surely must be of great importance in these cases. The moment the operation was over we began the continuous administration of oxygen. He had oxygen to inhale for nearly a fortnight. He liked it very much indeed and was pleased to have it; asked for it, and it obviously did immense good.

Remarkable Effects of Oxygen Inhalation.

Do you remember what I said about Dr. Langdon Brown saying in his book on nearly every page relating to diabetes something about the want of oxygen in the tissues and the need for oxygen? And yet it seems strange to me that at the end of that chapter he does not say, "Therefore you must give these patients as much oxygen as you can get them to take."

The administration of oxygen has a most extraordinary effect. I was about to amputate the breast of a stout female whose face and lips were blue. Although most unfavourable, yet it was not right to leave her to die of carcinoma of the breast, which was on the point of ulceration. So before the operation oxygen was ordered to be ready. During the operation the blood which flowed from the wound was deep purple. Then the oxygen was turned on, and at that moment all the wound became vivid red. The blood became arterial instead of being of the colour of dark treacle. That experience has made a most profound impression on my mind. If the tissues are in a condition such as that in diabetic gangrene, perhaps livid, with those dark patches on the heels and back, surely the more oxygen given to those defective tissues the better. I cannot help associating the recovery of that old man with this supply of oxygen, and I should say that the stump did unusually well; it healed by first intention, and the patient lived for 16 months.

Another Illustrative Case.

I will briefly refer to another case which was treated in the same manner. Many of you might have seen the operation performed.

CASE 4.—The patient was in Paget ward. He was certainly in a parlous state. There was extensive gangrene of the left foot and leg. One gallon of urine was passing out of him every day, and it contained $13\frac{1}{2}$ ounces of sugar. He was not very thirsty, although he sometimes drank a gallon of fluid a day. At the time of the operation the pulse was accelerated to 104, and the temperature had been nearly 102° F. The respirations, too, were accelerated, being 24 before the operation. His thigh was amputated in the same way as the last. The main vessels were tied and the bleeding stopped; he was never moved about on the table; and the moment he returned to the ward the continuous inhalation of oxygen was begun. He was very apathetic and sleepy, and was obviously on the verge of acetone poisoning. The urine contained diacetic acid, so that everything was in readiness for acetonæmia, but he survived and improved. For some inscrutable reason the house surgeon in charge of the case stopped the oxygen; perhaps he thought a hospital which was running into debt had no right to spend money on oxygen. But when the oxygen was stopped the patient became worse and I thought he would die. It was begun again and the patient improved, and slowly mended until we were able to send him out of the hospital. His wound, I thought, did remarkably well. Except for the places where the drainage-tube was put in, it healed by first intention, but the drainage opening shortly closed, and he did exceedingly well for such a class of case.

Site of Amputation.

But observe I amputated through the thigh. And I have told you of five cases in which I amputated through the leg, and three or four of them died. I have not time now to go into the reasons of their deaths. One died from shock and hæmorrhage due to the operation, one died from diabetic coma, and one died probably from sepsis.

The dangers of dying from sepsis seem to me far greater if you amputate through the leg, because you have still to deal there with calcareous vessels, and there may be still some infection of the lymphatics, veins, or tendon sheaths. I have clearly made up my mind now, from my limited experience of diabetic gangrene, that the amputation is better performed through the thigh and in the way I have described to you, and better performed at the earliest possible stage of the disease. Do not wait until the gangrene has spread, until the patient has become septic, and until the chances of prolonging life are vastly diminished.

THE TREATMENT OF PUERPERAL SEPTICÆMIA BY BACTERIAL VACCINES.¹

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IN the course of a discussion on "vaccine-therapy" held by the Hunterian Society in the spring of 1910 I made a preliminary report on a series of 20 cases of puerperal sepsis which had been investigated in the bacteriological laboratory of the London Hospital. Of these 20 cases 13 had been treated by inoculation. Since then we have continued working on the same lines, with the result that we have now a series of 100 cases which have been investigated, and 56 of these have been treated with vaccines.

The cases in the present series have, with few exceptions, been patients admitted to the puerperal septicæmia ward at the London Hospital. These patients are drawn from the neighbouring districts after confinements in their own homes, often under the most unfavourable sanitary conditions. In many cases they have been attended by a midwife and in others by a private doctor. It will be realised, therefore, that the present series includes only those cases which are looked upon prognostically as of such gravity as to necessitate removal to hospital. It should be added that these cases are all notified under the Act.

As I pointed out in my previous report, the very wide difference in mortality given by different authorities indicates that there is a considerable difference of opinion as to what should be included in the term "puerperal septicæmia." Clinically, a diagnosis of septicæmia rests largely on the temperature, the pulse, or a combination of temperature and pulse. Bacteriologically, a diagnosis of septicæmia may be made on a positive blood culture. If the result of blood culture is negative it does not follow that the case is not a septicæmia. It is well known that a blood culture may be done on one and the same case on several occasions, and be positive one time and negative another time. Further, if several tubes of media be inoculated at the same time some may show growth while others remain sterile. Again, special precautions with regard to media or quantity and dilution of blood may give a positive culture in a case which has been negatived by ordinary routine methods.

