean. For it has been a matter of observation that:

1. Where direct infection is prevented, by the suspension of all internal examinations, an epidemic of menstrual fever may be brought to a standstill.

2. Where where this infection has not been direct (by hands, etc.) but by the air, weilnus fatal or severe cases arise.
III. Self-Infection.

Semmelweis divided his cases into those caused by (1) Infection from without, + (2) Self-infection (autogenous). He made it plain however, that in the great majority of cases infection came from without, + in the cases of so-called self-infection the root of the evil chief lay in decomposing membranes, bruised necrotic tissues. Strictly speaking, this mode of infection is always at external, for the organisms which cause it must necessarily find their way in from without. The doctrine of autogenesis is fascinating one for men who are unwilling to take the precautions which are absolutely necessary to render their hands and instruments aseptic. Before microorganisms had been demonstrated, it was quite conceivable that decomposition of animal matter might take place spontaneously in the vagina. But this is now quite unbelievable so-called self-infection are caused by the entrance of pathogenic fevers from without which find lodgement in the genital tract to infect the Patient, before, during or after her delivery. We may, though as yet it is difficult to make a clear clinical distinction, distinguish cases of direct infection by microorganisms from without from cases in which blood poisoning occurs from the absorption
of phenomena, arising from the putrefaction of tissues or secretion set up by these microorganisms. But in both cases the organisms came from without. (Bünnar Archir. f. Gynäk. Bd. XXXIV. S. 326. - Fehling do. do. do.) In an article written in the Brit. Med. Journal in 1837 (vol. II. p. 1036) Robert Barnes says: "The simplest fundamental form of purpural fever is a compound of three forms of altered blood.

1) The blood of the granula.
2) The "parlament"
3) The "puerpera.

This is purely auto-genetic." He also asserts that haemorrhage, the uterine diathesis, congestion induced by pregnancy etc. may cause purpural fever without the introduction of any external poison. He admits that septic infection may in some cases cause purpural fever, but is very far from believing that all cases are caused by the entrance of poisons from without. How Barnes can come to this conclusion I do not understand, but as Winsel says the theory of self-infection simplifies matters immensely and will therefore always have a sturdy number of supporters (einen stattlichen Kreis von Anhängern).
The question of self-infection has been much discussed, especially in Germany. But the "self-infection" of the Germans is not really the same as Barus's autogenous fever. The question which should occupy our attention is this: Since we know that pre-puerperal wound infection is caused by microorganisms are these organisms introduced during or after labour, or is it possible that the microorganisms which exist in the vagina before labour may also be a cause. Steffens of Würzburg recently made an exhaustive inquiry into the subject and his conclusion are well worthy of consideration. (Bacteriologische Beurachtung der selbstinfection. Zeitschr. für Geb. in Frü. 30, 232. Heft 2.)

His method of procedure was as follows. The vaginal secretion was taken where possible from a pregnant woman who had not been previously examined. It was removed by means of the protein plate of a freckle which had been previously sterilised. The secretion was then transferred to a suitable medium. Scurrying were inoculated with it. Abscesses a general infection were produced. The organisms in these were compared with those found in the secretion. The effects produced by the infection of a pure culture.
of the secretion of these cultivated from the abscesses infected cases were in accordance with one another. Secretions were taken from 29 pregnant women and from these followed positive results in 12 cases (41.37%) so that the investigator says he feels justified in the opinion that the microorganisms which occur in the genital tract of the healthy woman who has not been vaginally examined are pathogenic organisms (Staphylococcus aureus and others + the Streptococcus). If Steffee's conclusions are really correct and from this case with which his experiments were made it is not possible to speak lightly of them one might well wonder how any parurient woman escapes. If really pathogenic organisms exist as Steffee says they do in the genital canals of about half the number of healthy parurient women, I fail to see how many of them especially if they be microorganisms can possibly escape infection unless it be that washing of the parts prior by the waters or their by the douche coming from the uterus free of microbes renders the implantation of the pathogenic organisms present in the vagina an impossibility. Thus the wounds are allowed time to granulate over and become uninfectable. If any, if these pathogenic germs exist in healthy vaginae.
would it not be a simple matter for an aseptic absolutely surgically clean finger to inoculate the woman during an examination. It is not difficult to suppose that some of these organisms would rest on the tip of the finger as it passed up towards the os. If we suppose that the case being examined were one of rigid os requiring some manipulation, an erosion of the cervix sufficient to inoculate would be easily produced even were the operator as gentle as needs be. Whatever truth there may be in Hefeker's observations I cannot admit that they are supported by clinical experience. Indeed the great bulk of clinical experience points the other way. It is of course within the limits of possibility that the organisms which exist in a healthy parietal woman's vagina might be inoculated by an aseptic finger, but if this does happen the results are not serious. A serious issue is rare if it ever does occur (Kirse). Clinical experience leads me to the conclusion that after a normal labour in which no examination has been made and no infection has taken place from without in spite of the fact that scraps of membrane sometimes remain and organisms are present in the vagina a fatal puerperal fever never follows. Undoubtedly in cases
cases occur in which although the patient has been quite undisturbed as regards examination yet a septic peritonitis has followed, but there have been cases in which an old accumulation of pus in a Fallopian tube existed or an old abscess discharged into the vagina by means of a fistulous tract. The septic matter has really been introduced from without though perhaps some considerable time previously so that these cases by no means contradict the conclusion stated above.

