THE
MECHANISM
OF
PARTURITION.

BY

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II. The most anterior part of the presentation, or that part nearest the pubes, is the lowest during labour.

III. That part of the presentation corresponding with the back of the child, in whatever way it may enter the pelvis, whether directed anteriorly or posteriorly, becomes, as a general rule, anterier before the termination of labour.

The above in breach cases in connection with this Law. The chin corresponds with the back in a face presentation; three proofs that it does so: 1. Mathematical proof; 2. Scientific proof; 3. Medico-anatomical proof. That part of each presentation, corresponding with the back of the child, seems, by its movement, to determine the relative position which the other parts of the presentation shall bear to the maternal pelvis. The relation subsisting between the occiput and biparietal in rotation; also between the chin and forehead.

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MECHANISM
OF PARTURITION.

CHAPTER I.

Introductory Remarks.

To understand aright the theory, and to undertake, in a rational manner, the practice of Midwifery, a clear and definite conception of the Mechanism of Parturition is absolutely necessary.

Many pages might be written in proof of this remark, but, not to waste time, we may here be allowed simply to observe, that an intimate theoretical and practical acquaintance with the mechanism of labour marks, more than anything else, the difference between the accomplished accoucheur and the unlettered midwife.

The latter, it is true, can generally tell you when the head presents, but she knows not in what position it enters the pelvis, how it passed through it, or in what manner it will emerge therefrom; she trusts to the "chapter
of accidents," and hopes that everything may go on favourably, but, should any unusual symptom occur, she is at once overwhelmed with fear and uncertainty, and, if she does not immediately lend her efficient assistance, the safety of her patient may be seriously compromised. Not so, however, with the skilful accoucher. He is fully prepared for every emergency. Each position he can diagnose; every movement he appreciates. His deep study of Nature's own laws, and his laborious investigations into one of the most wonderful of her operations, the process of childbirth, are at last turned into practical account; and whatever symptom may arise to impede the progress of labour, his well stored mind will suggest the remedy, and his well trained hand can apply it.

"The Mechanism of Childbirth," observed Naegle, our greatest authority on the subject, "should not only excite our attention and admiration, but deserves an elaborate study: on it depends the very existence of that department of the healing art, which can render assistance in cases of difficult parturition."

It was the imperfect knowledge of this fundamental fact of the obstetric art that retarded the advance of midwifery at the very time when the sister departments of medicine and surgery were making the most rapid
progress; and so erroneous were the ideas then entertained with regard to this most interesting and important process—a process, than which nothing would seem to have stronger claims on the attention, study, and serious consideration of mankind, involving, as it does, the very existence of our species;—that, until the year 1742, it was universally believed that the head of the child entered, and passed through, the pelvis, with the sagittal suture parallel with the antero-posterior pelvis diameter. Sir Fielding Ould of Dublin was the first to call in question this prevailing idea, and, in his little work, published in 1742, he maintains that, during labour, the child's head lies with the sagittal suture parallel with the transverse diameter of the pelvis, the face being directed to one or other ilium.

Previous to the discoveries of this distinguished obstetrician, the mechanism of parturition was not studied in the proper way. Instead of appealing to nature, examining for themselves, and resolving their difficulties by patient, laborious, and steady investigation at the bedside of the parturient female, the accoucheurs of those days argued and theorized on the subject in their own private studies, regarding the pelvis evidently as a rather complicated piece of mechanism, through which,
by their wide calculations, they were to drag, at best they could, the foetal cranium. Instead of humbly following the guidance of nature, they arrogantly assumed to themselves the right of dictating to her; hence, whenever they encountered any deviation from their favourite systems of figures and diagrams, instead of calling in question the correctness of their own theories, they unhesitatingly pronounced nature to be at fault, and forthwith had recourse to operative interference.

"Authors," remarked Prof. Simpson, "have but too often shown how they would move the head through the pelvis, if they had the direction of it, rather than endeavoured to show how nature herself conducts the process."

Sir Fielding Ould's observations on the mechanism of labour, though not altogether accurate, served to direct considerable attention to the subject, and it was not long ere many of his statements were confirmed, and others corrected and amended.

The views he entertained on the subject we subjoin in his own words. "When a child presents itself naturally, it comes with the head foremost, and, according to all authors that I have seen, with its face towards the sacrum of the mother, so that when she lies on her back, it seems to creep into the world on its hands and
feet. But here I must differ from this description in one point, which at first sight may probably seem very trivial; the head of the child does certainly lie on the sacrum of the mother, but the face does not, for it always, when naturally presented, is turned either to one side or the other, so as to have the chin directly on one of the shoulders."

In the last sentence of the preceding quotation, Sir Fielding not only errs as to the pelvic diameter occupied by the foetal cranium, but falls into the additional mistake of supposing that the neck of the foetus is partly rotated upon its body, and that the chin is turned towards one of the shoulders. The latter error was corrected by Smellie, who, nevertheless, agreed with Cullen as to the position of the head in the transverse diameter. But this is not so much to be wondered at, when we have Dr. Randolboth in our days assigning to the same diameter the two first positions of his classification.

Smellie was the next great discoverer, and to him we are much indebted for having elucidated many important facts in connection with parturition. He was the first to indicate the true direction taken by the gravid uterus at the commencement of labour, and to explain the position of the os uteri when it begins to
*In France, the doctrines of Ould and Smellic were taught by Delourge, and more recently by Schmidt and Hannke in Germany.*
dilate: he also pointed out the manner in which the
dental head enters the gradually expanding os. It
must be a matter of surprize, however, that, in spite of
the intimate knowledge of the whole process of child-
birth possessed by this eminent man, he should ne
ver have corrected the erroneous idea, which during his
time was universal, that the vertex formed the present
ing part of the child's head.

The brilliant discoveries of Culp and Smelt's ex
 cited the interest of all the great accoucheurs of Europe.
The mechanism of parturition still presented a wide
field for practical investigation, and it was not long
ere foreign obstetricians, eager to share with their British
brethren the well earned honours of discovery, started in
the same line of inquiry.

The next advances in the subject were made in the
year 1771, when the treatises of Joannes de Remhac of
Copenhagen, and of Matthias Saxtorph of Montpelier
were published almost simultaneously. Both of these
great men, unknown to each other, had discovered that
the head of the child, in natural labour, enters the pelvis
with the sagittal suture parallel with, neither the
conjugate, nor the transverse, but the oblique, pelvic
diameter, and that, in the great majority of cases, it
is the right oblique diameter of the pelvis, which is occupied by the foetal cranium; that is, the anterior large fontanelle is directed to the right sacro-iliac synchondrosis, while the posterior small fontanelle points to the left foramen ovale. Besides this, Solapres de Hoc was the first to mention the fact, which was afterwards strenuously insisted on by Naegeli, that, when the infant's head is originally placed in the so-called third position of authors, that is, in the right oblique pelvic diameter, with the occiput posterior, it sometimes passes, during the course of labour, into the second position, so that, in which the child's head lies in the left oblique diameter of the pelvis, the occiput being directed anteriorly. He, moreover, described the mechanism by which these changes are brought about, and made many other important observations which we have not time to notice here.

The mechanism of parturition found its next great exponent in the person of Bangelode, the celebrated pupil of Solapres. Following in the footsteps of his much esteemed teacher, and, like all truly great men, diffident of his own powers, he referred everything to nature; and, with a Jolly and perseveringly investigating for himself, he was able to corroborate most of the statements of Solapres.
add many original observations, and so to arrange and systematize the whole subject of labour, that even to this day many authors follow his classification.

But the man, who of all others, has done the greatest service to the obstetrical art, is Dr. C. F. Naegle, the illustrious Professor of Midwifery at Heidelberg. He it is to whom the cultivators of the science are most indebted. Distrusting all theory on the subject, setting aside for the time even the practical investigations of preceding observers, he applied himself, with a zeal that knew no bounds, to the study of nature itself; and by patient and unremitting attention to all the different phenomena connected with parturition, determining their character, and noting the order of occurrence, with his right fore-finger on the head of the child, often during the entire labour, he acquired such an insight into the mechanism of this wonderful process, that the little book, which he published on the subject in 1818, has been confirmed in almost every statement by succeeding observers, and will ever remain a monument of the genius and industry of its gifted author.

The extensive knowledge of the mechanism of parturition, which, through the labours of these great men, we now possess, has already been productive of the happiest
results. Obstetricians have learned to place more confidence in the powers of nature, than in the perfection of their instruments, or the dexterity of their own fingers. Middle- 
dome midwifery is now reprobated as bad practice; the last 
interference with the operations of nature, the better, has al- 
most passed into an axiom; and men now leave to the un-
aided efforts of nature the correction of many difficulties 
which formerly they would have sought to amend by manu-
nal or instrumental interference. As a consequence of all 
this, the various European hospitals show a marked de-
crease of mortality in their records of childbirth.

But although much has been done, there still remains 
we believe, much to be done. "No remark," observes Prof.
Simpson, "is certainly more true than that made by Dr.
Owen, that natural labour was the last sort of labour 
properly studied and properly understood, and we have no 
hesitation in pronouncing our opinion even at the present 
day, that though it is a subject worthy of the greatest atten-
tion, it has, at least in this country, hitherto excited very 
little notice, and though a topic on which above all others 
it is necessary to have correct opinions, there are certainly 
less of Great Britain entertain, generally speaking, 
more loose and more incorrect ideas."
The preceding structure was written by Dr. Thompson seven
ten years ago, when certainly it was well merited; but we
are charitable enough to think that it is not quite so ap-
pllicable now as then. The darkened understandings of
many British practitioners have at last, we believe, been
enlightened to a considerable extent, and the mysteries
of parturition have been cleared up in a manner intelligible
we trust, to the majority of them.

Still, the mechanism of labour is a fruitful subject
and has not yet been exhausted. Many statements re-
quire more ample corroboration, others need modification
or amendment, and there are, we doubt not, further dis-
covories yet to be made, new triumphs to be achieved by
the industrious and enterprising accoucheur.

Eager, however, though the writer of these remarks
may be to gain were it but one of these laurels,—to
elucidate some point hitherto unnoticed, or even to develop
some formerly mosted idea,—the very fact of his slender
experience precludes his indulging in any such innocent
delusion. All that is attempted in the following pages
is a correct and intelligible account of the "Mechanism
of Parturition," as, at present, understood.
In considering the mechanism by which one body is made to pass through some part of another body, we must pay attention to the three great elements by whose combined agency the process is accomplished, viz., 1. The expelling force; 2. the body to be expelled; and 3. the part through which it is to be expelled.

The process of parturition thus involves the consideration of, 1st. the Uterus, and the other muscles which, during the second stage of labour, take part in the expulsion of the child; 2nd. the Foetus; and 3rd. the Mother's Pelvis. The joint action of these three elementary agents constitutes the Mechanism of Parturition; but it is just as necessary to understand the separate action of each before we can fully comprehend the combined operation of all, as it is requisite to have mastered the mechanism of labour, before we can properly undertake the practice of midwifery.

Before entering, therefore, on the more immediate subject of our investigation, we shall introduce a few remarks on the three great elements of labour, in so far as they are subservient to the process of childbirth. We shall notice them separately, and in the following order: 1. The standard Female Pelvis. 2. The normal Foetus. and 3. The Uterus.
CHAPTER II.

The Female Pelvis.

A mere cursory glance at the female pelvis might almost dispose us to doubt the possibility of such a large body as the foetal head ever being able to pass through its interior, but a more careful consideration of its general configuration, and of its different planes and axes, would speedily correct any such misapprehension; and if we institute a comparison between the pelvises of the two sexes we cannot fail to be impressed with the wonderful adaptation of the female pelvis to the function of parturition: each progressive step of such an inquiry renders this fact more and more apparent.

The first difference between the male and female pelvis which will probably attract our notice is that the latter is the larger of the two. On further examination we observe that it is not as deep as the male pelvis, and that it is of a more delicate mould, its walls being smoother and not so curved; its cavity, moreover, is more capacious, and its inlet and outlet larger, the conjugate and transverse diameters, in particular, being longer than in the opposite sex. Besides this, the acetabula and tubera ischi are further apart, the sacrum is broader and not so curved, thereby rendering
the angle between the sacrum and the vertebral column is less marked than in the male. The mobility of the coccyx is greater, the symphysis pubis is not so deep, nor do the spinous processes of the ischiium encroach so much on the interior of the pelvis, as in the male. Again, the superior width of the pubic arch in the female, and the greater divergence of the name of the name of the pubis and ischiium, are points not to be overlooked. Altogether, the female pelvis is larger, shallower, smoother, and more rounded than that of the male, and consequently presents less impediment to the passage of any body through its interior.

But, towards the latter months of utero-gestation, certain changes take place in the pelvis calculated still further to facilitate the birth of the child: the different joints become more or less relaxed, especially the articulations of the coccyx and symphysis pubis which acquire a greatly increased mobility.

It is unnecessary to point out here how all the different characters of the female pelvis as contrasted with that of the male contribute to the comparatively safe and easy fulfillment of the process of parturition: the facts speak for themselves.

But, apart from any peculiarities of sex, the pelvis is singularly adapted to sustain the pressure to which in both
sexes, it is subjected, viz.: the prepuce common to male
and female of the superincumbent mass of the body, and
that greater prepuce peculiar to the female, first of the
pregnant uterus, and secondly, of the fetal head, as it is
forced through its cavity by the powerful contractions of the
uterus, and the other muscles which take part in the pre-
puclide stage of labour.

The shape and position of the sacrum is a most material
element in the mechanism of the pelvis, and were it not
that nature had tied together the sides of the pelvis arch
by this bone, the great strain which is imposed upon it
during labour would infallibly send it adrift. The
sacrum may be considered as either the keystone or the
beam of the arch formed by the pelvic bones, and in
whatever light we view it, the beautiful mechanical
contrivance subserved by its curved form must be evi-
dent: had it been a straight instead of a curved line,
not only would the circular head have been unable to adapt
itself to it, but, on account of the greatly diminished
strength which such an arrangement would necessarily
have entailed, the pelvis arch would probably have given
way under the enormous pressure to which it would have
been subjected during labour.

But another great mechanical advantage is ensured by
the wedge-like form of the sacrum, and by the manner in which it is placed between the two innominate bones, because, from the latter overlapping it at the edges of its outer surface, it results that, in proportion to the force applied to the pelvic arch, there is a corresponding resistance of the sacral keystone.

The pelvis, for convenience of description, has been divided into the upper or false, and the lower or true pelvis,—the linea ilipectinea marking the line of division. Of these, the true pelvis, as being the part involved in parturition, demands our attention. It consists of that portion of the pelvis situated below the ilipectineal line, and is divided into the brim, cavity, and outlet. The brim is represented by the linea ilipectinea; the cavity is formed by the sacrum posteriorly, and the pubes and ischia anteriorly and laterally; and the outlet is bounded by the coccyx posteriorly, and by the great sacro-iliac ligaments posteriorly and laterally, while the tuberosities of the ischia form the extreme lateral boundaries, and the name of the pubes and ischia enclose it in front and to the sides.

There are four diameters in the brim, cavity, and outlet,
* There are certain external measurements of the pelvis which it is important to know, as their deviations will generally indicate internal deformity. The following are copied from Dr. Church-ills Manual.

The external anterior-posterior diameter of the pelvis is from 7 to 8 inches.

The external transverse, between the crista ilii of each side, 13 to 16 inches.

From the anterior superior spine of one side to the other, 10 to 12 inches.

From the great trochanter of one side to the sacro-iliac symphysis of the other, 9 inches.

The following are copied from M. Naegle's work on uterine distortion.

1. From the tuber ischii of one side to the posterior superior spinous process of the opposite side, 6½ inches.

2. From the anterior superior spine of one side to the posterior superior spine of the other side, 7 inches, 10 lines.

3. From the spinous processes of last lumbar vertebra to the anterior superior spine of either side, 6 inches, 7-8 lines.

4. From the great trochanter of one side to the posterior superior spine of the ilium of the opposite side, 8 inches, 2 lines.

5. From the centre of the inferior edge of the symphysis pubis to the foot, sup. spine of ilium of opposite side, 8 inches, 2 lines.
1. The Conjugate, or antero-posterior; 2. The Transverse, at right angles to the preceding; 3 and 4. The two Oblique, extending from the sacro-iliac synchondroses to the opposite foramina ovalia, and being distinguished as right and left, according to the synchondroses from which each starts. We subjoin their measurements:

Conjugate. Diagonal. Transverse

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<th>Unit</th>
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Cavity: 4 1/2 4 1/2 4 1/2

Outlet: 3 1/2 — 4 4 1/2 4

(\* inches)

The depth of the true pelvis is posteriorly 5 inches, or, if the coccyx be extended, 6 inches; laterally, from the brim to the tuber ischii, 3 3/4 inches; and anteriorly, or the depth of the symphysis pubis, 1 1/2 to 2 inches.

The position of the pelvis, with respect to a straight line passing through the centre of the vertebral column, is oblique, the plane of the brim forming with such a line an angle of 150 degrees. With the horizon it forms an angle of 60° to 60°; this is the obliquity of the inlet. The obliquity of the outlet, according to Naegle, is 10° to 11°. In accordance with the obliquity of the pelvis, a straight line carried downwards through the upper
part of the sacrum passes through the acetabula; the point of the coccyx is seven or eight lines above the summit of the arch of the pubis; and the angle between the sacrum and last lumbar vertebra is three inches, nine lines higher than the pubis.

There are three pelvic planes generally spoken of, viz.,—the superior, middle, and inferior, or those of the bony, cavity, and outlet. That of the bony is represented by a line drawn from the promontory of the sacrum to the upper margin of the symphysis pubis; that of the cavity, by a line from the lower portion of the third piece of the sacrum to the middle of the posterior surface of the symphysis pubis; and that of the outlet, by a line extending between the tip of the sacrum and the lower margin of the symphysis pubis. We say tip of the sacrum, instead of coccyx, because during labour the latter may be displaced backwards a full inch, and then the tip of the sacrum comes to be the nearer of the two to the symphysis pubis, and thus before the real posterior limit of the pelvic outlet.

The superior plane of the female pelvis is inclined to the horizon at an angle of 60°, and to a vertical plane at an angle of 15°; the mid-plane is inclined to the horizon at
an angle of 45°; and the inferior plane at an angle of about 10° or 15°, if the tip of the coccyx be taken as the posterior limit, but at an angle of 15° or 16°, if the tip of the sacrum be accounted the posterior boundary, which is certainly is during parturition.

The axes of the pelvis are lines drawn at right angles to the centre of the planes. The axes of the brim and outlet form with each other a little more than a right angle; the former being described by a line extending from near the tip of the coccyx to the umbilicus; the latter, in the unipregnated state, extending from the promontory of the sacrum to midway between the tuberosities of the ischii, or to the anus, if prolonged through the soft parts. In the pregnant state, or rather during labour, where the coccyx is displaced backwards by the fetal head, and the plane of the outlet is represented by a line extending between the tip of the sacrum and the lower margin of the symphysis pubis, the axis of the outlet extends from a little in front of the promontory of the sacrum, to a little behind the anus. The axis of the mid-plane, or cavity of the pelvis, extends from a point between the tip of the coccyx and the anus, but rather nearer to the latter, to a point a few inches above the umbilicus.

It is highly important in midwifery practice to have
a clear conception of the axes of the inlet and outlet of the pelvis, and, in connection with these, of the axes of the uterus. If these different axes do not correspond, the labour is impeded; for, in cases where the axis of the uterus does not correspond with that of the inlet, the result is manifest: should the axis of the uterus approach the horizon, the child's head comes in contact with the promontorium sacrum, and, should it approach the perpendicular, it is forced against the pubes. These accidents are very embarrassing to the man who does not understand their cause, but, by the accomplished accoucheur, they are both easily recognised, and easily remedied. Again, in making vaginal examinations, assisting the birth of the child and placenta, and in all cases of manual and instrumental interference, especial attention must be paid to the axis of the outlet.