I would suggest that the explanation of these facts is that a septicæmia is not in most cases a condition in which multiplication of bacteria takes place to any great extent in the blood stream, but rather a condition in which there is a local bacterial infection around which the tissues have not reacted to form a localising barrier, and, consequently, bacteria are more or less continually being carried away into the general circulation. Here they probably do not survive very long unless they form an embolus or get caught in a thrombus, in which cases pyæmic abscesses may occur. If this is so we have included under the clinical term "puerperal fever" at least two different conditions: (1) a localised bacterial infection in the genital tract which is associated with more or less toxæmia; and (2) a local infection in the genital tract from which bacteria are being carried into the blood stream, continuously or discontinuously. These latter cases constitute the group of true septicæmias, but it must be realised that the two groups merge into one another and clinically cannot always be separated, and this doubtless explains the extraordinary variations of opinion as to the mortality. The determining factors would appear to be the relative balance between the virulence of the infecting agent on the one hand and the resistance of the tissues on the other.

In tabulating the cases which we have investigated and treated an attempt has been made to record those points which are of especial interest without making the tables too full of detail to be easily read. Further, the order in which the cases have been placed has been chosen as far as possible to simplify the deduction of conclusions. The cases are divided into two tables: (1) cases treated by vaccines; and (2) cases untreated by vaccines. In each table the patients

¹ A paper read before the Obstetrical and Gynæcological Section of the Royal Society of Medicine on Feb. 1st, 1912.

who lived are grouped together, as also are those who died. Farther, in each of these groups the cases in which there was definite bacteriological evidence of a blood infection are placed first.

I propose now to discuss briefly the results detailed in these tables, and at the same time a few words of explanation will be necessary about some of the headings.

"*Nature of labour.*"—This information is, of course, obtained second-hand, and it will be seen that in many cases, although it is put down as "normal," reference to the column "Other treatment" will show that in reality it was abnormal in so far as there was incomplete delivery of the placenta or membranes.

Out of the 100 cases 25 followed on miscarriage. In only 2 of these was a history obtained of criminal interference. The number of primiparæ, 27—that is, 36 per cent. if we exclude the miscarriages, or 27 per cent. including them—does not appear to be excessive, but in all probability this note is omitted in several more cases.

I regret that I have been unable to obtain more precise details as to examination or interference during the various stages of labour. It would appear, however, from the number of cases in which the third stage was abnormal or incomplete, that the risk of infection in such cases is many times greater than in those where there is interference in the second stage, the reason obviously being that in the third stage there is a wound area exposed, while in the second stage manipulation takes place within the membranes.

"*Day of onset.*"—This is taken as the day on which marked pyrexia was first observed. This is noted in 81 cases. It will be seen that 62 per cent. of the cases occur on the second or third day after delivery. It is also interesting to note that if we take the fatal cases alone the incidence on the second day is as great as that on the third day (11 to 11), while if we take the cases which lived the incidence on the third day is nearly double that on the second day (18 to 10). This suggests that the more virulent the infection the more rapid will be the onset and the more fatal the result.

"*Rigors.*"—It does not appear that any absolute prognostic significance can be attached to the presence or absence of rigors alone. Some of the most virulent and rapidly fatal cases never have a rigor at all, while others may have rigors almost daily for many weeks and eventually recover completely. It has been suggested by Schottmüller that a rigor is indicative of bacteria being thrown into the blood stream, and, farther, that the height of temperature is proportionate to the number of bacteria in the blood stream. This is supported by the fact that a single rigor frequently occurs shortly after the operation for clearing out an infected uterus, at which time it is easily conceivable that a few bacteria are shot into the circulation. This is also in accordance with the fact that a blood culture may sometimes show a growth if taken during or soon after a rigor, although previous cultures have remained sterile. It would seem probable, therefore, that the presence of repeated rigors denotes an improperly localised focus of infection, often septic thrombosed veins, which is the basis of a septicæmia.

"*Blood cultures.*"—This has been done in almost every case. 8-10 c.c. of blood is obtained by venipuncture and inoculated into tubes of ordinary glycerine and glucose broth. These are incubated at 37.6° C. for four days before being reported as negative. Some of the more recent cases have been incubated under anaerobic as well as aerobic conditions.

In 96 cases in which the blood has been examined a positive result has been obtained in 39—i.e., 40 per cent. This is clearly an under estimate of the number of true blood infections, as it will be seen that the blood examination has on several occasions been reported negative where pyæmic abscesses afford definite evidence of a blood infection. If it were possible always to take cultures during a rigor or when the temperature was at its highest point, the chances of getting a positive culture would probably be greatly increased. Of the 39 positive results 36 contained streptococci, and of these all but 2 were grown aerobically. Two cases grew staphylococcus aureus and one case grew a Gram-negative coccus which failed to grow in subculture. The two staphylococcus aureus cases were both following abortion, in one instance criminally induced.

