STUDIES ON PUERPERAL SEPSIS

BASED ON

THE EXAMINATION OF

THE VAGINAL FLORA OF WOMEN IN LABOUR

AND

THE INVESTIGATION OF AN

OUTBREAK OF PUERPERAL SEPSIS.

BEING A THESIS FOR THE DEGREE OF
DOCTOR OF MEDICINE PRESENTED TO
THE UNIVERSITY OF GLASGOW
BY
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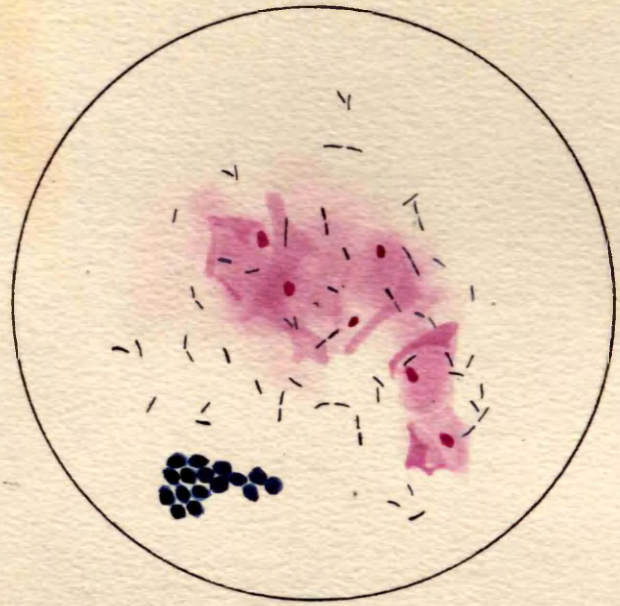

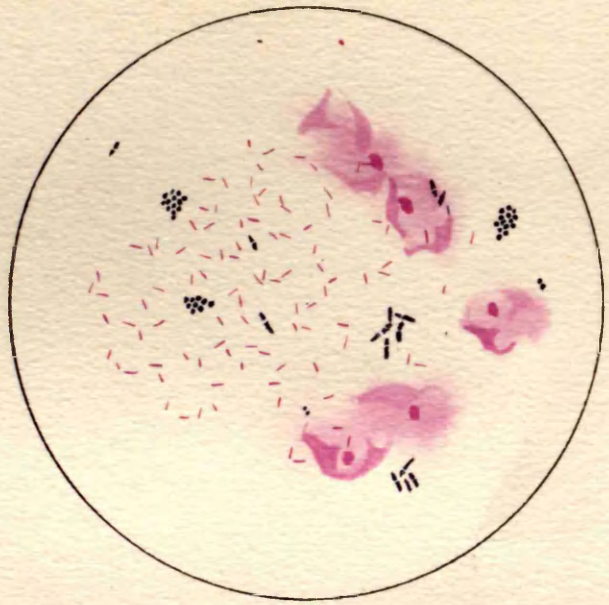

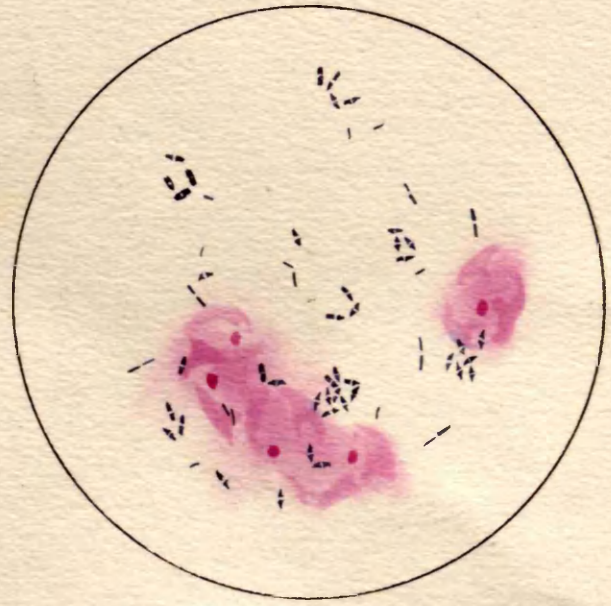

THE VAGINAL FLORA.

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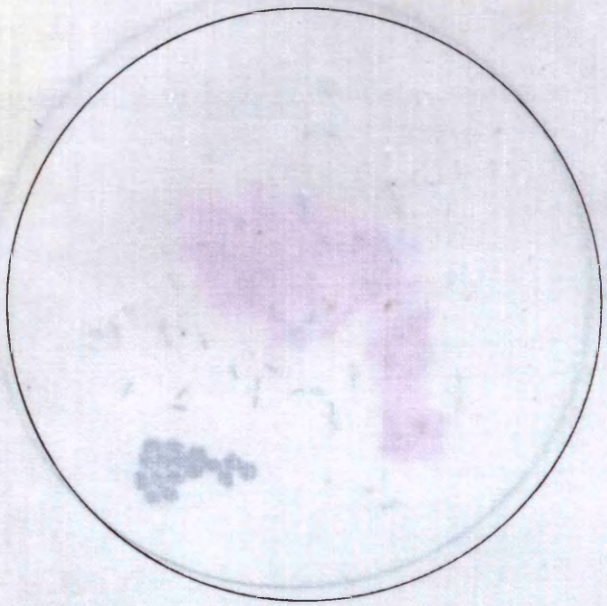

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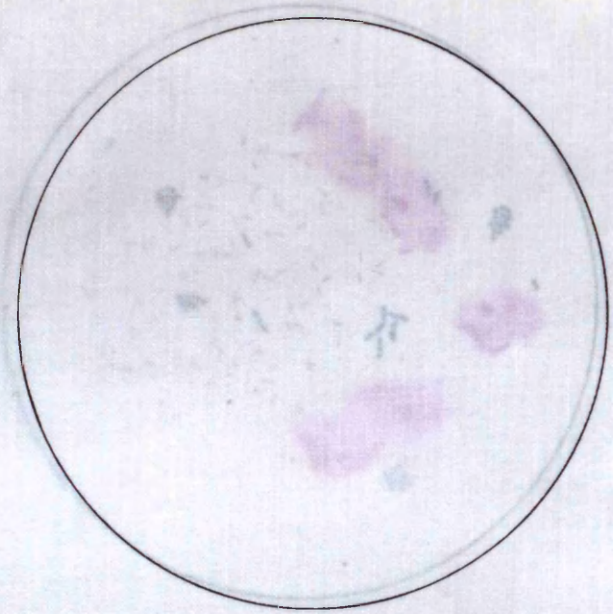

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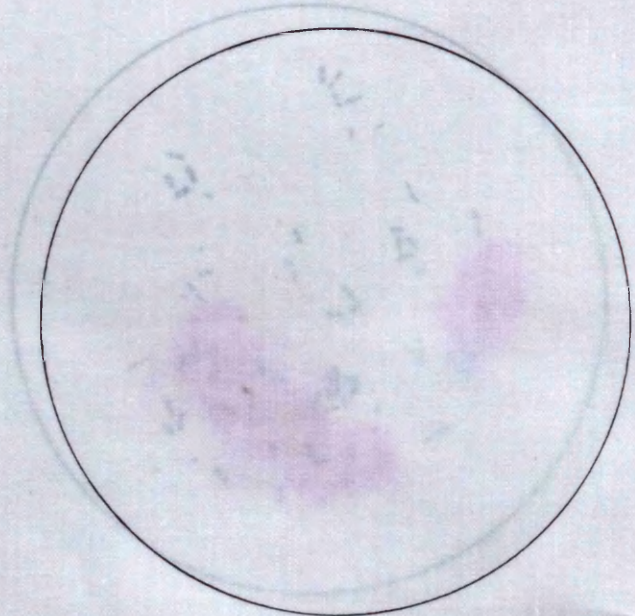

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STUDIES ON PUERPERAL SEPSIS.

For purposes of convenience this study on puerperal sepsis will be divided into two parts.

PART I. The vaginal flora of women in labour in relation to the development of puerperal sepsis.

PART II. Puerperal sepsis in a maternity hospital. A combined clinical, bacteriological and epidemiological study.

In PART I. all the material for examination was collected from patients in the labour wards of the Glasgow Royal Maternity Hospital; the bacteriological investigations were carried out entirely by myself in the Bacteriology Laboratory of the Pathological Institute at the Glasgow Royal Infirmary while a Muirhead Research Scholar in Bacteriology, and all the clinical notes were taken by me personally in the wards of the Maternity Hospital.

This study of the vaginal flora was being carried out by me when the opportunity arose of investigating the Puerperal Outbreak described in PART II. The work in PART I. was therefore curtailed in order to proceed with the bacteriological work described in PART II.

In PART II. much of the clinical information was extracted from the journals of the Maternity and Isolation Hospitals concerned, but the bacteriological examinations of swabs from the patients, staff and hospital, and the serological investigations were all conducted by myself in the laboratory.

PART I.

THE VAGINAL FLORA OF WOMEN IN LABOUR IN RELATION TO THE DEVELOPMENT OF PUERPERAL SEPSIS.

Introduction.

Methods.

1. Smears.
2. Cultures.
   (a) aerobic.
   (b) anaerobic.

Bacteria found on examination. (Total).

(a) Staphylococcus - albus.
                   - aureus.
(b) Streptococcus - non-haemolytic.
                  - viridans.
                  - haemolytic.
                  - anaerobic.
(c) Enterococcus.
(d) Coliform bacillus.
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(b) Proportions.
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Bacteria/

Bacteria found in vaginal flora.

(a) Total.
(b) Correlation of the pathogenic or potentially pathogenic types of bacteria with subsequent history.

Streptococcus - haemolytic.
- non-haemolytic.
- viridans.
- anaerobic.

Coliform bacillus.
Staphylococcus aureus.

Bacteria isolated from cases of puerperal sepsis and their correlation with those isolated during labour.

Summary.

Conclusions.

THE VAGINAL FLORA OF WOMEN IN LABOUR IN RELATION TO THE DEVELOPMENT OF PUERPERAL SEPSIS.

Various workers have shown that the majority of severe puerperal fevers and almost all fatal cases of puerperal septicaemia are due to infection with the streptococcus pyogenes (Bigger & Fitzgibbon, 1925., Kinloch et. al. 1928). Much work has been done with a view to determining what influence the flora present in the genital tract before delivery contributes to the incidence of puerperal sepsis, but attention has been directed mainly towards determining the frequency with which haemolytic streptococci are found, and correlating these findings with the subsequent history of the cases. Very few particulars are given of the varieties of other organisms found, because there has been always a tendency to assume that puerperal sepsis is invariably due to the haemolytic streptococcus. The bacteriology of minor puerperal sepsis shows that only a relatively small proportion of these cases are due to the haemolytic streptococcus. There are many other bacteria in the vagina which may possibly be the cause of pyrexia, or foul lochia.

The main object of this investigation was to determine the actual source of any infection arising in the puerperium and to find whether the infective organisms were present during labour, or were of extraneous origin. Swabs were taken from the upper portion of the vagina of 200 women in the first stage of labour. The grade of flora (see page 22) was determined by examining direct smears, and a full investigation of the flora was made by cultural methods, both aerobical and anaerobical. These findings were correlated with the clinical histories before and after labour and with any subsequent bacteriological examination made in the puerperium.

A summary of the bacteriological and clinical findings in each of the 200 women/

women examined is given in the Appendix, Table I. These clinical notes were taken personally during the puerperium and it was possible later when making a classification of the cases of sepsis to exclude all cases of extra genital infection and only consider those with true genital sepsis. A puerperium was considered abnormal when there was a temperature of 100.4°F. or more on one or more occasions, or where, although the temperature was not raised, there was evidence of foul lochia. No differentiation between puerperal fever and puerperal pyrexia was made, both conditions being grouped under puerperal sepsis. The extra genital types of sepsis amounted to 10 in all and consisted of cases of pneumonia (2), pleurisy, pyelitis (2), cystitis, breast abscess (2), parotitis and 1 case who died of shock 8 hours after delivery.

Methods.

No selection of cases was made beforehand, except that cases gravid for 24 weeks or less were not included. From a preliminary investigation it was found that the flora of the cervix and upper vagina were qualitatively similar, but quantitatively different and that if attention were directed only to the cervix organisms of importance present in the vagina might be overlooked. These findings are similar to those of Channon (1930), who also investigated this point. Such deductions led to swabs being taken from the posterior fornix of the vagina. The following method of taking swabs was adopted. The patient after being admitted to the labour ward had the external genitals carefully swabbed with a mild antiseptic (1: 2000 biniodide of mercury) and a Cusco's speculum inserted. With the vagina and cervix well in view the posterior part of the canal was swabbed with a long swabstick, great care being taken to avoid contamination from the lower vagina. The swabs were taken to the laboratory as soon as possible (within/

(within 8 hours) and plated out on two blood agar plates (5 per cent defibrinated horse blood). Two tubes of Hartley's broth without glucose and having a P.H. of 7.6 were also inoculated, and direct films made and stained by Gram's method. One tube of broth and a blood plate were incubated at 37°C. for 24 hours and the other plate and tube put in a McIntosh & Fildes' anaerobic jar with an indicator, the air being replaced by hydrogen: any free oxygen left in the jar was absorbed when the palladium asbestos was heated by electricity. The jar was incubated at 37°C. for 24 hours and then the cultures were examined for growth: if not satisfactory they were again incubated anaerobically for a further 24 hours. The plates and broth cultures grown aerobically were examined, slides made and the broth cultures plated on to blood agar plates and incubated at 37°C., similar examinations and sub-culturing being carried out in the anaerobic jar with the anaerobic cultures. By this means organisms which sometimes were missed by direct plating were often recovered from the plates grown from the broth and also such colonies as those of Döderlein's bacillus were more readily recovered when grown anaerobically. Careful notes of the morphology of the growth in broth and on the plates were kept, special attention being given to the effect of the colonies on the blood agar plates. Any streptococci showing signs of haemolysis were isolated and tested more thoroughly for their action on blood cells. The importance of true haemolysis in a classification is so great that it is thought advisable to give some account of this phenomenon at this point.

Haemolysis.

Classification of streptococci may be partly based on the changes produced in blood, Schottmüller (1903) noted the presence or absence of haemolysis when cultures were grown on blood agar plates. Holman (1916) made a classification of haemolytic and/

and non-haemolytic types by means of sugar reactions, but this is not wholly satisfactory. Smith & Brown (1915) and Brown (1919) have described the phenomena of haemolysis and distinguished between two types, alpha and beta. In alpha haemolysis there is a somewhat greenish discoloration and partial haemolysis of the blood corpuscles immediately surrounding the colony, forming a rather indefinitely bounded zone, outside of which is a second clearer zone. In beta haemolysis the colony is surrounded by a sharply defined clear band. To classify streptococci as haemolytic by examining their effect of growth in a blood agar plate is not, however, a sufficiently accurate test. True haemolysis is due to the production of a haemotoxin and the demonstration of a haemolysin must be carried out in a liquid medium. That such a rigorous test is necessary will be shown later on in the classification of haemolytic streptococci found on examination of throat and vaginal swabs (page 48).

Technique for Testing for Haemolysis.

McLeod (1912) has shown that the essential activity of a haemolytic streptococcus is the production of a haemolytic exotoxin and that this can be demonstrated by growing the organism for a varying short period (16 hours or less) in serum broth (20 per cent horse serum), adding the culture to a suspension of washed cells and incubating the mixture for two hours at 37°C. This method was adopted except that the broth cultures were centrifuged till apparently clear and the supernatant broth added to erythrocytes of the horse. Various types of red blood cells, as an indicator, were tried out for intensity and reliability, and it was found that the best results were obtained when a 3 per cent solution of horse blood cells in saline was added to an equal quantity of supernatant broth and incubated at 37°C. for two hours, by which time there was definite evidence of the presence/

presence or absence of lysis. The careful carrying out of such a test was the means of eliminating many pseudo-haemolytic strains which, grown only on blood agar, might have been erroneously designated haemolytic.

Fry (1933) draws attention to the desirability of growing cultures on blood agar anaerobically, as some haemolytic streptococci only show definite haemolysis when grown in the absence of oxygen. Burt-White & Armstrong (1928) described streptococci in the normal genital tract which produced haemolysis only under anaerobic conditions, but no further tests appear to have been carried out by them. Taylor & Wright (1930) studied all strains showing haemolysis when grown anaerobically on blood agar plates and found that in every case there was true haemolysis when they were subcultured.

All strains cultured anaerobically and showing signs of haemolysis on blood agar plates were carefully tested and the few strains showing apparent haemolysis were found to be enterococci.

Chocolate Agar.

When certain organisms are grown on heated blood agar a bleaching or green discoloration is produced. Such a phenomenon is of use in distinguishing the different types of streptococci and this medium was used as a routine when classifying the various streptococci. Melted nutrient agar with 15 per cent defibrinated horse blood is heated gently to about 95°C. when the mixture turns a "milk chocolate brown" of the consistency of hare soup, then poured into a Petri dish and allowed to solidify. Cultures of streptococcus viridans grown on such a medium at 37°C. for 24 hours produce a marked green discoloration. Warren Crowe (1927) states that all haemolytic streptococci belong to his "no colour" group, that is to say, they do not produce green or yellow colour on the chocolate blood medium. Williams (1932) however, has found that certain haemolytic streptococci

may/

may produce a greenish tinge on chocolate agar medium, and Tunnicliff has shown that strains of haemolytic streptococci from erysipelas have a definite green production on chocolate agar made with rabbits blood, while those from scarlet fever have no action on the medium. Chocolate agar medium was used for all the streptococci isolated, it being found a useful method for distinguishing enterococci from streptococci viridans and from other non-haemolytic streptococci.

Heat Test.

The streptococcus faecalis or enterococcus was partially differentiated from other non-haemolytic streptococci by its resistance to heat. Twenty-four hour broth cultures were heated at 60°C. for thirty minutes and then plated on to blood agar plates. Those organisms which survived this test were designated heat resistant.

Frequency of different Organisms.

222 Cases were investigated, but eventually only 200 were available for analyses the others being abandoned on grounds of duplication, false labour, or incomplete notes. The bacteriological findings for each case, together with the clinical histories are given in Table I. of the Appendix and the results recorded in the following Table (Table 1.) Taylor & Wright (1930) carried out a similar investigation on 1,123 women immediately prior to delivery, and the percentage of their findings is shown in brackets in the same Table. They do not, however, appear to have differentiated enterococci and other non-haemolytic streptococci, nor have they made any mention of yeast, gonococci, B. subtilis, or B. proteus.

Table 1.

Bacteria present in the Vaginae of 200 Women in Labour.

Cases.	Staphylo-:cocci.		Döderlein's Bacilli.	Diphtheroids.	Yeast.	Coliform Bacilli.	Gonococci.	B. Subtilis.	B. Proteus.	Streptococci.				
	Albus.	Aureus.								Non-haemolytic	Haemolytic.	Viridans.	Entero-:cocci.	Anaerobic.
200	114	12	64	28	30	62	3	6	2	42	1	25	33	1
Per cent.	57	6	32	14	15	31	1.5	3	1	21	0.5	12.5	16.5	0.5
Per cent.	(58.8)	(1)	(34.9)	(25.1)	-	(31.6)	-	-	-	(37.8)	(2.7)	-	-	(1.1)

(Figures in brackets indicate the findings of Taylor & Wright).

Although many of the bacteria isolated cannot be termed true pathogens, all the organisms found in the vaginae have been studied and some of their cultural characters and morphology noted in this investigation, together with the findings of other workers will now be discussed.

Staphylococcus albus.

Staphylococci are frequently recovered from suppurative processes and are present in varying numbers in air, water, milk, etc. Although many writers do not consider staphylococcus albus as a pathogen other writers (Topley & Wilson) have shown that strains producing a haemolysin are pathogenic to man and that they may/

may be the cause of such a pyogenic disease as peritonitis. Staphylococcus albus may or may not be concerned with the etiology of minor puerperal sepsis and for this reason it was considered advisable to keep a record of the number of cases in which this organism was isolated. Any staphylococcal colonies with a definite china white colour and no haemolysis were considered to be the Staphylococcus epidermis albus and were not included, as this coccus is nearly always present on the skin and has non-pathogenic properties. Thus in the 200 cases 57 per cent had evidence of staphylococcus albus, but the colonies as a rule were not numerous.

Staphylococcus aureus.

These golden yellow cocci were isolated both aerobically and anaerobically and showed a clear zone of haemolysis when grown on blood agar. Mild infections due to staphylococci are usually due to staphylococcus albus, while staphylococcus aureus may be responsible for such a severe form as a rapidly spreading lymphangitis, often terminating in an acute septicaemia. Staphylococcus aureus does not appear to be a frequent inhabitant of the genital tract, only 6 (3 per cent) women were found to harbour this organism during labour. One of these cases developed puerperal sepsis and staphylococcus aureus was isolated in large numbers from the lochia and cervix.

Döderlein's bacillus.

Döderlein (1892) carried out an extensive investigation on the vaginal secretion of pregnant women and described an almost homogeneous bacilliary flora of the bacillus with which his name is now associated. He regarded cases as normal which had these bacilli with some yeast and practically no other organisms, the/

the vaginal secretion being highly acid, a description which would now be termed a Grade A. flora. Text books do not give much information about this lacto-bacillus, but Cruickshank (1930) investigated the cultural characters and serological reactions, classifying it as a member of the acidophilus group of bacilli. It usually occurs as a rather slender, slightly curved bacillus of varying length (cf. frontispiece, Grade A.) some of the longer forms tending to lose Gram's stain. The bacilli are arranged in twos or threes forming obtuse angles and Y shaped figures, but often are grouped in bundles like C. diphtheriae. For cultivation glucose hormone agar with 5 per cent defibrinated rabbit blood is recommended, incubating for 48 hours at 37°C; but in the course of the present investigation Döderlein's bacilli were isolated fairly easily on ordinary hormone blood agar (5 per cent defibrinated horse blood) without the addition of glucose and incubating anaerobically or aerobically for 48 hours, provided the swabs were fresh. Individual colonies of Döderlein's bacillus are very small, discrete and translucent and if looked at carelessly might be mistaken for a poor growth of Diphtheroids or Streptococci, but on careful examination the periphery is seen to have a spreading irregular crenated edge. Jotten (1922) gives a similar description of the colony formation. On blood agar a brownish discoloration is often produced and on "chocolate agar" a green pigment due to the production of hydrogen peroxide.

Serological investigations (Cruickshank 1930) show that Döderlein's bacilli and lacto-bacilli derived from other sources are not serologically identical.

What the value of Döderlein's bacillus is, in the vagina, it is difficult to suggest. Its actual presence indicates as a rule a good type of vaginal flora, which in turn is usually present when the ovaries are functioning actively: the increase of glycogen in the superficial layers of the epithelum of the vagina increases/

increases the acid secretion which in turn prevents the growth of most organisms except Dŏderlein's bacillus, yeast and diphtheroids which can only live in such an acid medium. Dŏderlein's bacilli do not appear then to be pathogens. Examining the vaginal flora by direct smears 64 per cent of cases had Dŏderlein's bacilli, whereas when cultural methods were used in investigating the same cases only 32 per cent had this bacillus present. This difference may be accounted for by the fact that the medium used was more suited for the cultivation of streptococci than that of Dŏderlein's bacillus.

Diphtheroids.

Diphtheroids are members of the genus Corynebacterium other than the diphtheria bacillus. They are met with in conditions of health and also have been obtained from many mixed infections such as skin conditions, leprosy, war wounds and empyema. The Medical Research Council (1923) state that "there is no evidence that any corynebacterium other than C. diphtheriae plays any significant role as a pathogenic parasite of man, though various species form an important constituent of his normal bacterial flora". In animals there are at least two pathogenic diphtheroids apart from C. diphtheriae, C. pseudo-tuberculosis ovis and C. pseudo-tuberculosis murium, the first causing ulcerative lymphangitis of the horse and pseudo-tuberculosis of sheep and the latter being pathogenic to mice. Topley & Wilson maintain that in all probability C. pyogenes may play a causative role in some cases of pyelonephritis in cattle. Fleming (1919) describes experiments in which he shows how the growth of Streptococcus pyogenes is increased by the addition of diphtheroids, the diphtheroid bacillus acting as a powerful stimulant to the streptococcus, but the action is not reciprocal.

Diphtheroids occur in the vaginal flora of women both in labour and the puerperium/

puerperium. Whether or not they have any action on streptococci in the vagina it is impossible to say, but sometimes they are very numerous in puerperal sepsis. In this investigation 28 cases had diphtheroids, a percentage of 14.

Diphtheroids are capable of anaerobic cultivation (M.R.C. report) and this phenomenon was frequently noticed during the investigation when they were isolated on anaerobic culture and not aerobically. The type of diphtheroid was usually short and stumpy, but occasionally the long type like xerosis was isolated.

Yeast.

Yeast grows readily in a fairly acid medium and is frequently present together with Döderlein's bacillus, especially when there are no other organisms. It is quite harmless and apart from being an indication of an acid vaginal secretion is of no consequence.

Coliform bacillus.

Under ordinary conditions this organism exists as a harmless commensal in the bowel of all mammalian animals and is present usually in enormous numbers. Normally no injurious influence is exerted on the intestinal mucosa, but if resistance is lowered then the coliform bacillus may become established in certain tissues by gaining access to the lymphatics and even the blood stream. The close proximity of the rectum and the entrance to the genital tract allows infection of the vagina to take place very easily, here the coliform bacillus may have no injurious effect until after the tissues have been bruised or injured at childbirth when they may gain a foothold and set up a local sepsis or even a generalised infection.

Frequently coliform bacilli are the cause of acute and chronic infections of the urinary tract and may give rise to cholecystitis. In pregnancy they are commonly found to be associated with cystitis and pyelitis, while in the puerperium they/

they are often isolated from the urinary tract and even from the blood stream. When found in the blood they are not always the primary infection, because puerperal fever cases with haemolytic streptococci in the uterus sometimes have coliform bacilli isolated from a blood culture (cf. Part II. page 53). In all probability the coliform bacilli only gain access to the blood after the resistance of the woman has been lowered by the process of childbirth and from infection by the haemolytic streptococci introduced at or after the birth.

There are many varieties of the coliform bacillus and in an investigation of this kind an exacting classification is impracticable. All colonies having the morphology of B. coli, fermenting lactose, and giving a gram negative reaction with Gram's stain have been considered to belong to the coliform group. In many cases the colonies were very scanty, but occasionally they were found in pure culture. 62 Women (31 per cent) had coliform bacilli isolated on cultivation of swabs taken from the upper vagina.

Gonococcus.

This micrococcus now known to be the cause of gonorrhoea was first described by Neisser (1879) and later it was successfully isolated and cultivated by Bumm and others. The gonococcus or N. gonorrhoeae is present in various parts of the female genital organs when these are the seat of gonorrhoeal infection and if this is fairly recent or acute the organism may be isolated from the purulent exudate. Cultivation of the gonococcus is not easy and it is advisable that the medium be inoculated within half an hour after obtaining the material from the body. When the gonococcus extends to the uterus it may produce an inflammatory condition of the mucous membrane of the body and pass along the Fallopian tubes to produce a pyosalpinx or a localised peritonitis. Such conditions are especially liable to be/

be acquired during the puerperium. N. gonorrhoea was isolated from three cases; the baby of one of the women developed an ophthalmia and N. gonorrhoea were found in a direct smear from the eyes of the child.

B. Proteus and B. Subtilis.

A few cultures of these organisms were isolated. B. proteus has been said to produce pleurisy and meningitis, but as a rule neither this organism nor B. subtilis are pathogenic, although they often occur with other organisms in inflammatory conditions such as pyelitis and cystitis. Their occurrence in this investigation is of no importance.

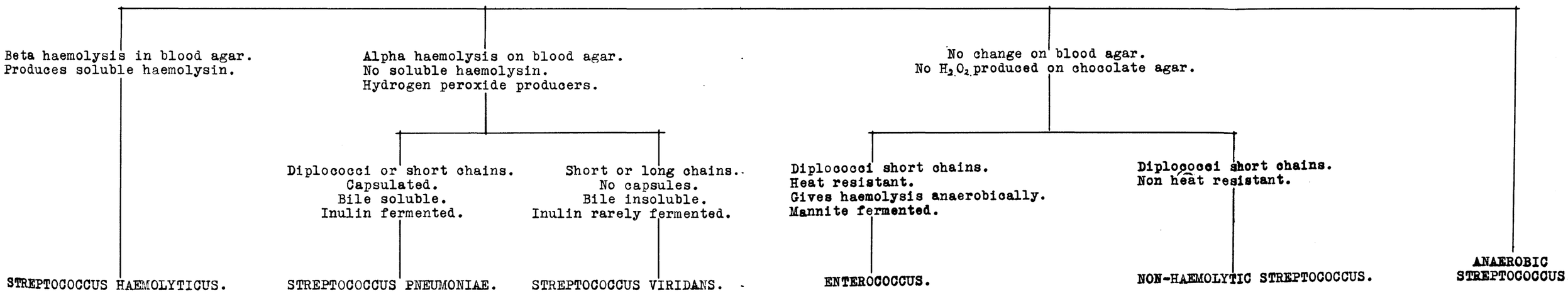
Streptococcus.

In connection with puerperal fever the streptococcal group is undoubtedly the most important. This group comprises the true haemolytic streptococcus (beta haemolysis), the streptococcus viridans, streptococcus faecalis or enterococcus, the non-haemolytic streptococcus and the anaerobic streptococcus. Before describing the various types which were isolated it is advisable to give an explanation of the classification employed.

Many writers have made elaborate classifications with subdividing groups and divisions and so describe many species. Holman (1916) had 16 varieties of streptococci and even these were subdivided. Similarly Brown subdivides his three main groups (alpha, beta and gamma) into 192 types. Such elaborate schemes are of little use in an investigation of this kind and the following classification was adapted and modified from that suggested by Topley & Wilson.

STREPTOCOCCUS.

Cocci in short or long chains
sometimes in pairs.



The genus streptococcus is divided into four primary subdivisions - (a) that containing the forms giving beta-haemolysis in blood agar plates and producing a soluble haemolysin in serum broth, (b) that comprising the peroxide producing strains which give alpha-haemolysis on blood agar plates and do not form a soluble haemolysin, (c) that which is made up of all those strains which produce no change in blood media and (d) those strains which will only grow anaerobically. Thus in Group I. we have the streptococcus haemolyticus, Group II. the streptococcus pneumoniae and the streptococcus viridans, Group III. all non-haemolytic streptococci and the enterococcus and in Group IV. the true anaerobic streptococcus.

Streptococcus haemolyticus.

Although only one case in labour showed the presence of haemolytic streptococci this organism was isolated in the puerperium from several of the women in this investigation and also from many other puerperal cases, including those described in Part II. so that the general characters of this organism will be described. All strains produced a certain amount of haemolysis on the blood agar plates, whether made from horse or rabbit blood. Much discussion has arisen on the influence of the intensity of the phenomenon of haemolysis produced with different kinds of blood. Various proportions of blood of horse, rabbit and man were tried out and the most reliable was 5 per cent defibrinated horse blood, the same findings as that of Christie & Andrewes (1932). Rabbit blood sometimes gave more marked haemolysis, but could not be depended upon. All produced haemolysin in 15 per cent serum broth (ascitic fluid) complete haemolysis of erythrocytes being produced when the supernatant fluid of the serum broth culture was added to an equal quantity of a 3 per cent solution of red cells/

cells in saline and incubated for 2 hours at 37°C. It is of interest to note that similar tests were tried out using Hartley's broth (P.H. 7.6 and no glucose) without serum. The results were the same, but not so clear cut, the growth was good but not so profuse as when serum was added. Fermentation tests with saccarhose, inulin, raffinose, mannite, salicin and milk were carried out, the cultures being grown in Hiss's broth, made with ox serum and Andrade's indicator. A reduction was got in saccarhose, lactose and salicin and no reduction with raffinose, inulin or mannite. Milk became acid. These fermentation reactions are similar to those described by Andrewes & Horder (1906). In fermentation tests care must be taken to prepare and use the proper medium in which to dissolve the test substances. Peptone water or meat extract must not be used and an indicator such as litmus is unsuitable as it does not react within the proper range. Holman (1916) and McLeod (1912) emphasise the importance of adding serum to the medium in order to ensure optimal growth.

Serological analysis may be carried out in an endeavour to determine more precisely the relation of particular varieties of streptococci to a particular infection. Haemolytic streptococci give rise to many conditions such as scarlet fever, erysipelas, puerperal fever and septicaemia, tonsillitis, lymphangitis, appendicitis and peritonitis, etc., and theoretically by means of antigenic analysis serological varieties should be correlated with apparently distinct diseases, but when tests are made serologically streptococci appear as a heterogeneous group. Griffith (1926) investigating scarlet fever found that only some two-thirds of haemolytic streptococci isolated from scarlet fever throats could be assigned to what he has designated four major types. The residue were a mixed lot of heterogeneous forms not only unlike the major types, but/

but dissimilar amongst themselves. Andrewes & Christie (1932) examined streptococcal strains from puerperal sepsis and attempted to compare them with ordinary surgical and erysipelas strains and were unable to find definite types of organism associated with any special disease. They point out that certain strains and sera have what is called 'group' properties and thus a worker who has, as he imagines, recognised a serological type of streptococcus associated with a certain disease, may have been actually deceived through working with a serum which is largely 'group' in character. Although haemolytic streptococci may not be classified by serological methods into types associated with special diseases, serological identification is of great value when streptococci are associated with an epidemic arising from an apparently common source. If two strains of streptococci are identical they can be shown to cross agglutinate with each other and absorb completely the sera prepared from both strains, such reciprocal reactions prove that they are similar and identical. The opportunities of obtaining identical strains are not very frequent. Smith (1931) has successfully carried out tests to track down the source of infection of patients with puerperal fever by isolating and studying serologically the haemolytic streptococci in the throats of attendants and other contacts. Similarly Meleny et. alli. (1928) carried out an investigation when an epidemic of puerperal sepsis occurred in a New York maternity hospital and were able to prove that the strains isolated from the patients were identical.

The serological details of a similar investigation will be described in Part II. (page 51).

Streptococcus viridans.

These cocci occur as diplococci or short chains and are what are known as 'green/

'green producers". They do not form a soluble toxin nor haemolysin. Usually they are non-pathogenic to animals other than the rabbit, in which some strains give rise to arthritis and valvular lesions bearing some resemblance to rheumatic infection in man. They are the cause of most cases of subacute ulcerative endocarditis in man, and are suspected of being aetologically related to many infective conditions including rheumatism. Recently, however, there has been a tendency to associate rheumatic conditions with the streptococcus haemolyticus. Only 25 cases (12.5 per cent) had streptococcus viridans isolated from the genital tract. All these strains gave a green coloration when grown on chocolate agar and produced a turbidity in broth.

Enterococcus.

Enterococcus or streptococcus faecalis, as it was formerly called, is a common type of intestinal streptococcus. It usually occurs as a diplococcus and its colonies when grown on blood agar are semi-transparent like other streptococci, but they tend to coalesce. There is no haemolysis except when grown anaerobically. When grown in broth the deposit is white and sticky, easily distinguished from the white granular deposit of streptococcus haemolyticus. The coccus is heat resistant and is not killed by exposure to 60°C. for thirty minutes. It is relatively non-virulent, but is sometimes found in cases of pyelitis, cystitis and appendicitis. It has been injected into animals in large doses without pathogenic effects. This species may be regarded as a normal parasite of the intestinal tract, but in exceptional circumstances it may assume a pathogenic role - 16.5 per cent of cases examined were found to have enterococci. It is essential to test fully the characters of these Gram positive diplococci, as they may be and have been identified as a pneumococcus, which is a much more delicate organism and of course bile/

bile soluble.

Non-haemolytic streptococcus.

This group comprises the streptococci which do not produce any change on blood agar, are not resistant to heat of 60°C. for half an hour and do not produce any haemolysin. When grown on chocolate they do not produce any green or yellow coloration and in broth form definite chains. Very little mention is made of this species in literature and they have not been found to be pathogenic.

Anaerobic streptococcus.

The question of the incidence and the participation of anaerobic streptococci in puerperal sepsis has recently been very much discussed. Many investigators have reported the isolation of obligatory anaerobic streptococci from the vaginae of normal and pregnant women. Krönig (1895) describes anaerobic streptococci and he and Menge (1897) seem to have been the first to demonstrate them in the vaginae of pregnant women. They have been reported by Douglas, Fleming & Colebrook (1920) as occurring in war wound and their presence in puerperal fever has been described amongst others by Schottmüller (1910-28), Harris and Brown (1929) and Colebrook (1930). Colebrook maintains that anaerobic streptococci are frequently in the vagina during pregnancy and that the incidence of infection has not been such as to suggest a contagious origin of the infection even though many of the cases required intra uterine manipulation during labour. He and Hare (1933) state that "anaerobic streptococci are often present in the lochia of women who do not have any fever, although seldom in great abundance" and they conclude that "anaerobic organisms rank second only to the group of haemolytic streptococci as causative agents of puerperal infection". White (1933) examined 50 women in the first/

first stage of labour, taking swabs from the upper part of the vagina. She found that out of 50 cases 18 had anaerobic streptococci, i.e., 36 per cent. Similarly swabs taken from women in the last month of pregnancy, out of 50 cases 15 had anaerobic streptococci, i.e., 30 per cent. She draws attention to the fact that often streptococci which fail to grow aerobically on primary cultures proved on subculture to be facultative anaerobes.

The possibility that anaerobic streptococci may sometimes be conveyed to the genital tract from other sources cannot, of course, be excluded, but an epidemic spread of this type does not seem to occur and attempts to isolate strictly anaerobic streptococci from the throat and rectum have so far been unsuccessful. Thus infection with these anaerobes may be deemed strictly autogenous, as they are present in the genital tract before delivery.

In the present investigation only one case in labour was found with a true anaerobic streptococcus and one puerperal case. Such a result can only be acknowledged as a failure and on considering Colebrook's early methods, when he examined 240 cases without isolating anaerobic streptococci, it is easily seen that the oversight on his part and also in the present investigation is partly due to the media and methods employed. In his latest paper (1933) he describes a new fluid medium (a tryptic digest of liver) which he has found much more suitable for their growth than the usual laboratory media. He also points out that anaerobic streptococci unlike haemolytic streptococci, or other aerobic varieties, are unable to multiply freely in human blood or serum unless the alkali reserve of the serum is abolished or reduced, or the anti-tryptic power of the serum neutralized.

Comparison of aerobic or anaerobic methods.