In studying the female pelvis, that part of it which demands our chief consideration is its interior, or, in other words, the parturient canal. The axis of this canal is an imaginary line equidistant from every point of the bones along which the centre of the child's head is supposed to pass: it forms a part of a circle, varying according to the curvature of the sacrum, and represents the path of the foetus through the pelvis. Many incorrect opinions have, at different times, been entertained with respect to this path by writers supposing that its axis was identical with the axes of the two or three
pelvic planes we have already considered. The truth is as Dr. Sykes Smith remarks, that "the axis of the canal is identical with every imaginary intermediate plane from the inlet to the outlet, at the point where the axis cuts the plane." But in order to understand fully the path of the foetuses through the pelvis, we must associate with the curve of the pelvis canal, "the axis of the uterine above, and of the distensible soft parts below." "Collectively, again observes Dr. Smith, "the patient line is expressed by an irregular parabolic curve, fixed from the bony of the pelvis to a line drawn from the inferior margin of the symphysis pubis to the apex of the sacrum, and variable from the fundus uterus to the pelvic brim, and from the outlet to the margin of the perineum, according to the position of the uterine, and the facility with which the coccyx is pushed back, or the perineum distended."

The pelvic diameters are more or less modified by the soft parts lining the pelvis. The outlet is chiefly affected. The transverse diameter at the brim is reduced by half an inch, and the conjugate by a quarter. The diameters of the cavity are not diminished by more than a quarter of an inch.
CHAPTER III.

The Foetus.

It is with the head of the foetus that we are principally concerned in parturition; and what we have to say of the body may be summed up in a very few words. The foetal skeleton represents a cone, of which the encephalon forms the broadest part or base; consequently after the expulsion of the head from the maternal passages, there is little difficulty in the transit of the body. The shoulders are now the only cause of delay, but they are generally expelled in the succeeding pains, the shortness of the neck contributing in a certain degree to this result, while, at the same time, it provides against mal-positions of the head; and the same pain which expels the shoulders completes the birth of the child.

As might be expected from the general contour of the pelvic cavity, the skull of the foetus approaches the oval form. The bones constituting the arch of the cranium are soft, and, by reason of the width of the different sutures, easily compressible. On this account the mechanism of parturition is rendered much simpler than it otherwise would be, and safer both to mother and
**Measurements of the Foetal Cranium.**

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Circumference</th>
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<tbody>
<tr>
<td>1. Occipito-Frontal</td>
<td>4 1/2</td>
</tr>
<tr>
<td>2. Transverse or bi-parietal</td>
<td>3 1/2</td>
</tr>
<tr>
<td>3. Occipito-mental or oblique</td>
<td>5</td>
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<tr>
<td>4. Sub-occipito-bregmatic</td>
<td>3 1/2</td>
</tr>
<tr>
<td>5. Fronto-mental</td>
<td>3 1/2</td>
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<tr>
<td>6. Bi-temporal</td>
<td>2 1/4</td>
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child; because, in cases of rigidity of parts, or want of space, the margin of one bone can ride over that of its neighbour, thus allowing the child's head to traverse a much smaller space than it could have done in a more supple condition. This compressibility, however, affects almost exclusively to the transverse diameter of the head, which can be reduced as much as a seventh of its original extent, or from three and a half, to three, inches, without impeding the life of the child, the upper lobes of the brain not being injured by it. The base of the cranium is, practically speaking, incomprehensible, so as to protect the important ganglia situated there from the influence of the various mechanical forces exerted during parturition.

In connection with the different pelvic diameters, it is well to know the various dimensions of the foetal skull, so that in whatever position it may lie within the pelvis, we may have a tolerably correct idea as to whether the case may or may not be left to nature. The table on the opposite page is useful in this respect.*

The sutures, or intervals between the different cranial bones, which it is important for the accoucheur to remember and recognize by touch, are — the sagittal,
situated between the parietal bones;—the Coronal, between the frontal and parietal bones;—the Frontal, between the two halves of the frontal bone;—and the Lambdoidal, between the occiput, and the posterior margins of the two parietal bones.

The Fontanelles are spaces between certain of the cranial bones, closed over by menbrane, in which as life advances of porous matter is deposited. They are two in number, an anterior and a posterior, and several sutures open into each. The anterior is much the larger of the two, and is situated at the anterior extremity of the sagittal suture; it is quadrangular, or lozenge-shaped, and, besides the sagittal suture behind, the frontal anterior and the coronal on each side, open into it. The posterior fontanelle is much smaller, and of a triangular form, and is situated at the posterior extremity of the sagittal suture: the sagittal suture anteriorly, and the lambdoidal on either side, open into it.
CHAPTER IV.

The Uterus.

In connection with the mechanism of parturition, we need only refer to the position and axis of the uterus, and to that part of its structure which is concerned in the expulsion of the foetus from the body of the mother.

And first of its position and axis. In the unimpregnated state, the uterus occupies the centre of the upper part of the pelvis, having the bladder in front, the rectum behind, and to the left side, and the vagina beneath it. It is not placed vertically in the pelvis, but its axis corresponds with that of the inlet.

Of the three coats which go to form the uterus, the middle or fibrous tunic is the only active agent in the process of parturition. The muscular fibres of this coat are generally divided by anatomists into three layers,—a superficial or external, a middle, and an internal. The external, commencing in the broad ligaments, extends in a fan-like manner over the fundus uteri; it forms a thin stratum closely connected with the peritoneum, which latter constitutes the external coat of the uterus. The middle layer is thicker and stronger
than the other two, particularly at the fundus uterus, but its fibres have no definite arrangement, and seem to strengthen the strata on either side. The internal layer is a thin delicate stratum which may be divided into three sets of fibres—the first surrounding the orifice of each Fallopian tube, the second encircling the body of the uterus, and the third forming an imperfect sphincter around the os uteri.

Each of these muscular layers has its own special function in the mechanism of parturition. The external is probably the first called into action, and as active labour has commenced, slowly and painlessly it has been contracting, causing the uterus to descend further into the pelvis, as is evinced by the subsidence of the abdominal tumour shortly before the actual expulsion of labour; at the same time it maintains the uterus in its proper position in the pelvis, and by supporting the fundus, converts it into a point d'appui, from which the internal muscular layers can act with greater facility in the dilatation of the os uteri. Various and conflicting are the explanations which have been hazarded as to the action of the middle and internal layers. But, not to waste time in demonstrating the incorrectness of most of these hypotheses, we may at once state that the middle and internal layers of the fibrous tunic of the uterus are the chief agents in
The lines a b, represent the direction of the force of the fundal muscles: 

c d, the direction of that of the circular muscles of the body of the uterus: 

d e, the combined force of these muscles.

The dotted right lines represent the direction of the force reflected 
by the liquor amnii. The dotted curved lines, the direction of the 
circular fibres of the body of the uterus.

"Let us suppose a line (a d) to pass from the opening of the 
Fallopian tube of one side of the uterus to the opposite, in such a 
manner as to represent the direction of the force of the fibres surround-
ing it. This line would pass obliquely downwards to the opposite 
side. If, therefore, these fibres alone acted, the uterus on that side 
would be diminished in its size, and the contents of the uterus pushed 
toward the lower section of the opposite side, but not against the os uteri. 
If, further, two such lines (a d) passing from the orifice of each Fallop-
ian tube represented the force of each set of these concentric fibres, the 
intersection of these lines would be the common point where these forces
the mechanical dilatation of the ovaries; and, from a careful consideration of their anatomical arrangement, it will be seen how admirably adapted they are for that purpose. This is particularly the case with the internal layer, for it must be evident that, when the circular fibres surrounding the orifice of each Fallopian tube contract, their united action will tend to diminish the fundus uteri equally on all sides, and the force conveyed by their contraction will be transmitted through the liquor amnii to the mouth of the womb. But, in order to explain this more intelligibly, we have copied the diagram on the opposite page, and the following paragraph explanatory of it, from Dr. Allenby's Lectures on the Mechanism and Management of Natural and Difficult Labours.

In considering the muscular layers of the gravid uterus and the uses subserved by their contractions, we are very naturally led to investigate the neuro-motor endowments of that organ. This subject opens up a wide and interesting field of inquiry, which has been more fully discussed and elucidated by Dr. Sykes Smith than by any other writer on midwifery. It would be foreign, however, to the purpose of the present essay to enter on it, so we shall confine our examination of subjects more nearly allied to the one under consideration.
would meet, and, to a certain extent, be opposed. The combined force must, therefore, take an intermediate direction equidistant from both lines, which would be represented by a line (d e) passing in the axis of the uteri, and through the uteri. It follows, therefore, that when the fundus of the uterus contracts equally, the resulting force must be communicated to the uteri, as perfectly as if the fibers passed vertically from the fundus to the mouth of the uterus.
Most writers of midwifery textbooks commence their description of the mechanism of parturition at the point where the first stage of labour terminates, and the second begins, either previously or subsequently considering the process by which the os uteri is dilated. This process, which constitutes the mechanism of the first stage of labour, is generally discussed under the head of "Natural Labour," instead of finding its place, (as in our humble opinion it should), in the chapter on the "Mechanism of Parturition."

But even apart from this, in an essay such as the present, where the mechanism of labour is our theme, we should consider it unfinished were we to omit the mechanism of the first stage; and, since we shall have no subsequent opportunity of introducing it, we shall begin at the beginning, and devote the next chapter to its consideration.
CHAPTER V.

Mechanism of the first Stage of Labour.

The mechanism of the first stage of labour leads us to consider the means adopted by nature to open up a door for the escape of the foetus from the confined limits of its uterine prison; in other words, the dilatation of the mouth of the womb. At the commencement of labour the os uteri cannot generally admit more than the tip of one finger, but, by the time the first stage has terminated, this small aperture has expanded so as to admit of the passage of the foetal head, a body whose circumference is usually about eleven inches. This wonderful result is accomplished by a simple and beautifully contrived mechanism, in examining which, we must pay attention to,

1. The Forces employed in the work of dilatation.
2. The Medium through which these forces act.
3. The Share taken by the os uteri in its own dilatation.

The forces employed in the first stage of labour are the contractions of the uterus only, the jejunal muscles being the chief agents in the process. The force generated by the united action of these muscles tending, as we have already explained, in the direction of the os uteri, comprises the
interposed amniotic fluid, and what has been called the "bag of membranes" is forced against the mouth of the womb, with a power of distension exactly equal to the force of contraction of these muscles.

But these fundal muscles, although the chief and most direct, are not the sole agents in the expansion of the os uteri; those fibres, described by Dr. Charles Bell in his valuable paper "On the Muscularity of the Uterus," which pass in what he terms a "vertiginous" direction from the fundus to the os, must, by their contraction, diminish the length of the uterine, and, by drawing up the os, have at the same time a tendency to expand it. The circular fibres also of the body and cervix, which at first sight might seem to act against the fundal muscles, do in reality, by reason of the interposed medium being fluid, assist their efforts; because, although like antagonistic muscles, they certainly resist the distending action of the fundal muscles, yet the very force of their resistance, being communicated to a fluid, is by it reflected on the os uteri, and thus, as is well remarked by Prof. Murphy, the whole uterine may be said to act as one muscle in dilating the os.

A great deal of discussion has arisen as to the direction in which uterine contraction takes place; and it is really marvellous to note the diversity of opinion which prevails on
what would seem to be such an easily ascertainable matter. Some observers affirm that the contractions always commence in the cervix uteri, supporting their opinion by the phenomena of labour pain; others, again, directly contradict this statement, contending that, from the very nature of a labour pain, such could never be the order of contraction. In support of the first view we have such great names as Wigram, Müller, and Michaelis; and their opinions are promulgated by many British writers and lecturers, as Dr. Hipps, Tyler, Smith, and Churchill. They teach that uterine contraction commences in the cervix, extends to the fundus, thence returns to the os uteri; and Michaelis imagines that were it not such the case, prolapse of the cord and descent of the arms before the head, would be much more frequent accidents than they are; since, as he supposes, the contraction of the cervix at the commencement of each labour pain would have a tendency to sweep up the cord or arm into the uterine, beyond the reach of danger, in case either of them happened to be prolapsed.

The opponents of this view, who comprise a large and influential part of the profession, teach that uterine contraction commences in the fundus, and thence travels slowly and progressively downwards to the os uteri. With this latter doctrine, which is the one received in the Edinburgh School, we are inclined to agree, more particularly
as, in all cases where we have tried to write the point at the bed side of the patient, we have always observed the contractions to follow the last indicated course. Besides, as shown by Prof. Murphy, the very arguments adduced by Dr. Rigby in support of Wrigan's view, exactly contradict it, and go to prove the opposite doctrine.

Having now considered the forces employed in the mechanism of the first stage of labour, let us proceed to the second element in this process, viz., the medium through which these forces act, or the liquor amnii.

We have already seen that the liquor amnii is the means by which the whole force of the uterine contractions is conveyed to the os uteri, the fundal muscles constituting the active agents, the waters of the amnion, the passive medium: but there are other, and most important, purposes subserved by the liquor amnii during the first stage of labour.

1. It prevents the dangers of inflammation of the mouth of the womb, which would almost certainly happen were the hard solid head of the child forcibly driven against it by the powerful uterine contractions, instead of the soft, elastic, fluid, bag.

2. It counters any irregularity of uterine action which may take place; for, since the force conveyed through a fluid
is equally distributed to every part with which that fluid is in contact, should the fibres of the uterus contract irregularly, still their force is equally applied to the os.

3. It obviates the evil effects which might arise from irregular dilatation of the mouth of the womb; for the forcible efforts of the uterine contractions to overcome the unexpanded portion, and which in other circumstances might produce lacerations, being transmitted through a liquid medium, are moderated and equalized ere they reach the os.

4. But one of its most important purposes is to protect the os uteri from being too forcibly acted on by the strong contractions of the uterine walls; for we must bear in mind that the force communicated to the liquor amnii is not entirely expended on the mouth of the womb, but is also directed against every part with which the membranes containing the waters are in contact. Now these membranes occupy the whole interior of the uterus, so that every part of the uterine cavity shares equally with the os uteri the force of the uterine contractions; on this account, as pointed out by Dr. Murphy, the force of contraction of the muscles of the fundus and body of the womb is to a certain extent reflected by the fluid medium back on themselves.

In short, the uses of the liquor amnii during the first stage of labour are these, to convey to the os the whole
muscular power of the uterus, dilating it without pro-
ducing irritation, and moderating and equalizing the
force employed in the dilatation.

Only one point now remains for our consideration; viz.,
the share taken by the os uteri in its own dilatation.
The muscular fibres of the os have a concentric arrangement,
but do not form a perfect sphincter. Besides the actual de-
montstration of this fact by the microscope, we have almost
disputable proof of it in the enormous extent to which the os
uteri is dilated to admit of the passage of the fetal head, and
it is a perfect sphincter, such an amount of distention could
never take place without laceration of the os. But what
has been said with regard to the incomplete nature of the mus-
cular fibres of the os applies equally to the whole uterus; for in
every part of the womb, where circular contractile fibres exist,
it has been remarked that at no point do they completely sur-
rround the organ. But in addition to this peculiarity of
structure common to the os with all other parts of the womb,
there is another peculiarity, not present in the body and fun-
dus, but confined to the cervix and os uteri, viz., it is the in-
mixture, with the contractile fibres, of elastic non-contractile
tissue, and this compound structure bestows on these parts
two very wonderful powers — wonderful from their seeming
incompatibility, viz., the power of dilatation during the first stage of labour, and the power of contraction after the labour is completed. Furthermore, the od from its peculiarities of structure admits of a two-fold dilatation, viz., 1st on account of the elastic tissues, a mechanical dilatation, by the contraction of the body and fundus uteri, by the pressure exerted on it by the amniotic bag, and subsequently by the pressure of the fetal head; 2nd, on account of the contractile fibres, a physiological, active, independent dilatation of these fibres themselves. The latter action has been most satisfactorily established by Dr. J. B. S. Smith, who compares its action to that of the pylorus.
CHAPTER VI.

Presentations of the Head in general.

We have now come to the second stage of labour, that stage to which, in most of the textbooks of midwifery, the mechanism of parturition is alone referred. By this time in most cases the bag of membranes has ruptured, and instead of it the solid head of the child is passing through the os uteri. nor is it the uterus alone which is now in action, the diaphragm and abdominal muscles are aiding it in every pain. A deep inspiration precedes each pain, pressing down the diaphragm on the uterus, and fixing the chest so as to facilitate the contractions of the abdominal muscles.

The mechanism of this stage is modified of course by the different positions of the foetus in respect to the maternal parts, or, in other words, by what is generally spoken of as the "Presentation" of the child.

In the immediately preceding sentence we have made use of two words synonymously, which, properly speaking, are not so: -- we refer to the terms "positions" and "presentation.

The "presentation" signifies that part of the foetus which juts up the os uteri, but by "positions" we mean the various relations which each presentation may bear to
the brim of the maternal pelvis. Thus, the head or breech, may either of them form the presentation in any given case, but they may each occupy different positions with respect to the pelvic brim; the occiput or sacrum, for example, may be directed either anteriorly or posteriorly—either inclining more to the one side of the pelvis or the other; so as to constitute, in the case of the cranium, right and left occipito-anterior, and right and left occipito-posterior, positions, and in the case of the breech presentation, right and left sacro-anterior, and right and left sacro-posterior, positions.

Various presentations of the child are met with in practice, but, passing over those of the back, belly, sides, etc., the occurrence of which is highly improbable, although mentioned by some French authors, we will content ourselves in the following pages with the description of such only as are treated of in recent text books of midwifery.

Of all the different presentations, that which is infinitely the most frequent, and which is, therefore, generally accounted the natural presentation of the fetus, is with the head downwards.

Of the Cephalic or natural presentation we will speak first, and thereafter of presentations of other parts than the head, or what are termed praenatal presentations,
comprehending under that term those of the trunk and upper extremities, and of the pelvis and lower extremities. According to the records of midwifery we find that the head generally presents 98 times in 100 labours, while the average proportion of pelvic presentations is but 3 or 4 in 100, and of the superior extremities only 1 in 300.

The question, as to how the child's head should generally be the dependent part, has long been a vexed one. Prof. Simpson in his learned essay "On the Attitude and Positions, Natural and Preternatural, of the Foetus in utero," attempts to disprove the gravitation theory, which, at the time he wrote, was perhaps the most universally accredited explanation of this question; and, after satisfactorily proving the absurdity of various other ideas entertained by different writers on the subject, and demonstrating the insufficiency of this theory to explain many of the phenomena assigned to its agency, he comes to the conclusion that the fact can only be explained by considering it a vital act dependent on muscular action. "The regulating vital power," he writes "guiding it to the assumption of that normal position in which its figure corresponds as exactly as possible to the figure of the uterine cavity, consists of a succession of reflex or excitatory motory movements of an adaptive kind on
the part of the fetus, excited by impressions made on its external surface. These impressions are produced when, from any motion on the part of the mother, the fetus is thrown out of position, and its cutaneous surface is brought in contact with the uterine parietes. The attitude of the fetus in utero would seem to favour the production of any such impressions; for, as pointed out by Dr. Simpson, those parts of the fetus which are chiefly exposed to irritation are the very parts which in the adult are most distinguished by their peculiar sensibility to tactile impressions, viz., the feet, the knees, and the sides.

But we must draw our notice to this most interesting question to a conclusion; we cannot afford time to enter on it at greater length; suffice it to say that Prof. Simpson's explanation of it is the most philosophical and satisfactory that has been offered to the profession.

But another question, connected with the great predominance of head presentations, demands a moment's consideration. We have been speaking of the manner in which the child's head comes generally to be the dependent part, but we have yet to consider the reason why it should be so. This question is of easier solution than the last. A hurried glance over Dr. Churchill's statistical tables is sufficient to settle the point.
We are at once struck with the great foetal mortality in all the other presentations, as compared with those of the head. Of breech cases 1 in 33 of the children are lost; of footling 1 in 25; and in presentations of the superior extremities more than half of the children, and 1 in 9 of the mothers, perish. These results are explained by the compresion to which the foetus is subjected in all cases where the head comes last, and by posture being rendered more tedious and difficult, even in some cases impracticable, from the non-adaptation of these prematurity presentations to the maternal parts. Where the pelvis of the mother much larger than the foetal head, and not, as is generally the case, accurately adapted to it, there would be the most imminent risk of compresion of the cord during labour, obviously so, because it would escape between the head and pelvic wall, and there get jammed. This is the danger to be apprehended, and if possible guarded against, in all presentations.