"*Uterus cultures.*"—These have been taken by a method

similar to one which has been used by Menge and Krönig. This is usually done in conjunction with the operation for removing retained secundines. After the vagina has been thoroughly douched the cervix is drawn down towards the vulva. This tends to straighten any flexion of the body on the cervix. A straight glass tube with a rubber diaphragm at the top is then passed up to the fundus. Having felt that its end is against the fundus it is withdrawn one inch. Knowing, then, that we have that much space to spare we can boldly pierce the rubber membrane with a Pasteur pipette without fear of wounding the wall of the uterus. Material is then sucked into the pipette by means of a rubber teat, and on withdrawing it the tip is sealed in a flame. The material obtained is then examined by films and cultures. On withdrawing the tube the uterus may be cleared out as usual.

As a further safeguard against contamination from the cervix a wider bore tube may first be passed up the cervix for two inches; the rubber capped tube is then passed without touching the cervix at all. It is important that the finger be not introduced before the cultures are taken, as by so doing contaminations may be introduced and also frequently such free hæmorrhage is set up that the specimen obtained contains little more than pure blood.

Cultures were taken from the uterus in 43 cases in this series. In 31 instances streptococci were grown in pure culture. Twice streptococci grew in large numbers, together with a few colonies of coliform bacilli, which were no doubt contaminations from the vagina or cervix. On one occasion staphylococcus albus alone grew, and on one occasion the cultures were noted contaminated. In only 7 cases were the results completely negative, and there is reason to believe that in some instances this was due to faulty technique. It will be seen, therefore, that streptococci occurred in 80 per cent. of the cases examined and in 76 per cent. in pure culture.

It should be remembered that these cases have been investigated entirely with a view to possible specific treatment and not as part of a research into the bacteriology of the genital canal in puerperal fever.

I find that two papers dealing at length with this subject have been read before this section during the last few years. It will therefore be of interest briefly to compare my results with those obtained by the authors of those papers. I refer to a paper by Mr. A. G. R. Foulerton and Dr. W. F. Victor Bonney² in 1905 on "The Causation of Puerperal Infections," and one by Dr. A. W. W. Lea and Dr. E. J. Sidebotham³ in 1909 on "The Bacteria of the Puerperal Uterus." It will be remembered that these workers each employed a different technique and obtained widely divergent results. Foulerton and Bonney used a glass tube with a paraffined wool cap at one end. Within the tube was a copper wire bearing a sterile swab. The tube was passed through the cervical canal, and the paraffined cap pulled off by means of a string. The wire with the swab attached to it was then advanced to the fundus and withdrawn again into the tube. The apparatus was then removed, with the swab inside, and plugged at each end. Lea and Sidebotham used a glass tube which was passed up to the fundus, suction being then applied by means of a syringe. It appears to me that the former technique is good, while the latter could not be expected to give reliable results. Turning to their results, briefly, Foulerton and Bonney found that (1) in 12 cases of normal puerperium examined, 100 per cent. sterile; (2) in 40 cases of severe puerperal infection examined, 80 per cent. had bacteria present; and (3) in these 40 cases streptococci or Gram + diplococci were present in 77.5 per cent. On the other hand, Lea and Sidebotham examined the contents of the uterus in 58 cases of normal puerperium and found bacteria present in 80 per cent. In these 46 cases 120 bacteria were found, an average of 2.8 varieties per case. If we compare this with the 100 per cent. sterile results quoted above it appears to me that imperfect technique is the only possible explanation of the difference. The point is important for this reason. If the uterus normally contains numerous bacteria during the puerperium it is clearly futile to waste time isolating pathogenic from non-pathogenic bacteria for the purpose of making a vaccine to

² THE LANCET, Jan. 21st, 1905, p. 162. Trans. Obstet. Soc., Lond., vol. xlviii., p. 11.

³ Proc. Roy. Soc. Med., Obstet. Section, 1909, vol. ii., p. 127.

treat a severe septicaemia. Our results which I have already quoted show that we can obtain a pure culture from the puerperal uterus in 76 per cent. of infected cases. This appears to me to be strong evidence against the correctness of Lea and Sidebotham's results.

It may sound paradoxical, but every bacteriologist will agree that while it is impossible to get a pure primary culture of one organism in 76 per cent. of cases if in reality a mixture is present in the material planted out, imperfect technique is all that is required to enable a mixture of bacteria to grow when in reality only one is present in the material we are intending to examine. I would submit, therefore, that if it is possible to grow a pure culture of one organism from the uterus (which is normally sterile) in 76 per cent. of morbid cases, we have strong evidence that this is really the infecting agent.

Before leaving this section of my paper it is interesting to note that Foulerton and Bonney's 77.5 per cent. of Gram + streptococci and diplococci very closely coincides with our 80 per cent., although they do not appear to have obtained pure cultures in so many cases.

"*Vaccines*."—Under this heading is indicated whether the case was treated with an autogenous vaccine or whether a "stock" was used—i.e., a vaccine prepared from a culture obtained from another patient. I have wherever possible used an autogenous vaccine. Only where no culture has been obtainable, or where the preparation of an autogenous vaccine is not yet complete, have "stock" vaccines been used. Some cases which have been commenced on a "stock" vaccine, and shown no improvement after several injections, have then been given an autogenous vaccine and have at once responded by a marked fall in temperature and general improvement. I consider, therefore, that an endeavour should be made to obtain an autogenous vaccine from the first in all cases and no valuable time be lost in extensive trials of "stock" vaccines.