The carrying out of an investigation using both aerobic and anaerobic methods entails/

entails a considerable amount of labour. Apart from isolating true anaerobic streptococci there are several advantages in employing this double method. From Table 2. it will be seen that certain organisms grow more readily when cultivated anaerobically, whereas many grow as easily one way as the other.

Table 2.

Comparison of Results of Anaerobic and Aerobic Methods.

	Staphylo-:cocci.									Streptococci.				
	Albus.	Aureus.	Döderlein's Bacilli.	Diphtheroids.	Yeast.	Coliform Bacilli.	Gonococci.	B. Subtilis.	B. Proteus.	Non-haemolytic.	Haemolytic.	Viridans.	Enterococci.	Anaerobic.
Combined Methods.	114	12	64	28	30	62	3	6	2	42	1	25	33	1
Aerobic Method.	113	8	37	17	23	48	0	6	2	38	1	15	31	0
Anaerobic Method.	109	7	54	24	21	52	3	0	0	25	0	15	22	1

Staphylococcus albus and aureus, streptococcus viridans, yeast and coliform bacillus appear to grow equally well under either condition, whereas Döderlein's bacilli, gonococci and diphtheroids prefer anaerobiases; enterococci and non-haemolytic streptococci grow better in the presence of oxygen, while B. subtilis and B. proteus are strict aerobes. Allowance has to be made for the figures from the combined methods, as some of the strains isolated anaerobically may not be the same as those isolated aerobically, also the one swab was used for culturing both plates, so that some cultures may have been missed and only isolated on one or other/

other of the plates. When compiling the total of organisms isolated, the results of both methods were considered so that there is a greater accuracy than there would be if only one or other method was used.

Grades of Flora.

In analysing the bacterial contents of the vagina it was found necessary to adopt some standard by means of which a classification could be made. R. Schröder (1926) discussing degrees of leucorrhoea divided the vaginal contents into four divisions and similarly Baird & Cruickshank (1930) describing the vaginal flora in pregnancy made three divisions. A modified classification was adopted consisting of three divisions - Grade A. consists of Döderlein's bacilli in pure culture with epithelial cells, sometimes yeast is present, and a few leucocytes are visible. Grade B. has Döderlein's bacilli in small numbers, together with epithelial cells and numerous diphtheroids, with or without other scanty organisms, but no coliform bacilli; leucocytes may be present. Grade C. has an abundant and mixed flora including diphtheroids, cocci, sometimes coliform bacilli and frequently leucocytes (cf. Frontispiece). This classification differs from that of Schröder in that only the bacterial flora is considered and not the general condition of the walls of the vagina. Cruickshank & Baird did not include leucocytes, but in view of these being so constant a finding they have been added to the classification. The hydrogen-ion concentration has been shown by various writers (Logan, Baird & Cruickshank) to vary with the grade of flora and no attempt has been made to ascertain the reactions in any of the cases.

Proportions of the Grades A. B. & C.

Examination of the 200 smears showed that 96 (48 per cent) had a Grade A. flora, 32 (16 per cent) had a Grade B. flora and 72 (36 per cent) had a Grade C. flora.

Other/

Other workers have classified the vaginal flora, but it is difficult to compare results with them as their standards are not always quite the same and moreover the swabs were often taken by them earlier in pregnancy.

Table 3.

Classification and Proportion of Grades of Vaginal Flora of 200 Women in Labour.

Grade.	Characteristics of Bacterial Flora.	No. of Cases.	Per-centage.
A.	Döderlein's bacilli, epithelial cells, sometimes yeast and sometimes a few leucocytes.	96	48
B.	Döderlein's bacilli, epithelial cells. Diphtheroids. Other organisms scanty, or absent. Sometimes leucocytes.	32	16
C.	An abundant and mixed flora of diphtheroids, enterococci, staphylococci and coliform bacilli. Epithelial cells. Usually leucocytes. Döderlein's bacilli absent, or very scanty.	72	36

Logan, examining the flora of pregnant women found Grade A. to have a percentage of 63, Grade B. 9 per cent, and Grade C. 28 per cent, while Baird & Cruickshank in a similar examination had slightly lower findings in Grade A. and higher in Grade C. They found 56 per cent Grade A., 10 per cent Grade B. and 34 per cent Grade C.

Relationship of Grades A. B. & C. to subsequent puerperal infection.

An analysis of the puerperium of the 200 women was made and 155 (77.5 per cent) were found to have a normal puerperium.

Table 4/

Table 4.

Puerperium of 200 Maternity Cases.

	Normal.	True genital Sepsis.	Cases of Sepsis excluded.
No. of Cases.	155	35	10
Percentage.	77.5	17.5	5

Of the 45 abnormal puerperia 10 were excluded, as already explained, on grounds of not being true genital sepsis, thus leaving 35 true cases of puerperal sepsis, or 17.5 per cent. When these cases of sepsis are considered with the grades 15 were Grade A, 2 were Grade B. and 18 were Grade C.

Table 5.

Relationship of Grades A. B. & C. to Puerperal Sepsis.

	Normal Puerperium. 155			True genital Sepsis. 35		
Grade.	A.	B.	C.	A.	B.	C.
No. of Cases.	78	26	51	15	2	18
Percentage	50.32	16.77	32.90	42.86	5.71	51.43

Grades A. & B. are very similar and taking them together there are 104 with a normal puerperium, that is, 67 per cent of the normal puerperia have a Grade A. or B. flora, whereas only 32.9 per cent of Grade C. have normal puerperia. The 17 abnormal A. & B. Grades consisted of 4 cases with foul lochia, the other 13 being cases of pyrexia - 9 were primiparae and of these 8 had normal deliveries, but had perineal tears, so that sepsis may occur with a Grade A. or B. flora when there are lacerations. The multiparae had no tears or recent lacerations. In Grade C. there were 18 cases of true genital sepsis (51.43 per cent of all cases/

cases of sepsis) 4 were classed as foul lochia and the rest were all pyrexias or puerperal fever cases, 2 being removed to an isolation hospital.

From these figures it can be deduced that the type of flora of women in labour cannot be used as an indication of whether the puerperium will be normal or abnormal. The grade does not vary with primiparaeand multipara, but multiparae show less tendency to develop puerperal sepsis. The incidence of puerperal sepsis is twice as great with Grade C. as with Grades A. and B. which may be explained by there being a greater risk of endogenous infection by the potentially pathogenic bacteria which are found in Grade C.

Correlation of pathogenic or potentially pathogenic types of bacteria with the subsequent history.

The examination of the vaginal flora has shown that there are many different types of organisms. By comparing these findings with the subsequent history it is of interest to show what cases had an abnormal puerperium and to see, if possible, whether there is any tendency to develop sepsis when any special organism is present during labour. Of the 200 cases examined 35 had an abnormal puerperium ascribed to true genital sepsis, and these 35 cases will now be discussed. Here the difficulty arises of deciding what are true pathogens and from a point of interest all the organisms isolated are shown and their relation to the subsequent sepsis in Table 6.

Staphylococcus aureus was not very frequent, but out of the 12 cases 3 (25 per cent) had puerperal sepsis. Döderlein's bacillus is a non-pathogen, but it is of interest to note that only 9 cases (14 per cent) out of the 64 with this bacillus were deemed to have a septic puerperium, which corroborates the findings of Döderlein himself who considered the presence of these bacilli as a normal and good flora. Whether diphtheroids are pathogens or not is questionable, but especially if associated with/

with other organisms there is evidence of some sepsis, as 9 cases out of 28 with diphtheroids (32.1 per cent) were found to have an abnormal puerperium.

Table 6.

Incidence of Bacteria in 200 Women early in Labour and their relation to Puerperal Sepsis.

	Staphylo-:cocci.									Streptococci.				
	Albus.	Aureus.	Döderlein's Bacilli.	Diphtheroids.	Yeast.	Coliform Bacilli.	Gonococci.	B. Subtilis.	B. Proteus.	Non-haemolytic.	Haemolytic.	Viridans.	Enterococci.	Anaerobic.
All cases in labour.	114	12	64	28	30	62	3	6	2	42	1	25	33	1
Cases developing puerperal sepsis.	18	3	9	9	2	15	2	0	0	6	0	5	6	0
Percentage.	15.8	25	14	32.1	16.6	28.1	66.7	-	-	14.3	-	20	18.1	-

Coliform bacilli were fairly frequent, 15 out of 62 cases with coliform bacilli (24.1 per cent) developed sepsis, a figure not surprising when the possible pathogenic powers of coliform bacilli are considered.

In the streptococcal group there was only one case in labour with haemolytic streptococci and no sepsis developed. Of the 42 cases with non-haemolytic streptococci 6 (14.3 per cent) were considered to have puerperal pyrexia, while the figure for those with the streptococcus viridans is slightly higher, 5 out of 25 cases (20 per cent). Enterococci had a percentage of 18.1, that is, of the 33 women who harboured enterococci in the vagina during labour 6 developed puerperal sepsis. The only case from which anaerobic streptococci were isolated did/

did not develop sepsis.

Gonococci were seldom isolated, there were 2 cases of sepsis from the 3 women with this organism, but the numbers are too small to be of any value in estimating their effect on puerperal sepsis.

Bacteria isolated from cases with puerperal sepsis and their correlation with those isolated during labour.

During the puerperium an endeavour was made to examine bacteriologically cases with sepsis, with a view to determining the relationship of the organisms found with those previously isolated during labour. Here throat swabs, cervical swabs, blood cultures and urine were examined. Cases with foul lochia were not examined if there was no rise of temperature, as there was no standard for the degree of foetor.

Three cases of puerperal sepsis were found to have true haemolytic streptococci in the lochia and of these two had also the same organism in the blood stream. Vaginal cultures taken before delivery did not show the presence of haemolytic streptococci as two had the streptococcus viridans and the other had the coliform bacillus. Throat cultures gave pneumococci, streptococcus viridans and M. catarrhalis. All had normal labours with no lacerations or stitches, so that in all probability it may be said that the haemolytic streptococcus was introduced at or after the delivery.

Of the 9 cases with coliform bacilli found in the puerperium 6 had this organism before delivery, 8 out of the 9 had perineal tears and had stitches inserted. It is presumed that these puerperal cases with coliform infection were endogenous, but no serological tests were carried out to prove this.

Of the others examined in the puerperium one had abundant diphtheroids before and after delivery, but the streptococcus viridans was present, so it is impossible/

impossible to say whether the diphtheroids or the streptococci were responsible, as they may have had a combined influence on the puerperium. One other case with Döderlein's bacillus ante-natally had a subinvolution with pyrexia, and numerous diphtheroids were isolated post partum.

Summary.

I. A bacteriological study of the vaginal flora of 200 women in labour was made by examination of smears AND by anaerobic and aerobic cultural methods.

II. The bacteria isolated are discussed and described and a comparison of the results of anaerobic and aerobic methods is given.

III. The subsequent history of the 200 cases is correlated with the bacteriological findings before delivery.

IV. The relationship of bacteria found before and after delivery is discussed.

Conclusions.

It is very difficult to compare the findings of this investigation directly with those of other workers, because of the difference in technique and the criteria adopted. As far as haemolytic streptococci are concerned the findings substantiate the more conservative views of others, that these organisms are infrequent inhabitants of the normal tract before delivery. The results suggest that there is some risk arising from the organisms present before delivery. This risk cannot be neglected, especially in the case of the coliform bacillus, which appears to produce a certain amount of sepsis, an important source of infection which should be capable of reduction. By including both aerobic and anaerobic methods more accurate figures are obtained of the groups of bacteria present in the vaginal flora, but it is essential to carry out a special technique for isolating anaerobic streptococci, such as advocated by Colebrook (1930-33). The importance of trauma to the tissues during labour has a considerable influence on/

on the after development of sepsis. This is not surprising when it is considered that there is a large area of damaged tissues exposed to infection by organisms of diverse kinds and varied origin. What happens depends, as in all infections, on the nature and virulence of the organism, the amount of resistance to infection often associated with the local condition it finds for its multiplication, and the general resistance of the patient herself. This may account for the variation in clinical severity of cases caused by similar organisms and the almost inevitable failure of a prognosis based on bacteriological findings only.

I. The examination of the vaginal flora of 200 women in labour shows the presence of a great variety of potentially pathogenic and non-pathogenic bacteria. Döderlein's bacilli were present in 32 per cent; diphtheroids in 14 per cent; the staphylococcus aureus in 6 per cent; the enterococcus in 16.5 per cent; the streptococcus viridans in 12.5 per cent; the non-haemolytic streptococcus in 21 per cent, and the coliform bacillus in 31 per cent.

II. True haemolytic streptococci were only isolated from one case in labour, which did not develop sepsis. True haemolytic streptococci are infrequent inhabitants of the genital tract before delivery.

III. Anaerobic streptococci were found not to be frequent inhabitants of the genital tract either before or after labour. One case (0.5 per cent) in labour had the anaerobic streptococcus, but did not develop sepsis. One case of puerperal sepsis was found to have anaerobic streptococci.

IV. The presence of coliform bacilli, diphtheroids, staphylococcus aureus and gonococci in the vaginal flora before delivery may predispose to puerperal sepsis especially if there is laceration or injury to the tissues.

V. Potentially dangerous organisms are to be found in the genital tract before delivery which may not infect the patient.

PART II.

AN OUTBREAK OF PUERPERAL SEPSIS.

A. Survey.

B. Clinical Observations.

C. Bacteriological Findings.

D. Epidemiology.

Summary.

Discussion.

AN OUTBREAK OF PUERPERAL SEPSIS.

Introduction.

Many generations of physicians have given their observations and careful inferences from facts on puerperal sepsis, but in spite of these it was not until the work of Pasteur & Lister that the medical profession became convinced of the communicable nature of puerperal fever. Newsholme (1927) described the efforts of some early writers to establish their views. In 1773 Dr. Charles White of Manchester not only stated that "it (puerperal fever) is an infection from without" but that "it may sometimes arise from a self infection". Dr. A. Gordon of Aberdeen (1795) concluded that the cause of this disease was a specific contagion or infection and declared that "he himself was the means of carrying the infection to a great number of women". Oliver Wendell Holmes (1843) in his essay on "The Contagiousness of Puerperal Fever" said that "Puerperal Fever is communicated from one person to another, both directly and indirectly" and emphasised that it might be carried from patient to patient by physicians and nurses. In his final monograph written in 1855 entitled "Puerperal Fever as a Private Pestilence" he supported the views and experiences of Semmelweiss - Semmelweis had to contend with bitter and almost incredible opposition in the face of the clear cut evidence presented by him. He stated in 1860 that "Puerperal Fever is not a contagious disease, but is conveyable from a sick to a sound puerpera by means of decomposed organic material".

In spite of all the care exercised in isolating and treating patients and all the other preventive measures used by doctors and nurses, cases still do occur with disquieting frequency in some localities, and even severe institutional epidemics/

epidemics are reported from time to time. In the Aberdeen report on Maternal Mortality (1928 - Kinloch, Smith & Stephen) the high incidence of puerperal sepsis in the institutions in Aberdeen was admitted to be due to contagion. Watson(1928) described a severe epidemic in a New York Maternity Hospital and Meleney et. al. gave a detailed bacteriological investigation of the relationship of the spread in the same epidemic. MacGregor (1930) showed the course of outbreaks of puerperal sepsis occurring in three maternity hospitals in Glasgow, but no real bacteriological proof was offered of the actual spread from case to case. Smith (1931) carried out an extensive investigation to prove the sources of puerperal infections and showed that 12 out of 15 cases with streptococci pyogenes haemolyticus were found to have the same strain as that found in the throat or nose of the doctor, nurse or student in attendance.

Many minor and even major outbreaks have occurred and it is regrettable that the details of these are not always available. The following is a study of an outbreak of puerperal sepsis which occurred at the end of 1932 and the beginning of 1933 in a maternity hospital. For purposes of convenience the outbreak will be described under four headings:-

A. Survey.

B. Clinical Observations.

C. Bacteriological Findings.

D. Epidemiology.

Much of the information in Parts B. and D. has been acquired through access to the journals of the hospitals, but the bacteriology has been carried out by me personally and is given in Part C.

General Survey.

The incidence of puerperal fever whether in maternity institutions or in domiciliary/

domiciliary maternity practice varies considerably from time to time. Sometimes there is quite a marked increase, without evidence of an epidemic; the increase may be generalised, more evident in the hospital cases or vice versa. Table 1. shows the incidence of puerperal sepsis arising in a maternity hospital for the years 1932-1933 and the incidence of puerperal sepsis in the domiciliary maternity practice of the same county.

TABLE I.

INCIDENCE OF PUERPERAL SEPSIS

A. IN A MATERNITY HOSPITAL
B. IN DOMICILIARY MATERNITY PRACTICE IN THE SAME COUNTY.

These comparative statistics of the incidence of puerperal sepsis have admittedly many possible errors which will be discussed in full on page 91 , but they undoubtedly illustrate that at the last quarter of 1932 and the first quarter of 1933 although there is little or any increase in the non-institutional cases there is a phenomenal rise of cases in the maternity hospital. Between 28th October, 1932 and February 1933 there occurred in a maternity hospital a series of cases of puerperal sepsis which in their number, mode of incidence and type of infection constituted an epidemic during these months. 472 women were confined, of whom 58 (12.3 per cent) were considered to have contracted puerperal sepsis, with 5 deaths. Bacteriological investigation of 47 of the 58 cases showed the presence of streptococcus pyogenes haemolyticus in 28. Although this epidemic was well advanced before cultures were retained for a more detailed investigation, many of the strains were found to be identical by serological tests, thus proving a common source of infection. Swabs from the throats of the staff were taken and although many members were found to have the streptococcus pyogenes haemolyticus in their throats at the time of the outbreak, only two strains were proved to be serologically identical with the strains isolated from the vaginae of patients.

In an epidemic of this size a detailed description of each case of puerperal sepsis is impossible, but Table VII of the Appendix gives a short summary of each case while in the maternity and isolation hospitals, arranged in order of sickening. The numbers in red indicate that a streptococcus pyogenes haemolyticus was isolated from these patients. A similar summary of the bacteriological findings is given in Table II of the Appendix.

CLINICAL OBSERVATIONS.

I. General Type of Infection.

(a) Onset.

(b) Temperature and Pulse.

(c) Lochia.

(d) Duration.

(e) Three types - mild, moderate and severe.

(f) Post mortem findings.

(g) Complications.

II. Relation of Infection to-

(a) Type of confinement.

(b) Previous health and antenatal history.

(c) Number of examinations.

(d) Parity.

(e) Wassermann Reaction.

(f) Dick Test.

III. Treatment.

(a) Serum. Type of serum.
(1) Effect of prophylactic doses of serum.
(2) Serum rash.

(b) General therapeutics.

(c) Glycerine.

Summary.

CLINICAL OBSERVATIONS.

Under this heading there will be discussed the mode of incidence of the disease, its general course, treatment and the terminal results.

General type of infection.

The time after delivery at which the first rise of temperature or pulse occurred was very variable. In the great majority of cases this rise was sudden, usually to about 101-102°F. with some chill, but not severe enough to be classed as a rigor.

Table 2.

Onset of Puerperal Sepsis in relation to the Puerperium.

Day.	1.	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Total.
No. of Cases	2	6	6	16	9	2	2	3	4	2	4	0	0	0	1	0	1	0	58

The greatest number of cases sickened between the 2nd and 5th days of the puerperium, although in one-third of the cases infection did not occur until the 6th day or later, as shown in Table 2. In the majority of cases infection probably occurred at delivery or soon after it, but the late onset, as for example, four on the 11th day, one on the 15th day and another on the 17th day, suggests that the infection of some patients was taking place not at the time of delivery, but in the puerperium. The giving of antistreptococcal serum at the time of delivery or immediately after may have masked the initial rise of temperature and pulse so that the date of onset may have been earlier than those signs indicated. After the initial rise the temperature was usually maintained with slight remissions for several days, and in those who recovered a gradual fall took place to normal. At the time of the onset of pyrexia the pulse also rose

and/

and the two curves as a rule ran together, though there was a tendency for the pulse to increase before the temperature rose. The duration of fever and rapid pulse was variable, lasting from two days to four weeks. The mild cases settled in a week, but if there were any complications, such as a cellulitis, the charts showed a pulse rate of one hundred or more and a temperature of 100°F. or over for weeks on end before they actually settled.

The character of the lochia was in general foul and purulent and the amount was, in the mild or moderate cases, profuse lasting for about 14 days when it gradually diminished.

Classification of the disease.

The extent and severity of the infection in puerperal sepsis may vary considerably and for purposes of classification three groups have been recognised - mild, moderate or severe. Such a division is always made by the superintendent-physician of the isolation hospital himself, who is in daily attendance on the patients, so that in this classification the standard adopted throughout is the same. Mild cases are those in which the general condition is good, the temperature and pulse being elevated for a few days, without rigors or complications and with a general progressive improvement from the time of onset of the disease until dismissal at the end of two or three weeks. Moderate cases are those in which the temperature and pulse are elevated for a week or longer, often with remissions and a general delay in improvement: there may be complications developing in the second or third week and dismissal does not take place until about a month or longer after the onset of the disease. Severe cases are those in which the general condition is very poor and associated with severe complications.

Table 3/

Table 3.

Types of Cases of Puerperal Sepsis.

Type.	No bacteriological examination.	Examined bacteriologically.		
		No Haem. strept.	Haem. strept.	Total.
Mild	11	13	10	34
Moderate	0	2	17	19
Severe	3	0	2	5

Of the 58 cases of puerperal sepsis 34 were classified as "mild", 11 of these were not examined bacteriologically and of the remaining 23 haemolytic streptococci were not identified in 13. Haemolytic streptococci were found in the genital tract of 6, in the throats only of 2, and 2 in abscesses developing at the site of a serum injection. Hence ten (29.4 per cent) of the mild cases harboured the haemolytic streptococcus. The incidence of the streptococcus haemolyticus in the "moderate" cases is much more striking. Here there were 19 cases of whom 17 (89.5 per cent) were found to harbour haemolytic streptococci. Of the 2 "moderate" cases without haemolytic streptococci one had a serum abscess from which the staphylococcus aureus was isolated and the other had a definite pelvic cellulitis.

All the severe cases died, 3 were not examined bacteriologically and the other 2 had haemolytic streptococci isolated from the cervical canal before death.

Description of "severe" types.

Patient No. 4 was aged 21 years and a primigravida. When she was admitted to hospital she had been in labour for 24 hours, was very anaemic and debilitated. She was delivered with forceps: there was no vaginal or perineal tear; the placenta was incomplete and was removed manually; a post partum haemorrhage followed/

followed. She was very collapsed and was given 30 c.c. of anti-puerperal serum, followed by 40 c.c. on the next day, and a third dose of 40 c.c. on the 4th day of the puerperium. She sickened on the 6th day, was given glycerine treatment without success and died on 12th day of the puerperium. No post mortem examination was made, and she was not transferred to the isolation hospital.

Patient No. 10A was delivered a week after patient No. 4 and sickened on the 2nd day of the puerperium, that is 6 days after patient No. 4. She was 29 years of age, in her second pregnancy, and was delivered with forceps. The placenta and membranes were complete, there was some laceration of the vagina and a small perineal tear which was not stitched. At the delivery she was given 30 c.c. of serum, but sickened the next day, with a sharp rise of temperature to 103°F. She was isolated, but did not improve: she had frequent rigors, green sickness, and on the 10th day was transferred to the isolation hospital, where on admission she was found to be extremely ill with a severe peritonitis and congestion at the base of both lungs. She died 7 days later, that is on the 17th day of the puerperium. Haemolytic streptococci were isolated from the genital tract during life, and post mortem examination revealed an extensive peritonitis. The uterus was involuting but contained pus: there was congestion at the bases of both lungs.

Patient No. 11 was aged 30 years, in her third pregnancy, and had a spontaneous labour: there was a small perineal tear which required one stitch. Three days later she had a sharp rise of temperature and pulse, and was given 40 c.c. of serum. She was removed on the 9th day to the isolation hospital; by that time she was very ill, with rales and rhonchi in her chest, a profuse purulent lochia, a temperature of 102-105°F. and a very rapid pulse. Haemolytic streptococci were isolated from her vagina and she died on the 23rd day of puerperium. Post mortem examination revealed a large white kidney, congestion of the lungs, and a thrombophlebitis of the left iliac vein. The body of the uterus was full of pus.

Patient/

Patient No. 12B was reported to have had mental disturbance during the last two months of her pregnancy; she did not improve and was admitted for induction of labour because of insanity and general debility. On the night of admission, before any operative interference, she went into labour and delivered herself of premature twins. Her mental condition became worse and on the 4th day the temperature rose: she was given 100 c.c. serum, but died on the 9th day. No bacteriological examination was made and she was not removed to the isolation hospital. There was no post mortem examination, but there was evidently definite puerperal sepsis as indicated by her pulse and temperature. It is of interest to note that one twin died, the cause of death being "prematurity" on the third day, and the other survived, although it developed purpura haemorrhagica.

The fifth death in the outbreak was that of patient No. 14A. She was 24 years of age, in her second pregnancy, and she was delivered normally, with a slight tear which required one stitch. On the 4th day of the puerperium the temperature and pulse rose; although she had 30 c.c. of serum on that day and 70 c.c. next day the pulse rate remained about 130, and she had a temperature of 104°F. Two days after sickening she was removed to the isolation hospital where she died on the 13th day. No haemolytic streptococci were found on examination of the lochia, and no post mortem examination was held. Before death she developed a definite thrombosis of her left femoral vein and lost the power of speech, although there was no evidence of an embolism. She had an acute bronchitis and pus in her urine.

Although there were only 5 cases of puerperal sepsis of the "severe" type they all appear to have had rather a similar course: especially congestion of the lungs and thrombo-phlebitis of veins, which probably points to a direct spread of infection along the blood vessels rather than by the lymph stream.

Complications/

Complications.

All the puerperal sepsis cases had high temperatures and rapid pulses, together with profuse purulent discharges, but many of the cases developed complications later.

Pelvic cellulitis developed in 4 cases, 3 of which had had haemolytic streptococci isolated from the genital tract. Such cases eventually cleared up, but their stay in the isolation hospital was protracted for as long as 53, 57, 58 and 102 days. There were 2 cases of pneumonia, one with pleural effusion which was tapped, haemolytic streptococci being found in the fluid withdrawn: the convalescence was uneventful. There were 6 cases of abscesses forming at the site of insertion of the needle for an injection, 1 developing in the elbow after blood for a Wassermann test had been withdrawn. The staphylococcus aureus was responsible for the infection in an abscess in the thigh, but the streptococcus haemolyticus was found in the other abscesses, also in pus from a mastitis. The most common complication was serum rashes. All 58 cases received serum and of these 36 had severe rashes, usually urticarial, developing about the 5th to the 8th day and gradually fading. These rashes developed irrespective of whether the patient had had scarlet fever or puerperal fever on a previous occasion.

Some factors influencing the infection.

(a) Type of labour.

In this series of confinements the types of labour were very varied. For purposes of convenience they may be classed as normal and abnormal - normal deliveries being considered those in which there is no interference,manual or instrumental, abnormal including all types of instrumental labour, abortions which were cleared out, whether manually or otherwise, and any cases in which the placenta or/

or membranes had to be removed.

Table 4.

Type of Labour in 58 Cases of Puerperal Sepsis.

Normal Labour.		Abnormal Labour.	
No Tear.	Tears.	No Tear.	Tears.
19	15	17	7

Of 58 cases of sepsis there were 34 normal deliveries (58.6 per cent) and only 15 of these had lacerations of the vagina or stitches in the perineum. 24 cases may be termed abnormal, requiring interference at the labour and only 7 of these had tears or lacerations. From these figures it may be deduced that infection is just as liable to occur when the labour is normal as when it is abnormal.

(b) Previous antenatal health and supervision.

Much of the information regarding previous health and former confinements is in many cases very vague or indefinite through the information being obtained from the patients themselves. The information as to whether or not they have had scarlet fever is often unreliable and their descriptions of ailments during pregnancy are rather misleading. Eight patients stated that before admission they were in bed with "influenza" or "bad colds" neither of which term really means anything, except that before the onset of labour there may have been some degree of debility.

80 per cent of the patients with puerperal sepsis had antenatal supervision. Many cases were diagnosed and treated for albuminuria and by the time they came to be delivered they were cured of this condition, but here again the information as to what supervision the patients actually received is misleading. A woman may be said to be having antenatal treatment who has attended a maternity clinic or her own/

own doctor on perhaps only one occasion, so that for purposes of assessing the value of antenatal treatment in this investigation no value can be attached to the information given.

Number of vaginal examinations while in labour.

Much importance has been attached to the number of vaginal examinations made on a woman in labour before and after admission. The type of case admitted to hospital may be a "booked case" and consequently has not been examined before delivery. She may be a case sent in after being attended by a midwife or doctor, either or both having examined her many times. Examinations may have been many, but carried out aseptically, or the examination may have been on a single occasion, but that once may have introduced infection. The relationship of the number of examinations, whether before or after admission to hospital to the incidence of subsequent sepsis, has not been considered although information was collected with regard to the number of examinations made by midwives and doctors before admission and by the staff after admission.

Parity.

Table 4A.

Number of Pregnancies.

Parity.	1	2	3	4	5	6	7	8	9	10	11	Not Noted.	Total.
No. of Cases.	28	8	3	5	2	2	1	3	1	-	1	4	58
Percentage of all septic cases.	48.3	13.8	5.2	8.6	3.4	3.4	1.7	5.2	1.7	-	1.7	6.9	100

There were 28 (48.3 per cent) primigravidae and 26 multiparae in the series of 58 cases of puerperal sepsis, and 4 cases in which the parity was doubtful.

Wassermann/

Wassermann Reaction.

The Wassermann test was carried out in 39 cases, 4 of which were weak positive; the other 35 were all negative. Of the weak positive cases patient No. 8 had persistent vomiting throughout pregnancy and made a very slow recovery, after sickening from puerperal fever; patient No. 10A was extremely ill and died of a generalised peritonitis and pneumonia; patient No. 15 had albuminuria during her pregnancy and had a fairly long convalescence; patient No. 20A had also albuminuria during her pregnancy and there was an abortion before admission.

Little can be deduced from such a small series of figures, except that when the Wassermann reaction is positive there is a tendency to have a poor antenatal history and a slow convalescence.

Dick Test.

Dick & Dick (1924) found that solutions of the exotoxin derived from cultures of the haemolytic streptococci from cases of scarlet fever may be employed in a skin test to determine susceptibility to scarlet fever. The test consists of the intradermal injection of a standardised dose of toxin into the flexor surface of the forearm. An area of reddening after injection represents varying degrees of susceptibility to scarlet fever. Following the Dicks' notable demonstration of an intradermal reaction in people susceptible to a culture filtrate of haemolytic streptococci from scarlet fever many investigations and reports were carried out and published. Burt-White (1928) examined 100 pregnant women and found no evidence that patients with a positive Dick test were more susceptible to invasion by the haemolytic streptococci in the puerperium. Stent (1930) as a result of her investigations stated that immunity to streptococcal toxin measured by the Dick test did not decrease the liability to puerperal fever. Cruickshank & Baird (1930) investigated the Dick test in relation to puerperal sepsis by carrying out the test on 600 women in labour or late pregnancy, and studying the subsequent/

subsequent puerperia. They found that women who reacted positively to the Dick test were not more liable to develop puerperal sepsis than were negative reactors. However, infection when it occurred tended to be more severe in the Dick positive than in the Dick negative cases.

35 of the 58 cases of puerperal sepsis were tested for the Dick reaction soon after admission to the isolation hospital, that is about the third day after they sickened. Many of the patients were unable to state definitely if they had had scarlet fever and for this reason the findings have been classified into 3 groups,

Table 5.

Relation of Puerperal Sepsis Cases to the Dick Test.

Reaction to the Dick Test.	Positive.	Negative.
Patients who had had scarlet fever.	0	11
Patients who had not had scarlet fever.	2	18
Patients unable to state whether or not they had had scarlet fever.	0	4

according to whether they were able to state if they had had scarlet fever or had not.

In such a small series of cases little can be said about the findings, but evidently the fact of having had scarlet fever did not prevent the development of puerperal sepsis. Of the 2 Dick positive cases patient No. 14A died on the 13th day of puerperium, but no haemolytic streptococci were isolated from her genital tract: the other, patient No. 44C, had haemolytic streptococci in her vagina, but was dismissed well after 29 days in the isolation hsopital.

Treatment.

There were 3 main lines of treatment - serum therapy, general therapeutics and/

and glycerine treatment.

Serum Therapy.

The success of anti-diphtheritic serum has led to the preparation and trial of various kinds of sera in the treatment of bacterial diseases.On the assumption that streptococci are the chief causal organisms anti-streptococcal sera have been extensively used in puerperal sepsis, with varying results. Various workers (Smith, Mackie & McLachlan, Andrewes & Christie) have shown that the haemolytic streptococcus cannot by any known method be grouped into the special varieties causing puerperal fever, scarlet fever erysipelas and pyogenic infection. In streptococcal infection the organism does not produce profound symptoms, due to absorption of its exotoxin from a local infection, but can invade the tissues to the extent of producing pyogenic and general septicaemic conditions. Thus before an individual can be considered immune to the streptococcus her tissues must have anti-bacterial as well as anti-toxic qualities. It is believed that in streptococcal infection as anti-toxic serum, whether prepared from scarlet fever, erysipelas or puerperal fever strains, will help to combat the exotoxic action of these organisms, but will have little value in eradicating the bacteria after tissue invasion has occurred. Referring to the uses of serum in Puerperal Sepsis the Aberdeen report on Maternal Mortality (1929) said that "the exotoxin will be neutralised by any monovalent anti-toxin, but for the destruction of the organisms a type (serological) specific anti-bacterial serum would be required".

Serum was administered to every case of puerperal sepsis while in the maternity hospital. The kind used was the puerperal streptococcal anti-toxin prepared by Messrs Parke, Davis & Co. The amount given varied with individual cases, as also did the time of administration. Table VII of the Appendix shows the individual doses and the dates on which they were given. The total dosage per/

per patient is shown in Table 6.

Table 6.

Dosage of Serum given to 58 Cases of Puerperal Sepsis.

No. of c.c.	10	20	30	40	50	60	70	80	90	100	130.
No. of patients.	1	1	2	5	1	3	7	5	3	29	1

from which it will be seen that 58 patients received 3,230 c.c. of serum, an average of 55.7 c.c. per person.

The prophylactic value of serum has been reported upon by Thomson & Cameron (1931) who reduced the incidence of puerperal infection in hospital by half through giving prophylactic doses of serum before delivery. Thomas (1932) has pointed out that the real test of the value of serum is when there is an actual risk of infection, as experienced in a puerperal ward where many cases of sepsis are congregated together. In the present series only 8 out of the 58 cases of puerperal sepsis received prophylactic doses at the beginning of labour and only 1 of these was found to harbour haemolytic streptococci in her genital tract. Moreover each of these cases received in addition to the prophylactic dose at least 60 c.c. of serum at or following delivery, so that it is difficult to assess the actual effect of the serum. Since all cases received serum treatment either at delivery or later, the effect appears to have been beneficial, but how much of improvement shown in pulse and temperature was due to the serum, or to the other therapeutic measures employed, it cannot be determined. There were 5 deaths in the series of 58 and 2 of these received serum in prophylactic doses.

It is of interest to note that many of the patients (36 out of 58) developed rashes following the administration of the serum, resulting in a temporary increase of temperature, pulse, and general discomfort. These rashes were usually/

usually urticarial in type and appeared about the 5th to the 8th day after the first dose of serum. The amount of serum did not influence the severity of the rash. There was no relationship between the development of the rash and the severity of the puerperal sepsis.

One patient with a very septic vagina resulting from severe lacerations and a perineal tear was given 50 c.c. of antigas gangrene serum in addition to puerperal serum and made an uneventful recovery. Another patient with pneumonia was given 100 c.c. of Type I and II anti-pneumococcal serum with excellent results.

General treatment.

General treatment varied with the individual patient, but all were treated in the Fowler position, were well purged and were sponged if they had a hyperpyrexia. Involution of the uterus was encouraged with doses of quinine or pituitrin and sleep was encouraged by the use of chloral and bromide when necessary.

Glycerine Treatment.

The introduction of glycerine as a local treatment in puerperal sepsis has met with considerable popularity. Glycerine drainage of the uterus has been used extensively at St. Mary Abbot's Hospital, London, and in many other British hospitals large and small, and has been found by many to have a beneficial effect in cases of local uterine sepsis. The therapeutic value of glycerine is attributed mainly to its physiological action in producing osmosis, which results in the bacteria being washed away from the inflamed tissues: it has also a definite bactericidal or antiseptic effect. Although all agree that it is beneficial in treatment some Kyle (1931) maintain that in glycerine there is a bio-chemical factor responsible for the good results obtained.

In this investigation all the cases removed to the isolation hospital were treated with glycerine after admission. The vagina was gently douched with Izal (1 per cent)/

(1 per cent): a catheter was then inserted into the uterus, frequently allowing the escape of pus. After this evacuation of pus 60 c.c. of glycerine and iodine (iodine one per cent) were gently introduced, the amount varying with the size of the uterus. This treatment was repeated three times in the day, but often one or two applications were sufficient as involution of the uterus was rapid after treatment was started. Some individuals required treatment for three or four days before there was any satisfactory response. Some of the cases were treated with a self retaining catheter, the catheter being left in the uterus for 3 - 4 days, while the others had the catheter reintroduced at each injection.

46 cases were treated with Izal douche and glycerine and iodine drainage with excellent results, there being only 3 deaths. Improvement in the general condition was very marked following the glycerine treatment. One great advantage was that in the majority of the cases it was possible to start the treatment very soon after the onset of the disease, an advantage seldom possible in sporadic cases sent in to the isolation hospital when the disease is as a rule more advanced and the response to treatment less rapid.

Summary of clinical observations.

I. Some clinical observations are given on 58 cases of puerperal sepsis occurring in one epidemic.

II. The general type of infection is discussed in regard to onset, general course of the disease and complications. Five fatal cases are described with the post mortem findings in two of these.

III. The relationship of the infection to the type of confinement, previous health, antenatal history and parity is given together with the results of the Wassermann and Dick tests.

IV. The effects of general treatment, serum therapy and glycerine drainage are discussed.

BACTERIOLOGICAL INVESTIGATIONS.

I. Introduction.

II. Methods -

(a) Isolation and cultivation of strains of streptococcus pyogenes.

(b) Preparation of agglutining antisera.