One might even go further than this and say that after a normal labour in which no infection has taken place from without even slight febrile symptoms (\( T > 100.4 \) F.) are rare. The series of cases lately published by Leopold, Ulenbain, Rossié, etc. are of special interest in this connection.

Leopold and Steinzech of Dresden in an article in the Archiv f. Gynäk. Bd. xxxviii. S. 330. (F.) give, among other interesting details note of 1123 cases of labour in which no internal disinfection whatever was used, the only precautions being careful disinfection of the external genitals and strict subjective antisepsis. Of these 1123 cases 90.29\% had no rise of temperature. Again a list of 233 cases by the same observer shows us that although
although in no one of these cases was an internal examination made or internal disinfection carried out 91% were without fever. But how can the 9% with rise of temperature be explained? Probably by the contact of cloths aseptic, with the external genitals, by metritis, or as has been shown the rise of temperature may have accompanied the restitution at integuments of bruised tissue which has been injured by a protracted labour.

Having therefore established our contention that in a case of normal labour in which no infection comes from without we see normally to consider the question of objective antisepsis necessary and if so to what extent? and in what cases?

The observations of Leopold, Szabo, Illermans, and others go to show that much better results can be got without the use of objective antisepsis than when the vagina is washed and scraped with a view to sterilising it.

Stetfekt's observations, which were referred to above, led him to the conclusion that in 50% of cases pathogenic organisms are found in the genital tract of healthy woman who have not been examined. These organisms he says must be removed in every case of labour by vigorous scrubbing.
scrubbing of the parts by two aseptic sponges followed by disinfectant douche, repeated every two hours. But this procedure seems to us a most unnecessary, if not even positively harmful one. From the first place this scrubbing by means of two sponges might be a fertile source of infection, for if there were any pathogenic organisms present they would be forced into the tissues and remain there in spite of antiseptic douches; and secondly, the frequent douching would remove the natural mucous of the vaginal passages, thus render them dry and not nearly in such a fit state to favour the exit of the child as if they had been left in their natural condition. If we remember that in a normal case of labour the natural mucous of the vagina acts as a cleanser of the passages, and besides this the rush of liquor amnii acts as a natural douche and carries away which is objectionable without depriving the passages of their natural lubricant; if we remember that the blood flow from the uterus for some time afterwards may also be considered as an antiseptic douche which washes away harmful substances from the newly made wounds, we can realise how important it is that in such cases nature should...
should be interfered with as little as possible.

(Archiv. f"ur gynäk. X. 1897. S. 442.)

Von Ott in Archiv. f"ur gynäk. 1897.

p. 410 says unequivocally, normal lochia are absolutely harmless to normal women, that is a woman cannot be infected by her own lochia.

Objective antisepsis therefore in a case of normal labor is needless. More than that, it may be dangerous. By meddling with the genital tract germ bearing air may be admitted to the lochia. If one woman may in the course of the process be carried to another, there rises to acute poisoning.

Pregnancy, labor, delivery, puerperia are physiological occurrences, and as such ought never, under any circumstance to be made a field for the most extravagant experiments. They ought rather, as far as possible, to be regarded as a physiological "noli me tangere".