With regard to the source from which the vaccine should be made, theoretically an organism obtained from the blood stream is more certain to be the offender than one obtained from the uterus, which is, of course, open more to contaminations. Practically, however, there are some very real advantages in the latter source. Firstly, our figures show a negative result in 60 per cent. of blood culture taken, whereas cultures taken from the uterus are found to give negative results in only about 20 per cent. of cases, and even this could doubtless be reduced if these cultures were always taken by or under the direction of one accustomed to the technique. Secondly, a proportion of blood cultures shows no growth until after two or more days have elapsed. Cultures from the uterus, on the other hand, almost invariably show growth within 24 hours if they are going to grow at all. Further, as the tables show, we can get pure cultures from the uterus in 76 per cent. of cases examined, so that in this percentage a vaccine can be prepared within 24 hours of taking our cultures. This is seldom possible from blood cultures, as in them it is only very exceptionally possible to make up a vaccine from the primary culture. I would urge, therefore, that if a case is at all serious, and the uterus is being explored, the opportunity of taking cultures at the same time by some reliable method should never be missed as this may afterwards be an irretrievable loss.

1935. "*Other treatment.*"—Under this heading falls operative interference for the removal of secundines, evacuating pus, &c.; also the administration of antistreptococcus serum. This latter has been given in 18 cases, sometimes in conjunction with and sometimes without vaccines. Of these 18 cases, 7 patients lived and 11 died. We have not noted any cases where antistreptococcus serum appeared by itself to have any marked effect in lowering the temperature or improving the general condition. On the other hand, in one case we have seen antistreptococcus serum given in 20 c.c. doses and repeated for eight doses, and after almost every dose the temperature rapidly ran up from two to three degrees Fahrenheit. This patient eventually recovered after the injections were discontinued. This case very strongly suggested that there was in the serum a distinct toxic element.

"Results."—It is difficult or perhaps even impossible to estimate accurately the benefit derived from any special line of treatment without having for comparison a sufficient number of control cases. These are not at present available.

The present arrangement of the septicæmia ward in this

hospital did not exist previously to the commencement of this series of cases, so that it is not possible to obtain a control series from that source.

The 44 cases in this series which have not been treated by vaccines cannot, without reserve, be taken as controls, as they include many mild cases which were not treated because it was considered that they would do well without. In cases where an autogenous vaccine had been prepared it was withheld if the temperature was already falling. Further, as was pointed out by the British Medical Association Committee appointed in 1905 to consider the question of puerperal morbidity, an efficient comparison of the statistics from various hospitals is impossible owing to diversity of standards of morbidity. The standard suggested by that committee includes all cases where the temperature reaches 100° F. on any two of the bi-daily readings from the first to the eighth day after delivery.

Whitridge Williams in a series of 92 cases of puerperal infection had a mortality of 15 per cent., but, as he adds, "our favourable results are probably attributed to the fact that many mild cases are included in our series which would have escaped detection except for the bacteriological examination of the lochia of all febrile cases"; and again, "In my practice such a procedure forms a part of the routine examination in every case presenting a rise of temperature above 101° F."

Perhaps some idea of the type of case we have been dealing with can be gathered from the temperatures. It is, of course, not practicable to show the charts of 100 cases. I have therefore grouped them according to their maximum temperatures, taking the maximum as the highest temperatures which have been reached apart from single rigors.

			Degrees Fahrenheit.	Per cent.
Maximum temperatures	...	...	107-108	2·6
"	"	...	106-107	6·6
"	"	...	105-106	32·0
"	"	...	104-105	28·0
"	"	...	103-104	22·6
"	"	...	102-103	6·6

Of the cases with a maximum temperature of between 102° and 103° only one was considered sufficiently grave to require vaccine treatment.

By the courtesy of Dr. Arthur Newsholme I have obtained from the Local Government Board the returns of the last few years of the notified cases of puerperal fever for some 250 odd boroughs and urban districts having a total population of about $1\frac{1}{2}$ millions of people. Calculating from these the mortality per million living, I have compared the figures so obtained with the death-rate from puerperal septic diseases per million living for the whole of England and Wales, obtained from the report of the Registrar-General. From this I find that the mortality of notified cases varies between 57 and 62 per cent. (see Table III.).

TABLE III.

Year.	Boroughs and urban districts.	Population (1901).	Cases of puerperal fever notified.	Cases notified per million living (1901).	Deaths from puerperal septic diseases per million living. England & Wales.	Percentage mortality amongst notified cases.
1906	258	19,437,867	1467	75·0	47	62·6
1907	257	19,432,397	1394	71·7	41	57·0
1908	259	19,458,754	1323	67·9	39	57·4
1909	258	19,432,190	1357	69·0	40	57·9
1910	253	19,532,548	1340	68·0	—	—

These figures coincide very closely with those published by Dr. Amand Routh in his presidential address to this section last October.⁴ Taking the notified cases of puerperal fever and the deaths from puerperal septic diseases in the Administrative County of London during the years 1906-1910 he arrives at the death-rate of 58.7 per cent. In the same

⁴ THE LANCET, Oct. 14th, 1911, p. 1055.