(c) Preparation of organisms for agglutination and absorption tests.

(d) Direct agglutination tests.

(e) Absorption tests.

(f) Blood cultures.

III. Results -

(a) Blood cultures.

(b) Preliminary classification.

(c) Preliminary agglutinations.

(d) Absorption tests.

(e) Swabs from laundry, walls, dressings, etc.

(f) Throat swabs of (1) patients, (2) staff.

Discussion.

Summary.

Conclusion.

BACTERIOLOGICAL INVESTIGATION IN AN EPIDEMIC OF PUERPERAL FEVER.

Introduction.

This epidemic, like most others, was well under way before it was recognised as such. Nearly all the early cases had had vaginal swabs examined bacteriologically, thus giving definite evidence of the actual presence of the streptococcus pyogenes as the infective organism, but, until the epidemic was notified, no cultures were preserved. This meant that many strains were not available for purposes of agglutination and agglutinin absorption tests.

Between 28th October 1932 and 17th Feburary 1933, 58 patients were notified as suffering from puerperal pyrexia or fever; 11 of these were not examined bacteriologically and out of the remaining 47, 28 were found to harbour the streptococcus pyogenes. 17 strains from patients were retained and preserved, 14 from the vaginae, 2 from throats and 1 from an abscess. Swabs were taken from the throats of the whole staff and 11 strains of haemolytic streptococci were obtained. Besides these acquired at the time of the epidemic, subsequent strains from sporadic cases of sepsis in the hospital were kept. It was decided to have the nurses throats swabbed weekly as a routine and the bacteriological findings of these for more than a year prove of interest (cf. chart, page 60).

In the classification of streptococci the majority of investigators agree in considering that streptococci may be separated from other organisms as a tribe chiefly on morphological grounds and that the haemolytic streptococcus as a species may be differentiated by testing for true haemolysis (cf. Part I, page 3). There is ample evidence that many serological types are included within the haemolytic streptococcal group (Dochez et. al. 1919: Griffith, 1926-27: Smith, 1926: Mackie & MacLachlan, 1928). The technical difficulties encountered in such studies are far greater with streptococci of the haemolytic type, because these strains form/

form long or moderately long chains which give a very granular growth in broth and often refuse to yield a diffuse suspension in saline. They appear to be subject to uncontrollable antigenic variations so that repeated tests on a single strain may give inconsistent reactions and there is also a great degree of antigenic overlap. Recent studies (Lancefield 1928) have shown that the streptococcus haemolyticus has three antigenic components: (a) a nucleo-protein, which gives cross agglutination with antisera prepared against related types, extending into the non-haemolytic group and thus yields no serological differentiation: (b) various polysaccharide antigens which are specific for the group streptococcus haemolyticus, but are shared in common by all the serological types within that species: (c) a protein antigen which shows type-specificity and differentiates various serological types within the haemolytic streptococcal group.

Such evidence shows that even when strains of streptococci have been isolated and proved to be haemolytic, there are considerable difficulties in establishing the similarity of two or more strains. Recent workers (Smith, Meleney et. al. and Andrewes) have shown the necessity for complete reciprocal agglutination and complete reciprocal absorption of agglutinin tests. Such a relationship brings very strong evidence in favour of the common origin of such strains and the probable sources of infection in an epidemic may be determined by this method. It was thought that such a study of the 28 available strains of haemolytic streptococci (10 nurses and 15 patients) from this epidemic, might indicate whether or not it was a true epidemic coming from a single source, and if so, whether or not the organism was being carried by a member or members of the attending staff.

Methods.

Isolation and cultivation of the strains investigated.

Swabs for examination were received within a few hours of their being taken. Blood/

Blood agar plates (5 per cent defibrinated horse blood) were inoculated by successive strokes. After 24 hours incubation numerous colonies of streptococcus pyogenes were generally visible and from one of these a second blood agar plate was sub-inoculated, also by successive strokes. After incubation overnight tests were carried out for haemolysis (see Part I. page 4) and if satisfactory, cultures were added to minced meat (Bullock's heart) broth, sealed with wax and stored at-2°C. Cultures preserved in such a way remained viable for at least 12 months (often longer). Cultures were also maintained on serum agar and kept at -2°C. They required to be subcultures at intervals of 5 - 6 weeks.

Preparation of agglutinating antisera.

The organism was grown from 18-24 hours in 15 c.c. of Hartley's broth then transferred to a 250 c.c. flask of broth (P.H. 7.6 and no glucose). After incubating at 37°C. overnight the cultures were centrifuged until the growth had sedimented. The organisms were then resuspended in carbol-saline and the emulsion standardised to 4,000 million organisms per c.c. The cultures were killed by exposure to 57°C. for 30 minutes. Rabbits (preferably grey chinchilla) were inoculated intravenously, 3 days in succession, every week with gradually increasing doses of organisms, beginning with 500 million in 0.5 c.c. of saline. When the dosage reached 4,000 million this quantity was not increased, but was repeated at each subsequent injection. About 6 - 7 weeks elapsed before the titre of the serum was tested. A week after this, provided the end titre was satisfactory, the animal was bled, its serum carbolised (0.1 of 5 per cent phenol to each c.c. of serum) and stored in the refrigerator. The end titre varied from 1 in 960 to 1 in 3,840. As two months were required for the preparation of an agglutinating serum the method was tried of giving an intravenous injection of 25,000 million organisms detoxicated by 1 per cent

gold/

gold chloride, followed a week later by a dose of about 10,000 million untreated living organisms (see Osman 1927, also Mackie & McLachlan, 1928). By this means a potent serum was obtained in certain cases after about 14 days, but there was a considerable loss of animals until the dosage was diminished. The end titre was 1 in 960 to 1 in 1,920. This gold chloride method was finally abandoned as being too extravagant on rabbits: further the potency of the serum tended to diminish considerably after a few months. Serum prepared by the slower method did not show any appreciable change in titre even after being kept for 12 months.

Preparation of organisms for agglutination and absorption tests.

The strains to be tested were grown in flasks of Hartley's broth for 24 hours, but if the growth was scanty the cultures were incubated for 48 hours. In all cases the growth was extremely granular and when a unifrom emulsion for an agglutination test was required transplants of the organism were made in Hartley's broth daily until a non-granular emulsion was obtained - this usually required 15-20 transplants and even then often tended to be granular. Emulsions thus transplanted and resuspended in saline were then put in the shaker for 10-15 minutes, swung for about 3 minutes and the saline suspension standardised to a suitable density (Brown's Scale I.). The difficulty of obtaining a really stable emulsion could often be overcome by using Hartley's broth as a diluent instead of saline. The preparation of a stable emulsion was often extremely difficult and after many attempts the method described was adopted. If the control tube showed any trace of granularity, with a good dark background illumination it was not considered perfect and the test was repeated.

Direct agglutination test.

The test was performed by making a geometric series of serum diluations from 1/15 up/

1/15 up to a dilution half that of the end titre of the serum. To each of the dilutions an equal volume of bacterial emulsion was then added and the mixtures of serum and emulsion transferred to narrow agglutination tubes. At 55°C. in the water bath it was found that there was a decided tendency to spontaneous agglutination and therefore, as advocated by Mackie & McLachlan (1928) all agglutinations were conducted at 37°C. in the incubator. After 2½ hours incubation the tubes were withdrawn from the incubator and left on the bench for 15 minutes before the readings were recorded. The end titre of the serum was taken as the highest dilution in which flocculation was seen with the naked eye. (Readings were again taken after standing on the bench overnight).

Slide method of agglutination.

Griffith (1926) in his work on the types of streptococci in scarlet fever used a quick method of testing for agglutination. He put emulsions on a slide with drops of sera diluted to 1:10 and examined for evidence of clumping. After a brief trial this method was abandoned by me as spontaneous agglutination was so prevalent as to make the results untrustworthy.

Absorption tests.

A considerable excess of bacterial emulsion has to be employed for saturation. Organisms freshly isolated from primary cultures or from meat broth cultures were grown for 18 to 24 hours in Hartley's broth and separated from the medium by centrifuging. Emulsions of the organisms in saline were then made and their quantity determined. The amount of organisms required to absorb 0.7 c.c. of a 1/15 dilution of serum was next determined: then into 2 tubes (3 X 0.25) the determined amount of organisms was placed and swung to dryness. To one of these 0.7 c.c. of a 1/15 dilution of serum was added, firmly corked, put in the shaker and/

and shaken at 37°C. for 3 hours. The tube was swung and the supernatant serum transferred to the second lot of emulsion and again shaken at 37°C. for 3 hours. The effect is to absorb agglutinins without diluting the serum to any extent and it can be repeated as often as required. The treated serum was then separated in the centrifuge and pipetted off. After storage overnight in a refrigerator two series of dilutions were prepared and the serum tested against the absorbing strain and the serum's own strain.

Blood cultures.

3 c.c. of blood were withdrawn in a sterile syringe and added to a flask of Hartley's broth (40 c.c.) to which 0.15 per cent sodium citrate had been added and incubated at 37°C. It was examined at the end of 2 and 7 days when subcultures were made on blood agar and the broth examined for the presence or absence of organisms.

Bacteriological results.

A short summary of all the bacteriological findings is shown in Table II. of the Appendix.

Table 7.

Results of Blood Cultures.

	Sterile.	Coliform Bacillus.	Staphylococcus Albus.	Total.
No. of Cultures.	28	2	6	36

Blood Cultures.

Thirty-six patients had blood withdrawn for blood cultures; four of these were repeated. In no case was the streptococcus pyogenes isolated. Two cultures had coliform bacilli (15; 18). Patient No. 15 had the streptococcus pyogenes/

pyogenes vaginally and the type of fever was moderate. Patient No. 18 had the streptococcus pyogenes vaginally five days after she sickened and again when tested 10 days later. She also had an abscess of her arm due to the streptococcus pyogenes and the type of fever was moderate.

The high percentage (77.8 per cent) of sterile cultures may perhaps be explained by their not being taken at the early onset of pyrexia. All the cultures were taken on the day after admission to the isolation hospital, which meant that in many cases the temperature had or was beginning to subside..

Table 8.

Preliminary Classification of Specimens examined for streptococcus pyogenes.

Source.	Positive.	Negative.	Total.
From patient's vaginae	23	23	46
From abscesses of patients	4	-	4
From throats of patients	4	31	35
From throats of the staff	28	21	49

Preliminary classification of specimens - Table 8.

The primary examination of swabs taken from the patients' vaginae and throats and from the throats of the staff pointed to an infection due to the streptococcus pyogenes and accordingly as many strains as possible were preserved and antisera prepared with a view to grouping the strains. Five antisera were prepared to begin with and later four others were prepared. Every strain isolated was then tested against the sera and this preliminary test seemed to indicate clearly that the great majority of the strains from the patients fell into one agglutinative group (see Table III of Appendix).

Preliminary/

Preliminary classification of strains in a main agglutination group.

Nine strains which appeared to belong to this group by agglutinating the sera up to their full titre were from the vagina, similarly there was one strain from an abscess and one from the throat of a patient. All these strains were isolated from patients who had been delivered in Pavilion IV. except that of the throat 42T which was from Pavilion III. It will be shown later that 42T was dissimilar from the other strains.

Table 9.

Preliminary classification of strains in main Agglutination Group.

Source.	Positive.	Negative.	Total.
From patients' vaginae	9	5	14
From patient's abscess	1	-	1
From patients' throats	1	1	2
From throats of staff	2	8	10

Only two of the staff N.30 and N.32 showed any inclination to agglutinate up to a high titre. N.30 was in attendance in Pavilion IV. and N.32 was in charge of the Isolation Pavilion. When two or more strains came from the same patient or nurse they always reacted in a similar manner.

Results of the absorption of agglutination tests.

As some strains were found to be similar it was now decided to prove, if possible, that these strains were identical. Although a preliminary classification had been made it was thought advisable to carry out absorptions with all the strains to obviate any strain having been overlooked through not having agglutinated to its full power. This entailed more work and was subsequently shown/

shown to be unnecessary as no other similar strains were discovered by this means. The results are shown in Table IV. of the Appendix, and are summarised below in Table 10.

Table 10.

Final Classification of 28 Strains of streptococcus pyogenes haemolyticus.

Antigenically Identical.		Probably Identical.		Not Classifiable.	
Complete reciprocal agglutination and agglutinin absorption tests.		Complete agglutination and complete absorption of agglutinin.		Partial or no agglutination. Partial or no absorption of agglutinin.	
Strain.	Source.	Strain.	Source.	Strain.	Source.
17	Patient's vagina	15	Patient's vagina	37	Patient's vagina
18	" "	19	" "	37T	" throat
21	" "	22A	" "	40	" vagina
N.30	Nurse's throat	22B	" "	42	" "
N.32	" "	35B	" "	44A	" "
		38	" "	44B	" "
		41A	" abscess	44C	" "
		N.30	Nurse's throat	N.6	Nurse's throat
		N.30	" "	N.6	" "
		N.32	" "	N.6	" "
		N.32	" "	N.9	" "
				N.15	" "
				N.19	" "
				N.22	" "
				N.27	" "
				N.39	" "
				N.44	" "
				S.H.	" "

All the nine strains from the vaginae absorbed the sera completely, as also did the strains from the two nurses' throats and from the abscess. The throat strain from patient No. 42, however, refused to absorb completely although repeated on several separate occasions. No strain which did not fall into the preliminary group gave complete absorption.

Thus five strains were shown to give not only complete reciprocal agglutination/

agglutination, but also complete "mirror" absorption; seven more strains completely agglutinated the five sera to their end titre and completely absorbed the agglutinin in the same absorptive doses as the strains of the sera. One throat strain 42T. fell outside this group by not absorbing the sera.

Result of agglutinations with scarlet fever sera.

Very early in the epidemic a patient who had been a contact with scarlet fever was admitted to Pavilion IV. and it was suggested that she might have been the cause of the epidemic. She herself did not develop scarlet fever or puerperal fever, but in order to eliminate this suggestion of infection, agglutinations were tried with the isolated strains against Types I., II., III. and IV. of scarlet fever with a negative result, except that there was an agglutination to a quarter titre with Type IV; this agglutination was similar to a control done with a strain from a different maternity hospital and no importance is attached to it as there was no absorption. These negative findings do not necessarily rule out the possibilities of this case being the primary source of infection since a proportion of scarlet fever strains are not agglutinated by Types I. to IV.

Results of examination of hospital fittings, walls, etc.

The possibility of the infection arising from other sources than patients was considered and investigated. Supplies of sterile dressings etc., for the whole hospital were sterilized in the one autoclave (Pavilion II) and examination of these dressings gave sterile cultures even when taken from the supply in Pavilion IV. Supplies of vulvar pads kept in the wards are not sterile and these were investigated. No haemolytic streptococci were found, but it is of interest to note that the makes of several of these pads, supplied by well known makers and advertised as hygienic gave a very mixed flora.

Cultures/

Cultures from the walls, floors, etc., of the labour rooms and wards in Pavilion IV. in no instance yielded haemolytic streptococci, and similarly cultures from the linen, the laundry, and the throats of the laundry staff gave no haemolytic streptococci; these examinations, however, were not made until the epidemic was well advanced.

The water and milk supplies were not investigated as they supply the whole hospital and surrounding districts.

Result of throat swabs.

The results of examination of the swabs taken from throats will be divided into three parts:-

A. Patients' throats.
B. Staff throats (at the time of the epidemic).
C. Staff throats (for 1 year following the epidemic).

A. Patients' throats.

Of the 58 notified patients 35 had swabs taken, and of these, only 4, were positive for haemolytic streptococci.

Table 11.

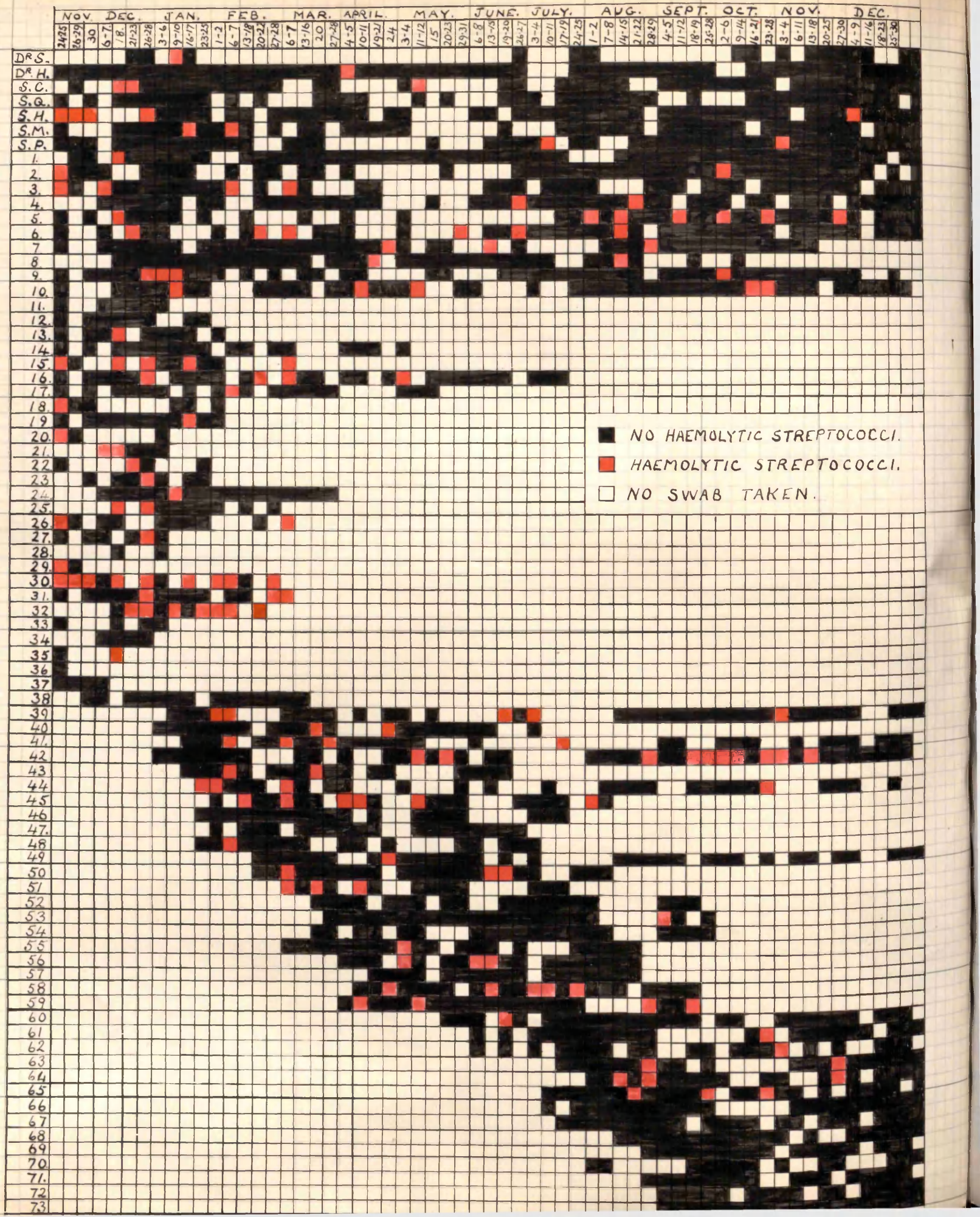
Results of Examination of 58 Patients' Throats.

	No haemolytic streptococci.	Haemolytic streptococci.	Not Examined.	Total.
No. of Throat Swabs.	31	4	23	58

Many of the throats were examined more than once. Thirty cases were notified before the first two positive throats were found and on a second examination three days later both throats were negative - no cultures of these were available for further investigation.

Towards the end of the epidemic two patients (Nos. 37 and 42) had on examination/

CHART I.


NOV. DEC. JAN. FEB. MAR. APRIL. MAY. JUNE. JULY. AUG. SEPT. OCT. NOV. DEC.
24-25 26-29 30 6-7 18 21-23 26-28 3-6 9-10 16-17 23-25 1-2 6-7 13-18 20-24 27-28 6-7 13-16 20 27-28 4-5 10-11 19-25 24 3-4 11-12 15 20-23 29-31 6-8 13-15 19-20 26-27 3-4 10-11 17-19 24-25 1-2 7-8 14-15 21-22 28-29 4-5 11-12 18-19 25-28 2-6 9-14 16-21 23-28 3-4 6-11 13-18 20-25 27-30 4-9 11-16 18-23 25-30
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NO HAEMOLYTIC STREPTOCOCCI.
HAEMOLYTIC STREPTOCOCCI.
NO SWAB TAKEN.

INCIDENCE OF HAEMOLYTIC STREPTOCOCCI IN SWABS TAKEN WEEKLY FROM THE THROATS OF THE NURSING STAFF OF A MATERNITY HOSPITAL.

examination, haemolytic streptococci in their throats. Strain 37T was found neither to agglutinate nor absorb the epidemic strains, and strain 42T although giving agglutination would not absorb completely any of the prepared sera, and so was excluded from the final group.

B. Result of examination of the throats of the staff during the epidemic.

Routine swabbing of the staff was not started until 24th November, by which time 9 cases had been notified, so that the findings before that date are not considered.

Table 12.

Results of Examination of Throat Swabs of the Staff during the Epidemic.

	Found negative for Haem. strept. on every occasion.	Found positive on one occasion only.	Found positive on more than one occasion.	Total.
No. of staff	19	23	13	55

The results deal with the staff between 24th November and 18th February, a period of 13 weeks. During that time there was a change of pupil midwives, so that actually 55 throats were examined, including nurses, sisters and doctors. The findings are shown on Chart I. Nineteen were on every occasion negative; 23 had a "positive throat" once, and 13 had haemolytic streptococci on more than one occasion. From a study of Chart I. it is evident that N. 9; N. 16; N. 30 and N. 32 were definite carriers, and on investigating these N. 30 and N. 32 fell into the "epidemic group".

C. Results of Throat Swabs of Staff for 1 year after the Epidemic.

The taking of throat swabs weekly from the staff was started as a routine procedure and a bacteriological study was made of these. From Chart I. it will be/

be seen that although sporadic haemolytic streptococcal throats occurred, there were very few which showed a tendency to recur. It must be admitted that many of the results may have been due to a casual infection, and that only those with several "positives" can be considered as carriers.

DISCUSSION.

Type of organism.

On isolating the haemolytic streptococci from blood agar plates and transplanting them into broth a striking similarity was noticed in some of the strains: this was the "rough matt" quality of the colonies and was especially noticed in those cultures from the vagina. In the throat strains very few showed this peculiarity. Lancefield & Todd (1928) say that only type specific antibody is removed by the "matt", but not by the "glossy" homologous organisms, and this may account for the sera appearing to be "type" and not "group". This is also remarked on by Andrewes & Christie (1932).

Virulence.

Cowan (1932) found that smooth forms of haemolytic streptococci were more virulent for mice. Eagles (1928) found in some strains that the rough forms were more virulent, while in others the smooth forms were more virulent than the rough. Andrewes & Christie (1928, p.34) explain this difference of appearances by the suggestion that there is a dissociation into colonies of two kinds, with some intermediate varieties. These findings were not corroborated, as in all the vaginal strains only rough or matt colonies could be isolated. The virulence of the strains may be considered intermediate, as only 5 deaths occurred.

Haemolysis.

After 12 months, cultures from the meat broth were again tested for their haemolysing/

haemolysing power and it was found that the strains had still retained their power of producing haemotoxin.

Throat swabs.

Although "colds" were very prevalent at the time of the outbreak streptococci were only found in four of the throats of notified patients. No swabs were taken of the other patients so it is impossible to assess the actual amount of "positive" throats amongst the patients. Although little is known of the effect of pregnancy on resistance to bacterial infection, there is some reason to believe that pregnant and parturient women enjoy increased powers of defence. Such resistance would explain the rarity of sore throats even among women who have temporarily become carriers of virulent streptococci.

That so many of the nurses had "positive" throats is well shown in Chart I. Many of the strains were not obtainable and a carrier may thus have been overlooked. It is very striking that very few nurses had a sequence of weeks with haemolytic streptococci in their throats, but in the cases of N. 30 and N. 32 there is repeated evidence of a throat infection for several weeks. These nurses may be classified as carriers, especially as their strains have been shown to be identical. Whether N. 30 and N. 32 started the epidemic, or contracted the infection while on duty cannot be said. N. 32, however, always worked in the Isolation Pavilion, where she would be constantly exposed to infection. N. 30 was in Pavilion IV. and delivered several of the early cases which developed puerperal sepsis, including patient No.12B who died. Patient No. 21 had a similar strain to N. 30, by whom she was delivered, but by that time the epidemic was well advanced so that the sepsis of this patient may have been acquired from the generalised infection.

That many of the staff were using antiseptic gargles was very evident when the weekly swabbing started, but this gargling was not carried out very thoroughly as after/

after a few weeks the blood plates resumed the normal amount of flora usually obtained from throat swabs.

N. 30 and N. 32 left the hospital about the end of the outbreak.

Sporadic cases continued to occur after 17th February, but none of these when tested gave any agglutinations or absorptions with the prepared sera of the epidemic.

Summary of bacteriology.

I. A study has been made by means of agglutination and absorption of agglutinin tests of the antigenic relationship of 28 strains of haemolytic streptococci associated with an epidemic of puerperal sepsis in a maternity hospital.

II. These organisms were cultured from the vaginae, throats and metastatic foci of patients and from the throats of the staff.

III. In the preliminary classification of strains, 11 out of 17 cultures from patients, and 2 out of 11 cultures from the throats of the hospital staff fell into a single agglutinative group.

IV. By reciprocal agglutination and absorption of agglutinin tests 5 of these strains were demonstrated to be antigenically identical - 3 came from patients' vaginae and 2 from the throats of nurses.

V. By agglutination and complete absorption of agglutinins 11 more strains from patients showed their antigenic similarity to, if not identity with these other strains.

VI. A chart is given showing the findings of haemolytic streptococci in the throats of the staff during the epidemic and for the ensuing twelve months.

Conclusions.

I. A series of 58 cases of puerperal sepsis occurring in a maternity hospital constituted an epidemic of which the causal organism was a haemolytic streptococcus.

II./

II. Agglutination and agglutinin absorption tests showed that the strains of haemolytic streptococci obtained from the cases were serologically identical, and therefore it must be deduced that the epidemic was due to the spread of this organism from patient to patient, or from attendant to patient. The mode of spread will be discussed later.

III. At least two members of the nursing staff were found to harbour the 'epidemic strain' of haemolytic streptococcus in their throats.

IV. A study of throat swabs from the staff over a period of 15 months showed that although many had casual haemolytic streptococci few were genuine persistent carriers.

EPIDEMIOLOGY.

Introduction.

I. Description of Hospital.

(a) Staff.
(b) Pavilions, laundry, etc.
(c) Distribution of beds.
(d) Sterilization of dressings.

II. Relation of Infection to -

(a) Age.
(b) Parity.
(c) Type of Labour.

III. Spread of Infection.

(a) Sequence of events.
(b) Incidence of cases.
(c) Distribution in the various pavilions.
(d) Pavilion IV.

IV. Relation of the Staff in attendance to the Infection.

V. Possible sources of Infection and Spread.

VI. Incidence of Puerperal Sepsis.

(a) Hospital practice.
(b) General practice in the same area.

Summary.

Conclusions.

EPIDEMIOLOGY.

The general type of infection in this outbreak of puerperal sepsis has been indicated in the clinical observations, and the bacteriological findings have shown that the majority of the cases were infected with strains of a haemolytic streptococcus, which on serological and agglutinin-absorption tests were found to be similar if not identical. The clinical observations and bacteriological findings having been discussed it is now proposed to give a few of the factors in relation to the epidemiology of the outbreak.

Description of the hospital, etc.

The staff consists of -

1 Physician-superintendent.
1 Resident medical assistant.
1 Consulting obstetrician.
1 Matron.
5 Sisters.
10 Staff nurses.
26 Pupil midwives.

The sisters and staff nurses are on the permanent staff, but the pupil midwives are only admitted for training, so that from time to time there are changes in the staff. At the time of the outbreak only 3 of the 26 pupil midwives were not State Registered Nurses.

The hospital is self-contained, standing in its own grounds and is used for antenatal and maternity cases only. The administrative block is the oldest part of the hospital and has the usual offices, resident's quarters, kitchens and nurses dining hall. Adjoining this building and in communication with it, are two wards known as Pavilions I. and II. Pavilion I. has 12 beds used for cases of abortion and for patients who have been delivered before admission. Pavilion II. consists of three beds and a small theatre. Such conditions as pyelitis or influenza/

influenza are admitted and delivered in this ward. There are besides Pavilions I and II. three other Pavilions, single storey buildings, each standing by itself and having its own staff. Pavilion III. has 16 beds for antenatal and postnatal cases. All cases in this Pavilion are delivered in the labour wards in Pavilion IV., an important point as will be shown later.

Table 13.

Distribution of Beds.

Pavilion.	No. of Beds.	Type of Case.
I.	12	Abortions. Delivery before admission.
II.	3	Pyelitis. Influenza.
III.	16	Antenatal and Postnatal.
IV.	26	General Confinements.
V.	6	Isolation.
	Total 63	

Pavilion IV. is the largest pavilion and has 26 beds. A plan of this pavilion is shown on Chart II, page 83 . It has three sections; the north wing has 1 ward of 8 beds, 2 single cubicles and 2 two-bedded cubicles, a slunge, bathroom and lavatory; the south wing has a similar layout of a ward and cubicles, but there are 2 beds less, as one cubicle is used as a sister's room. Between the north and south wings lies the common kitchen and at right angles is a central section comprising a dressing room and bathroom for the disrobing and ablution of admissions; there are two labour wards with a room for the sterilizers between and across the corridor linen rooms, a slunge, nursery, etc. From Chart II it will be seen that each section is complete in itself, but in spite/

spite of this fact infection was not limited to one ward or section. As already mentioned cases from Pavilion III. are delivered in the labour wards of Pavilion IV.

Pavilion V. known as "Isolation", has 6 beds in one ward, which is partly divided by partitions: it has the usual slunge, cupboards, kitchen, etc., and has a separate staff.

Besides the Administrative Block and Pavilions there is a nurses' home and a separate building for the "out patient department" where child welfare and antenatal and postnatal clinics are held. The laundry is very up to date and does all the laundering for the entire staff and the hospital. A boiler house provides steam for the laundry and heating of the hospital. The hospital ambulance is used only for bringing cases to the hospital.

All dressings, swabs and vulvar pads for the whole hospital are sterilized in the one sterilizer situated in the Administrative Block. Masks are used both at delivery and during daily swabbing of the patients. Boiled gloves are used by the nurses when attending to the patients, a fresh pair of gloves being used at each bedside. Bed pans are made of white metal and are put in a special steam sterilizer after use.

Relation of infection to the age of the patients.

Nearly half of the group of puerperal sepsis were women with their first pregnancy and, as might be expected, the largest age group is in the third decade of life.

Table 14.

Age Distribution in Puerperal Sepsis.

Age in Years.	Under 20	20 and under 25	25 and under 30	30 and under 35	35 and under 40	40 and upwards.
No. of Cases	9	21	9	9	7	3
Percentage of Cases of Sepsis	15.5	36.2	15.5	15.5	12.0	5.0

Unfortunately the ages of the patients who did not develop sepsis are not available, but the above table shows that 36.2 per cent of all the 58 cases of sepsis were women between the ages of 20 and 25, an age in which the standard of health and resistance to infection should be fairly high.

Relation of Infection to parity.

Here again no figures are available for comparison, nor is the parity of the other admissions available, but from Table 15 it is seen that out of 58 cases of sepsis 28 (48.3 per cent) are pregnant for the first time.

Table 15.

Number of Pregnancies.

Parity.	1	2	3	4	5	6	7	8	9	10	11	Not Noted.	Total.
No. of Cases.	28	8	3	5	2	2	1	3	1	-	1	4	58
Percentage of all septic cases.	48.3	13.8	5.2	8.6	3.4	3.4	1.7	5.2	1.7	-	1.7	6.9	100

These figures should be compared with Table 16, showing the type of labour, including that of injuries, such as tears and bruises.

Type of labour.

In considering the type of birth in relationship to the cases of sepsis several factors have to be considered and for purposes of convenience the 58 cases of sepsis have been divided into three main groups - the natural births, the instrumental deliveries and cases in which although the first stages were normal interference in the third stage was necessary. This last group includes cases of manually removed placentae and abortions which were cleared out digitally.

Table 16/

Table 16.

Type of Labour in 58 Cases of Puerperal Sepsis.

	Normal.					Abnormal.				Abortions or normal delivery with interference in 3rd stage.				
	34					15				9				
Lacerations or tears.	No tear.			Tears.		No tear.		Tears.		No tear.			Tears.	
No. of cases of Sepsis.	19			15		8		7		9			-	
Multigravida or primigravida.	M.	P.	-	M.	P.	M.	P.	M.	P.	M.	P.	-	M.	P.
	10	8	1	5	10	5	3	2	5	4	2	3	-	-

Analyses of the figures show that the majority of the cases were normal labours without interference. Out of the 58 cases of sepsis 34 (58.6 per cent) belonged to this normal group. In the abnormal group, that is where there was instrumental interference, there were 15 out of 58 (26 per cent). The remaining 9 cases of the 58 (15.5 per cent) required interference in the third stage of labour.

Considering the incidence of tears in the first group, 19 out of 34 (55.9 per cent) of the normal cases had no tear; 10 of these were multiparae and 8 primigravidae. Of the normal cases with tears there were twice the number of primigravidae to multiparae, and in the instrumental group 33.3 per cent had tears and were primigravidae. From these figures it may be deduced that in the present epidemic infection took place even though the delivery was normal without interference or tears.

Spread of Infection.

Sequence of events.

Between 28th October, 1932 and 17th February, 1933 there were 472 confinements of/

of which 58 (12.3 per cent) were notified as suffering from puerperal sepsis. Table VII. in the Appendix gives a summary in tabular form of the cases of sepsis including their antenatal history, type of confinement, and the course of the disease before and after admission to the Isolation Hospital.

The following is the sequence of events. The dates in the margin indicate the day of sickening.

The first case, Patient No. 1, was a woman of 34 who was admitted on 14th October with cardiac disease. Her condition was very poor and on 26th October abortion was induced because of her debilitated condition. She sickened on the 3rd day of the puerperium, but remained in Pavilion IV. until the 5th day, when she was removed to Pavilion V. (Isolation). On 3rd November, 8 days after the induced abortion, some more placental tissue was removed digitally: thereafter she improved, and was dismissed well 17 days later. 28th Oct.

The second case, patient No. 2, was delivered normally in Pavilion IV. on the same day as patient No. 1, but by different members of the staff. She sickened on the 6th day, suggesting an infection after and not at the delivery. She was sent to Pavilion V. immediately, where she at once responded to treatment and was dismissed on the 18th day of puerperium. 31st Oct.

These two cases may or may not have been concerned with the beginning of the outbreak. They were both away from Pavilion IV. for five days before the next case to sicken was admitted to the labour ward in Pavilion IV.

Patient No. 3 had a normal delivery on 6th November and sickened on the 3rd day. Amongst the staff who attended her was N. 15 who 8th Nov.

was/

was also present at the delivery of 7 subsequent cases who developed sepsis (Patients No. 7A; 7B; 11; 12B; 13B; 14A and 14C). The fact of 8 cases of sepsis being delivered by N. 15 between 6th November and 25th November is in itself very suspicious. N. 15 had haemolytic streptococci in her throat when examined in November and again on 18th and 26th December, but no serological resemblance could be found when her strain was tested against that of the "epidemic" strain.

The first fatal case was patient No. 4, who had a forceps delivery on 4th November with a post-partum haemorrhage and a retained placenta, which was removed manually. She was in Pavilion IV. at the same time as patient N. 3 and sickened on the 6th day. She was removed to Pavilion V. where she died of puerperal septicaemia on the 13th day. 9th Nov.

Patient No. 5 had a normal delivery and sickened on the 2nd day in Pavilion IV. A bacteriological examination of the genital tract revealed haemolytic streptococci, but she quickly recovered when removed to Pavilion V. being dismissed well 17 days after she was delivered. 11th Nov.

Patient No. 6 had a normal delivery on 9th November, sickening on the 4th day, that is the day after patient No. 5 sickened. She does not appear to have been very ill, but had a marked serum reaction and may not have been a true puerperal sepsis. 12th Nov.

These first six cases are all included in the sequence of events as any of them may have been part of the epidemic.

The next three cases sickened on the same day, 17th November, patients Nos. 7A and 7B on the 4th day and No. 7C on the 7th day. They were in Pavilion IV. but in different wards and cubicles. No. 7A had a normal delivery and after 8 days isolation in Pavilion V. 17th Nov. 17th Nov. 17th Nov.

[illegible]/

was dismissed well. Patients Nos. 7B and 7C. both had haemolytic streptococci isolated on bacteriological examination, but in spite of this infection they were dismissed well on the 12th and 15th days respectively, which points to the infection not being very virulent.

The tenth case to sicken, patient No. 8, had a forceps delivery with an antenatal history of persistent vomiting up till the time of admission. She was in Pavilion IV. until the 5th day, when she was isolated in Pavilion II. and dismissed 14 days later. She was sent into the Isolation Hospital 8 days later because of abdominal pain and fever, and was detained for 24 days. 18th Nov.

Patient No. 9 was admitted to Pavilion I on 20th November. She had been delivered before admission, but had a retained placenta which was removed manually after admission. Her general condition did not cause any alarm and she was not removed to the Isolation Hospital, but was only in the hospital 14 days. 21st Nov.

Patient No. 10A was a woman of 29, who had a forceps delivery on 21st November, with some lacerations of her vagina. She was in Pavilion IV. and was not isolated until 5 days after she sickened. She was sent to the Isolation Hospital on the 11th day, when she was extremely ill with severe rigors, a generalised peritonitis and congestion at the bases of both lungs. Haemolytic streptococci were found in the vagina on the 12th day, but blood cultures on the 17th and 18th days were both negative, as also was a swab from her throat. She ran a very high temperature during the 8 days in the Isolation Hospital, and died on the 19th day of puerperium. 22nd Nov.

Patient No. 10B sickened on the same day as patient No.10A 22nd Nov.

had/

had a forceps delivery and had the placenta removed manually. She had an antenatal history of oedema and albuminuria and during the puerperium suffered from pyelitis. No haemolytic streptococci were found and she made a good recovery. This case may perhaps have been an extra genital case of sepsis.

