PREGNANCY AND FEMINISM.

On the surface of the Woman's Movement floats the great vessel known as the *Vote*, and there are lots of little ships around it with sails trimmed to carry them into Franchise Harbour and Equal Representation Bay; but these things are only on the surface. There is underneath them a deep ground swell of discontent—in many cases well founded—of dissatisfaction with the life of woman-kind under certain circumstances, and of actual rebellion against the imposed self-sacrifice of the mother's lot. The agitation for the vote is a comparatively small matter; but this underlying changed outlook and mental attitude of so many women is no small matter either relatively or absolutely. Childbearing is self sacrifice, and does entail if not suffering at least irksomeness, weariness, strain, inquietude, and a certain separation from other more intellectual, perhaps more agreeable and more attractive, duties, not to name pleasures. In some cases it brings also danger, and it always means, sooner or later, the pains of labour. Of course there are, and ever have been, compensations for those whose hearts are motherly, and the women who bore us doubtless soon remembered no more the anguish for joy that a man was born into the world, but the compensations come after the suffering and are hidden from view at first, and it is not every woman who has the mother's heart. Now, if we obstetricians, who have by anaesthetics taken the sting out of labour and its pain, can by hygiene, supervision, and treatment remove some at least of the irksomeness from the nine months of pregnancy and the whole of the danger, we shall have done much to solve a part, and a not inconsiderable part, of the women's question. If we can assure her that pregnancy is ordinarily simply a period of strain and that the strain is a bracing and not a weakening and unnerving one, we shall put courage into her and alter her mental attitude towards childbearing; but if we have to say to her that gestation is to be regarded as a disease with an immunity reaction but no immunity from danger and attenuation of strength and health, how can it come to us as a surprise that the birth-rate falls still lower? I am not saying that the fall in the birth-rate is due to this or to any single cause, but I hold that the true nature of pregnancy is a factor which must be taken into account in all our thinking upon the subject.

PREGNANCY AND HIGH POLITICS.

Finally, the birth-rate of a country enters into the sphere of high politics, and behind the birth-rate there are, of course, necessarily the pregnancies of the women of that country. Napoleon said that the great need of his exhausted country was more mothers, and the same may be said of France now; but it may be said in another sense and for another object. France now requires more mothers and more pregnancies and a higher birth-rate, not that she may have more soldiers to wage wars of conquest and aggrandisement, but that she may not fall in numerical strength below the level of her rivals. Unless the birth-rate of France rises or that of her neighbour falls more quickly than it is doing, the French people will feel the loss of national strength so acutely that fear will enter in, and where fear enters there too often and too soon follows war. The nation with a high birth- and survival-rate and a limited territory must find room by colonization; where two races are living side by side in a country, the one with the higher birth-rate (the survival-rates being equal and migration inconsiderable) will inevitably rule, although the event may be delayed; the people who will not propagate must die. No wonder a far-seeing statesman said lately, in answer to his own question, What is the greatest thing in the world? "A baby!" In the ultimate issue of things babies are of greater import than battalions, and they are the true dreadnoughts of a nation; if they be well-nourished before they are born, if they are brought into the world with care, and if they are handled afterwards with tenderness and educated with knowledge and foresight, but without fads, they will not only stand to arms if need be for the defence of their land in their manhood, and be apt for the replenishing of her millions in their womanhood, but will also help to maintain her high rank among the nations in science, in literature, in commerce, and in all else that is worthy. Shakespeare was once a baby, and not an extraordinary but a very ordinary one;

Isaac Newton was less than an ordinary one, he was a premature one, no better than a fetus; Hobbes the long-lived philosopher, and George III the long-lived king, were both untimely births; and yet the history of the world would be the less interesting for their absence. Babies, indeed, are to be looked for, and even fetuses are not to be despised; and behind each are the nine or seven months of a pregnancy.

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A Lecture

ON

ANTE-NATAL HYGIENE:

ITS INFLUENCE UPON INFANTILE MORTALITY.*

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In this lecture I am dealing with ante-natal hygiene in its broadest sense, and my main object is to try to get that vital subject better understood and taken up more scientifically, both by medical practitioners, by municipalities, and by legislation, and last, but not least, by the mothers themselves. I am hoping that soon we shall have many definite signs of progress, and amongst them I would mention:

1. Compulsory registration and notification of stillbirths, and, if possible, notification of abortions.
2. Arrangements by which every poor woman shall have medical supervision during pregnancy.
3. The provision of pre-maternity wards in every locality, with facilities for conveyance thereto of any pregnant woman found to require hospital treatment.
4. The provision in every general or lying-in hospital in our larger towns and in university clinics of ante-natal research laboratories, and so far as may be practicable of pathological laboratories in every county and county borough under the supervision of the medical officer of health, where abortions and stillborn children and other products of conception can be systematically and scientifically examined by microscopical and bacteriological methods, so that we may gradually arrive at a more certain knowledge of ante-natal pathology.
5. The adoption of some means by which poor pregnant women can be financially assisted during the later months of pregnancy. This might be done by an extension of the maternity benefit for insured persons under the National Insurance Act, by which every pregnant woman may from the sixth or seventh month of pregnancy receive 5s. a week after voluntary notification of her pregnancy to the medical officer of health or her panel doctor.

Though I do not intend here to discuss ante-natal hygiene from the maternal standpoint, it is inevitable that that part of the general subject must be included, as many cases of fetal disease and death are maternal. All those interested in infant welfare are endeavouring still further to reduce the rate of infantile mortality, which in 1912 reached the relatively low figure of an annual mortality in England and Wales of 95 per 1,000 births in infants under 1 year of age. This is a gratifying rate when compared with those of 154, 149, 142, 153, and 127 in the previous five decades.†

Can this infantile death-rate of 95 per 1,000 births in 1912 be still further reduced? I believe it can. The London rate in 1912 was only 90 during the first year of life, and Hornsey, with a rate of 66.8, Bromley 68.1, Guildford 69.6, Hampstead 71.4, and Reigate with 71.9,

* Given on behalf of the National Association for the Prevention of Infant Mortality on January 13th, 1914.

† In 1911 there were 114,600 deaths from all causes under 1 year of age—130 per 1,000 births; but this increase of 35 per 1,000 births was due to deaths from diarrhoea, the result of hot weather and diminished milk supply in the labour strikes of the summer months.

show that still better results can be attained. Even if we cannot reduce this death-rate after birth, there is no doubt that much can be done to increase the fertility of women and to reduce the ante-natal death-rate of unborn children, and my remarks to-day are largely directed towards the latter object. Much is being done to remove ignorance and to increase knowledge amongst mothers and help them to make their lives brighter, their food more rational, their dwellings more hygienic, and their environment more healthy. Progress along these lines, besides lessening infant mortality, must have a further influence for good by improving the health and happiness of expectant and potential mothers, and through them of the children which they are to bring into the world. As medical men and women we are faced with four well-defined conditions which are reducing the number of infants needed to replenish the population.

- (a) Postponement of marriage.
- (b) The artificial prevention of fertilization of the ovum by one or both of the potential parents.
- (c) Ante-natal mortality.
- (d) Infantile mortality during the first year of life.

I am not now concerned with infantile mortality after birth, and will confine attention to the causes of the reduced birth-rate during recent years.

REDUCTION OF BIRTH-RATE.

We have, then, to consider three main factors which tend to reduce the birth-rate—namely, postponement of marriage, artificial prevention of conception, and ante-natal deaths.

Postponement of Marriage.