TABLE I.—Cases Treated by Vaccines.

No.	Nature of labour.	Day of onset.	Rigors.	Cultures.		Vaccines.	Other treatment.	Result.	Complications and remarks.
				Blood.	Uterus.				
1	Primipara; normal.	4th	+	Strepto.	Strepto.	Auto. strepto.	Uterus explored; abscess opened.	Lived.	Pyæmic abscesses; osteomyelitis of femur.
2	Normal.	5th	—	"	Not done.	"	Uterus cleared out.	"	—
3	Primipara; instruments.	2nd	+	"	Strepto.	"	Antistreptococcus serum.	"	—
4	"	—	+	"	Not done.	"	—	"	—
5	Born before doctor's arrival.	3rd	+	"	Strepto.	"	Uterus cleared out; abscesses drained.	"	Pyæmic abscesses contained pure streptococcus; infarcts in lungs and kidneys.
6	Primipara; normal.	2nd	+	"	Not done.	Auto. strepto. and coli.	"	"	Pyæmic abscesses; coli cystitis.
7	Primipara; post-partum hæm.; retained placenta.	8th	+	"	Strepto.	Auto. strepto.	Uterus cleared out.	"	—
8	6 weeks miscarriage.	22nd	+	Strepto. anaerob.	"	"	"	"	—
9	Primipara; normal.	3rd	+	"	Not done.	"	—	"	Thrombosed veins in legs.
10	Incomplete miscarriage.	—	—	Staph. aur.	"	Staph. aureus.	Uterus cleared out.	"	—
11	Retained secundines.	3rd	+	Negative.	"	Auto. strepto.	Abscesses drained.	"	Pyæmic abscesses in back, calf, and wrist-joint containing pure streptococcus.
12	Normal.	6th	+	"	"	"	Abscesses drained; knee aspirated.	"	Vaccine from knee-joint culture; pyæmic knee-joint; parametritic abscess; embolus of retinal artery.
13	Normal; 7½ months.	3rd	+	Not done.	"	Stock strepto.	Abscesses drained.	"	Pyæmic abscesses and pulmonary infarcts.
14	Normal.	7th	—	Negative.	Strepto.	Auto. strepto.	Uterus cleared out.	"	Pleurisy and ? pericarditis.
15	Placenta prævia.	3rd	+	"	Strepto. and coli.	"	"	"	—
16	2 months miscarriage.	—	+	"	"	"	—	"	—
17	Normal.	2nd	+	"	Strepto.	"	Uterus explored; laparotomy.	"	Encysted pus in pelvis.
18	Primipara; normal.	3rd	+	"	"	"	Uterus cleared out.	"	—
19	Born before doctor's arrival.	3rd	+	"	"	"	"	"	—
20	Premature rupture of membranes.	3rd	+	"	"	"	Antistreptococcus serum.	"	—
21	Primipara; normal.	3rd	—	"	"	"	Uterus cleared out.	"	—
22	Normal.	—	—	"	"	"	—	"	Parametritis.
23	Primipara; instruments.	5th	—	Not done.	Not done.	"	—	"	Parametritic abscess discharging into bladder.
24	"	—	+	Negative.	Strepto.	"	Uterus explored.	"	—
25	Instruments.	—	+	"	Not done.	Stock strepto.	—	"	—
26	3 months miscarriage.	5th	+	"	"	"	—	"	—
27	Normal.	2nd	+	"	"	"	—	"	—
28	Primipara; instruments.	3rd	—	"	"	"	Antistreptococcus serum.	"	—
29	Primipara; normal.	5th	+	"	"	"	—	"	—
30	6 weeks miscarriage.	—	+	"	Negative.	"	Uterus cleared out.	"	—
31	Normal.	2nd	+	"	Not done.	"	"	"	—
32	Incomplete miscarriage.	—	—	"	"	"	Laparotomy.	"	General peritonitis.
33	Normal.	2nd	—	"	"	"	—	"	—
34	Primipara; normal.	3rd	—	"	Strepto.	"	Uterus cleared out.	"	—
