Module 3
VAGINAL BIRTH
Birth Stages, Pelvic Types and Cranial Molding

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Module 3

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Preface

The notes for the Cranial Molding, Module 3 training are primarily a set of images. These images come from two sources: 1. The Fetal Cranial Studies video, and 2. The original research from Caldwell, Moloy and De 'Esopo from the 1920s and 30s, and, the main American obstetric text book, *The Principles and Practice of Obstetrics,* by De Lee and Greenhill, 1943.

The Fetal Cranial Studies is a video that I made with special fetal skulls that were prepared by Dr. Marc Pick, a chiropractor from Beverly Hills, California. I am grateful to Dr. Pick for being so generous with these skulls and his work. He soaked several fetal skulls in a mild preservative solution that makes the membranous quality of the natal skull very apparent. Additionally he has disarticulated the skulls so that they can demonstrate just how flexible perinatal cranial structures are.

I am providing these images to support you to build practical visualization skills for prenatal and birth therapy. You can use these images to perceive in your mind's eye body positions, movement patterns and cranial shapes associated with vaginal birth including the influence of mothers' pelvic shapes on babies. It is actually possible with many babies, children and adults to ascertain what happened to them during birth by observing and correlating movement patterns, body positions, movement sequences, postural imprinting and lasting cranial molding.

These images are presented so that you can begin with the fetal cranium, move to basic pelvic anatomy, study the pelvic shapes and see how the birthing baby's structures are influenced by the mother's pelvic structures. Many of the images are artistic renderings taken directly from x-rays of babies and moms taken during labor. They are anatomically accurate and correlate directly with babies' birth positions and mothers' pelvic shapes.

I have included the two chapters from the De Lee and Greenhill, *Principles and Practice of Obstetrics* (1943*)* because you will be able to get a very good representation of the common attitudes and thinking about birth from that time. This is extremely useful for anyone born during the 1940s.

Obstetric and midwifery practices in the United States and Europe have been profoundly influenced by the work of Caldwell, Moloy, and De Lee. I have provided here high quality reproductions taken from their original published work. This packet of notes represents many hundreds of hours of work by myself, Ginny Partridge, Tosh Montee, Zebediah Smith and Tom Gwynne.

The copyrights for these images are older than 50 years and in the United States are now part of the public domain which makes them available for reproduction here.

I am in the process of writing a narrative for these images and plan to publish a book from them.

Raymond F. Castellino, D.C., R.P.P.
June 18, 1999

Introduction to Pelvic Types and Birth Stages

The passageway – the maternal pelvis

Let us now examine the physical birth process itself by first looking at the passageway, the maternal or mother's pelvis.

The pelvis is made up of four sets of bones:

- A right ilia
- A left ilia
- A sacrum
- A coccyx

It is adhered together by ligaments and muscles.

There are several landmarks that are highly influential on the birth process. They are:

- The lumbosacral promontory, the junction between the lumbar spine and the sacral base, typically L5-S1
- The pelvic inlet or pelvic brim
- The pubic symphysis
- The sacrum
- Ischial spines
- The sacral apex and coccyx
- Ischial tuberosities.

In the 1920's and 30's, Caldwell and Moloy x-rayed 3000 mothers and babies in varying stages of labor. At that time, they still believed that x-rays were safe. They were ignorant of or were ignoring the fact that a certain percentage of these babies and mothers would suffer irreparable harm from the x-radiation. Caldwell himself died when he was 61. I cannot help wondering if his own overexposure to x-radiation did not contribute to his demise. The Curries, who discovered the radioactive properties of uranium, died from exposure to radiation. Caldwell and Moloy found, as you would imagine, that mothers' pelvic shapes came in varying shapes and sizes. They then categorized four basic pelvic types, based on the inlet shape. They also defined 16 or 18 combinations of pelvic types.

These pelvic types are important to our studies because it is the mother's pelvis, her passageway, that has a major influence on the imprinting that occurs on the baby. Each pelvic type provides a template for specific variations that are uniquely identifiable. The levels or layers of imprinting are the same as those used for skills, assessment and treatment discussed earlier:

Primary energetic patterns
Conjunct sites
Conjunct pathways
Vector Patterns
Cranial lesion patterns
Micromovement schema (Fluid tides, ventricular system, esoteric pineal, pituitary relationships)
Macromovement schema
Static posture schema and muscle tone patterns
Psychic patterns and psychological corollaries

William Emerson defined four basic birth stages. He confirmed these stages with Franklyn Sills and later myself. We have collectively correlated the movement patterns of hundreds of babies and thousands of adults. We had worked with life-size models of a gynecoid female pelvis and a baby doll before any of us looked closely at obstetric research. The patterns that Emerson and Sills defined were accurate for the gynecoid type. We found, however, that there too many variations which did not fit the basic conjunct sites and movement patterns they defined.

Between 1990 and 1993, I (Castellino) thoroughly researched the twentieth century obstetric literature. I found the 1943 obstetric text *Principles and Practice of Obstetrics* by De Lee and Greenhill. This text was very useful for my personal understanding because I was born in 1944. De Lee was the father of twentieth century obstetrics. He was a compassionate doctor who, given the constraints of medical knowledge of the time, was interested in the least injury to the baby. Yet, he designed the De Lee forceps, the De Lee suction and was instrumental in beginning the obstetric trend of combining episiotomy and forceps as a delivery method. The way he perceived birth was strongly influenced by the work of Caldwell and Moloy in the 1920s and 1930s. The influence of Caldwell and Moloy continues today in 1999 in every major obstetric text and many midwifery texts.

In March of 1993 we (Emerson and Castellino) adopted the four pelvic types as a way to understand the patterns Emerson, Sills as well as I were seeing with the babies and adults in our practices. We found immediately that the many variations when considered in relationship to other pelvic types made new sense. This new correlative step simplified understanding , facilitation and teaching.

The four pelvic types / shapes

At this point, the four pelvic types are introduced considering their simplest common denominator, the pelvic brim or pelvic inlet.

The four pelvic types in the order of birthing ease are:

- Gynecoid: round inlet
- Anthropoid: oval inlet with the widest diameter in the anterior/front to posterior/back dimension
- Android: triangular inlet
- Platypelloid: plate-like inlet, narrow in the anterior/front to posterior/back dimension and wide in the transverse/side to side dimension

Based on the Caldwell-Moloy studies, the frequency of occurrence varies depending on the cultural group. In 1943, De Lee and Greenhill reported that the x-ray studies completed by Caldwell, Moloy, and D'Esopo showed that of 3000 Caucasian women:

- 41.4% had the Gynecoid, oval or what they called the "normal" female pelvis
- 32.5% had the Android or triangular type pelvis
- 23.5% had the Anthropoid or long anterior to posterior pelvic shape
- 2.6% had the Platypelloid or the "flat" narrow pelvis in the Anterior to posterior dimension

Later *British Gray's Anatomy* reported the following percentages for black women:

- 42.1% Gynecoid
- 15.7% Android
- 40.5% Anthropoid
- 1.7% Platypelloid

It is interesting to note that the two most efficient risk-free pelvic shapes for birthing are the gynecoid and anthropoidal types. The most inefficient challenging birth shapes for birthing are the android and the platypelloid shapes. 82.6% of black women (African descent) and 64.9% of white women (European descent) are said to have the most efficient pelvic shapes for birthing. Fortunately, the shape of the birth passage is not the only factor contributing to the efficiency of birthing. Other factors include the emotional states of the mother and birthing team during labor and delivery, the mother's and father's familial and birth histories, their beliefs about birth and the mother's overall physical condition.

I do not as yet have percentages of pelvic types for Asian, South American or Middle Eastern decent.

The pelvis then is divided into two areas or spaces and two transition sites. From top to bottom they are the:

- False pelvis, the area between the iliac crests and above the pelvic brim or inlet
- Pelvic inlet or pelvic brim
- Mid-pelvis, the area surrounded by the pubic rami and sacrum
- Pelvic outlet, which is made primary of the muscle and ligamentus soft tissue of the perineal floor as it adheres to the ischial spines and includes the birth canal.

The pelvic inlet, mid pelvis and outlet form the areas that define the birth stages. These three areas are a triune that will correlate with the three trimesters of pregnancy.

Most often babies turn themselves head down and negotiate the space of the false pelvis before labor begins. The birth stages begin as the baby's head enters the pelvic inlet with one side of its head toward its mother's spine and lumbosacral promontory. Later we will examine cranial molding patterns, postural elements and movement patterns to deduce the babies' lie side. Usually these patterns will correspond with the labor and birth history as the parents describe it and with the labor and delivery records.

Birth Stages

The birth stages according to Emerson are based on what the baby has to do to negotiate his/her way through its mother's pelvic passage as a cranial (head first) vaginal birth. These stages do not correspond with the stages of labor as they are classically defined obstetrically. In fact, most often the baby's head engages its mother's pelvic inlet before the onset of physiologic labor. The birth stages are:

- Stage one, inlet dynamics - the baby's head engages the pelvic inlet.
- Stage two, mid-pelvic dynamics - the baby's head negotiates the mid pelvis, passing zero station of the ischial spines.
- Stage three, outlet dynamics - the baby's head is born and restitutes.
- Stage four - the baby's shoulders and body are born, routine medical interventions are done including the cutting of the umbilical cord.

To apply this information to the birth process, let us look at a simplified overview of the gynecoid birth dynamics from the perspective of what happens to the passenger, the baby:

- Stage one. The parietal area of the baby's head comes into contact or conjuncts the mother's lumbosacral promontory and descends into the pelvis part way through the pelvic inlet.
- Stage two starts when rotation of the baby's head begins toward the mother's sacrum.
- Stage three starts with the baby's head rotated up against mom's sacrum. The head at the neck will flex and then extend as the head is born. Stage three completes when the head is born.
- Stage four begins with restitution of the baby's head. This means that the baby's head turns so that it is rests properly on its body. Stage four includes the birth of the anterior shoulder, the posterior shoulder, the body, the cutting of the cord, and any medical procedures that are performed until the baby stabilizes and is bonded with his/her mother and father.

The key concept that ties the birth process to the developmental stages from preconception through pregnancy is that the first three birth stages recapitulate the three phases that we have seen before. Each birth state compresses and couples the characteristics of that stage into physical structure.

- During stage one, the endogenous direction toward self will be compressed and coupled into the body structure.
- During stage two, the directional dilemmas and confusion of the darkness will be compressed and coupled into body structure.
- During stage three, the exogenous direction toward the creation will be compressed and coupled into body structure.
- Stage four, immediately after birth of the head, recapitulates the three aspects again.

As you study these birth stages, note where you have difficulty staying present, where you phase out, get confused or have difficulty comprehending. These places usually indicate areas where the student has some residual trauma stored. It is important to frequently reorient yourself, first to yourself then to the person you are working with: Top / bottom, front / back, right / left, inside / outside.

Lie side identification
The lie side is the side of the baby's head that is toward the mother's lumbosacral prominence. The non-lie side is the side of the baby's head toward the mother's anterior pelvic structures like her pubic symphysis.

Visual Assessment of lie side from the fetal perspective

- Internal rotation side.
- Frontal slope is greater on the lie side.
- Head rotates to the lie side in neutral upright position.
- Eye is closer to midline on the lie side.
- Low shoulder on the non-lie side with anterior shoulder dystocia.

Baby movement patterns for lie side identification

- Spinal C curve, cavity is on the lie side.
- Lie side is more contracted.
- Lie side movements are more inhibited when compared to non-lie side.

Non-lie side identification:

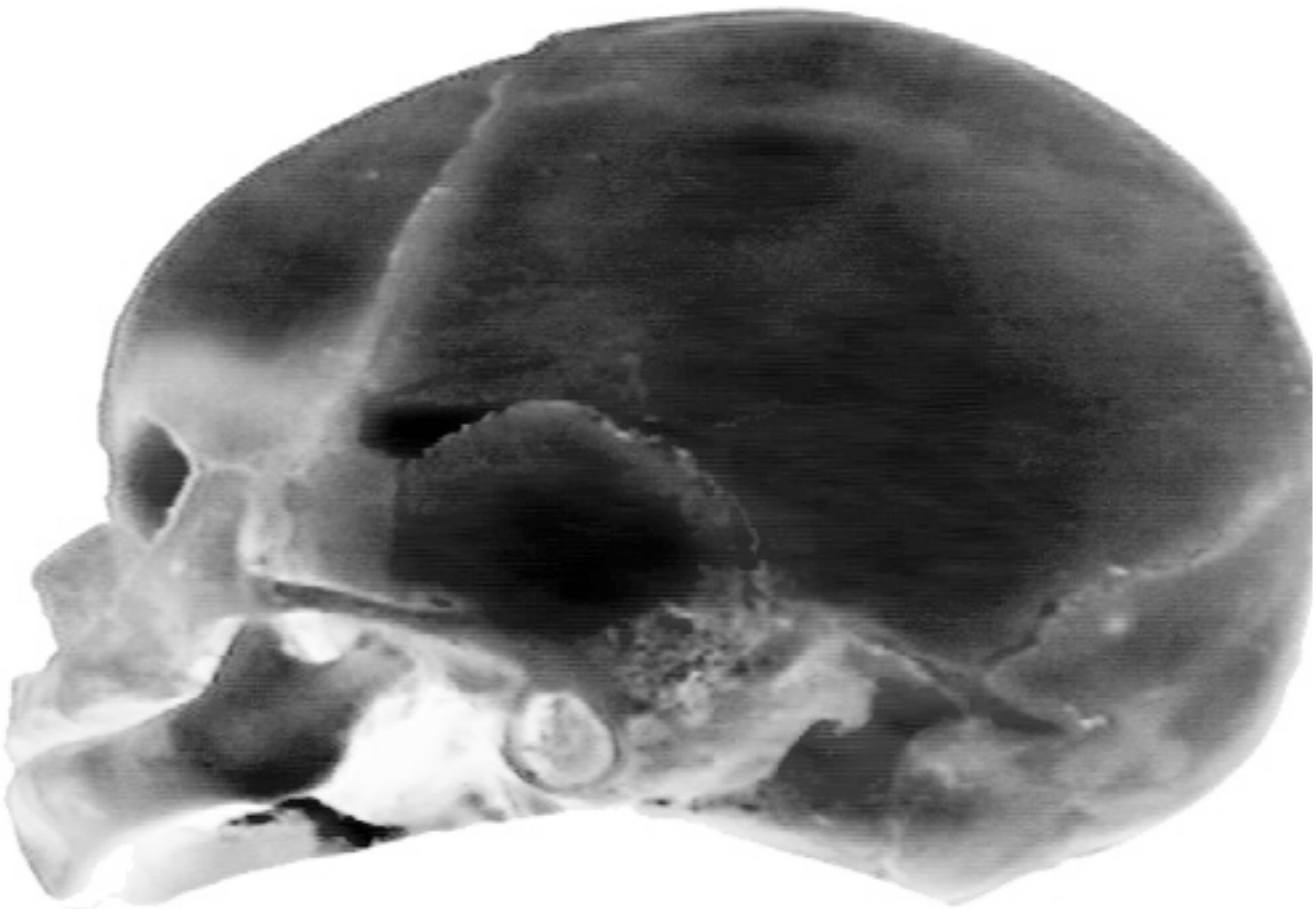
- External rotation side sentence?
- Frontal slope is less on the non-lie side.
- Head rotates away from the non-lie side in neutral upright position.
- Eye is further away from the midline on the non-lie side.

Baby movement patterns for non-lie side movement patterns

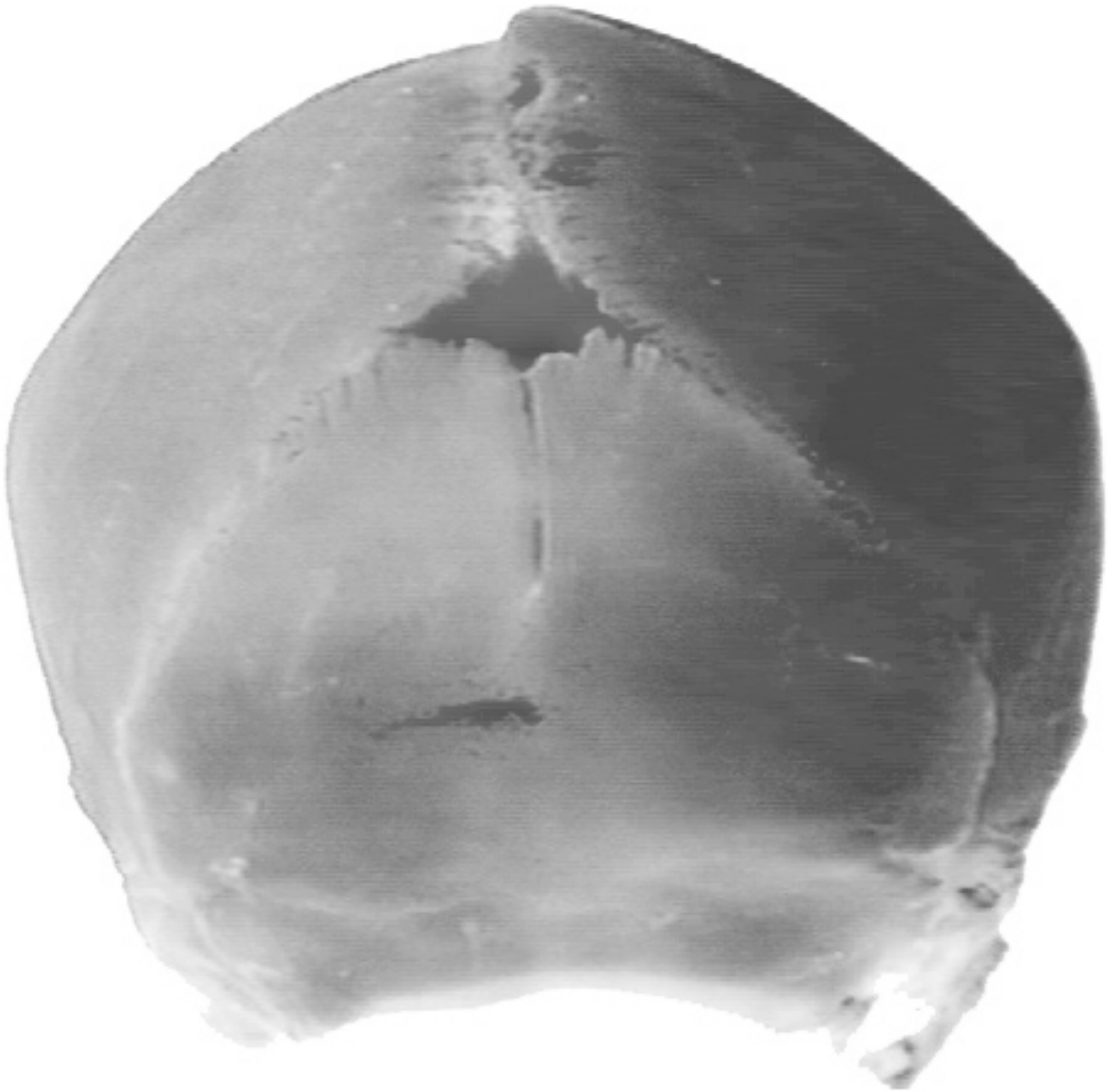
- Spinal C curve, convexity on the non-lie side.
- Non-lie side movements are more open and free. Same thing?
- Non-lie side movements are freer and uninhibited.