In 1871, 1.3 per cent. married women were married before 20 years of age, as compared with 0.5 per cent. in 1911; 13.9 per cent. married women were between 20 and 25, instead of 9.4 per cent. in 1911; 45.5 per cent. between 25 and 35, instead of 46 per cent.; and 39.3 per cent. between 35 and 45 years of age, instead of 44.1 per cent. in 1911.

As fertility diminishes with advancing age, change in the date of marriage must have an appreciable effect in diminishing the birth-rate, and represents, the Registrar-General states, 1.56 per cent. of the total reduction in the birth-rate.

Prevention of Maternity.

The extent to which the artificial prevention of maternity is carried in any nationality can only be roughly estimated by the difference between the past and the present birth-rate.

The birth-rate attained its highest point in England and Wales in 1876. Taking that rate as 100 per cent., the Registrar-General states that in 1911:

1. The birth-rate on the total population of all ages fell to 68—a fall of 32 per cent.;
2. The fertility on the female population aged 15 to 45 years fell to 64—a fall of 36 per cent.;
3. Legitimate fertility on married women aged 15 to 45 years fell to 66—a fall of 34 per cent.;
4. Illegitimate fertility fell to 56—a fall of 44 per cent.

These are startling figures, and become still more so when put into other more concrete form, for the Registrar-General says that "if the fertility of married women in proportion to their numbers had been as high in 1911 as in 1876-1880, the legitimate births would have numbered 1,273,698 instead of the 843,505 actually recorded. This means a potential loss to the nation of 430,193 lives in the one year (1911).

As already stated, part of this potential loss is due to postponement of marriage, or, in other words, to an increase of unmarried and widowed women in 1911 between the ages of 15 and 45, but the Registrar-General considers that the decrease of fertility of married women, revealed by statistics, is "largely due to deliberate restriction of child-bearing." This is borne out by all observers of the tendency of the age and by one's professional experience in all ranks of patients.

This "restriction of child-bearing" usually takes the form of prevention of conception, but in some cases it may mean criminal abortion, and this possibility is, of course, more probable where the women are unmarried.

As every method of artificial prevention of conception is harmful in both its physical and its moral effect, we, as medical practitioners and eugenicists, should do our best to counteract the habit by appealing to the child-love which

is rarely entirely absent from women, and to the spirit of patriotism which should be present in all.

Ante-natal Mortality.

The third main cause of our low birth-rate is ante-natal mortality. It seems to be true that the large numbers of fetal deaths due to abortions, premature labours, and stillbirths lessen the number of potential live births nearly or quite as much as the deaths of infants during their first year of life lessen the numbers of the survivors. If we consider that an infant's life begins at fertilization of the ovum, we are confronted with the estimated fact, as yet only imperfectly realized, that about as many infants die during their fetal life of 9 months as during the survivors' first year of separate existence.

With our present statistics it is impossible to compute with scientific accuracy the relative or actual number of children who die *in utero*, but the figures in the following table help us to arrive at a rough estimate.

TABLE I.—Statistics regarding Stillbirths and Abortions.

	Percentage to Live Births.	
	Stillbirths.	Abortions.
Philadelphia (Dr. La Fetra) ¹ ...	5.0	20.0
England and Wales (1908-12):		
London	2.18	→
74 large towns and boroughs	3.06	—
67 small towns... ..	3.34	—
Boston, U.S.A.	3.9	→
Manhattan, U.S.A. ²	4.8	—
Dr. Priestley's statistics ³ ...	—	{ 23 % of all pregnancies. 30 % of all live births.
Dr. Whitehead's statistics ³ ...	—	{ 14 % of all pregnancies. 16.6 % of all live births.
Dr. Whitridge Williams's statistics ⁴	—	16 to 20 % of all pregnancies.
Dr. Malins of Birmingham ⁵ ...	—	19.23 % of all pregnancies.
Professor Taussig ⁶	—	30 % of all pregnancies.
Dr. Amand Routh*	2.8	27.4 % of all pregnancies.

*I found that 1,000 consecutive married private patients who had been pregnant between 1880 and 1900 had 2,550 live births (2.55 children for each woman), 74 stillbirths, and 980 abortions. These, like the other figures in Table I, were those of patients, who would be more likely to abort than healthy women.

In 1910, 2,312 stillbirths—that is to say, deaths after the twenty-eighth week of gestation—were notified in London, representing 2.2 per cent. of the total births. If this proportion holds good for 1911 and for the whole of England and Wales, the stillbirths would have been 19,736 for 1910, and 19,385 in 1911.

In taking the percentage of stillbirths to registered births in the London metropolitan boroughs as 2.2, and calculating the total for England and Wales on that basis, there is no doubt that the percentage is understated. I have had the advantage of information supplied to me by Dr. Newsholme, Medical Officer, Local Government Board, as regards the percentage of stillbirths notified under the Notification of Births Acts, 1907, for the 74 county boroughs and towns with populations of over 50,000, and for the 67 towns of 20,000 to 50,000 inhabitants. The following table shows an enormous variation in the

TABLE II.—Showing the Average Percentage of Stillbirths to Registered (Live) Births in the Towns and County Boroughs and in London where the Notification of Births Act, 1907, is in Force.

	1910.	1911.	1912.	1908 to 1912, or other Periods.	Range of Percentages for 3 Years 1910-12.
In 74 county boroughs and towns over 50,000 population	3.01	3.18	2.98	3.06	1.08 to 5.52
In 67 towns with populations between 20,000 and 50,000	3.21	3.07	3.34	3.34	1.19 to 7.82
In the 29 metropolitan boroughs	2.14	2.21	2.46	2.18	0.31 to 5.85

percentages of stillbirths, but the totals tend to show that the true average is nearer 3 stillbirths to 100 live births, instead of 2.2 per cent. as in the case of London.

Adopting the moderate estimate of four abortions to each stillbirth we get a total of 98,680 abortions, premature labours and stillbirths in 1910, and 96,925 in 1911, not very different from the number of deaths of children under 1 year of age from all causes in the same years—namely, 94,579 in 1910 and 114,600 in 1911. The total live births in 1910 were 896,962, and in 1911 881,138, so that the ante-natal deaths were in proportion of 1 to every 9 births, about 11 per cent. in both years, and this is probably far less than the real percentage. Table III brings out these figures clearly.

TABLE III.—Estimated Loss to England and Wales from Postponement of Marriage, Lowered Fertility, Ante-natal Deaths, and Infantile Mortality in 1911.

	1910.	Loss to Population in 1911.
Potential loss due to postponement of marriage and reduced fertility of married women only	—	430,193
Estimated abortions, premature labours, and stillbirths (in married and unmarried women)	98,680	96,925
Recorded infantile deaths under 1 year of age (legitimate and illegitimate)	94,579	114,600
Total estimated probable loss of population (potential and actual) for 1911 ...		641,718

When it is considered that the number of infants in England and Wales in 1911 who survived this double loss was only 782,362, the loss to the nation is seen to be colossal, nearly cent. per cent.

We, as medical practitioners, appreciate and encourage every effort made by others to improve the condition of gravid women and their unborn babes, but it is time that something more than general effort should be made in this direction. In addition to philanthropic assistance we must have more legislative help, and to enable these two helps to be advantageously operative there must be organized medical oversight, including if possible some regular supervision over every poor gravid woman unable to pay for a registered medical practitioner. To get the maximum of benefit out of these three varieties of assistance there must be points at which philanthropy, legislation and medical assistance touch, so as to make them an organized whole.

Before discussing these three ways by which we can help the unborn babe to survive its nine months of intra-uterine existence, I will set out a list of some of the more important maternal and fetal conditions which may require ante-natal treatment if we are to save the child from disease, abnormality or death.