Patient No. 11 was a multipara with a normal delivery on 21st. November. She had a small perineal tear and 1 stitch, sickened on the 3rd day and after isolation was transferred to the Isolation Hospital, where she died on the 23rd day. She had congestion of the lungs and a thrombo-phlebitis of the left iliac vein. Haemolytic streptococci were isolated from the vagina. 23rd Nov.

On 22nd November patients Nos. 12A and 12B were both delivered in Pavilion IV. and sickened on the 4th day. Patient No. 12A had a normal delivery, but on 29th November haemolytic streptococci were found in the vagina. She developed a pelvic cellulitis and had a long convalescence. Patient No. 12B was not examined bacteriologically, but died of acute insanity on the 8th day. 25th Nov. 25th Nov.

Patients Nos. 13A and 13B were in adjoining beds in the south section of Pavilion IV. They were both delivered normally on 22nd and 23rd November and both sickened on 27th November. Haemolytic streptococci were found on bacteriological examination, and they both had a slow convalescence in the Isolation Hospital. 27th Nov. 27th Nov.

On 25th November patient No. 14A had a normal confinement, sickened on 28th November and had a thrombosis of the left leg. She died in the Isolation Hospital on 6th December. 28th Nov.

The twentieth and twenty-first cases were delivered on 25th November and sickened on the 5th day. They were both normal deliveries/ 29th Nov. 29th Nov.

deliveries, but had perineal tears requiring 1 stitch. They were in the same ward in Pavilion IV. Haemolytic streptococci were found in the genital tracts and they both had a long convalescence of 6 and 8 weeks, before being dismissed from the Isolation Hospital.

Patient No. 15 had a difficult breech delivery in Pavilion IV. 5th Dec. on 1st December. On 10th December no haemolytic streptococci were found, but on 24th December they were found in the vagina. A blood culture on 12th December was negative for haemolytic streptococci, but coliform bacilli were isolated from the blood. It was 38 days after her delivery before she was fit to be dismissed from the Isolation Hospital.

Patient No. 16 was a mild case in Pavilion I. with no haemolytic 5th Dec. streptococci. She was in Pavilion I and gave birth to an anencephalic monster. She sickened on 5th December, the 9th day and made a good recovery.

In the same Pavilion patient No. 17 had a normal delivery and 10th Dec. sickened on the 3rd day, that is, 5 days after patient No. 16 had been isolated. Haemolytic streptococci were isolated from the vagina, and she developed an abscess in her right arm.

On 11th December patient No. 18 developed pyrexia on the 3rd day, 11th Dec. after a normal delivery, but with slight vaginal lacerations. She not only had haemolytic streptococci in the vagina, but had to have an abscess in her arm incised, the pus of which contained haemolytic streptococci.

Patient No. 19 had been in labour for two days before she was 13th Dec. admitted and delivered in Pavilion IV. She had a contracted pelvis

and/

and a craniotomy was performed. Eleven days later she developed a pyrexia and was transferred to the Isolation Hospital. Haemolytic streptococci were recovered from the lochia. The late onset of this case is very suggestive of infection having taken place during the puerperium and not at the delivery.

The next case to sicken on 14th December was patient No. 20A on the 4th day; a normal delivery with no tears and no haemolytic streptococci were found on bacteriological examination. 14th Dec.

Pavilion I. had the next case, patient No. 20B, an abortion with a curettage. She had a glycosuria and no evidence of haemolytic streptococci. She developed an abscess at the site of injection of serum, the pus of which when examined was found to contain the staphylococcus aureus. 14th Dec.

On 15th December Pavilion IV. again had a case of puerperal sepsis. Patient No. 21 who had had antenatal treatment for three weeks beforehand for a high blood pressure and albuminuria, was delivered normally on 14th November. Next day she developed fever. Haemolytic streptococci were found and she developed a pelvic cellulitis. 15th Dec.

Patient No. 22A was delivered the day before patient No. 21 and sickened on 16th December, on the 4th day. Haemolytic streptococci were found in the vagina, and she also developed a severe pelvic cellulitis. 16th Dec.

Patient No. 22B sickened on the same day as patient No. 22A. She had a breech delivery on 10th December and sickened on the 7th day of puerperium. She was in Pavilion III. but was delivered in Pavilion IV. Her strain of haemolytic streptococci was the same 16th Dec.

as the epidemic strain.

On 15th December patient No. 23 had labour induced with bougies in Pavilion IV. theatre because of a high blood pressure. She was delivered of a macerated foetus on 15th December and sickened on 19th December. She was in the same ward as patient No. 22A, but no haemolytic streptococci were found on bacteriological examination. 19th Dec.

Between 21st December and 14th January there were 13 cases notified and removed to the Isolation Hospital; 6 of these were sent from Pavilion IV. All were considered mild and in no case was a haemolytic streptococcus isolated from the swabs, taken from the throat or vagina; 9 had normal deliveries, and it is very noticeable that 8 of the 13 developed pyrexia late on in the puerperium, 9th-11th days. This break of 13 cases without haemolytic streptococci and only slight rises in temperature may have been due to over care on the part of the hospital to remove cases with the least sign of an increased temperature and pulse. Many of these cases had severe urticarial rashes following the injection of serum and causing a temporary rise in temperature and pulse for a few days. They were only detained for about three weeks in the Isolation Hospital. This break of 13 doubtful cases seems to point to the end of the epidemic, as many of these would not under ordinary circumstances have been notified, many of them being notified through over anxiety to prevent any further spread of the epidemic. Following these cases there were some fresh cases with haemolytic streptococcal infection.

21st Dec. 23rd Dec. 24th Dec. 25th Dec. 28th Dec. 31st Dec. 2nd Jan. 4th Jan. 6th Jan. 7th Jan. 13th Jan. 13th Jan. 14th Jan.

On 14th January patient No. 35B was admitted with a temperature and a history of having had influenza. She was delivered normally in Pavilion IV. and sent at once to Pavilion V. from where she was transferred/ 15th Jan.

transferred to the Isolation Hospital. Haemolytic streptococci were isolated from the vagina, the strain being of the epidemic type. In all probability infection took place in Pavilion V.

Patient No. 36 had a difficult forceps delivery in Pavilion IV. 17th Jan.
on the same day as patient No. 35A. No haemolytic streptococci were isolated, but she developed a pelvic cellulitis on the 8th day.

Patient No. 37 had an incomplete abortion, and was curetted in 23rd Jan.
Pavilion I. She had haemolytic streptococci in the throat and vagina, but no serological similarity could be found with the epidemic strain.

On 22nd January patient No. 38 was delivered normally in 25th Jan.
Pavilion IV. and on the 4th day developed a pyrexia. Haemolytic streptococci belonging to the epidemic strain were isolated from the vagina.

Patient No. 39 had an incomplete abortion and was well until 29th Jan.
the 10th day, when she developed a rapid pulse and a high temperature: there was an abscess in her thigh at the site of a serum inoculation. Haemolytic streptococci were isolated from this pus, but unfortunately was not available for comparison with the epidemic strain of serum.

Patient No. 40 was in bed for a month before admission with 31st Jan.
influenzal pneumonia. She had a partial placenta praevia and was delivered in Pavilion IV. of a stillborn child on 30th January. She was sent straight to Pavilion V. where she developed pyrexia next day and was transferred to the Isolation Hospital with basal pneumonia. The haemolytic streptococci isolated from the vagina did not correspond to the epidemic strain.

The next case to appear was patient No. 41A, who sickened on 6th Feb.
6th/

6th February, the 15th day. She was delivered before admission and after admission had a severe post-partum haemorrhage and was given a transfusion in Pavilition IV. when transferred to Pavilion V. where she remained until 6th February, when she developed an abscess in her thigh. Her throat and vagina were twice examined bacteriologically but no haemolytic streptococci were found. Haemolytic streptococci were found in the pus of the abscess, and were identical serologically with the epidemic strain. Infection may have occurred while she was in Pavilion V.

Patient No. 41B was delivered before admission and was admitted 6th Feb.
with a temperature on the day patient No. 41A sickened, that is, 6th February. She had a streptococcal pneumonia with effusion, which apparently had developed before admission.

The day following the sickening of patients Nos. 41A and 41B 7th Feb.
another patient No. 42 developed a temperature on the 3rd day. She was an incomplete abortion and had haemolytic streptococci in the throat, which were not similar to the epidemic strain; she made an uneventful recovery.

Nine days after patient No. 42 sickened, that is, on 8th February, 11th Feb.
patient No. 43, who had been treated in the antenatal wards for a severe pyelitis, was admitted to Pavilion IV. for an induction of labour. Bougies were inserted and she was delivered next day. She had a severe post-partum haemorrhage and a blood transfusion, but made a good recovery after having had a temperature of 102-103°F. for 8 days. No haemolytic streptococci were found in the throat or vagina.

The last three cases to be included in the series of 58 cases of 17th Feb.
puerperal pyrexia were patients Nos. 44A, 44B, and 44C. Patient No.

44a/

44A had a central placenta praevia, patient No. 44B had a temperature on admission and a post-partum haemorrhage, and patient No. 44C was delivered in the ambulance on the way to the hospital. All three cases sickened on 17th February and had haemolytic streptococci in the genital tract. No relationship between these streptococci and the epidemic strain could be made out. They all recovered in the fourth week of the puerperium. 17th Feb. 17th Feb.

Incidence of cases developing sepsis.

From the sequence of events it will be seen that the cases of sepsis were developing at irregular intervals, sometimes two or even three days passing without a single case and then three or four cases developing on consecutive days.

Table 17.

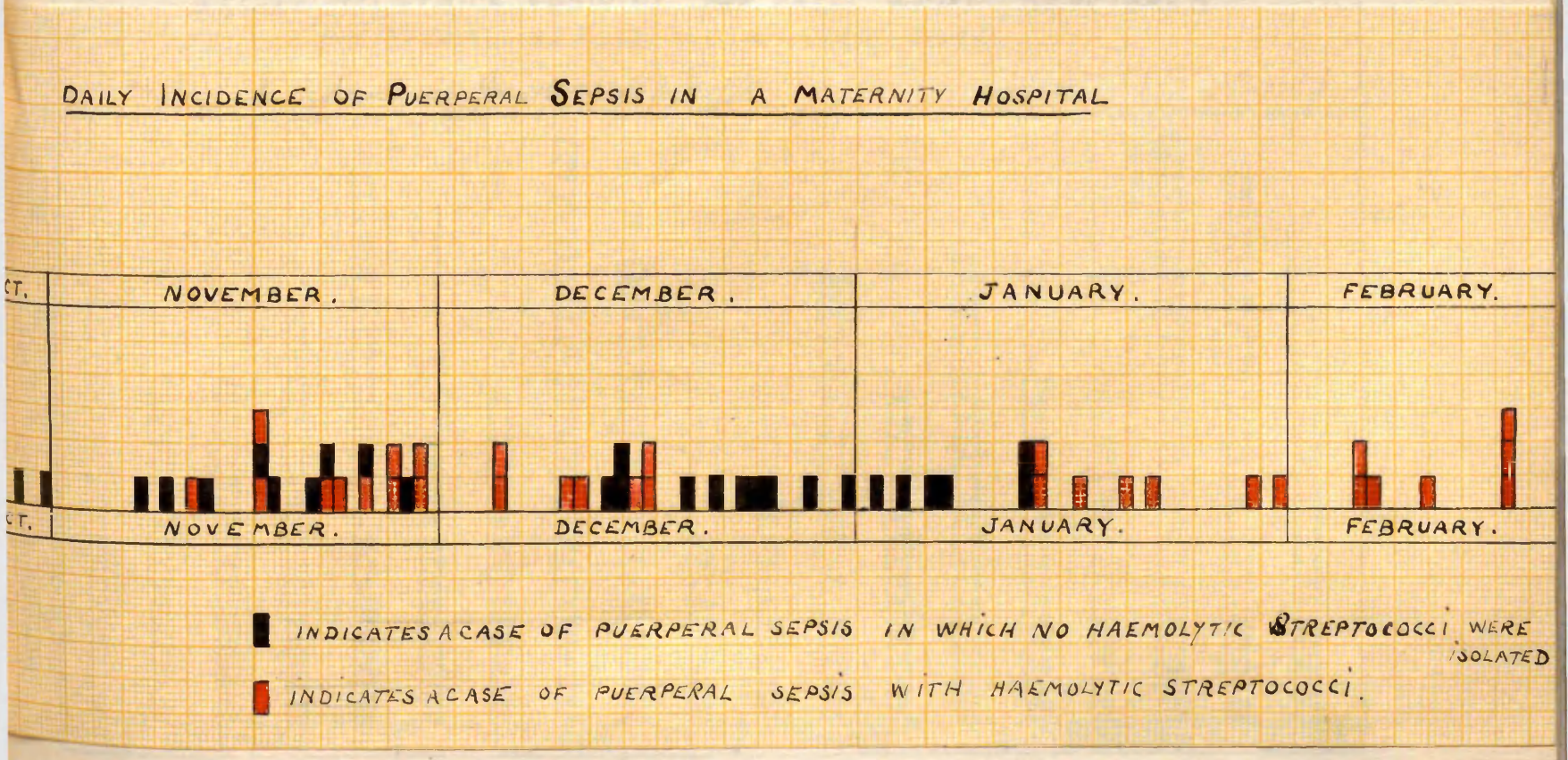


Table 17 shows the daily incidence of the occurrence of sepsis. From October to the middle of November there were 5 cases at varying intervals, then from 17th November there was an increase, 2 cases often sickening on the one day. From the middle of December, as already noted, there were 13 cases, all very mild without evidence of haemolytic streptococci, and then from 14th January onwards there were cases with haemolytic streptococci, but sickening at longer intervals. The last 3 cases actually sickened on the same day.

While Table 17 shows the various days on which patients sickened with puerperal sepsis it is of interest to consider the number of women delivered and to compare that figure with the number of women who developed sepsis.

Table 18.

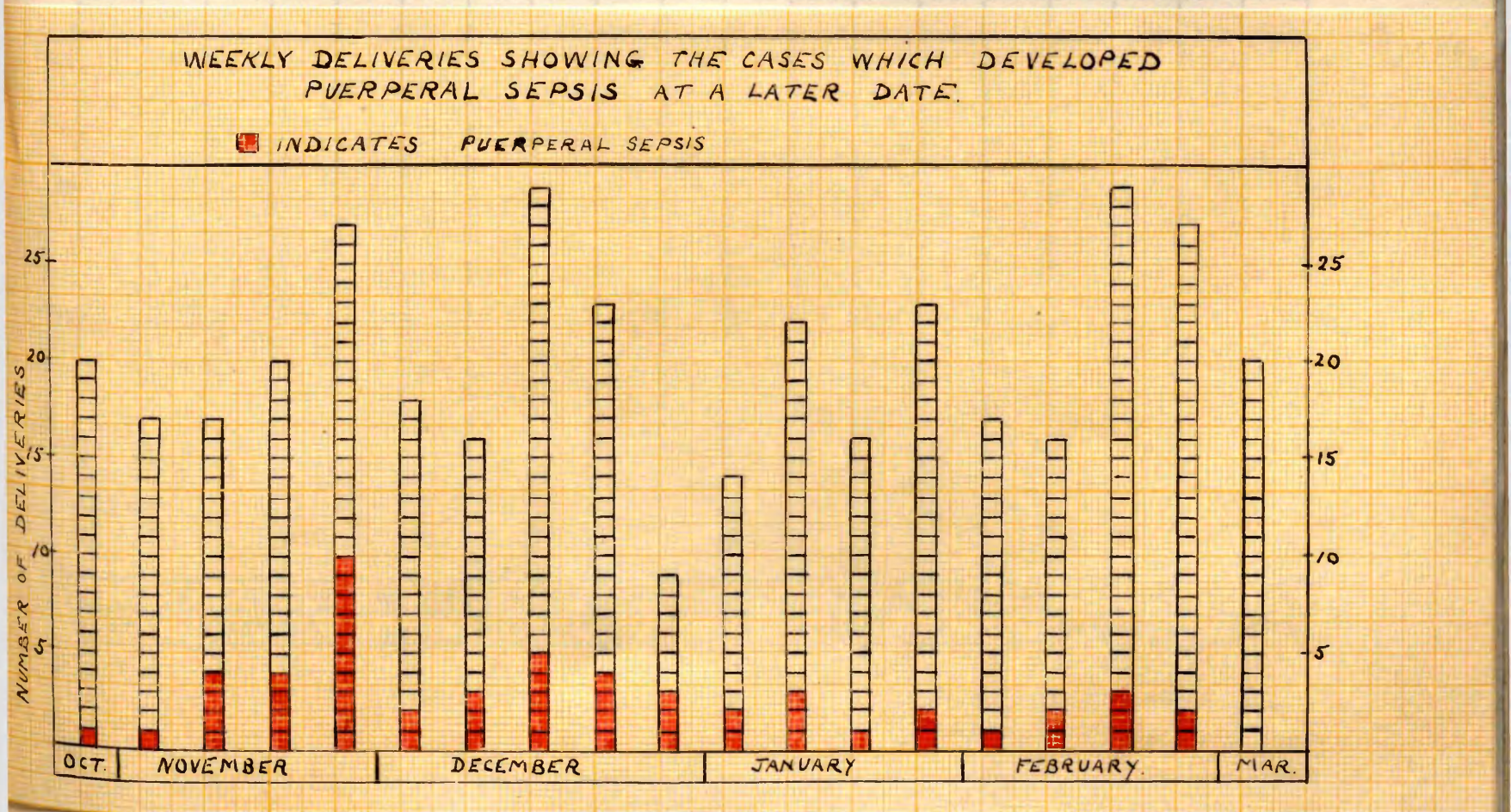
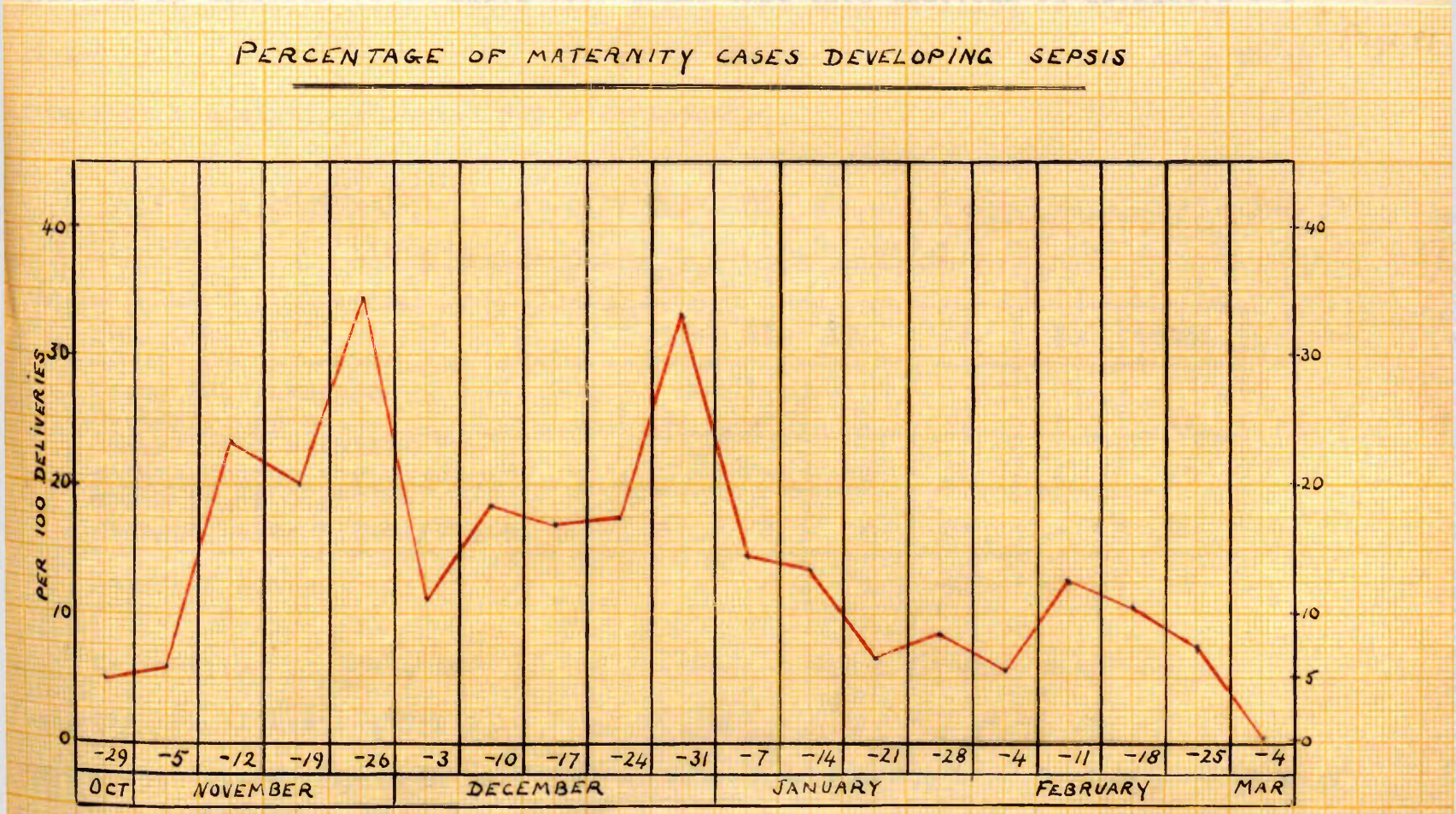


Table 18 shows the weekly births in the hospital. Each square represents one birth and each column the total number of deliveries during that week (corrected for twins). The squares in red represent those cases which developed sepsis whether in that week or at a later date. Such a diagram gives a rough indication of the number of weekly deliveries and the number developing sepsis. The same figures have been used for Table 19. Here the percentage of cases developing sepsis are shown.

Table 19.



This at once demonstrates the high percentage of deliveries developing sepsis from the middle of November till the end of February. Such a diagram, however, only shows cases treated in one institution and for a period covering four months and the question arises as to what happed before and after this period. A full description of these points together with a comparison of results in cases not treated in hospital will be given in full on page 93

Distribution of cases.

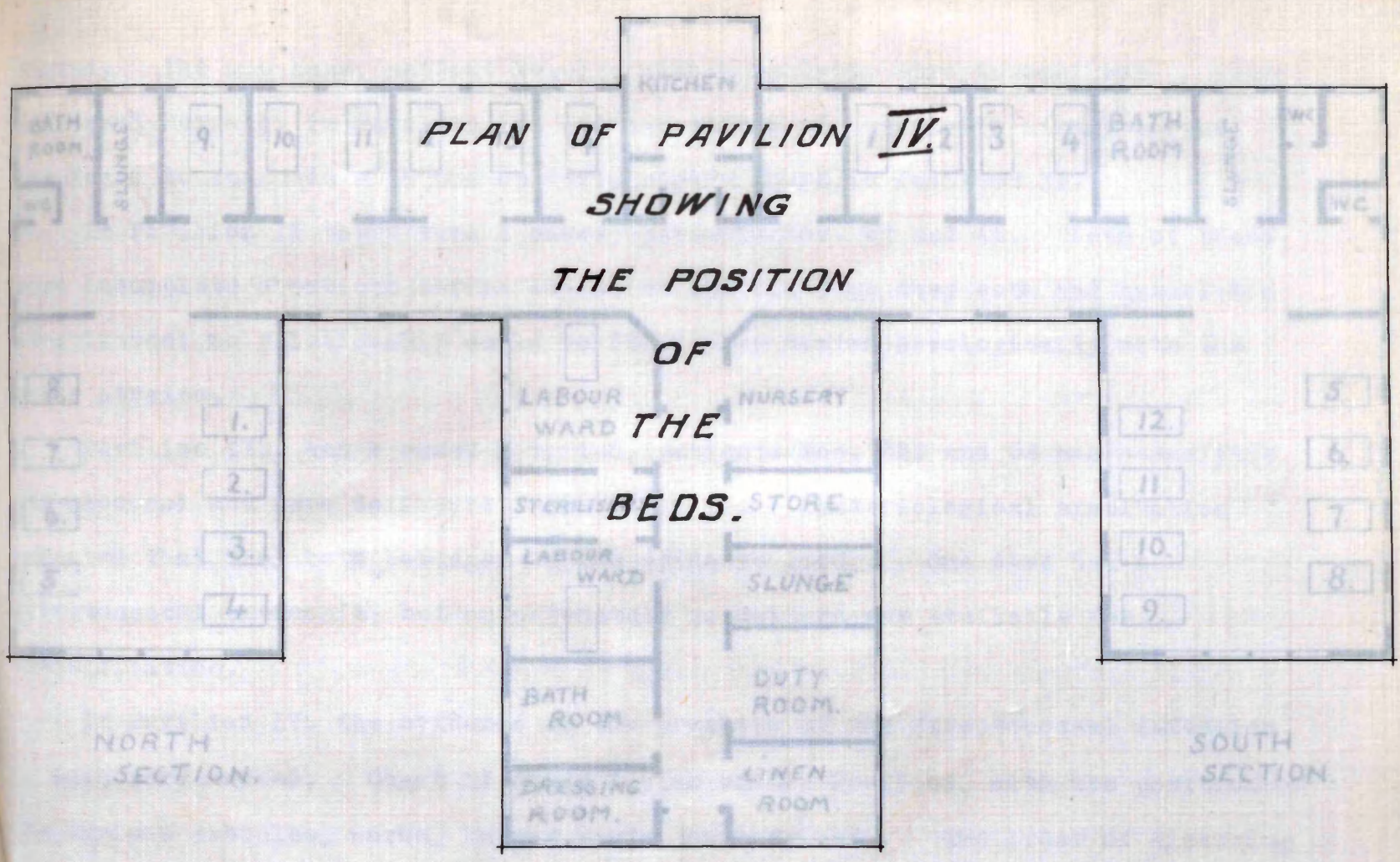
Although there are five pavilions in the hospital it is very striking that during four months 42 out of 58 (74.4 per cent) of all notified cases actually sickened in Pavilion IV. Table III. shows that this pavilion is evidently the centre of infection, whether all the cases are considered, or whether only those from whom haemolytic streptococci were isolated.

Table 20.

Distribution of Cases in the Hospital.

Pavilion.	I.	II.	III.	IV.	V.	Total.
Cases not examined bacteriologically.	2	-	1	8	-	11
Cases found negative for streptococcus haemolyticus.	4	-	2	12	1	19
Cases found positive for streptococcus haemolyticus.	1	2	3	22	-	28
Notified cases.	7	2	6	42	1	58

In Pavilion I. there were in all 7 cases. The 2 in whom there was no bacteriological examination were dismissed well at the end of twelve and eight days respectively, and both were delivered before admission. Those cases in whom no haemolytic streptococci were isolated were all delivered before admission, three being incomplete abortions and one a forceps delivery with a lacerated vagina/

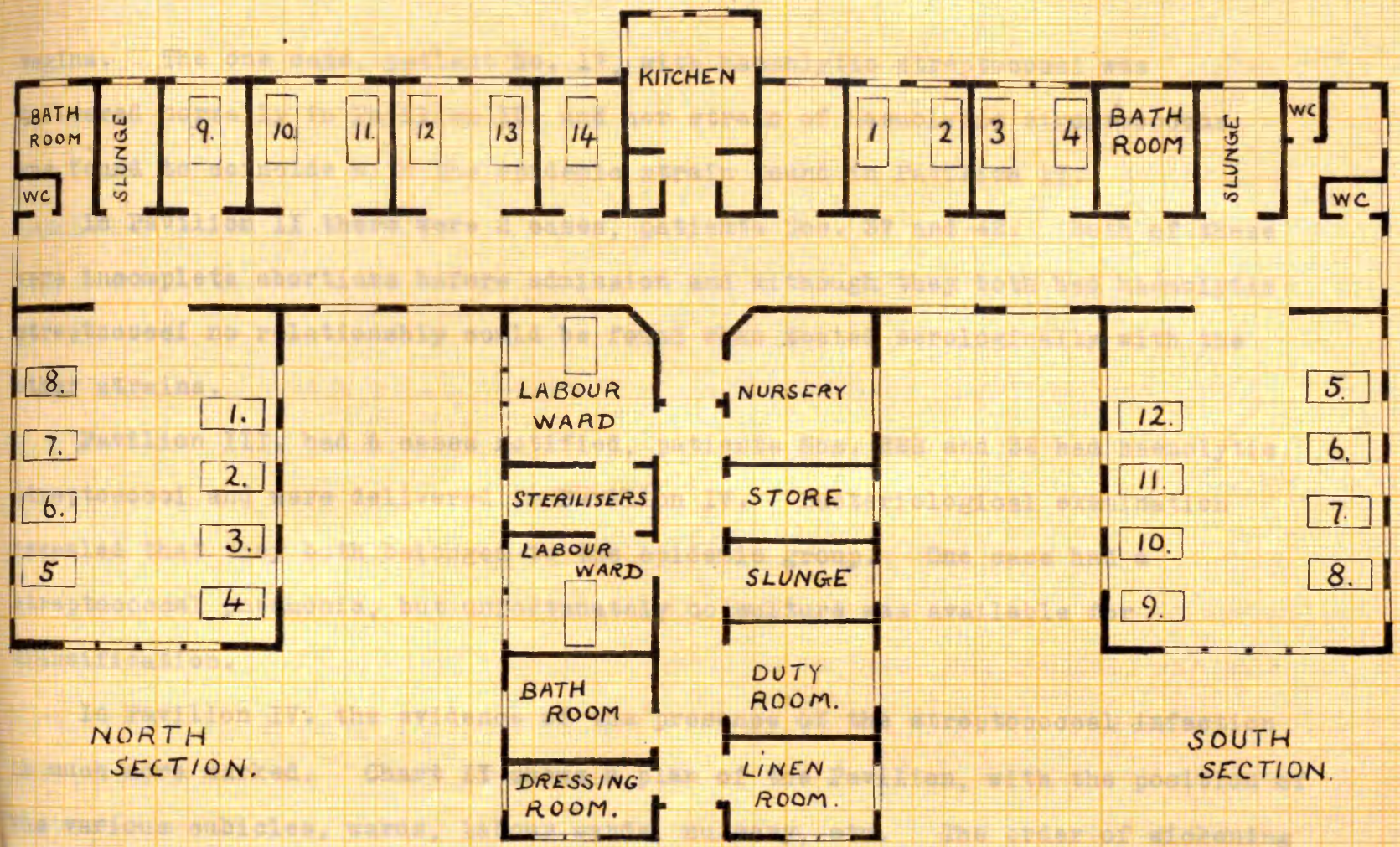


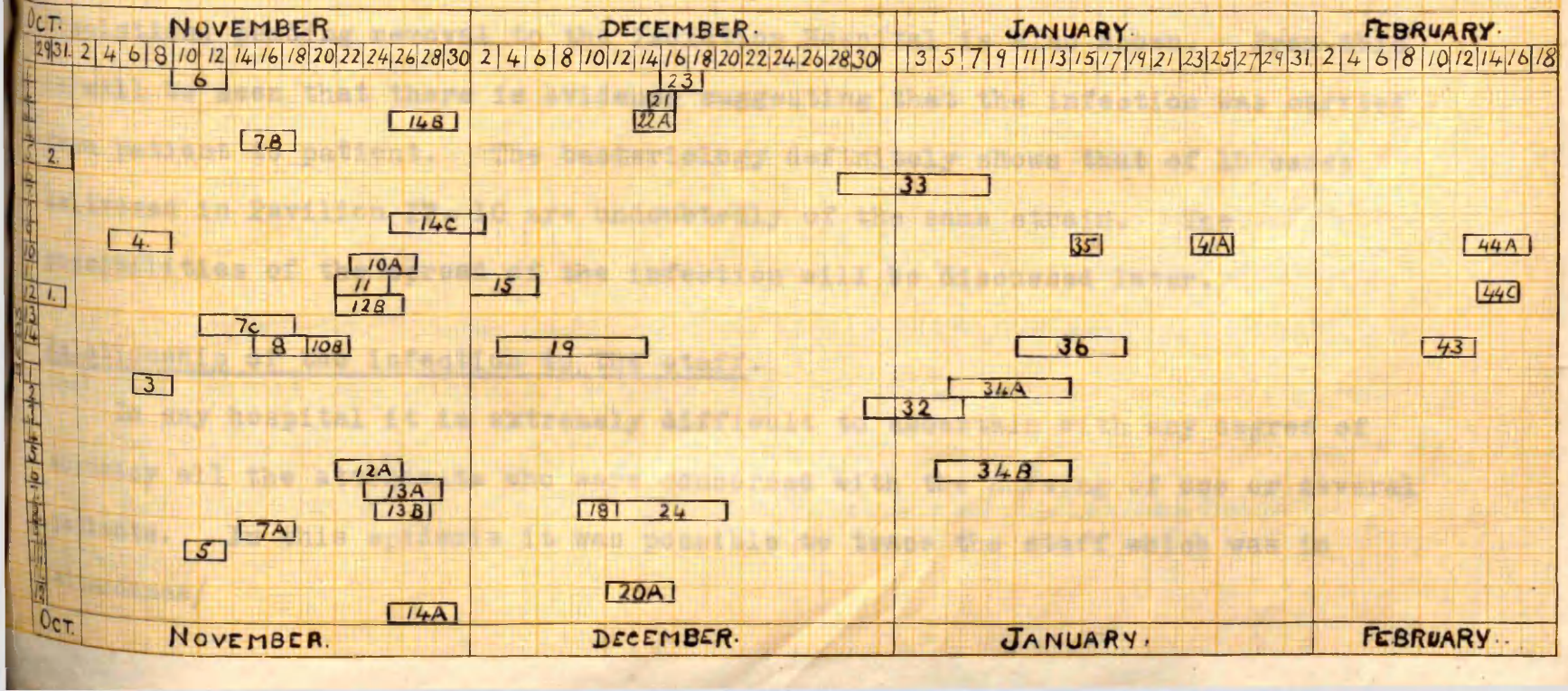
PLAN OF PAVILION IV.
SHOWING
THE POSITION
OF
THE
BEDS.

DIAGRAM
SHOWING
THE ORDER OF THE DEVELOPMENT.
OF SEPSIS
IN PAVILION IV.
AND THE RELATIONSHIP OF THE BEDS
TO THE SPREAD OF INFECTION.

[THE FIGURES IN ▭ DENOTE THE PATIENTS NUMBER &. THE SIZE OF THE ▭ THE NUMBER OF DAYS IN THAT BED.]

CHART II.


KITCHEN
BATH ROOM
SLUNGE
WC
9.
10.
11.
12
13
14
1
2
3
4
BATH ROOM
SLUNGE
WC
WC
8.
7.
6.
5
1.
2.
3.
4
LABOUR WARD
STERILISERS
LABOUR WARD
BATH ROOM
DRESSING ROOM.
NURSERY
STORE
SLUNGE
DUTY ROOM.
LINEN ROOM.
12.
11.
10.
9.
5.
6.
7.
8.
NORTH SECTION.
SOUTH SECTION.


OCT.
NOVEMBER
DECEMBER.
JANUARY.
FEBRUARY.
29 31 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
3 5 7 9 11 13 15 17 19 21 23 25 27 29 31
2 4 6 8 10 12 14 16 18
6
23
21
22A
14B
7B
2.
33
14C
4.
10A
11
12B
15
1.
7c
8
10B
19
36
43
3
34A
32
34B
12A
13A
13B
18
24
7A
5
20A
14A
OCT.
NOVEMBER.
DECEMBER.
JANUARY.
FEBRUARY.

vagina. The one case, patient No. 17, with haemolytic streptococci was delivered normally in Pavilion IV. and her strain of haemolytic streptococcus was found to coincide with the epidemic strain found in Pavilion IV.

In Pavilion II there were 2 cases, patients Nos. 37 and 42. Both of these were incomplete abortions before admission and although they both had haemolytic streptococci no relationship could be found when tested serologically with the other strains.

Pavilion III. had 6 cases notified, patients Nos. 22B and 38 had haemolytic streptococci and were delivered in Pavilion IV. Bacteriological examination revealed that they both belonged to the epidemic group. One case had a streptococcal pneumonia, but unfortunately no culture was available for classification.

In Pavilion IV. the evidence of the presence of the streptococcal infection is much more marked. Chart II shows a plan of the Pavilion, with the position of the various cubicles, wards, labour wards, nursery, etc. The order of sickening and the relationship of the beds is shown by means of the table on the same chart. The number of days each patient occupied a bed before being removed to Pavilion V. (Isolation) pending removal to the Isolation Hospital is also shown. From this it will be seen that there is evidence suggesting that the infection was carried from patient to patient. The bacteriology definitely shows that of 15 cases delivered in Pavilion IV. 10 are undoubtedly of the same strain. The possibilities of the spread of the infection will be discussed later.

Relationship of the infection to the staff.

In any hospital it is extremely difficult to ascertain with any degree of accuracy all the attendants who were concerned with the nursing of one or several patients. In this epidemic it was possible to trace the staff which was in attendance/

attendance at the delivery and these have been entered with other information in the summary in the Appendix, Table VII.

When search is made for the nurses who looked after the patients during the puerperium considerable difficulty is experienced. Pavilion IV. has 26 beds, with a north and south section, but one nurse is not allocated to definite beds, so that she may be attending to patients at both ends of the Pavilion within a very short time; also even although each nurse were kept to her own end of the Pavilion the staff is naturally curtailed at the nurses' meal times and the nurses do each others work.

The bacteriological evidence has shown that some of the staff had haemolytic streptococci in their throats. Although N. 30 and N. 32 had the epidemic strain some of the rest of the staff probably carried it as well, but the fact may have been disguised by the use of gargles just before the throat swabs were taken. This suggestion is made because many of the swabs taken from the nurses' throats showed no evidence of growth of any sort, which is most unusual in normal throat swabs.

Of the five charge-sisters only two had positive throats. S.C. did not have haemolytic streptococci until 18th December and 23rd December, and her strain was not found to correspond to the epidemic strain. S.H. had haemolytic streptococci in her throat at the end of November and was suspended from duty. On her return on 26th December streptococci were isolated from her throat, but were not of the epidemic strain. From that date onwards no haemolytic streptococci were ever found in her throat. Here again there is a possibility of this sister having at one time carried the infection, but the cases at which she assisted did not all develop sepsis and there is no reason to associate the infection with her any more than with the rest of the staff. The superintendent-physician and house physician/

physician may be excluded from spreading the infection. They delivered many of the cases, but only twice were haemolytic streptococci found in their throats and these on further examination were found to belong to a different group than the epidemic strain.