Section I

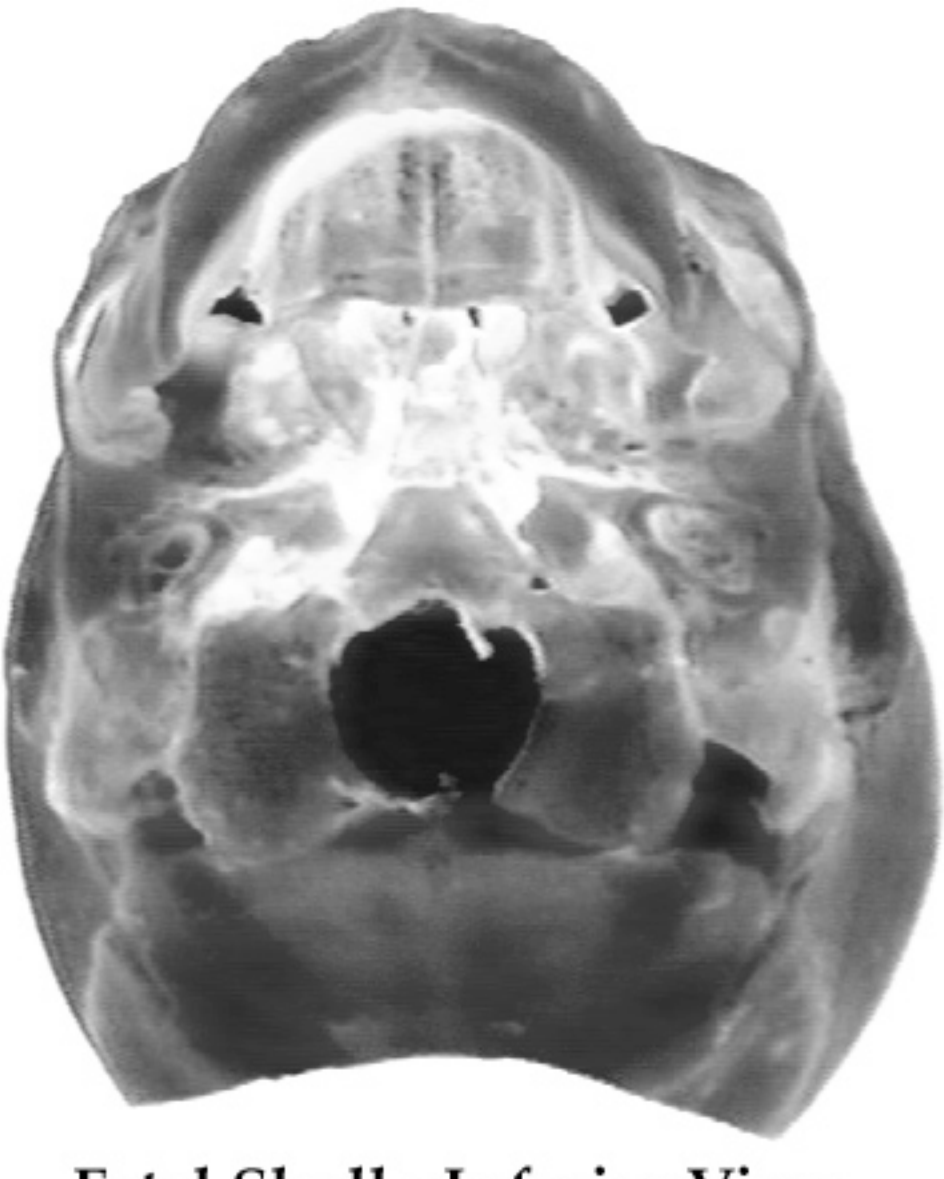
Fetal Skull - Anterior View



Fetal Skull - Side View

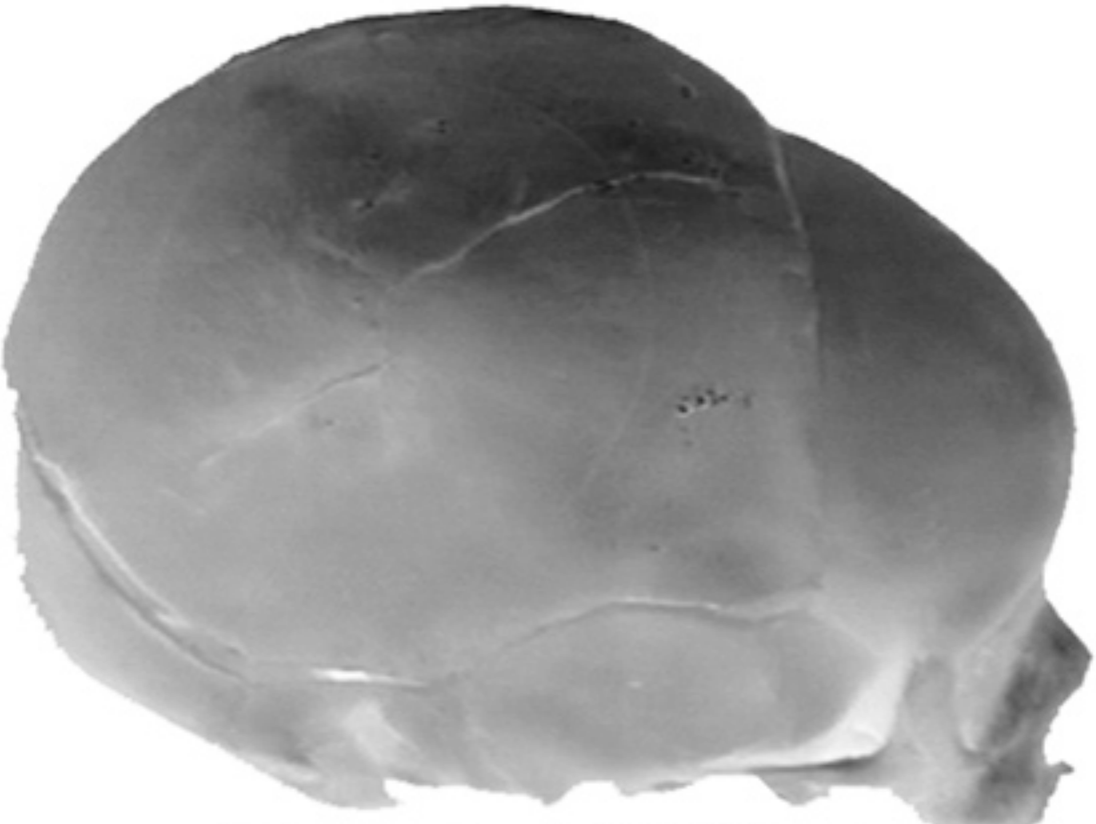


**Fetal Skull - Posterior View
With Occipital Squama, Posterior Fontanelle,
Lambdoidal Suture, Parietal Suture, and
Parietal Bones**