The manner in which the foetal head presents at the brim of the pelvis is termed its "position." But we must remember that frequently during the course of labour the position of the head at the brim is changed when it reaches the outlet of the pelvis. Various errors in theory have arisen among authors from forgetting that the
position of the head refers only to the direction it assumes at the pelvic inlet.

In considering the various positions of the head, it is with the oblique diameters of the pelvis only that we have to do; for we find that, with very few exceptions indeed, the head enters the pelvis with its greatest measurement parallel with one or other of these diameters; and, on account of the measurement of the oblique diameters remaining the same in the cavity and outlet, as at the birth, we shall find, further, that the petal cranium passes through, and emerges from, the pelvis in either of these diameters.

The head very rarely, if ever, enters the pelvis in the conjugate diameter, and for the very obvious reason, that there is not room for it; in a case of premature labour such a position might certainly occur, but with an ordinary sized head at the full term, and in a pelvis of the usual form, it must be very improbable; Dr. Campbell indeed, denies the possibility of its occurrence in any circumstances, but this is going a step too far, because there are pelvises of such a shape that a full-sized child's head could occupy no other than the antero-posterior diameter. Such pelvises are not uncommon in obstetrical museums, we ourselves having seen more than one specimen.

The head presents more frequently, perhaps, in the trans-
than in the conjugate diameter, but this position is also rare owing to the space taken up on each side by the Psoas and Gluteus muscles. Dr. Rankothama makes transverse positions the first and second of his classification, taking the position of the ear as the basis of his diagnosis, and assuming that, when the one ear is felt behind the symphysis pubis, the other must be in apposition with the sacral prominence; and, further, as a consequence, drawing the conclusion that, the short diameter of the head corresponding with the conjugate pelvic diameter, the opposite long diameter of the head must correspond with the opposite or transverse diameter of the pelvis.

But in a recent paper by Dr. R. U. West of Alford*, the fallacy of this conclusion is pointed out. Dr. West has frequently felt the ear directly behind the symphysis when the posterior fontanelle was in relation with the seat-abdomen, and his repeated experience, which he has taken means to confirm by a careful measurement of several heads immediately after birth, leads him further to remark that "when an ear is at the symphysis pubis, the head is already in the most favourable oblique diameter of the pelvis." This observation we ourselves have had several opportunities of verifying.
Naegle, in his little work on the Mechanism of Parturition, to which we have already alluded, following the arrangement generally adopted at the time he wrote, describes the osseous head as entering the pelvis in four different positions, viz., I. with the occiput directed to the left foramen ovale; II. to the right foramen ovale; III. to the right sacro-iliac synchondrosis; and IV. to the left sacro-iliac synchondrosis.

These numbers, however, do not express the relative frequency of the positions they represent. The third position, for example, is by far more frequent occurrence than the second, and should, properly speaking, have been placed before it. Thus, Naegle pointed out, but, fearing to complicate the subject in any way by introducing a more strictly accurate numerical classification, he allowed the numbers to remain as former writers had left them.

Latterly, however, seeing that his researches had been approved of and confirmed by the majority of the profession, he placed the right occipito-posterior position second in order. He, moreover, went a step further, finding, from his own more extended experience, as well as from the testimony of others, that the left occipito-anterior, and the right occipito-posterior, are of infinitely more frequent occurrence than the right occipito-anterior, and the left occipito-posterior posi-
he ultimately taught that the two first mentioned from the rule of natural labour, the latter two the exceptions to it.

Dr. Simpson and Rigby in this country promulgated similar views, restricting only two positions in their classification of cranial presentation, viz., those which occur in the right oblique pelvic diameter. Dr. K. H. West, however, in his paper, from which we quoted a few pages back, and which is the latest treatise on the mechanism of cranial presentation, holds opposite views. He entirely disagrees with Naegle as to the greater frequency of right occipito-posterior, as compared with right occipito-anterior, positions, and adopts Naegle's original classification, thus coinciding with Basset, Dugas, Illiger, Caimon, Reddin, Lambir, Busch, Allader, and many others of the older authors. He also attempts to show the source of fallacy of Naegle's observations. Dr. West's essay is one of great merit, and well worthy of careful perusal, but almost our faith in the views of Naegle received a considerable shock in the reading of it, as soon as we attempted to mature our temporary mistrust vanished, and our convictions of the accuracy of all Naegle's statements were only strengthened the more.

Besides this, we are inclined to believe that, in his system of classification, Dr. West pays more attention to the position of the head at the outlet, than at the inlet of the pelvis.
The left occipito-anterior, and the right occipito-posterior, cranial positions are the opposite of each other, and occur, both of them, in the right oblique pelvic diameter, i.e., the diameter extending between the right sacro-ischial symphysis, and the left foramen ovale. (The diameters being named from the symphysis or from which they start.) Naegle estimates that the fetal head presents in the right oblique diameter of the pelvis in 99 out of every 100 classical presentations, and most of the great obstetricians of the present day coincide with him; furthermore, in spite of Dr. West's opinion to the contrary, we are disposed to agree with him in thinking that many, perhaps most of the so-called exceptions to this general rule have their origin in the inaccuracies of either careless or incompetent observers.

Why the head should enter the one oblique pelvic diameter so much more frequently than the other, is by no means so clearly made out as the simple fact that such is the case. As to the diameters themselves, the only difference between the two seems to be that the left has the rectum situated in it; but this would appear too trifling an explanation of the fact.

With regard to this question, Dr. Ely Smith observes,
"As far as I am aware, no other reason can be given for the greater frequency of presentations in the right oblique position, with the right side of the fetal head downwards than the greater strength of the right limbs, and the occupation of the left oblique diameter by the rectum."

Professor Chadwick would explain not only this fact, but the relative frequency of occipito-posterior to that of occipito-anterior positions, by reference to the reflex movements of the uterus, and to the same agency he would ascribe the ability of presentations in the direct pelvic diameters, and their comparative frequency in the oblique.

We have frequently wondered whether or not the uterus, from its position at the commencement of labour, or from some influence exerted by the incessant contractions which take place at that period, had any share in the phenomenon, but we have failed in discovering any just grounds for our surmises. We can imagine, however, that the head comes down equally between the two oblique diameters, that is, directly on the promontory of the sacrum, and that it is so nicely balanced there that even the seemingly trifling presence of the rectum on the left side, is sufficient to prevent its lodging in the left oblique diameter. It has been observed, indeed, in some cases where the head occupied the left oblique diameter, that the rectum lay nearer the median line than usual; and in one case of this nature, it was found in the right oblique diameter.
We have already spoken of the Position of the foetus, or the relation which any presentation may bear to the maternal parts; we must take care not to confound this term with the "Attitude" of the foetus, which means the relation of the different parts of the child with respect to one another. In all the four cranial positions, the attitude of the foetus at the commencement of labour is the same:—the head is flexed, the chin resting on the sternum, the arms are crossed in front of the chest; the spine is slightly curved, and the legs are crossed, and pressed close to the abdomen.

We have now to follow the fetal head in its passage through the canal formed by the pelvis and soft parts of the mother.

In each of the four cranial positions, the head advances with its centre nearly corresponding with the axes of the several parts through which it has to pass. This is the common onward movement of the head, but various secondary and supplementary movements will also be found to take place in a greater or less degree, such as flexion and extension, or the movement of the head on its bi-lateral axis; rotation, the movement on its vertical axis; and what has been named the "Obliquity" of the head, or the downward
inclination of that side of it nearest the pubes, which is preserved throughout the whole course of labour, and which is a movement on its antero-posterior axis. These evolutions, along with the common onward movement of the head through the parturient canal, considered in relation with the mother's pelvis, constitute the mechanism of the second stage of labour.

As the foetal head is forced into the pelvis by the labour pains, its flexion is a little increased; this is called the dip of the occiput, and it varies in proportion to the comparative resistance opposed to the antero and postero-polar poles of the cranial sphenoid. This circumstance is explained by the spine being articulated with the cranium at a point nearer the postterence of the occiput than the chin; when, therefore, the resistance of the pelvic planes is equally opposed to the two opposite poles of the head, the antero half (the occiput) being the longer leg of that lever which has the spine for its fulcrum, forces down the shorter limb (the occiput), and thus the head is made to revolve slightly on its bilateral axis. As the head approaches the axis of the outlet, its flexion gradually diminishes, and when it reaches the osseous vaginae it is completely extended. A consideration of the
different planes and axes of the pelvis shows that the changes just enumerated must necessarily take place in the order described, to constitute the labour natural; any deviation therefrom is, therefore, to be clasped as unnatural labour.

Extension takes place in the following manner. The head, still flexed, reaches the uterine vaginae, the presenting part is slightly protruded by the uterine contractions; and the upper part of the occiput, coming in contact with the lower margin of the symphysis pubis, forms a fixed point or centre, around which the head rotates on its bi-lateral axis, on what is called the "circle of Love." The upper and posterior quarter of the parietal bone of that side of the head which is anterior emerges first from the maternal passages, and is followed by the rest of the head; the face sweeping the perineum, and the chin escaping last of all.

In its passage through the pelvis we have thus, first, the flexion of the head; then the flexion is diminished, and there is lastly Extension of the head when born.

"Restitution" is a term met with in most of the textbooks of midwifery. It is the last movement performed
by the head, and does not occur until it has cleared the
vulva. But as it takes place in all the four cranial posi-
tions, and depends for its manifestation on intra-pelvic
mechanism, we deem it advisable to explain it here in a
general way, referring to the next chapter the considera-
tion of the modifications dependent on each different position.
The original position of the head in one of the oblique pel-
vic diameters is retained by it during its passage through
the pelvis, until it reaches the floor, when it performs
what we have already spoken of as its "Rotation." In this
movement, the occiput, propelled slightly by each suc-
cessive uterine contraction, is gradually pushed round to-
wards the conjugate diameter of the pelvis, until it escapes
under the pubic arch. The long soid of the child's head,
however, never comes into exact relation with the last named
diameter, but, although losing much of its former oblique
direction, still retains it to a certain extent, and finally
emerges from the pelvis in a position about midway bet-
ween the oblique and conjugate diameters. No sooner,
however, is the head born than it is seen suddenly to right it-
self, and to resume its original oblique direction, the face
being directed towards the inner and posterior part of one
of the mother's thighs, whether it be to the right or the
left depends of course, on whether the rotation of the head
took place from the right or left oblique diameter of the pelvis. This is the "Restitution of the head," and consists of a movement on its perpendicular axis, similar in all respects to the movement of Rotation, only occurring without, instead of within, the pelvis.

We mentioned as a reason for describing this "Restitution or re-rotation of the head," that, although occurring out of the pelvis, it was nevertheless effected by an intra-pelvic mechanism. This, we proceed to explain, promising that, if the description be found incorrect, we alone are chargeable with the inaccuracy.

As the head emerges from the pelvis, the shoulders generally enter it in the opposite oblique diameter to that formerly occupied by the head; this is explained by the cranial ovale being placed at right angles with the transverse measurement of the shoulders, and if we continue to keep in mind this relation which they bear to each other, the manner in which the restitution is effected must appear quite evident.

Suppose that the head had occupied the right oblique diameter in the first position of Naegele, the shoulders then would come into the left oblique diameter. But, as we have already stated, the head is obliged to a certain extent to move out of the oblique, and to approach more
or left the antero-posterior pelvic diameter, before it can be expelled, and thus the exact relationship between it and the shoulders is temporarily interfered with; this movement, however, it will easily be understood, has no effect in displacing the latter, since the requisite rotation takes place without any difficulty, as far as the child is concerned, between the head and the second cervical vertebra; and any difficulty which may exist, is not the result of immobility of the fetal head on its vertical axis, but of the relative disproportion in size between it and the mother's pelvis,—the former requiring to be moulded to the latter by the uterine contractions, which gradually suspect the occiput towards the pubic arch. As soon, however, as the head is freed of the constraining limits of the maternal parts, it naturally replaces itself in its proper relation to the shoulders,—which relation being at right angles to them, and they occupying the left oblique pelvic diameter, is, of course, in the direction corresponding with the right oblique diameter, the position, namely, which it had occupied within the pelvis.

But what are the uses subserved by the various rotations of the fetal cranium on its different axes?
We have already seen that rotation places it in a position from which it may be expelled from the mother's pelvis; but what advantage is gained by flexion, extension, and obliquity of the head? Space is economized; because these movements ensure that, at no period of the labour, will the greatest length or width of the cranium be opposed to any of the pelvic diameters; thus, the obliquity diminishes the biparietal, and flexion and extension both diminish the antero-posterior, diameter.

The term "Obliquity" may be used in reference to three different conditions of the foetal cranium during parturition, viz.: 1. with regard to the pelvic diameter in which it lies; 2. to its own bi-lateral diameter, as occurs in flexion and extension; 3. to its own antero-posterior diameter, as is exemplified in the downward bias of one side of the head.

The mechanism by which the shoulders and rest of the body traverse, and emerge from, the parturient canal, is simple and soon told.

When explaining the restitution of the head, we mentioned incidentally that the shoulders entered the brim, just as the head was helping the outlet,
of the pelvis, and in the opposite oblique diameter 
that occupied by the head. Little or no adaptation to the 
maternal parts is either observed or required in their pro-
fusion and expulsion; and frequently the same pain 
which expels the head gives birth also to the body. In 
most cases, however, a second contraction is requisite to 
bring the shoulders into the world, and with them, as 
a matter of course, the rest of the body, which presents 
no impediment whatever to the well dilated pelvic 
passages. The most anterior of the two shoulders es-
deples just under the arch of the pubis, closely followed 
by the other, which succeeds over the perineum.

In further describing the mechanism of the different 
varieties of the cephalic presentation, we shall divide the 
subject into,—

I. Natural Positions of the Head, viz.,—The 
Four Cranial Presentations of Naegele.

II. Mal positions, viz.,—Face, Forehead, and 
Ear presentations.
Cranial Positions.


1. Occipito-anterior
   - Left I
   - Right II

2. Occipito-posterior
   - Left IV
   - Right III
CHAPTER VII.

Natural Positions of the Head.

The natural positions of the head are four in number; the long ovoid of the foetal cranium corresponding, in the first and third, to the right oblique, and in the second and fourth, to the left oblique, pelvic diameter. But as many mistakes have arisen from assigning different numbers to different positions, each author adopting a numerical nomenclature of his own, it will be much simpler, and productive of less misconception, to name each position according to the relation which the occiput of the child's head bears to the pelvis of the mother. We shall have then to describe a left occipito-anterior, and a right occipito-posterior, position, occurring in the right oblique diameter of the pelvis, and a right occipito-posterior, and a left occipito-posterior, position, occurring in the left oblique diameter.

This system of nomenclature we have arranged in a tabular form on the opposite page: the ordinal numbers on the right hand indicate the numerical arrangement of Naegle, each number being placed opposite to the position, which it is designed to express.
Table of Dr. Martin Barry's cases drawn up by Prof. Simpson.
The Positions of the Head in 335 Cranial Presentations at the
Edinburgh Maternity Hospital.

I. Occipito-anterior Positions.
1st Position; or occiput directed to left foramen ovale, in 256 cases.
2nd Position; or occiput directed to right foramen ovale, in 1 case.

II. Occipito-posterior Positions.
3rd Position; or occiput directed to right sacro-iliac synchondrosis, in 76 cases.
4th Position; or occiput directed to left sacro-iliac synchondrosis, in 2 cases.

Total. 335
Of the four cranial positions, the left occipito-anterior is by far the most frequent, occurring to Naegele in the proportion of 69 per cent. of all his head presentations, to Dr. Halma in 74 per cent.; to Mad. Lachapelle in 77 per cent.; and to Mad. Rowin in 80 per cent. The late Dr. Martin Barry met with it in 256, out of 335, cranial cases. (see table on opposite page).

The left occipito-posterior position occurs in a very small proportion, according to Naegele in 03 per cent.; to Halma in 77 per cent.; to Mad. Lachapelle in 04 per cent.; and to Mad. Rowin in 05 per cent.

As to the comparative frequency of the other two positions, a considerable diversity of opinion exists. Naegele having met with the right occipito-posterior in 357 cases out of 1210 head presentations, or in 29 per cent., while Mad. Lachapelle states it as occurring in 077 per cent., and Mad. Rowin, in only 05 per cent. Again, in 1290 cranial cases, Naegele encountered only one instance of the right occipito-anterior position; but while his percentage of this position thus stands as low as 07, that of Mad. Rowin reaches 19, and that of Mad. Lachapelle is no less than 21.

Naegele's statistics, however, have been found more in accordance with subsequent experience than those of the
Frequency of Breech-to-posterior Positions, as given by different Practitioners. (Simpson’s Obstetric Works. Vol.I. page 465).

<table>
<thead>
<tr>
<th>Practitioner</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collins</td>
<td>1 in every 1336 labours.</td>
</tr>
<tr>
<td>Bland</td>
<td>1 in 374</td>
</tr>
<tr>
<td>Baedleboog</td>
<td>1 in 346</td>
</tr>
<tr>
<td>Lachapelle</td>
<td>1 in 171</td>
</tr>
<tr>
<td>Cusack</td>
<td>1 in 151</td>
</tr>
<tr>
<td>Haundell</td>
<td>1 in 121</td>
</tr>
<tr>
<td>Merriman</td>
<td>1 in 67</td>
</tr>
<tr>
<td>Lobstein</td>
<td>1 in 18</td>
</tr>
<tr>
<td>Gergowen</td>
<td>1 in 14</td>
</tr>
<tr>
<td>Murphie</td>
<td>1 in 7</td>
</tr>
<tr>
<td>Villeneuve</td>
<td>1 in 7</td>
</tr>
</tbody>
</table>

Barry, Joseph Bell, High, Duton, Stott, Naegaele, and {1 in every 3 or 4 labours.}

Prof. Simpson.
two distinguished French ladies who differ with him. Many right occipito-posterior positions, from not having been diagnosed until they had changed into the right occipito-anterior position, have been clasped under the latter; this, doubtless, accounts in great part for the statistical results arrived at by these ladies. For, we must recollect that every such mistake not only adds one to the per centage of the last named position, but also diminishes by one the per centage of right occipito-posterior positions. But besides this, as pointed out by Dr. Simpson, the observations of Naegle were made generally by himself; those of Mmes. Lachapelle and Bowin chiefly by females attached to the Maternité Hospital of Paris. The latter observations, moreover, "were collected without there having been previously strongly pointed out a great source of fallacy in confounding the second and third positions, and those of Naegle were conducted with a perfect knowledge of, and a view to, this fallacy." Another very common source of error results from trusting entirely to the direction in which the restitution of the child's head takes place. Many practitioners content themselves with this, at all times, unsatisfactory diagnosis, without ascertaining definitely the position of the head by
Speaking of the difficulties of obstetrical diagnosis, Dr. Tyler
then adds remarks, "In estimating relations of position, we always
naturally refer to the position of our own body as the standard of
comparison. But in a case of labour, the accoucheur stands
in the upright position, and has to deal with the mother and
the child in the horizontal position; the fetus and the mother
being themselves reversed, the child standing, as it were, in
its head within the system of the mother."
early vaginal examination: When the face turns at birth to the inner and posterior part of the right thigh of the mother, they unhesitatingly pronounced it to be a left occipito-anterior position, and if to the same part of the opposite thigh, they are equally ready to declare it a right occipito-posterior position. Now this is perhaps the most fallacious criterion by which we could frame our diagnosis, because, as is well remarked by Prof. Simpson, "the face of the infant sometimes does turn to the right after it has passed the outlet, even though it were originally an occipito-posterior position."