From the list of patients and the staff in attendance two nurses N.8 and N. 30 are seen to have attended many of the early cases. The strain isolated from N. 8 was shown to differ from the "epidemic" strain. This is an important point as it shows the necessity for a complete serological examination of any haemolytic streptococcus isolated from the throat of an attendant on a case which develops puerperal sepsis. Epidemiologically N. 8 might well have been incriminated, but the fact that her throat strain of haemolytic streptococcus is different serologically from the epidemic strain absolves her from any droplet spread of the infection. N. 30 was evidently a genuine carrier. She had haemolytic streptococci isolated at weekly intervals on seven different occasions and left the hospital at the end of February, that is about the time the epidemic appears to have come to an end. The first patient with evidence of haemolytic streptococcal infection was No. 5 and she was delivered by N. 30. N. 30 also delivered patient No. 21 who was found to have the epidemic strain of streptococci in the vagina. If the masks used at the delivery were efficient then N. 30 should not have infected the patient No. 21, but she may have attended to her after delivery without using a mask. The other carrier was N. 32, who was always in Pavilion V. (Isolation). She must have been a constant source of infection, but many of the patients attended to by her appear to have been infected before they came under her care. She left the hospital at the same time as N. 30, just at the end of the epidemic.

From the bacteriological examination of throat swabs from the staff it may be/

be deduced that there were at least two nurses who were active carriers of the 'epidemic strain'.

Possible sources of infection and spread.

The bacteriological investigation has shown that the predominating infective organism was a haemolytic streptococcus. This coccus is very extensively distributed. It is always active and particularly conspicuous as a cause of disease in the winter and spring months. It occurs not only in the nose and throat of persons suffering from colds and sore throats, but also in the naso-pharynx of normal persons who may have come in contact with them. Certain people carry them for months in the crypts of their tonsils; others are only "carriers" for a few days. Real carriers are constantly discharging infective material when coughing or sneezing, or even speaking. From the nose and mouth streptococci are transferred to handkerchiefs, hands, pockets and to other nearby objects. If no masks are worn by attendants, a so called "sterile field" may become contaminated. When outside the body streptococci die off rapidly, particularly if exposed to sunlight. The transfer from person to person may be directly from naso-pharynx to naso-pharynx, or from throat to hands and thence to another person or object.

The occurrence of haemolytic streptococci in the vaginae of pregnant women has been shown to be relatively rare, Part I, page 26 . To bring about infection several factors are necessary in the host, such as the presence of a break or injury, or a lowered power of resistance caused by exposure to cold, under nourishment, etc. Likewise the strains of haemolytic streptococci vary at different times in their invasive power. Infection is also influenced by the number of organisms, the frequency of infection and also the site of inoculation; that is to say infection is influenced by factors both in the host and in the

infecting/

infecting organism. In sporadic cases of puerperal sepsis the factors operating on the host are just as important as the factors inherent in the organism, but to account for an epidemic of such proportions as described it is more logical to look for the chief factors in the invading organism. In this outbreak there is an average group of women, varying from each other in susceptibility, but as a group not unusually susceptible. The possible source of infection might be looked for either among the staff in attendance, the equipment of the hospital, or the women themselves. Cultures from the throats of the staff revealed many with haemolytic streptococci. These findings together with the results of subsequent swabs at weekly intervals are shown on chart I, page 60 . At the time of the epidemic there was an increase in the number of "colds in the head" among the staff, so that many with streptococci in their throats would undoubtedly be causing droplet infection about the wards. Subsequent examinations of the throats of the staff showed that many were only "casual carriers" the infection being present only for a very short time, but a few were classed definitely as "chronic carriers" as they had a series of throat swabs positive for haemolytic streptococci. As soon as routine swabbing began the staff apparently resorted to gargles as was indicated from the scanty growth on some of the plates, but in spite of this two nurses, N. 30 and N. 32, had repeated positive throats. One of these nurses was in Pavilion V. (Isolation), but N. 30 was delivering cases in Pavilion IV. at the beginning of the outbreak. In suggesting droplet or spray infection from the throat or nose of a carrier it is inferred that the carrier, whether nurse or patient, can spray the streptococci on to hands or dressings, and these in turn infect the genital tract. Whether N. 30 infected the first patient, or whether some other nurse was the means of infection cannot be determined, for N.30 although she was a carrier of the epidemic strain, may have acquired the infection in/

in her throat from one or more of the patients or staff. The want of serological evidence regarding the strains of streptococci in the early part of the epidemic makes it impossible to ascribe the start of the epidemic to this nurse. Then S. H. and N. 15 had evidence of haemolytic streptococci and were associated with the delivery of many of the cases, but the strains from their early throat swabs were not available for classification: although their later strains did not fall into the epidemic group they may have had the epidemic strain in their throats at an earlier date. N. 32 had the epidemic strain in her throat at several examinations. She always worked in Isolation and she may have acquired the infection from some of the patients or the patients' linen. Working constantly in a small pavilion with nothing but infected cases she could very easily acquire the infection. The majority of the cases had sickened for some time before they came to be nursed by her in Pavilion V. so that it is very doubtful whether she was at all responsible for infecting them. A few cases who sickened late in the puerperium may have received the infection from her. The only definite fact is that many of the staff had severe "colds" which naturally spread among themselves when they congregated at meals or in their own quarters. The patients themselves seem to have been very free from colds and examination of their throats seldom revealed the presence of haemolytic streptococci. This is easily explained as each patient's bed stands in an area of at least 100 square feet, so that there is little chance of infection travelling by air from bed to bed.

If no bacteriological investigation had been carried out the general inference would have been that the presence of haemolytic streptococci in the staff was responsible for the outbreak. Serological investigation has partly disproved this, as many of the staff did not fall into the epidemic group and consequently other sources of infection must be considered.

Cultures/

Cultures from the walls of the wards, labour rooms, and the laundry itself yielded no growth of streptococci, but such cultures were only taken late in the epidemic so that infection might have been present earlier in the epidemic. The laundry staff all had "negative throats" and there was no evidence of any "poisoned fingers" which might have been the means of infecting some of the linen. The hospital supplies of dressings, etc., were all sterilised in the one steriliser and bacteriological investigation of these proved negative, but unfortunately these examinations were carried out late in the epidemic.

The possibility must now be considered whether the patients themselves brought the organism into the hospital. The general prevalence of streptococcal infection throughout the county made this idea worthy of consideration. On the other hand if such were the case one would have expected a more rapid development of symptoms. As explained in the general survey, although there was an increase of haemolytic streptococcal disease in general, there was no marked increase in the incidence of puerperal sepsis in the same area among the maternity cases in domiciliary practice. The theory of the patients carrying the organism was finally disproved when the bacteriological investigations showed that many of the strains of haemolytic streptococci were not only similar, but also serologically identical. These findings, however, do not preclude the possibility that the first patient brought the organism into the hospital.

To account for the source of infection is difficult and an equally difficult problem is to explain how and why the infection spread in a hospital where every precaution is taken to avoid sepsis. In the pre-Lister days it is easy to understand how epidemics of puerperal sepsis were common events, for there seems to be no doubt that in those days there was a direct transfer by the hands in some of the cases, the spread being carried from patient to patient by the practitioner or attendants. The present epidemic must have been caused by the coincidence of

a/

a number of factors.

The onset of the pyrexia has been shown to occur in the majority of cases on the 2nd, 3rd, 4th, and 5th days of the puerperium. This at once suggests that infection was occurring in the labour ward, or shortly after removal to the post-natal beds. If infection took place in the labour rooms the only probable source of infection was the throats and hands of the staff. Although masks were worn in the labour ward this does not exclude the possibility of infection from the nose and throat as masks may be inefficient through faulty material or careless adjustment. Many cases were delivered on the same day in the same labour ward and yet only a percentage developed sepsis. From chart II. page 83 it will be seen that in Pavilion IV. there was always a fresh case of pyrexia to carry on the infection, so that as soon as one case of puerperal sepsis was removed another case was already sickening; there is therefore the possibility of a constant source of infection among the patients themselves. If the staff were carrying out the routine swabbing of patients efficiently no infection should have been carried from patient to patient. The swabbing of patients is carried out with sterile gloves, a fresh pair for each case, but all the gloves are boiled and kept in the one container. This means that if a nurse does not sterilise her hands efficiently when she takes a pair of gloves from the basin she may contaminate several other pairs of gloves. Again after the routine attention to patients fresh vulvar pads are obtained from a bag which has the whole supply for the ward; one nurse removing a pad with contaminated hands may be the means of infecting several pads which may be used immediately for other patients and so the infection may spread. In a busy hospital with many patients, however well organised the hospital may be, nurses may from time to time unconsciously relax their aseptic technique.

Another possibility of the spread of infection is in the use of bed pans.

In/

In this hospital metal bed pans are provided, and these are put in a steriliser, specially constructed for the purpose, immediately after use and then stored in the slunge room. The sterilisers provided are very efficient, provided care is taken to leave them in the steriliser for the prescribed period, but if withdrawn too soon a false sense of security is offered, as the pan may have been used for a septic patient and so infection is carried to another patient, although not necessarily in an adjacent bed, or even in the same ward. The possibility of patients becoming infected by bed pans before leaving the labour ward must not be overlooked.

Puerperal Sepsis in Hospital and in Domiciliary Practice.

In presenting any statistical figures there are always many possible errors which although known cannot always be eliminated. In this consideration of the incidence of puerperal sepsis there are many factors which influence the actual figures used; some of these are very obvious and others are more remote. In spite of these errors it is considered that there is some value in the analyses in showing the differences and similarities of the incidence of puerperal sepsis cases in a maternity hospital and in domiciliary practice.

The incidence of puerperal sepsis has been calculated by taking the number of cases of sepsis and the number of births in the same hospital and finding the percentage of sepsis. Similarly the percentage has been calculated for the sepsis in the same area, but in domiciliary practice. In the Aberdeen report (1927) attention is drawn to the difficulties of getting accurate figures for the notification of puerperal fever for previous years. Since then the introduction of the notification of puerperal pyrexia in 1929 has simplified this difficulty; now cases are notified much more promptly. The notifications in the present series are all taken from the register of the Medical Officer of Health. It might be suggested that many cases are not notified promptly, but in the/

the area under consideration 79 per cent of notified cases of puerperal sepsis are treated in hospital, which makes notification compulsory before removal to hospital becomes possible; also every midwife has to report within 24 hours if she has attended a case of puerperal sepsis, so that the notifications under consideration may be taken as fairly accurate. The notifications from the hospital are just as accurate: since the occurrence of the epidemic at the end of 1932 all cases of sepsis must be removed to the Isolation Hospital.

Puerperal sepsis may follow abortions as well as stillbirths or live births. No differentiation has been made, all cases of sepsis being included. It has not been possible to correct the incidence of puerperal sepsis and allow for the occurrence of abortion in either hospital or domiciliary practice, because abortions are not notifiable.

Table VI. in the Appendix gives the number of births in four-weekly intervals and the number of cases of puerperal sepsis notified in groups of the same intervals, together with the percentage incidence of sepsis for hospital and domiciliary practice for 1932. The total incidence of puerperal sepsis for hospital practice is 10.1 per cent, whereas domiciliary practice in the same area is only 2 per cent. In 1933 the figures were 6.3 per cent and 1.7 per cent respectively.

The very high incidence in the hospital practice compared with the domiciliary practice in the same area is very striking. In the Aberdeen report (1927) Smith draws attention to the high incidence of deaths due to puerperal sepsis in the Aberdeen hospitals as compared to cases treated at home. The Departmental Committee in their report on Maternal Mortality and Morbidity (1932) took the view that his analysis of conditions in Aberdeen should not be assumed to apply to the whole country, and gave evidence that the incidence of puerperal deaths/

deaths from haemolytic streptococci was consistently higher among women delivered at home than among those delivered in hospital. The figures presented in the Appendix, although taken for puerperal sepsis whether resulting in morbidity or mortality, certainly confirm the analysis of the Aberdeen report.

The incidence of puerperal sepsis throughout the two years shows well marked fluctuations that are common in all diseases caused by haemolytic streptococci. This fluctuation is better illustrated when the incidence taken at four-weekly intervals is shown in graphic method.

TABLE 21

INCIDENCE OF PUERPERAL SEPSIS PER 100 DELIVERIES

A. IN HOSPITAL ——

B. IN DOMICILIARY MATERNITY PRACTICE ——

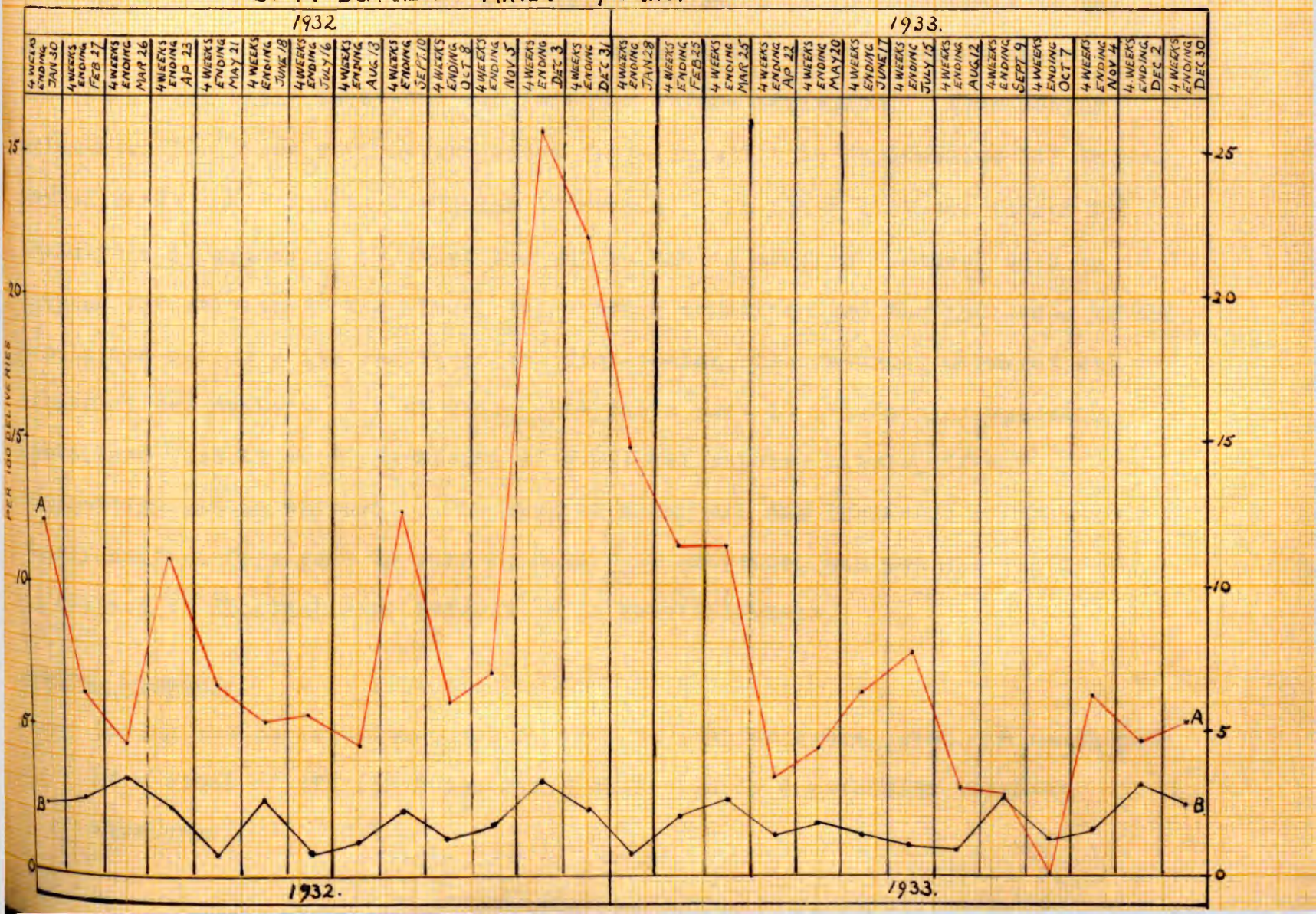


Table 21 shows graphically the incidence of puerperal sepsis in hospital and domiciliary practice for the years 1932 and 1933 in the same area. The same table has also been shown on page 32 , but at thirteen-weekly intervals so that considerable "smoothing" has taken place. Considering the lower graph of the two, that is the one illustrating the percentage of cases of sepsis in women delivered at home, there is some fluctuation, but it does not show any seasonal fluctuation, the course of sepsis running fairly evenly. When the graph for hospital sepsis is considered things are very different, not only is there a marked fluctuation, but there is evidence of an epidemic occurring at the end of 1932 and the beginning of 1933.

Why there should be evidence of minor epidemics it is impossible to say. As is well known all maternity hospitals receive the worst types of cases, many are often very badly lacerated and infected before admission. Even making allowances for these very severe cases there is still no explanation for the marked rises occurring at irregular intervals. In other diseases caused by haemolytic streptococci fluctuations may be due to complex factors, such as varying infectivity of the virus, the carrier condition and the influence of the population medium - its constitution, its spacing, its internal movement and the influx of new members, all of which play their part in determining epidemic prevalence, but in this prevalence of puerperal sepsis, little, if any, explanation can be offered. The type of woman and the incidence of trauma is fairly uniform from year to year in midwifery practice, but yet the incidence is subject to fluctuations, especially in hospital cases.

General Summary.

I. During the period 28th October, 1932 to 17th February, 1933, 58 women out of a total of 472 (12.3 per cent) delivered in a maternity hospital developed/

developed puerperal sepsis.

II. During the same period no similar epidemic occurred amongst women confined in their own homes in the area from which the hospital patients were drawn.

III. The bacteriological investigation shows that at least eleven of the cases of puerperal sepsis were infected with the same strain of haemolytic streptococcus.

IV. Only two nurses were proved to be "carriers" of the "epidemic strain".

V. All other possible sources were bacteriologically negative.

VI. Nurses were suspected but no definite source was identified.

DISCUSSION AND CONCLUSIONS ON AN OUTBREAK OF PUERPERAL SEPSIS.

Although this investigation has failed to clear up many points there are on the other hand many facts which may be considered of interest, especially from an epidemiological viewpoint.

Clinically the cases are very similar and showed no difference from the usual type of puerperal sepsis seen in sporadic cases. Some had normal labours, others required the use of instruments and some had interference in the third stage of labour. They were all delivered in the two labour wards in Pavilion IV, except those cases which had been delivered before admission, and there was no single member of the staff present at all the deliveries. The post partum course was strikingly similar in all the cases. After delivery all went well until the 2nd, 3rd, 4th., or 5th days and then suddenly the presence of an infection was announced by a rise of temperature to 102°F. Thereafter the length of time before a complete recovery took place varied considerably. Some of the early cases were only ill for as short a time as eight days, but others, especially when they had a pelvic cellulitis, took a very long time to recover. The 5 fatal cases appeared really early in the epidemic, among the first 19 cases. The first fatal case sickened on 9th November and the other four between 22nd and 25th November. In the final Report of the Departmental Committee on Maternal Mortality & Morbidity (1932) stress is laid on the importance of febrile cases being sent to an isolation hospital sufficiently early so that suitable treatment may be carried out. In this epidemic the failure to remove early cases promptly must be commented upon, especially in regard to the five fatal cases. Why these early cases should have succumbed it is difficult to suggest, as probably the infection would not be any more virulent at that stage of the epidemic than later, but evidently thrombo-phlebitis was more prone to occur in these early fatal cases.

In/

In most epidemics (e.g., measles, influenza) the severer types of cases occur well on in the outbreak. Here the fatal cases occurred soon after the infection was recognised, which suggests massive infection due to faulty technique (including the failure of isolation) in the early stages and that improvement in methods only took place after the alarm had been given. The special treatment carried out in all cases removed to the Isolation Hospital was the administration of large doses of puerperal anti-streptococcal serum with glycerine drainage of the uterus, and was very successful. The good results obtained may be attributed to two main factors - the prevention and reduction of a toxaemia by the early administration of serum and the partial elimination of local sepsis by glycerine drainage. This latter treatment in the early stages of the disease appears very helpful and apparently is only successful when infection is localised in the uterus and vagina and has not spread to the lymphatics and blood stream.

It is unfortunate that no indication of the possible existence of an epidemic was reported to the Bacteriological Laboratory, as all the cultures would have been retained for investigation. As it was the early cultures were lost. The loss of these early cultures naturally makes it impossible to prove that the early cases were infected with the same strain of haemolytic streptococcus. The bacteriology, however, shows that many of the staff were harbouring haemolytic streptococci in their throats, whereas the patients' throats were practically free of infection. Moreover, it has been possible to prove that of the 47 women examined bacteriologically 28 had a haemolytic streptococcal infection, 17 of these 47 strains were available for further tests and 10 were found to belong to the one strain - the epidemic strain. These 10 were proved to be identical by employing not only the usual serological procedure adopted for the identification of the streptococcus, but also by employing the more accurate process of "absorption of agglutinin" and "mirror/

"mirror absorption" tests. In addition to the proof that 10 patients were infected by the same strain, it was proved that at least 2 of the nursing staff carried haemolytic streptococci of the epidemic strain in their throats, and that they were definite carriers. Many of the staff were shown to be casual carriers with occasional haemolytic streptococci in their throats, but it was shown that their strains were dissimilar to the epidemic strain. An endeavour was made to isolate haemolytic streptococci from the hospital equipment, dressings, laundry and linen, but was unsuccessful. This may be because such examinations as were made were carried out after the epidemic was well advanced.

From the epidemiological point of view many interesting facts have been elicitated which naturally lead to the consideration of various problems, some of which can be explained, but others have to be left unanswered. Such questions are associated with the source of the infection; how, why and when did the infection enter the hospital, and why did the epidemic cease. Bacteriological examination has shown that the infection was due to a haemolytic streptococcus. The recognition of infection in the first case or cases was missed or unrecognised through a tendency to attribute the onset of fever to some condition other than its true cause, and through omitting to send swabs for a bacteriological examination. Isolation of actual or suspected cases was at first slow and not always effective until the true significance of the outbreak had become apparent. The actual recognition of the presence of puerperal fever was preceded by several cases of fever attributed rightly or wrongly to other causes. In an outbreak of this kind it is difficult to determine how the infection was introduced and to follow the precise sequence of events, but there is a clear indication that the spread of a haemolytic streptococcal infection is a relatively easy matter under average conditions even in an up-to-date maternity hospital. Once the infection had obtained a foothold it persisted for several weeks.

Having/

Having gained access to the hospital the question arises of how the infection was spread and here it is suggested that many of the cases were infected from bed to bed. Whether the infection was carried by the throats of the nurses or by their hands or by bed pans is not clear, all are possible sources of the spread. The false security of using a fresh pair of boiled rubber gloves when swabbing each patient may have had some part in the dissemination of the infection. One pair of gloves and a strong antiseptic are more valuable than so called asepsis, once the epidemic was established.

The termination of the outbreak probably was due to a tightening up of ward routine, including the using of masks in the wards when attending to patients and the introduction of disinfectants for the hands of the nurses. At no time was anything but sterile water used for the vulvar toilet of the patients.

This hospital received patients from a very wide district, and many of the admissions were in a very poor condition when they entered the hospital, because of the effects of unsuccessful attempts at delivery by midwives and outside practitioners. Cases of difficult labour were frequent and there were admitted from time to time numerous women who had already been infected. In these circumstances it is difficult to see how the hospital could avoid sporadic cases of puerperal sepsis. The infection having entered the hospital the question arises of how it was spread among the women. In the outbreak the disease appeared to have spread irrespective of whether the confinement was normal or otherwise. If there was some defect in technique it must have been a temporary one, because as soon as the epidemic was recognised every precaution was taken to avoid a further spread of infection. It is apparent that ordinary methods of the conduct of labour and the puerperium did not impose a sufficient barrier against the occurrence of successive cases of sepsis.

The question of what was happening to maternity cases in the district apart from hospital cases led to a compiling of the incidence of puerperal sepsis in hospital and domiciliary practice. The analysis shows that there is a much higher incidence of sepsis among women in a maternity hospital than in women having their confinements at home.

A consideration of the outbreak justifies the conclusion that the passage of infection amongst parturient women is insufficiently hindered by the technique in vogue and gives rise to the suggestion that if a severe type of infection can pass from patient to patient, less severe and unrecognised types of minor sepsis may often pass from bed to bed. How to improve upon the methods used in an up-to-date hospital is difficult to suggest and equally difficult is the problem of how to minimise the occurrence and spread of the infection. The impression is left that although our knowledge of bacteriology has advanced considerably there is still much to be done in the prevention of puerperal sepsis.

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STATEMENT OF 200 MATERNITY CASES.

TABLE I.

No.	Age.	Married or Single.	Parity.	Past Health.	Scarlet Fever.	Rheumatism.	Past Pregnancies.	Antenatal Health.	Labour.	Tears.	Stitches.	Puerperium.	Days in Hospital.	Grade.	BACTERIOLOGICAL FINDINGS. During Labour. Aerobic.	BACTERIOLOGICAL FINDINGS. During Labour. Anaerobic.	BACTERIOLOGICAL FINDINGS. During Puerperium
15	27	M.	1	Erysipelas of face 2 years ago.	No	No	-----	Good. Version attempted 4 days before admission.	Breech. Forceps. Premature dead.	No	-	Normal	17	B.	Coliform bacilli.	Döderlein.	
16	30	M.	1	Good.	No	No	-----	Good.	Low forceps. Slightly contracted pelvis.	Yes	4	Normal.	10	C.	Non-haem. strept. Coliform bacilli.	Döderlein. Enterococci. Coliform bacilli.	
17	32	M.	4	Good.	No	No	2 Instruments, 1 Normal.	Debilitated.	Normal.	No	-	Normal.	10	A.	Döderlein. Yeast. Non-haem. strept. Staph. albus.	Döderlein. Yeast. Staph. albus.	
18	35	M.	4	Good.	No	No	1 Miscarriage, 2 Normal.	Good.	Normal.	No	-	Normal.	12	A.	Döderlein. Staph. albus.	Döderlein. Staph. albus.	
20	43	M.	9	Good.	No	No	6 Normal, 1 Miscarriage, 1 Stillbirth.	Albuminuria. Sclerotic arteries.	Ante partum haemorrhage. Membranes perforated. Premature, alive.	No	-	Albuminuria cleared on 4th day.	9	C.	Coliform bacilli Staph. albus.	Non-haem. strept. Coliform bacilli.	
22	17	M.	1	Influenza 3 months ago.	No	No	-----	Good.	Normal	No	-	Normal.	10	B.	Yeast. Staph. albus.	Yeast. Staph. albus.	
25	19	S.	1	Good.	No	No	-----	Good.	Normal.	Yes	1	Normal.	11	B.	Strept. viridans. Staph. aureus. Staph. albus.	Strept. viridans. Staph. aureus. Staph. albus.	
27	20	S.	1	Pleurisy.	No	No	-----	Good.	Normal. Catgut in vagina.	Yes	4	Normal.	11	B.	Döderlein. Diphtheroids. Staph. albus.	Döderlein. Diphtheroids. Staph. albus.	
29	29	M.	5	Good.	No	No	4 Instruments.	Good.	Normal.	No	-	Normal.	10	B.	Diphtheroids. Staph. albus.	Döderlein. Staph. albus.	
31	40	M.	10	Cardiac disease, for 8 years.	No	No	Normal.	Antenatal wards for 3 weeks.	Normal.	No	-	Normal.	13	C.	Non-haem. strept. Staph. albus. Coliform bacilli.	Non-haem. strept. Coliform bacilli.	
32	26	M.	1	Good	No	No	-----	Good	Normal.	No	-	Normal.	11	B.	Coliform bacilli.	Coliform bacilli.	

No.	Age.	Married or Single.	Parity.	Past Health.	Scarlet Fever.	Rheumatism.	Past Pregnancies.	Antenatal Health.	Labour.	Tears.	Stitches.	Puerperium.	Days in Hospital.	Grade.	BACTERIOLOGICAL FINDINGS. During Labour. Aerobic.	During Labour. Anaerobic.	During Puerperium.
33	29	M.	7	Pneumonia 5 years ago.	No	No	3 Normal, 3 Miscarriages at 12/52.	Admitted with pleurisy.	Normal.	No	-	Normal.	39	B.	Coliform bacilli.	Döderlein. Coliform bacilli.	
34	25	M.	1	Diphtheria at 7 years.	No	Yes	-----	Good.	Forceps. Episiotomy. Catgut in vagina.	Yes	4	Normal.	14	A.	Staph. albus.	Staph. albus.	
36	20	S.	1	Cystitis 2 years ago.	No	No	-----	Good.	Normal.	Yes	1	Rigor on 4th day. Temp. 103°F.	21	A.	Diphtheroids.	Strept. viridans.	Throat - M. Catarrhalis. Pneumococci. Diphtheroids Cervix - Diplococci. Diphtheroids.
38	21	M.	1	Good.	No	Yes	-----	Good.	Delayed. Membranes perforated. Forceps.	No	-	Normal.	12	A.	Staph. albus.	Döderlein. Coliform bacilli.	
39	19	S.	1	Good.	Yes	No	-----	Good.	Normal. Slight vaginal laceration.	No	-	2nd day temp. 102°F. Foul lochia.	28	A.	Strept. viridans.	Strept. viridans.	Throat - Non-haem. streptococci. Cervix - Haemolytic streptococci, (abundant).
40	39	M.	7	Anaemia.	No	No	4 Normal; 1 transverse, stillborn; 1 twins, stillborn.	Severe headaches. Impaired vision for 2 days.	Severe ante-partum haemorrhage. Version, spontaneous delivery.	No	-	Normal.	10	A.	Staph. albus.	Staph. albus.	
41	28	M.	2	Good	No	No	1 Premature.	Good.	Contracted pelvis. Mature, dead.	No	-	3rd day temp. 99.4°F. Breasts engorged	11	B.	Diphtheroids. Non-haem. strept.	Diphtheroids.	
42	25	M.	3	Good.	No	No	2 Normal.	Good.	Normal.	No	-	4th day temp. 101.4°F. Subinvolution. Profuse lochia.	16	A.	No growth.	No growth.	Throat - Diphtheroids. Pneumococci. Cervix - Diphtheroids (abundant).
45	32	M.	8	Good.	No	No	6 Normal, 7th twins.	Good.	Breech. Legs brought down.	No	-	Normal.	10	A.	Yeast.	Döderlein. Yeast.	
46	31	M.	5	Good.	No	No	4 Normal.	Good.	Normal.	No	-	Normal.	10	A.	Döderlein. Yeast.	Yeast.	
47	21	S.	1	Good.	No	No	-----	Good.	Normal.	No	-	Normal.	10	A.	Nil.	Nil.	
48	28	M.	3	Good.	No	No	2 Normal.	Good.	Normal.	No	-	Normal.	9	C.	Non-haem. strept. Coliform bacilli.	Yeast. Non-haem. strept. Coliform bacilli.	
50	19	M.	1	Good.	No	No	-----	Good.	Normal.	No	-	7th day temp. 102°F. Pulse 120. Coryza.	11	A.	Enterococci.	Enterococci.	
51	25	M.	1	Good.	No	No	-----	Good.	Normal.	Yes	1	Profuse lochia.	10	A.	Staph. albus.	Staph. albus.	

No.	Age.	Married or Single.	Parity.	Past Health.	Scarlet Fever.	Rheumatism.	Past Pregnancies.	Antenatal Health.	Labour	Tears.	Stitches.	Puerperium.	Days in Hospital.	Grade.	BACTERIOLOGICAL FINDINGS. During Labour. Aerobic.	During Labour. Anaerobic	During Puerperium.
53	30	M.	1	Good.	No	No	-----	Slight oedema.	Contracted pelvis. High	Yes	6	2nd day temp. 102-104°F. Foul lochia. Removed to Belvidere Hospital.	17	C.	Coliform bacilli.	Coliform bacilli.	Throat - Pneumococci. M. Catarrhalis Cervix - Coliform bacilli.
55	34	M.	8	Good.	No	No	6 Normal, 1 face presentation.	Bronchitis.	Normal. Placenta ragged.	No	-	Piece of placenta expelled.	9	C.	Coliform bacilli.	Coliform bacilli.	
56	34	M.	2	Good.	Yes	No	1 Breech.	Good.	Premature, alive.	No	-	Normal.	12	A.	Non-haem. strept. Staph. albus.	Staph. albus.	
58	21	M.	2	Good.	No	No	1 Normal.	Good.	Normal.	No	-	4th day foul lochia. Temp. 100°F. Pulse 112. Not sustained.	10	C.	Enterococci. Staph. albus. Coliform bacilli.	Staph. albus.	
60	33	M.	10	Good.	No	No	6 Normal, 2 Miscarriages 12/52, 1 breech.	Good.	Normal.	Yes	1	Normal.	9	C.	Coliform bacilli.	Coliform bacilli.	
62	27	M.	3	Renal calculus 1 year ago.	No	No	1 Spina bifida; 1 at 8 months.	Cystitis.	Normal.	No	-	Normal.	10	A.	Enterococci.	Nil.	
63	28	M.	5	Good.	No	Yes	3 Normal; 4 transverse, stillborn.	Good.	Normal.	No	-	Normal.	10	C.	Enterococci. Staph. albus. Coliform bacilli.	Enterococci. Coliform bacilli.	
64	37	M.	10	Good.	No	No	8 Normal, 1 pre-:mature, stillborn.	Vomiting 8th-9th month.	Normal.	No	-	Normal.	14	A.	Döderlein. Yeast.	Döderlein. Yeast.	
65	25	M.	1	Good.	No	No	-----	Oedema of feet.	Normal.	No	-	Normal.	10	A.	Enterococci. Staph. albus.	Enterococci. Staph. albus.	
66	19	S.	1	Good.	No	No	-----	Good.	Normal.	Yes	2	Normal.	10	B.	Non-haem. strept. Staph. aureus. Staph. albus.	Non-haem. strept. Staph. albus.	
67	25	M.	5	Good.	No	No	3 Normal, 1 mis-carriage 8/52.	Good.	Normal.	No	-	Normal.	10	C.	Diphtheroids. Enterococci. Staph. albus.	Diphtheroids. Staph. albus.	
68	29	M.	2	Typhoid fever at 9 years.	No	No	Miscarriage at 8/52 1 year ago.	Good.	Normal.	Yes	1	Normal.	10	C.	Enterococci. Staph. albus.	Enterococci. Staph. albus.	
69	38	M.	5	Good.	Yes	No	2 Forceps, 1 miscarriage 12/52 1 Craniotomy.	Umbilical hernia. Varicose veins.	Contracted pelvis. Caesarean section. Repair of hernia.	No	-	Normal.	34	B.	Staph. albus. B. Subtiles.	Staph. aureus. B. Subtiles.	
70	20	M.	3	Good.	No	No	2 Normal.	Good.	Normal.	No	-	Normal.	9	A.	Nil.	Nil.	

No.	Age.	Married or Single.	Parity.	Past Health	Scarlet Fever.	Rheumatism.	Past Pregnancies.	Antenatal Health.	Labour.	Tears.	Stitches.	Puerperium.	Days in Hospital.	Grade.	BACTERIOLOGICAL FINDINGS. During Labour. Aerobic.	During Labour. Anaerobic.	During Puerperium.
71	43	M.	10	Good.	No	No	1 Forceps, 1 normal, 2 miscarriages 20/52, 5 breech.	Slight haemorrhage before admission.	Miscarriage 20/52	No	-	2nd day rigor. Temp. 101.8°F. Pulse 110. 3rd day 100.6°F. Lochia scanty.	12	A.	Enterococci. Staph. albus.	Gonococci. Enterococci. Staph. albus.	
72	29	M.	3	Good.	No	No	2 Normal.	Good.	Normal.	No	-	Normal.	9	A.	Yeast. Staph. albus.	Yeast. Staph. aureus. Staph. albus.	
73	18	M.	1	Good.	No	No	-----	Bronchitis. Albuminuria.	Accidental haemorrhage.	Yes	-	Albumen cleared on 6th day.	9	C.	Enterococci. Staph. albus.	Enterococci. Staph. albus.	
75	34	M.	6	Good.	No	No	2 Forceps, 1 breech, 1 normal, 1 miscarriage 12/52.	Good.	Perforation of membranes.	Yes	1	Normal.	9	C.	Yeast. Staph. albus.	Yeast. Staph. albus.	
76	18	M.	2	Good.	No	No	1 Normal.	Good.	Premature, alive.	No	-	Foul lochia 3rd-5th day.	10	C.	Staph. albus.	Diphtheroids.	
77	35	M.	7	Good.	No	No	5 Normal, 1 stillborn.	Oedema of feet and vulva.	Normal.	No	-	2nd-4th day temp. 102-100°F. Pulse 128. Pleurisy. Bronchitis.	30	B.	B. Subtilis. Staph. albus. Enterococci.		
78	31	M.	1	Good.	No	No	-----	Failed forceps outside.	Contracted pelvis. Forceps. Stillborn. Episiotomy. Catgut in vagina.	Yes	5	Normal. 45c.c. anti-puerperal serum on delivery.	17	A.	Non-haem. strept. Staph. albus.	Non-haem. strept. Staph. albus.	
79	36	M.	10	Good.	No	No	9 Normal.	Slight ante-partum haemorrhage.	Marginal placenta praevia. Membranes perforated. Leg brought down.	No	-	Normal.	11	A.	Staph. albus. Strept. viridans.	Staph. albus. Strept. viridans.	
80	31	M.	9	Good.	No	No	8 Normal.	Good.	Normal.	No	-	Normal	11	C.	Coliform bacilli.	Coliform bacilli.	
81	26	M.	1		Yes	Yes	-----	Oedema of feet from 7th month.	Rigid perineum. Forceps. Episiotomy. Catgut in vagina.	Yes	3	Post-partum haemorrhage. Intra uterine douche. Normal.	11	A.	Nil.	Nil.	
82	20	M.	1	Good.	No	No	-----	Good.	Membranes perforated. Normal.	No	-	Normal.	10	A.	Non-haem. strept. Staph. aureus. Staph. albus.	Doderlein. Diphtheroids. Staph. albus.	
83	20	S.	1	Good.	No	No	-----	Good.	Normal. Membranes incomplete.	No	-	4th day piece of placenta expelled.	9	C.	Diphtheroids. Coliform bacilli.	Non-haem. strept. Staph. albus.	
84	30	M.	1	Nephritis 2 years ago.	No	No	-----	Oedema of feet and legs. No albumen.	Forceps.	No	-	Normal.	10	C.	Diphtheroids. Staph. albus. Coliform bacilli.	Diphtheroids. Staph. albus. Coliform bacilli.	