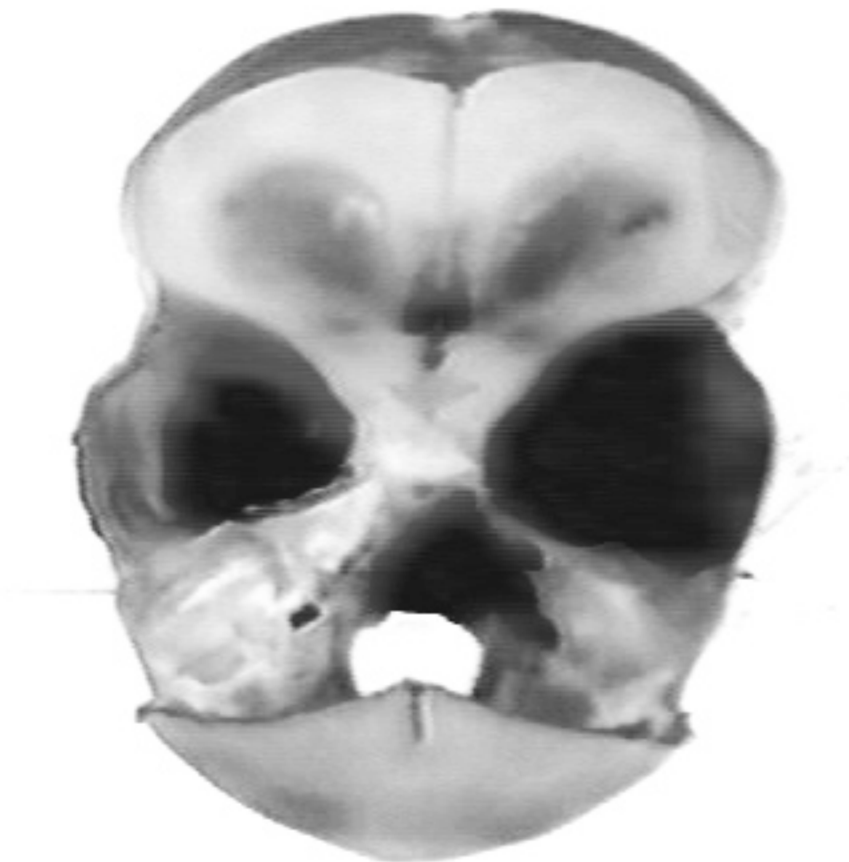
Fetal Skull - Inferior View

Fetal Skull - Superior View
With Anterior Fontanelle



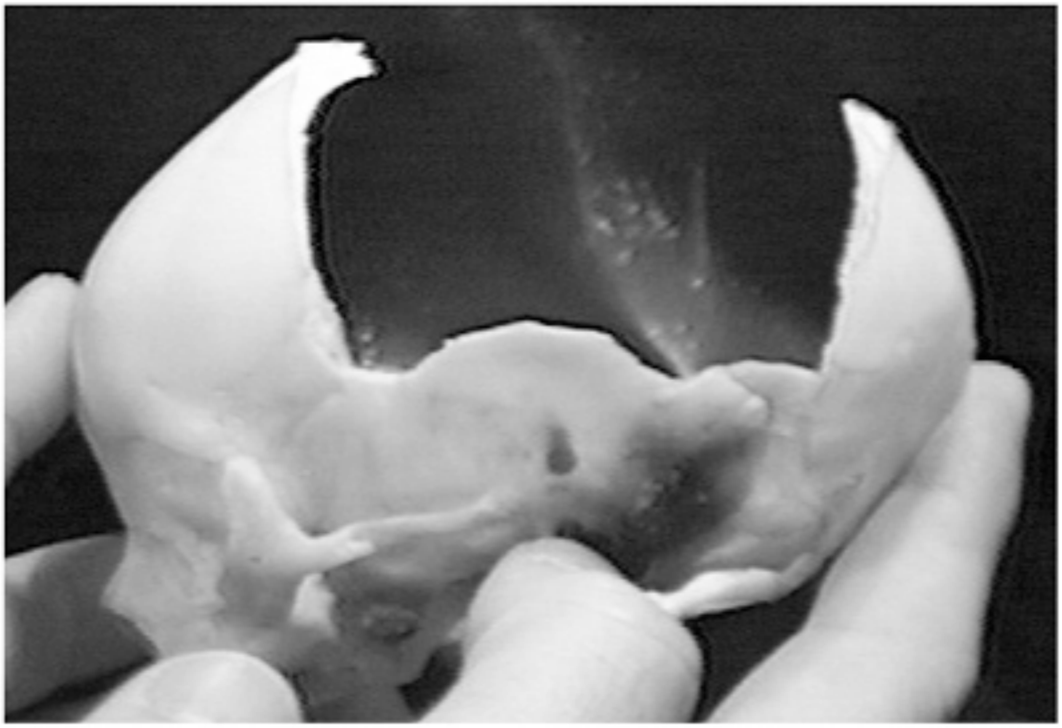
Fetal Skull - Parietal Bones

Fetal Skull - Parietal Bones Removed



Fetal Cranial Base
With Frontal And Occipital Squama
Superior View

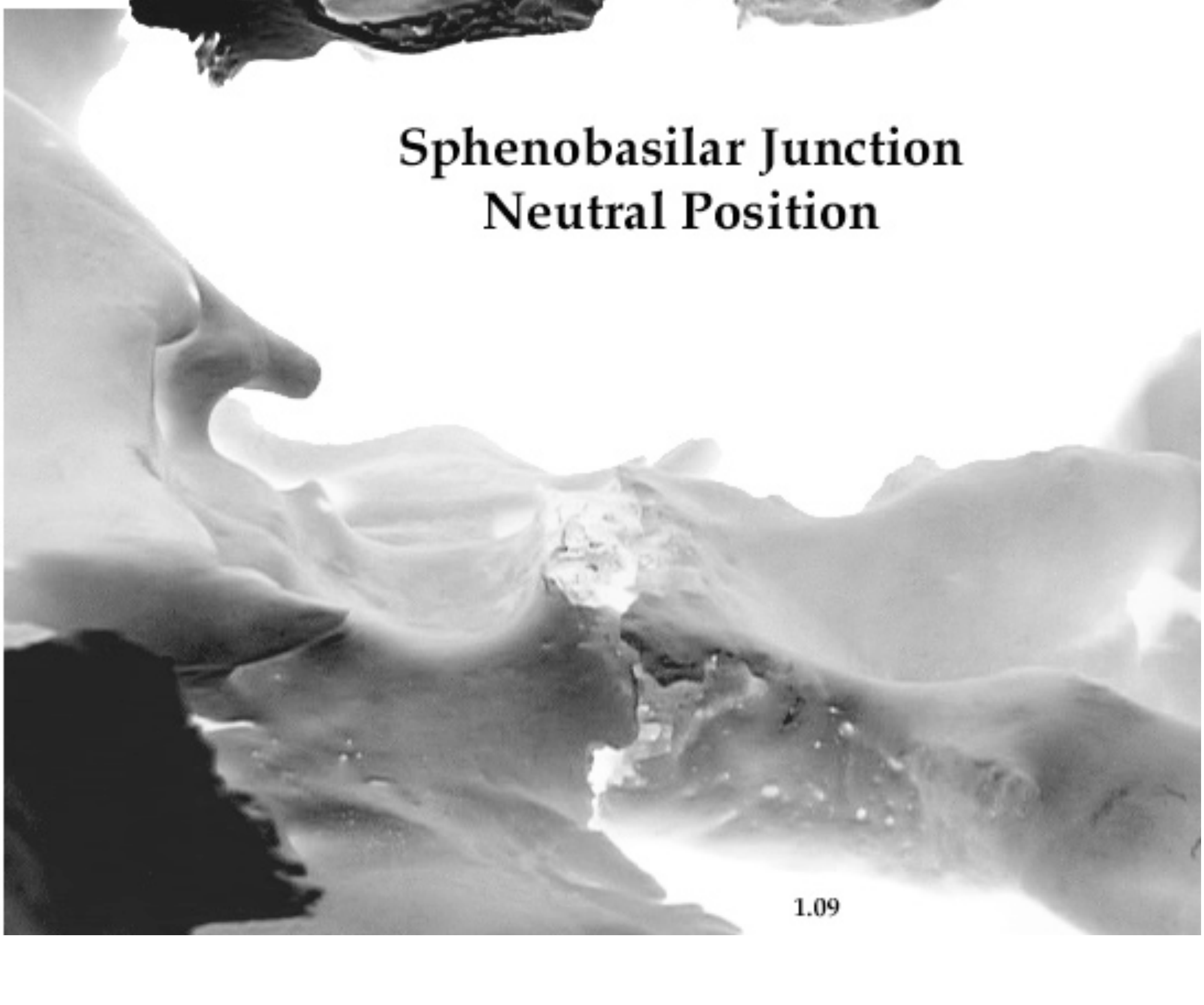
Fetal Skull- Side View



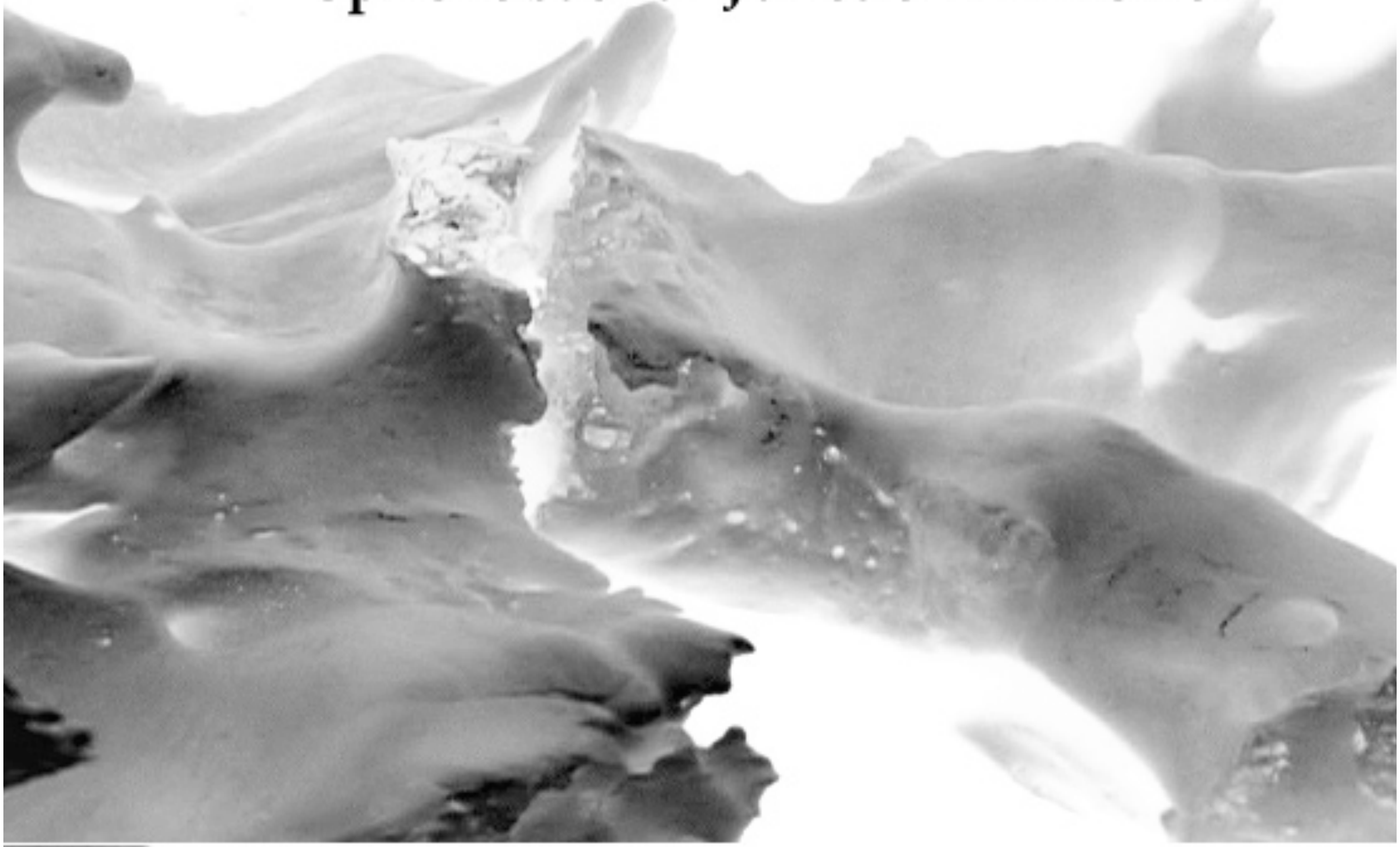
Flexion

Extension

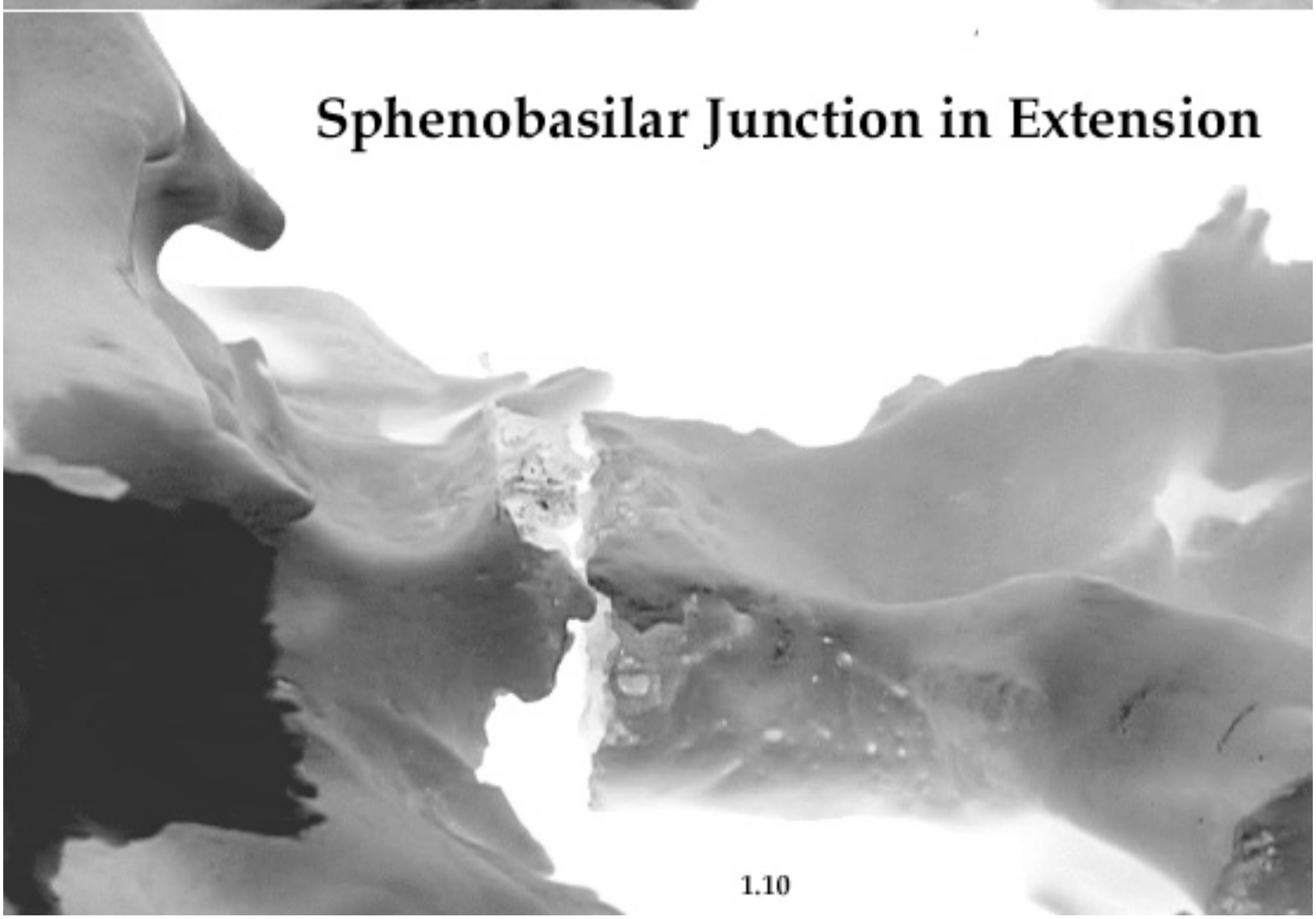
Sphenobasilar Junction
Neutral Position



Sphenobasilar Junction in Flexion

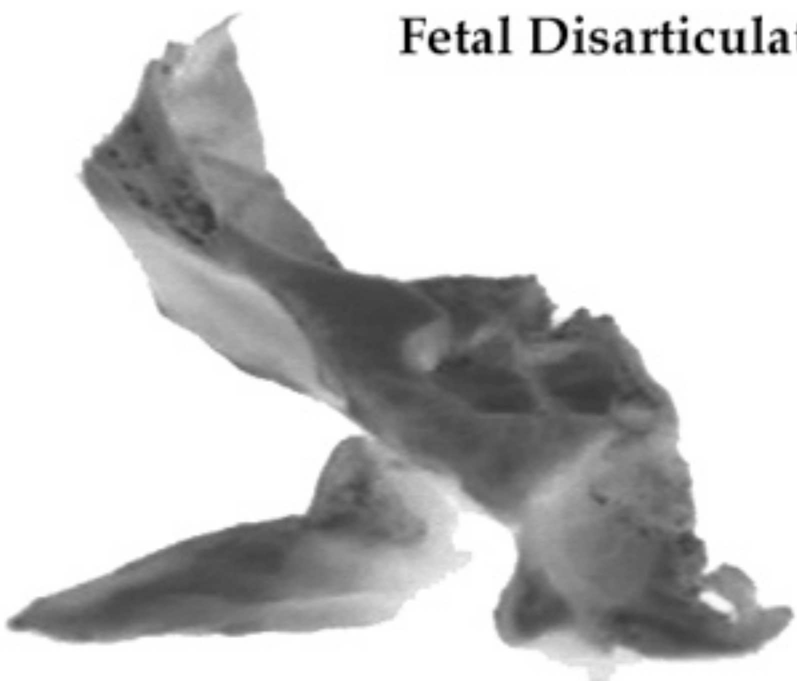


Sphenobasilar Junction in Extension

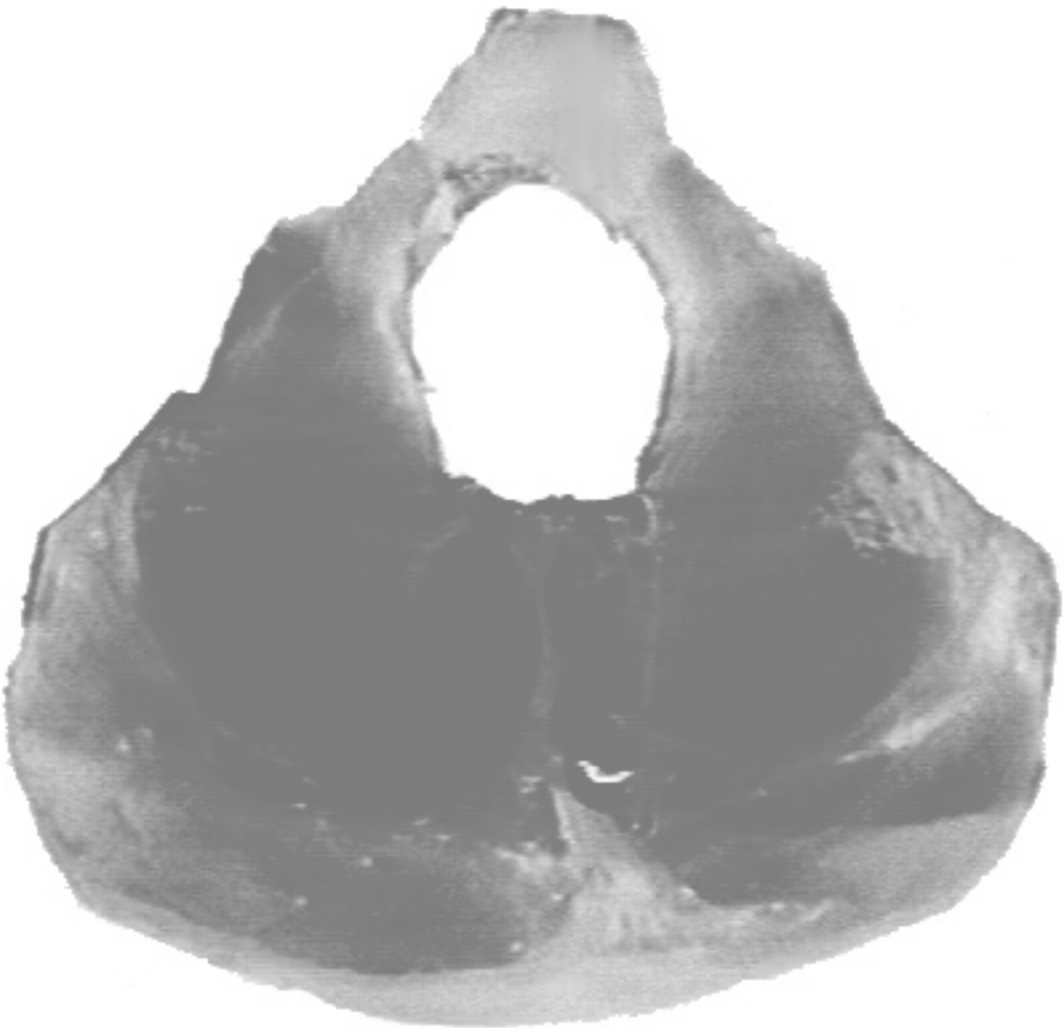


Fetal Disarticulated Sphenoid Bone
With Squamous Portion Removed
From Left Great Wing
Inferior View