The diagnosis of the different cranial positions, though it may appear a very simple matter as described in a book or exhibited in a diagram, is by no means so easy at the bedside of the parturient female; and it is only by the most assiduous attention to the entire mechanism of every case to which we may at first be called, keeping our finger on any doubt that arises in our mind, or if we wish to ascertain any particular point, on the fetal head, as did Naegele, during the whole course of labors; and also, by a thorough knowledge of the pelvis and fetal cranium in the dried state, it is only by these means that we can hope to attain proficiency in this difficult, but highly important and necessary art.*
We find the fetal head at the commencement of labour lying at various depths in the pelvis; at one time it is discovered high up, barely within reach, having scarcely entered the bony; and at another time it is quite in the cavity of the pelvis, and covered by the thin distended cervix uteri, even before the uterine has begun to contract. This latter condition, when it does occur, is met with chiefly in primiparae, and is caused, probably, by the greater rigidity of the abdominal walls in them as compared with multisettes. In the latter the head is generally found at the time, and it is cases of this description that we shall keep in view in the following remarks on the four cranial positions, since in such cases we shall be enabled to follow the fetal head in its entire course through the pelvis, from beginning to end.

Class I. Occipito-anterior Positions.

Order I. Occiput to the left.

(1st Position of Naegele.)

In this, the most common cranial position, the head enters the pelvis in the right oblique diameter, the occiput being directed towards the left fornix ovale, and the fore-head towards the right sacro-iliaic synchondrosis; or it may be found in a line between the direction just indicated and the transverse diameter of the pelvis.
matter of observation that, the earlier in the labour, the nearer is the head found to this diameter.

At the commencement of parturition, the os uteri does not correspond with the axis of the pelvic canal, as it subsequently does when fully dilated; but projects backwards towards the upper part of the sacrum, and generally somewhat to the left. The finger, therefore, in making an examination at this period, must be passed up in the direction of the promontory of the sacrum.

On reaching the os, which, at the beginning of the first stage of labour, is generally just large enough to admit the point of the finger, we come upon the sagittal suture of the foetal cranium running parallel with the right oblique pelvic diameter. It is the middle part of this suture on which our finger first impinges, and we feel it dividing the os into two unequal segments, the anterior being the larger of the two; that is, the sagittal suture is nearer the promontory of the sacrum than the symphysis pubis.

But, although the sagittal suture is what we feel first within the mouth of the womb, it is not the part of the head situated lowest in the pelvis, or nearest the os-temum vaginae; on account of the obliquity of the head, of which we have previously spoken, it is the right parietal
bone which lies deepest in the pelvis; and the first part
against which the finger, introduced in the axis of the pel-
vic outlet, impinges, is the right tuber ischiaticum, which,
though covered by a thin stratum of the expanded cervix
uteri is to be recognised by what has been described as its
"hard conical feel." This is generally termed the "prev-
ing part."

We say generally, because, with regard to this point
as to many others in midwifery, much misconception
has arisen from different authors meaning different
things; thus, one man speaks of the lowest point of the
head as the presenting part; another, the spot with
which the finger first comes in contact when introduced
in the direction of the pelvic axes; a third defines it to
be that part of the head which is the most prominent
within "the ring formed by the deep parts of the parturient
canal in the different stages of labour"; while a fourth
confounds all these points of view together, and speaks of
each at different times as the presenting part.

To avoid such confusion we adopt Dr. Soper Smith's
suggestion, and, in all cases of labour, when speaking of
the presenting part, we mean that portion of each presen-
tation felt most prominently within the circle of the os
uteri, the vagina, and the osseum vaginae in the suc-
cessive stages of labour."
The presenting part corresponds in fact with that portion of the presentation which is unsupported by the walls of the parturient canal during the different stages of labour.

Upon these parts, which are thus, in succession, left unsupported is formed the caput succedaneum or tumour of the scalp. It is easily seen how this swelling is produced. The head being pressed against the different openings through which it has to pass, and the different parts of the canal at these points presenting a resistance to the head around the circumference of each successive opening, construct the vessels of the scalp there situated, causing in the uncontracted and unsupported presenting part an exudation of serum, or blood, or both combined.

In the position now under consideration, we shall find the presenting part, at the commencement of labour, to be the right frontal bone, about the middle of its upper edge, and on this spot is formed the first swelling of the scalp, or what has been called the primary caput succedaneum. It is here caused by the pressure of the os uteri, is generally about an inch, to an inch and a half, in diameter, and sometimes extends a little across the sagittal suture to the left frontal bone. In cases of rigid os uteri this swelling is very distinctly marked, and should the second
stage of labour be quickly and easily accomplished the child may be born with this swelling only - no secondary tumour having been formed. In cases where the os uteri has been easily dilated, and the compression exerted by it on the scalp slight, no primary tumour may be found at birth.

As labour advances, and the mouth of the womb becomes more expanded, the most prominent part of the head in the centre of the os is the middle portion of the posterior superior quarter of the right parietal bone.

When the head comes down on the floor of the pelvis, the presenting part at the os uteri vaginae, is the upper and posterior angle of that bone; on this spot is formed the secondary tumour, and in cases where the second stage of labour is tedious and the pains strong, the swelling will be large and dark-coloured. This secondary everted succedaneum is generally always present, more or less, and, usually, there is also a trace of the primary tumour; but when the first stage of labour has been very easy and rapid, the secondary swelling alone is visible. In cases, however, in which considerable pressure has been exerted in the foetal head during both stages of labour, an elevated tumid ridge is found extending from the situation of the presenting part in the first stage of labour to that in the second, that is, from the middle
of the upper edge of the right parietal bone to its posterior superior angle, or even as far as the upper portion of the occiput.

We have already spoken of the sagittal suture running parallel with the right oblique pelvic diameter. When the patient is lying on the left side, with her back towards the medical attendant, (the usual obstetrical position), this is made out by feeling it extending in one direction forwards and downwards, and in the other backwards and upwards. Pursuing the suture forwards and downwards as soon as the os is sufficiently expanded to admit of our doing so, the finger comes on a small triangular depression which terminates it in this direction, and where other two sutures join it laterally; this is the posterior fontanelle.

Retracing our finger along the sagittal suture, and pressing it in a direction backwards and upwards, we reach the anterior fontanelle, terminating it in this direction.

Now it must be evident how essential it is, for the diagnosis of the different cranial positions, to distinguish between these two fontanelles; in fact, it is absolutely necessary for the acconcheur, who intends to practice the obstetrical art in a rational and scientific manner, to be able to recognise with his finger during labour the sutures and fontanelles of the foetal cranium.
As to the sutures, the sagittal is to be known by its terminating in a fontanelle at each end; the frontal, by its being continuous with the sagittal, and by its joining the large quadrangular fontanelle; the coronal, also by its leading into the large fontanelle at one end, and terminating in a joiner part of the cranium at the other; and by being at right angles to the sagittal and frontal sutures; and the lambdoidal, by its joining the small triangular fontanelle.

The diagnosis of the fontanelles is sometimes rather difficult to make out, as great differences frequently exist both in their actual and relative size; thus, the posterior may be unusually large, and might thus be mistaken for the anterior, or it may be so small as almost to escape observation; the anterior also may be pretentiously large or unusually small; and besides this, other fontanelles may exist in unusual situations, these last, which are termed false fontanelles, always more or less complicating the diagnosis.

The anterior fontanelle, however, is generally to be recognized by its quadrangular form, by four sutures opening into it, one at each angle, by its sides being bounded by long margins which do not project into the space; and, where both fontanelles can be felt, by its usual large size as compared with the posterior.
The posterior fontanelle is perhaps easier of diagnosis from its uniform triangular shape; from the three sutures opening into it at different angles; and from its sides not being bounded by straight horizontal margins as in the anterior, but being represented by the projecting posterior superior angles of the two parietal bones, and the apex of the os occipitale.

Towards the commencement of labour the fontanelles are generally at about an equal height in the pelvis, the long diameter of the foetal cranium being nearly parallel with the superior pelvis plane; but as the head descends, the occiput gradually becomes lower, and we can in general feel the posterior fontanelle before the anterior. At this time the chin and the mastoid process of the left temporal bone are the highest points of the foetal head; the right half of the occiput, and the contiguous portion of the temporal bone being the lowest. If we now direct our fingers just behind the body of the right os pubis we shall feel the right ear.

In the preceding chapter we described pretty fully the nature of the various evolutions of the foetal head on its different axes; we have, therefore, little more now to do than merely to indicate their order of occurrence in each position.

As the head is forced further down into the pelvis, the "clif"
of the occiput first increases and then diminishes; and probably just about the time that the fontanelles come again to be on nearly the same level, the head, now down on the pelvic floor, performs what we have already described in a general way as its "rotation."

The long ovoid of the fetal cranium changes gradually from the oblique to nearly the conjugate diameter of the pelvis, describing in this rotatory movement about one eighth of a circle. The most prominent portion of the occipital bone glides downwards and forwards upon the inclined planes formed by the descending rami of the pubis and the internal surface of the ilium, so that the middle portion of the superior and posterior quarter of the right parietal bone, and its posterior and upper angle, become successively the most prominent points of the descending head." (Dr. Tyler Smith).

The head now becomes gradually more and more extended and the ancha, impinging on the inferior border of the symphysis pubis, forms a fixed point around which the head, revolving on its bi-parietal axis, describes the circle of Lamy and emerges from the anatodal parts,—the face gliding over the perineum and the occiput ascending in front of the symphysis pubis. The head never loses its original lateral obliquity, but falls out of the pelvis in a position almost as oblique as that in which it entered it.
It is always a satisfactory thing to know the position of the foetus in utero, even before the accession of labour, and if this we are generally enabled to form a tolerably correct estimate by observing in what part of the mother's belly the pulsations of the foetal heart are most distinctly marked, and on which side of her body the mother chiefly perceives the movements of the child.

The pulsations of the foetal heart are most distinctly marked over the left sub-scapular region; that side of the mother accordingly, in which they are best heard indicates the side to which the back of the child is directed, and with it, of course, the occiput. It is almost impossible, however, to distinguish in this way between an occipito-anterior, and an occipito-posterior position; all that we can affirm is that the occiput is turned to the right or left side as the case may be; hence, when the pulsations are loudest in the left inferior abdominal region, we are to expect either a left occipito-anterior, or a left occipito-posterior position; in no case could we absolutely affirm which it was, but, from its great comparative rarity, the latter may be almost altogether ignored. In like manner, if the pulsations are heard most distinctly in the right inferior abdominal region, then we diagnose either the right occipito-anterior, or right occipito-posterior position; the former, on account of its extreme rarity, like the left occipito-posterior position, need not be taken into account.
On questioning a pregnant woman as to the motions of the child within her womb, she will generally be able to state positively on which side of the belly they are chiefly felt. Now these movements are due to the striking out of the limbs of the fetus against that part of the uterine parietes opposite which they lie; and since the limbs are coiled up on the thorax and abdomen of the child, that side of the womb on which they are most distinctly felt must indicate the side to which the anterior surface of the fetus is turned; the back, and with it the occiput, will, of course, be directed toward the opposite side. Hence, putting aside the two positions occurring in the left oblique pelvic diameter, when these sensations are especially referred to the right side of the abdomen, the left occipito-anterior position is to be diagnosed, and when to the left side, the right occipito-posterior. Thus aid to the diagnosis of position, however, is not available in all cases, since some women have, throughout pregnancy, such an indistinct perception of these movements, that no reliance can be placed on their statements; others feel them as much on one side as the other; and others, again, seem to feel them on both sides at once, and sometimes over the whole abdomen. Yet, however, a woman confidently declares that she feels the fetal movements on one side, while you are equally certain that the cardiac pulsations are most distinct.
on the opposite, there is every probability that the occiput and back of the child are directed towards the side in which the pulsations are loudest.

But, the only absolutely certain means of diagnosis before birth, is tactile examination of the foetal examination, per vaginam. After birth, however, we possess, in the position of the infant succedaneun on the child's head, an unfailing test of the accuracy of our diagnosis.

Order 2. — Occiput to the right.
(2nd Position of Haegel). It is quite superfluous to give a separate detailed account of the right occipito-anterior position, since it is exactly the converse of that which we have just described; what is right in the one being left in the other, and vice versa. Thus, the present position occurs in the left oblique pelvic diameter, the lowest side of the head during labour is the left; it is the left ear which is felt behind the pubis; the rotation of the head takes place from right to left, and after birth, the child's face is turned to the mother's left thigh; the clip of the occiput, and the subsequent movement of extension are the same in every respect as in the previous position.
But, before passing on to the consideration of occipito-posterior positions, we deem it advisable to recapitulate briefly, and in their order, the various movements performed by the foetal exocelium during labour in occipito-anterior positions, we shall thus be the better enabled to appreciate the modifications of these different movements in the second stage of the tabular arrangement of cranial positions, as compared with the first.

The evolutions observed in occipito-anterior positions are the following:

1. The progressive onward movement of the head, in which, in spite of all the secondary evolutions on its different axes, the centre of the head, during the whole course of labour, corresponds very nearly with the axes of the different parts of the parturient canal through which it passes.

2. The movement of the head on its occipito-frontal axis, in which, its one side becomes depressed on entering the bome, and remains lower than the other throughout the entire labour, the depressed side always being that nearest the pubis.

3. The movements of the head on its bi-panetal axis, viz., flexion and extension. In the first the occiput is depressed, and this state of matters exists during the descent of the head through the pelvis; when it reaches the pelvic floor, however, extension takes place, and the
forehead becomes, and continues to be, the lowest point until the head is expelled.

4. The movements of the head on its perpendicular axis. These consist of its rotation, and its restitution, or re-rotation, the first taking place within the pelvis, just before the birth of the head, and the second, external to the pelvis, immediately after its expulsion.

Class. II. Occipito-posterior Positions.

Order 1. Occiput to the right.

(3rd Position of Naegele).

This, for two reasons, is the most interesting of all the cranial positions. First, from the immense discussion to which it has given rise, and from the conflicting opinions which still prevail respecting it; and secondly, on account of that remarkable restitution of the head on its vertical axis which takes place on the floor of the pelvis, and by which the long ovoid of the head is changed from the right, into the left, oblique pelvic diameter.

The mechanism of this position was never properly understood until the appearance of Naegele's celebrated essay on Parturition in 1818. Jolazius de Preule, no doubt, was aware of the peculiar rotation of the head from the one pelvic diameter into the other, and mentions it in his book,
but no further notice seems to have been taken of the subject, and neither his celebrated pupil, Baudelocque, nor any of his immediate successors, refer in any way to the original observations of Dolagnes. We find even such recent writers on midwifery as Denman, Herriman, Blandell, and Hamilton quite ignorant of its true nature, and looking upon it as a very rare, and at the same time, a very serious, position. Caesarean regarded it as a small presentation, and urged the adoption of manual and instrumental means as necessary for its rectification. Dr. Blandell, who in no very measured terms vented his indignation on every species of unnecessary interference with the operations of nature, recommends, in this perfectly simple and natural position, every means of interference, such as rectification, turning, the forceps, lever, and even the perforator—everything, in fact, except the Caesarian and degenerate operations. And even at the present day, we have Dr. Ramsbotham declaring that presentations in the transverse, and in the left oblique, pelvic diameters, with the occiput forward, are "by far" more frequent than the present position.

Oecipito-posterior positions are just as easily and as safely terminated as oecipito-anterior, and the labour is quite as natural in the one case as in the other.
No additional strength is required on the part of the mother, and no particularly favoring circumstances or unusual proportions are necessary, either as regards the fetal head or the maternal passages. With the exception of possibly one or two additional pains which may be required during the process of rotation, there is perhaps no perceptible difference in a labour in which the occiput is at first descended backwards, and one in which it is originally placed anteriorly.

Knowing this, how sad it is to think of all the expedients, more or less unsafe to mother, or child, or both, which have been practiced under the impression that occipito-posterior cases could not be finished by the natural powers.

It was really in many respects a fortunate circumstance that men, who inculcated such unnecessary and dangerous procedure in the treatment of these simple cases, did also have cared in another point regarding them, we mean their relative frequency of occurrence as compared with the other positions. Strange enough to say, we always find these two errors going hand in hand; those men who recommend active and unjustifiable interference with these cases being in general the very men who seldom, according to their own account, meet with them; they congratulate themselves, their patients, and the profession on the extreme rarity of these much to be dreaded positions!
It is really terrible to attempt even to realize the accidents and deaths which must have occurred in the hands of such men, had they made earlier and more correct diagnoses than they were in the habit of doing, had they known, in fact, as we now do, that occipito-posterior positions occur once in every three or four cases of natural labour, instead of only once in 1300 labours, as thought by Collins.

Occipito-posterior positions have two different modes of termination. In the one, the head emerges from the pelvis with the occiput posterior, as originally placed; in the other, a rotation of the head on its vertical axis takes place previous to birth, where by the occiput is brought round to one or other acetabulum, and the case is finished as if it had been anterior all along. The latter termination, as being by far the more frequent, we will consider first.

In the first order of occipito-posterior positions (that now under consideration), the long axis of the child's head lies in the right oblique pelvic diameter, just as in the left occipito-anterior position; only, in the present instance, the relative position of the two poles of the cranial axis, with respect to the pelvis, is reversed; the occiput being in opposition with the right sacro-ilial symphysis, the forehead with the left foramen ovale.
When the fingers is placed up to the os inturis about the commence-ment of parturition, the sagittal suture is felt in a direction parallel with the right oblique diameter of the pelvis, and unless we could also diagnose one of the fontanelles or some other suture of the cranium, we could not from that digital examination determine whether we had to do with a left occipito-anterior, or a right occipito-posterior, position. As soon, however, as the os is well dilated, a correct diagnosis may be formed. The fingers of the accoucheur, introduced from behind, as the patient lies on her left side, encounters the large anterior fontanelle when passed downwards and forwards, and the posterior fontanelle is made out in the opposite direction. At first both fontanelles are about an equal height in the pelvis, sometimes the one, sometimes the other, being most easily reached; but as labour advances, the occiput usually descends, and it has been observed that in occipito-posterior positions the flexion of the head is generally greater than in occipito-anterior positions. The posterior fontanelle is most most easily reached; but this is not invariably the case, for the fore-head sometimes descends lower than the occiput, and without seemingly impeding the labour. The left parietal bone is in relation with the pubis, and, of course, stands lowest in the pelvis.
As the head reaches the floor of the pelvis the fontanelles come again on nearly the same level, and now it is that the change which chiefly distinguishes occipito-posterior from occipito-anterior, positions takes place. In describing this interesting phenomenon, Naegle observes, — "As soon as the head experiences the resistance which the inferior part of the pelvic cavity opposes to it, or, in other words, the oblique surface which is formed by the lower end of the os sacrum, by the os coxae, the ischiadic ligaments etc., by which it is compelled to move from its position backwards, in a direction forwards, it turns by degrees with its greatest diameter into the left oblique diameter of the pelvic cavity; i.e., the posterior fontanelle is directed to the right granum ovale, and as the head approaches nearer and nearer to the inferior aperture, it is the posterior and superior quarter of the left sacral bone, which is felt in the cavity of the pelvis opposite to the pubic arch." The head, in fact, is changed from the right occipito-posterior, into the right occipito-anterior, position, and the labour is terminated just as if it had originally presented in the latter position.

The term Rotation of the head is rather an unfortunate one, as explaining the change we have just described, for it would seem to imply that the movement was an instinctive adaptation on the part of the head itself, whereas
the change is brought about simply by the manner in which the cranial moves through the parturient canal, taken in conjunction with the pelvic planes and axes. We must keep in mind that the laterality of the parietal bone in all cranial positions always keeps in advance of the rest of the head, and that in this way the head presents a smaller circumference to the maternal passages than in any other possible position. Recollecting this, and also that the axes of the pelvic inlet and outlet are almost at right angles to each other, we must see that, when the head arrives at the axis of the outlet, in order that the latter parietal, which till then has been the presenting part, may still continue to present a certain amount of revolution on the vertical axis of the head must take place; otherwise, the parietal just anterior would cease to be the part in advance. The fact is that the axis of the parietal forces the child's head onwards; the passage through which it has to pass is most likely only large enough to admit it in the smallest diameters; the uterine contractions, however, are strong; it has now reached the axis of the outlet; there is a difficulty; but, since it has progressed so far through the pelvis with the latter parietal in advance, although the canal here does make a curve, yet, in consequence of the usual inability of the head to pass through in any
other way, it still maintains the facial posture as its presenting part, and the very force behind compels it quite independently of itself, to perform that slight revolution which enables it to do so. The movement is thus entirely a mechanical one, independent alike of any muscular action on the part of the mother or foetus, as is sufficiently proved by its occurrence when both mother and child are dead. We can, indeed, imitate the process by forcing a dead child through the pelvis of a dead mother. The foregoing is our explanation of this wonderful phenomenon, but whether correct or not we will not venture to affirm.