TABLE IV.—Causes of Ante-natal Disease and Death.

I. PATERNAL CAUSES.

Syphilis and Tuberculosis, by direct infection of ovum.
Diabetes, Bright's Disease, Plumbism, etc., inducing Debility of Embryo.

II. MATERNAL CAUSES.

A. Pathological.

1. Malnutrition:—Anaemia, etc.
2. Acute Specific and Infectious Diseases:—Small-pox, Scarletina, Measles, Enteric, Influenza, Erysipelas, Pyelitis, Acute Pneumonia, Bronchitis, etc., Gonorrhoea.
3. Chronic Diseases:—Tuberculosis, Syphilis, Diabetes, Bright's Disease, Heart Disease, Asthma, Plumbism, Chorea.
4. Tropical Diseases:—Malaria, Cholera, Dysentery, etc.
5. Toxaemia:—Pernicious Vomiting, Albuminuria, Eclampsia, Acute Yellow Atrophy of Liver.

B. Mechanical.

Retroversion of Gravid Uterus, Pelvic Contractions, Obstructing Tumours (Fibromyomata, Ovarian Osteomata), Carcinoma Cervicis, Cicatricial Stenosis of Cervix, Vagina, etc., Ventriflexion of the Uterus, Vulvar Abnormalities.

C. Miscellaneous.

Ante-partum Haemorrhages (Accidental, Placenta Praevia), Ectopic Gestation, Criminal Abortions, Operations during Pregnancy.

III. FETAL CAUSES.

A. Developmental.

B. Pathological.

Hydramnios.

Hydatidiform Degeneration of Chorion, Blood Moles.

Fetal Toxaemias.

C. Mechanical.

Malpositions and Malpresentations, Malformations, Relatively large Children.

NOTE.—Many of the above conditions could be prevented, or diagnosed early and appropriate treatment adopted, if women were under medical supervision during pregnancy.

In discussing ante-natal hygiene we are dealing with the infants' well-being alone, but it is obvious that, as a rule, where something needs remedying from the child's point of view the mother will also derive benefit from any measures successfully adopted. If, for instance, the child's illness *in utero* is due to maternal disease or toxaemia, the child can only be treated through the mother by such medical or surgical means as may be indicated to arrest the ultimate results of the toxaemia present, such as albuminuria, eclampsia, acute yellow atrophy of the liver and hyperemesis gravidarum. If from another point of view the child's position *in utero* is abnormal, as in transverse presentation, it is obvious that if the malposition is rectified, not only will the birth of the child be rendered relatively safe and easy, but the risk to the mother of a delayed, or tedious, or possibly obstructed labour is removed.

Now, how can this formidable list of the dangers to which the fetus is directly or indirectly liable be relieved by philanthropic, legislative, and medical means?

1. Philanthropic Measures.

I include under this head both private and administrative assistance.

Food.—These efforts to help an expectant mother are mainly directed to relieve her poverty by supplying nourishing food, and at the same time to prepare her by mental equipment for the arrival of the child. Improving the nutrition of the expectant mother must also improve the nutrition of the unborn babe. The mother is found also to be much more able to bear the strain of parturition and to suckle her babe, and the child itself, instead of being often immature and sickly, is robust from birth.

Housing.—Regard must also be paid to the need of sanitary dwelling-rooms as well as good food, for the fetus lives on the blood of the mother, and if her lungs inhale septic or deficiently oxygenated air, both suffer.

Industrial Work.—Dr. Newsholme's report on infantile mortality for 1913 has many forcible remarks about other disadvantageous conditions which require alteration, if ante-natal life is to be rendered secure. Amongst these he emphasizes the fact that, speaking generally, the industrial employment of pregnant women does great harm to the fetus *in utero*. Of course we are sometimes faced with the difficulty that if the mother is poor, and stays at home because of the onerous or prolonged or fatiguing nature of her employment she necessarily loses her wages, and would need pecuniary assistance to help her to support her home. Even if a poor woman is solely engaged in household duties, these become onerous and often harmful during pregnancy. The mortality of the children of textile workers from "developmental defects" is exceptionally high, and this is believed by the Registrar-General to be due to the fact that the wives of such workers frequently work in the mills themselves till late in their pregnancies.

Need for Pre-maternity Benefit.—I wish it had been possible, or were even now possible, to arrange by the National Insurance Act that every wage-earning woman, insured through her husband or herself insured, could receive 5s. a week as soon as she was notified to be pregnant, say at the sixth or seventh month, in addition to the 30s. maternity benefit which she already gets after her child is born. The anxiety of a poor woman as regards the coming birth is very real, especially if she be a primigravida, but this anxiety is largely removed by the prospect of the maternity benefit. It is a pity that some equally certain pecuniary relief cannot be forthcoming during the pregnancy. It would either help pregnant women to stay at home and be free from outside work, or would pay for help in their household work. It would also prevent some very poor women, potential mothers,

from trying to avoid maternity owing to their very real dread of financial stress during a possible pregnancy. In some places clubs have been formed to which women can pay in money for their pregnancies, and get an added bonus from local philanthropy. This is valuable help.

Boarding Out.—If poor pregnant women could be sent to country homes or sanatoriums during part of their nine months' expectancy, very great good could be done. A weekly bonus of 5s. would facilitate this. There are thousands of small farmers or cottagers in rural districts near large towns who would willingly put up such women in summer for 5s. a week. I have had practical experience of this in hospital patients, and know that it is possible.

Health Societies.—In a valuable paper read at the conference in 1913, Mrs. Kitson Clark⁷ of Leeds states that there are 200 voluntary health societies in Great Britain, some worked by voluntary helpers who do their own work and receive no pay, some managed by voluntary helpers who pay for expert advice, and some who work under the direction of public authorities. The first two types of health societies work with the sanitary authorities, though they are not controlled by them. These 200 health societies are mainly occupied in dealing with the health of the mother and infant after birth, but many usefully arrange for lectures to expectant mothers on hygiene, home nursing, infant hygiene, etc., and help to remove the ignorance so frequently found to be present. If more visits were paid to expectant mothers by agents of these 200 societies more good might be done, and the formation of clothing and money clubs, restaurants and milk dépôts, for expectant as well as actual mothers, should in suitable areas be encouraged.

2. Legislation.

Whilst philanthropic help to expectant mothers can only deal directly with their nutrition, their environment and their mental and moral equipment, legislation could do much more by earlier notification and registration, for by it the condition and medical needs of the mother and the unborn babe could be made known to the medical authorities and timely help could be given to the patient.

Compulsory Registration of Stillbirths.

I believe great good would follow compulsory registration of stillbirths, which does not now exist in this country, for we would also get valuable statistics and more knowledge of the causation of ante-natal deaths and disease.

The Notification of Births Act, 1907, may at present be adopted by any local authority, and its provisions then become compulsory in that urban or rural area. The provisions of the Act include notification to the medical officer of health (not to the registrar of births and deaths) of the birth of any child after the expiration of the twenty-eighth week of pregnancy within thirty-six hours after birth, whether alive or dead, and is to be made by the father or the attendant.

The Local Government Board may place the area of any local authority under the Act "if they think it expedient, having regard to the circumstances of the area," but it is probable that an amending Act would be required if all the local areas in the country were simultaneously put under the provisions of notification enforced by the Act. At present 74 out of 98 large towns, and 67 out of 111 small towns have adopted the Act, and it has also been adopted since 1909 for the administration of the County of London in the 29 metropolitan boroughs by order of the Local Government Board.