No.	Age.	Married or Single.	Parity.	Past Health.	Scarlet Fever.	Rheumatism.	Past Pregnancies.	Antenatal Health.	Labour.	Tears.	Stitches.	Puerperium.	Days in Hospital.	Grade.	BACTERIOLOGICAL FINDINGS. During Labour. Aerobic.	BACTERIOLOGICAL FINDINGS. During Labour. Anaerobic.	BACTERIOLOGICAL FINDINGS. During Puerperium.
85	38	M.	10	Good.	No	No	8 Normal, 1 miscarriage 12/52.	Debilitated.	Normal.	No	-	Normal.	26	A.	Döderlein. Diphtheroids.	Döderlein. Diphtheroids.	
86	19	M.	2	Good.	No	No	1 Forceps.	Good.	Normal.	No	-	Normal.	10	A.	Yeast. Strept. viridans.	Yeast. Strept. viridans. Gonococci.	
87	22	M.	2	Good.	No	No	1 Normal.	Debilitated.	Normal.	No	-	Normal	9	B.	Staph. albus. Enterococci.	Staph. albus. Enterococci.	
88	21	M.	1	Good.	No	No	-----	Good.	Normal.	Yes	1	Normal.	10	C.	Coliform bacilli.	Coliform bacilli.	
89	22	M.	1	Good.	No	No	-----	Good.	Normal.	No	-	Normal.	12	A.	Strept. viridans.	Nil.	
91	17	S.	1	Good.	No	No	-----	Good.	Normal.	Yes	2	4th-5th day temp.100.6-100°F. Pulse 108. Foul lochia.	11	B.	Döderlein. Diphtheroids. Staph. albus.	Döderlein. Diphtheroids.	
92	34	M.	1	Good.	No	No	-----	Good.	Forceps. Stillborn. Episiotomy.	Yes	4	Normal.	10	C.	Staph. albus.	Non-haem. strept. Staph. albus.	
93	23	M.	1	Good.	No	No	-----	Good.	Normal.	Yes	2	3rd day foul lochia.	9	A.	Non-haem. strept. Staph. albus.	Staph. albus.	
94	40	M.	8	Good.	No	No	7 Forceps (4 stillborn).	Good.	Membranes perforated.	No	-	Normal.	10	A.	Yeast Enterococci. Staph. albus.	Yeast. Enterococci. Staph. albus.	
95	29	M.	1	Good.	No	No	-----	Good.	Normal. Membranes ragged.	Yes	1	3rd day piece of placenta passed.	10	A.	Nil.	Döderlein.	
96	26	S.	1	Good.	No	No	-----	Good.	Normal.	No	-	Normal.	10	A.	Yeast.	Yeast.	
100	38	M.	1	Good.	No	No	-----	Influenza 4 weeks ago. Failed forceps outside.	3rd vertex. Rotation. Forceps. Catgut in vagina.	Yes	7	Normal.	10	C.	Coliform bacilli.	Coliform bacilli.	
101	32	M.	5	Good.	No	No	2 Forceps, 2 normal.	Haemorrhage from 8th month.	Placenta praevia. Dilitation of cervix. Leg brought down. Macerated foetus.	No	-	Normal.	10	C.	Enterococci. Staph. albus.	Enterococci. Staph. albus.	
103	40	M.	9	Good.	Yes	No	8 Forceps (1 premature)	Slight oedema of feet. No albumen.	Normal.	No	-	Normal.	9	C.	Strept. viridans.	Strept. viridans.	
106	30	M.	1	Good.	Yes	No	-----	Good.	3rd vertex. Rotation. Forceps. Lacerated vagina.	No	-	Post-partum haemorrhage. Douche. 4th-5th day temp.100-102°F. Foul lochia. Piece of placenta expelled on 3rd day.	16	C.	Diphtheroids. Coliform bacilli.	Diphtheroids. Coliform bacilli.	.Throat - Strept. viridans. Diphtheroi M. Catarrhalis. Cervix - Anaerobic streptococci.

No.	Age.	Married or Single.	Parity.	Past Health.	Scarlet Fever.	Rheumatism.	Past Pregnancies.	Antenatal Health.	Labour.	Tears.	Stitches.	Puerperium.	Days in Hospital.	Grade.	BACTERIOLOGICAL FINDINGS. During Labour. Aerobic.	BACTERIOLOGICAL FINDINGS. During Labour. Anaerobic.	BACTERIOLOGICAL FINDINGS. During Puerperium.
107	23	M.	1	Good.	No	No	-----	Good.	Normal.	No	-	Normal.	9	C.	Non-haem. strept.	Nil.	
108	21	M.	1	Good.	No	No	-----	Good.	Normal.	No	-	Normal.	9	B.	Non-haem. strept. Staph. albus.	Enterococci.	
109	17	M.	2	Good.	No	No	1 Normal.	Good.	Normal.	No	-	Normal.	9	C.	Non-haem. strept. Staph. albus.	Diphtheroids.	Urine - Staph. albus. Coliform bacilli.
112	19	M.	1	Good.	No	No	-----	Pyelitis at 8 months. Oedema of feet.	Normal.	No	-	4th-8th day temp. 99.8°-104°F. Pulse 100. Pyelitis.	11	B.	Non-haem. strept. Staph. albus.	Non-haem. strept.	
113	22	M.	3	Good.	No	No	2 Normal.	Good.	Normal.	No	-	Normal.	9	A.	Strept. viridans.	Strept. viridans.	Urine - Coliform bacilli.
114	19	M.	1	Good.	No	No	-----	Good.	Normal.	No	-	6th day foul lochia. 9th day rigor. Temp. 102°F. Pulse 118. 10th day temp. 101.6°F. Pulse 118.	18	C.	Coliform bacilli.	Coliform bacilli.	
115	30	M.	4	Appendicitis and peritonitis 4 years ago.	Yes	No	3 Normal.	Pyelitis.	Normal.	No	-	Normal.	10	A.	Enterococci. Staph. albus.	Staph. albus.	
117	32	M.	4	Tube and ovary removed 3 years ago.	Yes	No	Puerperal pyrexia with 1st and 3rd.	Persistent vomiting throughout.	Normal.	No	-	Normal.	9	B.	Enterococci. Staph. albus.	Enterococci. Staph. albus.	
118	41	M.	9	Appendicitis and pleurisy.	No	No	8 Normal.	Good.	Normal.	No	-	Normal.	9	C.	Enterococci. Staph. albus.	Enterococci. Staph. albus.	
119	33	M.	1	Gastric ulcer.	No	No	-----	Good.	Normal.	Yes	3	Normal.	10	C.	Non-haem. strept. Staph. albus.	Non-haem. strept. Staph. albus.	
120	36	M.	1	Good.	No	No	-----	Varicose veins. Oedema of feet.	Forceps. Ragged placenta. Catgut in vagina.	Yes	3	Normal.	12	C.	Staph. albus.	Strept. viridans. Staph. albus.	
121	32	M.	2	Tonsillitis at intervals.	No	No	1 Normal.	Albuminuria for last 7 days. Comatose. 3 Fits.	Eclamptic. Chorion deficient. Stillborn.	No	-	Normal.	12	A.	Döderlein Staph. albus.	Döderlein. Staph. albus.	
122	23	M.	1	Diphtheria.	Yes	No	-----	Oedema of feet 1 week.	Normal.	No	-	Normal.	11	C.	Coliform bacilli.	Coliform bacilli.	
123	31	M.	1	Good.	No	No	-----	Oedema of face and feet.	Normal. Membranes ragged.	Yes	3	7th-8th day temp. 103°-99.8°F. Pulse 130-110. Lochia foul.	15	C.	Staph. albus.	Staph. aureus. Coliform bacilli.	
124	27	M.	1	Bronchitis.	No	Yes	-----	Severe haemorrhage 4 hours before admission.	Partially concealed accidental haemorrhage. Premature, dead.	No	-	Right apical pneumonia. Died.	14	A.	Staph. albus.	Staph. albus.	

No.	Age.	Married or Single.	Parity.	Past Health.	Scarlet Fever.	Rheumatism.	Past Pregnancies.	Antenatal Health.	Labour.	Tears.	Stitches.	Puerperium.	Days in Hospital.	Grade.	BACTERIOLOGICAL FINDINGS. During Labour. Aerobic	During Labour. Anaerobic.	During Puerperium.
125	26	M.	4	Good.	No	No	2 Normal, 1 forceps.	Good.	Normal.	No	-	Normal.	10	C.	Staph. albus.	Staph. aureus. Coliform bacilli.	
126	33	M.	7	Hemiplegia 7 years ago. Breast abscess incised 8 weeks ago.	No	No	3 Normal, 1 breech, 2 miscarriages 12/52	Swollen feet from 8th month.	Low forceps	No	-	Normal.	10	A.	Nil.	Nil.	
128	36	M.	3	Bronchitis.	No	No	1 Forceps, 1 Puerperal pyrexia.	Good.	Normal.	Yes	1	4th-7th day temp.101.2°-100°F. Pulse 100-110. Lochia foul.	16	C.	Diphtheroids. Coliform bacilli.	Coliform bacilli.	
129	37	M.	7	Good.	Yes	No	3 Normal, 1 forceps, 2 miscarriages 12/52.	Good.	Membranes perforated.	Yes	1	Normal.	12	C.	Non-haem. strept. Coliform bacilli.	Non-haem. strept. Coliform bacilli.	
130	21	M.	1	Good.	No	No	-----	Good.	Membranes perforated.	No	-	Normal.	15	A.	Staph. albus.	Staph. albus.	
131	24	M.	3	Good.	No	No	2 Normal.	Albuminuria.	Breech.	No	-	Normal.	13	C.	Non-haem. strept. Staph. albus.	Staph. albus.	
132	38	M.	9	Good.	No	No	8 Normal.	Post-partum haemorrhage. Oedema of feet.	Membranes perforated. Premature. Placenta complete.	No	-	Normal.	10	A.	Non-haem. strept. Coliform bacilli.	Non-haem. strept. Coliform bacilli.	
135	25	M.	1	Good.	No	No	-----	Albuminuria.	Low forceps. Placenta ragged.	Yes	3	3rd-5th day foul lochia.	14	C.	Enterococci. Staph. albus. Coliform bacilli.	Staph. albus. Coliform bacilli.	
136	28	M.	5	Good.	No	No	1 Forceps, 3 normal.	Ante-partum haemorrhage.	Premature. Stillborn.	No	-	Normal.	9	C.	Staph. albus. Coliform bacilli.	Staph. albus. Coliform bacilli.	
137	26	M.	3	Bronchitis.	No	No	2 Normal.	Bronchitis.	Normal.	Yes	3	Normal.	12	C.	Non-haem. strept. Staph. albus.	Non-haem. strept. Staph. albus.	
139	20	M.	1	Cholecystectomy 2 years ago.	No	No	-----	Pyelitis from 2nd month. Antenatal wards.	Normal.	No	-	Normal. Pyelitis.	33	A.	Nil.	Nil.	Urine - Coliform bacilli.
140	19	M.	2	Good.	No	No	1 Normal.	Coliform bacilli in urine.	Normal.	No	-	Normal. 6th day temp. 100.4°F. Pulse 88. (?) Nipples.	11	B.	Diphtheroids. Non-haem. strept. Staph. albus.	Diphtheroids. Staph. albus.	Cervix - Non-haem. streptococci. Staphylococcus albus.
141	36	M.	2	Good.	No	No	1 Normal.	Good.	Normal.	No	-	Normal.	11	B.	Staph. albus.	Staph. albus.	
142	20	M.	1	Pneumonia at 10 years.	No	No	-----	Good.	Normal.	No	-	Normal.	11	A.	Nil.	Nil.	

No.	Age.	Married or Single.	Parity.	Past Health.	Scarlet Fever.	Rheumatism.	Past Pregnancies.	Antenatal Health.	Labour.	Tears.	Stitches.	Puerperium.	Days in Hospital.	Grade.	BACTERIOLOGICAL FINDINGS. During Labour. Aerobic.	During Labour. Anaerobic.	During Puerperium.
143	44	M.	1	Ex-ophthalmic goitre at 17 years.	No	No	-----	Good.	Caesarean section. Foul liquor amnii. Membranes necrotic. 20 c.c. anti-strept. serum.	No	-	5th-10th day temp. 100.2°-101°F. Pulse 120.	42	A.	Strept. viridans. Staph. albus.	Strept. viridans. Staph. albus.	Blood culture - sterile. Urine - Non-haem. strept. Cervix - Non-haem. strept.
144	20	M.	1	Good.	No	No	-----	Good.	Normal.	Yes	2	2nd-7th day temp. 99°-101°F. Pulse 108. Foul lochia.	19	A.	Enterococci. Staph. albus.	Staph. albus.	Blood culture - sterile. Urine - coliform bacilli. Staph. albus. Cervix - Coliform bacilli. Staph. albus.
145	32	M.	2	Good.	Yes	No	1 Miscarriage at 12/52.	Albuminuria.	Breech. Episiotomy.	Yes	4	6th-8th day temp. 100°-100.6°F. Pulse 104-124.	49	A.	Yeast. Enterococci. Staph. albus.	Yeast. Enterococci. Staph. albus.	Blood culture - sterile. Urine - sterile. Cervix - coliform bacilli. Staph. albus.
146	25	S.	1	Good.	No	Yes	-----	Good.	Forceps. Catgut in vagina.	Yes	6	6th day foul lochia.	18	A.	Diphtheroids. Staph. albus.	Döderlein. Diphtheroids. Staph. albus.	Blood culture - sterile. Urine - sterile. Cervix - Scanty coliform bacilli.
147	27	M.	2	Good.	No	No	1 Normal.	Good.	Normal.	No	-	Normal.	10	A.	Staph. albus.	Doderlein. Staph. albus.	
148	30	M.	3	Pneumonia 3 times.	Yes	No	1 Normal, 1 pyelitis.	Albuminuria from 7th month.	Membranes perforated. Premature twins.	No	-	Normal.	36	A.	Nil.	Nil.	
150	25	M.	2	Good.	No	No	1 Premature.	Good.	Normal. Chorion deficient.	No	-	Normal.	11	C.	Coliform bacilli.	Coliform bacilli.	
151	21	M.	2	Good.	No	No	1 Normal.	Good.	Normal.	No	-	Normal.	11	A.	Döderlein Yeast. Non-haem. strept.	Döderlein. Yeast. Strept. viridans.	
152	40	M.	10	Good.	No	No	9 Normal.	Varicose veins.	Twins, mature.	No	-	Normal.	9	A.	Coliform bacilli.	Döderlein. Coliform bacilli.	
155	31	M.	1	Good.	No	No	-----	Leucorrhoea.	Contracted pelvis. Forceps. Membranes ragged. Catgut in vagina.	Yes	6	Paresis of bladder. No rise in temperature.	18	C.	Haem. strept. Staph. albus.	Strept. viridans. Staph. albus.	Urine - Haemolytic strept.
154	31	M.	9	Treated for V.D. 1½ years ago.	No	No	2 Normal, 1 twins, 4 miscarriages 16/52.	Good.	Version. Normal.	No	-	Normal.	12	A.	Döderlein Non-haem. strept. Staph. albus.	Döderlein. Staph. albus.	
156	24	M.	2	Good.	No	No	1 Normal.	Good.	Breech.	No	-	Glands in axilla. Engorged breasts.	10	A.	Staph. albus.	Döderlein.	Urine - sterile.
157	17	S.	1	Good.	No	No	-----	Good.	Normal.	Yes	2	8th day lochia foul. 1 Rigor.	14	A.	Staph. albus. B. Subtilis.	Döderlein. Staph. albus.	Urine - sterile.

No.	Age.	Married or Single.	Parity.	Past Health.	Scarlet Fever.	Rheumatism.	Past Pregnancies.	Antenatal Health.	Labour.	Tears.	Stitches.	Puerperium.	Days in Hospital.	Grade.	BACTERIOLOGICAL FINDINGS. During Labour. Aerobic.	During Labour. Anaerobic.	During Puerperium.
158	35	M.	7	Good.	No	No	6 Normal.	Ante-partum haemorrhage.	Accidental haemorrhage. Premature, alive.	No	-	Normal.	10	A.	Staph. albus.	Staph. albus.	
159	32	M.	9	Good.	No	No	8 Normal.	Good.	Baby born before admission.	No	-	Normal.	11	C.	Staph. aureus. Staph. albus.	Staph. albus. Coliform bacilli.	
160	25	M.	2	Good.	No	No	1 Normal.	Bronchitis.	Normal.	Yes	1	Engorged breasts.	9	A.	Staph. albus.	Staph. albus.	
161	24	M.	4	Good.	No	No	3 Normal.	Good.	Normal.	No	-	Normal.	9	C.	Staph. albus.	Staph. albus.	
162	29	M.	3	Good.	No	No	2 Normal.	Good.	Normal.	No	-	Normal.	9	C.	Coliform bacilli.	Coliform Bacilli.	
163	18	M.	1	Good.	No	No	-----	Good.	Vaginal lacerations	Yes	3	Normal.	10	A.	Staph. albus.	Doderlein. Staph. albus.	
164	31	M.	3	Good.	No	No	1 Normal, 1 forceps.	Good.	Normal.	No	-	Normal.	9	A.	Döderlein. Staph. albus.	Döderlein. Staph. albus.	
165	28	M.	4	Good.	No	No	3 Normal.	Good.	Normal.	No	-	Normal.	9	A.	Staph. albus.	Döderlein.	
166	28	M.	8	Good.	No	No	1 Normal, 6 premature, stillborn.	Good.	Contracted pelvis.	No	-	Normal.	35	A.	Staph. albus. Coliform bacilli.	Döderlein. Coliform bacilli.	
168	18	M.	1	Good.	No	No	-----	Good.	Normal.	No	-	Lochia foul.	11	A.	Staph. albus.	Döderlein. Staph. albus.	
169	23	M.	1	Good.	No	No	-----	Pyelitis.	Normal.	No	-	Normal. Foul lochia.	10	C.	Diphtheroids. Staph. albus. Coliform bacilli.	Diphtheroids. Staph. aureus. Coliform bacilli.	
170	29	M.	3	Good.	No	No	2 Normal.	Good.	Normal.	No	-	Normal.	9	C.	Non-haem. strept. Staph. albus. B. Subtilis.	Non-haem. strept. Staph. albus. B. Subtilis.	
[illegible]	22	M.	1	Appendix and 1 ovary removed 2 years ago.	No	No	-----	Good.	Normal.	Yes	1	8th day temp. 101.4°F. Pulse 124. 9th day temp. 104.4°F. Pulse 160. Breast abscesses. Pyuria.	41	A.	Döderlein. Staph. aureus. Staph. albus.	Döderlein. Staph. albus.	Blood culture - sterile. Throat - Pneumococci. M. Catarrhalis. Urine - Coliform bacilli. Cervix - Doderlein. Staph. aureus (abundant).
[illegible]	22	M.	1	Diphtheria. T.B. left arm at 5 years.	No	No	-----	Good.	Normal.	Yes	1	5th day temp. 101.2°F. Pulse 120. 6th day temp. 102°F. Pulse 114. Bronchitis. Subinvolution.	17	C.	Staph. albus. Coliform bacilli.	Döderlein. Staph. aureus. Staph. albus.	Blood culture - sterile. Cervix - Staph. albus. Urine - Coliform bacilli. Throat - Strept. viridans.
[illegible]	27	M.	1	Good.	No	No	-----	Good.	Contracted pelvis. Failed forceps outside. Craniotomy. Catgut in vagina.	Yes	4	4th day temp. 100.2°F. Pulse 88. Foul lochia.	12	C.	Döderlein. Staph. albus. Coliform bacilli.	Staph. albus. Coliform bacilli.	

No.	Age.	Married or Single.	Parity.	Past Health.	Scarlet Fever.	Rheumatism.	Past Pregnancies.	Antenatal Health.	Labour.	Tears.	Stitches.	Puerperium.	Days in Hospital.	Grade.	BACTERIOLOGICAL FINDINGS. During Labour. Aerobic.	During Labour. Anaerobic.	During Puerperium.
[illegible]	29	M.	2	Good.	No	No	1 Breech.	Albuminuria. Pyelitis.	Normal.	Yes	1	Normal.	10	A.	Döderlein. Yeast. B. proteus. Staph. albus.	Yeast. B. proteus. Staph. albus.	Vagina - sterile. Throat - Non-haem. strept. Pneumococci. M. Catarrhalis. Urine - Coliform bacilli.
[illegible]	40	M.	5	Good.	No	Yes	1 Forceps, 2 normal, 1 miscarriage 8/52.	Good.	Contracted pelvis. High forceps.	Yes	3	Normal.	9	C.	Staph. albus. Coliform bacilli.	Staph. albus. Coliform bacilli.	
[illegible]	27	M.	2	Varicose veins.	No	No	1 Forceps.	Good.	Normal.	No	-	Normal.	23	A.	Staph. albus.	Staph. albus.	
[illegible]	27	M.	2	Good.	No	No	1 Forceps.	Good.	Normal.	Yes	2	Normal.	10	A.	Yeast. Non-haem. strept.	Yeast. Non-haem. strept.	
[illegible]	38	M.	14	Good.	No	No	8 Normal. 5 miscarriages.	In Stobhill 2 months ago with diabetes. Fehling reduction on admission.	Normal.	No	-	Normal.	8	B.	Yeast Non-haem. strept. Staph. aureus. Staph. albus.	Yeast. Non-haem. strept. Staph. aureus. Staph. albus.	
[illegible]	36	M.	1	Appendicitis 9 years ago.	No	No	-----	Good.	General contracted pelvis. Membranes perforated. Stillborn. Catgut in vagina.	Yes	2	8th day temp. 100.2°F. Pulse 110. Sloughing of vulvar lacerations. Subinvolution.	13	C.	Non-haem. strept. Coliform bacilli. Staph. albus.	Coliform bacilli. Staph. albus.	Cervic - Coliform bacilli. Urine - Pus cells. Staph. albus.
[illegible]	30	M.	1	Good.	No	No	-----	Good.	Breech. Extended arms and legs. Episiotomy. Catgut in vagina.	Yes	7	3rd-7th day temp. 101°-100°F. Pulse 120. Episiotomy not healed. Bronchitis.	35	A.	Yeast Staph. albus. Coliform bacilli.	Coliform bacilli.	Blood culture - sterile. Cervix - Coliform bacilli. Urine - Coliform bacilli.
[illegible]	20	S.	1	Bronchitis.	No	No	-----	Good.	Normal.	No	-	Normal.	9	C.	Coliform bacilli. Staph. albus.	Coliform bacilli.	
[illegible]	21	M.	1	Diphtheria at 6 years.	No	Yes	-----	Good.	Normal	No	-	Normal.	11	A.	Strept. viridans. Staph. albus.	Staph. albus.	
[illegible]	31	M.	1	Good.	No	No	-----	Good.	Normal. Vaginal lacerations.	No	-	1st-2nd temp. 101°F. Pulse 100. Subinvolution.	16	C.	Coliform bacilli.	Coliform bacilli.	Blood culture - sterile. Cervix - Coliform bacilli. Urine - Coliform bacilli.
[illegible]	[illegible]	M.	2	Good.	No	No	1 Breech.	Good.	Normal	Yes	1	Normal.	11	A.	Non-haem. strept. Staph. albus.	Anaerobic strept. Staph. albus.	
[illegible]	[illegible]	M.	1	Good.	No	No	-----	Good.	Normal	No	-	Normal.	10	B.	Enterococci Staph. albus. Coliform bacilli.	Enterococci Staph. albus.	
[illegible]	[illegible]	M.	7	Diphtheria 4	No	No	6 Normal.	Good.	Normal.	No	-	5th day temp. 99.2°F. Pulse 92. Rash on body.	10	C.	Staph. albus. Coliform bacilli.	Enterococci. Staph. albus. Coliform bacilli.	

No.	Age.	Married or Single.	Parity.	Past Health.	Scarlet Fever.	Rheumatism.	Past Pregnancies.	Antenatal Health.	Labour.	Tears.	Stitches.	Puerperium.	Days in Hospital.	Grade.	BACTERIOLOGICAL FINDINGS. During Labour. Aerobic.	During Labour. Anaerobic.	During Puerperium.
187	20	M.	1	Good.	No	No	-----	Feet swollen from 8th month. Ante-partum haemorrhage.	Membranes perforated. Live child.	No	-	Normal.	15	B.	Enterococci. Staph. albus.	Enterococci. Staph. albus.	
188	33	M.	1	Sore throat and glands periodic-:ally. Goitre for some years.	No	No	-----	Breathlessness.	Normal.	Yes	2	Normal.	9	B.	Enterococci. Staph. albus.	Enterococci.	
189	20	S.	1	Good.	No	No	-----	Good.	Premature, alive.	No	-	2nd-4th day temp. 100.6°-99.2°F. Pulse 118-100.	12	C.	Döderlein. Yeast. Non-haem. strept.	Döderlein. Non-haem. strept. Gonococci.	Pus from baby's eyes - Gonococci.
190	23	M.	2	Good.	Yes	No	1 Forceps.	Good.	Normal. Episiotomy.	Yes	2	Normal.	9	C.	Döderlein. Non-haem. strept.	Non-haem. strept. Staph. albus.	
191	19	M.	1	Diphtheria.	No	No	-----	Good.	Premature, alive.	No	-	Normal.	9	A.	Nil.	Nil.	
192	24	S.	1	Good.	No	No	-----	Good.	Normal.	Yes	2	Normal.	10	B.	Strept. viridans. Staph. albus.	Strept. viridans. Staph. albus.	
193	25	M.	3	Good.	No	No	1 Pyelitis, 1 normal.	Pus cells and Coliform bacilli in urine.	Normal.	No	-	Normal.	10	A.	Nil.	Nil.	
194	29	M.	4	Curettage 1 year ago.	No	No	1 Forceps, 2 normal.	Good.	Ragged placenta manually removed. Post-partum haemorrhage. Douche. Catgut in vagina.	Yes	2	Blood transfusion on 3rd day. 2-8th day temp.102°F. Pulse 140. Repeated rigors Pneumonia. Empyema. Transferred G.R.I.	18	B.	Staph. citreus.	Doderlein. Staph. albus.	5th day blood culture - sterile. Cervic - Coliform bacilli. Diphtheroids. 13th day blood culture - Non-haem. streptococci.
195	17	S.	1	Good.	No	No	-----	Good.	Normal. Post-partum haemorrhage.	No	-	Normal.	12	A.	Yeast. Non-haem. strept.	Yeast. Non-haem. strept.	
196	23	S.	1	Good.	No	No	-----	Good.	Normal.	No	-	3-5th day temp. 99.4°F. Pulse 96. Constipation.	10	A.	Yeast. Strept. viridans. Staph. albus.	Yeast. Staph. albus.	
197	22	M.	1	Appendicitis 2 years ago.	Yes	No	-----	Good.	Delayed, forceps.	Yes	3	Normal.	10	A.	Yeast. Strept. viridans. Staph. albus.	Döderlein. Staph. albus.	
198	31	M.	6	Good.	No	No	5 Normal.	Good.	Normal.	No	-	Normal.	9	A.	Nil.	Nil.	
199	34	M.	3	Good.	No	No	2 Normal.	Good.	Twins. Premature alive.	No	-	Normal.	10	C.	Coliform bacilli.	Coliform bacilli.	

No.	Age.	Married or Single.	Parity.	Past Health.	Scarlet Fever.	Rheumatism.	Past Pregnancies.	Antenatal Health.	Labour.	Tears.	Stitches.	Puerperium.	Days in Hospital.	Grade.	BACTERIOLOGICAL FINDINGS. During Labour. Aerobic.	During Labour. Anaerobic.	During Puerperium.
200	19	M.	1	Diphtheria. Appendicitis 9 years ago.	No	No	-----	Headache and swollen feet for 4 weeks.	Normal	Yes	2	Normal.	10	B.	Enterococci. Staph. aureus. Staph. albus. Coliform bacilli.	Enterococci. Staph. aureus. Staph. albus. Coliform bacilli.	
201	21	S.	1	Rheumatic fever 3 years ago.	No	Yes	-----	Swollen feet in early months.	Normal. Membranes ragged.	No	-	Normal.	9	A.	Döderlein. Staph. albus.	Diphtheroids. Staph. albus.	
202	34	M.	6	Good.	Yes	No	5 Normal.	Good.	Normal.	No	-	Normal.	10	A.	Döderlein Staph. albus.	Döderlein. Staph. albus.	
203	41	M.	1	Good.	No	No	-----	Good.	Twins - (1) breech legs brought down (2)vertex, version.	Yes	2	Normal.	11	A.	Staph. albus.	Strept. viridans. Staph. albus. Coliform bacilli.	
204	33	M.	1	Septic poisoning from teeth 2 years ago.	No	No	-----	Good.	Contracted pelvis Mid forceps. Stillborn.	No	-	Died of shock 8 hours later.	8 hrs	C.	Döderlein Staph. albus. Coliform bacilli.	Döderlein. Staph. albus. Coliform bacilli.	
205	36	M.	5	Good.	No	No	2 Normal, 1 stillborn, 1 forceps.	Good.	Normal.	No	-	6th-8th day temp. 100°-101.4°F. Pulse 120. Foul lochia.	32	C.	Non-haem. strept. Staph. albus.	Non-haem. strept.	Blood culture - sterile. Cervix - Pure non-haem. coli. Urine - Negative.
206	21	M.	1	Diphtheria 2 years ago.	No	No	-----	Good.	Normal. Tear of labia majora. Catgut sutures.	Yes	2	3rd-4th day temp. 102.4°-101.4°F. Pulse 110/84 Foul lochia. Breasts.	42	A.	Enterococci.	Enterococci. Diphtheroids. Staph. albus.	Blood culture 7th day - sterile. Urine - Non-haem. staphylococci. Cervix - Haem. staphylococci.
207	21	M.	2	Rheumatic fever at 6 years.	No	No	1 Normal.	Good.	Membranes perforated. Normal.	No	-	Normal.	10	C.	Yeast.	Enterococci. Diphtheroids.	
208	18	M.	1	T.B. Lung at 14 years.	Yes	No	-----	Good.	Normal. Bruising of vagina.	No	-	Normal.	12	C.	Yeast. Coliform bacilli.	Yeast. Coliform bacilli.	
209	24	M.	2	Good.	No	Yes	1 Normal.	Good.	Face presentation. Anencephalic. Premature.	No	-	Normal.	13	A.	Döderlein. Coliform bacilli.	Döderlein. Coliform bacilli.	
210	27	M.	1	Good.	Yes	Yes	-----	Good.	Delayed. Low forceps. Episiotomy. Catgut in vagina.	Yes	4	Normal.	10	A.	Yeast. Döderlein.	Döderlein. Diphtheroids. Staph. albus.	
211	38	M.	9	Good.	No	No	4 Normal, 3 forceps, 1 premature, stillborn.	Fell 6 weeks ago.	Transverse. Prolapsed cord. Catgut in vagina.	Yes	2	Normal.	10	A.	Döderlein	Döderlein.	
212	38	M.	5	Good.	No	No	4 Normal.	Swelling of feet from 8th month.	Normal.	No	-	Normal.	14	C.	Yeast Döderlein. Coliform bacilli.	Yeast. Döderlein. Coliform bacilli.	

No.	Age.	Married or Single.	Parity.	Past Health.	Scarlet Fever.	Rheumatism.	Past Pregnancies.	Antenatal Health.	Labour.	Tears.	Stitches.	Puerperium	Days in Hospital.	Grade.	BACTERIOLOGICAL FINDINGS. During Labour. Aerobic.	BACTERIOLOGICAL FINDINGS. During Labour. Anaerobic.	BACTERIOLOGICAL FINDINGS. During Puerperium.
213	20	M.	1	Good.	No	Yes	-----	Erythema nodosum 6 months ago. V.S. murmur at apex.	Normal. Tear of labia majora. Catgut.	Yes	-	Normal.	10	A.	Döderlein.	Döderlein.	
214	26	M.	2	Good.	No	No	1 Normal.	Good.	Normal.	Yes	1	Normal.	10	A.	Yeast.	Yeast. Döderlein. Diphtheroids.	
215	29	M.	1	Good.	No	No	-----	Marked albuminuria. Swelling of feet.	Delayed. Mid forceps. Stillborn. Placenta and membranes very foul.	Yes	2	3rd-5th day lochia foul.	7	A.	Döderlein.	Döderlein.	
216	24	S.	1	Good.	No	No	-----	Good.	Normal.	No	-	Normal.	10	A.	Staph. albus.	Döderlein.	
217	25	S.	1	Good.	No	No	-----	Good.	Breech. Version. Examphalos of viscera. Membranes ragged.	Yes	2	5th day temp. 100.2°F. Pulse 104.	11	C.	Yeast. Non-haem. strept. Coliform bacilli.	Yeast. Non-haem. strept. Coliform bacilli.	
218	28	M.	7	Good.	No	No	1 Forceps, 4 normal 1 miscarriage 6/52	Good.	Normal.	No	-	Normal.	10	A.	Staph. albus.	Staph. albus.	
219	45	M.	12	Curettage 1½ years ago.	No	No	8 Normal, 3 miscarriages 12/52.	Haemorrhage at 5 months. Varicose veins.	Membranes perforated. Normal.	No	-	Normal.	26	C.	Döderlein. B. proteus. Coliform bacilli.	Döderlein. B. proteus. Coliform bacilli.	
221	26	M.	1	Good.	Yes	No	-----	Good.	Breech. Extended legs. Catgut in vagina. Spina bifida.	Yes	4	Normal.	10	A.	Döderlein. Staph. albus.	Döderlein.	
222	27	M.	2	Good.	No	No	1 Forceps.	Good.	Flat pelvis. Forceps. Membranes ragged.	No	-	Normal.	10	C.	Döderlein. Diphtheroids. Staph. aureus.	Döderlein. Staph. aureus.	
223	36	M.	4	Good.	No	No	3 Normal.	Sickness throughout pregnancy.	Normal. Placenta unhealthy.	Yes	2	Normal.	11	A.	Staph. albus.	Staph. albus.	
224	37	M.	6	Good.	No	Yes	1 Miscarriage 16/52, 4 normal.	Ante-partum haemorrhage.	Central placenta praevia.	No	-	5th-8th day temp. 100.4°F. Pulse 101. Lochia normal. Pus in urine.	16	B.	Döderlein. Non-haem. strept.	Döderlein. Staph. albus.	Urine - Coliform bacilli.
225	33	M.	2	Good.	No	No	1 Normal.	Severe pain of 8 hours duration. Twisted ovarian cyst.	Right oophorectomy. Normal delivery 12 hours later.	No	-	10th day septic parotitis. Removed to Western Infirmary.	15	C.	Döderlein. Coliform bacilli.	Döderlein. Coliform bacilli.	
226	19	M.	2	Good.	No	No	1 Normal.	Slight haemorrhage.	Normal.	No	-	Normal.	10	A.	Döderlein. Non-haem. strept. Staph. albus.	Non-haem. strept. Diphtheroids. Staph. albus.	

Age.	Married or Single.	Parity.	Past Health.	Scarlet Fever.	Rheumatism.	Past Pregnancies.	Antenatal Health.	Labour.	Tears.	Stitches.	Puerperium.	Days in Hospital.	Grade.	BACTERIOLOGICAL FINDINGS. During Labour. Aerobic.	BACTERIOLOGICAL FINDINGS. During Labour. Anaerobic.	BACTERIOLOGICAL FINDINGS. During Puerperium.
23	M.	2	Good.	No	No	1 Normal.	Leucorrhoea.	Normal. Membranes ragged.	No	-	3rd-5th day temp. 101.8°-103°F. Pulse 130. Sub-involution. Foul lochia. Robroyston.	5	A.	Döderlein. Strept. viridans. Staph. albus.	Döderlein. Staph. albus.	Blood culture - Haem. streptococci. Cervix - Haem. streptococci.
22	M.	3	Good.	Yes	No	1 Premature, 1 Kidney trouble.	Slight albuminuria.	Normal.	No	-	Normal.	11	B.	Non-haem. strept.	Nil.	
38	M.	12	Kidney disease 2 years ago. In G.R.I.	No	No	4 Forceps, 1 miscarriage 16/52, 1 eclampsia, 5 normal.	Blurred vision. Chronic nephritis.	Normal.	No	-	Normal.	10	B.	Non-haem. strept. Staph. albus.	Döderlein. Non-haem. strept. Staph. albus.	
26	M.	1	Good.	No	No	-----	Good.	Normal. Slight ante-	Yes	3	Normal.	13	B.	Strept. viridans. Staph. albus.	Diphtheroids. Strept. viridans. B. subtilis.	
28	M.	2	Rheumatic fever. Appendicitis 3 years ago.	No	Yes	1 Forceps.	Good.	Normal. Placenta ragged. Catgut in vagina.	Yes	2	Normal.	11	A.	Yeast. Strept. viridans. Staph. albus.	Döderlein. Yeast. Diphtheroids.	
42	M.	5	Good.	Yes	No	4 Forceps.	Good.	Stillborn. Membranes deficient.	No	-	Normal.	10	A.	Döderlein. Diphtheroids.	Döderlein. Diphtheroids.	
39	M.	10	Good.	Yes	No	7 Normal. 2 Miscarriages 6/52	Midwife's case. Many examinations.	Delayed. Membranes perforated. Normal.	No	-	1st-3rd day temp. 100°-104.8°F. Pulse 100/120. Arthritis. To Robroyston.	4	C.	Coliform bacilli.	Coliform bacilli.	Blood culture 18 hours after delivery - Haem. strept. Blood culture 4th day - sterile.
24	M.	1	Good.	No	No	-----	Good.	Normal.	No	-	Normal.	10	A.	Döderlein.	Döderlein.	
27	M.	1	Good.	No	No	-----	Good.	Breech. Extended legs. Episiotomy. Catgut in vagina.	Yes	4	Normal.	10	B.	Enterococci. Staph. albus.	Döderlein. Staph. albus.	
28	M.	1	Good.	Yes	No	-----	Good.	3rd Vertex. Rotation. Forceps. Episiotomy. Catgut in vagina.	Yes	4	Normal.	16	B.	Enterococci. Staph. albus.	Staph. albus.	
39	M.	4	Good.	No	No	3 Normal.	Swelling of feet. Incontinence of urine for last 3 weeks.	Normal.	No	-	8th-14th day temp. 103.4°F. Pulse 130. Rigors. Foul lochia. Rash. Cystitis.	38	C.	Enterococci. Coliform bacilli.	Döderlein. Strept. viridans. Coliform bacilli.	Urine - Coliform bacilli.
40	M.	1	Good.	No	No	-----	Good.	Uterine inertia. Forceps Catgut in vagina.	Yes	4	Normal.	11	A.	Enterococci. Staph. albus.	Staph. albus.	