Dr. Tyler Smith adopts an even more mechanical view of the subject. He supposes that the spine of the ischium is the "determining cause" of the ultimate direction of the head in this position. "If the occiput," he says, "is driven below and behind this point, the head emerges from the pelvis in the position it held at the commencement of its passage through the pelvis, or nearly so." Again he writes,—"More frequently the head, on entering in the third (right occipito-posterior) position, passes downward until the occiput meets the spine of the right ischium; when, instead of passing behind this prominence, it glides in front of it, and, directed by the ischiatic planes, passes
* Prof. Simpson thinks that, in the present position, the spine of the ischium has very little influence, if any, in determining the ultimate direction of the head; and he explains the mechanism of the partial rotation solely on physical grounds. We subjoin a few extracts from his remarks with a view to the better understanding of the subject, he first lays down the following axioms:—

1. That the impelling power of the uterus is transmitted to the head of the infant along the line of the spine.
2. That the spine is articulated to the head nearer the occiput than the chin, and consequently (more especially after the flexion of the chin upon the breast) the expulsive force of the uterus bears most strongly and directly upon the occipital region; and
3. That the mobility of the smooth and lubricated surface of the fetus upon the smooth and lubricated surface of the uterine and vaginal cavities is such, that if the occiput is forced to rotate in any degree, the occiput will, in turn, produce a secondary but corresponding rotation upon the forehead and other parts of the infant's head, and consequently upon the body also, unless it happen to be morbidity and tonically grasped by the uterus, which is rare.

Observe one point more—the direction in which the power of the contracting uterus first impels the body and head of the child, is in the line of the axis of the limb of the pelvis—that imaginary line which is usually represented...
downwards and forwards until it occupies the second (right occipito-anterior) position."

With regard to the steps of the process by which the occiput advances from the right sacro-iliac synchondroses to the right foramen ovale, Naegle remarks that "the rotatory screw-like motion of the head as it advances, usually takes place much more quickly as the pain comes on, than the retrograde motion in a similar direction which follows as the pain ceases, and that the head, when the pain has ceased, as far as one can judge from the common signs, still continues to draw back towards its former position and direction. In the interval between two pains, immediately before the coming on of the next, I usually found the head at the greatest distance from the position it had taken during the height of the preceding pain. Hence, if a person examine during a pain, but withdraws his finger upon its cessation as soon as he perceives the contraction in the uterine to cease, he will have no perfect idea of the process." If, however, as has been done by the author of this paper, the finger be kept on the anterior fontanelle, during the middle of the second stage of labour, the most vivid impression of the head's rotation will be afforded to the person so doing. As the head comes down on the axis of the outlet, the
as running from the umbilicus to the lowest point of the
sacrum. In the common occipito-posterior position, the impelling
power of the uterine thrust forces the right side of the occiput, (for the
head is placed obliquely) against the concave floor of the pelvis, and
its further progress downwards and backwards in that direction
is arrested by the resisting structures of that floor. The occiput
is thus subjected to two forces meeting at an obtuse angle, viz.,
to the impelling power of the uterine thrust from above, and to the resisting
power of the pelvis floor from below—and these two powers set
upon it with similar force—physical action and reaction being
always equal. The necessary result is, that the part acted up-
on, viz., the occiput, moves forward and to the right with a
descent-like movement—sometimes rapidly—sometimes slowly,
and in a line diagonal to the lines of the forces acting upon it—
exactly as if it were impelled by a single force. Or, as mathe-
maticians express it, it moves in a line diagonal to a parallel
support, two of the sides of which are formed by the lines of the
two resisting forces. The diagonal or resultant line of motion
of the occiput, at this point in the labours, is in a line running
tangential in the direction of the axis of the outlet, and the move-
ment of the occiput forwards in this direction is further greatly
promoted and facilitated by this being, at the same time, the
direction in which it encounters incomparably the least resis-
tance to its further progress.” (Simpson’s Obstetric Works. page 262).
Forehead will be felt distinctly to move round from its original position at the left foramen ovale to the left sacro-iliac sphenoidal axis. You can feel the sagittal suture running parallel with just the right oblique diameter of the pelvis, then with the transverse, and lastly with the left oblique. Now if one can place any dependence whatever on his sense of touch, there can be no mistake about this; and to have actually felt it, is at once the best proof to one's own mind of its reality, and the best answer to those who would either doubt or deny its occurrence. For he who can confidently affirm that with his own fingers he has felt the entire process has a great advantage over him who can only say he has not, since the latter is merely a negative statement, the offering most likely of an inferiority of attention, or an inferiority of skill.

The primary cranial swelling in the right occipito-posterior position is found on the middle of the superior border of the left parietal bone; the secondary occurs on the posterior superior quarter of the same bone; the same parts as in the right occipito-anterior position.

In connection with the present position we have still to consider its other and less frequent terminations.
*The notation*, says Prof. Simpson, "of the foetal head upon the floor of the pelvis is, on a contracted scale, like that of the spindle of a screw upon a nut, provided with one-half of a single or broken thread. If relatively the spindle is too small, or the nut too large, the former may pass through the cavity of the latter without any rotation— as in the exceptional cases just now alluded to;— but if they are properly adapted in size to each other, the spindle can only make its transit by its helix rotating upon the inclined plane of the corresponding helix of the imperfect nut,"—as happens in the usual termination of occipito-posterior positions.
...wiz., that in which the head emerges from the pelvis outlet in the same direction as it entered the bini, the forehead coming in relation with the arch of the pubis, and the occiput being directed along the curve of the sacrum and femur.

We have already tried to assign reasons for the occurrence of the more usual termination, and have quoted Dr. Cyler Smith's theory, as to the spine of the ischium being the determining cause of both species of mechanism; but there are many who hold that the termination we are now considering seldom or never occurs except when the mother's pelvis is much larger than the fetal head.*

Naegele records that, in ninety-six cases of the right occipito-posterior position, which he observed with particular care, the labour was terminated with the forehead to the pubis only three times, and that there were certain peculiar circumstances in the labour sufficient to account for the occurrence of each of these exceptional cases.

"In one," he says, "the upper and under apertures of the pelvis were unusually wide, the fontanelles large, the paitetal bones remarkably soft, communicating a feel like gold tincture, and had false sutures; the labour was also very rapid."

"Another was the case of a healthy robust female in
her second pregnancy; who thought she had still eight or
ten days more to go. Having much exerted herself in the
execution of some duties, the liquor amnii escaped during
the night without her being aware of it; the dilatation of
the os uteri to an inch and a half proceeded very slowly, the
third and fourth stage (i.e. the rupture of the membranes
and the birth of the child) passed unusually quick; the
umbilical cord was twisted twice round the child's neck,
and no more liquor amnii followed the birth of it; the pelvis
was generally, but especially at the inferior aperture, re-
markably wide."

"The third was the case of a robust, healthy, well-formed
woman of two and twenty in her first pregnancy; her
labours came only weeks before the proper time; the child
weighed five pounds six ounces, the paitental bones were
in places soft, communicating a sensation like purch-
ament or twisted; the child was healthy and threw well, nor
did the circumstances of the labour, with this exception,
present anything unusual."

The experience of Naegele thus goes to prove that, unless
there are some pecularities in the child's head, or in the
mother's pelvis, or in the character of the labour, or in all
three combined, the occurrence of the present termina-
tion is very rare indeed. But on the other hand we
have such an excellent authority as Dr. T. J. Green, stating us that he has several times met with it in cases where the head was large, so large indeed in comparison with the pelvis, that in some instances the forceps had to be applied to effect delivery.

In both terminations of the right occipito-posterior position, the primary dwelling of the scalp is on the same spot, viz., the middle of the superior border of the left parietal bone, and the secondary tumour is found in the most frequent termination on the posterior superior angle of the same bone, but in the present case on the anterior superior angle. This latter fact is the first to clear the external orifice, and the restitution of the head takes place towards the left thigh of the mother.

When the head is unusually small, as in cases of premature labour, it may be forced through the outlet almost regardless of any adaptation, with its long diameter nearly parallel with the conjugate pelvic diameter; but, generally speaking, the forehead impedes on the lower margin of the symphysis pubis, and becomes the fixed point around which the rest of the head revolves in its emergence from the maternal parts. The head is flexed at birth, the occiput swept the
Perineum, and as soon as it and the vault of the cranium are born, the forehead slips out from under the symphysis pubis, followed by the eyes, nose, mouth, and chin.

Order 2. — Occiput to the left.
(4th Position of Naegle.)

The mechanism of this position requires no separate description, as, with the exception that it occurs in the opposite oblique pelvic diameter, it is in every respect similar to the other occipito-posterior position.

It also has two terminations, the one, the most common, in which the occiput is born anteriorly; the other, of extreme rarity, in which the forehead emerges first. Each is the exact converse of the corresponding terminations of the right occipito-posterior position.
CHAPTER VIII.

Mal-positions of the Head.

There is a remarkable similitude in the mechanism of parturition in all the various presentations of the child, whether natural or preternatural. On this account, and since in the preceding two chapters, we have dwelt pretty minutely on the different evolutions performed during labours by the foetal cranium, our descriptions in this chapter will be less tedious than they otherwise would be. We shall in fact have rather to indicate those points in which the mal-positions agree with, and those in which they differ from, the natural positions, than enter upon a detailed description of the several changes which take place during the passage of the head through the parturient canal, in these cases.

Complete flexion of the foetus is its natural attitude in utero; this is more particularly observed when the cephalic extremity of the ovoid formed by the fully flexed foetus constitutes the presenting part. Flexion of the head in this case constitutes the true guidance of a natural position, and it would not be difficult to trace every mal-position of the head to some interference with this normal condition, either before, at the commencement,
or during the progress of parturition. Thus too great flexion sometimes occasions a presentation of the occiput, complete extension, again places the face lowermost; and a position intermediate between flexion and extension constitutes a forehead case. Presentations of the side of the head (ear presentations) are also referable to the same cause.

The most frequent malpositions of the head are those of the Face, Forehead, and Ear.

**Face Presentations.**

Face presentations, according to Dr. Churchill's statistics, occur once in every 331\(\frac{1}{3}\) labours. They are either primary or acquired; i.e. the face is found lowermost, either before the commencement of labour, or it becomes so during its progress. Rancho Blum thinks they are originally brow presentations, but cranial cases have frequently been observed to pass during parturition into face presentations; hence, regarding as we do, all malpositions of the head as deviations from its normal attitude of flexion, in those cases where a brow presentation is acquired after the head enters the pelvic brim, we consider that it must have been originally a cranial case; and we explain
its subsequent malposition by supposing that the occiput must come in contact with some part of the pelvis during labour, and thus have caused the brow to descend. On the same principle we explain those presentations of the face which are acquired during parturition; only in the latter, we account for the still greater deviation from the usual flexed state of the head, by supposing, either that the occiput has hitched on the pelvis or walls even to a greater extent than in brow presentations, or that the head is smaller or the pelvis larger than in the last mentioned cases. Thus, we refer every case of acquired malposition of the head to an original presentation of the cranium, considering forehead cases as the first step, and face cases as the second, from the natural condition of flexion.

Hitching of the occiput on some part of the pelvis we have assigned as the cause of acquired cases of mal position; those cases in which the normal flexion of the head has been interfered with previous to parturition have been ascribed to superabundance of the liquor amnii, or obliquity of the uterus.

The resemblance between the mechanism of face and cranial presentations is very striking; and it is a highly interesting inquiry to trace where the analogy
Facial Positions.

Classes

Orders.

Right:

Left:

1. Mento-anterior

2. Mento-posterior
exists, and where it is defective. It is most important to recollect that, in the present malposition, the chin is the point through which the uterine efforts are carried, and that, in this respect as in others, it represents the occiput in cranial cases. Hence, we speak of mento-anterius and mento-posterior positions, just as of occipito-anterius and occipito-posterior positions. Like the occiput, whether situated anteriusly or posteriorly at the beginning of labour, the chin ultimately emerges from the pelvis anteriorly. This fact is the great key to the proper understanding of face cases.

The face, like the cranium, may be found in four different positions at the pelvic brim. Of these, there are two great clasps, according as the chin is originally placed anteriusly or posteriorly; and each clasp is divisible into two orders, according as the chin is directed to the one side or the other. (See table on opposite page).

Of the two clasps, the mento-anterius is the more frequent occurring, according to a statistical table drawn up by Prof. Simpson, in the proportion of 114 to 82 of the mento-posterior clasps. The distinctions of orders are not so well marked as in cranial positions, and the left oblique pelvic diameter is more frequently occupied by the facial than
by the cranial, or void. It will, therefore, be quite suffi-
cient to consider the mechanism of the two edges with-
out special reference to the orders in each. In truth, we are almost compelled to adopt this course, for,
to one who, like the writer of this paper, can pretend to
practical experience of face cases, it is difficult,
amicably the various contradictory and unsatisfactory
statements respecting them in the different textbooks,
and lectures on midwifery, to arrive at any very defi-
nite conclusions. What, for example, do authors mean
by speaking of the forehead or chin, as the case may be,
being turned to the right or left "clivus"? What is the
exact significance of this word clivus? Does it mean
the sphen-ethmoid synchondroses or the acetabulum, or does
it refer to some indefinite space between these two points,
or is it simply a synonym for the whole innominate bone?
If the long axis of the face, like that of the cranium, lie
in one or other of the oblique pelvic diameters, and if the
forehead and chin are the opposite poles of the facial
void, why not describe face positions in as exact language
as those of the cranium? Why, in short, should a man
adopt a term when speaking of facial cases, which he
never made use of in the description of cranial cases?
From this general accusation of vagueness, we must
except the admirable lectures of Dr. Tylers Smith, as published in the Lancet for 1866; we have there the relative positions of the chin and forehead to the maternal pelvis described in language not to be misunderstood; the description of face cases is, in fact, as precise as that of cranial cases. But if we are pleased with Dr. Smith's lucid description of face positions, we are equally startled at his classification. Mento-anterior, he considers so rare as compared with mento-posterior, positions that he does not deem them worthy of separate consideration, and he cites Naegle's essay on the mechanism of parturition as confirmatory of this opinion. Prof. Thompson, on the other hand, who holds the very opposite doctrine, also quotes Naegle as an authority for his views. Such contradictions are very puzzling to the student, but if in Naegle's original essay the positions of the face are spoken of in as obscure terms as in the English translation, we do not wonder so much that even two such eminent men should have made exactly opposite interpretations.

**Class I. Mento-anterior Positions.**

Of the two orders in this class, the right mento-anterior, or that in which the long axis of the face lies in the
left oblique pelvic diameter, seems to be generally considered the more frequent; we shall, therefore, keep this position in view in describing the mechanism of the first clasp.

If a vaginal examination be made about the commencement of labour, the bridge of the nose, which corresponds with the sagittal suture in cranial positions, is felt crossing the os uteri in a direction parallel with the left oblique pelvic diameter, and dividing the circle of the os into two unequal segments, of which the anterior is the larger. Passing the finger forwards and to the right, as soon as the dilatation is sufficient to admit of it, the mouth is reached, which is to be recognised by the lips, the firm alveolar ridges, and the mobile tongue in the centre; still further forwards the chin is found in relation with the right acetabulum. Retracing the finger, and passing it in the opposite direction, i.e. backwards and to the left, we reach the root of the nose, and the commencement of the frontal suture, which, if pursued upwards and backwards may sometimes be felt terminating in the anterior fontanelle. But the seldom the latter is made out, the better, because the more favourable will be the position of the head, and the further removed will it be from a forehead presentation,
which is a much more formidable malposition than the face.

As labour progresses, the upper part of the right half of the face constitutes the presenting part, and on this situation is formed the primary fetal edema, which, if the second stage of labour is easy and of short duration, or if the head be delivered with instruments, will sometimes be the only tumor present. But, in usual circumstances, towards the latter part of labour, the under half of the cheek becomes the lowest part of the presentation, and on it, more especially if the face be detained long at the external orifice, is formed the secondary swelling, which, together with the first, which involves the right eye and malar bone, causes in general great disfigurement of the infant's face.

We have seen that, in cranial presentations, the head was first flexed, then that flexion was diminished, and that there was ultimately extension. The reverse holds good in face cases. When the head enters the brim it is fully extended, the occiput being bent back on the sinciput, so that the face lies nearly flat across the brim; but this flexion, gradually decreasing as the head descends the pelvic planes, is changed to flexion.
at the outlet, and the head is born with the chin pressed against the sternum.

We also spoke of the head in cranial cases, as exhibiting in its transit through the pelvis three kinds of obliquity—viz., an obliquity as to the diameters of the pelvis, as to the superior pelvic plane, and as to its own bi-parallel diameter. The same triple obliquity obtains in face cases; the long axis of the face lies parallel with one or other of the oblique diameters of the pelvis; the one pole of the ovoid is lower than the other, and is thus oblique in relation to the superior pelvic plane; and the anterior extremity of its own transverse axis is lower than the posterior.

When the face has reached the floor of the pelvis, the forehead and chin are nearly on the same level; and now it is that the movement of rotation takes place. The chin, like the occiput in the right occipito-anterior position, of which the present is the analogue, moves slowly round from the acetabulum towards the pubic arch, and after describing the eighth of a circle, escapes beneath the right scapus. And now is seen the ultimate flexion of the head: after the emergence of the chin, the upper
part of the neck in front, coming in contact with the lower border of the symphysis pubis, forms the fixed point around which the fetal head revolves, the vault of the cranium gliding over the perineum, and the occiput escaping last of all.

Class II. Mentoposterior Positions.

Of this class of face positions, that order, in which the chin is directed to the right sacro-iliac symphysis, seems to be generally considered the more frequent of the two. It is the analogue of the right occipito-posterior cranial position, the bridge of the nose in the one case corresponding with the sagittal suture in the other, and, like it, lying parallel with the right oblique pelvic diameter. The right side of the face here as in the last position forms the presenting part, and the caput succedaneum are situated on the same spots; in fact the right mento-posterior is converted, during labour, into the right mento-anterior position, the chin rotating from the sacro-iliac symphysis to the acetabulum, just as does the occiput in the analogous cranial positions. But as we have already sufficiently described the mechanism of the latter position, we need not follow the present one to its termination; all
we require to do is to direct attention to the additional rotation which takes place in the present instance, by which the long ovoid of the face is changed from the right, into the left oblique pelvic diameter.

This rotation is identical with that which occurs in the third cranial position, the chin representing the occiput, being the part chiefly influenced by the force communicated through the spinal column, and determining by its movement that of the whole presentation.

At first the forehead is the lower pole of the facial ovoid, as is shown by the upper half of the face being involved in the primary cranial dwelling; but as labour advances, and the face comes down on the floor of the pelvis, the forehead and chin come on nearly the same level. The latter now begins to be moved slowly and gradually round from the brow-iliac synchondrosis; and by the time the rotation into the left oblique pelvic diameter has been effected, the chin has become the lower pole of the ovoid.

We have now to deal with a right meta-anteor position, which terminates just as if it had been to from the beginning.

Fæce cases says Vaegele, "Proceed usually without great difficulty than, and terminate quite as successfully.
as, those where the vertex presented." This statement, however, seems to us rather too absolute; for, if we consider the larger diameters of the foetal head opposed in face cases to the pelvic passages, it must be evident that parturition cannot be quite so easy in them as in cranial presentations; and, in fact, most obstetricians agree in stating them as in general more tedious. Besides this, the child is exposed to greater danger from the risk of compression of the veins of the neck, and the fontanelle, which is usually very much distended, is more liable to be lacerated.