Much information is also supplied to the local supervising authority of the various administrative counties and county boroughs under Regulation E 21 of the Central Midwives Board, which requires that the midwives shall, "as soon as possible," send notice, in all cases of stillbirth, where a registered medical practitioner is not in attendance at the time of birth.

A compulsory Registration of Stillbirths Act, on the basis of the provisions now in force under the Notification of Births Act, 1907, and the Midwives Act, would prove exceedingly useful, provided especially that the limit of time of registration be not extended beyond that required in the former Act—thirty-six hours.

One of the main objects of notifying births within thirty-six hours of the confinement is to enable women

—especially the poorest women, who are usually attended by midwives—to be visited by officers of the local authority or by the staff of voluntary societies working under the direction of the medical officer of health for the area. To be of any real scientific use in cases of stillbirths, in unattended cases, or in cases attended by midwives, such visits should be made before the stillborn child and the afterbirth have been disposed of; and the visitor should be a medical practitioner, for it is obvious that, if the first visit is only made after the midwife has ceased attendance—about ten days—no scientific information as regards the condition of the fetus or membranes or as to the cause of the stillbirth could be forthcoming. I think, therefore, that if the child is stillborn, and if the mother was not under the care of a qualified medical practitioner, notification should be made within twelve hours, and the child and membranes should be sent to the laboratory for careful examination and report. This is not possible now, but one of these days the medical officers of health in every county or county borough will have a laboratory and a pathological expert to report upon all such specimens. It must be acknowledged that medical practitioners and even obstetric experts have as yet a very imperfect knowledge of the pathology of "products of conception" prematurely born. Systematized scientific examination of abortions and stillbirths is made in very few hospitals. There should be an ante-natal research laboratory in every general and lying-in hospital, and more especially in our teaching hospitals and university clinics. An obstetric pathologist should be appointed, and amongst his other duties he would systematically examine the fetus and placenta and every "product of conception" which came to hand, and report upon it after full examination by bacteriological and histological methods. Such methods would after a little experience enable the cause of the death of the expelled fetus to be scientifically ascertained, and the undecided questions of the transmission of disease from the mother to the child through the placenta would be answered. Later on, when chemical pathology takes its proper place, the nature and origins of placental and fetal toxæmias may also be determined.

From the point of view of statistics, ante natal pathology and efficient prophylaxis, notification of every abortion would add greatly to the value of registration of stillbirths, but this seems unlikely to be now adopted.

The organization whereby all pregnant women can be seen and sufficiently examined by a competent medical practitioner is difficult to establish. Compulsory notification of pregnancy, as suggested by Dr. Munro Kerr,⁸ might supply the means, but there are, I think, insuperable objections to such compulsory notification. If a "pregnancy benefit" at the sixth or seventh month, as I have suggested, could be forthcoming to every poor insured woman after her pregnancy had been certified, by a method of voluntary notification to the medical officer of health or her panel doctor, arrangements could then be easily made by which the woman should continue under medical supervision and undergo appropriate treatment. This would save many fetal lives. Amongst many arrangements which would need to be organized would be the provision throughout the country of pre-maternity or pregnancy wards, advocated by Dr. J. W. Ballantyne, and conducted by him in Edinburgh for nearly fourteen years.

Arrangements would also have to be made by which poor women, considered by the medical officer of health or his representative to require hospital treatment, should be conveyed to a pre-maternity ward in a general or lying-in hospital in an adjacent town, or to a reserved pre-maternity bed in the local cottage hospital.

The vital difference between the results of the medical and especially the surgical treatment of the complications of pregnancy and labour, when the woman is attended from the first in a pre-maternity hospital as compared with being admitted as an emergency case after outside treatment has failed, is well known. I give one example of this. In 1911 I collected⁹ 1,058 cases of contracted pelvis treated by Caesarean section performed by living obstetricians in Great Britain and Ireland, and I found that in "clean" cases, such as those already in hospital, only 2.2 per cent. of the mothers died, and hardly any of the children, whereas in cases in which previous attempts at delivery had been made the percentage of mortality was 34.3 and the fetal mortality at least as high.

MEDICINE AND SURGERY IN THE ANTE-NATAL STAGE OF LIFE.

I have already given a list of maternal or fetal conditions which, if untreated, may lead to fetal disease or death. But before such conditions can be treated the opportunity for making a diagnosis must be found.

If all women were under medical observation during pregnancy, not only should we be able to prevent about half the present ante-natal deaths, but also prevent many infants from being born feeble or prematurely.

It cannot be too well realized that many of the deaths of infants dying shortly or immediately after birth are due to ante-natal conditions, or to obstructed labour due to causes which could have been discovered or guarded against if the expectant mother had been professionally attended. About one fourth of children who die in their first year of life die in the first week of life. The Registrar-General suggests that a large proportion of deaths due to "prematurity," or which now come under the indefinite heading of atrophy, debility, and marasmus, "are due to congenital debility owing to which the infants' prospects are hopeless from the moment of birth, progress as regards such cases being possible only by improved ante-natal hygiene." Dr. Newsholme, in his fascinating Second Report on Infantile Mortality, alludes (pp. 27-28 and 91) to the remarkable differences in the death-rate of infants in their first week and first month of extrauterine life in various places. He agrees that whilst some of the deaths in the first week of life, ascribed to premature birth and congenital defect, may be due to lack of care after birth, some are also due to lack of care at birth, and many to ante-natal conditions.

The infantile death-rate from premature birth and congenital defects varies enormously in different places, from 40, 50, or 60 per cent. above the average for the 241 urban areas, to 35 and 40, and 50 per cent. below the average in certain towns.

As tending to show that ignorance on the part of both mothers and fathers may increase the infantile death-rate, the Right Hon. John Burns,¹⁰ in his remarkable presidential address at the Conference on Infant Mortality at Caxton Hall last August, stated that doctors' babies died only at the rate of 40 per 1,000 during the first year, whereas in those of miners the rate is 160, and of unskilled labourers 150, and the average was 100. He rightly attributed this to the doctor's skill and intelligent attention to detail by persistent care and prophylaxis. There is very little doubt that a similar difference in ante-natal deaths would be found if statistics were procurable.

Some of the more important conditions discoverable by routine examination of pregnant women, as shown in Table IV, may now be considered and some of the measures, prophylactic and curative, likely to prove useful to the unborn babe indicated.

PATERNAL CAUSES OF FETAL DISEASE OR DEATH.

These are difficult of proof, but, apart from the probability that the ovum may be fertilized and infected simultaneously by the spermatozoa in such diseases as syphilis and tuberculosis, it is also probable that a debilitated father's spermatozoa, in such wasting diseases as diabetes, Bright's disease, plumbism, etc., may be so devitalized that the resulting embryo is either malformed or so weak *ab initio* that it fails to survive long *in utero*. These points are dealt with at greater length under maternal conditions.

MATERNAL CAUSES.

A. PATHOLOGICAL CONDITIONS.

1. Malnutrition.

A weak or ill woman will usually have an inactive, unhealthy ovum, and it is clearly less likely to develop normally when fertilized.

2. Acute, Specific, and Infectious Diseases.

Where there is danger from infection from any acute infectious fever, the pregnant woman should be removed, for abortions and premature labours frequently follow maternal infection.

Small-pox, for instance, causes abortion or premature labour in the severe types, but not in the discrete forms. The fetus may get the disease *in utero*. The mother should be vaccinated during the pregnancy if exposed to

the contagion, for in some cases the fetus is said to be thereby rendered immune to the infection after birth, but this statement requires further confirmation.