35	Placenta prævia.	2nd	—	"	Not done.	"	—	"	Venous thrombosis in leg.
36	Retained placenta.	3rd	+	"	Strepto.	"	Uterus cleared out; abscess opened.	"	Abscess in abdominal wall; cultures streptococcus and staphylococcus.
37	V.-para; normal.	2nd	+	"	Not done.	"	Uterus cleared out.	"	Temperature fell 12 hours after vaccine; 3 days after uterus was cleared out.
38	IV.-para; retained placenta.	6th	+	"	"	"	—	"	—
39	Excessive bleeding.	4th	+	Strepto.	Strepto.	Auto. strepto.	Knee joint and abscesses drained.	Died.	P.M.—Pyæmia; endocarditis; venous thrombosis.
40	Normal; seventh month.	2nd	+	"	"	"	Antistreptococcus serum.	"	One dose stock vaccine; 15 doses anti-streptococcus serum. P.M.—Ulcerative endocarditis.
41	3 months miscarriage.	3rd	+	"	Not done.	"	Uterus explored; joints drained.	"	P.M.—Pyæmia.
42	Multip.; normal.	5th	+	"	Negative.	Stock strepto.	Uterus cleared out.	"	Died 36 hours after admission. One dose stock vaccine. P.M.—Pus in both knees and one elbow. Purulent endometritis.
43	Ante-partum prolapse.	3rd	—	"	Not done.	Auto. strepto.	Peritoneal cavity drained.	"	General peritonitis; empyema.
44	Dead hydrocephalus; 3 days labour.	4th	+	"	"	"	—	"	Died 48 hours after vaccines commenced.
45	Primipara; normal.	3rd	+	"	Negative.	"	Uterus explored. Nil found.	"	P.M.—Septic thrombosis of uterine vein; pyosalpinx; peritonitis.
46	"	3rd	+	"	"	"	—	"	Purulent thrombosis of iliac veins, uterine veins, and vena cava up to level of renal veins.
47	Primipara; instruments.	3rd	+	"	Not done.	"	Antistreptococcus serum.	"	Died 24 hours after admission. One dose stock vaccine.
48	Incomplete miscarriage.	—	—	"	"	"	Uterus cleared out; laparotomy; antistreptococcus serum.	"	Died 24 hours after admission. One dose stock vaccine. Septic thrombosed varicose veins.
49	"	—	—	"	"	"	—	"	Pelvic peritonitis; cultures streptococcus.
50	Primipara; post-partum hæmorrhage.	3rd	—	"	Strepto.	Auto. strepto.	Uterus cleared out.	"	P.M.—Cerebral abscess.
51	III.-para; adherent placenta.	2nd	—	"	"	Stock strepto.	"	"	Died 24 hours after admission. One dose stock vaccine.
52	V.-para; 18 hours labour.	3rd	+	"	"	Auto. strepto.	Placenta removed.	"	No post mortem. Blood culture 7 days after onset.
53	2 months abortion.	7th	+	Negative.	Not done.	Stock strepto.	Uterus cleared out.	"	Temperature normal for 1 week. Patient up 2 days. Death from (?) heart failure or detached thrombus. No post mortem.
54	Primipara; instruments.	4th	—	"	"	"	Peritoneum drained by vagina.	"	One dose stock vaccine. P.M.—Ulcerative endocarditis. Infarcts in spleen and kidneys. Hypopyon.
55	Primipara; instruments.	9th	+	"	Strepto.	Auto. strepto.	Uterus cleared out.	"	Died 48 hours after admission. One dose stock vaccine. No post mortem.
56	Normal.	3rd	+	"	Not done.	Stock strepto.	"	"	P.M.—Purulent endometritis.