No.	Age.	Married or Single.	Parity.	Past Health.	Scarlet Fever.	Rheumatism.	Past Pregnancies.	Antenatal Health.	Labour.	Tears.	Stitches.	Puerperium.	Days in Hospital.	Grade.	BACTERIOLOGICAL FINDINGS. During Labour. Aerobic.	During Labour. Anaerobic.	During Puerperium.
[illegible]	35	M.	2	Curetted twice in 1925.	No	No	1 Normal.	Leucorrhoea. Anaemia.	Normal.	No	-	Normal.	10	C.	Staph. albus. Coliform bacilli.	Staph. albus. Coliform bacilli.	
[illegible]	33	M.	6	Erysipelas 1 month ago.	No	No	5 Normal.	Good.	Normal.	No	-	Normal.	10	C.	Coliform bacilli.	Coliform bacilli.	
[illegible]	26	M.	4	Good.	No	No	3 Normal.	Breech. Version at Dispensary.	Normal.	No	-	Normal.	10	B.	Non-haem. strept. Staph. albus.	Döderlein. Non-haem. strept. Staph. albus.	
[illegible]	36	M.	6	Good.	No	No	4 Normal. 1 Breech.	Normal.	Normal.	No	-	Normal.	10	A.	Enterococci. Staph. albus.	Doderlein. Enterococci.	
[illegible]	23	M.	3	Good.	No	No	2 Normal.	Breech. Version at Dispensary.	Normal.	No	-	Normal.	10	C.	Diphtheroids. Non-haem. strept. Coliform bacilli.	Non-haem. strept. Coliform bacilli.	
[illegible]	27	M.	2	Good.	No	No	1 Forceps, stillborn.	Good.	Normal.	No	-	Normal.	10	A.	Strept. viridans.	Strept. viridans.	
[illegible]	31	M.	2	Good.	No	No	1 Normal.	Good.	Normal.	No	-	Normal.	9	A.	Non-haem. strept.	Nil.	
[illegible]	28	M.	1	Good.	No	No	-----	Midwife's case.	Delayed. Forceps. Episiotomy. Catgut in vagina.	Yes	4	Normal.	13	C.	Enterococci. Coliform bacilli.	Enterococci. Coliform bacilli.	
[illegible]	28	S.	1	Good.	No	No	-----	Good.	Normal.	No	-	Normal.	10	A.	Döderlein. Yeast.	Döderlein. Yeast.	
[illegible]	25	M.	1	Good.	No	No	-----	Good.	Normal.	No	-	Oedema of vulva.	10	C.	Diphtheroids. Coliform bacilli.	Diphtheroids. Coliform bacilli. Gonococci.	
[illegible]	[illegible]	M.	1	Good.	No	No	-----	Good.	Delayed. Mid forceps. Episiotomy. Catgut in vagina.	Yes	3	Foul lochia.	10	C.	Strept. viridans. Enterococci. Coliform bacilli.	Strept. viridans. Enterococci. Coliform bacilli.	
[illegible]	30	M.	3	Good.	No	No	1 Forceps, 1 Normal.	Good.	Normal. Old tear	Yes	2	Normal.	10	A.	Döderlein.	Döderlein. Strept. viridans.	

TABLE II.

BACTERIOLOGICAL FINDINGS IN PUERPERAL SEPSIS.

Red denotes the presence of Streptococcus pyogenes haemolyticus.

No.	Admission.	Confinement.	Onset.	Cervical Cultures.	Blood Cultures.	Throat Cultures.	Cultures from Secondary Suppurative Sources. Source.	Cultures.	Type of Fever.
1	14Oct.	26Oct.	28Oct.	-----	-----	-----	-----	-----	Mild.
2	26Oct.	26Oct.	31Oct.	-----	-----	-----	-----	-----	Mild.
3	2Nov.	6Nov.	8Nov.	-----	-----	-----	-----	-----	Mild.
4	2Nov.	4Nov.	9Nov.	-----	-----	-----	-----	-----	Severe.
5	23Oct.	10Nov.	11Nov.	24 Nov.	-----	-----	-----	-----	Moderate.
6	9Nov.	9Nov.	12Nov.	-----	-----	-----	-----	-----	Mild.
7A	13Nov.	14Nov.	17Nov.	-----	-----	-----	-----	-----	Mild.
7B	13Nov.	14Nov.	17Nov.	24 Nov.	-----	-----	-----	-----	Mild.
7C	27Oct.	11Nov.	17Nov.	24 Nov.	-----	-----	-----	-----	Mild.
8	15Nov. 9 Dec.	15Nov.	18Nov.	13 Dec. 24 Dec.	16 Dec.	21 Dec.	-----	-----	Moderate.
9	20Nov.	20Nov. B.A.	21Nov.	-----	-----	-----	-----	-----	Mild.
10A	21Nov.	21Nov.	22Nov.	2 Dec.	7 Dec. 8 Dec.	-----	-----	-----	Severe
10B	17Nov.	19Nov.	22Nov.	-----	-----	-----	-----	-----	Mild.
11	20Nov.	21Nov.	23Nov.	29 Nov.	2 Dec. 8 Dec.	30 Nov.	-----	-----	Severe.
12A	22Nov.	22Nov.	25Nov.	29 Nov. 29 Dec.	2 Dec.	24 Nov. 30 Nov.	-----	-----	Moderate
12B	21Nov.	22Nov.	25Nov.	-----	-----	-----	-----	-----	Severe.
13A	23Nov.	23Nov.	27Nov.	29 Nov. 29 Dec.	2 Dec.	30 Nov.	-----	-----	Moderate.
13B	23Nov.	24Nov.	27Nov.	29 Nov. 20 Dec. 29 Dec.	23 Dec.	28 Dec.	-----	-----	Mild.
14A	24Nov.	25Nov.	28Nov.	2 Dec.	2 Dec.	-----	-----	-----	Severe.

No.	Admission.	Confinement.	Onset.	Cervical Cultures.	Blood Cultures.	Throat Cultures.	Cultures from Secondary Suppurative Sources. Source.	Cultures from Secondary Suppurative Sources. Cultures.	Type of Fever.
14B	25Nov.	25Nov.	29Nov.	29 Nov. 2 Dec. 24 Dec.	7 Dec. Staph. albus. 8 Dec.	21 Dec.	-----	-----	Mild.
14C	25Nov.	25Nov.	29Nov.	2 Dec. 29 Dec.	7 Dec.	21 Dec.	-----	-----	Moderate.
15	29Nov.	1Dec.	5Dec.	10 Dec. 24 Dec.	12 Dec. Coliform bacilli.	21 Dec.	-----	-----	Moderate.
16	26Nov.	27Nov.	5Dec.	7 Dec.	7 Dec.	28 Dec.	-----	-----	Mild.
17	8Dec.	8Dec.	10Dec.	13 Dec. 24 Dec.	16 Dec.	21 Dec.	-----	-----	Mild.
18	8Dec.	9Dec.	11Dec.	15 Dec. 24 Dec.	19 Dec. Coliform bacilli.	21 Dec.	Abscess R. Arm.	Haem. Strept.	Moderate.
19	2Dec.	3Dec.	13Dec.	15 Dec. 23 Dec.	19 Dec.	21 Dec.	-----	-----	Moderate.
20A	10Dec.	11Dec.	14Dec.	17 Dec.	16 Dec.	21 Dec.	-----	-----	Mild.
20B	27Nov.	28Nov. curetted.	14Dec.	16 Dec.	19 Dec.	-----	Serum abscess.	Staph. aureus.	Moderate.
21	25Nov.	14Dec.	15Dec.	20 Dec. 23 Dec.	21 Dec.	21 Dec.	-----	-----	Moderate.
22A	12Dec.	13Dec.	16Dec.	18 Dec. 20 Dec. 24 Dec.	23 Dec. Staph. albus.	21 Dec.	-----	-----	Moderate.
22B	10Dec.	10Dec.	16Dec.	18 Dec. 20 Dec. 23 Dec.	-----	18 Dec. 21 Dec.	-----	-----	Moderate.
23	2Dec.	15Dec. Induction.	19Dec.	18 Dec. 21 Dec. 23 Dec.	23 Dec.	18 Dec. 21 Dec.	-----	-----	Mild.
24	12Dec.	12Dec.	21Dec.	23 Dec.	26 Dec.	-----	-----	-----	Mild.
25	22Dec.	22Dec.	23Dec.	27 Dec.	31 Dec.	29 Dec.	-----	-----	Mild.
26	20Dec.	20Dec.	24Dec.	27 Dec. 29 Dec.	31 Dec.	27 Dec. 29 Dec.	-----	-----	Mild.

No.	Admis-sion.	Confine ment.	Onset.	Cervical Cultures.	Blood Cultures.	Throat Cultures.	Cultures from Secondary Suppurative Sources. Source.	Cultures.	Type of Fever.
27	17Dec.	17Dec. Abor-tion B.A.	25Dec.	27 Dec.	-----	27 Dec.	-----	-----	Mild.
28	20Dec.	20Dec.	28Dec.	29 Dec.	4 Jan. Staph. albus.	29 Dec.	-----	-----	Mild.
29	28Dec.	28Dec. Abort :ion. B.A.	31Dec.	-----	-----	-----	-----	-----	Mild.
30	23Dec.	23Dec.	2Jan.	-----	-----	-----	-----	-----	Mild.
31	31Dec.	31Dec. B.A.	4Jan.	4 Jan. 10 Jan.	11 Jan. Staph. albus.	4 Jan.	-----	-----	Mild.
32	29Dec.	30Dec.	6Jan.	10 Jan.	11 Jan. Staph. albus.	-----	-----	-----	Mild.
33	28Dec.	28Dec.	7Jan.	9 Jan.	11 Jan. Staph. albus.	9 Jan.	-----	-----	Mild.
34A	4Jan.	5Jan.	13Jan.	15 Jan.	-----	-----	-----	-----	Mild.
34B	4Jan.	4Jan.	13Jan.	14 Jan. 17 Jan.	-----	14 Jan.	-----	-----	Mild.
35A	9Jan.	10Jan. Failed forceps B.A.	14Jan.	16 Jan.	-----	-----	-----	-----	Mild.
35B	14Jan.	14Jan.	14Jan.	16 Jan.	-----	16 Jan.	-----	-----	Mild.
36	9Jan.	10Jan.	17Jan.	18 Jan.	20 Jan.	18 Jan.	-----	-----	Moderate. Pelvic cellulitis.
37	19Jan.	20Jan.	23Jan.	23 Jan.	-----	23 Jan.	-----	-----	Mild.
38	22Jan.	22Jan.	25Jan.	25 Jan.	26 Jan.	25 Jan. 1 Feb.	-----	-----	Moderate.

No.	Admission.	Confinement.	Onset.	Cervical Cultures.	Blood Cultures.	Throat Cultures.	Cultures from Secondary Suppurative Sources.		Type of Fever.
							Source.	Cultures.	
39	19Jan.	19Jan. B.A.	29Jan.	-----	-----	-----	Serum abscess.	Haem. strept.	Mild. Abscess.
40	29Jan.	30Jan.	31Jan.	30 Jan. 31 Jan. 1 Feb.	1 Feb.	30 Jan.	-----	-----	Moderate.
41A	23Jan.	23Jan.	6Feb.	21 Jan. 8 Feb.	10 Feb.	21 Jan.	Abscess Thigh.	Haem. strept.	Mild Abscess of thigh.
41B	6Feb.	6Feb. B.A.	6Feb.	7 Feb.	8 Feb.	7 Feb.	Pleural effusion.	Haem. strept.	Moderate.
42	31Jan.	31Jan.	7Feb.	7 Feb.	7 Feb.	7 Feb.	-----	-----	Mild.
43	23Jan.	8Feb.	11Feb.	2 Feb.	14 Feb.				
44A	13Feb.	13Feb.	17Feb.	18 Feb. 20 Feb.	24 Feb.	18 Feb. 20 Feb.	-----	-----	Mild.
44B	13Feb.	14Feb.	17Feb.	18 Feb. 20 Feb.	22 Feb.	18 Feb. 20 Feb.	-----	-----	Mild.
44C	14Feb.	14Feb.	17Feb.	18 Feb. 20 Feb.	24 Feb.	18 Feb. 20 Feb.	-----	-----	Mild.

TABLE III.

Agglutination Tests with Strains of Streptococcus Haemolyticus.

Sera.	K. 17	F.18	McL.21	S.N.30	T.N.32	D.
End Titres.	1920	960	1920	1920	3840	3840
STRAINS						
15 from patient's vagina	1920	960	960	960	3840	960
17 " " "	1920	960	1920	1920	3840	960
18 " " "	1920	960	1920	1920	3840	240
19 " " "	1920	960	960	480	3840	480
21 " " "	1920	960	1920	1920	3840	240
22A " " "	1920	960	120	480	3840	960
22B " " "	1920	960	1920	1920	3840	480
35B " " "	1920	960	1920	1920	3840	3840
37 " " "	60	0	0	0	240	0
37T " " throat	60	60	120	120	480	120
38 " " vagina	1920	960	1920	1920	3840	960
40 " " "	120	60	120	120	0	1920
41A " " "	1920	960	960	960	3840	240
42T " " throat	960	480	1920	1920	960	960
44A " " vagina	120	240	240	240	240	3840
44B " " "	120	60	120	120	120	1920
44C " " "	60	0	60	120	120	1920
N. 6 " nurse's throat	120	0	0	120	120	120
N. 9 " " "	60	60	60	60	120	120
N.15 " " "	120	120	120	120	120	60
N.19 " " "	120	120	120	120	120	120
N.22 " " "	60	60	60	60	60	120
N.27 " " "	120	60	120	120	120	480
N.30 " " "	1920	960	960	1920	3840	3840
N.32 " " "	1920	960	1920	1920	3840	480
N.39 " " "	240	120	240	240	120	240
N.44 " " "	120	120	120	120	120	120
S.H. " " "	120	120	120	120	120	60

K.17 serum prepared from strain from vagina of patient 17
F.18 " " " " " " " " 18
McL.21 " " " " " " " " 21
S.N.30 " " " " " throat of nurse 30
T.N.32 " " " " " " " " 32
D. " " " " " vagina of patient in another hospital.

TABLE IV.

Absorption Tests with Strains of Streptococcus haemolyticus.

Sera				K.17	F.18	McL.21	S.N.30	T.N.32
Titre				1920	960	1920	1920	3840
Absorbing Strains.								
15	From	patient's	vagina	0	0	0	0	0
17	"	"	"	0	0	0	0	0
18	"	"	"	0	0	0	0	0
19	"	"	"	0	0	0	0	0
21	"	"	"	0	0	0	0	0
22A	"	"	"	0	0	0	0	0
22B	"	"	"	0	0	0	0	0
35B	"	"	"	0	0	0	0	0
37	"	"	"	240	240	240	240	480
37T	"	"	throat	240	240	240	240	480
38	"	"	vagina	0	0	0	0	0
40	"	"	"	120	240	240	480	480
41A	"	"	"	0	0	0	0	0
42T	"	"	throat	240	480	480	480	480
44A	"	"	vagina	480	480	480	480	480
44B	"	"	"	480	480	480	480	480
44C	"	"	"	480	480	480	480	480
N.6	"	nurse's	throat	240	120	480	120	480
N.9	"	"	"	---	---	---	---	---
N.15	"	"	"	240	---	---	---	---
N.19	"	"	"	---	---	---	---	---
N.22	"	"	"	---	---	---	---	---
N.27	"	"	"	---	---	---	---	---
N.30	"	"	"	0	0	0	0	0
N.32	"	"	"	0	0	0	0	0
N.39	"	"	"	240	480	240	480	240
N.44	"	"	"	480	480	480	480	480
S.H.	"	"	"	----	---	---	---	---

TABLE V.

Incidence of Puerperal Sepsis in Thirteen-weekly Periods.

1932.

In a Maternity Institution.			In maternity domiciliary practice in the same county.		
Births.	Sepsis.	Percentage.	Births.	Sepsis.	Percentage.
242	17	7.02	1412	38	2.69
228	18	7.90	1504	26	1.73
215	15	6.98	1337	18	1.34
243	44	18.11	1307	30	2.30
928	94	10.13	5560	112	2.01

1933.

In a Maternity Institution.			In maternity domiciliary practice in the same county.		
Births.	Sepsis.	Percentage.	Births.	Sepsis.	Percentage.
280	31	11.07	1379	24	1.74
279	15	5.38	1376	17	1.24
226	7	3.09	1187	20	1.68
260	13	5.00	1204	27	2.24
1045	66	6.32	5146	88	1.71

TABLE VI.

Incidence of Puerperal Sepsis in Four-weekly Periods.

Date (1932).	In a Maternity Institution.			In maternity domiciliary practice in the same county		
	Births.	Sepsis.	Percentage.	Births.	Sepsis.	Percentage.
Jan. 3 - Jan. 30	74	9	12.16	438	10	2.28
Jan. 31 - Feb. 27	64	4	6.25	388	10	2.58
Feb. 28 - Mar. 26	89	4	4.50	459	15	3.27
Mar. 27 - Apl. 23	57	6	10.53	430	10	2.33
Apl. 24 - May 21	74	5	6.76	516	4	0.77
May 22 - June 18	75	4	5.33	476	13	2.73
June 19 - July 16	71	4	5.64	443	4	0.90
July 17 - Aug. 13	65	3	4.62	423	5	1.18
Aug. 14 - Sep. 10	63	8	12.70	388	8	2.06
Sep. 11 - Oct. 8	66	4	6.06	390	4	1.26
Oct. 9 - Nov. 5	71	5	7.04	393	7	1.78
Nov. 6 - Dec. 3	82	21	25.60	408	13	3.19
Dec. 4 - Dec. 31	77	17	22.08	408	9	2.21
	928	94	10.13	5,560	112	2.00

Date (1933).	In a Maternity Institution.			In maternity domiciliary practice in the same county		
	Births.	Sepsis.	Percentage.	Births.	Sepsis.	Percentage.
Jan. 1 - Jan. 28	75	11	14.67	440	3	0.68
Jan. 29 - Feb. 25	89	10	11.24	401	8	2.00
Feb. 26 - Mar. 25	89	10	11.24	439	11	2.50
Mar. 26 - Apl. 22	90	3	3.33	458	6	1.31
Apl. 23 - May 20	92	4	4.34	428	8	1.87
May 21 - June 17	81	5	6.17	389	5	1.29
June 18 - July 15	77	6	7.80	406	4	0.98
July 16 - Aug. 12	67	2	2.99	372	3	0.80
Aug. 13 - Sep. 9	75	2	2.67	365	10	2.74
Sep. 10 - Oct. 7	69	0	0.00	325	4	1.23
Oct. 8 - Nov. 4	81	5	6.17	341	5	1.47
Nov. 5 - Dec. 2	86	4	4.66	359	11	3.06
Dec. 3 - Dec. 30	74	4	5.40	423	10	2.36
	1,045	66	6.32	5,146	88	1.71

STATEMENT OF 58 CASES OF PUERPERAL SEPSIS.

TABLE VII.

No.	Age.	Parity.	Past Health. Previous Confinements.	Scarlet Fever.	Antenatal Supervision.	Labour.	Tears.	Stitches.	Placenta and Membranes.	Staff in Attendance.	Serum.	Admitted.	Delivered.	Sickened.	Section where Sickened.	Date and Place of first Isolation.	Removed to Isolation Hospital.	General Condition.	Perineum and Vagina.
1	34		Cardiac disease and general poor health.		Yes	Induced abortion	No	-	Uterine contents removed.	V.S. Dr.S. Dr.H.	28 Oct. 60c.c.	14 Oct.	26 Oct.	28 Oct. 3 rd day.	P.IV. N.12	P.V. 30 Oct.	----		Foul vaginal discharge.
2	18	1				Normal.	No	-	Complete.	S.C. N.23 N.11	27 Oct. 70c.c.	26 Oct.	26 Oct.	31 Oct. 6th day.	P.IV. N.5	P.V. 31 Oct.	----		Foul lochia.
3	34	8	3 Premature births. 1 Miscarriage. Post encephalitis lethargica.		Yes	Premature. Normal.	No	-	Complete.	N.19 S.Q. N.15	3 Nov. 10c.c. 8 Nov. 30c.c. 8 Nov. 40c.c.	2 Nov.	6 Nov.	8 Nov. 3rd day	P.IV. S.I	P.V. 8 Nov.	----		
4	21	1	Marked anaemia.		Yes	Forceps. Post-partum haemorrhage.	No	-	Incomplete. Adherent. Removed manually.	Dr.H. N.34 N.8 S.H.	4 Nov. 30c.c. 5 Nov. 30c.c. 7 Nov. 40c.c.	2 Nov.	4 Nov.	9 Nov. 6th day	P.IV. N.9	P.V. 8 Nov.	----	Patient somewhat collapsed. Rigor 7th day.	
5	29	1	Leucorrhoea.		Yes	Normal.	Yes	2	Complete.	N.23 S.Q. N.30	11 Nov. 40c.c. 12 Nov. 30c.c. 12 Nov. 30c.c.	22 Oct.	10 Nov.	11 Nov. 2nd day	P.IV. S.9	P.V. 12 Nov.	----		
6	24	4	3 Normal.		Yes	Normal.	No	-	Complete.	N.8 S.H. N.X.	11 Nov. 40c.c. 12 Nov. 30c.c. 14 Nov. 30c.c.	9 Nov.	9 Nov.	12 Nov. 4th day	P.IV. N.I	P.I. 12 Nov.	----	Marked serum reaction. Painful breasts.	
7A	24	2	Chorea and highly excitable.		Yes	Normal.	No	-	Complete	N.26 S.Q. N.15	18 Nov. 40c.c. 18 Nov. 30c.c.	13 Nov.	14 Nov.	17 Nov. 4th day	P.IV. S.8	P.V. 17 Nov.	----	Suffers from chorea. Highly excitable.	
7B	29	2	First instrumental labour.		Yes	Instrumental	No	-	Complete	N.23 S.Q. N.15	18 Nov. 40c.c.	13 Nov.	14 Nov.	17 Nov. 4th day	P.IV. N.4	P.V. 20 Nov.	----		
7C	24	2	Albuminuria. Persistent high blood pressure.		Yes	Induction. Normal delivery.	No	-	Complete	N.16 S.H. N.1.	18 Nov. 40c.c. 18 Nov. 30c.c.	27 Oct.	11 Nov.	17 Nov. 7th day	P.IV. N.13	P.V. 8 Nov.	----		
8	25	1	Vomiting up till week before admission.	Yes	Yes	Forceps	Yes	3	Complete	Dr.H. S.H. Day Staff	15 Nov. 40c.c. 18 Nov. 30c.c. 19 Nov. 20c.c.	15 Nov. Re-adm. 9 Dec.	15 Nov.	18 Nov. 4th day	P.IV. N.14	P.II 19 Nov.	---- 10 Dec.	Abdominal pain.	Perineum healed. Brownish discharge.

STATEMENT OF 58 CASES OF PUERPERAL SEPSIS.

TABLE VII.

ents.	Scarlet Fever.	Antenatal Supervision.	Labour.	Tears.	Stitches.	Placenta and Membranes.	Staff in Attendance.	Serum.	Admitted.	Delivered.	Sickened.	Section where Sickened.	Date and Place of first Isolation.	Removed to Isolation Hospital.	General Condition.	Perineum and Vagina.	Temperature and Duration.	Pulse and Duration.	Wassermann.	Dick Test.	Days in Hospital.	Date of Dismissal.	Remarks.
id th.		Yes	Induced abortion	No	-	Uterine contents removed.	V.S. Dr.S. Dr.H.	28 Oct. 60c.c.	14 Oct.	26 Oct.	28 Oct. 3 rd day.	P.IV. N.12	P.V. 30 Oct.	----		Foul vaginal discharge.					24	20 Nov.	Placenta removed 3 Nov. Well. Mild.
			Normal.	No	-	Complete.	S.C. N.23 N.11	27 Oct. 70c.c.	26 Oct.	26 Oct.	31 Oct. 6th day.	P.IV. N.5	P.V. 31 Oct.	----		Foul lochia.					13	12 Nov.	Well. Mild.
.		Yes	Premature. Normal.	No	-	Complete.	N.19 S.Q. N.15	3 Nov. 10c.c. 8 Nov. 30c.c. 8 Nov. 40c.c.	2 Nov.	6 Nov.	8 Nov. 3rd day	P.IV. S.I	P.V. 8 Nov.	----			101-103°F. 2 weeks.				20	28 Nov.	Well. Mild.
		Yes	Forceps. Post-partum haemorrhage.	No	-	Incomplete. Adherent. Removed manually.	Dr.H. N.34 N.8 S.H.	4 Nov. 30c.c. 5 Nov. 30c.c. 7 Nov. 40c.c.	2 Nov.	4 Nov.	9 Nov. 6th day	P.IV. N.9	P.V. 8 Nov.	----	Patient somewhat collapsed. Rigor 7th day.						7	16 Nov.	Died. Certified cause of death "Puerperal Sepsis" Severe.
		Yes	Normal.	Yes	2	Complete.	N.23 S.Q. N.30	11 Nov. 40c.c. 12 Nov. 30c.c. 12 Nov. 30c.c.	22 Oct.	10 Nov.	11 Nov. 2nd day	P.IV. S.9	P.V. 12 Nov.	----			101°F. 9 days.				15	26 Nov.	Well. Moderate.
		Yes	Normal.	No	-	Complete.	N.8 S.H. N.X.	11 Nov. 40c.c. 12 Nov. 30c.c. 14 Nov. 30c.c.	9 Nov.	9 Nov.	12 Nov. 4th day	P.IV. N.I	P.I. 12 Nov.	----	Marked serum reaction. Painful breasts.						17	29 Nov.	Well. Mild.
		Yes	Normal.	No	-	Complete	N.26 S.Q. N.15	18 Nov. 40c.c. 18 Nov. 30c.c.	13 Nov.	14 Nov.	17 Nov. 4th day	P.IV. S.8	P.V. 17 Nov.	----	Suffers from chorea. Highly excitable.						8	24 Nov.	Well. Mild.
		Yes	Instrumental	No	-	Complete	N.23 S.Q. N.15	18 Nov. 40c.c.	13 Nov.	14 Nov.	17 Nov. 4th day	P.IV. N.4	P.V. 20 Nov.	----							8	25 Nov.	Well. Mild.
		Yes	Induction. Normal delivery.	No	-	Complete	N.16 S.H. N.1.	18 Nov. 40c.c. 18 Nov. 30c.c.	27 Oct.	11 Nov.	17 Nov. 7th day	P.IV. N.13	P.V. 8 Nov.	----							8	25 Nov.	Well. Mild.
	Yes	Yes	Forceps	Yes	3	Complete	Dr.H. S.H. Day Staff	15 Nov. 40c.c. 18 Nov. 30c.c. 19 Nov. 20c.c.	15 Nov. Re-adm. 9 Dec.	15 Nov.	18 Nov. 4th day	P.IV. N.14	P.II 19 Nov.	---- 10 Dec.	Abdominal pain.	Perineum healed. Brownish discharge.	100-102°F. 7 days. 100°F. 4 days.	120 7 days 100 4 days	Pos. (?)	Neg.	14 24	2 Dec. 4 Jan.	Dismissed 2 Dec. Re-admitted 10 Dec. with temp. 101.8°F. Transferred to Isolation Hospital. Well. Moderate.

No.	Age.	Parity.	Past Health. Previous Confinements.	Scarlet Fever.	Antenatal Supervision.	Labour.	Tears.	Stitches.	Placenta and Membranes.	Staff in Attendance.	Serum.	Admitted.	Delivered.	Sickened.	Section where Sickened.	Date & Place of first Isolation.	Removed to Isolation Hospital.	General Condition.	Perineum and Vagina.	Temperature and Duration.	Pulse and Duration.	Wassermann.	Dick Test.	Days in Hospital	Date of Dismissal.
9	37	1	Chronic bronchitis.		Yes	Stillbirth before admission. Full time.	No	-	Retained. Removed manually	Dr.S. Dr.H.	20 Nov. 10c.c. 21 Nov. 90c.c.	20 Nov.	20 Nov. B.A.	21 Nov. 2nd day	P.I.	Hut 21 Nov.	---					Not done	Not done	11	2 Dec.
10A	29	2				Forceps.	Yes	-	Complete.	S.H. Dr.S. Staff.	21 Nov. 30c.c.	21 Nov.	21 Nov.	22 Nov. 2nd day	P.IV. N.10	P.V. 26 Nov.	1 Dec.	Very ill. Rigors before admission. Severe peritonitis. Hypostatic congestion.		103-104°F. 8 days.	110-120 8 days	Pos. (?)	Neg.	7	8 Dec.
10B	25	1	Albuminuria and oedema from 7th month.		Yes	Forceps.	No	-	Retained. Removed manually.	Day Staff Dr.S.	19 Nov. 90c.c.	17 Nov.	19 Nov.	22 Nov. 4th day	P.IV. N.14	Hut 21 Nov. P.V. 7 Dec.		Pyelitis.		100°F. 4 weeks.		Not done	Not done	24	16 Dec.
11	30	3		No		Normal	Yes	1	Complete	N.15 S.Q. N.23	23 Nov. 40c.c.	20 Nov.	21 Nov.	23 Nov. 3rd day	P.IV. N.11	P.V. 24 Nov.	29 Nov.	Delirious. Rales and rhonchi in chest.	Lochia purulent. Small tear.	102-105°F. 15 days.	110-140 15 days	Neg.	Neg.	15	13 Dec.
12A	30	6	Forceps with 2nd confinement.	No	Yes	Normal.	No	-	Complete.	N.14 S.H. N.7 N.17	25 Nov. 40c.c. 26 Nov. 60c.c.	22 Nov.	22 Nov.	25 Nov. 4th day	P.IV. S.5	P.V. 25 Nov.	29 Nov. re-adm. 10 Feb.	Good. Old perineal tear. Parametritis and subinvolution. Pelvic Cellulitis.	Lochia profuse and purulent.	100°F. 4 weeks.	90-100 2 days.	Neg.	Neg.	33 20	31 Dec. 1 Mar.
12B	32	5	4 Normal. Slightly mental before 8th month.		Yes	Premature twins	No	-	Complete	N.30 S.Q. N.15	25 Nov. 100c.c.	21 Nov.	22 Nov.	25 Nov.	P.IV.	P.V.	---	Acute insanity.				Not done	Not done	4	29 Nov.
13A	19	1		No	Yes	Normal.	No	-	Complete	N.14 S.C. N.10 N.2	27 Nov. 40c.c.	23 Nov.	23 Nov.	27 Nov. 5th day	P.IV. S.6	P.V. 28 Nov.	29 Nov.	Fair. Slight anaemia. Uterus large.	Profuse purulent lochia	100-102°F. 21 days. 99-100°F. 7 days.	110-130	Neg.	Neg.	40	7 Jan.
13B	21	1		No	Yes	Normal.	No	-	Complete	N.15 S.Q. N.25	26 Nov. 10c.c. 27 Nov. 50c.c. 27 Nov. 40c.c.	23 Nov.	24 Nov.	27 Nov. 4th	P.IV. S.7	P.V. 27 Nov.	18 Dec. 6 Feb.	Bronchitis. Albuminuria.	Slight haemorrhage.	99-100°F. 10 days.	100-130	Neg.	Not done	28 29	14 Jan. 4 Mar.
14A	24	2	1st confinement instrumental.	No	Yes	Normal.	Yes	1	Complete	N.15 S.Q. N.26	28 Nov. 30c.c. 29 Nov. 70c.c.	24 Nov.	25 Nov.	28 Nov. 4th day	P.IV. S.12	P.V. 29 Nov.	30 Nov.	Acute bronchitis. Pyelitis.	Lochia profuse, red. Pyuria. Small tear.	101-104°F. 7 days.	120-130 7 days.	Neg.	Pos.	7	6 Dec.

ments.	Scarlet Fever.	Antenatal Supervision.	Labour.	Tears.	Stitches.	Placenta and Membranes.	Staff in Attendance.	Serum.	Admitted.	Delivered.	Sickened.	Section where Sickened.	Date & Place of first Isolation.	Removed to Isolation Hospital.	General Condition.	Perineum and Vagina.	Temperature and Duration.	Pulse and Duration.	Wassermann.	Dick Test.	Days in Hospital	Date of Dismissal.	Remarks.
is.		Yes	Stillbirth before admission. Full time.	No	-	Retained. Removed manually	Dr.S. Dr.H.	20 Nov. 10c.c. 21 Nov. 90c.c.	20 Nov.	20 Nov. B.A.	21 Nov. 2nd day	P.I.	Hut 21 Nov.	---					Not done	Not done	11	2 Dec.	Well. Mild.
			Forceps.	Yes	-	Complete.	S.H. Dr.S. Staff.	21 Nov. 30c.c.	21 Nov.	21 Nov.	22 Nov. 2nd day	P.IV. N.10	P.V. 26 Nov.	1 Dec.	Very ill. Rigors before admission. Severe peritonitis. Hypostatic congestion.		103-104°F. 8 days.	110-120 8 days	Pos. (?)	Neg.	7	8 Dec.	Died. Severe. P.M. Peritonitis. Uterus subsiding. Congestion at base of lungs.
		Yes	Forceps.	No	-	Retained. Removed manually.	Day Staff Dr.S.	19 Nov. 90c.c.	17 Nov.	19 Nov.	22 Nov. 4th day	P.IV. N.14	Hut 21 Nov. P.V. 7 Dec.		Pyelitis.		100°F. 4 weeks.		Not done	Not done	24	16 Dec.	Well. Mild. Baby died at 14 days - Purpura haemorrhagica.
	No		Normal	Yes	1	Complete	N.15 S.Q. N.23	23 Nov. 40c.c.	20 Nov.	21 Nov.	23 Nov. 3rd day	P.IV. N.11	P.V. 24 Nov.	29 Nov.	Delirious. Rales and rhonchi in chest.	Lochia purulent. Small tear.	102-105°F. 15 days.	110-140 15 days	Neg.	Neg.	15	13 Dec.	Died. Severe. P.M. Large white kidney. Congestion of lungs. Thrombo phlebitis of left iliac vein. Pus in body of uterus.
	No	Yes	Normal.	No	-	Complete.	N.14 S.H. N.7 N.17	25 Nov. 40c.c. 26 Nov. 60c.c.	22 Nov.	22 Nov.	25 Nov. 4th day	P.IV. S.5	P.V. 25 Nov.	29 Nov. re-adm. 10 Feb.	Good. Old perineal tear. Parametritis and subinvolution. Pelvic Cellulitis.	Lochia profuse and purulent.	100°F. 4 weeks.	90-100 2 days.	Neg.	Neg.	33 20	31 Dec. 1 Mar.	Well. Moderate. Well.
ly l		Yes	Premature twins	No	-	Complete	N.30 S.Q. N.15	25 Nov.100c.c.	21 Nov.	22 Nov.	25 Nov.	P.IV.	P.V.	---	Acute insanity.				Not done	Not done	4	29 Nov.	Died. Severe. "Puerperal Septicaemia". First twin died at 3rd day, 2nd twin purpura haemorrhagica - recovered.
	No	Yes	Normal.	No	-	Complete	N.14 S.C. N.10 N.2	27 Nov. 40c.c.	23 Nov.	23 Nov.	27 Nov. 5th day	P.IV. S.6	P.V. 28 Nov.	29 Nov.	Fair. Slight anaemia. Uterus large.	Profuse purulent lochia	100-102°F. 21 days. 99-100°F. 7 days.	110-130	Neg.	Neg.	40	7 Jan.	Well. Moderate.
	No	Yes	Normal.	No	-	Complete	N.15 S.Q. N.25	26 Nov. 10c.c. 27 Nov. 50c.c. 27 Nov. 40c.c.	23 Nov.	24 Nov.	27 Nov. 4th	P.IV. S.7	P.V. 27 Nov.	18 Dec. 6 Feb.	Bronchitis. Albuminuria.	Slight haemorrhage.	99-100°F. 10 days.	100-130	Neg.	Not done	28 29	14 Jan. 4 Mar.	Well. Mild. Discharged Maternity Home 3 Dec. Well.
	No	Yes	Normal.	Yes	1	Complete	N.15 S.Q. N.26	28 Nov. 30c.c. 29 Nov. 70c.c.	24 Nov.	25 Nov.	28 Nov. 4th day	P.IV. S.12	P.V. 29 Nov.	30 Nov.	Acute bronchitis. Pyelitis.	Lochia profuse, red. Pyuria. Small tear.	101-104°F. 7 days.	120-130 7 days.	Neg.	Pos.	7	6 Dec.	Died. Severe. Thrombosis of left leg. Loss of power of speech. No evidence of embolism.