Scarlatina appears to me much less common during pregnancy than at other times, and pregnancy may, therefore, confer some sort of immunity. In early pregnancy scarlatina usually causes abortion.

Measles is stated to cause abortion or premature labour in 80 per cent. of cases, and the children are sometimes born with the rash upon them.

Typhoid Fever.—Abortion or premature labour is said to occur in from 40 to 60 per cent. of the cases, and it is believed that the death of the fetus is due to direct transmission of the typhoid bacillus, which has been frequently found in the fetus.

Influenza.—In severe cases 80 per cent. are said to abort, preceded often by profuse haemorrhage, but mild cases do not abort.

Pyelitis, or pyelonephrosis, is one of the most acute of the complications of pregnancy, due usually to acute *Bacillus coli* infection of the pelvis of the right kidney. If the attack is prolonged or severe, abortion may have to be induced.

Acute Pneumonia.—Abortion or premature labour is frequent in severe cases, the fetus often being born unexpectedly with membranes intact. In such cases the woman rarely if ever recovers. Fetal expulsion may be due to deficient oxygenation of the maternal blood, the fetus being born alive, but in a few cases fetal death has been proved to be due to direct transmission of the pneumococci.

Gonorrhoea.—Conception does not occur during the active course of gonorrhoeal infection of the vagina or endocervix, and sterility may be permanent, even after apparent complete recovery, by the effects of double salpingitis. This is a fact which should be fully realized. Acute infection during pregnancy is rare, but I recently saw a woman who was infected a month before term. Labour ensued ten days after infection, and in spite of all precautions the child was infected at birth and had a proved gonococcal conjunctivitis, vulvitis, and vaginitis, all of which soon yielded to treatment. The mother had no serious trouble, liquor iodi being freely applied to the parts affected soon after parturition. In some cases gonorrhoea, contracted in the early months, has led to abortion by the involvement of the endometrium. The treatment of gonorrhoeal infection during pregnancy is clearly to try to cure the mother as soon as possible and prevent fetal infection at birth.

3. Chronic Maternal Diseases affecting the Fetus in Utero.

Tuberculosis.

Although the mother apparently improves during pregnancy there is no evidence that there is any real arrest of the disease. All observers agree that there is marked retrogression after the strain of labour, and especially after lactation, if that should have been unwisely permitted. The functional quiescence, and the process of involution of so many important organs and ductless glands previously working at high pressure, and the physiological degeneration and disintegration of tissues closely concerned with the uterus and its mucosa, all tend to make such a progressive disease as tuberculosis advance with rapidity during the lying-in period, constitutional resistance being temporarily at its minimum. It does not, however, appear to be the case that a tuberculous woman is liable to abortion, nor is there evidence that her bacilli are conveyed to the fetus, the placental epithelium being apparently able to act as an efficient filter. There is no reason, therefore, why abortion or premature labour should be induced during the pregnancy from the point of view of the child, and it is at least doubtful whether it is maternally advisable, for the induction of premature labour would probably be almost as severe a strain on the unprepared tissues as a full-term delivery.

Opinions differ on this important question of the transmission of congenital tuberculosis and on the frequency of placental tubercle, but it is obvious that, if it were already infected, induction of premature labour would not improve the child's prospect if it survived.

It is well known that the children of tuberculous women are often remarkably well developed at birth and may remain healthy if not suckled by their mothers. Some

consider the children of tuberculous mothers more prone to the disease than others, especially in the form of spinal caries, or renal tubercle some years after, but as the majority of such children appear to escape the disease, one cannot advocate the wholesale induction of abortion which might be indicated if opposite views were held. The permanence of health in some children of tuberculous mothers may be due to the extra care taken of such children, but some think that such children are born with a greater power of resistance, and have really acquired during the period of their intrauterine existence a relatively greater immunity.

It appears to be possible that tubercle may be conveyed to the ovum by the spermatozoa of the father. This has been shown to occur in experiments upon rabbits and guinea-pigs. It has also been demonstrated that tubercle bacilli are sometimes seen in the interior of ova which are still within the Graafian follicle and probably then of maternal origin. In either case such infected ova would if fertilized soon die *in utero*, and need not be considered by us as bearing on treatment.

Syphilis.

The effect of syphilis upon the fetus *in utero* is far-reaching, either by causing its death and premature delivery or by producing such debility and ill health that it dies at birth or shortly afterwards.

Statistics as to the syphilitic death-rate *in utero* and during the first year of life vary enormously. The infantile death-rate during the first year of life for England and Wales as a result of syphilis is given as 1.29 per 1,000 births, for Scotland 1.4, for Ireland 0.59, but the extreme difficulty of the diagnosis apart from a bacteriological examination of the infant by the Wassermann test during life, or the discovery of spirochaetes after death, almost certainly makes these figures, for past years at all events, unreliable. A further reason for believing these figures unreliable is the desire of the medical practitioner in charge of the case to avoid adding to the grief of the mother and father by putting syphilis as the primary cause of the death in the death certificate, "atrophy," "debility," and "marasmus," or "prematurity," being convenient and partially true substitutes. This opens up the large question of the need of a change in the secrecy of the death certificate so far as the cause of death may be concerned. But this is outside our present subject.

In Uganda, where a terrible wave of syphilis has involved the whole native population during the last few years, Dr. A. R. Cook says that out of 40,000 consecutive cases attending two dispensaries in the country, 22 per cent. were sufferers from venereal disease, and that 70 per cent. of the children born there either die from premature birth or are stillborn, or die in their first week after birth, as a result of syphilis or from the gross ignorance of the natives, who prefer being treated by the native medicines before consulting European doctors. McDonagh¹¹ says that nearly 50 per cent. of congenital syphilitics die before birth.

If the mother is infected prior to conception the ovum itself is probably infected, and abortion or premature birth ensues. If the mother is infected after the conception the fetus is infected through the placenta, though, if infected late in pregnancy, some children escape. It seems also clear, notwithstanding recent discoveries, that the father by his spermatozoa can transmit the disease direct to the ovum without infecting the mother, as stated in Colles's law, unless he has infectious lesions at the time of coitus. The woman, if not then directly infected, may escape all clinical evidence of the disease, and is probably herself rendered immune by the intimate circulation between herself and the fetus and by the constant casting off into the maternal circulation of fragments of the chorionic villi. In some cases the mother under such conditions presents a positive Wassermann reaction, but Whitridge Williams considers that it is not clear that she is therefore suffering from latent syphilis, and suggests that this positive reaction may be due to the transmission of antibodies through the placenta, and not necessarily to the presence of living spirochaetes in the mother.

The discovery by McDonagh¹¹ of intracellular parasitic spores developing into spirochaetes, in December, 1912, has an important bearing on the truth of Colles's law, which was believed in by every one till it was pointed out that

the *Spirochaeta pallida* is three times as large as the head of the spermatozoon, making the conveyance of the spirochaete in the spermatozoon apparently impossible. The spores result from the multiple subdivision of the fertilized female cell, and if these can convey the disease the difficulty disappears. In any case, I feel sure Colles's law remains often true.

There is much disagreement as regards the proportion of women who present a positive Wassermann reaction and who eventually bear syphilitic children in those cases where the women show no clinical evidence of the disease. There is much uncertainty as to why in some cases both mother and child give a positive reaction, whereas in others the mother is negative and the child positive. In other cases the mother is positive, the child negative at birth, but positive a month later.