TABLE II.—Cases Untreated by Vaccines.

No.	Nature of labour.	Day of onset.	Rigors.	Cultures.		Vaccines.	Other treatment.	Result.	Complications and remarks.
				Blood.	Uterus.				
57	Normal.	4th	+	Strepto.	Not done	Nil.	Uterus explored; antistrept. serum.	Lived.	—
58	Primipara; instruments.	3rd	+	? Gonococcus.	"	"	Uterus explored.	"	Pneumonia; blood-culture, Gram-diplococcus, failed to grow in subculture.
59	Primipara; ruptured perineum.	3rd	—	Negative.	Strepto.	"	Uterus cleared out.	"	Temperature fell rapidly after clearing out uterus.
60	Three months miscarriage.	—	—	Not done.	"	"	" "	"	" " "
61	Two months miscarriage.	3rd	—	Negative.	Negative.	"	" "	"	" " "
62	Normal.	7th	—	Not done.	Strepto.	"	" "	"	" " "
63	Post-partum hæmorrhage.	2nd	—	Negative.	Not done.	"	" "	"	Mild case; retained placenta.
64	Normal.	7th	—	"	"	"	" "	"	Abscess in thigh at site of ergot injection.
65	Four months miscarriage.	4th	+	"	"	"	Abscess drained.	"	Abscess at side of sacrum.
66	Three months miscarriage.	18th	+	"	Negative.	"	Uterus cleared out.	"	Temperature fell rapidly.
67	Normal.	2nd	+	"	Strepto.	"	" "	"	" " "
68	"	3rd	—	"	Contaminated.	"	—	"	—
69	Two months miscarriage.	4th	+	"	Not done.	"	—	"	Thrombosed veins in leg.
70	Normal.	3rd	—	"	"	"	Credé ointment.	"	—
71	Incomplete miscarriage.	—	—	"	Staph. alb.	"	Uterus cleared out.	"	Temperature fell rapidly.
72	Instruments.	2nd	—	"	Not done.	"	—	"	—
73	Primipara; normal.	7th	—	"	"	"	Antistreptococcus serum.	"	Laceration of cervix; mild case.
74	Normal.	3rd	+	"	"	"	Uterus cleared out; antistrept. serum.	"	Mild case.
75	"	8th	+	"	"	"	Antistreptococcus serum.	"	Laceration of cervix; mild case.
76	Criminal abortion.	—	+	"	"	"	—	"	Mild case.
77	Normal.	1st	+	Strepto.	"	"	Uterus cleared out.	Died.	P.M.—Abscess in broad ligament; peritonitis.
78	"	4th	—	"	"	"	—	"	P.M.—Thrombosis left internal and common iliac veins.
79	Primipara; normal.	2nd	—	"	"	"	—	"	Septic broncho-pneumonia.
80	Incomplete miscarriage.	2nd	+	"	"	"	Uterus cleared out.	"	P.M.—Endocarditis; peritonitis; septic embolus in lung.
81	Three months miscarriage.	2nd	+	"	"	"	—	"	P.M.—Pelvic cellulitis; thrombosis of ovarian veins; pyæmic abscesses in lungs.
82	Instruments.	2nd	—	"	"	"	—	"	P.M.—Peritonitis.
83	Born before doctor's arrival.	—	—	"	"	"	—	"	P.M.—Osteomyelitis of pubic bones.
84	Incomplete miscarriage.	2nd	—	"	"	"	Antistreptococcus serum.	"	P.M.—Sloughing endometritis; peritonitis.
85	Primipara; instruments.	4th	+	"	Strepto.	"	Uterus cleared out.	"	No post-mortem examination.
86	Multipara.	2nd	—	"	Not done.	"	Peritoneal cavity drained.	"	Pure streptococci in peritoneal pus. Died 20 hours after admission; second day after onset.
87	Incomplete miscarriage.	3rd	+	"	"	"	Uterus cleared out.	"	P.M.—Recent endocarditis.
88	Primipara; normal.	6th	+	"	"	"	—	"	No post-mortem examination.
89	Criminal abortion.	5th	+	Staph. aur.	"	"	—	"	P.M.—Pyæmic abscesses in lungs and myocardium.
90	Retained secundines.	17th	+	Negative.	"	"	Uterus cleared out.	"	P.M.—Purulent parametritis; thrombosis of internal iliac veins.
91	Normal.	2nd	+	"	Negative.	"	Uterus cleared out; antistrept. serum.	"	P.M.—Purulent endometritis; salpingitis; abscess in left ovary.
92	Instruments.	2nd	+	"	Strepto.	"	Uterus cleared out.	"	Died 24 hours after admission.
93	Retained secundines.	—	+	"	"	"	" "	"	Pericarditis.
94	Primipara; instruments.	2nd	+	"	Not done.	"	—	"	Almost moribund on admission.
95	Post-partum hæmorrhage; retained placenta.	2nd	—	"	"	"	Uterus explored; nothing found.	"	P.M.—Thrombosis of uterine and ovarian veins.
96	Four months miscarriage.	3rd	+	"	Cocci seen, nil grew.	"	Uterus cleared out.	"	P.M.—Septicæmia; pyæmic abscesses in kidneys.
97	Primipara; normal.	3rd	—	"	Strepto.	"	Antistreptococcus serum.	"	Numerous rigors for nine days before death.
98	Six weeks miscarriage.	20th	+	"	Not done.	"	Uterus explored; antistrept. serum.	"	General peritonitis and empyema.
99	Four months miscarriage.	—	+	"	Negative.	"	Uterus cleared out; abscesses drained.	"	Numerous rigors.
100	Eight months still-born.	8th	+	"	Not done.	"	Uterus cleared out.	"	Parametritic abscess.
									Cystitis; numerous rigors.

paper Dr. Routh gives another table showing that for the first six months of 1911 there were 145 cases notified in the Administrative County of London, having a death-rate of 46.9 per cent. It is interesting to note that in the same period there were in the London Hospital 28 cases notified (and therefore included in Dr. Routh's figures), having a death-rate of 25 per cent.

The mortality shown in Table III. appears to coincide fairly accurately with the mortality amongst the untreated cases in the series we are considering, namely, 55 per cent., if we remember that amongst these are included an excess of the milder cases which reduce the mortality. I desire, however, without placing too much importance on these figures, to put our results on record and to indicate briefly what appear to me to be justifiable conclusions.

Of the 56 cases treated 38 lived while 18 died, giving a mortality of 32 per cent. Of the 44 cases untreated 20 lived while 24 died, giving a mortality of 55 per cent. As I have already stated, these are not strictly comparable cases, as those untreated include on the one hand a few of the severest cases where death occurred before any specific treatment could be commenced, and on the other hand many comparatively mild cases. The bias, however, is rather towards lowering the mortality amongst the uninoculated owing to the excess of the mild cases. More valuable evidence can, however, be obtained if we consider those cases only in which there was definite bacteriological evidence of a blood infection. By this I mean either a positive blood culture or pyæmic abscesses from which a streptococcus was obtained in pure culture. Amongst those treated there were 28 such cases, Nos. 1-13 and 39-53. No. 52 did well for a time and had a normal temperature for a week. She was then allowed up. On the second day of getting up she was suddenly taken ill and she died in half an hour from heart failure. I omit this case therefore from my figures. Of the other 27 cases 13 lived (1-13) and 14 died (39-51 and 53), giving a mortality of 52 per cent. It should be noted that amongst these 27 cases counted as treated are included 6 which only received a single dose of a vaccine within 24 hours of death.