Fetal Disarticulated Vomar



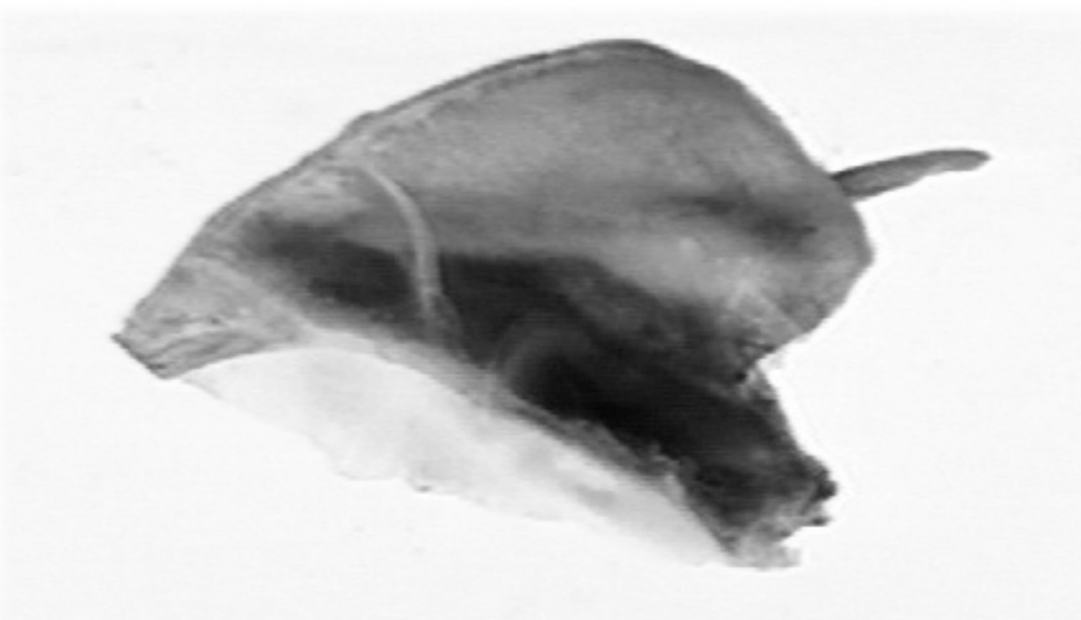
Fetal Disarticulated Sphenoid And Vomar



Fetal Disarticulated Occipital Bone
Inferior View

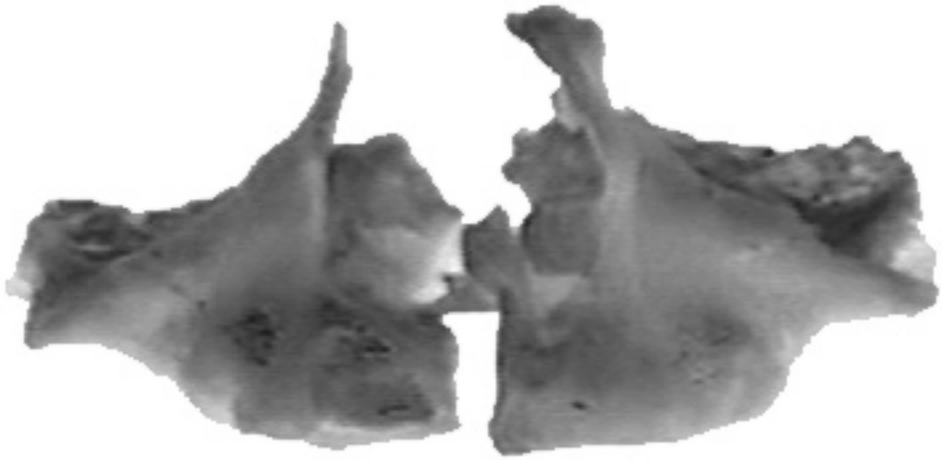
Fetal Disarticulated Temporal Bone

External

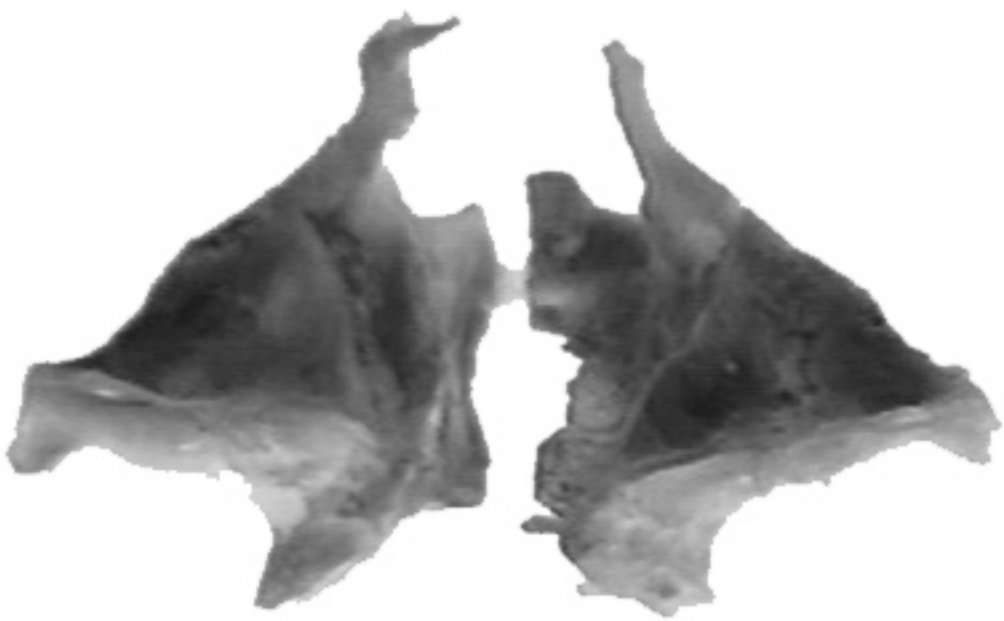


Internal

Fetal Disarticulated Maxilla

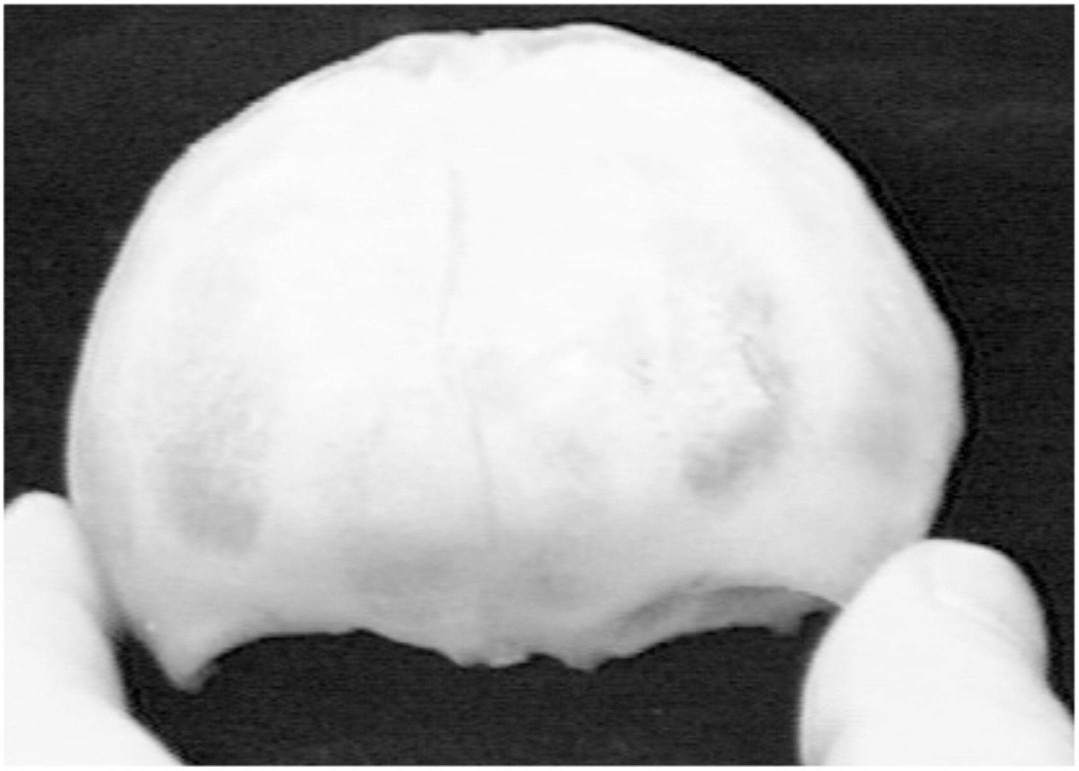


Anterior View

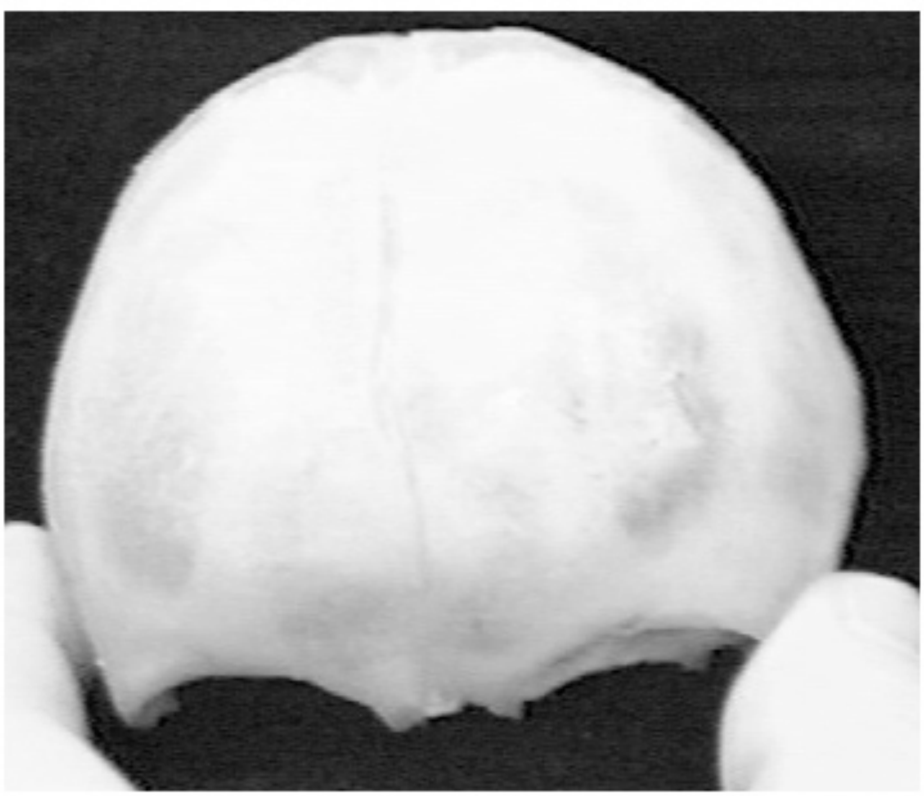


Posterior View

Fetal Disarticulated Frontal Bone



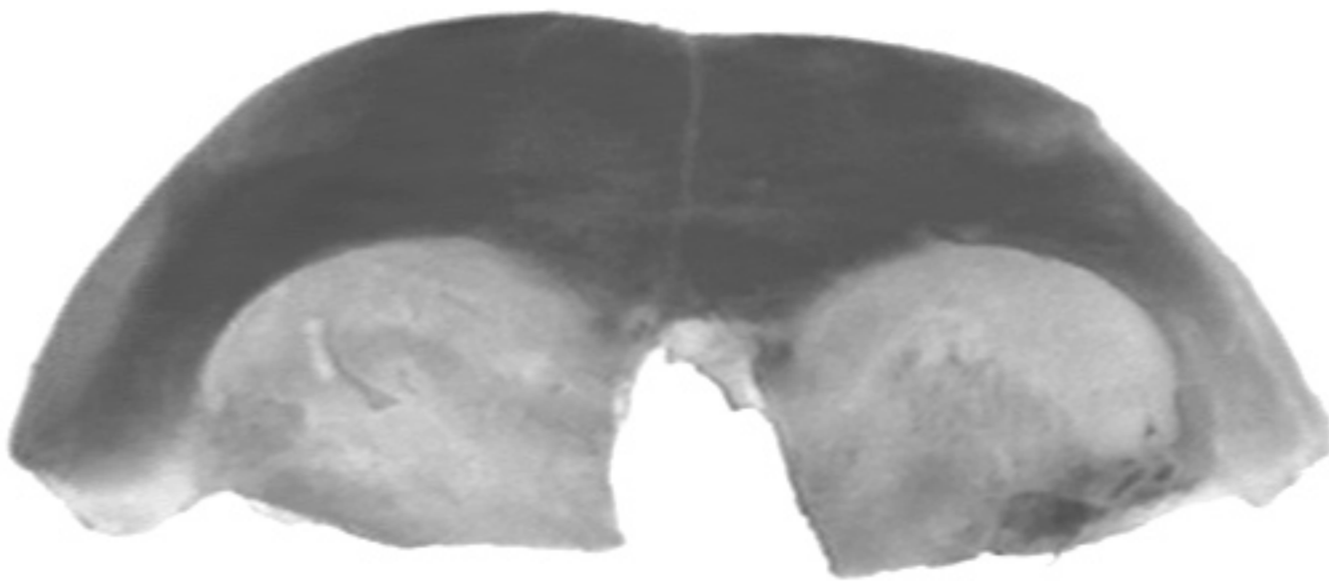
External Rotation

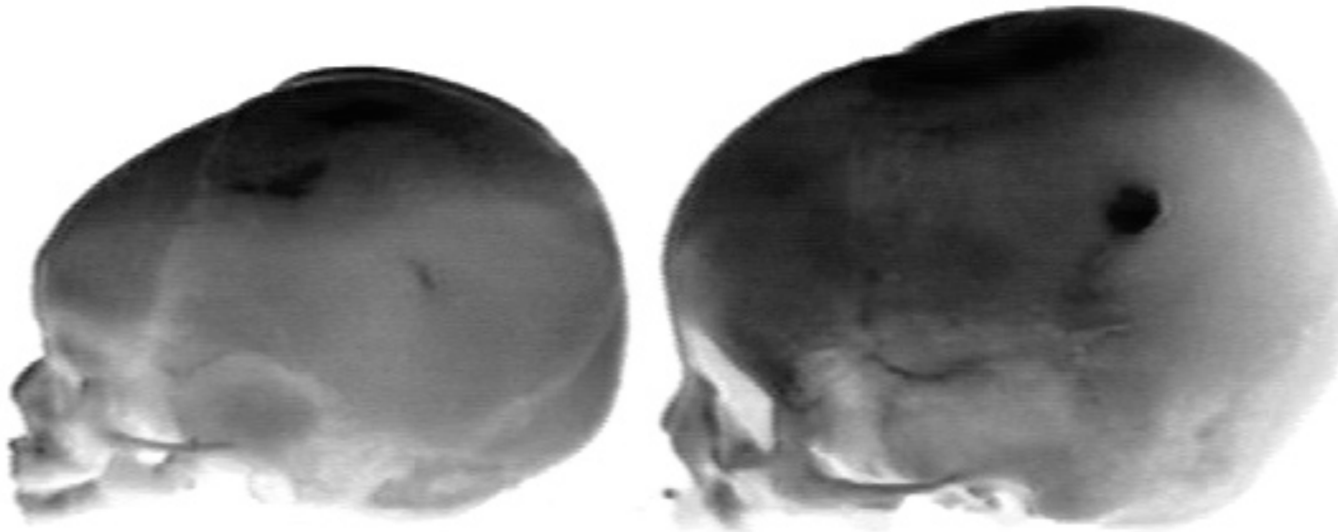


1.15

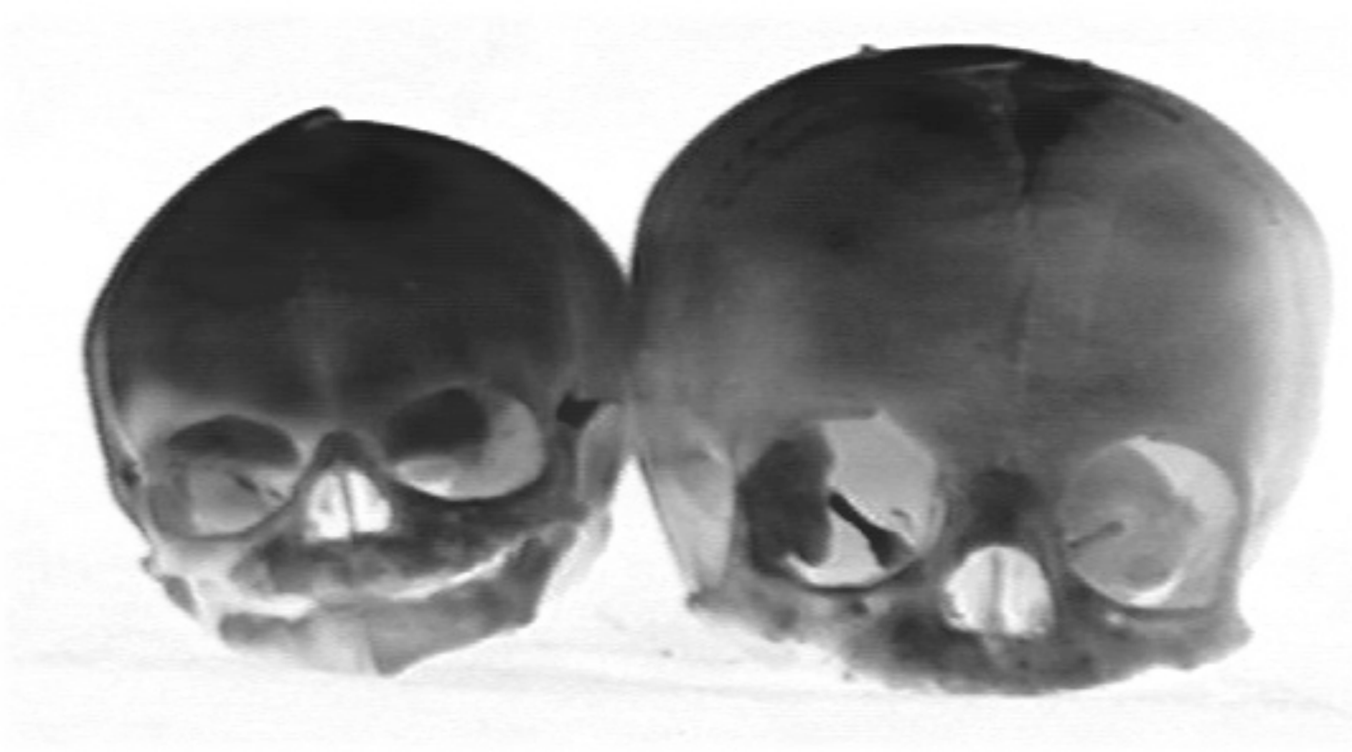
Internal Rotation

Fetal Disarticulated Fetal Bone
Inferior View





Fetal Skulls - Side View



Fetal Skulls - Anterior View

Section II

PELVIC ANATOMY

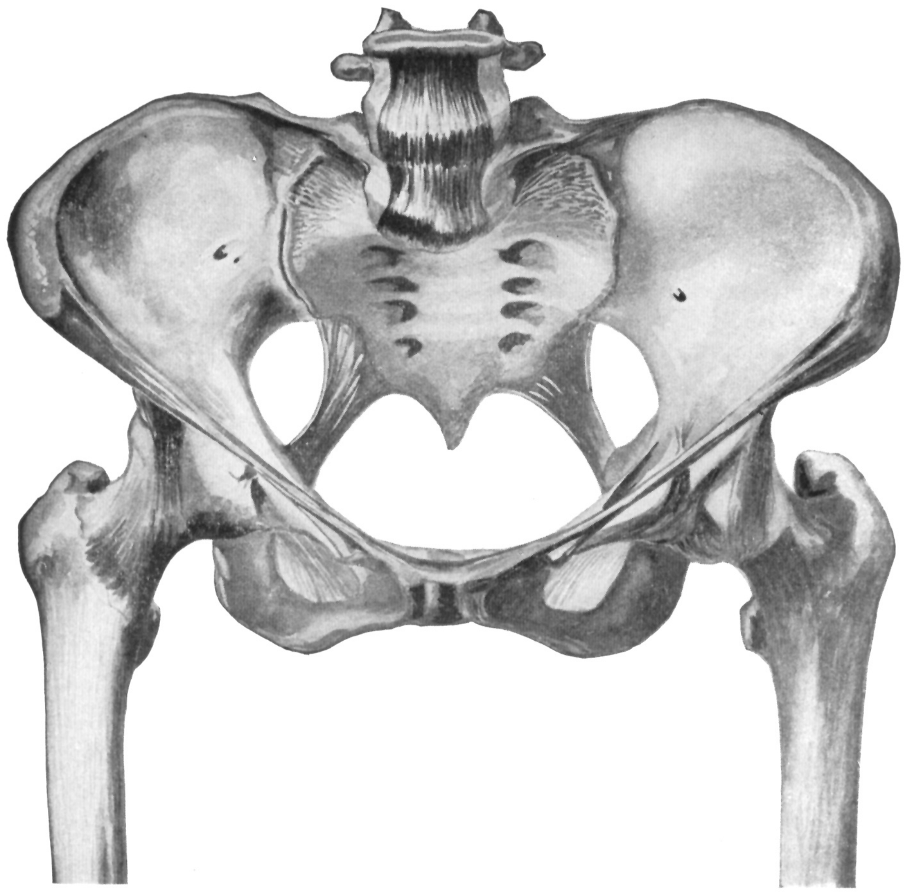


FIG. 159.—NORMAL FEMALE PELVIS.

This specimen selected from several thousand by Tramond of Paris as "the normal European female type" is perhaps slightly rachitic.

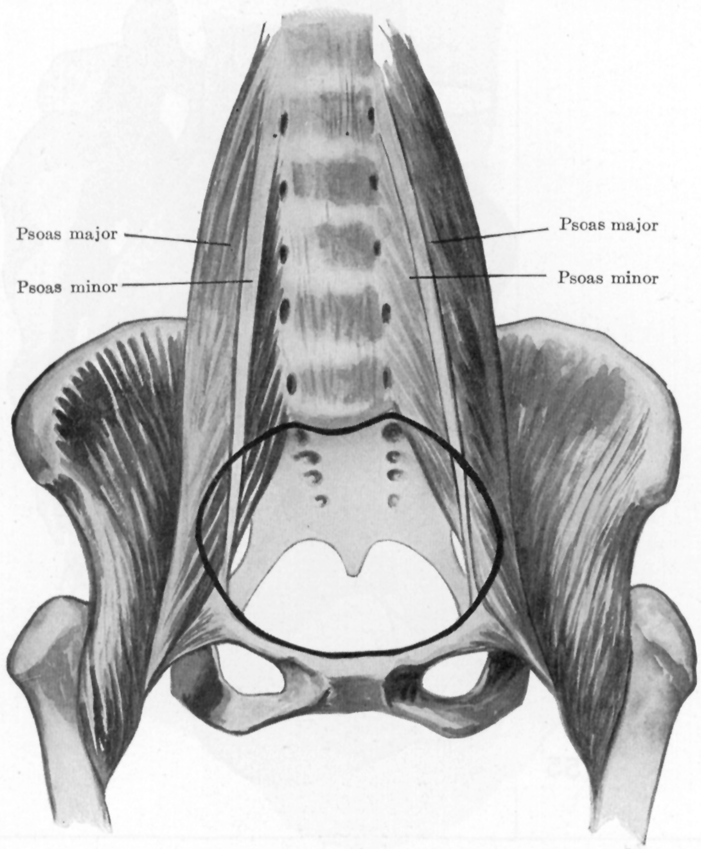


Fig. 163.—Showing Inlet Encroached on by Iliopsoas Muscles.

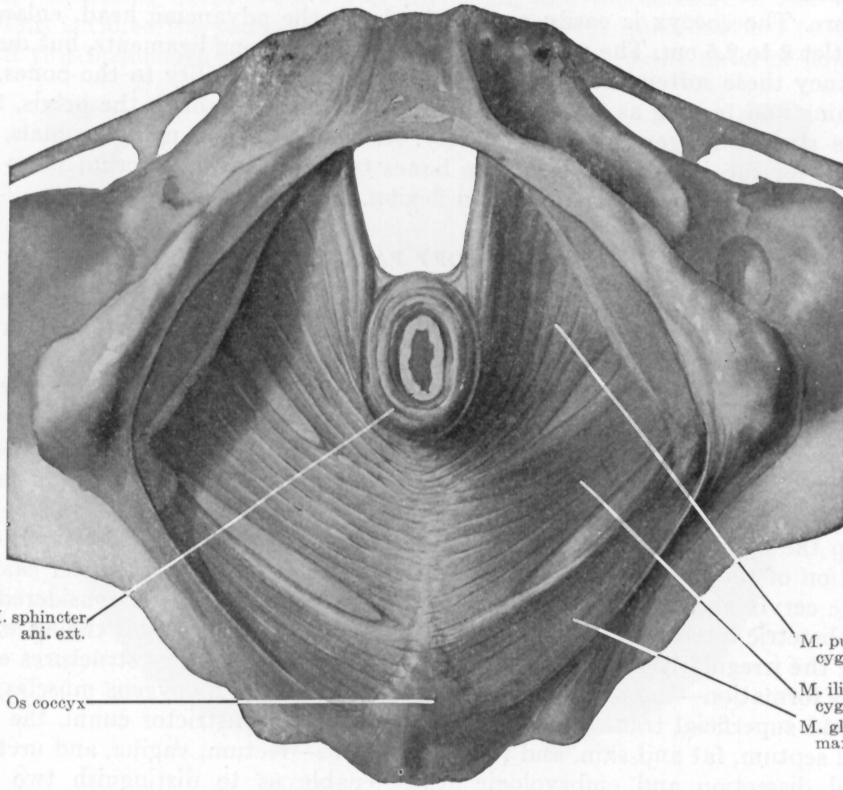


FIG. 168.—LEVATOR ANI FROM BELOW.

Drawn from a dissection made by E. Calhoun and E. Potter, N. W. Univ. Med. School.

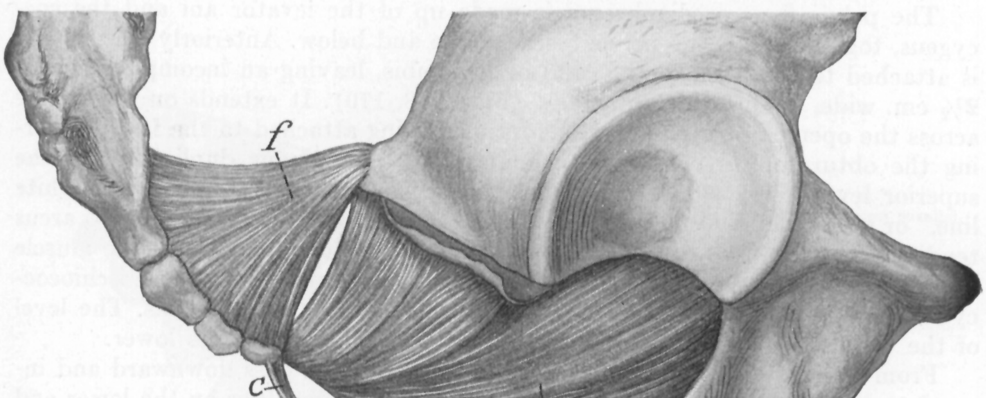


FIG. 169.—SHOWS LEVATOR ANI FROM SIDE—SLINGLIKE ACTION.

a, Vagina; *b*, rectum; *c*, posterior fibers of sphincter; *d*, anterior fibers of sphincter ani; *e*, levator ani, puborectal portion; *f*, musculus ischiococcygeus (somewhat modified from Luschka.)

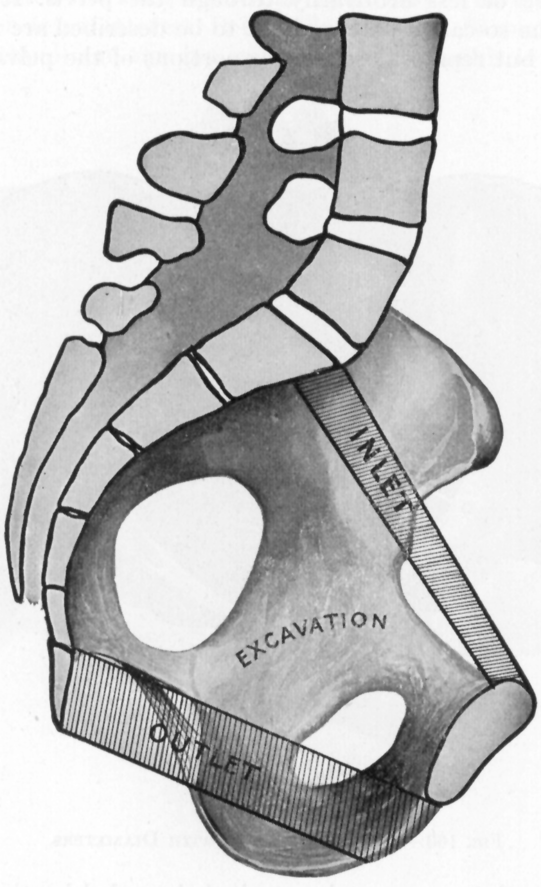


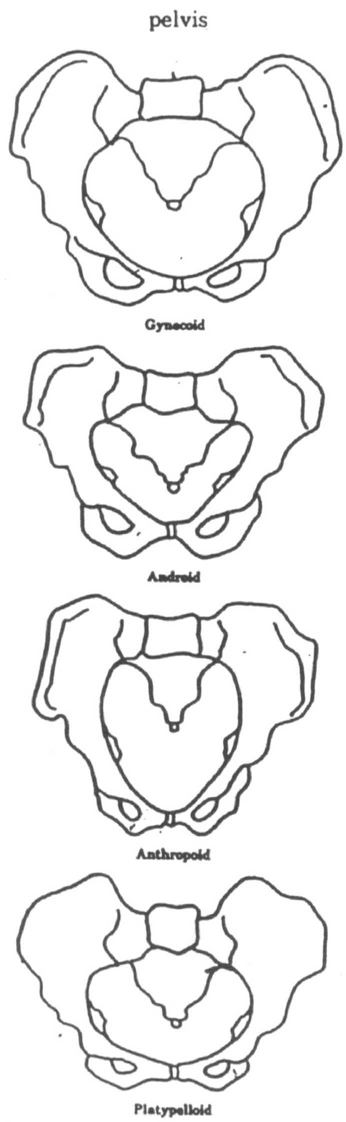
FIG. 161.—THE REGIONS OF THE PELVIS.

Section III

GENERAL PASSAGE WITH PELVIC TYPES AND COMBINATIONS

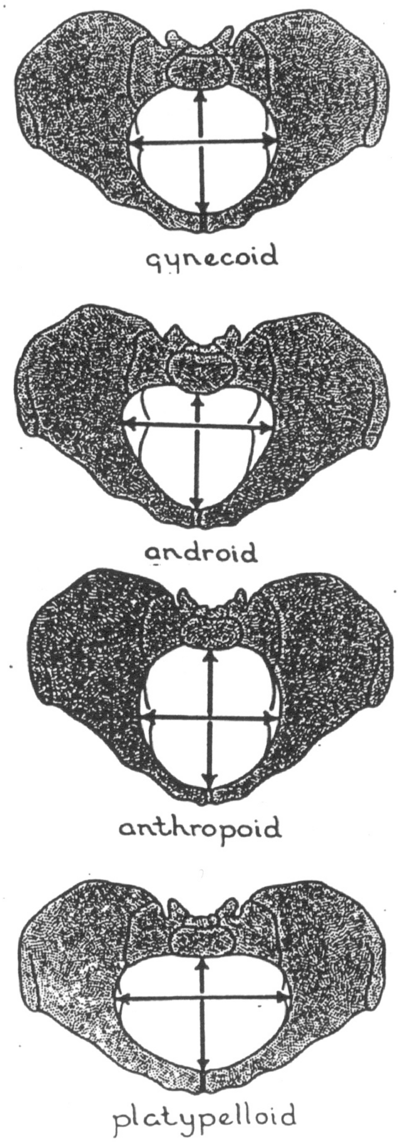
Pelvic Shapes

From: Dorlands Med. Dictionary

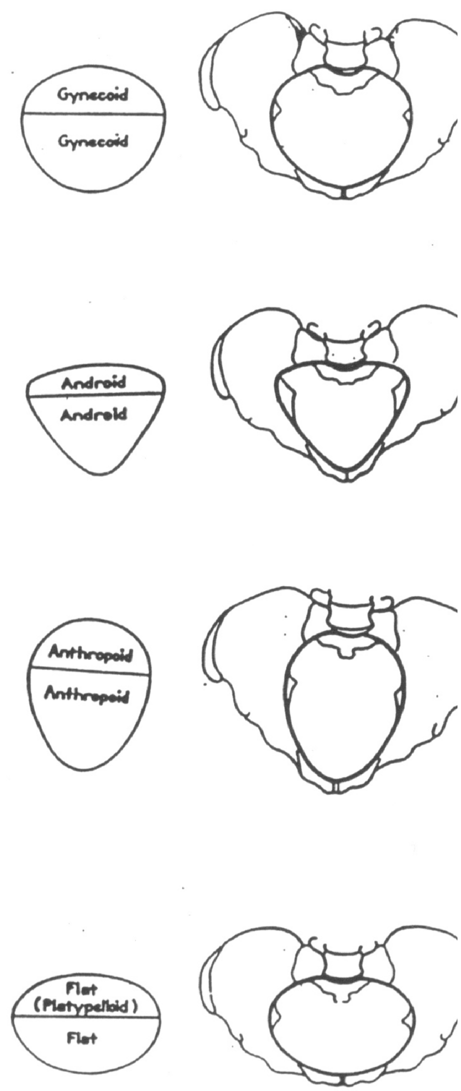


Various types of pelvic inlet (Greenhill and Friedman)

Oxorn-Foote Human Labor & Birth



de Lee & Greenhill



Pelvic inlet (Caldwell-Moloy classification)

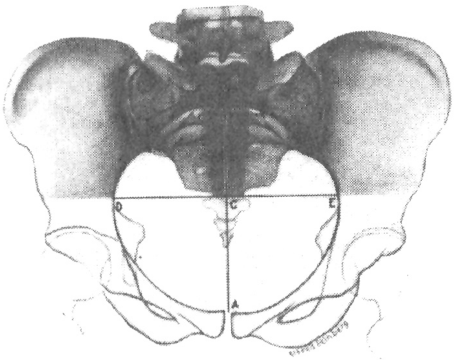


Fig. 8.

