and apparently cannot develop in any other tissue of the body, unless, perhaps, in the joints in which, according to Kammerer, it is present in some cases of gonorrhoeal rheumatism. (It must be said, however, that some investigators have failed to confirm this observation.) Bumm states that pure gonorrhoeal pus may be injected into the subcutaneous cellular tissue without causing any reaction, and that if, after twenty-four hours, an incision is made, and some of the pus which was injected is removed, it will be found that the cells are still in good condition, but that the cocci have disappeared; this fact is of interest also as showing that pus, apart from the micro-organisms which it contains, does not exert any pyogenic action. Also, as I have previously said, when suppurative bubo occurs after gonorrhoea, the staphylococcus pyogenes aureus or albus is present in the pus from the gland, and not the gonococcus; suppurative bubo being therefore the result of a mixed infection, and not a necessary complication of gonorrhoea. The same is the case in abscesses outside the urethra in connection with gonorrhoea.

Kitt has found that, in the case of the coccus of mastitis in cows, the organisms only exert their pathogenic action when they are present in the ducts or acini of the mamma; if injected directly into the tissue of the mamma they cause no suppuration.

The anatomical arrangement of the part is probably a very important factor in the production of acute osteo-mylitis. This disease is, as we have seen, due to the action of the pyogenic cocci, and it not unfrequently stands apparently in some relation to an injury. But the injury and the presence of the cocci do not explain the whole of the etiology of the disease, more especially they do not explain why it is that the disease is almost entirely limited to certain bones and to certain parts of bones. Not that most of the bones in the body may not, under certain circumstances, become the seat of this affection, but as a rule the disease has certain very favourite seats, such as the femur, especially its lower end, the upper and lower ends of the tibia, the upper end of the humerus, and the radius. Now these are the bones which grow most rapidly, and in them the disease commences during the period of growth, and most usually in the neighbourhood of the epiphysal line, where the growth is of course most active. Thus the fact that the bones are growing helps apparently to determine the seat of the disease, possibly because there is a large amount of young indefinite tissue at these parts, possibly also because there are plenty of blood-vessels, and also perhaps because the circulation in the ends of the bone is apparently less rapid than elsewhere (Neumann). It is interesting also to note, as showing probably the influence of similar conditions, that when this disease attacks infants, it is usually limited to the neighbourhood of the epiphysal line, giving rise to acute epiphysitis. At the same time, the anatomical peculiarities will not suffice to explain all the facts because in growing animals, belonging to species not insensitive to this poison, the disease is not produced by injection into the circulation, unless some other determining cause, such as injury, comes into play; and because also the disease not infrequently occurs after acute fevers, such as typhoid fever. As regards the anatomical arrangement of the part in its relation to acute osteo-mylitis, all that we can say therefore is that there is some peculiarity in growing bones, not necessarily limited to the growth at the epiphysis, which has an important influence on the production of the disease.

PLACENTA PRÆVIA.¹

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THE theory and treatment of placenta prævia have been so frequently the subject of discussion, that it may seem to require an apology for bringing it before the Section. But it must, I think, be conceded that the conflicting ideas or dogmas urged as to the proper treatment prove that the true theory that can alone govern a rational scheme of treatment is not yet fairly recognised.

It will be my endeavour to put this fundamental point in a clearer light. I cannot better expose the unsettled and irrational practices that prevail than by briefly stating some of them.

Some still advocate the old "*accouchement forcé*," pure and simple, or with slight mitigation, and these have the recent authority of Spiegelberg.

Schroeder, perhaps the greatest representative of modern German obstetric science, sums up the treatment thus: "Rupture the membranes, draw down a foot, and wait during extraction."

Some contend that the whole treatment consists in bimanual turning. This operation finds, as I long ago pointed out, useful application (*Lancet*, 1861); but it is really the "*accouchement forcé*," mitigated. Some think the whole treatment consists in plugging.