Turning now to the similar series of untreated cases, we have 16 examples—Nos. 57, 58, 77-89, 95. Of these, 2 lived (57, 58) and 14 died (77-89, 95), giving a mortality of 87.5 per cent. Further, if we confine ourselves to streptococcal cases we have 12 out of 13 cases untreated dying—mortality, 92 per cent. It would appear, therefore, that treatment by inoculation with vaccines in this series of cases has reduced the mortality by 30-40 per cent. How far this will be borne out in larger series of cases will be seen in the future, but

3. The temperature may steady until the daily maximum is not above 102°. Further injections fail to reduce this. In these cases there is probably a local collection of pus which must be found and drained; the temperature will then quickly fall to normal. No. 12 illustrates this well. Previously to inoculation the patient had 17 rigors in 16 days; the daily temperatures varied between 100°-106°. After the first injection the rigors ceased entirely, and the temperature subsided until the daily maximum was 102°. It remained thus for some three weeks, further injections having no influence. An abscess then pointed in the buttock. Immediately on opening and draining it the temperature fell to normal and did not rise again.

Conclusions.

1. The mortality amongst those cases of puerperal septicæmia in which there is definite bacteriological evidence of bacteria in the blood stream is from 85 to 95 per cent.

2. This mortality may by inoculation with autogenous vaccines be reduced to about 55 per cent.

3. The mortality amongst notified cases of puerperal fever is about 60 per cent.

4. This mortality may by inoculation with appropriate vaccines be reduced to about 30 per cent.

5. In cases of puerperal sepsis, if it is decided to explore the uterine cavity the opportunity should not be lost of obtaining a culture at the same time.

6. In the treatment of puerperal sepsis "stock" vaccines give inferior results, and should only be used when an autogenous vaccine cannot be obtained.

I desire, in conclusion, to express my thanks to Dr. Russell Andrews, under whose care the majority of the cases have been; also to some other members of the staff of the London Hospital for permission to make use of cases under their care. Further, my thanks are due to Dr. W. Bulloch, in whose laboratory I have carried out this work.

York-street, W.

THE FINSBURY MEDICAL SOCIETY AND THE SHOREDITCH AND FINSBURY TUBERCULOSIS DISPENSARY.—The members of the Finsbury Medical Society have entered a protest against the formation of this dispensary on personal and general grounds. They consider that as soon as a decision was made to establish a dispensary in the neighbourhood a meeting of the whole of the medical profession of the district should have been called, so that the methods upon which the institution was to be worked could be explained to them and discussed. But they feel that, apart from personal feeling, there are reasons why they should object to give their coöperation to the Shoreditch and Finsbury Dispensary at the present time. When the National Society for the Prevention of Consumption first began to ask for public assistance in promoting tuberculosis dispensaries there was no National Insurance Act and no compulsory notification of phthisis. It is clearly stated in the Insurance Act that some such scheme as a tuberculosis dispensary should be established, and they point out that directly an insured person or any of his dependants is certified to be tuberculous, he can no longer claim "medical benefit," and is at once transferred to "sanatorium benefit," when the Government in return for contributions which have been paid has undertaken to provide treatment. If the Commissioners decide to recognise the existing tuberculosis dispensaries and finance them it is probable that the medical officers will be called upon to give expert opinion as to whether a compulsorily certified case is a suitable one for treatment in a sanatorium. The medical officer of the dispensary may feel it his duty to examine all contacts, and so draw numerous young people not yet insurable into the meshes of the dispensary for treatment. The question to be answered is, Under whose control shall the management of these dispensaries be:—(1) outside voluntary agency; (2) municipal control; or (3) local medical practitioners? The members of the Finsbury Medical Society came to the conclusion that the local practitioners should staff the dispensaries themselves, with the assistance of a resident medical officer. "It is time," they add, "that the idea that a general practitioner has forgotten all the medicine he ever learned was exploded."

Temperature chart of Case 15, showing the mean of six 4-hourly temperatures and spacing of injections of vaccine. (A A mark injections of vaccine.)

these figures suggest that the benefit is sufficient to justify a continued and more extended trial of the treatment.

The length of time occupied in the treatment of these cases is a question which doubtless will be inquired about.

Roughly speaking, it appears from our series that the cases may be divided into three groups:—

1. Those which respond at once to an inoculation of a vaccine, the temperature falling to normal within 48 hours. Case 3 is a good example of this. Previously to inoculation there were streptococci in the blood stream and the temperature had varied between 101° and 104° F. for four days. Following on the first inoculation the temperature fell; within 24 hours the maximum was 102°, and in 48 hours it was normal. Recovery was uninterrupted.

2. They may respond to each of a series of injections, the average of the six 4-hourly temperatures falling a degree or so. Case 15, a chart of which is given, shows this well.