No.	Age.	Parity.	Past Health. Previous Confinements.	Scarlet Fever.	Antenatal Supervision.	Labour.	Tears.	Stitches.	Placenta and Membranes.	Staff in Attendance.	Serum.	Admitted.	Delivered.	Sickened.	Section where Sickened.	Date & Place of first Isolation.	Removed to Isolation Hospital.	General Condition.	Perineum and Vagina.	Temperature and Duration.	Pulse and Duration.	Wassermann.	Dick Test.	Days in Hospital.	Date of Dismissal.
14B	19	1	Swelling of feet and legs at 7th month.	No	Yes	Normal.	Yes	1	Complete	N.17 S.H. N.2 N.7	29 Nov.100c.c.	25 Nov.	25 Nov.	29 Nov. 5th day	P.IV. N.3	P.V. 29 Nov.	1 Dec.	Fair. Uterus large.	Profuse brown lochia. Small tear.	100-102°F. 14 days.	90-110 14 days	Neg.	Neg.	49	18 Jan.
14C	22	1	Albuminuria.	Yes	Yes	Normal.	Yes	2	Chorion slightly deficient.	N.15 S.Q. N.33	29 Nov. 30c.c. 1 Dec. 30c.c.	25 Nov.	25 Nov.	29 Nov. 5th day	P.IV. N.8	Nil.	1 Dec.	Good.	Small tear Profuse red lochia.	102°F. 7 days.	120 7 days.	Neg.	Neg.	35	4 Jan.
15	19	1	Albuminuria.	No	Yes	Breech. Difficult. Stillbirth.	Yes	1	Complete	Dr.H. S.P. Staff	2 Dec. 70c.c. 5 Dec. 30c.c.	29 Nov.	1 Dec.	5 Dec. 5th day	P.IV. N.11	P.V. 5 Dec.	7 Dec.	Good.	Profuse brownish lochia. Small tear.	100-101°F. 16 days.	100-120	Pos. (?)	Neg.	32	7 Jan.
16	20	1	Hydramnios.	No		Artificial rupture of membranes. Anencephalic monster.	No	-	Complete	Dr.S. Dr.H.	27 Nov. 10c.c. 28 Nov. 30c.c. 29 Nov. 30c.c. 1 Dec. 30c.c.	26 Nov.	27 Nov.	5 Dec. 9th day	P.I.	P.V. 5 Dec.	6 Dec.	Good. Subinvolution of uterus.	Profuse purulent lochia.	103-100°F. 4 days.	130 4 days	Neg.	Neg.	25	4 Jan.
17	38	11	1;5;10 Instrumental. 7th Eclampsia. Bad cold on admission.	No	Yes	Normal.	No	-	Complete	N.25 S.C. N.8	8 Dec. 10c.c. 11 Dec. 30c.c.	8 Dec.	8 Dec.	10 Dec. 3rd day	P.I.	P.V. 11 Dec.	11 Dec.	Fair. Rigor before admission. Albuminuria.	Profuse purulent lochia.	104-99°F. 4 days.	100-90	Neg.	Not done	30	11 Jan.
18	35	3	1 Full time, 1 miscarriage.	Yes	Yes	Normal.	Yes	-	Complete.	N.25 S.P. N.33	8 Dec. 10c.c. 11 Dec. 30c.c. 12 Dec. 60c.c.	8 Dec.	9 Dec.	11 Dec. 3rd day	P.IV. N.7	P.V. 11 Dec.	13 Dec.	Good. Albuminuria. Uterus large.	Profuse lochia.	102-101°F. 7 days.	100-110 7 days.	Neg.	Not done	30	11 Jan.
19	21	1	Two days in labour before admission.	No	No	Contracted pelvis. Craniotomy.	Yes	-	Complete	Dr.S. S.C. Staff	3 Dec.100c.c. 13 Dec. 30c.c.	2 Dec.	3 Dec.	13 Dec. 11th day	P.IV. N.14	P.V. 13 Dec.	13 Dec.	Fair.	Profuse purulent lochia.	105-102°F. 8 days.	120-130 8 days.	Neg.	Neg.	32	14 Jan.
20A	39	7	1,4,5,6 Instruments. 2,3 Stillbirths. Albuminuria during 7th month.	No	Yes	Normal.	No	-	Complete	N.19 N.2	10 Dec. 10c.c. 11 Dec. 30c.c. 15 Dec. 30c.c.	10 Dec.	11 Dec.	14 Dec. 4th day	P.IV. S.11	P.V. 15 Dec.	15 Dec.	Good. Uterus large. Albuminuria.	Lochia profuse slightly purulent.	100°F. 3 days.	130 3 days.	Neg.	Not done	17	31 Dec.
20B	40	8	Abortion before admission.	No		Incomplete abortion. Packed. Curettage.	No	-		Dr.S. Dr.H.	27 Nov. 10 c.c. 28 Nov. 60c.c. 29 Nov. 30c.c.	27 Nov.	28 Nov. Curetted.	14 Dec. 17th day	P.I.	P.V. 14 Dec.	15 Dec.	Fair. Glycosuria. Glucose 3.2%	Lochia moderate. Serum abscess, thigh.	101°F. 4 days.	110-120 14 days	Pos. (?)	Not done	43	28 Jan.
21	16	1	Albuminuria. High blood pressure.	No	Yes	Normal.	Yes	2	Incomplete	N.30 S.P. N.26	13 Dec. 10c.c.	25 Nov.	14 Dec.	15 Dec. 2nd day	P.IV. N.2	P.V. 15 Dec.	16 Dec.	Fair. Blood pressure 120/80 No albuminuria.	Perineal tear Profuse purulent lochia. Pelvic cellulitis 11 Jan.	102-103°F. 16 days. 99-101°F. 8 days.	110-130 14 days	Neg.	Neg.	58	11 Feb.

ents.	Scarlet Fever.	Antenatal Supervision.	Labour.	Tears.	Stitches.	Placenta and Membranes.	Staff in Attendance.	Serum.	Admitted.	Delivered.	Sickened.	Section where Sickened.	Date & Place of first Isolation.	Removed to Isolation Hospital.	General Condition.	Perineum and Vagina.	Temperature and Duration.	Pulse and Duration.	Wassermann.	Dick Test.	Days in Hospital.	Date of Dismissal.	Remarks.
and .	No	Yes	Normal.	Yes	1	Complete	N.17 S.H. N.2 N.7	[illegible] Nov.100c.c.	25 Nov.	25 Nov.	29 Nov. 5th day	P.IV. N.3	P.V. 29 Nov.	1 Dec.	Fair. Uterus large.	Profuse brown lochia. Small tear.	100-102°F. 14 days.	90-110 14 days	Neg.	Neg.	49	18 Jan.	Well. Moderate. Discharge from baby's eyes.
	Yes	Yes	Normal.	Yes	2	Chorion slightly deficient.	N.15 S.Q. N.33	29 Nov. 30c.c. 1 Dec. 30c.c.	25 Nov.	25 Nov.	29 Nov. 5th day	P.IV. N.8	Nil.	1 Dec.	Good.	Small tear Profuse red lochia.	102°F. 7 days.	120 7 days.	Neg.	Neg.	35	4 Jan.	Well. Moderate.
	No	Yes	Breech. Difficult. Stillbirth.	Yes	1	Complete	Dr.H. S.P. Staff	2 Dec. 70c.c. 5 Dec. 30c.c.	29 Nov.	1 Dec.	5 Dec. 5th day	P.IV. N.11	P.V. 5 Dec.	7 Dec.	Good.	Profuse brownish lochia. Small tear.	100-101°F. 16 days.	100-120	Pos. (?)	Neg.	32	7 Jan.	Well. Moderate.
	No		Artificial rupture of membranes. Anencephalic monster.	No	-	Complete	Dr.S. Dr.H.	27 Nov. 10c.c. 28 Nov. 30c.c. 29 Nov. 30c.c. 1 Dec. 30c.c.	26 Nov.	27 Nov.	5 Dec. 9th day	P.I.	P.V. 5 Dec.	6 Dec.	Good. Subinvolution of uterus.	Profuse purulent lochia.	103-100°F. 4 days.	130 4 days	Neg.	Neg.	25	4 Jan.	Mild.
l.	No	Yes	Normal.	No	-	Complete	N.25 S.C. N.8	8 Dec. 10c.c. 11 Dec. 30c.c.	8 Dec.	8 Dec.	10 Dec. 3rd day	P.I.	P.V. 11 Dec.	11 Dec.	Fair. Rigor before admission. Albuminuria.	Profuse purulent lochia.	104-99°F. 4 days.	100-90	Neg.	Not done	30	11 Jan.	Well. Moderate. Abscess of right arm.
	Yes	Yes	Normal.	Yes	-	Complete.	N.25 S.P. N.33	8 Dec. 10c.c. 11 Dec. 30c.c. 12 Dec. 60c.c.	8 Dec.	9 Dec.	11 Dec. 3rd day	P.IV. N.7	P.V. 11 Dec.	13 Dec.	Good. Albuminuria. Uterus large.	Profuse lochia.	102-101°F. 7 days.	100-110 7 days.	Neg.	Not done	30	11 Jan.	Well. Moderate. Abscess of right arm incised 22 Dec.
	No	No	Contracted pelvis. Craniotomy.	Yes	-	Complete	Dr.S. S.C. Staff	5 Dec.100c.c. 15 Dec. 30c.c.	2 Dec.	3 Dec.	13 Dec. 11th day	P.IV. N.14	P.V. 13 Dec.	13 Dec.	Fair.	Profuse purulent lochia.	105-102°F. 8 days.	120-130 8 days.	Neg.	Neg.	32	14 Jan.	Well. Moderate. Boils on chin and buttock 28 Dec.
s.	No	Yes	Normal.	No	-	Complete	N.19 N.2	10 Dec. 10c.c. 11 Dec. 30c.c. 15 Dec. 30c.c.	10 Dec.	11 Dec.	14 Dec. 4th day	P.IV. S.11	P.V. 15 Dec.	15 Dec.	Good. Uterus large. Albuminuria.	Lochia profuse slightly purulent.	100°F. 3 days.	130 3 days.	Neg.	Not done	17	31 Dec.	Well. Mild.
	No		Incomplete abortion. Packed. Curettage.	No	-		Dr.S. Dr.H.	27 Nov. 10 c.c. 28 Nov. 60c.c. 29 Nov. 30c.c.	27 Nov.	28 Nov. Curetted.	14 Dec. 17th day	P.I.	P.V. 14 Dec.	15 Dec.	Fair. Glycosuria. Glucose 3.2%	Lochia moderate. Serum abscess, thigh.	101°F. 4 days.	110-120 14 days	Pos. (?)	Not done	43	28 Jan.	Glycosuria still present on discharge. Moderate. Pus from abscess - Staph. aureus.
	No	Yes	Normal.	Yes	2	Incomplete	N.30 S.P. N.26	13 Dec. 10c.c.	25 Nov.	14 Dec.	15 Dec. 2nd day	P.IV. N.2	P.V. 15 Dec.	16 Dec.	Fair. Blood pressure 120/80 No albuminuria.	Perineal tear Profuse purulent lochia. Pelvic cellulitis 11 Jan.	102-103°F. 16 days. 99-101°F. 8 days.	110-130 14 days	Neg.	Neg.	58	11 Feb.	Well. Moderate. Pelvic cellulitis.

No.	Age.	Parity.	Past Health. Previous Confinements.	Scarlet Fever.	Antenatal Supervision.	Labour.	Tears.	Stitches.	Placenta and Membranes.	Staff in Attendance.	Serum.	Admitted.	Delivered.	Sickened.	Section where Sickened.	Date & Place of first Isolation.	Removed to Isolation Hospital.	General Condition.	Perineum and Vagina.	Temperature and Duration.	Pulse and Duration.	Wassermann.	Dick Test.	Days in Hospital.	Date of Dismissal.
22A	26	1		No		Normal.	Yes	1	Complete.	S.C. N.25 N.X.	12 Dec. 10c.c. 16 Dec. 60c.c. 17 Dec. 30c.c.	12 Dec.	13 Dec.	16 Dec. 4th day	P.IV. N.3	P.V. 16 Dec.	18 Dec.	Thickening of left parametrium. Delirious 14 Dec.	Profuse purulent lochia. Pain in left iliac fossa.	100-101°F. 7 days. Normal. 98.4°F. 14 days. 101-102°F. 12 weeks.	99-110 7 days 70-80 14 days 110-120 12 wks.	Neg.	Neg.	102	30 Mar
22B	24	1		Yes	Yes	Breech.	Yes	2	Complete. Membranes ragged.	Dr.H. S.C.	11 Dec. 70c.c. 16 Dec. 30c.c.	10 Dec.	10 Dec.	16 Dec. 7th day	P.III.	P.V. 16 Dec.	17 Dec.	Good.	Cervical tear. Purulent lochia.	100-104°F. 14 days.	110-120 14 days	Neg.	Neg.	36	21 Ja
23	41	4	High blood pressure	No	Yes	Induction. Macerated foetus. Bougies.	No	-	Complete. Chorion deficient.	V.S. Dr.S. Dr.H. S.P.	16 Dec. 60c.c. 17 Dec. 20c.c.	2 Dec.	15 Dec.	19 Dec. 5th day	P.IV. N.1.	P.V. 17 Dec.	19 Dec.	Good. Uterus large.	Lochia purulent.	99.4-102°F. 2 days.	110-100 2 days	Neg.	Neg.	20	17 Ja
24	18	1		No		Normal.	Yes	2	Complete. Membranes slightly deficient.	S.H. N.24 N.2	12 Dec.30 c.c. 21 Dec.30 c.c.	12 Dec.	12 Dec.	21 Dec. 10th day	P.IV. S.7	P.II. 17 Dec. Cubicle	21 Dec.	Fair. Uterus large. Albuminuria.	Slight tear. Profuse purulent lochia.	104°F. 7 days.	120-90 7 days	Neg.	Neg.	22	11 Ja
25	29	6	Puerperal sepsis 1st confinement. Albuminuria.	No	Yes	Normal.	No	-	Complete.	N.14 N.9 N.8	22 Dec. 70c.c.	22 Dec.	22 Dec.	23 Dec. 2nd day	P.III	P.II. Cubicle	24 Dec.	Fair. Uterus large.	Lochia moderate.	100-102°F. 4 days.	90-110 4 days	Neg.	Neg.	19	11 Ja
26	21	1		No	Yes	Normal.	No	-	Complete	N.11 N.34 S.P.	20 Dec. 20c.c. 21 Dec. 30c.c. 22 Dec. 30c.c. 25 Dec. 20c.c.	20 Dec.	20 Dec.	24 Dec. 5th day	P.III	P.V. 24 Dec.	27 Dec.	Good.	Lochia normal.	102°F. 2 days.	90-72 2 days	Neg.	Neg.	23	18 J
27	27					Incomplete abortion before admission.	No	-	Incomplete		17 Dec. 20c.c. 18 Dec. 10c.c. 19 Dec. 30c.c. 20 Dec. 20c.c.	17 Dec.	17 Dec.	25 Dec. 9th day	P.I.	P.V. 20 Dec.					Not done	Not done	12	31 D
28	31	3	High Blood pressure. Albuminuria. Temp. on admission 100°F.	Yes	Yes	Normal.	Yes	-	Complete. Chorion	N.16 S.P.	20 Dec. 20c.c. 21 Dec. 80c.c.	20 Dec.	20 Dec.	28 Dec. 9th day	P.V.	P.V. 22 Dec.	29 Dec.	Good. Albuminuria.	Slight tear. Lochia profuse and red.	102°F. 3 days.	120 2 days	Neg.	Neg.	21	18 J
29	33	1			Yes	Incomplete abortion before admission.	No	-	Incomplete		30 Dec. 40c.c. 31 Dec. 60c.c.	28 Dec.	28 Dec.	31 Dec. 4th day	P.I.	P.V. 31 Dec.					Not done	Not done	9	8
30	32	1	Bad cold on admission		Yes	Normal.	Yes	1	Complete.	N.34 N.9	23 Dec. 20c.c. 24 Dec. 30c.c.	23 Dec.	23 Dec.	2 Jan. 11th day	P.I.	P.V. 1 Jan.					Not done	Not done	7	8

ments.	Scarlet Fever.	Antenatal Supervision.	Labour.	Tears.	Stitches.	Placenta and Membranes.	Staff in attendance.	Serum.	Admitted.	Delivered.	Sickened.	Section where Sickened.	Date & Place of first Isolation.	Removed to Isolation Hospital.	General Condition.	Perineum and Vagina.	Temperature and Duration.	Pulse and Duration.	Wassermann.	Dick Test.	Days in Hospital.	Date of Dismissal.	Remarks.
	No		Normal.	Yes	1	Complete.	S.C. N.25 N.X.	12 Dec. 10c.c. 16 Dec. 60c.c. 17 Dec. 30c.c.	12 Dec.	13 Dec.	16 Dec. 4th day	P.IV. N.3	P.V. 16 Dec.	18 Dec.	Thickening of left parametrium. Delirious 14 Dec.	Profuse purulent lochia. Pain in left iliac fossa.	100-101°F. 7 days. Normal. 98.4°F. 14 days. 101-102°F. 12 weeks.	99-110 7 days 70-80 14 days 110-120 12 wks.	Neg.	Neg.	102	30 Mar.	Improved. Moderate. Delirium. Pelvic cellulitis. Irregular dismissal. Temperature still elevated.
	Yes	Yes	Breech.	Yes	2	Complete. Membranes ragged.	Dr.H. S.C.	11 Dec. 70c.c. 16 Dec. 30c.c.	10 Dec.	10 Dec.	16 Dec. 7th day	P.III	P.V. 16 Dec.	17 Dec.	Good.	Cervical tear. Purulent lochia.	100-104°F. 14 days.	110-120 14 days	Neg.	Neg.	36	21 Jan.	Well. Moderate.
ure	No	Yes	Induction. Macerated foetus. Bougies.	No	-	Complete. Chorion deficient.	V.S. Dr.S. Dr.H. S.P.	16 Dec. 60c.c. 17 Dec. 20c.c.	2 Dec.	15 Dec.	19 Dec. 5th day	P.IV. N.1.	P.V. 17 Dec.	19 Dec.	Good. Uterus large.	Lochia purulent.	99.4-102°F. 2 days.	110-100 2 days	Neg.	Neg.	20	17 Jan.	Well. Mild.
	No		Normal.	Yes	2	Complete. Membranes slightly deficient.	S.H. N.24 N.2	12 Dec.30 c.c. 21 Dec.30 c.c.	12 Dec.	12 Dec.	21 Dec. 10th day	P.IV. S.7	P.II. 17 Dec. Cubicle	21 Dec.	Fair. Uterus large. Albuminuria.	Slight tear. Profuse purulent lochia.	104°F. 7 days.	120-90 7 days	Neg.	Neg.	22	11 Jan.	Well. Mild.
	No	Yes	Normal.	No	-	Complete.	N.14 N.9 N.8	22 Dec. 70c.c.	22 Dec.	22 Dec.	23 Dec. 2nd day	P.III	P.II. Cubicle	24 Dec.	Fair. Uterus large.	Lochia moderate.	100-102°F. 4 days.	90-110 4 days	Neg.	Neg.	19	11 Jan.	Well. Mild.
	No	Yes	Normal.	No	-	Complete	N.11 N.34 S.P.	20 Dec. 20c.c. 21 Dec. 30c.c. 22 Dec. 30c.c. 25 Dec. 20c.c.	20 Dec.	20 Dec.	24 Dec. 5th day	P.III	P.V. 24 Dec.	27 Dec.	Good.	Lochia normal.	102°F. 2 days.	90-72 2 days	Neg.	Neg.	23	18 Jan.	Well. Mild.
			Incomplete abortion before admission.	No	-	Incomplete		17 Dec. 20c.c. 18 Dec. 10c.c. 19 Dec. 30c.c. 20 Dec. 20c.c.	17 Dec.	17 Dec.	25 Dec. 9th day	P.I.	P.V. 20 Dec.						Not done	Not done	12	31 Dec.	Well. Mild.
re. . F.	Yes	Yes	Normal.	Yes	-	Complete. Chorion	N.16 S.P.	20 Dec. 20c.c. 21 Dec. 80c.c.	20 Dec.	20 Dec.	28 Dec. 9th day	P.V.	P.V. 22 Dec.	29 Dec.	Good. Albuminuria.	Slight tear. Lochia profuse and red.	102°F. 3 days.	120 2 days	Neg.	Neg.	21	18 Jan.	Well. Mild. Granular casts in urine.
		Yes	Incomplete abortion before admission.	No	-	Incomplete		30 Dec. 40c.c. 31 Dec. 60c.c.	28 Dec.	28 Dec.	31 Dec. 4th day	P.I.	P.V. 31 Dec.						Not done	Not done	9	8 Jan.	Well. Mild.
		Yes	Normal.	Yes	1	Complete.	N.34 N.9	23 Dec. 20c.c. 24 Dec. 30c.c.	23 Dec.	23 Dec.	2 Jan. 11th day	P.I.	P.V. 1 Jan.						Not done	Not done	7	8 Jan.	Well. Mild.

No.	Age.	Parity.	Past Health. Previous Confinements.	Scarlet Fever.	Antenatal Supervision.	Labour.	Tears.	Stitches.	Placenta and Membranes.	Staff in Attendance.	Serum.	Admitted.	Delivered.	Sickened.	Section where Sickened.	Date & Place of first Isolation	Removed to Isolation Hospital.	General Condition.	Perineum and Vagina.	Temperature and Duration.	Pulse and Duration.	Wassermann.	Dick Test.	Days in Hospital.	Date of Dismissal.
31	23	1		Yes	Yes	Forceps delivered.outside. Oedema of vulva.	Yes		Very adherent Removed 2 days later.	Dr.H. S.M.	31 Dec. 40c.c. 1 Jan. 60c.c.	31 Dec.	31 Dec.	4 Jan. 5th day	P.I.	P.V. 3 Jan.	6 Jan.	Good. 1 Rigor before admission.	Lochia profuse, purulent. Cervical tear.	99-100°F. 14 days.	110-100 14 days	Neg.	Neg.	27	1 Feb.
32	24	2	First child Spina Bifida.	Yes	Yes	Normal.	Yes	1	Complete.	N.24 S.C. N.4	30 Dec. 10c.c. 7 Jan. 30c.c.	29 Dec.	30 Dec.	6 Jan. 8th day	P.IV. S.2.	P.V. 5 Jan.	7 Jan.	Good. Urtecarial rash, right leg.	Lacerated cervix. Perineal tear. Lochia purulent.	101-100°F. 6 days.	100-110 6 days	Neg.	Neg.	26	1 Feb.
33	20	1		Yes	Yes	Normal.	No	-	Complete.	N.19 N.34 N.2	31 Dec. 10c.c. 7 Jan. 30c.c. 8 Jan. 30c.c.	28 Dec.	28 Dec.	7 Jan. 11th day	P.IV. N.6	P.V. 7 Jan.	8 Jan.	Good. Urtecarial rash on thigh.	Cervical erosion. Lochia purulent.	101°F. 2 days.	120 2 days	Neg.	Neg.	21	28 Jan.
34A	20	1		Yes	Yes	Normal.	Yes	3	Complete.	N.11 N.40 N.10	6 Jan. 30c.c. 12 Jan. 70c.c.	4 Jan.	5 Jan.	13 Jan. 9th day	P.IV. S.1.	P.V. 11Jan.	15 Jan.	Good.	Cervical tear. Lochia purulent.	102°F. B.A.	100 2 days	Neg.	Neg.	18	1 Feb.
34B	23	1	Perineal abscess 11 Nov.	Yes	Yes	Normal.	No	-	Complete	N.11 N.2 N.40 N.38	4 Jan. 20c.c. 13 Jan. 30c.c. 14 Jan. 30c.c.	4 Jan.	4 Jan.	13 Jan. 10th day	P.IV. S.5	P.V. 13Jan.	14 Jan.	Good. Albuminuria.	Lochia purulent. Epithelial casts in urine.	103-101°F. 2 days.	120	Neg.	Neg.	19	1 Feb.
35A	19	2	Albuminuria on admission.		Yes	Forceps before and after admission.	Yes	3	Complete.	Dr.S. Dr.H. S.C.	9 Jan. 20c.c. 10 Jan. 80c.c.	9 Jan.	10 Jan.	14 Jan. 5th day	P.IV. N.13	P.V. 10Jan.	15 Jan.		Perineum septic and oedematous. Vagina lacerated. Lochia purulent.	101-99°F. 2 days.	120-110 2 days	Neg.	Neg.	21	4 Feb.
35B	22	2	1st Instruments. Influenza, temp. 99°F. on admission.		Yes	Normal.	Yes	1	Complete	N.42	14 Jan. 60c.c. 15 Jan. 40c.c.	14 Jan.	14 Jan.	14 Jan. 1st. day	P.IV. N.9	P.V. 14Jan.	15 Jan.	Good. Albuminuria.	Lochia profuse.	101°F. 2 dys 102°F. 13-15th days.	120-90 7 days 110,13-15th dy	Neg.	Neg.	56	11 Mar.
36	23	1		Yes		Prolonged. Difficult forceps.	Yes	3	Complete		9 Jan 20 c.c. 10 Jan. 80c.c.	9 Jan.	10 Jan.	17 Jan. 8th day	P.IV. 14	P.V. 17Jan.	18 Jan.	Good. Albuminuria.	Large ununited tear. Lochia scanty, purulent.	Normal 7 days. 103-101°F. 4 weeks.	120-110 7 days 110-130 4 wks.	Neg.	Neg.	57	15 Mar.
37	38			No	No	Incomplete abortion.	No	-	Curetted		20 Jan. 70c.c.	19 Jan.	20 Jan.	23 Jan. 4th day	P.II	P.V. 22Jan.	----	Good.	-----	102°F. 2 days.	-----	Not done	Not done	9	30 Jan.
38	19	1		Yes		Normal.	No	-	Complete		25 Jan. 90c.c.	22 Jan.	22 Jan.	25 Jan. 4th	P.III	P.II T.	25 Jan.	Good. Subinvolution of uterus.	Lochia profuse and red.	103-101°F. 11 days.	120-130 11 days	Neg.	Neg.	26	1 Mar.

ements.	Scarlet Fever.	Antenatal Supervision.	Labour.	Tears.	Stitches.	Placenta and Membranes.	Staff in Attendance.	Serum.	Admitted.	Delivered.	Sickened.	Section where Sickened.	Date & Place of first Isolation	Removed to Isolation Hospital.	General Condition.	Perineum and Vagina.	Temperature and Duration.	Pulse and Duration.	Wassermann.	Dick Test.	Days in Hospital.	Date of Dismissal.	Remarks.
	Yes	Yes	Forceps delivered. outside. Oedema of vulva.	Yes		Very adherent Removed 2 days later.	Dr.H. S.M.	31 Dec. 40c.c. 1 Jan. 60c.c.	31 Dec.	31 Dec.	4 Jan. 5th day	P.I.	P.V. 3 Jan.	6 Jan.	Good. 1 Rigor before admission.	Lochia profuse, purulent. Cervical tear.	99-100°F. 14 days.	110-100 14 days	Neg.	Neg.	27	1 Feb.	Well. Mild.
ia	Yes	Yes	Normal.	Yes	1	Complete.	N.24 S.C. N.4	30 Dec. 10c.c. 7 Jan. 30c.c.	29 Dec.	30 Dec.	6 Jan. 8th day	P.IV. S.2.	P.V. 5 Jan.	7 Jan.	Good. Urtecarial rash, right leg.	Lacerated cervix. Perineal tear. Lochia purulent.	101-100°F. 6 days.	100-110 6 days	Neg.	Neg.	26	1 Feb.	Well. Mild.
	Yes	Yes	Normal.	No	-	Complete.	N.19 N.34 N.2	31 Dec. 10c.c. 7 Jan. 30c.c. 8 Jan. 30c.c.	28 Dec.	28 Dec.	7 Jan. 11th day	P.IV. N.6	P.V. 7 Jan.	8 Jan.	Good. Urtecarial rash on thigh.	Cervical erosion. Lochia purulent.	101°F. 2 days.	120 2 days	Neg.	Neg.	21	28 Jan.	Well. Mild.
	Yes	Yes	Normal.	Yes	3	Complete.	N.11 N.40 N.10	6 Jan. 30c.c. 12 Jan. 70c.c.	4 Jan.	5 Jan.	13 Jan. 9th day	P.IV. S.1.	P.V. 11Jan.	15 Jan.	Good.	Cervical tear. Lochia purulent.	102°F. B.A.	100 2 days	Neg.	Neg.	18	1 Feb.	Well. Mild.
	Yes	Yes	Normal.	No	-	Complete	N.11 N.2 N.40 N.38	4 Jan. 20c.c. 13 Jan. 30c.c. 14 Jan. 30c.c.	4 Jan.	4 Jan.	13 Jan. 10th day	P.IV. S.5	P.V. 13Jan.	14 Jan.	Good. Albuminuria.	Lochia purulent. Epithelial casts in urine.	103-101°F. 2 days.	120	Neg.	Neg.	19	1 Feb.	Well. Mild. "Profuse serum rash".
		Yes	Forceps before and after admission.	Yes	3	Complete.	Dr.S. Dr.H. S.C.	9 Jan. 20c.c. 10 Jan. 80c.c.	9 Jan.	10 Jan.	14 Jan. 5th day	P.IV. N.13	P.V. 10Jan.	15 Jan.		Perineum septic and oedematous. Vagina lacerated. Lochia purulent.	101-99°F. 2 days.	120-110 2 days	Neg.	Neg.	21	4 Feb.	Well. Mild. Very septic vagina.
99°F.		Yes	Normal.	Yes	1	Complete	N.42	14 Jan. 60c.c. 15 Jan. 40c.c.	14 Jan.	14 Jan.	14 Jan. 1st. day	P.IV. N.9	P.V. 14Jan.	15 Jan.	Good. Albuminuria.	Lochia profuse.	101°F. 2 dys 102°F. 13-15th days.	120-90 7 days 110,13-15th dy	Neg.	Neg.	56	11 Mar.	Well. Mild. Abscess of right breast incised.
	Yes		Prolonged. Difficult forceps.	Yes	3	Complete		9 Jan 20 c.c. 10 Jan. 80c.c.	9 Jan.	10 Jan.	17 Jan. 8th day	P.IV. 14	P.V. 17Jan.	18 Jan.	Good. Albuminuria.	Large ununited tear. Lochia scanty, purulent.	Normal 7 days. 103-101°F. 4 weeks.	120-110 7 days 110-130 4 wks.	Neg.	Neg.	57	15 Mar.	Well. Moderate. Pelvic cellulitis developed second week.
	No	No	Incomplete abortion.	No	-	Curetted		20 Jan. 70c.c.	19 Jan.	20 Jan.	23 Jan. 4th day	P.II	P.V. 22Jan.	----	Good.	-----	102°F. 2 days.	-----	Not done	Not done	9	30 Jan.	Well. Mild.
	Yes		Normal.	No	-	Complete		25 Jan. 90c.c.	22 Jan.	22 Jan.	25 Jan. 4th	P.III	P.II T.	25 Jan.	Good. Subinvolution of uterus.	Lochia profuse and red.	103-101°F. 11 days.	120-130 11 days	Neg.	Neg.	26	1 Mar.	Well. Moderate. Abscess of right elbow incised 1st.Feb.

No.	Age.	Parity.	Past Health. Previous Confinements.	Scarlet Fever.	Antenatal Supervision.	Labour.	Tears.	Stitches.	Placenta and Membranes.	Staff in Attendance.	Serum.	Admitted.	Delivered.	Sickened.	Section where Sickened.	Date & Place of first Isolation.	Removed to Isolation Hospital.	General Condition.	Perineum and Vagina.	Temperature and Duration.	Pulse and Duration.	Wassermann.	Dick Test.	Days in Hospital.	Date of Dismissal.
39	22	4		No		Incomplete abortion B.A.	No	-	Incomplete.		20 Jan.100c.c.	19 Jan.	19 Jan.	29 Jan. 11th day	P.IV.	P.V. 29 Jan.	30 Jan.	Abscess of right thigh.		99.8°F. 2 days.	90-110 7 days	Not done	Not done	45	15 M
40	42	9	Influenzal pneumonia for 4 weeks.	No	Yes	Incomplete placenta praevia. Packed. Stillborn.	No	-	Membranes ruptured artificially.	N.42 S.P. N.24	29 Jan. 50c.c. 30 Jan. 50c.c.	29 Jan.	30 Jan.	31 Jan. 2nd day	P.IV. T.	P.V. 30 Jan.	31 Jan.	Pneumonia. V.S. murmur of heart.	Lochia brown and moderate.	103-99°F. 14 days. 102-99°F. 3 weeks.	130-90 14 days 120-90 3 wks.	Neg.	Neg.	51	22 M
41A	23		Confined before admission. Bronchitis.			Post-partum haem, Collapsed. Glucose transfusion.	No	-	Complete.		23 Jan. 80c.c.	23 Jan.	23 Jan.	6 Feb. 15th day	P.IV. N.9	P.V. 24 Jan.	6 Feb.	Laryngitis and cough.	Lochia slightly purulent. Serum abscess.	101-103°F. 3 days.	110-130 3 days	Not done	Not done	38	15 M
41B	37	4	Elevated temperature on admission. Cough.	Yes	Yes	Normal. B.A.	No	-	Complete.		6 Feb.100c.c.	6 Feb.	6 Feb. B.A.	6 Feb. 1st day	P.III.		7 Feb.	Extremely ill. Right basal pneumonia.	Lochia profuse and red.	103-100°F. 14 days.	130-100 14 days	Neg.	Neg.	27	15 M
42	35	4	Abortion 1 year ago.	No		Incomplete abortion.	No	-	Incomplete.	Dr.H.	31 Jan. 20c.c.	31 Jan.	31 Jan.	7 Feb. 8th day	P.II. T.	P.V. 6 Feb.	7 Feb.	Very anaemic.	Lochia moderate and red.	101°F. 3 days.	100 4 days	Neg.	Neg.	23	1 M
43	18	1	Severe pyelitis for last 6 weeks.		Yes	Induction. Post-partum haem. Blood transfusion.	Yes	2	Complete	Dr.H. Dr.S.	10 Feb.100c.c.	23 Jan.	9 Feb.	11 Feb. 3rd day	P.IV.		12 Feb.	Cystitis. Dulness at R. base.	Cervical tear. Lochia purulent.	102-103°F. 8 days.	120-100 8 days	Not done	Neg.	28	11 M
44A	30	5		No		Central placenta praevia. Difficult labour. Blood transfusion.	No	-	Broken, removed manually.		13 Feb.100c.c.	13 Feb.	13 Feb.	17 Feb. 5th day	P.IV.	Hut. 16 Feb.	18 Feb.	Fair.	Brown foul lochia.	102-101°F. 5 days.	100-110 9 days	Neg.	Neg.	26	15 M
44B	22	1	Influenza before admission.	No		Normal. Post-partum haemorrhage.	Yes	2	Incomplete	N.48 S.M.	14 Feb. 10c.c. 16 Feb. 90c.c.	13 Feb.	14 Feb.	17 Feb. 4th day	P.IV.	Hut. 15 Feb.	18 Feb.	1 Rigor.	Lochia slightly purulent.	100-101°F. 5 days.	100-110 9 days	Neg.	Neg.	26	15 M
44C	27	8	Baby born in ambulance.	No		Before admission.	No	-	Complete		14 Feb. 30c.c.	14 Feb.	14 Feb.	17 Feb. 4th	P.IV.	P.II. T. 17 Feb.	18 Feb.	Fair.	Lochia profuse and purulent.	101-100°F.	110-100 8 days	Neg.	Pos.	29	18 M

inements.	Scarlet Fever.	Antenatal Supervision.	Labour.	Tears.	Stitches.	Placenta and Membranes.	Staff in Attendance.	Serum.	Admitted.	Delivered.	Sickened.	Section where Sickened.	Date & Place of first Isolation.	Removed to Isolation Hospital.	General Condition.	Perineum and Vagina.	Temperature and Duration.	Pulse and Duration.	Wassermann.	Dick Test.	Days in Hospital.	Date of Dismissal.	
	No		Incomplete abortion B.A.	No	-	Incomplete.		20 Jan.100c.c.	19 Jan.	19 Jan.	29 Jan. 11th day	P.IV.	P.V. 29 Jan.	30 Jan.	Abscess of right thigh.		99.8°F. 2 days.	90-110 7 days	Not done	Not done	45	15 Mar.	Well. Moderate. Abscess incised. Strept. haem.
eumonia	No	Yes	Incomplete placenta praevia. Packed. Stillborn.	No	-	Membranes ruptured artificially.	N.42 S.P. N.24	29 Jan. 50c.c. 30 Jan. 50c.c.	29 Jan.	30 Jan.	31 Jan. 2nd day	P.IV. T.	P.V. 30 Jan.	31 Jan.	Pneumonia. V.S. murmur of heart.	Lochia brown and moderate.	103-99°F. 14 days. 102-99°F. 3 weeks.	130-90 14 days 120-90 3 wks.	Neg.	Neg.	51	22 Mar.	Well. Moderate. Left basal pneumonia.
re onchitis.			Post-partum haem, Collapsed. Glucose transfusion.	No	-	Complete.		23 Jan. 80c.c.	23 Jan.	23 Jan.	6 Feb. 15th day	P.IV. N.9	P.V. 24 Jan.	6 Feb.	Laryngitis and cough.	Lochia slightly purulent. Serum abscess.	101-103°F. 3 days.	110-130 3 days	Not done	Not done	38	15 Mar.	Well. Mild. Serum abscess incised. Strept. haem.
erature Cough.	Yes	Yes	Normal. B.A.	No	-	Complete.		6 Feb.100c.c.	6 Feb.	6 Feb. B.A.	6 Feb. 1st day	P.III.		7 Feb.	Extremely ill. Right basal pneumonia.	Lochia profuse and red.	103-100°F. 14 days.	130-100 14 days	Neg.	Neg.	27	15 Mar.	Well. Moderate. Right basal pneumonia. Pleural effusion. Strept. haem.
ar ago.	No		Incomplete abortion.	No	-	Incomplete.	Dr.H.	31 Jan. 20c.c.	31 Jan.	31 Jan.	7 Feb. 8th day	P.II. T.	P.V. 6 Feb.	7 Feb.	Very anaemic.	Lochia moderate and red.	101°F. 3 days.	100 4 days	Neg.	Neg.	23	1 Mar.	Well. Mild.
s for		Yes	Induction. Post-partum haem. Blood transfusion.	Yes	2	Complete	Dr.H. Dr.S.	10 Feb.100c.c.	23 Jan.	9 Feb.	11 Feb. 3rd day	P.IV.		12 Feb.	Cystitis. Dulness at R. base.	Cervical tear. Lochia purulent.	102-103°F. 8 days.	120-100 8 days	Not done	Neg.	28	11 Mar.	Well. Mild. Albuminuria.
	No		Central placenta praevia. Difficult labour. Blood transfusion.	No	-	Broken, removed manually.		13 Feb.100c.c.	13 Feb.	13 Feb.	17 Feb. 5th day	P.IV.	Hut. 16 Feb.	18 Feb.	Fair.	Brown foul lochia.	102-101°F. 5 days.	100-110 9 days	Neg.	Neg.	26	15 Mar.	Well. Mild.
re	No		Normal. Post-partum haemorrhage.	Yes	2	Incomplete	N.48 S.M.	14 Feb. 10c.c. 16 Feb. 90c.c.	13 Feb.	14 Feb.	17 Feb. 4th day	P.IV.	Hut. 15 Feb.	18 Feb.	1 Rigor.	Lochia slightly purulent.	100-101°F. 5 days.	100-110 9 days	Neg.	Neg.	26	15 Mar.	Well. Mild.
	No		Before admission.	No	-	Complete		14 Feb. 30c.c.	14 Feb.	14 Feb.	17 Feb. 4th	P.IV.	P.II. T. 17 Feb.	18 Feb.	Fair.	Lochia profuse and purulent.	101-100°F.	110-100 8 days	Neg.	Pos.	29	18 Mar.	Well. Mild.

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