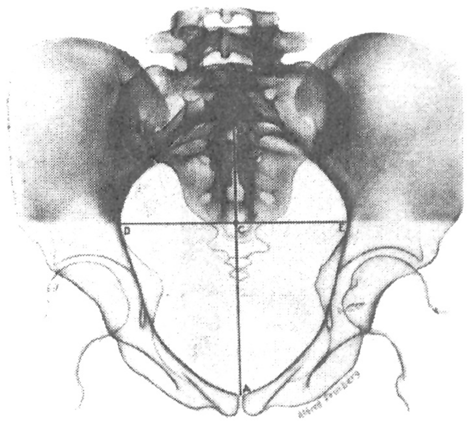


Fig. 9.

Fig. 8.—Gynecoid type. For each pelvic type, Figs. 8 to 11, note that the widest transverse diameter *D. E.* intersects the anteroposterior diameter *A. B.* at *C.*, dividing the latter into two parts: the anterior sagittal diameter *A. C.* and the posterior sagittal *C. B.* Note the variation in length of each in the four parent types. The perpendicular relation of the widest transverse of the inlet and the interspinous diameter cannot be illustrated due to the slight tilt of the inlet.

Fig. 9.—Anthropoid type. (See legend under Fig. 8.)

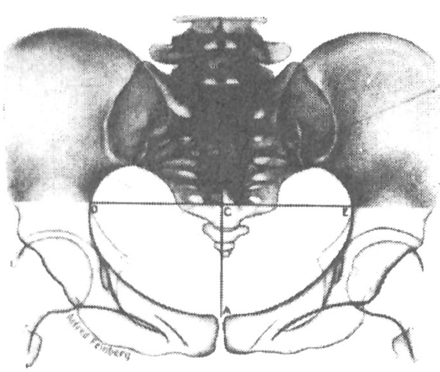


Fig. 10.

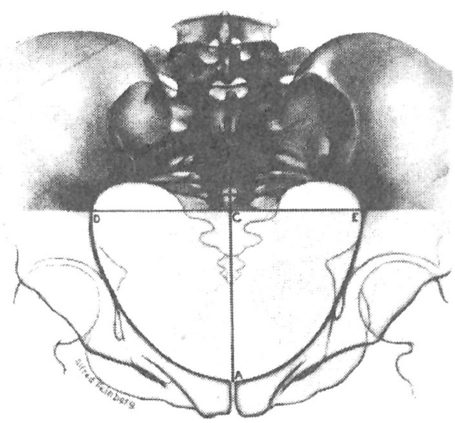
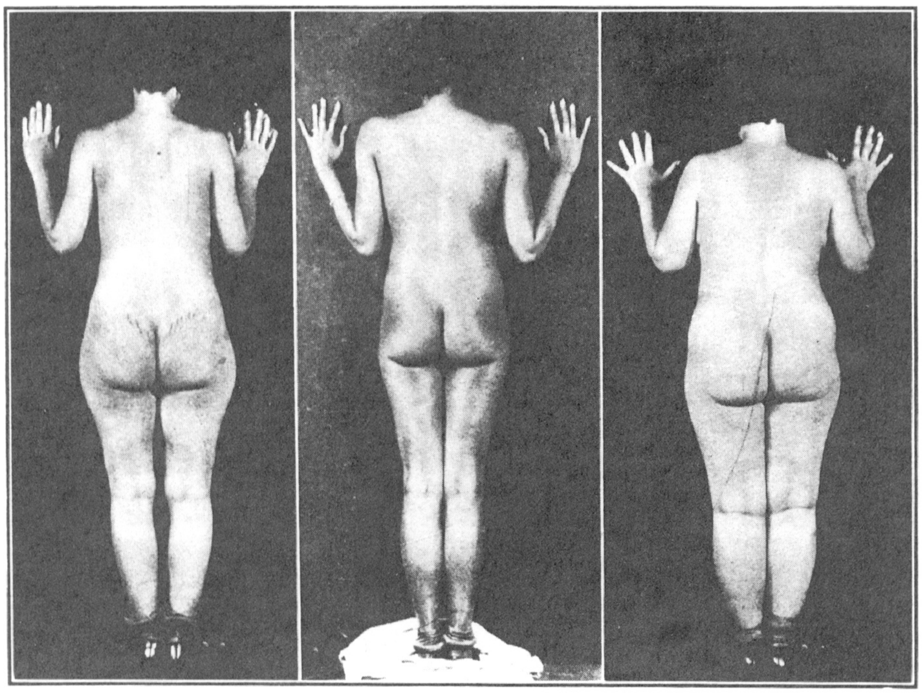


Fig. 11.

Fig. 10.—Platypelloid (flat) type. (See legent under Fig. 8.)

Fig. 11.—Android type. (See legend under Fig. 8.)



A. B. C.

Fig. 19.—*Physical form versus pelvic type.*

A. The gynecoid type. Note the narrow shoulders and narrower waistline. The hips are broad. The lower legs are well curved and tend to be slender.

B. The anthropoid type. The shoulders are broad and the hips narrow. The legs are straight and slender.

C. The android type. Posteriorly the body is square. The waistline is thicker than in the other types. The legs are straight. The thickness of the thigh is preserved throughout the lower legs into the calves, the ankles, and the feet.

PELVIC ANATOMY

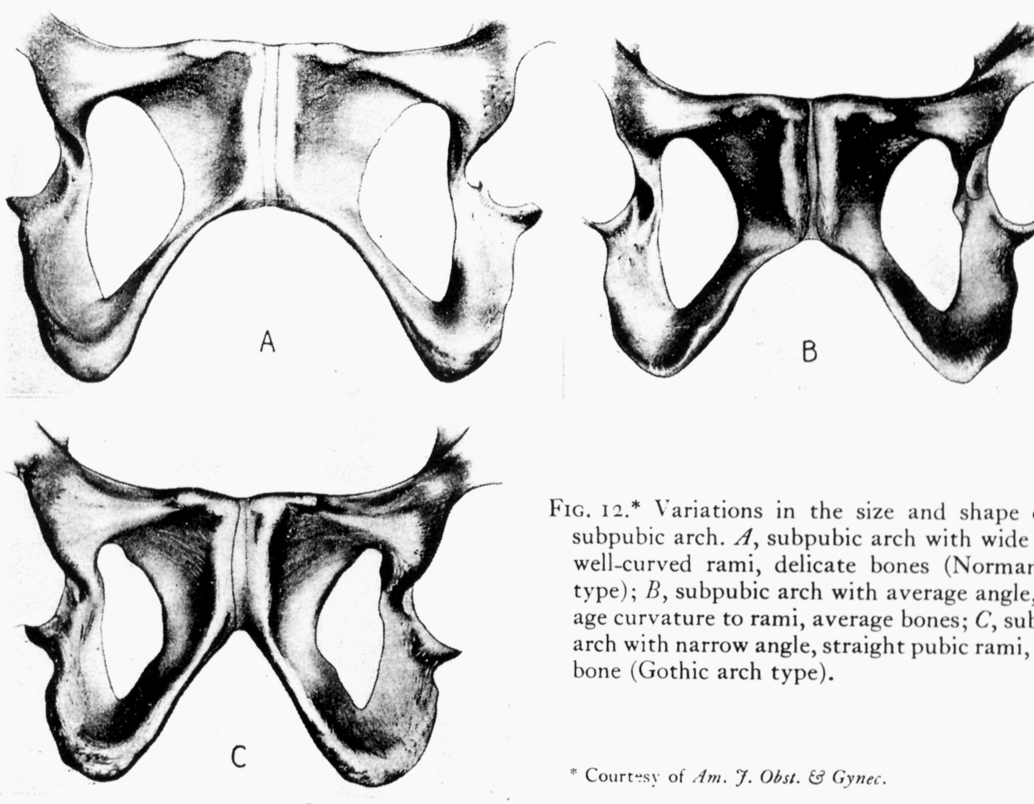


FIG. 12.* Variations in the size and shape of subpubic arch. *A*, subpubic arch with wide a well-curved rami, delicate bones (Norman type); *B*, subpubic arch with average angle, a age curvature to rami, average bones; *C*, subp arch with narrow angle, straight pubic rami, he bone (Gothic arch type).

* Courtesy of *Am. J. Obst. & Gynec.*

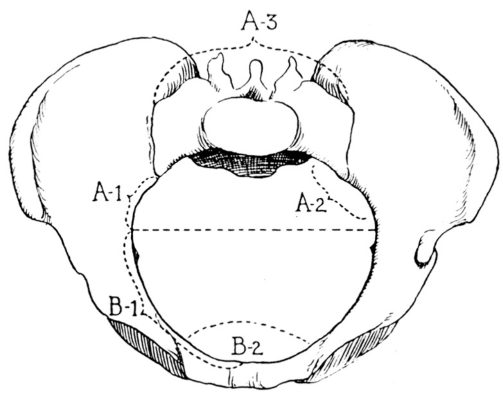


Fig. 1.—A diagrammatic representation of the anatomical variations at the inlet with definition of terms: A_1 The "posterioriliac portion" of the inlet. Variable in length and curvature. A_2 The sacrosciatic notch. Variable in size and shape. A_3 The sacrum. Variable in size, shape, and inclination. B_1 The "anterior pubo iliac" portion of the inlet. Variable in length and curvature. B_2 The angle between the pubo-iliac portions of the fore pelvis. Variable in size.

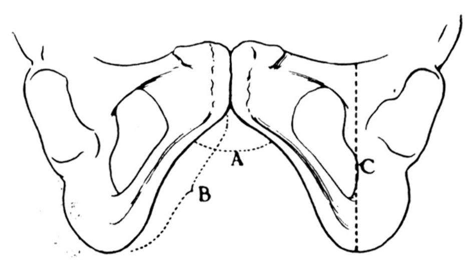


Fig. 2.—A diagrammatic study of the variations which materially affect the fore pelvis. *A*, The subpublic angle. Variable in size. *B*, The length, curvature, and mode of origin of the pubic rami from the body of the pubic bone. *C*, The depth of the true pelvis.

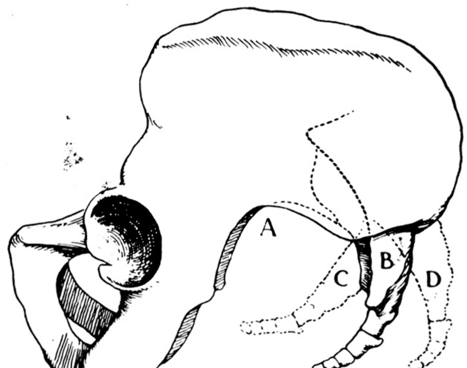


Fig. 3.—A diagrammatic study of the variations which affect posterior pelvic capacity: *A*, The size and shape of the sacrosciatic notch. *B*, Sacrum with normal curvature and inclination. *C*, Acute forward curvature in the terminal segments. *D*, A straight sacrum.

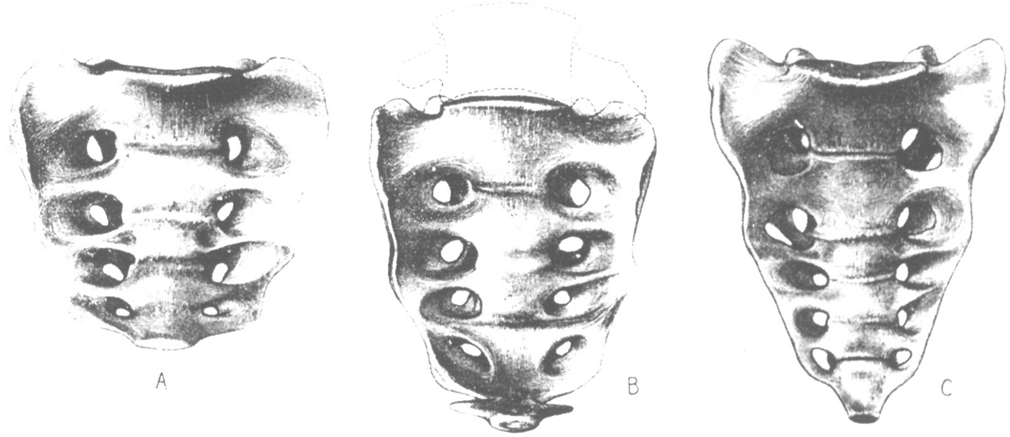


FIG. 16.* Variations in the sacrum (front view). *A*, short broad female type five segments; *B*, partial fusion of 5th lumbar vertebra and first coccygeal vertebra; *C*, complete fusion of either coccygeal or 5th lumbar vertebra to form a sacrum with six segments.

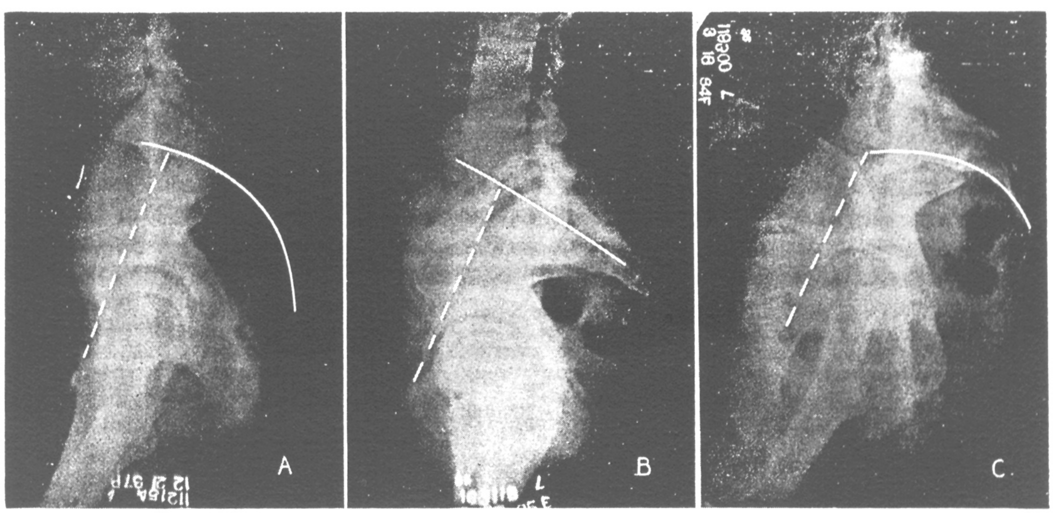


FIG. 18. Variations in sacral curvature (lateral view), inclination, and posterior pelvic capacity.

A, average curvature and forward inclination to the sacrum. Convergent bore from the lateral aspect. Note the length of the posterior sagittal diameter at the level of the spines and the level of the sacrococcygeal platform below. The head was arrested in the occipito-anterior position by the forward sacrum at a low level over the pelvic outlet.

B, straight curvature and average inclination to the sacrum. Note the ample posterior sagittal diameter at the level of the ischial spines. Straight bore from the lateral aspect. The straight sacrum carries the sacral tip and the sacrococcygeal platform to a low level. As a result the head descended to a low level to become arrested in the occipitotransverse position due to a flat android type of inlet (lateral view of Fig. 5, Part III).

C, marked curvature and backward inclination to the sacrum. Divergent bore from the lateral aspect. Note ample posterior sagittal diameter at the level of the spines to be utilized by the head if the inlet is ample enough to allow descent. Delivery by caesarean section. Android-flat type of inlet. Absolute obstruction at the inlet. Films obtained in labor show cone-shaped moulding of the head to the short anteroposterior diameter at the inlet.

From CALDWELL & MOLOY ET AL material

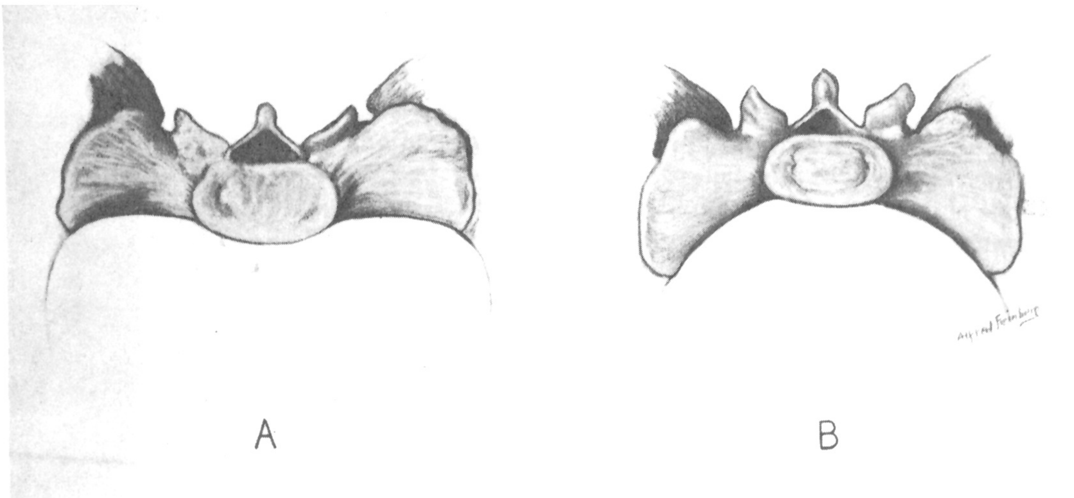
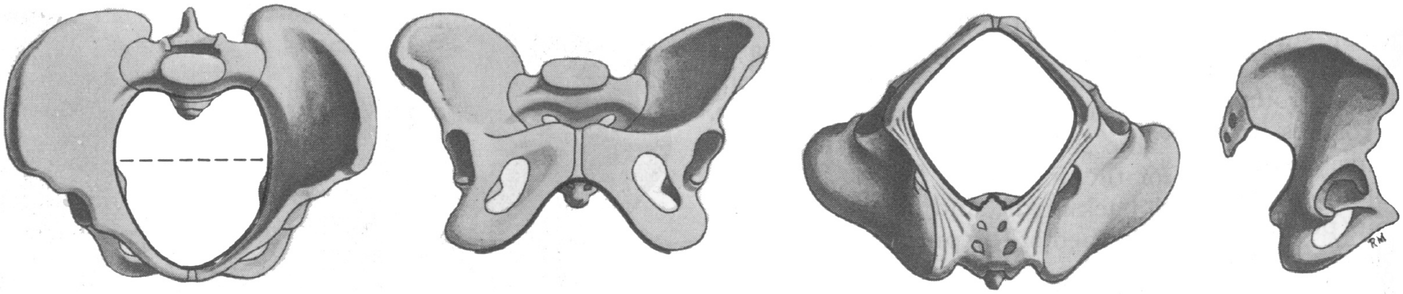
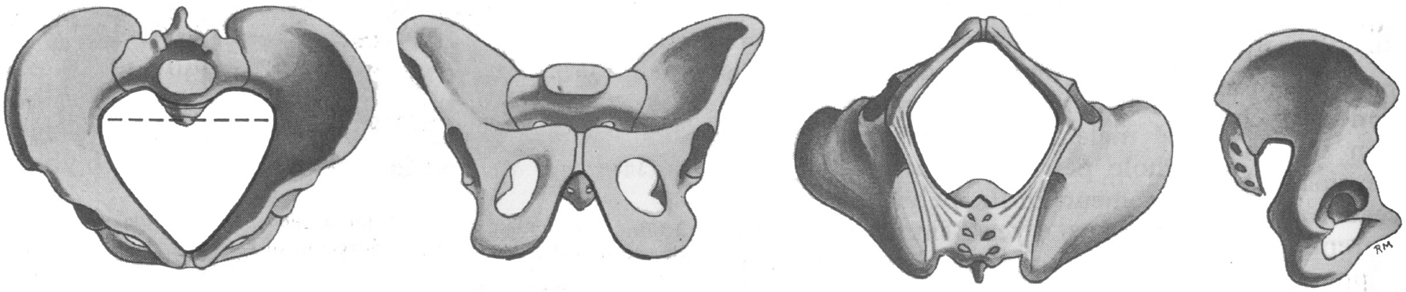


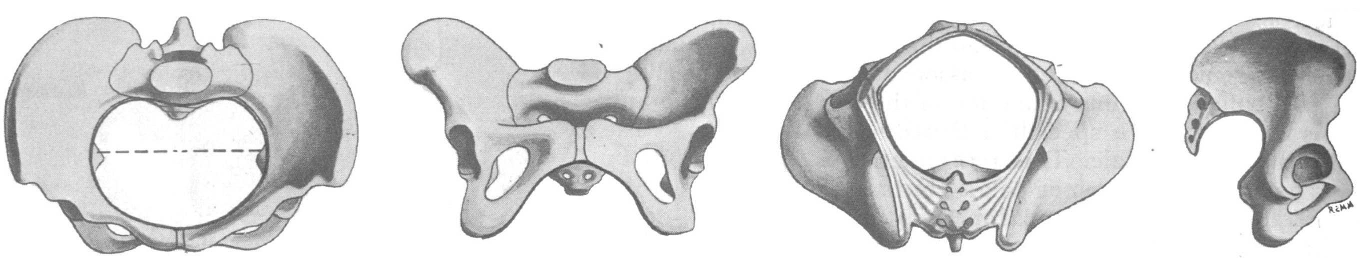
FIG. 17. Transverse sacral concavity. *A*, straight margin to first sacral segment, common in android types; *B*, markedly concave margin of first sacral segment, common in anthropoid types.