The following criticism by Ludwig Miller in his work on *Placenta Prævia* (1877) is, with few exceptions, singularly just: "Smellie did not follow any one method exclusively, but acted according to the indications of the case in hand. In this he made a step in advance, which places him higher than all his predecessors, and many of his successors."

It may be urged generally against the more rapid or forcible methods that they are fraught with danger to the child. Following the practice of the elder Simpson and of some of the older teachers, those who advocate these methods assume that the conditions are so perilous to the child that they are justified in leaving the child out of consideration, well satisfied if they can save the mother.

I cannot stop to discuss the fallacies which entangle this argument. I will simply state, as the result of extensive clinical experience and anxious casuistical analysis, that those methods which are the most successful in saving the mother are often exactly those which give the best chance to the child. Here, as in other of the great clinical problems in obstetrics, the guiding principle should be to seek for a solution which offers the greatest security for both mother and child, not condemning either.

It is no longer permitted to us, without ample proof of clear necessity, to sacrifice the child in order to save the mother. The cases in which the two lives are supposed to stand in antagonism are vanishing before the light of modern science and skill. And in no conjuncture is this more true than in the treatment of placenta prævia. Countless infants have been sacrificed on the altar of false theories. My own experience gives 33 per cent. of children born alive; and that, concurrently with a larger saving of mothers than has been secured by other methods.

A gross fallacy, which vitiates the teaching and practice of many men, is to regard the particular manipulation which they most affect as constituting the whole treatment of placenta prævia. If they had grasped the true theory, and had the faith that leads to action, they would have seen that there is no one method of treatment, but that several operations come into use in accordance with the stage of the labour, and the particular conditions of the case in hand.

Since I first sketched my theory of placenta prævia in the *Lancet* in 1847, and especially since the publication of my Lettomanian Lectures in 1857, the leading idea of that theory has been largely recognised. Thus it is now admitted that there is a well-defined boundary between the lower zone of the uterus and the body of the uterus proper; and that the lower zone is distinguished from the upper zones of the uterus by peculiar attributes.

The theory of placenta prævia, developed from my original conception is depicted in the following diagram, (No. 1), and is summarised as follows:

The pregnant uterus is divided into three zones: the upper or fundal (*f.z.*, Diagram 1); the equatorial (*e.z.*) and the lower (*l.z.*). The fundal zone is divided from the equatorial by an imaginary line (1-2), the upper polar circle. This line has not been anatomically demonstrated, nor has it been recognised by anyone but myself; but it serves to mark a distinction, which I believe is real, between the properties of the upper and the equatorial zones in their relations to placental attachment and to hæmorrhage.

The equatorial zone is divided from the lower zone (commonly, of late, called the lower uterine segment), by the line 3-4. This is Barnes's boundary-line (1847-1857), since then sometimes called Braune's os internum, Bandl's ring, or Schroeder's contractions-ring.

The fundal zone (5) is the seat of fundal placenta, the region of safest and most typical normal attachment. The equatorial zone (7) is the seat of lateral or equatorial placenta. It disposes, I believe, to what is called accidental hæmorrhage, but may be fairly regarded as a comparatively safe normal attachment. This is still more true when the placenta is attached partly in the fundal zone and partly in the equatorial, as

¹ Read in the Section of Obstetrics at the Annual Meeting of the British Medical Association held in Dublin, August, 1887.

seen (6). Danger especially begins when the placenta descends partly into the lower zone, as at 8-9. This constitutes partial placenta prævia. The part of placenta invading the lower zone is liable to premature separation. Complete placenta prævia, or placenta prævia centralis, occurs when all or the greater part of the placenta grows within the lower zone, and covers the os internum.

Explanation of Diagram 1.