But we are only speaking comparatively: the real dangers to be apprehended from ordinary face cases are by no means formidable, and any interference with them is wholly unjustifiable.

If, however, the usual rotation of the outlet which occurs in mento-posterior positions did not take place, and were the head forced onwards, with the chin still remaining posterior, then great difficulty and danger would be encountered, because the greatest diameters of the foetal head would be opposed to the osseum vaginae, and the fontanelle would consequently run the most imminent risk of being lacerated by the enormous distension to which it would necessarily be subjected. Such a contingency, however, although described
by the older authors, and even figured by Smeullen, fortunately never occurs; it is indeed mechanically impossible, for either the neck would require to be spun out seven or eight inches, or both the head and chest must needs occupy the pelvic cavity at the same time,—both of which occurrences are impossible. In this respect presentations of the face differ from those of the cranium; and it is a fact worth bearing in mind that, although in cranial cases the occiput may remain posterior throughout the whole labour, frequently without very much apparent difficulty, in face cases the chin must, sooner or later, become anterior. The head cannot otherwise be born, and if nature will not effect the necessary rotation, art must. Occipito-posterior positions have thus two terminations; mento-posterior positions, only one.

Occasionally, but very rarely, the face changes during labour into a cranial position; and this is probably due to the chin hitching on the sacro-vertebral ligaments, or ischiatric spines. It were a hazardous and unjustifiable experiment, however, to attempt to imitate this by art, and he who would venture to put it in practice will probably have to recapitulate the conversion of a simple face case into a difficult forehead presentation.
Those cases in which the chin is turned to the acetabulum, or sacro-iliac synchondroses of the left side of the pelvis, are exactly the converse of the positions we have just described, and require no separate notice, since, with the exception of what is right in one and left in the other, and vice versa, the mechanism of both is identical.

The body in face cases is born in the same way as in cranial presentations. In the positions we have considered, the right shoulder being the most anterior, and therefore the lowest in the pelvis, escapes first under the pubic arch, while the other, describing the circle of Lienau, sweeps over the perineum. The mechanism here follows the same order as that in the left occipito-anterior, and the ordinary termination of the left occipito-posterior cranial position.

In the other facial, as in the other cranial, positions, the order, of course, is reversed, the left shoulder then escaping first.

Forehead Presentations.

We have spoken of the forehead presentation as intermediate between that of the cranium and the face. This statement, strictly speaking, is not quite correct;
Forehead Positions.

Classes.

1. Fronto-anterior
   Orders.
   \{ Right.
   \{ Left.

2. Fronto-posterior
   \{ Right.
   \{ Left.
For a position to be exactly intermediate between a cranial and a face presentation, in other words, between complete flexion and complete extension, should be one in which there is neither flexion nor extension, where, in fact, the anterior and posterior poles of the cranial ovoid are on the same level, just as is the case in the normal attitude of the adult head in the erect posture. Now, in the forehead presentation, the anterior pole of the cranial ovoid is the most dependent part, the occiput being on a considerably higher level in the pelvis; there is thus a considerable degree of extension. The head, in fact, is intermediate between complete extension and that condition in which both fontanellen are on the same level; the term semi-extension would therefore best express its position in a brow presentation.

The forehead, like the other head presentations we have been considering, may be found in four different positions at the pelvic inlet, viz., with the brow directed to the right or left side, anteriorly, or to the right or left side, posteriorly. The diameter of the head, extending between the chin and the anterior fontanelle, is that which, in all these cases, corresponds with the oblique diameters of the pelvis; and the head in this malposition, on account of its shape and increased dimensions, encounters greater difficulty in its
transit through the parturient canal than in any other cephalic presentation. According to Dr. F. Parnell, the forehead presentation requires an inch more space than does the cranial.

As to the cause of the present malposition, it seems generally to be produced by the hands of the child getting in between the chin and sternum, and thus preventing the true flexion of the head.

The diagnosis of these cases is very simple and not to be mistaken. The right or left frontal prominence forms the presenting part, and the sensation communicated to the finger by the adjoining large quadrangular fontanelle is quite distinctive of a brow presentation.

Besides the frontal prominence and the anterior bregma, the frontal and sagittal sutures can be felt; and the relative position of the latter to the fontanelle indicates the direction in which the forehead lies.

The frontal suture is to be made out by its leading to the nose and face; the sagittal, by its being opposite to the frontal. If the sagittal suture be felt running from the large fontanelle in an oblique direction, forwards and upwards, then it is a fronto-anterior position, and if
obliquely backwards and upwards, then it is a fronto-posterior position. But it is quite unnecessary to describe separately the different forehead positions, since what is said of one may be said of all.

The brow presentation has always a tendency to be converted into a face ease, and we are inclined to believe that such would always happen, were there sufficient room for the additional extension of the head, and were the uterine contractions strong enough. But, suppose the case will not admit of this change, what happens? If the head be left alone, it is gradually forced downwards, until at last it becomes completely wedged in the cavity of the pelvis; the labour is then at a standstill, and the powerful, but unavailing, efforts of the uterus would soon exhaunt the woman; interference is, therefore, imperatively demanded, and if the forces cannot effect delivery, the head must be opened.

If the present malposition, however, be recognized early in the labour, it may often be converted into a natural cranial position, by simply pressing with the finger on the brow during the pains. The further descent of the forehead is thus prevented, and the whole force of the uterine contractions is expended on the posterior
part of the head, by which means the occiput is made to descend. This desirable result, however, will sometimes fail to be produced on account of the child's hands completely filling up the space between the chin and sternum.

**Ear Presentation.**

This is by far the most rare of all forms of malposition of the head, and need not detain us long.

Its diagnosis is a very simple matter; on palpating the finger within the os uteri, you feel the ear, which from the peculiarity of its shape can never be mistaken for anything else. Either the right or left ear may present, and the longest diameter of the head usually lies in one or other oblique pelvic diameter.

Ear presentation is produced either by a too large, or by a too small pelvis. In the former case the very size of the pelvis permits the head to double up on the neck, when the labour pains force down the body; in the latter case the usual narrowness of the brim, proving an obstacle to the admission of the head, the force of the uterus is reflected on the neck, which at last is compelled to give way, and bending laterally, an ear presentation is thus produced. When this malposition is the result of a too
large pelvis, there is no delay; but when due to contraction of the inlet, the labour is rendered both tedious and difficult.

In considering the mechanism of this malposition, we shall, for the sake of brevity, suppose a case, in which the summit of the head is directed to the right sacro-iliac symphysis; the left shoulder impinging on the opposite side of the pelvic brim. Should the head so placed manage to clear the inlet, it is propelled into the cavity in proportion as the uterine contractions force on the advancing body of the child. But when it reaches the floor of the pelvis, "in consequence" observes Dr. Rannambothain, "of its being doubled sideways on the shoulder, the space required for its exit thus is more than the inferior pelvic aperture affords, and before it can escape it must take a fresh direction; a change in situation, therefore, is effected; -- not indeed a semirotatory turn, such as the head describes under the presentation of the vertex, but the summit of the head passes downwards, moving on the joints of the neck as on a hinge; the face is by degrees thrown into the hollow of the sacrum; and the occiput is turned up under the arch of the pubis."
CHAPTER IX.

Preternatural Presentations in general.

Those presentations of the fetus in which its cephalic extremity presents at the outlet we have already considered under the head of Natural Presentations. We have now to pay attention to what are termed Preternatural Presentations, or those in which some other part than the head is situated inferiorly.

To describe the various preternatural presentations of the child which have been enumerated and figured by different authors, were only to waste time and wasting material. There is scarcely a square inch of the fetal body which has not, according to many of the older obstetrical writers, constituted a part of some preternatural presentation. The neck, side, back, belly, loins, breech, one foot, both feet, the breech and the feet, one knee, both knees, one arm, both arms, the elbow, the shoulder, a foot and a hand, a foot and both hands, a hand and two feet, and both hands and both feet—have all been mentioned at different times by different observers as presentations to be met with in practice. This endless multiplicity, however, instead of ensuring exactitude, as was doubtless intended, served only to confuse and mystify.
the anxious inquirer after knowledge. From the great rarity of most, not to say the probable non-occurrence of several, of the presentations we have enumerated, at least at the full term of utero-gestation, and from the fact that many of them, by reason of non-adaptation to the maternal parts, must be modified during labour by accidental circumstances, either in the character of the labour itself, or in the relative proportions of the presentation to the pelvic passages, and since the same presentation may, consequently, terminate differently at different times, it is evident that it is simply impossible to fix a standard for each, according to which, in every case, its mechanism will be regulated.

Accordingly, adopting an arrangement at once simple and comprehensive, most recent authors divide presentational presentations into two great orders, viz.,

I. Pelvic Presentations, or those of the breech, and lower extremities.

II. Transverse Presentations, or those of the trunk, and upper extremities.

Since the publication of Prof. Simpson's essay "On the Attitude and Positions, Natural and Preter-natural,
of the "Fetuses in Uteri," to which we have already referred, little was known of the cause of premature labour. Previously, mal presentations, their cause or causes, and the modes of their production, were looked upon as an obstetrical puzzle, the ultimate solution of which many accoucheurs seemed to despair of. And, while several (and among them, some of our latest and best systematic writers on midwifery) frankly acknowledged their inability to explain their occurrence, others, unwilling to confess their ignorance, and at the same time fearful of displaying it, avoided entering upon any lengthened investigation of the subject, contenting themselves with referring to it merely in a casual way, and hazarding a few vague hypotheses, none of which tended to a satisfactory conclusion.

Various anomalous circumstances have, doubtless, been set forth by different authors as the causes of these presentations, but not one of them attempted to explain the modus operandi of any of these supposed causes. Mal presentations have been severally ascribed to—some peculiarity in the form or size of the uteri, in the form or size of the fetuses, in the quantity of the liquor amnii during some period of uterine gestation, or in the umbilical cord: also to premature efforts of
the mother, too great inactivity during pregnancy, over exertion of strength, external violence, insertion of the placenta to one side of the uterus, plural births.

Others, again, who believed that the foetus in utero sat, monkey-like, on the top of its mother's sacrum during the greater part of pregnancy, and that as soon as it felt the first symptoms of that process by which it was to be dislodged from its free and easy position, it plunged head foremost into the surrounding waters of the amnion, performing a somersault in its descent, and landing with its cranium on the os uteri, so as to ensure its greater safety during the approaching labour—those who held under such an eponymous impression of the intra-uterine wisdom of our species, as evinced in this wonderful aquatic exploit, ascribed the occurrence of all mal-positions and mal-presentsions to some irregularity in, or interference with, the mechanism of the afore-named somersault.

We believe ourselves correct in stating that Dr. Simpson was the first who both described what he conceived to be the causes of mal-presentations of the foetus, and also explained the modes in which these causes were supposed to operate in producing them. Prof. Paul Dubois of Paris, although he theorized very learnedly on the subject
of the natural position of the foetus, and ascribed its production to a psychical cause, nevertheless touched very slightly on the causation of pretermnatural labour. Dr. Simpson, on the contrary, enters very fully on the latter subject, and shows that the circumstances pre-
ductive of malpresentations of the child are not only ex-
plicable by his doctrine of the cause of the natural posi-
tion of the foetus, but are strong arguments in its sup-
port. The following are the causes to which he ascribes the production of these abnormalities:

1st. Prematurity of the labour.

Dubois first distinctly pointed out what is now regarded as an established fact, that the foetal head does not take up its permanent position at the os uteri till about the sixth month of pregnancy, and that, from that time onwards to the full period of utero-gestation, the frequency of cephalic presentations increases in a gradually progressive ratio. Previously to the sixth
month pelvic presentations are nearly as common as cephalic, and crossbirths are of frequent occurrence; hence Dr. Simpson, with good reason, considers prematurity
of the labour as one of the causes of malpresentations,
"2d—Death of the child in utero; or, in other words, the loss of the adaptive vital reflex actions of the foetus," to which Dr. Simpson ascribes the maintenance of the usual position of the foetus with the head foremost.

"3d—Causes altering the normal shape of the foetus or contained body, or causes altering the normal shape of the uterus or containing body, and thus forcing the foetus to assume, in its reflex movements, an unusual position, in order to adapt itself to the unusual circumstances in which it happens to be placed." Among other propositions relative to the common position of the foetus, Dr. Simpson attempts to establish this, that "the position of the foetus, with the head placed over the os uteri, is that position in which the physical shape of the normal and fully developed foetus is best adapted to the physical shape of the normal and fully developed cavity of the uterus."

"4th—Causes physically displacing either the whole foetus or its presenting part, during the latter periods of intra-gestation, or at the commencement of labour, such as a false step, external violence &c.

Ill presentations, according to a table drawn up by Prof. Simpson, occurs once in every twenty-seven labours, but according to Dr. Churchill's statistics only once in ninety cases.
Pelvic presentations, although more dangerous than those of the cranium, can in general be brought to a safe termination, without recourse to operative interference. But in every birth delivery must always be expedited by art, except in a few rare circumstances which will be mentioned when treating of these cases.

As might be expected, the statistics of intratinal labour exhibit a large percentage of fatal cases. Pelvic presentations are but in a slight degree more dangerous to the mother than are cranial cases, but one in three of the children perish. In transverse presentations, in spite of the assistance afforded by art, the mortality both to mother and child is most alarming: more than half of the children, and one in nine of the mothers are lost.

It becomes a matter of importance, seeing the great increase of mortality in malpresentations, to recognize them, if possible, before the occurrence of parturition, or at all events, as soon after it as possible, so that, in cases of danger, early measures may be adopted for the preservation of mother and child; for it is an undoubted fact that many lives are lost, which might have been saved.
had the circumstances of the case been sooner recognized, so that earlier assistance might have been afforded.

Malpresentations are frequently observed to recur in the same woman; hence, if called upon to deliver a patient who has at some previous period been the subject of a malpresentation, we must take into consideration the possibility of its recurrence, and as speedily as possible inform ourselves of the existing state of matters.

This circumstance has been ascribed to an irregularity in the early pains of labour by which the form of the uterus has been more or less altered. The fact that faulty presentations are extremely rare in primiparae, is to a certain extent confirmatory of this explanation; for, in a uterus imperagnated for the first time, the labour pains are very equal and regular, and the organ preserves its natural form and shape.

Some women there are who, from their sensations during one pregnancy as compared with those during another, can predict a wrong position of the child, but fortunately many such presentations are never realized. Peculiarities in the foetal movements, however, and more particularly variations in the position of the os, the auscultatory signs, are not to be disregarded. But in no case can we be perfectly certain of a mal-
presentation, until on tactile examination we discover some other part than the head presenting at the os uteri. Nevertheless, there are generally present at the commencement of labour, even before an accurate vaginal examination can be instituted, certain indications on which, from their constancy, we may place considerable reliance, and the existence of which should at once raise in our minds the gravest suspicions, suspicions which should never be allayed until every feature of the case is distinctly recognized. But, as these indications differ according to each malpresentation, we shall defer their consideration until we treat separately of the different orders of prematernal labours.

To say that, in any given case, the head does not present at the os uteri, is equivalent certainly to saying that the presentation is prematernal; but this is but a negative statement:—how are we to arrive at a positive diagnosis?—in other words, how are the different malpresentations to be distinguished, one from another?

The importance of a correct diagnosis in midwifery practice cannot be over-estimated; for, not to speak of the superiority of the skilful hand to the uncertain fingers of the case-leaf or inexperienced, the most serious, if not fatal,
consequences may result from the want of this valuable faculty—life and death, indeed, may frequently be said to depend on its proper exercise. Most surgical authors and lecturers insist strongly on the importance of what they term the "tactus eruditus," or the possession of a correct tactile diagnosis. But this gift, or rather acquisition (for it is only to be learnt by patience and attention), should distinguish the obstetrician not less than the surgeon; indeed, when we consider the higher interests involved in the practice of the former, we feel inclined to say that he stands even more in need of it than the surgeon. And with a view to the attainment of this valuable faculty, we know of no better recommendation to the young accoucheur than this—examine carefully the head, face, breech, and extremities of every new-born babe on which you can lay hands. The writer of the present remarks used to feel all over each child born in his practice among the poor, and, in order to imitate more closely the circumstances under which vaginal examinations are conducted, he used to close his eyes while so doing. But little opportunity has as yet been afforded him of testing the value of this particular plan, yet, in spite of the wonderment occasioned in the minds of many of the
Female Hibernians who witnessed the proceeding, the very reasons, which suggested the adoption of the practice, deemed themselves sufficient to warrant him in recommending it to those who are tyros in the obstetric art.

The differential diagnosis of the various presentations of the child is not quite such an easy matter as one might suppose; for the construction of one part by the powerful contractions of the uterus, and the time after which another from the compression to which it has been subjected in traversing the unyielding pelvis frequently alter the form and consistence of the presentation so much that even in the hands of the most experienced there is often considerable difficulty in recognising the presenting part. Thus, the face and breech have been confounded with each other, and an osseous or sutural scalp has been mistaken for the buttock, and vice versa; yea, so unreliable is the uneducated sense of touch, that the knee and elbow, and even the hand and foot have been confounded with each other; mistakes leading in alms! too many instances to the most lamentable result to.

The points leading to a correct diagnosis of a
breach presentation are its rounded, soft, elastic feel, and the genital cleft, in which may be recognised the more or less moveable coccyx at one end, the organs of generation at the other, and the anus between the two. In the case of a male child, the scrotum and penis form very distinctive features of the presentation. Notwithstanding, however, the seeming simplicity of this diagnosis, the breach has been confounded with the face, especially in cases where the general inequalities which mark the surface of the latter have been, to a certain extent, obliterated by the time action consequent on protracted labour. In such circumstances the mouth and eyes have severally been mistaken for the anus and vulva, and the malar bone has been confounded with the ilium. But the bridge of the nose in face cases, and the genital cleft in breach presentations, should constitute sufficiently accurate diagnostic marks of either case; the former being a large, prominent, conical mass, wholly unlike any part of the breach; and the latter, as having close to the anus the moveable coccyx leading to the broad unequal surface of the back of the sacrum.

The anus and vulva are to be distinguished from the mouth by the absence of the tongue and the alveolar ridges. The anus is further to be recognised by its contracting on the fingers when you attempt to introduce it; and the mouth
by its grasping the finger and sucking it.

The eye should at once be identified by its globular form, but it is an organ, which, from its extreme delicacy, cannot admit of much fingerings.

The meconium may be discharged in all kinds of presentation, but that which comes away on the finger in breech cases is said to be more tenacious than in other presentations.

A well marked caput succedaneum of the scalp has even been mistaken for a buttock. This, however, is an error not likely to happen to a person of any experience, for the prominent well defined tuber ischii in the one case, and the smooth, flat, cranial vault, on the other, which can be felt beneath the swollen integument, can hardly be confounded by the experienced practitioner.

The tuber ischii has been confounded with the shoulder, but attention to those points of diagnosis of breech cases which we have already laid down, should be sufficient to prevent the mistake.

The knee is to be recognised by the two rounded condyles of the femur, with the trough like depression between them. It has been confounded with the elbow, heel, and shoulder. The elbow is to be distinguished by the sharp projection of the
The differential diagnosis between the bace and elbow is generally considered more difficult than any other in the fetal body, and for this reason I am inclined to believe that the mere projection between the two prominences in the one case, and the depression between them in the other, form by no means a reliable distinction in every instance. I never had an opportunity, it is true, of examining an elbow presentation, but I have carefully examined just with one finger and then with two fingers among a little elbow immediately after birth, and with this frequent result that I never could recognize, with any approach to distinctness, a distinctness which could be of any use in practice—the short median projection with the well marked prominence on either side of it, as described in works on midwifery, as diagnostic of an elbow presentation. On the contrary I could not in many cases discern in the flexed elbow of the newborn babe any very appreciable line of demarcation between the external condyle of the humerus and the olecranon; the two, both on ocular and tactile inspection, unless the latter were very minute, so minute as to be quite inapplicable during labour, seemed to form but one mass; and the space between the olecranon and the internal condyle (which is always a well marked interval) conveyed to the fingers very much the same sensation as the depression between the condyles of the femur. In such circumstances the great disproportion in size between that prominence constitut
Sheeranons, instead of, as in the case of the knee, the depression, between its two prominences.* The heel and shoulder differ from the knee in having only one large prominence instead of two; and they are to be distinguished from each other by the malleoli to toes in the former, and the humerus, clavicle, and spine of the scapula in the latter—all of which diverge in different directions from the prominence of the shoulder.