(Vol. 5. Archiv. f. gyn. Bd. XIX. S. 410.)

But in pathological cases where interference is absolutely necessary, meddles assume an entirely different aspect. These we must treat on purely surgical principles, and object as well as subjective antisepsis is a most important factor in our conduct of such cases.
Prophylaxis.

Of late years immense strides have been made towards perfecting which is called the prophylactic treatment of Puerperal Fever. It had been long recognised that once puerperal fever in any of its forms broke out therapeutic measures were always uncertain in their action and usually unavailing where the severer forms of the disease had eluded themselves. In these cases prevention is the only cure.

Puerperal fever, slight at start is a wound-infection fever. Infection is conveyed from without to the patient. In every case of labour therefore, our prophylactic treatment must, broadly speaking, be

To prevent as far as possible wounds or laceration of the genital tract during labour.

To prevent the entrance of infective or putrefactive material into the genital tract before, during, or after labour.

1. Prevention of wounds or lacerations

Wounds or lacerations are more likely to occur in primiparas, some of them are not preventible. Others are, and we should do our utmost to prevent them. Perineum is a most fertile source of infection. It is of common occurrence.
speak, "In the maternity house (Breplan) tears of over 2.5 cm. in length measured from the fourchette, occurred in 103 out of 3000 deliveries, or 3.5%.\" Now in many cases this cannot be prevented, but I am equally sure that in many others it may be prevented. Support of the perineum has been ridiculed by many accoucheurs, but practised correctly it is of infinite value in preventing lacerations. Putting aside those cases of instrumental labor in which the perineum becomes injured by the blades of the forceps, the cause of perineal rupture as a rule is that when the tissues have become stretched to the utmost a strong uterine contraction forces the imperfectly extended head down so a tear is produced. To prevent this, mere pressure of the head backwards is of little use. The accoucheur should place the woman on her left side with her knees well-drawn up, her buttocks conveniently near the edge of the bed. He should then sit down on the bed behind her place his right hand so that the palm covers the perineum, while the four fingers rest partly on the right lip of the vulva, the thumb on the left. In this way the advance of the head can be controlled by the perineum stripped back.
Some years ago I was told by an experienced country practitioner that he had met with very few premature cases in his practice where the cervix remained unruptured. He attributed this to the fact that in country districts the children are on the average size and as a rule the uterine contractions more vigorous than in town-bred women. During the last three years I have invariably adopted the method partly described above with a view to protecting the cervix, and the result has been all I could desire. Out of 26 premature there was only one cervical rupture in that case labour was so rapid that I had not sufficient time to take the usual precautions. Four of the cases were instrumental. Three of these were occipito-anterior, and one was an occipito-posterior. In two of these there was there a cervical tear. The forceps used were Simpson's Axis traction. (See article by Dr. Brown at B. Med. Assoc. 1886.)

I have classed cervical tears just amongst the wounds which occur during labour because I believe that they are the most common and most important. There is no doubt that the lower a wound is in the genital tract the more likely is it to get infected. Therefore
Therefore, the utmost importance of preserving the perineum intact as often as possible. Some wounds during labour I have said are not preventible. Tears at the posterior commissure between natural labial labia are never wanting, nor are tears in front near the urethra & clitoris. The cervix is almost always torn. The placental site is always an open wounded surface.

All wounds that of the genital tract so long as they remain open are liable to become infected. This gives rise to pyrexial fever. We must therefore prevent their occurrence as far as possible by

1. Preventing undue prolongation of labour which would give rise to undue pressure on the parts & consequent sloughing.
2. Interfering as little as possible so that the vaginal eburnous membrane may be preserved intact, on whose interference is necessary performing the manipulations required with extreme care & gentleness.
3. Supporting the perineum by the method above described i.e. promoting extension of the head & preventing too forcible expulsion of it.

II. We must prevent the entrance of infective or infective materials before, during or after labour.
Were we able to prevent all wounds during labour such precautions would not be necessary. But as I have said, however small the labour slight external wounds, tears of the cervix, rupture of the placental site are natural and unavoidable. But they are more the less dangerous. I have shown, in discussing the physiology of premature fever that the hands of the accoucheur, or midwife, are the most fruitful sources of infection. Gloves, instruments, utensils of various sorts, impure air are also of importance as by these means infection may easily be caused. The question which has therefore, to be answered is this:

How can we best prevent the entrance into the genital tract of the parturient woman of infective or subinfective material which may be conveyed by the hands, by instruments, by spumes, or by the air itself, how can we prevent so-called self-infection.