1-2. Upper polar circle. 3-4. Lower polar circle. (This lower polar circle is Barnes's boundary line, 1847-1857; Braune's os internum, 1872; Bandl's ring, 1876, more lately Schroeder's contractions-ring). *f.z.* Fundal or upper zone. *e.z.* Equatorial or middle zone. *l.z.* Lower zone or lower uterine segment. *B.* Bladder. *V.* Vagina. *o.i.* Os internum uteri. *o.e.* Os externum. *5.* Fundal or safe placenta. *6.* Fundo-lateral placenta. *7.* Lateral or equatorial placenta. *8.* Partial placenta prævia. *9.* Placenta prævia lateralis. *10.* Placenta prævia centralis. *c.c.* Conjugate diameter of brim. *c.d.* Conjugate diameter of cavity. *c.e.* Conjugate diameter of outlet. The thick interrupted line represents the position occupied by the foetal head presenting.

In such cases as the last the gestation may not inaptly be called ectopic, inasmuch as the ovum, or an important part of it, is developed in the lower zone of the uterus, a region not adapted by Nature for the process.

The thick interrupted line in the lower zone marks the position occupied by the foetal head. The boundary line 3-4 nearly corresponds with the equator of the foetal head, and frequently nearly with the pelvic brim.

I think Bandl has exaggerated the anatomical differences between the middle and lower zones of the uterus. In specimens that have come under my observation [Drawings by Dr. Barnes were exhibited.] the course of the musculature is continuous, the wall not being materially thinner in the lower zone before labour. Of course, under the distension caused by the passage of the head, the lower zone and cervix may be thinned to the extent he depicts.

I will not in this place attempt a full discussion of the various theories emitted as to the cause of the hæmorrhage. I will only

state briefly some of the conclusions, more or less provisional, at which I have arrived. We may fairly start from two fundamental propositions: 1. The source of the hæmorrhage is the uterine vessels; 2. These vessels are torn across by the detachment of placenta from its uterine connection. The difficulty is to demonstrate what causes this premature detachment. Is it contraction of the uterus, causing such a diminution of its area that the placenta cannot follow? If this diminution of area of the uterine wall be the cause, we must postulate active uterine contraction. This is usually assumed to take place. No doubt sometimes it does. Possibly the frequent peristaltic movement of the uterine wall may occasionally pass the normal limit, and thus a degree of contraction may occur sufficient to throw off adhering placenta. Possibly uterine contraction more active, even spasmodic, may occur. But it is a matter of clinical observation that in many cases hæmorrhage sets in before there has been any obvious contraction of the uterus. It comes on when the subject is asleep; she is awakened, not by pain, but by the flooding. The most frequent time is at a menstrual epoch. One factor then presents itself: increased vascular tension. This tells upon the uterine vessels and upon the placental vascular system. This tension disposes to rupture of the vessels. This rupture takes place at the weakest part, that is, in the vessels running between the uterus and placenta.

Another factor cannot be overlooked. The spongy cellular structure of the placenta favours accumulation of blood in it. The uterine arteries continue to pump in blood, but the return by the venous sinuses does not keep pace with the inflow. Hence the rapidly distended placenta becomes larger in area than the corresponding area of uterus. Frequently the distension of the placenta is so great that its cavernous structure gives way, and there is hæmorrhage into the substance of the organ. Thus the placental bulk becoming suddenly too large detaches itself from the uterus. This process does not necessarily involve, in the first instance, contraction of the uterus. Contraction is, indeed, pretty likely to follow under the reflex irritation induced. But it does not always follow, at least not to any appreciable degree. Why does the flooding so often persist? Because contraction does not set in.

The form of contraction that prevails in the lower zone or segment is retraction. Longitudinal muscular fibres are continued from the middle zone along the walls of the lower zone, even into the cervix and vagina. Their action is to pull up or retract the lower zone, opening the cervix, thus aiding the driving power of the body of the uterus and the abdominal muscles in canalising the passage and forcing the foetus through it. When this retraction is retarded there is hæmorrhage; when retraction goes on well hæmorrhage ceases. An obstacle to efficient retraction is the partial adhesion of the placenta. Detach this, and frequently, the vital power not being reduced too low, efficient retraction sets in. This is a matter of direct clinical observation, that is, to those who have the faith and courage to observe, not blindly thwarting Nature by rushing to the brutal expedient of "forced delivery." Those who intercept the natural order of a physiological process are not entitled to give evidence in contradiction of those who have watched the process throughout. They are out of court.