Thus Miss McIlroy took 100 gynaecological cases (91 married) from her out-patient department in Glasgow suffering from various chronic gynaecological complaints, all cases of obvious syphilis being excluded. She found that the Wassermann reaction was present in 53 of these cases. In her 91 married cases, 41 had had one or more miscarriages, yet only 13 of these showed a positive reaction. In 5 of the 21 negative cases showing histories of stillbirths and miscarriages the offspring showed positive reactions. This result is difficult to explain, but is recognized to exist by several writers on the subject.

McDonagh's views differ markedly from those which are founded on such results as Dr. Louise McIlroy's cases. He says most mothers who show no clinical evidence of syphilis, but bear syphilitic children, present a positive Wassermann reaction, and he considers that such mothers "are very prone" to develop gummata at or about the menopause. He says all congenital syphilitics, early or late, present a positive Wassermann reaction, and long-continued treatment may fail to change it.

Mr. Beckwith Whitehouse¹² of Birmingham states that out of 16 cases of chronic metritis and fibrosis uteri 7 showed a well-marked positive Wassermann reaction, only one of which had a defined syphilitic history, and he has drawn attention to the researches of Knöpelmacher and Lehdorffe,¹³ who have shown that 50 per cent. of the mothers of syphilitic children give a positive reaction some years after the birth of the last child, although a few months after parturition 90 per cent. of such women react positively.

The results of the researches of both Dr. McIlroy and Mr. Whitehouse show that in groups of women with chronic uterine disease, and presenting a large percentage of positive Wassermann reaction (53 and 42 per cent. respectively), the changes in the uterine tissues (fibrosis and periarteritis, etc.), are similar to changes found in hepatic cirrhosis and other recognized syphilitic lesions. If these changes *in utero* are often the result of syphilis, it is one explanation of the frequent early abortions which occur in infected women.

Diagnosis and Treatment of Syphilis.

Ten years ago a positive diagnosis in the absence of a living child with clinical evidences of syphilis was impossible, especially if the physician only had the history of one or two premature births of dead children, and no history of syphilis in either parent, and the mother was apparently healthy. In such case, however—and I have seen several—I have found that by giving the expectant mother $\frac{1}{8}$ grain of mercury perchloride thrice daily a healthy living child would be born and would remain apparently healthy.

Amongst several instances of the truth of Colles's law I will mention the following:

A lady had been married four years and had had two stillbirths shortly before full term, and had also had an abortion, of two months' gestation, six months before seeing me. She was then six weeks pregnant, and had no personal history pointing to syphilis. Her husband, however, acknowledged having had syphilis, its last clinical evidence having been twelve years previous to marriage. I put her on mercury perchloride gr. $\frac{1}{8}$ thrice daily, and delivered her of a healthy child six months later. The year following she again conceived, but refused all treatment, and was delivered prematurely of a feeble, unhealthy child, with vague specific symptoms and permanent mental deficiency. Two years afterwards she again became pregnant, and was again treated by me with mercury perchloride from the sixth week of gestation, and had a healthy child.

The discovery of Wassermann's reaction, and of the treatment by salvarsan and neo-salvarsan has revolutionized diagnosis, prognosis, and treatment. One of the difficulties in the case of poor women is to organize means by which a Wassermann test can be made. Dr. Louis Parkes, medical officer of health for Chelsea, has led the way by arranging with the Lister Institute for the carrying out of the Wassermann blood reaction free of charge for medical practitioners attending the poorer classes in Chelsea. This is a great advance, and if it could be generally adopted would be of enormous advantage. It is evident, however, that free diagnosis which is not followed by free treatment would be useless.

We have already seen that pregnant women, bearing *in utero* a child subsequently proved to be infected (perhaps directly through the paternal spermatozoa), may not in all cases present a positive Wassermann reaction. Such cases are probably very exceptional; in them a positive diagnosis could not be made, and few would in such negative cases adopt radical treatment by salvarsan. Apart, however, from these cases, if a pregnant woman gives a positive Wassermann reaction, immediate treatment is imperative, and should be commenced by an injection of salvarsan, followed by a course of mercurial treatment. Such treatment will not only cure the mother but the fetus *in utero* as well, for both arsenical and mercurial salts and potassium iodide readily pass through the placental circulation to the fetus. Data are not yet available to enable us to know when cure is assured for the unborn babe. Dr. C. F. Marshall¹⁴ quotes Hochsinger, who says that out of 516 births of syphilitic infants 253 were stillborn, and of the 263 others 55 died in spite of antisiphilitic treatment. He thinks about 25 per cent. of syphilitic infants may under treatment become fairly normal.

Salvarsan, when injected intravenously into the mother, does not produce abortion or interfere with the growing fetus, for, as Sir Almoth Wright¹⁵ says, "Salvarsan is an absolutely scientific drug, which attacks a specific organism only. It combines with the protoplasm of that organism to form a new innocuous chemical compound. It does not injure the patient's tissues in any way, nor inhibit the powers of the blood serum." There is, therefore, safety in its use. In 46 cases collected by Lorrey, in which intravenous injection of salvarsan was used in pregnant women between the second and ninth month, no abortion occurred. In three cases the fetus died *in utero*, in twelve cases the child was known to have recovered from the disease. McDonagh¹¹ says that if salvarsan be given before secondaries appear in a woman infected during pregnancy the child escapes infection.

Chronic Nephritis.

Women with chronic nephritis may pass through child-bearing without the development of fresh symptoms, but sometimes the inefficient kidneys fail to do the extra work thrown upon them, and the fetus may die poisoned by the mother's failure to excrete urea and its primary products. Sometimes an added toxæmia produces symptoms which cannot be distinguished from toxæmic albuminuria, and as a result eclampsia may supervene. Here, again, the fetus may be expelled dead or dying. Some believe that pre-existing chronic nephritis is a very common cause of intrauterine death of the fetus. I have seen recurring cases of fetal death in two mothers, where there was no albuminuria, but where gradual lessening of urea excretion was discovered. In both cases I believe I saved fetal lives in subsequent pregnancies by inducing premature labour when the urea had been steadily reduced to about 200 grains a day.

All such cases require much watchfulness and frequently repeated examination of urine; premature labour should be promptly induced in the presence of such danger symptoms, or if acidosis is present.

Diabetes.

Apart from a harmless lactosuria, which may be present in 5 per cent. of pregnant women shortly before full term, diabetes may be a serious complication of pregnancy. Whitridge Williams¹⁶ collected 66 cases of severe diabetes in pregnant women; 27 of these mothers died soon after labour, and 23 of the remainder died during the next few years. Fully 12 per cent. of the pregnancies ended

prematurely, and 33 per cent. of the children born at term were dead. These cases of diabetes are probably due to altered metabolism in the ductless glands and pancreas, and may be toxæmic in origin.

Heart Disease.

Much difference of opinion exists as regards the interaction of pregnancy and heart disease, but where the heart is only able with difficulty to cope with its work, compensation not having been fully maintained, the addition of the extra work involved by pregnancy becomes a serious danger.

Mitral stenosis is said to be the most serious lesion: but everything depends upon the amount of compensation present, and it is safer to watch the clinical evidences carefully, and, if the mother is losing ground, and especially if dyspnoea or oedema supervene, premature labour should be at once induced irrespective of the viability of the child. In inducing labour in these cases every effort should be made to lessen maternal strain and to shorten labour by anaesthesia (oxygen-ether) and by instrumental delivery. If the pregnancy be allowed to go on after marked dyspnoea and anasarca have developed, abortion or premature labour will take place.

Asthma.

Asthma usually becomes seriously aggravated during pregnancy, and if, in spite of treatment, cardiac insufficiency or marked dyspnoea supervene, abortion or premature labour should be induced as in chronic heart disease.

Plumbism.