I. Prevention of infection by hands.

(A) Infection by the hands may be prevented by thorough antiseptic precautions. Knowing as we do nowadays the value of wound infection and the means of preventing it, it is the duty of the accoucheur before he touches a parturient woman, to disinfect his hands several times thoroughly as possible. Whenever the case be, in
in hospital or private practice, or in town, in a well-appointed house as in a poorer one, this may never be omitted.
When called to a case of labour my routine practice is as follows:
I put on clean linen, fresh underdrawers. As a rule this is possible for the great majority of calls come by night, and it is easy to have clean things ready. I disinfect my hands speariously by washing and scrubbing them with strong solutions of corrosive sublimate soap before going out. On arriving in the room where the woman is, after preliminary enquiries I proceed to wash and scrub my hands up to the elbow with warm water and sublimate soap. This ought to occupy at least three minutes. The nails are also thoroughly scrubbed and cleaned and are always kept short. The most convenient brush for cleansing hands and nails I have found to be Bailey's rubber brush which is easily cleaned and is very durable. Next, the arms and hands are washed and steeped in a solution of 1:10,000 corrosive sublimate. The whole disinfection is never accomplished under five minutes. This being done the attendant as far as he himself is concerned is ready to make a vaginal examination.
In cases, however, where the attendant has been in contact with infection, cases previous to attending the labour, a more thorough disinfection is required. A warm bath ought to be taken and plenty of overfatty antiseptic soap used. The hands should be washed. A complete change of clothing should be effected. This having been done, before the patient is touched, I adopt the plan suggested by Fürbringer slightly modified:

(a) The hands and arms are well steeped in warm water, soaped and scrubbed, the nails having been previously carefully cut and cleaned with a pen-knife.

(b) The hands and arms are washed with a 5% solution of alcohol for one minute. This removes all trace of fat and grease and renders the skin more easy to attack by means of a disinfectant.

(c) The hands and arms are well brushed and washed in a solution of 1/10,000 Carminic Sublimate.

The disinfection is then complete.

The Carminic Sublimate most convenient for use is that made up in small tubes by Ferris & Co. of Bristol, after Dr. Cullenworth's suggestion (see B. Med. J. Oct. 6, 1888). Each tube contains 10 grains.
10 gms. corrosive sublimate.
50 gms Tartaric acid.
1 gr. Cochnial.

This dissolved in 1 pint of water gives a
strength of 1:10,000.

Infection by the hands may be prevented by
making the number of vaginal examinations
as small as possible. Seipold's statistics of
cases which were delivered in the Dresden
clinique without any internal examinations
having been made (see Archiv f. Geburtsh. Bd.
xxviii. S. 330 ff.) show us what excellent
results may be obtained by a purely
expectant treatment in a great number of
cases. But although this may be possible
in hospital practice I do not think it
would be so in private. So an ordinary
practitioner's time is too precious to enable
him to wait hour after hour uncertain
as to the real condition of the os or the
time the labour may occupy. As a rule
it is undoubtedly the case that, by
young practitioners at least, the vaginal
examination made are far too numerous.

To doubt one is anxious to know how
the case is progressing and many women
have an idea that a vaginal examination
helps the labour. But it ought to be an
rule that one examination during the first stage and another when the membranes have broken should suffice, the hands & arms having been thoroughly disinfected before both of these. For the rest, the information which we need can in an ordinary case be gained from an external examination. It would be well were the truths of this were realised then it is. The external examination practised properly gives an immense amount of information. As far as I have seen, it is not sufficiently taught or practised in this country. In Prague & Vienna on the other hand, it forms an important part of the examination of the woman.

In no case, under any circumstances whatever should the internal examination be made without previous strict subjective antiseptic. During the 1st stage of labour only one examination should be made, unless under special conditions — as in the case of eclampsia, nephritis, bad pulse, general condition, haemorrhage from the genital tract, extremely distressing pains, abnormal duration of 1st stage (local conditions). Faulty position of the head in the pelvis, failure of fetal heart, faulty position of foetus (conditions discoverable by external examination).
During the 2nd stage, one examination should be made when the waters burst, and only ought to be repeated when delay seems great or the head does not advance.