There is still another condition of the placenta that disposes to self-detachment. This is alteration of its texture from fibrinous indurations, fatty degeneration, or other condition impairing the natural homogeneity. Some such change is especially apt to occur in the præval flap of placenta. In my *Obstetric Operations* and in the *System of Obstetric Medicine and Surgery*, written by myself and Dr. Fancourt Barnes, I started another theory of the cause of premature detachment and hæmorrhage; this is that the placenta, growing more rapidly than the corresponding uterine area, shoots out beyond this area, and so leads to detachment. It has been objected that there is no proof of this. It is true there is no direct proof; but, on the other hand, it is not disproved by simply denying it; and the argument from analogy with the history of tubal ectopic gestation is very strong. In cases of this kind the rupture of the sac and hæmorrhage take place mainly because the sac is not adapted to keep pace with the rapid growth of the ovum about the third month; the sac bursts, and there is effusion of blood. Now I have shown that placenta prævia is a form of ectopic gestation. It is a legitimate deduction that the processes of both are similar.

The case may be summed up in the following propositions:—

1. The hæmorrhage comes mainly from the bared uterine surface, and is arterial. (Simpson thought it was from placenta.)

2. In the progress of many labours, there is a stage when the flooding is spontaneously arrested. (The old dogma was, that the hæmorrhage was unavoidable, and must go on until delivery; and this dogma still governs the practice of many men, precipitating them into rash action.)

3. This spontaneous arrest does not depend upon total detachment of the placenta, nor upon death of the child, nor upon syncope of the mother, nor upon pressure upon the lower segment of the uterus bared of placenta, although one or more of these conditions may favour it.

4. The constant conditions of this physiological arrest are contraction of the uterus, active or tonic, thrombosis, or clotting at the orifices of the vessels, and

5. The physiological arrest of flooding is neither permanent nor secure until the whole of that portion of the placenta which had adhered within the lower zone is detached, this being the portion which is liable to be detached during the opening of the lower segment of the uterus to the extent necessary to give passage to the child. The limit of dangerous placental attachment corresponds to the equator of the child's head (*vide* Diagram 1, 3-4). Below it, the lower segment must dilate; above it the placental attachment is normal, and the uterine region need not and does not dilate. On the contrary, it contracts to force the child into the lower zone, which undergoes canalisation, continued by the cervix and vagina.

This boundary line, revealed to me by close clinical observation and physiological study, has since been demonstrated by anatomical research by others. The illustrations exhibited show this. My boundary line, described in 1847-1857, and many times since, became Braune's *os internum* in 1872, Bandl's ring in 1876, and more lately Spiegelberg's lower boundary of contracting part of uterus, and Schroeder's "contractions-ring." I think I am entitled to claim it as my discovery, if priority goes for anything. But I go further, and submit that these and other writers, although recognising this fundamental fact of a definite boundary line, and attaching their names to it, have failed to grasp its full significance. Had they formed a clear conception of its importance, they would have drawn the obvious therapeutical deductions, and would have made it the guiding principle of treatment. Instead of this, their treatment remains simply empirical. Imperfect in physiological conception, it is barren in therapeutical issue. Attempts have been made to define the extent of the lower zone by measuring the distance from the *os internum* to the boundary line. These are based upon the fallacy that all cases are alike. The uterus and the foetal-presenting part vary in absolute and relative proportions, according to the development of the uterus and the size of the child. It is idle to pretend to fix a constant boundary line, measured by tape or rule. My estimate is based on the observation of cases at term, and the measurement of foetal heads at the equator. The true limit is the height from the cervix to the equator of the foetal head.