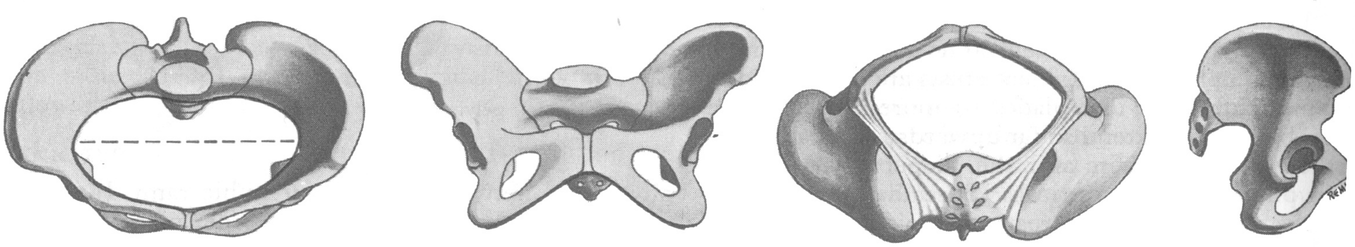
A Anthropoid.



B Android.



C Gynaecoid.



Platypelloid.

The major differences between the four types of pelvis in the most cepted classification. Types shown in A and B are commonest and C in females, while D is rare, even in females. Note the superior and inferior apertures, greater sciatic notch, and subpubic arch. Note varying proportion between fore- and hind-p anterior and posterior to transverse diameter of the inlet. (Caldwell Moloy's Classification, after Clyne—see footnote reference 240.)

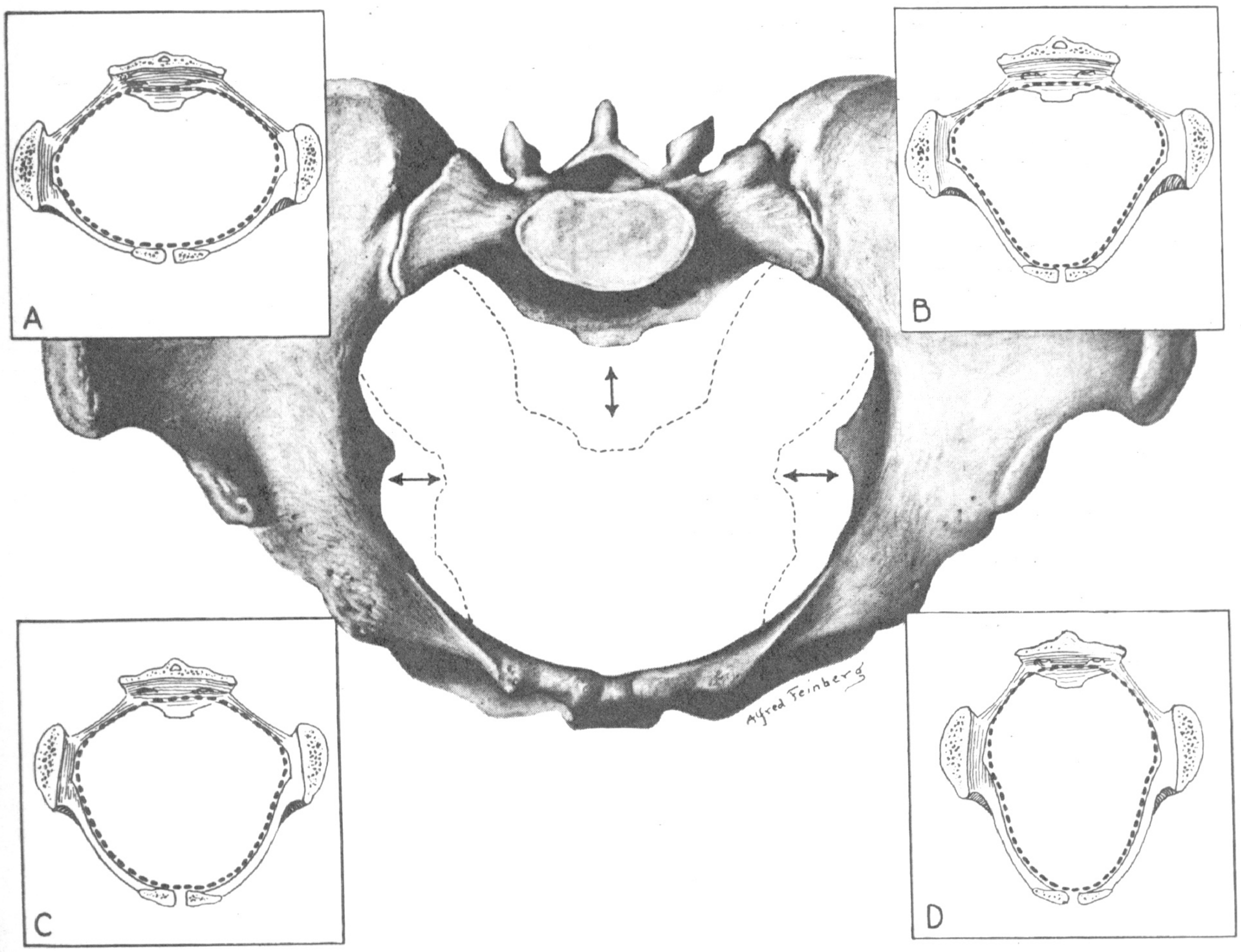


Fig. 19.* **Variations in the shape of the lower pelvis as caused by variations in the splay of the side walls laterally and the inclination and curvature of the sacrum in the sagittal plane.** *A*, the flat type or transverse oval; *B*, the wedge-shaped type; *C*, the round type; *D*, long narrow oval type.

* Courtesy of Thomas Nelson & Sons.

Female (brachypellic) type	28.8 per cent
Round (mesatipellic) type	46.6 per cent
Anthropoid (dolichopellic) type	22.6 per cent
Flat (platypellic) type	2.0 per cent

Thoms points out that in the female type pelvis, except when abnormally small, true pelvic dystocia is seldom encountered, the fetal head descending through the upper pelvis in the left or right occiput anterior position and pre-

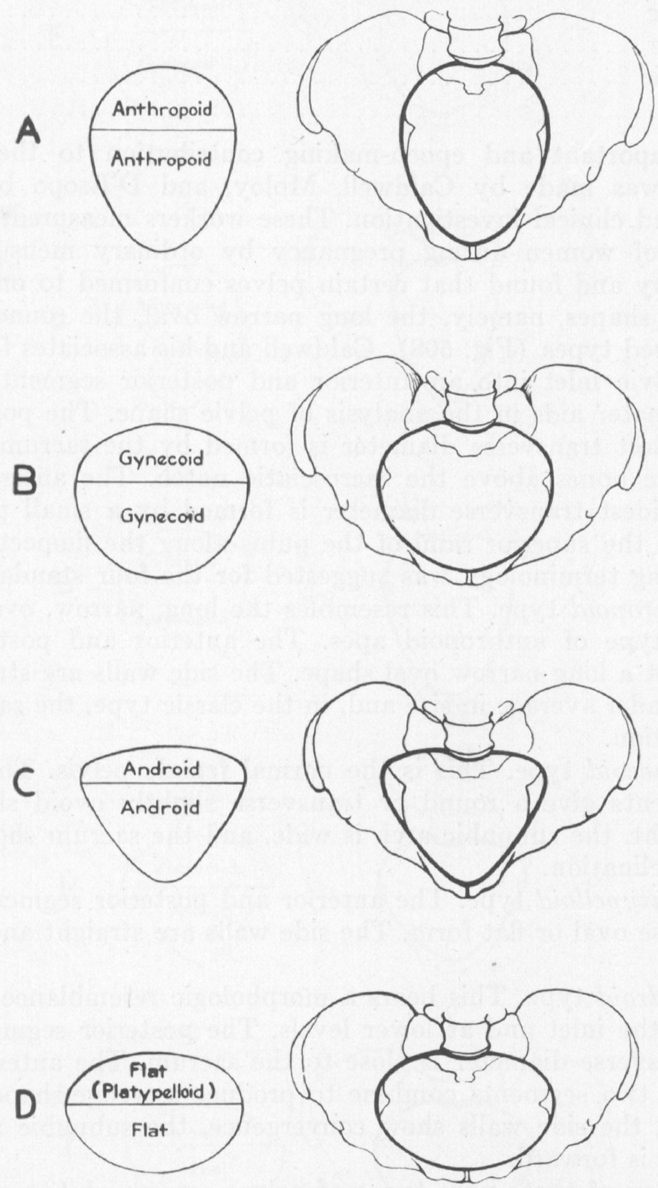


FIG. 508.—PURE TYPES OF PELVIC INLET ACCORDING TO CALDWELL, MOLOY, AND D'ESOPO.

senting at the outlet with the occiput anterior. In the round type pelvis, the occurrence of primary occiput posterior position is far commoner than formerly was suspected. Small pelves of this variety have long been known as the generally contracted or small round pelves. There is slight difference between certain round type pelves and anthropoid type pelves. In both types the fetal head in the downward passage tends to adapt itself to the most suitable diameter. In the anthropoid type pelvis, at the superior strait this diameter is the anteroposterior. Therefore in forceps delivery with the head in a persistent posterior position, progress is far easier if the occiput is directed downward in this position rather than rotated anteriorly. In delivery of the after-coming head in version and extraction or in breech presentation, the same principle should apply, aiding the after-coming head to engage with its long diameter in the long diameter of the pelvis.

Among the 500 cases, the incidence of operative delivery performed solely or chiefly for abnormal pelvic conformation was:

Brachypellic	7.6 per cent
Mesatipellic	0.4 per cent
Dolichopellic	2.6 per cent
Platypellic	10.0 per cent

Another important and epoch-making contribution to the study of the female pelvis was made by Caldwell, Moloy, and D'Esopo based on pelvic radiography and clinical investigation. These workers measured the pelves of a large number of women during pregnancy by ordinary mensuration and by roentgenography and found that certain pelves conformed to one of four characteristic inlet shapes, namely, the long narrow oval, the round, the flat, and the wedge-shaped types (Fig. 508). Caldwell and his associates found that division of the pelvic inlet into an anterior and posterior segment at the widest transverse diameter aids in the analysis of pelvic shape. The posterior segment behind the widest transverse diameter is formed by the sacrum and a portion of the two iliac bones above the sacrosciatic notch. The anterior segment in front of the widest transverse diameter is formed by a small portion of both iliac bones and the superior rami of the pubis along the iliopectineal lines.

The following terminology was suggested for the four standard types:

I. The *anthropoid* type. This resembles the long, narrow, oval shape of the pelvis of one type of anthropoid apes. The anterior and posterior segments together present a long narrow oval shape. The side walls are straight, the subpubic arch is under average in size and, in the classic type, the sacrum shows an average inclination.

II. The *gynecoid* type. This is the normal female pelvis. The anterior and posterior segments give a round or transverse slightly ovoid shape. The side walls are straight, the subpubic arch is wide, and the sacrum shows an average to backward inclination.

III. The *platypelloid* type. The anterior and posterior segments combine to give a transverse oval or flat form. The side walls are straight and the subpubic arch is wide.

IV. The *android* type. This bears a morphologic resemblance to the human male pelvis at the inlet and at lower levels. The posterior segment is flat and the widest transverse diameter is close to the sacrum. The anterior segment is triangular. The two segments combine to produce a wedge-shaped appearance. At lower levels, the side walls show convergence, the subpubic arch is narrow and the sacrum is forward.

The frequency of these pure types of pelves among white women was:

Gynecoid type	41.4 per cent
Android type	32.5 per cent
Anthropoid type	23.5 per cent
Platypelloid type	2.6 per cent

Each pure type shows a characteristic shape for both segments at the inlet and also at the mid and lower pelvis. Pure types occur less frequently than "mixed" forms which reveal a departure from the characteristic shape of the parent type either at the inlet, in the pelvic cavity, or in both (Figs. 509 and

510). Certain pure types with characteristic inlet shapes may show variations below the inlet. These forms are classified according to the inlet shape, augmented by descriptive terms which describe the lower pelvic deviations. For instance, pelves which reveal anthropoid or gynecoid inlet types become "mixed forms" through the presence of convergence of the inside walls, a narrow subpubic

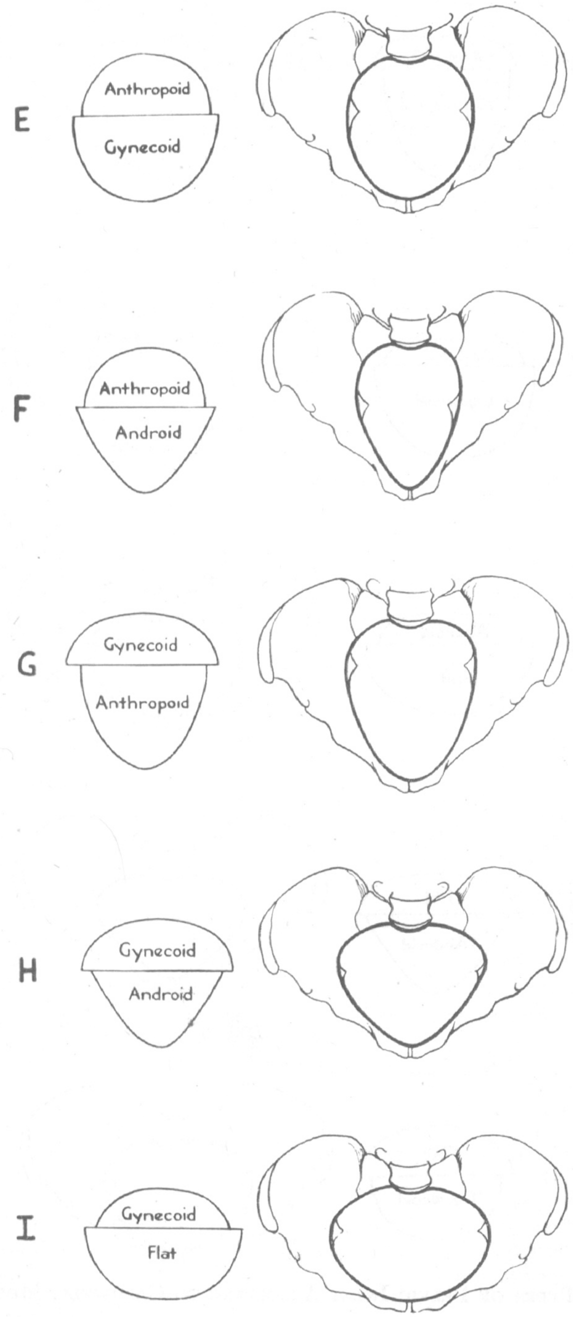


FIG. 509.—MIXED TYPES OF PELVIC INLET ACCORDING TO CALDWELL, MOLOY, AND D'ESOPO.

arch, a forward lower sacrum, or some other departure from the classic anthropoid or gynecoid pure type. Android types may become "mixed forms" by revealing straight side walls, or a wide subpubic arch, or any other departure from the classic android shape in the mid or lower pelvis. In other mixed types, the inlet differs from the pure forms in addition to the presence of lower pelvic variations. These forms require a modified terminology to define the inlet shape

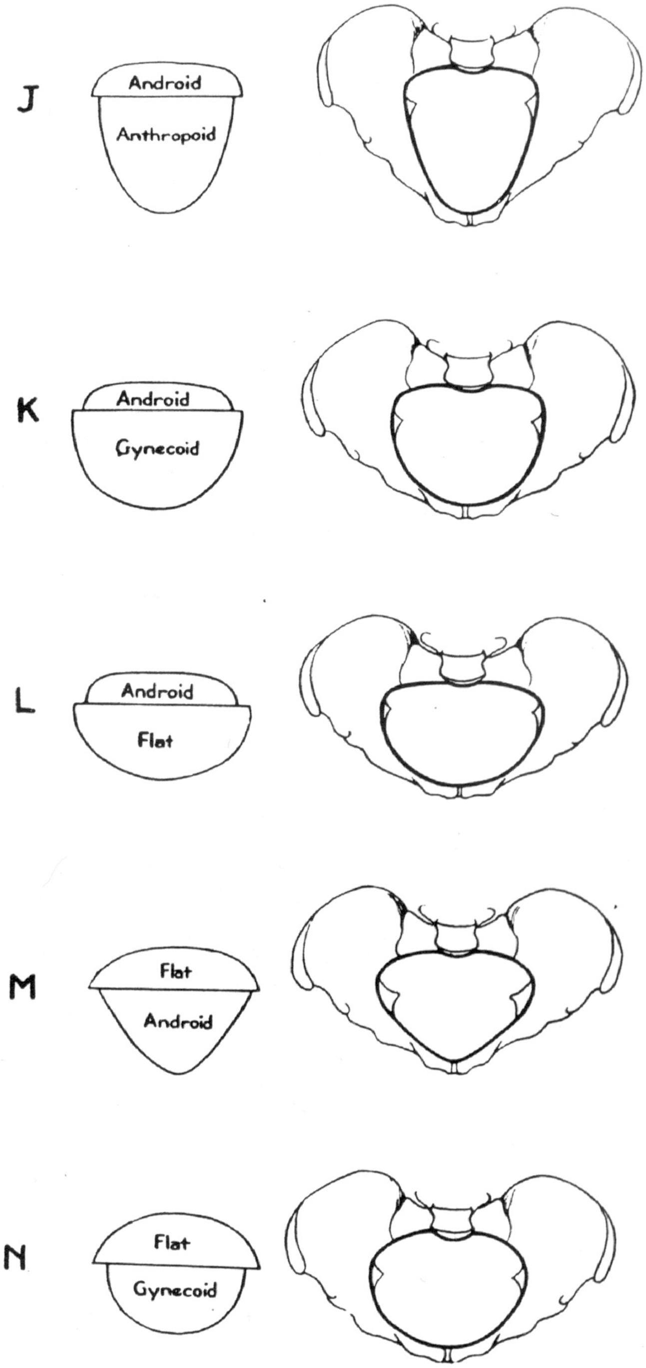


Fig. 510.—Mixed Types of Pelvic Inlet According to Caldwell, Moloy, and D'Esopo.

tion of the pelvis but with certainty by roentgenography. When an abnormality is recognized, a roentgenologic examination surely should be made. It is important to know the type of pelvis with which one is dealing in order to follow the mechanism and course of labor with intelligence. Likewise it is essential to know the exact shape of the pelvis in order to perform a midforceps delivery, breech extraction, or version and extraction without harming mother or baby. Caldwell and his associates maintain that from the standpoint of roentgenologic technic, these variations in pelvic morphology cannot be studied with accuracy by single flat anteroposterior films. Stereoroentgenograms viewed in the precision stereoscope which corrects distortion should form the basis for the roentgenologic technic if accuracy in the classification of the pelvis is desired.