During the 3rd stage, no examination at all should be made unless urgently called for. (See Veit, Berlin: Klein: Wickersh. 19th. Tr. 19.)

11. Infection by instruments, sponges, clothes, etc. may also be prevented by proper precautions, in two words by absolute cleanliness.

Since the introduction of sanitary accommodation sheets by various firms the difficulty of ensuring that the patient woman should be delivered with absolutely clean surroundings has been overcome to a great extent. More lately, specially made outfit for accouchements is a most valuable preventive of infection in a case where the patient can afford to pay for it. Everything necessary for the ligaments is made up in a box which is only opened when labour begins. Labour over, the ligaments are simply burnt. In this way the bed is kept free from contamination if discharges of any kind to the surroundings are perfectly absent. A special packet of carbolicised or sublimated absorbent wood...
wool ought to be kept for cleansing the external perineum. When in use, it should be carefully avoided.

Instruments such as catheters should, when in use, lie in 5% solution of carbolic acid. Forceps should, after use, be carefully boiled, then well scrubbed, with 5% Carbolic acid solution before use.

In giving douches, I prefer a tube long enough to make a siphon. This is more easily used than a Huggins. To the end of this I attach a glass vaginal tube. This can be easily cleaned after use in any ordinary case, ought to be broken after use in any case with stinking lochia or high temperature.

III. Infection by means of the Air may be prevented by

1. Having the air as pure as possible. Ventilation should invariably be from the outer air; the windows should always remain slightly open from the top whatever the season of the year. This can always be done with safety if the bed is in a proper position. It has been suggested that the lying-in room should be thoroughly flushed with air several times daily by first covering up the patient before opening the windows.
The window should be so that a thorough draught of fresh air may pass through the room. The length of time which this occupies will depend on the season of the year, but at any time it may be done without chilling the patient. By the use of sanitary sheets these soiled with discharge may be immediately removed so that all danger of their contaminating the surrounding air is obviated.

(b) It is important not to allow entrance of air into the genital tract after delivery to prevent this we must during and after the 3rd stage if possible avoid any digital exploration of the vagina. After the delivery of the placenta if the patient has been in the lateral position we must carefully see to it that before she turns on to her back, the uterus is firmly contracted. If not it may happen that with the very effort of turning round, air may be sucked into the uterus with disastrous results (Räuppe).

III. Prevention of so-called Self Infection.

The real danger to any parurient woman of infection from her own body lies in the want of sufficient cleansing of the external genitals - the vulva on account...
account of the hair which surrounds it, in account of its contact with the urine and the utero-vaginal secretion, from its immediate neighborhood to the anus, from its position between the thighs is an extremely favourable position for the cultivation of microorganisms or putrefying material. This may find its way into the genital tract during labour or it may even be carried into the vagina on the point of an otherwise thoroughly aseptic finger. It is therefore necessary before undertaking any vaginal examination, and in any case when labour commences, to render the external genitals as aseptic as possible. If this is thoroughly and conscientiously done one may believe in the ordinary run of cases dispense with all vaginal douches with advantage. (See discussion of Dr. Buszaki's paper 'Infections of the Maternal Uterus', Transactions Vol. II. 1890, p. 298)

The method which I adopt is as follows:

1. The parts are well rubbed and soaped with warm water and sublimated soap by means of a fresh mass of absorbent wool.
2. They are next washed with an 80% solution of alcohol.
3. They are again soaped and rubbed with warm water.
4. They are drenched with 1:1000 corrosive sublimate solution.
This ought to be done in every case of labour. It is not nearly so troublesome to oneself as to the patient as vaginal douching, and done thoroughly renders the latter process unnecessary.

In conclusion we may shortly note the results of modern prophylactic antiseptic treatment. The following table from Priestly's address on Maternity Hospitals (Empire of Hygiene and Demography, 1891, speak for themselves.