6. When this stage of detachment has been reached, by Nature or by art, there is no physiological reason why any further detachment or flooding should take place until after the expulsion of the child, when, and not till then, the remainder of the placenta, which adheres to the middle and upper zones of the uterus, is cast off, as in normal labour. This preservation of the connection between placenta and the body of the uterus is commonly enough to preserve the child. It is chiefly in the extreme cases of central placenta prævia, in which the placenta is in greater part or wholly within the lower zone, or when as not seldom happens, labour sets in prematurely, that the child's life is compromised.

7. Adhesion of the placenta over the *os uteri internum* impedes the regular dilatation of the part; and, consequently, whilst such adhesion lasts, the ordinary course of labour is hindered or perverted.

8. Injury and inflammation of the uterine structures, particularly of the cervix, are especially likely to ensue upon delivery in placenta prævia. One of the purposes intended by Nature, in fixing the seat of the placenta in the fundal and equatorial zones, is the preservation of the parts, rendered highly vascular by connection with the placenta, from distension and contusion attending the passage of the child.

The treatment logically flowing from the foregoing physiological propositions is set forth in the following therapeutical propositions:—

1. The greatest amount of flooding frequently takes place at the commencement of labour, and frequently even before there is

any clear indication of labour; generally at what would have been a menstrual period. The cervix is always, from its being near the seat of placental attachment, highly vascular, and is frequently at this stage very rigid. Any attempt to force the hand through this structure at this stage, to detach the whole placenta or to deliver, must be made at the risk of injuring the womb. The dragging the child through the cervix, even when it has not been necessary to pass the hand into the uterus, is a proceeding affording slender chance of life to the child, and fraught with peril to the mother. Hence the indication to pursue a course of treatment as free from violence or precipitation as possible.

Diagram 2—Showing a flap of prævia placenta, and the demarcation between the prævia and equatorial portions of placenta, corresponding with the uterine boundary line. The finger shows how the prævia flap can be detached from the lower zone.

2. The entire detachment of the placenta is not necessary, and is not to be depended upon, to arrest the hæmorrhage. (Since my demonstration of this point, Simpson, I believe, abandoned the practice, and I do not think anyone now advocates it.)

3. Since the dilatation of the cervical portion must take place in order to give passage to the child, and since during the earlier stages of this necessary dilatation hæmorrhage is liable to occur, it is desirable to expedite this stage as much as possible, avoiding violence.

4. In cases where labour appears imminent, with considerable hæmorrhage, whilst the *os internum uteri* is still closed, the arrest of the flooding and the expansion of the *os* may be promoted by rupturing the membranes and the use of tents.

5. Since a cross-presentation or other unfavourable position of the child is apt to impede or destroy the regular contractions of the uterus, which are necessary to arrest the flooding, it is mostly desirable to deliver as soon as the condition of the *os uteri* will permit.

6. In some cases the simple use of means to excite contraction of the uterus, as rupturing the membranes or the employment of galvanism, may suffice to arrest the hæmorrhage.

7. In some cases in which it is observed that the *os uteri* has moderately expanded, or to a diameter of 1.25 inch or 4 centimètres, the placenta being felt to be detached from the lower zone, and the hæmorrhage having ceased, it is not necessary to interfere

with the course of labour, now become normal. Hæmorrhage rarely persists after full canalisation of the passage.

8. At the critical period, when the total detachment of the placenta or forcible delivery is dangerous or impracticable, the introduction of the index finger through the os, and the artificial separation of that portion of the placenta which adheres within the lower zone, is a practicable and safe operation. This proceeding is illustrated in Diagram 2, which represents the foetal surface of a placenta drawn from Nature. The flap at the lower part was præval placenta. The shaded line exactly corresponds to the uterine boundary line. The flap itself corresponds to the lower zone of the uterus. It shows the compression of the foetal head. I have introduced the index finger to show how it is made to sweep behind the præval flap to detach it as far as the boundary line.

9. The artificial detachment of that portion of the placenta which adheres within the lower zone will at once liberate the os internum from those attachments which impede its equable dilatation; and, by facilitating the regular contraction of this segment of the uterus, favour the arrest of hæmorrhage, and convert a labour complicated with placenta prævia into a natural labour.