Lead-poisoning is a well-known cause of abortion when it affects the mother, but also¹⁷ causes sterility and abortion when the father is affected. I recall a case in which a healthy woman had repeated abortions, for which no cause could be discovered till it was found that the husband had suffered for years from chronic plumbism. When he was cured she had a living child. If the mother has plumbism, abortion follows in 65 per cent. or more of the pregnancies, and any children are unhealthy, only 10 per cent. surviving their tenth year. The lead is conveyed to the fetus through the placenta. In unrelieved cases sterility results. Plumbism contracted by women taking diachylon plaster is in certain localities a frequent cause of criminal abortion.

Chorea Gravidarum.

Pregnancy may supervene during idiopathic chorea without serious result, but chorea gravidarum is a disease *sui generis*. In severe cases the fetus *in utero* may die, but may not be at once expelled. If delay occurs ("missed abortion"), or even if abortion at once follows, septicaemia is very apt to develop.

Opinions differ largely as regards the desirability of inducing abortion. I have seen cases recover after it, but in two other cases the patient has become comatose and has died, although the choreic movements have been arrested. It is quite possible that chorea gravidarum is toxæmic in origin.

Tropical Diseases.

European women who become pregnant in tropical climates and who cannot "go to the hills" and escape the great heat, should be sent home so as to avoid the risk of abortion which may follow maternal cholera, dysentery, or malaria and other tropical diseases.

Cholera in pregnant women causes abortion or premature labour in 54 per cent. of cases, and cholera bacilli have been found in the dead fetus.

Malaria, if of severe type, may cause abortion or premature labour in about 40 per cent., but mild cases show no tendency to this termination. Some authorities consider that the fetus *in utero* may be infected, especially in the tertian form, but proof of this by the discovery of the characteristic parasite is awaited. Quinine can be given with impunity in maternal malaria, its slight ecboic influence upon the uterus being apparently in abeyance.

Toxæmias of Pregnancy.

As causes of fetal death and expulsion of the ovum, the toxæmias of pregnancy form an important group. Some of these toxæmias are maternal in origin, some fetal. Some are no doubt due to the formation and retention of

altered metabolic products derived from the ductless and other glands of the mother; some are due to toxins derived from the placental or perhaps even from fetal metabolism. Chemical pathology cannot yet discover the toxins present by examination of the maternal blood, and we have to make a diagnosis of toxæmia by the general symptoms caused by the toxins, and by the chemical effects of such toxins upon the secretions of the liver and kidneys. The importance, therefore, of every pregnant woman being occasionally seen by a medical practitioner, and of her urine being chemically examined, is obvious.

The effect of maternal toxæmia upon the fetus in marked cases is grave. The early ovum is expelled, and the more advanced fetus dies and is born prematurely.

It is probable that the clinical evidences of toxæmia vary according to the variety of toxin present rather than to the quantity of the poison.

Pernicious Vomiting of Pregnancy.—Whitridge Williams was the first to show that in severe cases of toxæmic hyperemesis an abnormally large proportion of the total nitrogen in the patient's urine was excreted in the form of ammonia instead of urea, the ammonia coefficient rising from 4 to 5 per cent. to 30 or 40 per cent., or even more. Swayne¹⁸ of Bristol and Herbert Williamson¹⁹ of London have shown that acidosis is usually present in these and most other serious toxæmic cases. In severe cases of the pernicious type abortion should be induced if rectal feeding fails. Reflex non-toxæmic cases yield with almost certainty to one application of liquor iodi to the endocervix applied up to the internal os uteri, even in cases where the artificial induction of abortion seemed inevitable.

Toxæmic Albuminuria.—This urinary condition and its general evidences are sometimes the only clinical symptoms, but it often precedes eclampsia, or is associated with acute yellow atrophy of the liver, and may usher in an attack of the insanity of pregnancy. It usually appears in the second half of pregnancy. Headache, giddiness, cedema, visual troubles, and epigastric pain are the usual symptoms, with marked changes in the scanty urine. In severe cases the child is born prematurely and is still-born. In all cases frequent examinations of the urine are essential, and rest in bed with a milk diet and free purgation should be ordered. If the albuminuria increases, or if acidosis develops, or urea excretion lessens, or if sleepiness or epigastric pain supervenes, or slowness of the fetal heart is noted, premature labour should be induced to save both mother and child.

Puerperal Eclampsia.—This toxæmic manifestation is relatively frequent (1 in 250 pregnancies); it occurs mainly in primiparae (70 per cent.), and develops in the later months of pregnancy or during labour in about 80 per cent. of the total cases. The fetus dies in nearly one-half of all the cases, and in most uterine contractions ensue and the child is born rapidly. Eclampsia could possibly often be prevented by discovery of the scanty albuminuric urine and by appropriate treatment. Should eclampsia threaten or supervene, premature labour should be induced by rupture of the membranes, which reduces intra-abdominal tension, and by instrumental delivery of the fetus under anaesthesia when the cervix is dilated. If dilatation of the cervix be absent abdominal Caesarean section is the best and most rapid way of emptying the uterus. In many cases after the birth, and in some cases after the death of the fetus *in utero*, the convulsions cease, and these facts in the absence of certain knowledge as regards the nature and origin of the toxæmia, cause us at present to advocate emptying the uterus. In time we shall adopt a more rational and scientific treatment.

Acute Yellow Atrophy of the Liver.—This serious and generally fatal result of toxæmia usually appears in the later months of pregnancy, and is accompanied by headache, abdominal pain, jaundice, haemorrhagic vomiting, diarrhoea, followed by coma. The area of liver dullness is diminished, and the urinary changes are well marked and distinctive. The fetus is prematurely born and is usually dead. We know nothing certain as to the origin or nature of the toxæmia.

B. MECHANICAL MATERNAL CONDITIONS.

Retroversion of Gravid Uterus.—Symptoms, except perhaps backache, bladder irritability, and reflex vomiting, may be absent till the fundus uteri becomes incarcerated; then retention and incontinence of urine with abdominal

pain are added. A careful physical examination at once reveals the diagnosis. Prompt emptying of the bladder and replacement of the gravid uterus should be performed, for otherwise abortion about the fourth month of pregnancy or septic cystitis would follow.

Pelvic Contractions.—These can readily be determined during every stage of pregnancy, and in primiparae should always be sought for, and if contraction be detected expert advice should be secured, and the patient should be admitted to a pre-maternity ward at the proper date. If the pelvis is only slightly contracted, and it is believed that a living child can be delivered at or after the thirty-sixth week, labour may be induced then or afterwards. In a markedly contracted pelvis, or at full term, Caesarean section should be performed. If this be done before any other methods of extraction have been attempted, the case is "clean"; the maternal mortality is 2.2 per cent., and the fetal mortality almost nil.

Obstructing Tumours.—These, again, can only be detected by physical examination, which is the more necessary because fibromyomata, ovarian tumours, or bony tumours do not almost cause subjective discomfort during the early months. Roughly speaking, these tumours should be removed during the pregnancy if this can be safely and easily done, otherwise they should be dealt with at full term, together with Caesarean section or hysterectomy, according to circumstances. Expert advice and treatment in a pre-maternity ward are essentials to safety in the cases of poor women. I have notes of Caesarean section performed in 74 cases of fibromyomatous tumour, with 16 fetal deaths (21.6 per cent.), in 28 cases of ovarian tumour with 1 fetal death (3.5 per cent.), and in 15 cases of osteomata, etc., with 3 fetal deaths (20 per cent.); many of these were not "clean" cases.