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Cases</th>
<th>Mortal Cases</th>
<th>Illness per cent.</th>
<th>Purified no.</th>
<th>Deaths per cent.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1886</td>
<td>17,193</td>
<td>1,583</td>
<td>9.43</td>
<td>82</td>
<td>0.48</td>
</tr>
<tr>
<td>1887</td>
<td>18,405</td>
<td>1,803</td>
<td>10.04</td>
<td>82</td>
<td>0.44</td>
</tr>
<tr>
<td>1888</td>
<td>19,763</td>
<td>1,562</td>
<td>8.18</td>
<td>66</td>
<td>0.33</td>
</tr>
<tr>
<td>1889</td>
<td>21,280</td>
<td>1,415</td>
<td>6.90</td>
<td>60</td>
<td>0.28</td>
</tr>
<tr>
<td>Total</td>
<td>76,666</td>
<td>6,363</td>
<td>8.97</td>
<td>290</td>
<td>0.38</td>
</tr>
</tbody>
</table>

Imperial Lying-in Hospital, Vienna

<table>
<thead>
<tr>
<th>Date</th>
<th>Deliveries</th>
<th>Deaths</th>
<th>Mortality per 1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1857-62</td>
<td>25, 124</td>
<td>422</td>
<td>28</td>
</tr>
<tr>
<td>1863-1880</td>
<td>68, 779</td>
<td>1,117</td>
<td>16</td>
</tr>
<tr>
<td>1881-1885</td>
<td>15, 070</td>
<td>106</td>
<td>4</td>
</tr>
</tbody>
</table>
Vienna Maternity (cont.)

Mortality from Puerperal Fever.

<table>
<thead>
<tr>
<th>Date</th>
<th>Rate per 1,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1863-80</td>
<td>13.</td>
</tr>
<tr>
<td>1881-85</td>
<td>4.</td>
</tr>
</tbody>
</table>

Dresden (Leopold.)

<table>
<thead>
<tr>
<th>Date</th>
<th>Deliveries</th>
<th>Deaths from Puerperal Fever</th>
<th>Mortality per 1,000 from Puerperal Fever</th>
</tr>
</thead>
<tbody>
<tr>
<td>1863</td>
<td>1,368</td>
<td>12</td>
<td>8.7</td>
</tr>
<tr>
<td>1865</td>
<td>1,365</td>
<td>2</td>
<td>1.4</td>
</tr>
<tr>
<td>1886</td>
<td>1,387</td>
<td>2</td>
<td>1.4</td>
</tr>
<tr>
<td>1887</td>
<td>1,388</td>
<td>1</td>
<td>0.9</td>
</tr>
</tbody>
</table>

Paris Maternité (Tarnier)

<table>
<thead>
<tr>
<th>Date</th>
<th>Mortality per 1,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1858-69</td>
<td>93 = 1 in 10.2</td>
</tr>
<tr>
<td>1870-89</td>
<td>23 = 1 in 43.4</td>
</tr>
<tr>
<td>1882-88</td>
<td>11 = 1 in 91.0</td>
</tr>
</tbody>
</table>

New York Maternity Hospital

<table>
<thead>
<tr>
<th>Year Ending</th>
<th>Deliveries</th>
<th>No. of Deaths</th>
<th>Deaths per 1000 Deliveries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1883</td>
<td>429</td>
<td>34</td>
<td>26</td>
</tr>
<tr>
<td>1884</td>
<td>505</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>1885</td>
<td>541</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>1886</td>
<td>663</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>
In looking over these tables we see how the Vienna maternity between 1863-80 shows a distinct improvement due to improved ventilation and better management. But on the introduction of antiseptics the improvement which followed was very remarkable indeed the death rate falling from 18 to 4 per 1000.

These tables prove conclusively that Haldafeld of Copenhagen was right when he said "the Hygiene of a maternity depends less on its constitution or its age than upon the hygienic principles upon which it is directed and on the perseverance with which these principles are carried out in the daily service."

In this country the results of antiseptic prophylaxis have been equally brilliant. Up till 1879 the maternity hospital, York Road, London was the scene of repeated outbreaks of puerperal fever. It was closed then and reopened in 1879 under an entirely new system, the rules adopted being those drawn up by Sir Joseph Lister. The results were highly satisfactory and have remained so, as is shown in Dr. Bozalls communication to the Obstetrical Society Vol. XXII. 1890.
1833-1860 deaths averaged 30.8 per 1000.
1861-1879 " " 18.0 " "
179-1890 " " 6.0 " 

During three years only one case of
Puerperal fever occurred. It is now
an unusual occurrence for a puerperal woman
to have a temperature of over 100°.