The shoulder is sometimes mistaken for the elbow, but it may be distinguished from it, negatively, by the absence of the internal condyle, and, when the axilla can be reached, the ribs constitute a positive diagnosis.

There is also a considerable resemblance between the elbow and heel, but these can be no difficulty in distinguishing the latter so long as the toes are within reach.

It is a dreadful error to mistake a hand for a foot, or vice versa, as the treatment of each is so widely different; hence, the differential diagnosis of these two presentations cannot be too strongly impressed on the student of midwifery.

Some authors have spoken of the greater length of the sole of the foot, as compared with the palm of the hand; others have adduced, as a distinctive point, the relative length of the nails in the fingers and toes, alleging that they are more fully developed in the latter. But, in a diagnosis of this nature, where
by the olecranon and the external condyle of the humerus com-
bined, and the other formed by the internal condyle only, was
quite distinctive of the elbow.
you have not the hands and feet of the same child to compare
with each other, it is manifestly absurd thus to depend on
degree;—for the palm of an unusually large hand in one case,
may be as long as the sole of an under-sized foot in another, and
a diagnosis founded on the relative lengths of the toe and finger
nails will even prove more fallacious. Dependence, therefore,
must not be placed on degree, but on kind.

The chief points of diagnosis in jostling cases are, that
the toes are nearly equal in length, and that no one toe can
be opposed to the others, as the thumb is to the fingers; besides,
this, the large prominence of the heel, which projects in a dir-
section opposite to the toes, and the two smaller tubercles
formed by the navel or above, and on either side of it, are
quite distinctive of the foot. The thick rounded instep is an
other point which should distinguish the foot from the hand.

The hand may be identified by the irregular line of digits,
each being of a different length; but its great diagnostic
mark is the thumb, which is to be recognised by its being
situated on a much lower level than the rest of the fingers,
and by its extensive range of motion, particularly its power
of abduction. For you can fold it into the palm of the hand.
The presence or absence of this mark indicates better than
anything else the difference between the hand and foot.
But the hand is further to be distinguished by its being on
the same plane, and continuous, with the arm, whereas the
foot is placed at an angle with the leg; its mobility, moreover,
is much greater than that of the foot, and the fingers can be
doubled up so as to form the foot.

The true function andcekismes, due to the compression
exercised on the fetal structures during protracted labour,
frequently give rise to such an amount of deformity in the pre-
senting part, that diagnoses is rendered difficult in the ex-
treme. This is particularly the case when the face or breech
forms the subject of these conditions, and were the soft
parts, in such perplexing circumstances, the only guides
to the diagnosis, the most skilled and experienced accou-
trians would not infrequently be at a loss. But there
fortunately exists, in the form of the osseous structures, a
more reliable basis on which to found our diagnoses, and
which, although it may be to a certain extent masked, is
not materially altered by any contingent circumstances.
How important then the knowledge of the various bone pro-
minences and depressions, which characterize each presentation,
and how essential that education of the sense of touch, by
which we shall be enabled, in whatever condition the soft
parts may be, to arrive at a correct diagnoses!
CHAPTER X.

Pelvic Presentations.

Pelvic Presentations comprehend those of the breech, knees, or feet, or of a single knee or foot.

Some authors describe separately the presentations of the antero-sacral, and of the inferior extremities, (including under the latter knee and foot cases, since the former are always converted into the latter during the progress of labour); but, as we have already indicated the differential diagnosis of these parts, and since in each variety, the mechanism by which the child is expelled is regulated by the same general laws, we shall make one description serve for all.

Naegeli states the proportion of pelvic presentations as four in every hundred labours. Presentations of the breech, according to Dr. Churchill, occur once in 59½ labours; and footling cases, once in 115. Presentations of the knee are very rare, being met with not often probably than once in three or four thousand labours.

There are sometimes certain unusual symptoms previous to the accession of parturition, and others at the commencement of that process, before anything definite can be
ascertained by vaginal examination, from the occurrence of which we may have reason to suspect a pelvic presentation.

Any difference in the external aspect of the abdomen, whether as regards form or size, as compared with former pregnancies, is apt to excite the apprehensions of the pregnant woman, leading her to imagine some malposition of the child; but these fancies are not worthy of much regard, because the mere inversion in the present cases of the ovoid formed by the foetal body does not alter the form of the uterus as to cause any apparent change in the external configuration of the abdomen. So slight an extent, indeed, in the case of pregnancy, does the malposition of the contained body interfere with the shape of the containing organ, that even in transverse presentations, where the long axis of the foetus is opposed to the short transverse axis of the uterus, anything unusual in the figure of the woman, if it really do exist, generally escapes unnoticed. Besides this, any obvious alteration in the shape of the uterus might as well be the result of twins, or of irregular development of the uterine fibres, as of malposition of the child.

There are on record, however, a few very rare instances in which, on account of the emaciation of the patient, or other peculiar and favouring circumstances, external
External examination has revealed to the touch through the walls of the abdomen and uterus, the foetal head occupying the highest point of the uterine tumours.

Abnormal movements of the part of the child, either as to their nature or extent, as felt by the mother, constitute a more reliable indication of malposition. These sensations, as perceived by the mother during the latter half of pregnancy are produced by the striking of the child's extremities against the uterine walls; that portion of the uterus, therefore, which corresponds with the coiled-up limbs, is the part in which these movements should especially be felt, and such we find to be actually the case. In cephalic presentations they will, of course, be chiefly perceived in the fundus and upper part of the uterus; if, therefore, during the latter weeks of utero-gestation, these sensations are not felt in their usual high position, but are principally referred to the cervix and lower part of the uterus, we should consider it a tolerably strong presumptive evidence of a pelvic presentation, and the hint thus afforded is not to be forgotten when labour supervenes.

The stethoscope is of very little, if any, value in the diagnosis of pelvic cases; for the pulsations of the foetal heart are heard loudest at a point so near the centre of the ovary formed by the coiled-up foetus, that no natural
difference is produced whether the pelvis or cephalic extremity be uppermost.

The symptoms which present themselves on the actual expiration of labour are more to be depended on. At this period the uterine tumour is said to be deeper in the pelvis in breech, than in cranial, presentations; but this fact, if it be a fact, is not of much value to us in the way of diagnosis, since, even in similar presentations, the uterine may be deeper in the pelvis of one woman, than of another, at the commencement of parturition; and there may be variations in this respect in the same woman, in different labours, the presentation being the same in each case. In fact, the degree to which the uterine sinks in the pelvis is due, not to the altered form of the pregnant organ, but to the amount of contraction which takes place, to the dimensions of the pelvis inlet and cavity, and to the degree of tension or relaxation of the abdominal parietes.

One or more, however, of the following signs will generally be present at the commencement of pelvis labour.

1. On vaginal examination, the os uteri will be found unusually high, the presentation being difficult to reach by the finger, or perhaps entirely out of
reach. This is especially to be observed in knee and footling cases.

2. If the os can be reached, we shall probably find that the extent of its dilatation is not commensurate with the strength of the pains.

3. On further examination, our attention will not fail to be arrested by the absence of that part so familiar to the touch, the sphenoidal angle of the foetal cranium, which usually fills up the cervix uteri, instead of which we shall probably find that,

4. The presentation is less solid, and more easily moved about than the head.

5. The shape of the bag of membranes, particularly in footling cases, will also attract our notice. It will be found less tense than in cranial presentations, and instead of the rounded form which obtains in the latter, it will be felt projecting from the os uteri in the shape more or less of a cone, which has been likened to the fingers of a glove, but which perhaps resembles more closely a piece of intestine.

6. It not unfrequently happens, however, that we fail to discover the amniotic pouch, the waters having broken at a very early period of the labours.

7. In such circumstances, the manner in which the liquor amnii is discharged is often distinctive of the presentation. In the present instance it flows away gradually until it has all
been discharged; whereas in cranial cases, when the mem-
brane ruptures there is a sudden gush of the fluid followed
by as sudden a stoppage, in consequence of the head coming
down on the os ilium and there acting as a ball-valve; after
the head is expelled there is usually another gush, and som-
times a third after the birth of the body.

The mechanism of Pelvic labours is governed by certain de-
terminate laws, just as in the case of cranial presentations;
but, on account of the smaller circumference of the foetal pelvis,
and the consequent want of that exactitude of adaptation to the
material passages, which distinguishes the head, deviations from
these laws are more frequent in their occurrence, and less serious
in their result than in cranial cases.

When treating of face presentations, we took occasion to point
out the remarkable similarity which exists between the face
and cranium, with respect to the different positions in which
these parts may be found at the commencement of labour.
In each we observed two great claspers, viz., that, in which
the occiput or chin, as the case might be, was directed forward,
and that, in which each was placed posteriorly; and we further
remarked that each of these claspers was divided into two
orders, which were named according as the occiput or chin
was more inclined to the one side of the pelvis, or to the other.
Pelvic Positions.

Classe | Orders.
-------|--------
Left.  | Left.  
Right. | Right.

1. Sacro-anterior.
2. Sacro-posterior.
The observations then made apply equally to pelvic presentations in which the sacrum is the analogue of the occiput and chin in cranial and face cases, respectively.

Accordingly, the table on the opposite page represents the classification of pelvic presentations.

Of the two classes, the first, or sacro-anterior, is simpler in its mechanism, and more frequent in its occurrence than the sacro-posterior in the proportion, according to Vaegele, of 121 to 10; or about 3 to 1.

Of the four positions, the left sacro-anterior, according to most authorities, is the most frequently met with; and in our subsequent description of the sacro-anterior class, we shall illustrate the mechanism by reference to this position.

Class I. Sacro-anterior Positions.

Order I. Sacrum to the left.

If, in this position, we examine per vagum as the presentation is entering the bicorn, our fingers will impinge on the mates which feel like two soft elastic cushions separated by a space, in which we will recognize the parts we have already enumerated as distinctive of the genital cleft. The direction of the sulcus, we will remark, is oblique, corresponding in the present instance to the left oblique pelvic diameter. In this respect it forms the analogue of the sagittal suture in cranial.
and the more in face presentations. We will further observe
that it is much nearer the posterior than the anterior lip of the
os uteri, so that the buttock which is anterior, (and which,
in the position now under consideration, is the left), occupies
the larger half of the os: the left ischium forms, in fact, the
presenting part.

As the labour advances and the mates descend, the left
buttock still keeps in advance, and the other parts of the fetus
bear the following relation to the pelvis of the mother:—the
sacrum is directed towards the left foramen ovale; the
transverse measurement of the hips occupies the left oblique
pelvis diameter; the right tectum is pointing to the left
sacro-illiac synchondrosis, and the left, to the right foramen
ovale.

We have already said, that a pelvis presentation, from
its smaller size is not so accurately to the parturient canal
as is the head; and as a consequence of this we find that,
in true-anterior positions, the long diameter of the breech
does not at birth approach so near the antero-posterior dia-
meter of the outlet of the os uterinus pelvis, as, in cranial
cases, the long diameter of the child's head is compelled to
do. Naegeli, indeed, derives that, in passing the outlet, the
transverse measurement of the hips changes at all from
its original oblique direction at the brim. With this opinion, however, we do not altogether coincide; for, as to speak of the testimony of many great observers who disagree in this point with Nægelo, we cannot help thinking that the breech must, in general, rotate on its vertical axis, at least to a slight extent, as it is forced through the outlet.

Supporting the breech to have now come down on the floor of the pelvis, the left ischiium will be felt immediately within the vulva. The slightest movement of rotation towards will be sufficient to allow of its slipping out from beneath the left branch of the pubic arch; towards the upper part of the left pubic ramus, and under its inferior margin, it then becomes fixed, and serving as a centre to the rest of the presentation, the breech rotates on its antero-posterior axis, and the right ischiium, first distending, and then sweeping over the perineum, escapes last of all. In this mode of exit, the pelvis of the child is flexed sideways on its trunk, thus performing a movement analogous to the flexion of jaws once at birth.

The legs may be born at the same time as the breech, the feet having been on the same level with the ischia during the entire labour; but if frequently happens that, just as the breech is entering the brim, the feet, which previously
had been close to the water, hit it on some part of the pelvis, and, in progression as the breech descends, they rise, so that they eventually become doubled up on the anterior surface of the body, the toes pointing to the chest. But even when this is the case, the legs are not long after the breech: when ever so much of the infant's body has passed the pelvis outlet, so that the thighs as far as the knees, have cleared the vulva, what remains of the legs is expelled from the vagina by the contraction of its fibres. And thus the lower half of the body is born; the abdomen of the child being directed to the inner and posterior part of the mother's right thigh.

The chest is now passing through the outlet, and simultaneously with this, the shoulders are entering the bume in the diameter just vacated by the breech; that is to say, with their long or transverse measurement parallel with the left oblique pelvic diameter, the right shoulder pointing backwards and to the left, the left, forwards and to the right. The arms are frequently born just as they were originally placed, viz., crossed in front of the chest; but the same accident sometimes happens to them as to the lower limbs. They are displaced upwards, and if means do not be used to bring them down, they may get one on each side of the head and seriously interfere with its transit through the pelvis.
The shoulders having now reached the pelvic floor, a slight movement of rotation, similar to that performed by the breech, takes place; the left shoulder, like the corresponding hip, being directed forwards, moves slightly round from the right acetabulum towards the right ramus of the pubis, and escapes under the arch; the opposite shoulder, which points backwards, is by this movement thrown more into the conjugate diameter of the pelvis, and distends the perineum in its progress towards the ostium vaginae.

As the shoulders are passing through the external orifice, the head, which has never lost its original condition of complete flexion (the firm pressure of the fundus uteri, by keeping the chin on the sternum, having in fact served to preserve it), enters the brim in the right oblique diameter, the opposite to that previously occupied by the breech and shoulders. This flexed attitude of the head is the best in which it could be placed, for the occiput being the highest point and the chin the lowest, it is not the fronto-occipital, but the shorter sub-occipito-frontal, diameter of the head which is opposed to the pelvic diameters. On this account, and since the parturient canal has already been well dilated by the passage of the body, the head in general is not long of being born, more particularly if care has been taken to have the arms expelled at the same time as the thorax.
Before, however, it can emerge from the pelvis, a slight rotatory movement on its vertical axis, similar to that previously observed by the back and shoulders, and identical with what occurs in the first and second cranial positions, must take place. The occiput moves round from the left acetabulum towards the pubic arch, so that the long axis of the head comes almost in relation with the conjugate pelvic diameter; the upper part of the meninges, almost the same depth as in cranial cases, (only the conditions here are reversed), impinges on the lower border of the symphysis pubis, and there forms a fixed point around which the head rotates in its exit from the pelvis; the chin is now felt a few inches from the vulva, projecting into the perineum, the face being lodged in the hollow of the sacrum; the next force usually effects delivery, and the chin emerging first, is followed by the rest of the face, the forehead, and the cranial vault, the occiput being the last part to clear the passages.

The right sacro-ante
terior position is the exact converse of the preceding, and demands no separate description.

**Class II. Sacro-posterior Positions.**

**Order I. Sacrum to the Left.**

The body of the child in sacro-posterior positions is in exact relation with that of the mother, the head being situated...
supernally, while the belly looks towards the mother's belly, and the back, towards the mother's back.

In considering those cranial cases in which the occiput was originally directed posteriorly, we found that, with very few exceptions, it rotated round from the sacro-iliac synchondrosis with which it was in relation to the acetabulum of the same side, and ultimately emerged from the pelvis anteriorly; in a few rare instances, however, we found that this rotatory movement did not take place, and that the head escaped under the arch of the pubes with the brow directed forwards.

In face cases, again, we saw that the chin, whether originally placed anteriorly or posteriorly, always emerged from the pelvis anteriorly, that is to say, there was no exception, since otherwise the head could not be born, and that if nature were insufficient to effect the necessary rotation, art must.

In pelvic presentations, on the other hand, the breech as a general, almost invariable rule, traverses and emerges from the pelvis in the same direction in which it had entered it; thus, the sacrum, when anterior at first, remains so to the last, and when originally placed backwards, it is born posteriorly.

The left sacro-posterior position, or that in which the sacrum is in relation with the left sacro-iliac synchondrosis,
is generally considered the more frequent of the two orders in the present clasps. The belly of the child in this position is directed towards the right side of the mother's abdomen, and the transverse measurement of its hips occupies the right oblique pelvic diameter, the right trochanter pointing to the right sacro-iliac symphysis; the left, to the left foramen ovale.

The left ischium forms the presenting part, and the same amount of rotation as was required in the right sacro-iliac position is sufficient to allow of its escape under the pubic arch. The mechanism of its emergence, and the birth of the entire breech, is the same in both cases, with the exception that, in the present instance, the belly of the child, instead of the back, emerges anteriorly, and that it is subsequently directed towards the anterior and inner, instead of the posterior and inner, part of the mother's right thigh.

But the latter difference is only temporary, for as the shoulders are passing the pelvic outlet, the body of the child exterior to the maternal structures may be seen suddenly to turn round, so that the belly and toes which a moment before looked forwards and to the right, are now directed backwards and to the right.

This movement is due to the rotation of the head on its
vertical axis which takes place within the pelvis. The head enters the bicorn in the left oblique diameter with the occiput directed to the left sacro-iliac symphysis; but it can very seldom be born in this position; a change, therefore, is effected; the head rotates on its vertical axis, carrying the whole body along with it, and the occiput travels from the left sacro-iliac symphysis to the left acetabulum. The long axis of the head now lies in the right oblique pelvic diameter and the case terminates in the same way as a left sacro-anterior position.

The mechanism of the right sacro-posterior position is exactly the converse of the above.

Naegle mentions that in a few very rare instances, sacro-posterior, are converted into sacro-anterior, positions inside of the pelvis, instead of outside, as is generally the case.
Transverse Positions.

Classes.

1. Dorsal-anterior
   - Right
   - Left

2. Dorsal-posterior
   - Right
   - Left
CHAPTER XI.

Transverse Presentations.

Transverse Presentations, or Crossbirths, we have defined as presentations of the trunk and upper extremities; but, as in the great majority of cases it is one or other shoulder which primarily presents at the os uteri, we need not spend time in describing those other cases in which some part of the body forms the presenting part.

Shoulder, or Arm, Presentations, as they have also been called, (for often during labour the elbow or hand comes down and projects through the os uteri), are divided, like the other presentations of the child, into two great classes, according as the back of the child is originally directed anteriorly or posteriorly, and each class is subdivided into two orders, according as the head lies towards the right or left side of the maternal pelvis.

The first class of our tabular arrangement occurs about twice as often as the second; but there are no statistics to show whether the head is more frequently turned to the right or left side.

The right dorso-anterior, and the left dorso-posterior, positions occur in the left oblique diameters of the pelvis; and the left
dors-anterior, and the right dors-posterior positions, in the right oblique diameter. In the dors-anterior and posteria positions on the right side of the pelvis, the right shoulder presents; and in the corresponding positions on the left side, it is the left shoulder.

As was the case with pelvis presentations, so with crossbirths, there are no absolutely certain diagnostic signs of their existence previous to the accession of labour; and even at that period, with the exception of uterine escape and spasms which are sometimes coincident with these cases, the symptoms are very much the same as those already enumerated as characteristic of pelvis labour; only in the present instance they will be all somewhat exaggerated. In fact, nothing short of actual tactile examination can determine with certainty a transverse presentation. Even when the presenting part can be reached, there is occasionally considerable difficulty experienced in distinguishing between different parts of the foetal body. This is more particularly the case when the elbow or knee constitute the presentation, and one is often so much puzzled by their great resemblance to each other, as to be unable to arrive at a positive diagnosis. In such circumstances the only alternative is to bring down altogether the doubtful limb, when the foot or hand, whichever it should
happen to be, will easily be identified. This manoeuvre fortunately in no way interferes with the subsequent progress of labour in either case; and if it turn out to be a transverse presentation it will be further useful in distinguishing the position in which the child lies; for, from the direction of the thumb we shall be enabled to ascertain whether it is the right or left arm that forms the presenting part.