The following is a complete classification of pelves suggested by Caldwell, Moloy, and D'Esopo:

I. *Normal Female Growth Types:*

A. Variations at the inlet:

1. True anthropoid type	transversely contracted type
2. Anthropoid-gynecoid type	
3. Anthropoid-android type	anthropoid with narrow fore pelvis
4. True gynecoid type	normal female pelvis
5. Gynecoid-anthropoid type	
6. Gynecoid-android type	gynecoid with narrow fore pelvis
7. Gynecoid-flat type	
8. True android type	masculine type, funnel type
9. Android-anthropoid type	
10. Android-gynecoid type	
11. Android-flat type	
12. True platypelloid type	
13. Flat-gynecoid type	difficult to distinguish from gynecoid-flat
14. Flat-android type	difficult to distinguish from android-flat

B. Variations below the inlet:

1. Side walls of pelvis	divergent, straight, or convergent
2. Subpubic arch	wide, moderate, narrow
3. Pubic rami	straight (masculine or Gothic) curved (feminine or Norman)
4. Pubic symphysis	masculine or feminine type
5. Ischial spines	long, sharp, short, or flat
6. Apex of sacrosciatic notch	wide, average, narrow
7. Base of sacrosciatic notch	wide, average, narrow
8. Number of sacral segments	
9. Sacral curvature	(*a*) longitudinal—straight, average, marked (*b*) transverse—straight, average, marked
10. Sacral inclination	(*a*) upper portion—forward, average, backward (*b*) lower portion—forward, average, backward
11. Terminal sacrum	sharp, average, blunt
12. Lateral bore	divergent, straight, convergent

C. General pelvic variations:

1. Pelvic size	large, average, small, according to pelvimetry measurements of cardinal diameters
2. Pelvic bones	heavy, average, light
3. Symmetry of pelvis	(*a*) symmetrical at inlet, mid, or lower pelvis (*b*) asymmetrical (to right) at inlet, mid, or lower pelvis (*c*) asymmetrical (to left) at inlet, mid, or lower pelvis

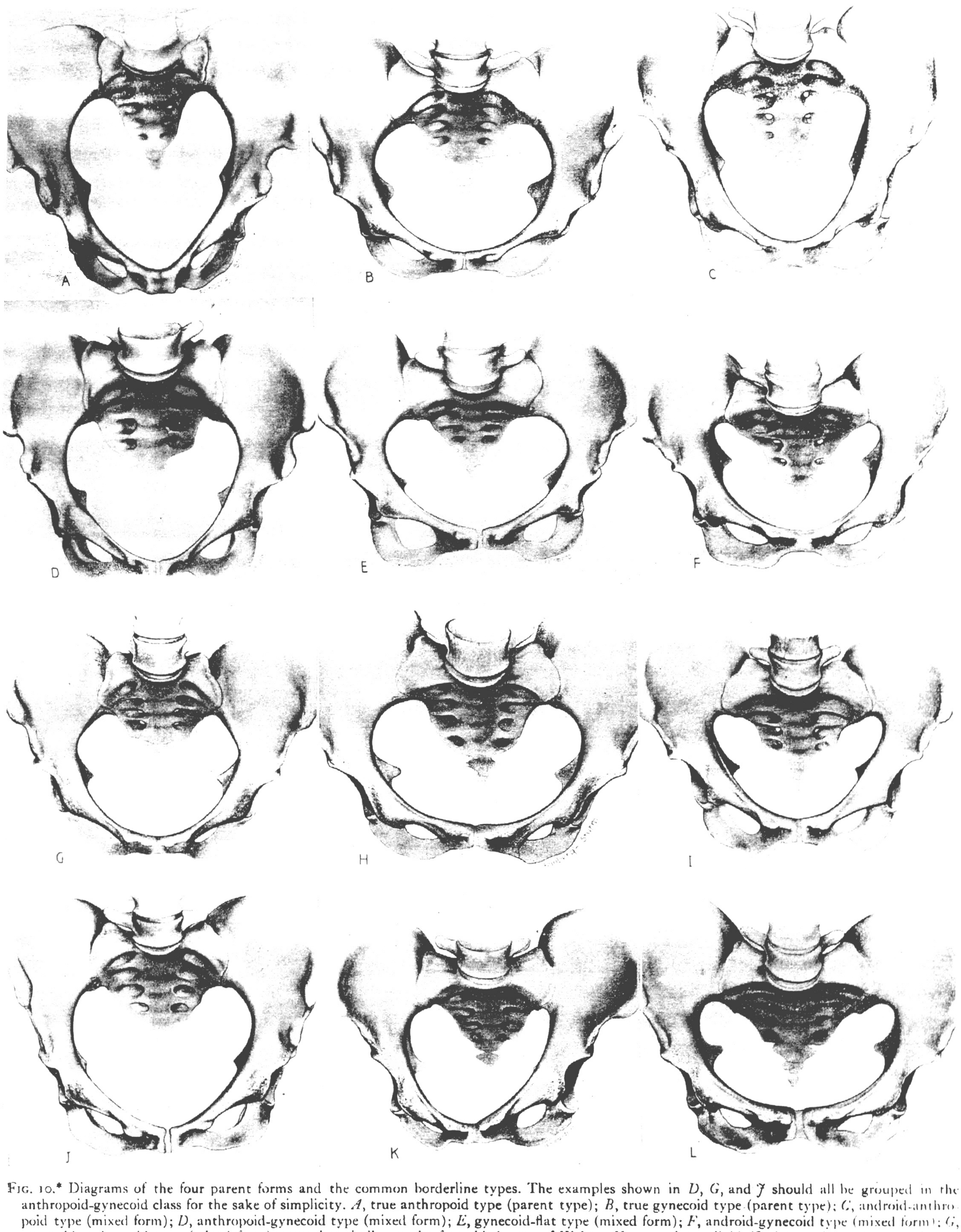


FIG. 10.* Diagrams of the four parent forms and the common borderline types. The examples shown in *D*, *G*, and *J* should all be grouped in the anthropoid-gynecoid class for the sake of simplicity. *A*, true anthropoid type (parent type); *B*, true gynecoid type (parent type); *C*, android-anthropoid type (mixed form); *D*, anthropoid-gynecoid type (mixed form); *E*, gynecoid-flat type (mixed form); *F*, android-gynecoid type (mixed form); *G*, gynecoid-anthropoid type (mixed form) somewhat similar to the four-sided type of Weber; *H*, true platypelloid (flat) type (parent type); *I*, true android type (parent type); *J*, gynecoid with a narrow fore pelvis (mixed type); *K*, asymmetrical type; *L*, android-flat type (mixed form).

* Courtesy of *Am. J. Obst. & Gynec.* and constructed by use of stereoroentgenograms and photographs obtained from Professor T. Wingate Todd.

Section IV

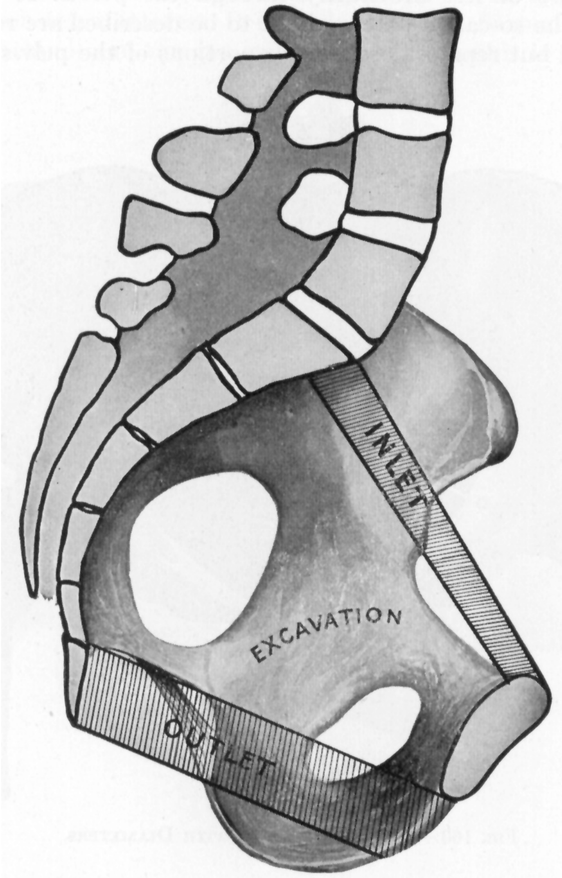
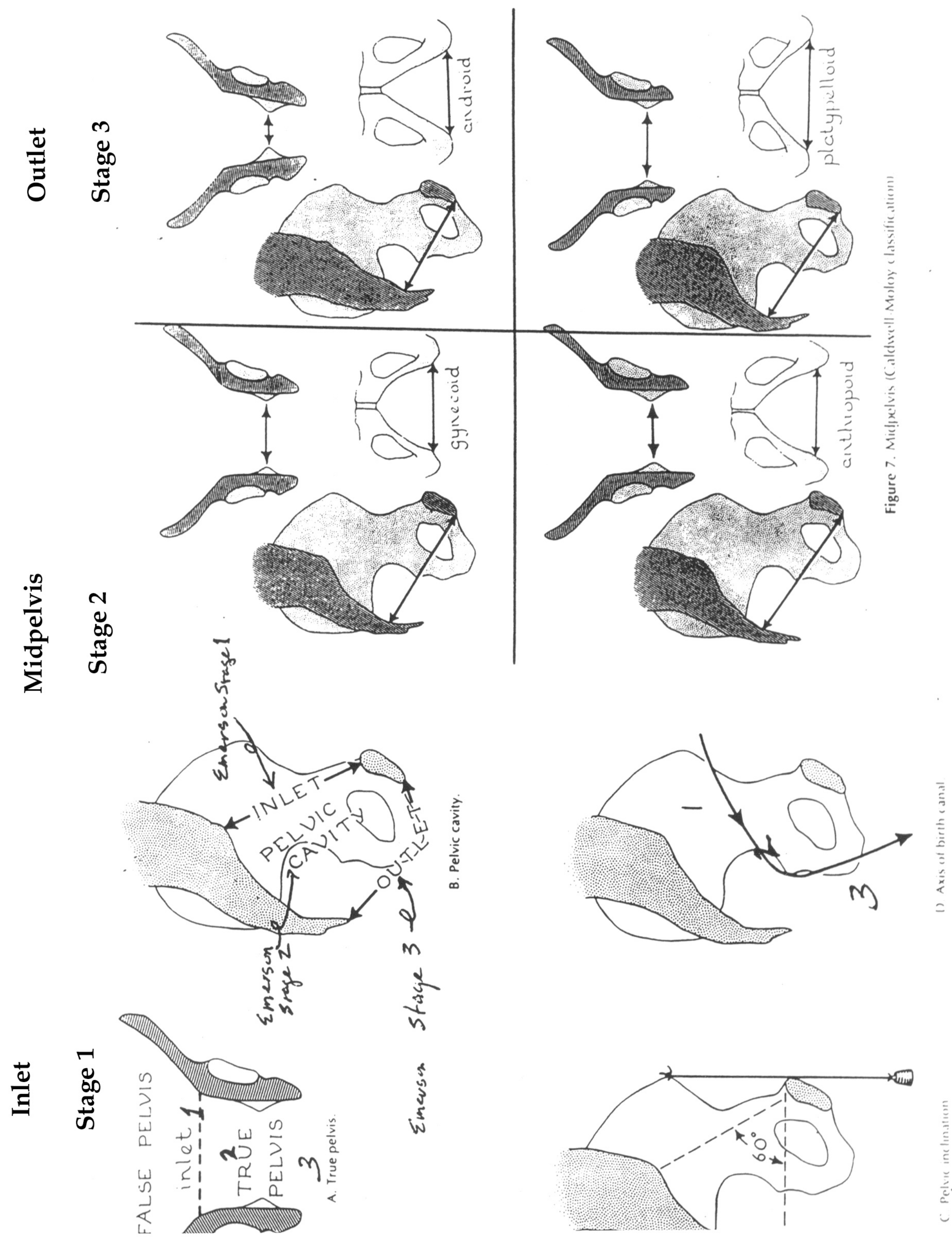


Fig. 161.—The Regions of the Pelvis.



A. True pelvis.

B. Pelvic cavity.

C. Pelvic inclination

D. Axis of birth canal.

Figure 7. Midpelvis (Caldwell Moloy classification)

FIG. 445.—DEFLEXION ATTITUDE. MEDIAN VERTEX, "MILITARY."

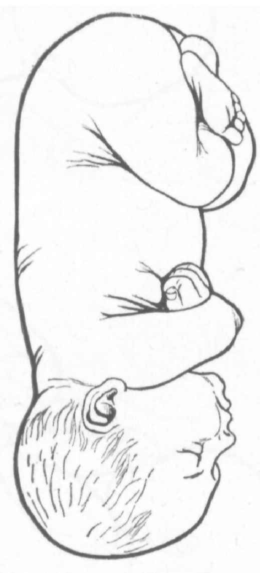


FIG. 446.—DEFLEXION ATTITUDE. FOREHEAD OR BREGMA PRESENTATION.

FIG. 447.—DEFLEXION ATTITUDE. BROW PRESENTATION.

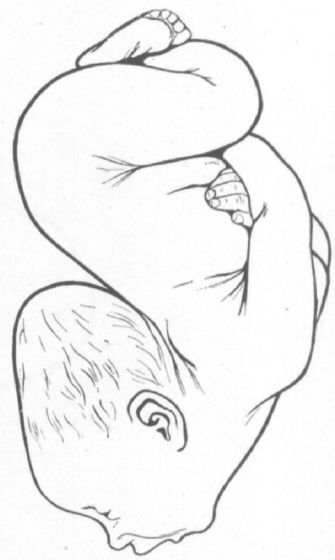


FIG. 448.—DEFLEXION ATTITUDE. FACE PRESENTATION. DEFLEXION COMPLETED.

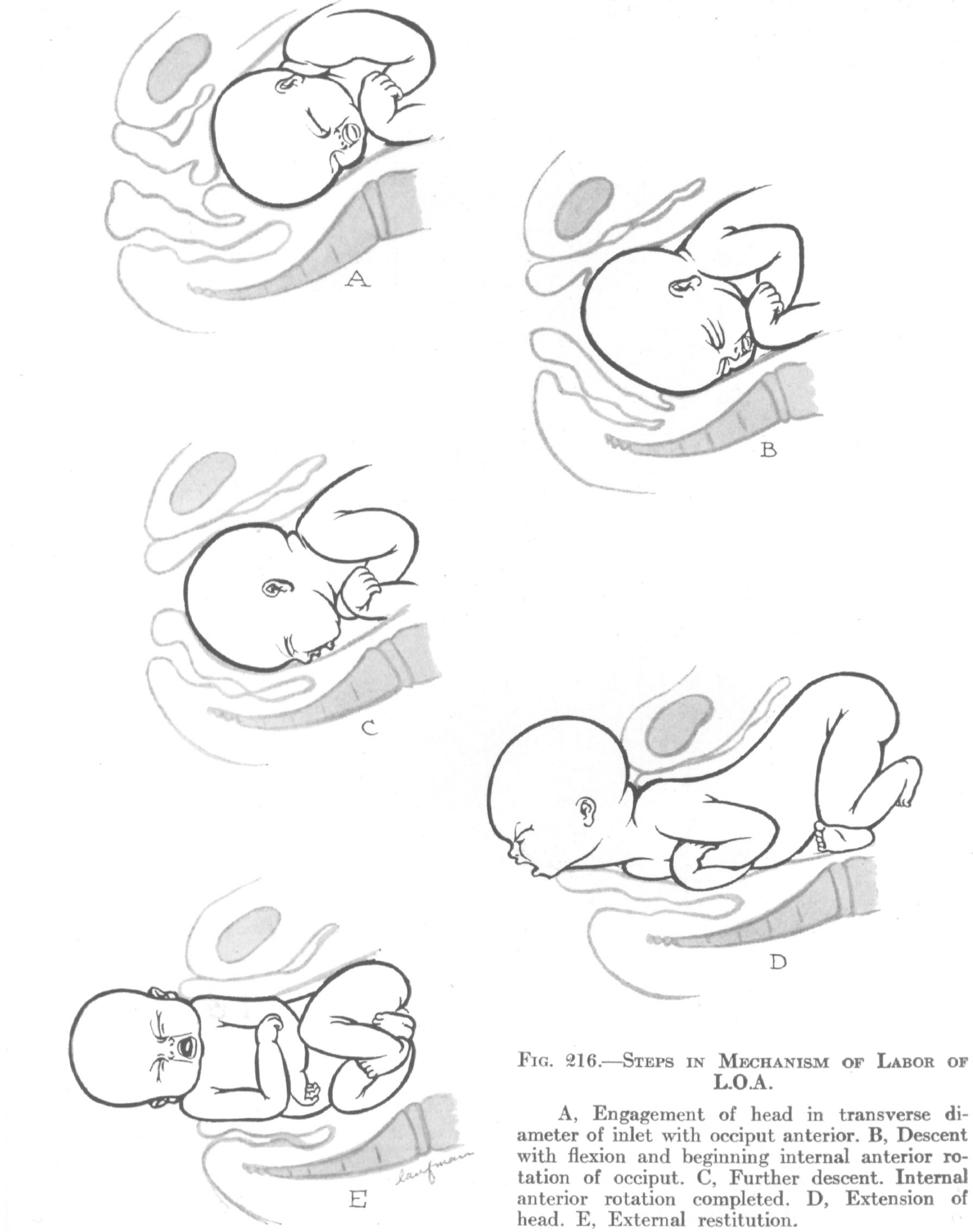


FIG. 216.—STEPS IN MECHANISM OF LABOR OF L.O.A.

A, Engagement of head in transverse diameter of inlet with occiput anterior. B, Descent with flexion and beginning internal anterior rotation of occiput. C, Further descent. Internal anterior rotation completed. D, Extension of head. E, External restitution.

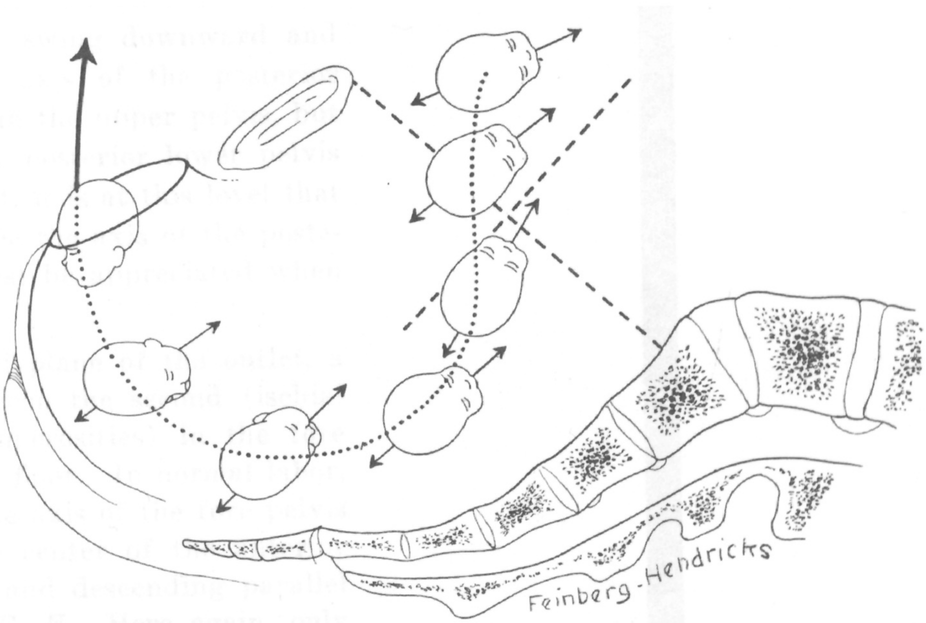


Fig. 23.—Diagrammatic representation of the axis of descent as revealed by this investigation. A line joining similar points on the series of fetal heads reveals general character of the curved axis. Note the angular relationship between the fetal axis and the perpendicular axis of the pelvis, and the difficulty of anatomically associating the relation of head to pelvis at any given level. The fetal piston moves upward and downward in a straight line with each contraction. Note relationship of its position to the static pelvis at the following levels: (1) During engagement from a posterior parietal position at the inlet. (2) At low level in posterior pelvis (see Fig. 24, *C. D.*). (3) Shift forward with descent along inclined plane of outlet. (4) On perineum to distend it by straight drives downward in axis of fore pelvis (see Fig. 24, *G. F.*).

finds the ear close by and the zygomatic process with the edge of the orbit. A false fontanel will confuse the diagnosis, and its presence should always be suspected when the findings are not typical. To distinguish the sagittal suture from the lambdoid or coronary, it is to be noted that the latter two lie in strongly curved planes but the sagittal sutures lie in a less arched surface. The position of the head can almost always be determined by these means, but in cases of doubt it is well to *search for the ear.* The position of the ear will disclose the position of the head. However, there must be considerable cervical dilatation to permit palpation of an ear. In the second stage, after hard labor pains have

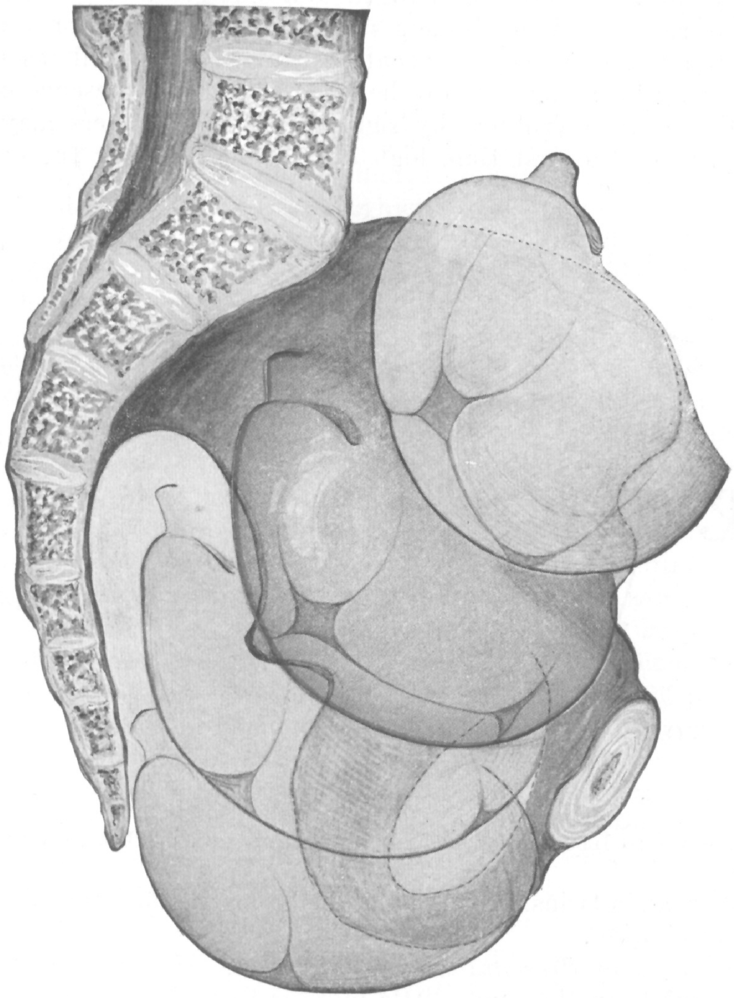


Fig. 268.—Showing the Head in Four Degrees of Engagement.
The red head is just fully "engaged," the topmost head is "not engaged," and the lowest "is at the outlet."

molded the head and developed on it a caput succedaneum, the landmarks are obscured, but still discoverable; and here also recourse may be had to the ear. The tragus points to the face.