Carcinoma of the Cervix Uteri.—This is said by Sarwey to occur about once in 2,000 cases, and frequently leads to abortion and adds to the chances of puerperal septicaemia. If the carcinoma is detected in an early stage, panhysterectomy (Wertheim), at any date of the gestation, should be performed, but if the cancer be advanced and inoperable, gestation may be allowed to continue and abdominal Caesarean section performed at term. In 33 cases collected by me treated by Caesarean section only 5 children died.

Cicatricial Contraction of Cervix or Vagina.—As a result of injuries, received usually in a previous confinement, scar tissue may form and prevent delivery. Caesarean section at term must be done to save both mother and child. In 8 cases collected by me in which this treatment was adopted all the mothers and children survived.

Ventrifixation of the Uterus.—It is now known that this does not cause dystocia as often as was supposed, but that it sometimes does so is clear from the fact that amongst my 1,285 cases of Caesarean section performed by living British operators there were seven cases of ventrifixation in which that operation was required. Six of the children survived.

C. MISCELLANEOUS MATERNAL CONDITIONS.

Ante-partum Haemorrhages.—These cases require expert advice, and many of the poorer women would be advantageously treated in pre-maternity wards. The type of treatment will, of course, depend upon whether the haemorrhage is due to complications such as mucous polypus or malignant disease of the cervix, or is the result of partial detachment of a normally situated placenta, or of a placenta praevia. In the latter group the haemorrhage may seriously endanger the life of the fetus, and labour may need to be promptly induced in the interest of both mother and child.

Ectopic gestation need only be mentioned as a cause of ante-natal death, for even secondary abdominal gestations rarely result in a living child.

Criminal Abortion.—What percentage of abortions are criminally induced is unknown. All obstetricians see large numbers of cases in hospital out-patient practice in which the woman has tried to end the pregnancy by advertised drugs, by purgatives, or by diachylon plaster, and cases are admitted into hospital where knitting needles or skewers have been used. Septic troubles not infrequently follow both successful and unsuccessful attempts, and require prompt hospital treatment.

Operations during pregnancy should only be done when necessary, lest abortion ensue, but by steadying the muscular and nervous systems by anaesthesia, even such operations as myomectomy and ovariectomy can be safely performed. Abortion follows 50 per cent. of myomectomies, but rarely follows ovariectomy. Operations for appendicitis complicating early pregnancy do not usually cause abortion, but in the later months premature labour usually results.

FETAL CAUSES.

A. DEVELOPMENTAL CAUSES OF FETAL DEATH.

A very large number of deaths occur during the first few days or weeks after the ovum is fertilized. The human embryo is then merely a mass of cells gradually being placed in defined groups, and undergoing specific changes in character. A faulty grouping or position of these embryonic cells leads to serious subsequent deformity, or if the attachments to the mother be at fault, to failure in nutrition and early death of the fetus. I have already alluded to developmental defects as a result of industrial occupation during gestation. Many early abortions appear to be due to haemorrhages from the early chorio-decidual spaces, leading to diffuse clots, which, together with the early ovum, are expelled at the date of the next period without any attempt at the formation of an organized blood-mole, which would be found in the second or third month. I do not allude to developmental errors in the placenta or cord, the presence of which could not be detected before birth.

B. PATHOLOGICAL FETAL CONDITIONS.

Hydatidiform Disease of the Chorion.—If the uterus is enlarged above its normal dimensions at the supposed date, and fibromyomata are absent, and especially if palpation be unsatisfactory, and there be a "red-currant juice" discharge, this disease may be suspected. Examination may reveal a mass bulging through the dilating cervix. It is possible that a healthy twin may also be present *in utero*, but this is so rare, and the risk of a subsequent chorion-epithelioma is so real, that the uterus should be emptied; the ovum affected practically never has a living fetus in its centre.

Blood moles and fleshy moles produce somewhat similar symptoms, such as metrorrhagia, but the uterus is usually below its normal size at the presumed date of pregnancy. Owing to interference with the blood supply of the embryo it is always dead.

Hydramnios.—This condition is associated with fetal malformations in nearly 50 per cent. of cases, and the fetus, if otherwise normal, is often feebly constituted and dies within the year. If, therefore, there is serious abdominal distension and resulting dyspnoea, the labour should be ended by puncturing the membranes.

Fetal Toxaemias.—It is almost certain that some of the toxaemias arise as a result of altered metabolism in the fetal placenta, especially in the cells of the syncytium or of Langhans's layer, and perhaps even in the fetus itself, but no certain proof of this is yet forthcoming. We can only estimate their gravity by their effect upon the mother, and in some cases by the altered heart-beat or intrauterine death of the fetus.

C. MECHANICAL FETAL CAUSES.

Malpositions of the Fetus.—The position of the fetus *in utero* should always be determined by abdominal palpation or by bimanual examination. It is quite easy, if the child's head be at the fundus or is laterally placed, to encourage it to descend gradually towards the pelvis. After it is pushed down to the level of the navel, its own relative weight in the last month of pregnancy will cause it to engage at the brim. To do this the patient should be seen every two or three weeks after the sixth month.

Fetal Malformations.—Fetus hydrocephalus, anencephalus, acephalus, acardiacus, amorphus, and many other types, lead to many fetal deaths, but, with the exception of the first type, they can rarely be diagnosed during gestation, and treatment is, of course, ineffectual.

Relatively Large Children.—These are occasionally encountered, especially when the father is a big bony man with a brachycephalic head and the woman is small and the pelvis barely normal. A history of dystocia, or fetal death during a previous parturition may lead to the condition being suspected and discovered. In such cases

a timely induction of labour at the thirty-eighth week makes all the difference to both mother and child.

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A METHOD OF PRODUCING RAPID AND FATAL INTOXICATION WITH BACTERIAL PRODUCTS,

WITH SPECIAL REFERENCE TO THE CHOLERA VIBRIO.

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It has been shown by Hort and Penfold (1912) that sublethal doses of *B. typhosus* culture become lethal if injected in a large quantity of distilled water. They further showed that if the water be injected first into one vein, and the sublethal dose of culture subsequently into another vein, death resulted.

We bring forward evidence in this paper to show:

1. That this same augmenting effect of distilled water is obtained with cultures of *V. cholerae* and many other organisms, and that it is not due to the original broth employed as the culture medium.
2. That it is obtained with cholera toxin or filtrate, and does not require the actual presence of organisms.
3. That in the case of *V. cholerae* death is frequently immediate, this immediate death suggesting analogies with the acute anaphylactic intoxication.
4. That if the toxin be injected first and the distilled water two hours afterwards, death may result immediately.
5. That certain toxic substances do not become more toxic on administration in large quantities of distilled water.
6. That lysis of the blood plays a part in the production of these effects.

The rabbit was the experimental animal used. We employed, when possible, animals between 1.8 and 2.2 kilograms. Animals of other weights were used, however, but any conclusion in the paper depending on animals of weights diverging from this standard will be supported by protocols giving the actual weights. The intravenous method of injection was used unless otherwise stated.

Controls.

The following controls were made, namely: The effect of the intravenous injection of one-thirtieth of the body weight of distilled water, the effect of distilled water with added broth or peptone, and the effect of pure cholera culture.

CONTROL I.—Effect of the Injection of One-thirtieth of the Body Weight of Water Intravenously.

	Weight of Rabbit in Kilos.	Quantity of Water Injected Intravenously.	Result.
1	2.13	71 c.cm.	Quite well 14 days later.
2	2.09	70 "	Remained quite well.
3	2.14	71 "	Quite well next day, and therefore used for a further injection.

The water used throughout was distilled twice. It was used immediately after the second distillation.

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