10. The immature uterus, partly paralysed by loss of blood, cannot always be trusted to assume the vigorous action necessary to effect delivery; it is, therefore, necessary to aid canalisation by dilating the cervix artificially; this can be done safely and quickly by my caoutchouc water dilator. This has come into general use, and the testimony in its favour is conclusive. But one or two German teachers say it is not effective. The bags they have tried must be bad specimens, or skill in using them was wanting.

11. Sufficient dilatation being obtained, delivery may, if necessary, be accelerated by forceps, by turning, or by embryotomy, according to the special indications dictated by the condition of the child. If turning be resorted to, I insist strenuously upon the importance of delivering the after-coming head by the forceps, if there be any difficulty or delay in the passage of the head under manual traction. The forceps so applied takes off the constriction of the imperfectly dilated cervix from the child's neck; and traction bearing upon the head, facilitates moulding, and takes off all strain from the neck; axis-traction also is to be observed. In my hands, this proceeding has contributed materially to the saving of the child.

The measures that come into successive use are:—

1. Rupture of the membranes.
2. Apply a firm binder over the uterus.
3. A plug may be used to gain time, but it must not be trusted; watch closely.
4. Separate all the placenta that adheres within the lower zone, and observe closely. If no hæmorrhage, wait awhile. The uterus may do its own work; if not, dilate the cervix by the water bags. Again pause and observe. If Nature fail to deliver, we resort to the forceps, which gives the best chance to the child, or turn.

In following this order of procedure, we strictly follow the law of physiology. We do not force Nature, but obey her. Current medical literature is full of examples proving the value of these precepts, and not a few cases published as illustrations of the success of other methods, especially of turning, are more correctly explained by the fact, probable in many, certain in some, that in carrying out the operation of turning, the placenta had been detached from the lower zone. Where the principles enunciated by me have been thoroughly and intelligently observed, as has been done on a considerable scale, as by Dr. Murphy, the success has been unexampled.

An emphatic illustration of the treatment advocated by me is found in the following summary of the experience in placenta prævia in the practice of St. Thomas's Hospital for 1887 (*St. Thomas's Hospital Reports*) by Dr. Cory:—"Five cases occurred during the year. In one case there are no particulars; in two the placenta was partially separated, and delivery effected by forceps; both children were saved. In two the placenta was partially separated; version was performed, and the children were lost; all the mothers recovered." Dr. Cory adds:—"The lesson to be learned in these cases is well shown, namely, never attempt version if the head is presenting, and hæmorrhage has been stopped by the partial separation of the placenta."

LONGEVITY IN IRELAND.—Among the deaths registered in Ireland for the December quarter were the following:—Two at 100 years, two at 103, two at 104, one at 110, and one at 111 years respectively.

PATENCY OF THE UTERINE CANAL AS AFFECTED BY FLEXION OF THE UTERUS.

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THE effect of flexion of the uterus in interfering with the patency of the uterine canal is a subject on which a diversity of opinion exists. In the healthy normal uterus the tissues surrounding the uterine canal are of considerable strength and thickness, and under such circumstances a great degree of bending of the uterus does not occur; but when circumstances are otherwise, and the tissues are soft and non-resistant, possibility of severe bending is greater. When flexion is present, the thickness of the walls of the canal tend to preserve the patency of the canal, but it is evident that the calibre of the tube will be more likely to be diminished if at the same time the walls of the canal are relaxed, soft, and wanting in tonic.

Fig. 1.

From the various conflicting descriptions of the state of the os uteri internum in cases of flexion, it is difficult to arrive at decisive conclusions, observations by means of the sound being difficult to make in a sufficiently uniform manner, and the sound itself being liable to alter the conditions actually present.

The following, as a piece of pathological evidence as to the condition in regard to patency of the canal in a case of antelexion, may be considered worthy of attention.

Fig. 2.

In the Museum of University College there is one of the few existing preserved specimens of acute antelexion of the uterus. This specimen I had before described. Five years ago the speci-