It now and again happens that a natural presentation is converted during labour into a cross birth; and this accident has, and with great probability we think, been ascribed to contraction of the pelvis bone; indeed, in several women, the subjects of repeated cross births, this species of deformity has been discovered both before and after death.

We formerly ascribed contraction of the pelvis as one of the causes of cross presentation; and it is our conviction that, in a case where the cranium primarily presented, but where a certain amount of contraction of the bony had given rise to an ear presentation, if the narrowing had only been a few degrees greater, a transverse presentation would have been the result.

In the former case, on account of the opposition which the distorted bony presents to the downward progress of the head, the impelling power of the uterus causes the neck to bend laterally, where there is greatest space, so that the ear becomes
the lowest point of the descending head, and in this position the head, presenting as it does smaller diameters than in the usual cranial presentation, is forced through the narrow inlet. In the latter case, however, by reason of the still greater amount of pelvic contraction, the head cannot be admitted even sideways, as in face presentation. Forced on, therefore, by the powerful action of the uterine from above, and resisted by the unyielding pelvis below, it is compelled to move in a line diagonal to the lines of the forces acting upon it; physical action and re-action always being equal. Accordingly the neck is obliged to double on itself, and the head is pushed into one or other cleft of Jepson, while the shoulders, being of much smaller dimensions, is forced down in its place.

A transverse presentation, occurring in a pelvis of the usual dimensions, and where the child is at the full time and of the normal size, cannot be expelled without assistance. But when the pelvis is unusually large, and the fetus dead or premature, or in the second of twins, where the child is relatively much smaller than the passages, the natural powers have sometimes been sufficient to effect delivery. In such circumstances the infant may be born in two different ways, the one being termed Spontaneous Evulsion, Version, or Turning, the other and by far the more frequent, Spontaneous Expulsion.
Spontaneous Version was first described by Dr. Denman, and is an extremely rare occurrence. It consists of nothing short of an intra-uterine descent of the child's body—the conversion, in fact, of a shoulder, into a cephalic or pelvic presentation. This wonderful evolution where it has been observed, generally took place before the membranes ruptured, or just at the time of their doing so: the shoulder was felt to recede from its position, and to pass above the pelvic brim, and shortly thereafter the breech or head of the child was found occupying its place. The labour then proceeded exactly as if these parts had formed the original presentation.

Dr. Douglas of Dublin was the first to offer the true explanation of Spontaneous Expulsion; and so much greater is its relative frequency as compared with Spontaneous Version, that never having met with a case of the latter, he denied the accuracy of Dr. Denman's account of it, and even questioned the possibility of its occurrence. Subsequent experience, however, has satisfactorily determined that both of these excellent observers were right in one respect and wrong in another: Dr. Denman's description of Spontaneous Expulsion was quite accurate; but he erred in supposing it the only termination of naturally delivered transverse presentations; Dr. Douglas was also correct in his explanation of Spontaneous Expulsion.
but wrong in doubting the occurrence of Spontaneous Vaginal
Spontaneous expulsion, as its name implies, consists of a
forcing of the doubled up body of the child through the pelvic
passages, without, as in the case of Spontaneous Evolution, any
attempt on the part of nature at a rectification of the malposition.
This process being altogether as abnormal and unnatural, no
ever well marked adaptation of the parts to the maternal pelvis
can be observed in its mechanism. One point, however, deserves
especial notice, as being another instance of the analogy we have
traced in all the presentations of the child; it is this, that the
back of the infant always emerges from the pelvis antero-laterally,
even when originally placed backwards; in this respect trans-
verse presentations agree with those of the face; for as the latter
cannot be born with the chin directed postero-laterally, the former
cannot be born with the dorsum directed postero-laterally. Keeping
this fact in mind, the following description of the mechanism
of Spontaneous Expulsion will serve for both of the classes in our
tabular arrangement.

The head is fixed over the horizontal canals of the right or
left of pubis, as the case may be, and the presenting shoulder
never recedes from the original position; it toils up at the pelvic
brim, but, keeping always in advance, and propelled by, and
drawn into the pelvis by each successive uterine contraction, it is
the first part to clear the external orifice. As soon as the whole
arm is expelled, the clavicle comes under the lower margin of
the pubic arch; the shoulder, at each pain, is pushed slightly
upwards in front of the pubis, towards the Mons Veneris; and, the
back being directed anteriorly, the sacrum comes in relation with
the posterior surface of the symphysis pubis, which fits accur-
ately into the concave space between the external occipital tuber-
osity and the last cervical vertebra, and thus there is formed
as it were a hinge, around which, in one enormous sweep, the
whole fetal body rotates in its exit from the pelvis. In this
movement the shoulders and breech are thrown into the con-
cavity of the sacrum, and thence forced on by the powerful uter-
ine contractions, they glide forwards over the perineum, distend-
ing it frightfully, and leaving when born, the head and
the arm opposite to that which presented, still in the pelvic
passages. The arm may then be pulled down by the fingers of
the medical attendant, and the head is delivered in the same
way as in an ordinary breech labours.
CHAPTER XII.

The Analogies of Parturition.

In the preceding pages we have considered the mechanism, and in connexion with it the diagnosis of each individual presentation of the child; and in the investigation of this interesting subject, we have found, that, in all the different modes in which the infant may present at the pelvic brim, there is a remarkable analogy in the process by which it is propelled through, and ultimately expelled from, the maternal parts.

There are, in fact, certain great general laws, the operation of which is observable in the mechanism of all the presentations of the child, be they natural or spontaneous; since, therefore, we have already discussed the mechanism of each separate presentation, it may not be out of place to conclude the present essay with a brief notice of a few of these laws which, to a greater or less extent, govern all.

I. Each presentation of the child lies in the pelvis, as a general rule, with its greatest measurement parallel with one or other of the oblique pelvic diameters.

Thus, the oblique diameter of the pelvis is occupied—in cranial presentations by the long ovoid of the child's head; in face cases, by the long, or fronto-mental measurement;—
in breech presentations, by the long transverse diameter of the hips; while in cephalic births the whole length of the body may be said to lie in an oblique direction.

II. The most anterior part of the presentation, or that part nearest the pubis, is the lowest during labour.

Thus, in cranial presentations, it is that parietal bone, in face cases, that cheek, in brow presentations, that frontal prominence, and in breech cases, that ischium which is directed anteriorly, that lies lowest in the pelvis.

III. That part of the presentation corresponding with the back of the child, in whatever way it may enter the pelvis, whether directed anteriorly or posteriorly, becomes, as a general rule, anterior before the termination of labour.

Thus, the occiput in cranial presentations, the chin in face cases, and the dorsum in shoulder presentations, whether originally directed forwards or backwards, always emerge from the pelvis anteriorly, if the case be normal.

In those breech cases, also, where the back of the child is originally directed to the spine of the mother, this law does not altogether fail; for although the breech may be born with the sacrum posterior as when it entered the pelvis, yet we saw that as the head came in relation with the pelvic planes, a rotation
of the occiput from the sacro-iliac synchondrosis towards which it was directed to the acetabulum of the corresponding side, both place, and that the body of the child extenues to the maternal parts also performed a similar revolution; so that ultimately the back of the infant came to look anteriorly.

We have already more than once spoken of the chin as the analogue of the occiput, but without attempting to demonstrate the fact. Now, if we can satisfactorily establish the analogy between these two parts, the correspondence of the chin with the dorsum of the infant follows as a matter of course. But, however evident this may appear to the mind, it is by no means an easy matter to explain it in words. We know the fact that the chin in face cases plays the part of the occiput in cranial, of the sacrum in pelvic, and of the dorsum in transverse presentations. When investigating the mechanism of face cases, we could not help observing the analogy, as to function, distinguishing between the chin and the parts just mentioned; and we do not require to be told that these parts, at any rate, correspond with the back of the child. Since, therefore, the chin in face cases corresponds in function with the occiput, sacrum, dorsum, in cranial, pelvic, and transverse presentations, respectively, and since the latter manifestly correspond with the back of the child, we conclude that the chin is that portion of a face presentation which corresponds with the same part.
This forms a corollary to the axiom, "things, that are equal to the same thing, are equal to one another," and would stand thus. Things, that are equal to one another, are, each of them, equal to the same thing. In other words, if A is equal to B, and B is equal to C; A also is equal to C. Now, the function of the chin in face cases is identical with that of the occiput in cranial presentations; but the occiput corresponds with the back of the child; therefore, the chin also does the same.

This is one mode (more mathematical, certainly, than philosophical) of proving the analogy between the chin and occiput, and the correspondence of the chin with the back of the child; but were we called upon for a more scientific explanation of the fact, we might venture on a statement somewhat like the following. The fetal cranium being generally more or less spheroidal in shape, presentations of the head are almost always of an ovoid form; the presenting part being, in the great majority of cases, either the ovoid formed by the vault of the cranium, or that formed by the face. Now these two ovoid presentations have one part common to both, viz., the forehead; and it seems an established law with respect to the forehead in cranial and presentation, that it shall always play the part of the anterior pole of the cranial spheroid, whether the occipito-frontal, or the meta-frontal ovoid be the presentation. If the existence of this law be admitted, it follows
as a matter of course, that the chin and the occiput are the posterior poles of the cranial spheroid, in the presentations of the face and cranium, respectively. And the occiput corresponding allowedly, with the back of the child, it further follows, that in face cases, the chin corresponds with the same part.

But, after all, in attempting to demonstrate the correspondence between the chin and the back of the child, it is quite unnecessary to take anything for granted, since it may be explained on simple mechanical principles. In the quotation from Prof. Simpson's obstetric works opposite page 19, particular attention is directed to the two following points: 1. That the impelling power of the uterus is transmitted to the head of the infant along the line of the spine, and 2. That in a natural presentation, both on account of the head being articulated to the vertebral column at a point nearer the occiput than the chin, and by reason of the complete flexion of the head, more especially, the repulsive force of the uterus bears most strongly and directly upon the occipital region.

Now, in flexion of the head, as in a cranial presentation, if the uterine force is transmitted to the occipito-frontal orbit chiefly through the occiput, and for this reason, in particular, that the occiput, when the head is thus flexed, is placed almost in the same line as the spine, along which the force is carried, it must be evident that, in complete extension of the
head, as in face cases, the part of the presentation most directly in the line of the spine will be the part most directly operated upon by the impelling power of the uterus, and will thus be the part corresponding with the back of the infant. This point may be very simply ascertained: take a dead child, and bend back the macka on the vertebral column, so as to imitate the extension of a face presentation, and it will at once be manifest that, of the whole mento-frontal avoid, the chin is the part most directly in the line of the spine; in fact, a line prolonged from the spine, and in the same direction with it, will pass very nearly through the chin, when the head is completely extended.

In connection with the Law now under consideration, the following point deserves attention, viz., that the part of each presentation corresponding with the back of the child, seems, by its movement, to determine the relative position which the other parts of the presentation shall bear to the maternal pelvis.

This point has been sufficiently established in the immediately preceding remarks; because, the force generated by the uterus being transmitted along the vertebral column of the infant to that portion of each presentation either directly continuous with the spine, or in the same line with it, in other words, to the part corresponding with the back of the child, it follows that the movements of the rest of the presentation must necessarily be determined and regulated by the movements of this part.
Accordingly, in cranial presentations the occiput is the regulator of the different rotations of the head. In each movement of the cranium on its bi-parietal or vertical axis, it traverses a greater space than any other part of the presenting ovipod except the forehead, which, being exactly opposite to it, passes, of course, whenever the occiput moved one way, through an equal space in the opposite direction. But, in movements of the head on its perpendicular axis, we must remember that the sole object of the rotation, in all cases, is to place the occiput in such a position, as that it shall emerge from the pelvis anteriorly. Accordingly, although the occiput moves through a space equal to that traversed by the occipital pole of the cranial ovipod, yet, even apart from our knowledge of the fact, it is quite natural to suppose that the occiput must be the regulator of these movements which have reference only to itself. The corresponding movements of the forehead are to be ascribed merely to the circumstance that the latter happens to be the opposite pole of that ovipod, of which the occiput is the chief and regulating pole.

The relation subsisting between the occiput and bipariet in rotation of the head during parturition may be illustrated by reference to the North and South poles of the needle of the Mariner's Compass. The movements of the South pole are subordinate to, and entirely dependent on, those of the North.
whereas the movements of the North pole are strictly independent. It is just the same with cranial presentations; the North pole being represented by the occiput, the South by the forehead. And what has been said with regard to the occiput and forehead in cranial presentations, applies, with equal force, to the chin and forehead, respectively, in face cases.

IV. — In order that the part corresponding with the back of the child shall emerge from the pelvis anteriorly, a certain amount of rotation, or movement of the presentation on its vertical axis, takes place.

In those cases where the part corresponding with the back was originally directed forwards, to one or other acetabulum, rotation to the extent of the eighth of a circle takes place; and where it was originally directed backwards, to one or other sacro-ilial symphysis, the rotation equals the quarter of a circle.

The mechanism of this intra-pelvic rotation has been likened to that of the screw. The same principle obtains in both: it is that of a solid body descending in a spiral direction, the inclined planes of the exterior of a hollow body. In the case of the screw this is exemplified by the rotation of the spindle within the nut; and in parturition it is seen to greatest advantage in occipito-posterior cranial positions, when the rotation, or change into an occipito-anterior position,
which takes place on the floor of the pelvis, causes the occiput to move in a spiral direction down the inclined planes of the ischium and pubis of one or other side of the pelvis. Now a screw is nothing more nor less than an inclined plane winding in a spiral direction around, either the outside of a solid, or the inside of a hollow cylinder, the former being known in mechanics as the male, the latter, as the female, screw.

In the rotation of the fetal head to which we have just alluded, the exocciput plays the part of the male screw or spindle, while the pelvis fulfills the condition of the female screw, or nut. Furthermore, the occiput represents the spiral groove or thread, of the male screw; the inclined planes of the pubis and ischium, that of the female screw. And so with a face or breech presentation, which, in like manner, plays the part of the male screw— the chin in the one case, and the most anterior ischium, in the other, represents the thread of the spindle.

On examining the conformation and measurements of the pelvis, the principle of the screw becomes still more apparent. The longest diameter at the brim is the transverse, in the cavity the oblique, and at the outlet the antero-posterior; and, in accordance with these measurements, we find that the head at the commencement of parturition is generally nearer the transverse diameter than...
At any subsequent period, that as the labour advances it corresponds more exactly with the oblique, and that at both it approaches the conjugate? A line, therefore, beginning at the transverse, passing through the oblique, and ending at the antero-posterior pelvic diameter will very nearly mark the path pursued by the foetal cranium, in occipito-anterior positions. This line, it will be seen, does not represent a complete resolution, but merely a portion of a spiral, as the occiput rotates only one eighth of a circle in occipito-anterior, and one fourth of a circle in occipito-posterior positions.

The spiral thread of the pelvis, or mouth of the uterus, is thus an imperfect one, at least in so far as a single pelvis is concerned. But since the occiput may rotate a quarter of a circle, every pelvis must possess a portion of a spiral groove at least equal to that extent; so that, four pelvises, placed one above another, should represent one complete spiral coil, and such we will find to be the case.

In addition to the imperfect nature of the thread in the uterus formed by the child's head and the mother's pelvis, we find that the spindle and nut do not fit into each other very accurately; there is, nevertheless, a general adjustment observable in the relative positions of the pelvic diameters as to stunt the oblong form of the foetal cranium, or perhaps we should rather say, in the configuration of the foetal cranium.
so as to correspond with the arrangement of the pelvic diameters. Besides, at those points where the occiput comes in contact with the lateral planes of the pelvic wall, the thread of the male, may be said to fit into that of the female, sooner; and, were it not for this timely adjustment at these points of contact, and the movement of the fetal cranium within the pelvis in a spiral direction, just after the manner of the spindle within the nut, the advancing head would encounter much greater mechanical resistance than it usually meets with, if perhaps, its progress might not be altogether arrested.

When considering the change of the right occipito-posterior into the right occipito-anterior position, we mentioned that, although the uterine contractions, aided by the abdominal muscles, were the forces employed in the propulsion of the head through the pelvis, yet they had no influence in the rotation of the head which takes place in these cases, that movement being simply a mechanical action, depending for its manifestation on the gliding of the oblong head of the child along the planes and axes of the pelvis.

Now, when a weight or pressure is applied to a male seam adjusted within the chambers of a female, the former has a tendency to descend the spiral inclined plane of the latter; just as in particular, the uterine contractions and the other expulsive forces represent the weight or
prepare which compels the foetal extremity (the male screw) to descend the spiral inclined planes of the pelvis (the female screw). The apparatus which many surgeons use for describing these names in prescriptions is a familiar example of this kind of action.

But since in occipito-anterior positions the occiput traverses a much smaller space than in occipito-posterior, there must be a separate spiral groove for each; and since, in the right occipito-anterior and posterior positions, the occiput rotates from right to left, whereas in the left corresponding positions it moves from left to right, each side of the pelvis must have two portions of a screw, the inclined planes of which run in opposite directions to the corresponding inclined planes of the other side. Further, in every natural labour, the corresponding spiral of each side of the pelvis must necessarily be traversed by the foetus; in occipito-anterior positions it will be the smaller, and in occipito-posterior, the larger, spirals. But, to explain this statement, we have already seen that the child's shoulders always occupy the opposite oblique diameter to that in which the head had been placed; if the head, therefore, was in the left occipito-anterior position, the occiput would move on the smaller spiral of the left side of the pelvis in a direction from left to right, and the right
shoulde would descend the corresponding spiral of the opposite side in a direction from right to left, it would, in fact, just follow the same path along which the occiput moves in the right occipito-anterior position; and, in like manner, if the head was in the last named position, it would descend the smaller spiral of the right side of the pelvis, while the left shoulder would follow the corresponding spiral of the left side, thus traversing the same path as a left occipito-anterior position.

A knowledge of these spiral inclined planes is by no means unimportant in the practice of the obstetric art. Thus, we may learn in theory what we will find practice confirms, viz., that in most cases it is impossible to perform artificial rotation of the head, as we may have occasion to do in cases requiring the forceps, before it has arrived at that part of the pelvis where rotation usually takes place; prior, in fact, it has reached one or other of the spiral grooves, and until a certain adjustment has taken place between the fetal cranium and the pelvis.

V. In all presentations, rotation seems to take place about the same part of the pelvis; and that part is low down, near the outlet.

We may test this during labour by observing with our
Joints when and where the rotation occurs; and by imitating
the rotation of occipito-posterior cranial positions with a dried
foetal skull, and a dried pelvis, as nearly adapted in size to
each other as possible, we shall find additional confirmation
of the present laws.

VI. — Each presentation describes the segment of a cir-
cle in its exit from the pelvis.

At birth, some part of the presentation becomes a fixed
point, or centre, or hinge, on the symphysis pubis, around
which the rest, in emerging from under the pubic arch, de-
scribes part of a circle.

We do not mean to say that the preceding six Laws
are strictly observed in every case. Nature's laws have
many exceptions; and all that we affirm, with regard to
those regulating parturition, is this, that their operation is
as general as to render their observance the rule, their non-
observance the exception to it. There are several points,
doubtless, where, we must admit, the striking general
analogy, which distinguishes all the presentations of the
child, does seem to fail; at least we are unable to
trace its existence.

As to the facts enumerated in these laws, we must not
consider them as phenomena of either a vital or inexplicable nature; but we are to regard the various positions and movements, which these laws regulate, as merely mechanical adaptations of each different presentation to the planes and axes of the pelvic canal.

David Anderson Morey,  
31st March 1858.