We have often felt the need of an accurate scientific method of conveying to others the exact position or degree of rotation of the presenting part. The usual designations are good as far as they go. To refine this part of our art DeLee designed the plan shown in Fig. 267. The pelvis is laid on a circle with radii marking the degrees. The pubis is 0 degree, the sacrum 180 degrees. With this plan L.O.A. would be L.O. 45 degrees; R.O.P. = R.O. 135 degrees; L.O.T. = L.O. 90 degrees, etc. One can thus designate every stage of rotation, *e. g.*, L.O.

15 degrees; R.O. 110 degrees, and the figure stated represents the arc the occiput must travel to complete anterior rotation.

4. *Station. The Advancement of the Head Along the Birth Canal.*—By both external and rectal examinations the degree of engagement of the head can always be determined and a vaginal exploration would not be needed if this were all we wished to learn.

The head is "floating" when it is freely movable above the inlet. It is "fixed in the inlet" when moderate pressure will not dislodge it, but its parietal bosses have not yet passed the region of the inlet.

The head is "engaged" when its greatest horizontal plane has passed the region of the inlet. In occiput presentation this is the biparietal plane, and "engagement" is shown clinically, first, by the lowest part of the head having reached the interspinous line or passed it; second, by the head covering two thirds of the sacrum, *i. e.*, the lowest part of the head has reached the third parallel of Hodge and one can hardly insert two fingers between the head and the

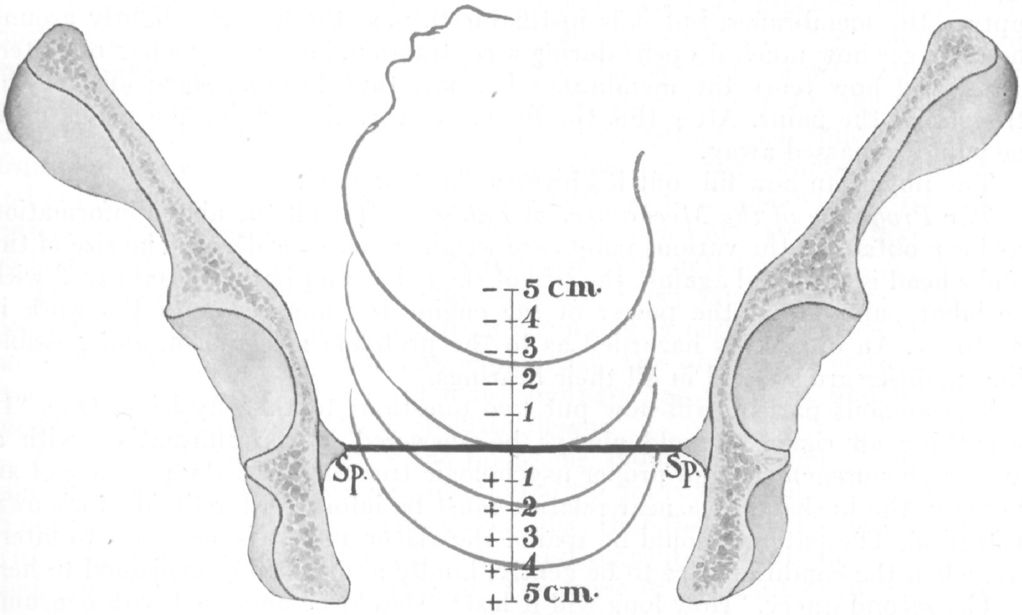


FIG. 269.—DESIGNATING THE STATION OR DEGREE OF ENGAGEMENT OF THE HEAD BY CENTIMETERS ABOVE OR BELOW THE INTERSPINOUS LINE. (See Figs. 561 and 563.)

end of the sacrum and, third, by the head covering three fourths of the symphysis. The head is in the "midplane" when the lowest part of the cranium lies between the tuberosities, and "at the pelvic outlet" when the two parietal bosses have passed the tuberosities (Fig. 268). After this the head comes well down "on the perineum" and lies in the distended vagina and vulva. In order to express in understandable scientific terms the exact station of the head, DeLee devised the following plan. A vertical coronal plane is imagined passing through the spines of the ischia. This plane is divided in centimeters and numbered, as shown in Fig. 269. The interspinous line is zero, 0. The centimeters above are minus, those below plus. If the head has reached the spines, *i. e.,* just engaged, we say the head is "engaged, at 0." If it is higher, we say "not engaged, —2, —3, —4," as the case may be. If it has passed zero we say "engaged, +1, +2," etc.

By first touching the top of the head, then carrying the fingers to the sacrum and then to the side walls of the pelvis, it is easy to determine the relation of one to the other, especially if the maneuver is combined with external palpation.

Too great emphasis cannot be laid on the importance of accurately defining

Section V

labor throughout the lower levels of the pelvis. No attempt is made to give statistical data in this paper. Instead, we are describing what to us are some of the outstanding observations in the careful study of over 1,000 complete roentgenologic examinations of the pelvis and fetal head obtained before, during, or after labor in conjunction with the known details of the actual delivery and the facts ascertained by vaginal examination.

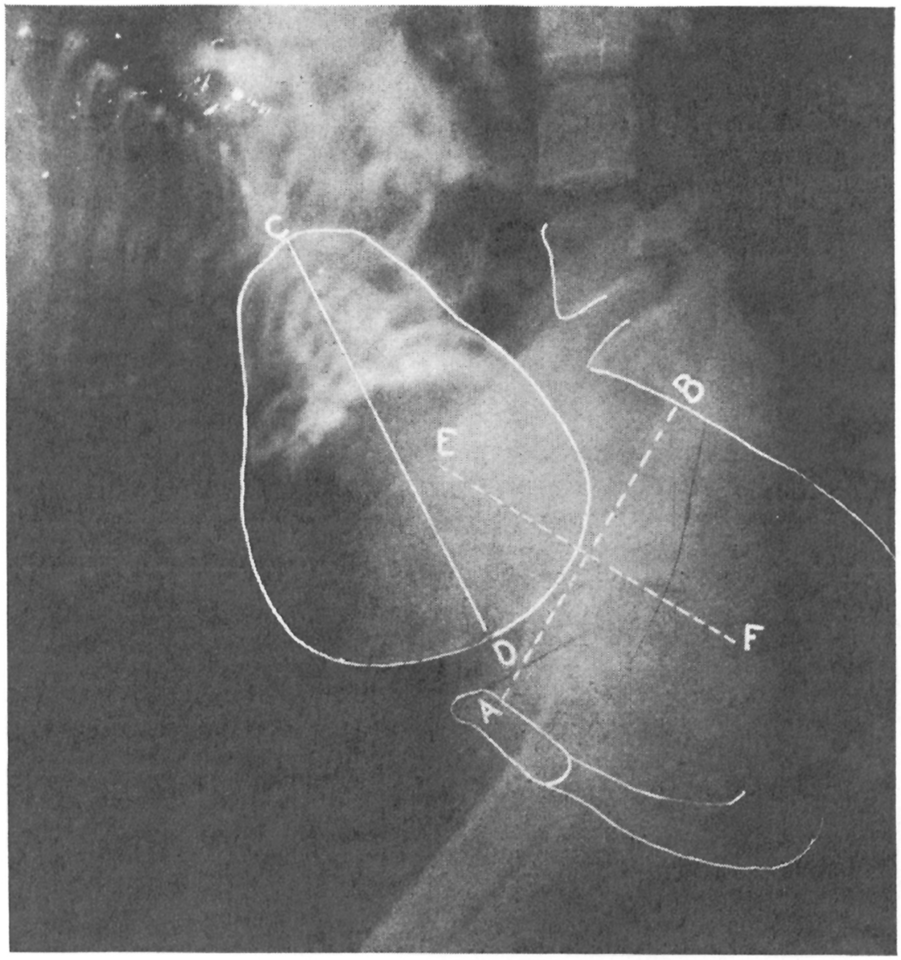


Fig. 1.—Lateral roentgenogram early in labor. *A. B.*, First plane of inlet and true conjugate diameter. *C. D.*, Long axis of fetal head. *E. F.*, Perpendicular to inlet through midpoint of true conjugate diameter. Extreme posterior parietal position at inlet. Such a marked degree is rare. Note relationship of *C. D.* to *E. F.* and *A. B.*

Careful study of the lateral roentgenograms illustrated in Figs. 1 to 7, in which the fetal head and its long axis (*C. D.*), the true conjugate (*A. B.*), and a perpendicular through its midpoint (*E. F.*), as well as the pubic and sacral boundaries of the true pelvis from the lateral aspect have been outlined, will bring out several important points relating to the entire mechanism of labor. These facts are separately dealt with in greater detail later in the text.

The marked obliquity of the long axis of the fetal head to the true conjugate diameter or its perpendicular, illustrated in Figs. 1 and 2, accounts for the positions assumed by the vertex in extreme examples of a posterior and anterior parietal position. In Figs. 3 and 4 the more usual degree of obliquity is shown. The long axis of the head, however, is still at an angle to the inlet. With engagement and descent into the true pelvis a marked change in the direction of the long axis of the head occurs, and in Figs. 5 and 6 it will be noted that *C. D.* is now directed downward and backward away from the perpendicular *E. F.* The axis of the head in Fig. 5 is directed posteriorly forming a wide angle to *E. F.*, and in Fig. 6 the head has descended to a low level with its long axis parallel and close to the sacrum. After

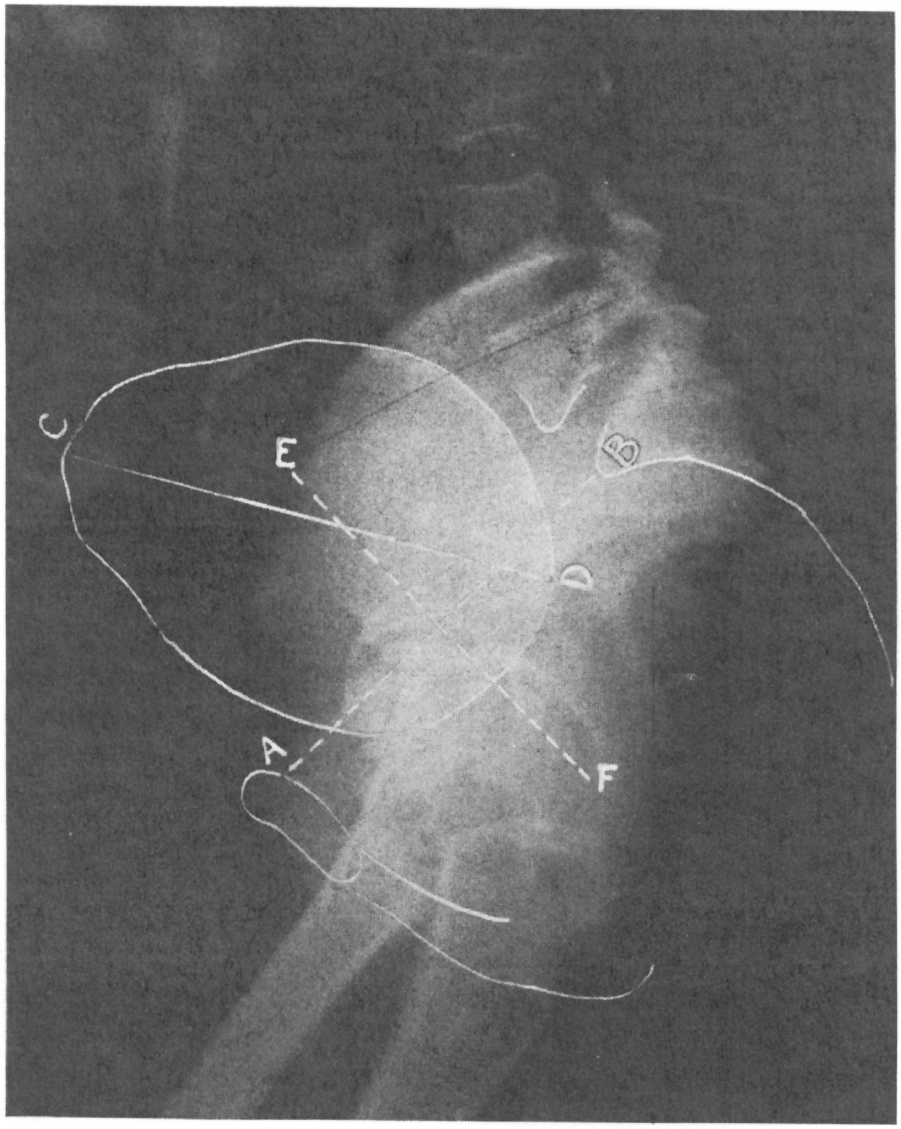


Fig. 2.—Lateral roentgenogram early in labor. *A. B.*, First plane of inlet and true conjugate diameter. *C. D.*, Long axis of fetal head. *E. F.*, Perpendicular to inlet through midpoint of true conjugate diameter. Extreme anterior parietal position, so rare in this degree as to be considered an obstetrical curiosity. Note relationship of *C. D.* to *E. F.* and *A. B.*

rotation has occurred and the vertex has descended into the lower fore pelvis (Fig. 7), the axis of descent again shows no relationship to the perpendicular of the inlet, but seems obviously parallel with the symphysis and descending rami of the pubes. It will be observed that the perpendicular to the true conjugate *E. F.* serves merely as an axis of reference from which the angular relationship of the long axis of the head within the true pelvis may be determined.

The extreme example of the posterior parietal position or the so-called Litzmann's or Varnier's obliquity, illustrated in Fig. 1, is quite rare, but the lesser degree of the same obliquity, as illustrated in Fig. 3, represents in our experience the common position at the time of engagement. As descent occurs from this or any position into the true pelvis, the long axis of the fetal head swings downward and backward, while the fetal axis is carried forward until the line of descent,

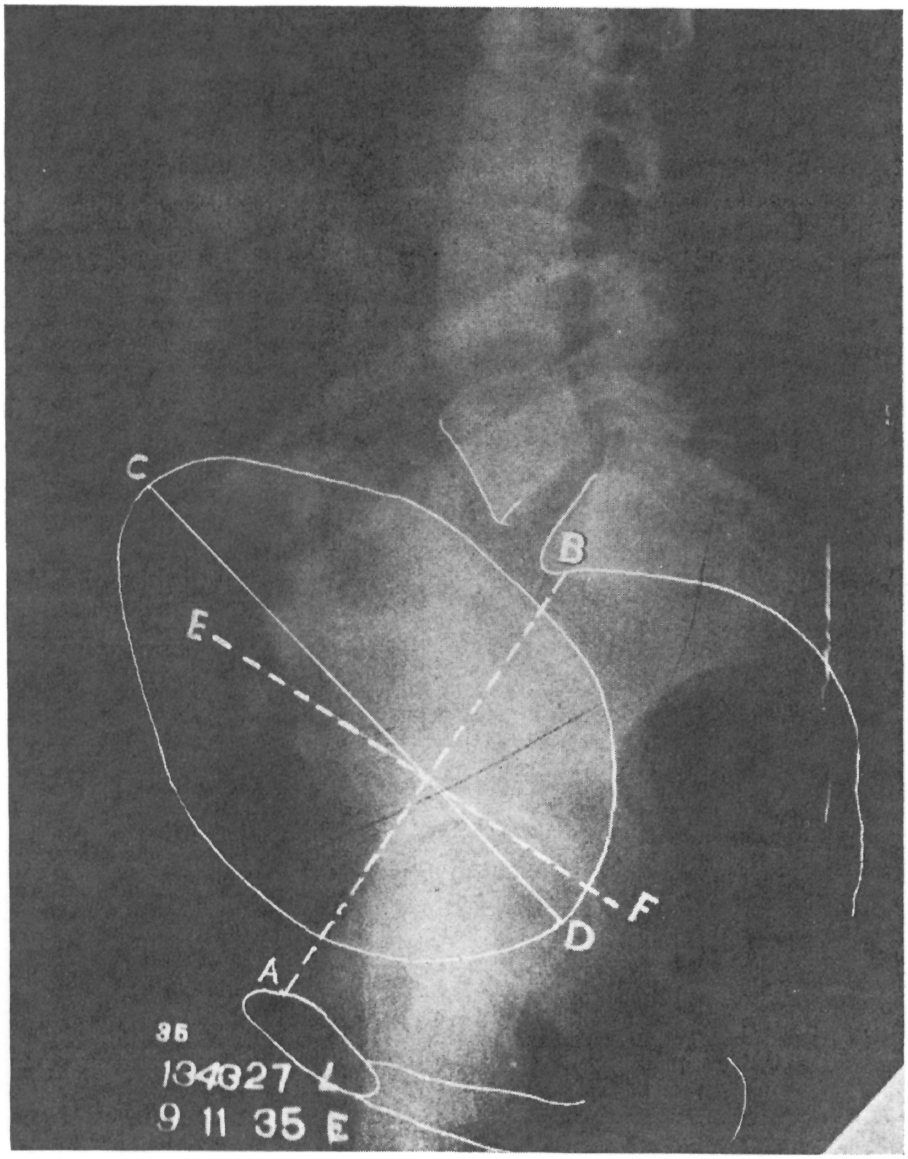


Fig. 3.—Lateral roentgenogram early in labor. *A. B.*, First plane of inlet and true conjugate diameter. *C. D.*, Long axis of fetal head. *E. F.*, Perpendicular to inlet through midpoint of true conjugate diameter. The usual degree of a posterior parietal position at the inlet. This degree of asynclitism is the average at engagement. Note that *C. D.* slopes forward to *E. F.* pointing into fore pelvis.

having crossed behind the perpendicular of the inlet, points toward the bottom of the posterior pelvis as represented by the anterior surface of the lower sacrum (compare Fig. 3 with Figs. 5 and 6). This curve of descent from the upper fore pelvis to the bottom of the posterior pelvis necessitates that the posterior parietal bone and sagittal suture, originally felt near the symphysis, is carried downward and backward, becoming less easily palpable, while the anterior parietal becomes more accessible to the examining finger as the level of the midpelvis is approached. Though the head is constantly adapting itself to the pelvis, the chief factors which cause rotation become operative at this level. Synchronous with rotation, the head descends and moves forward along the inclined muscular plane of the lower fore pelvis until the back is close to and parallel with the symphysis.

The typical anterior parietal position or Nägele's obliquity, in which the sagittal suture points toward the promontory of the sacrum as in Fig. 2, in our experience is so rare as to be considered almost an obstetric curiosity. Lesser degrees of the

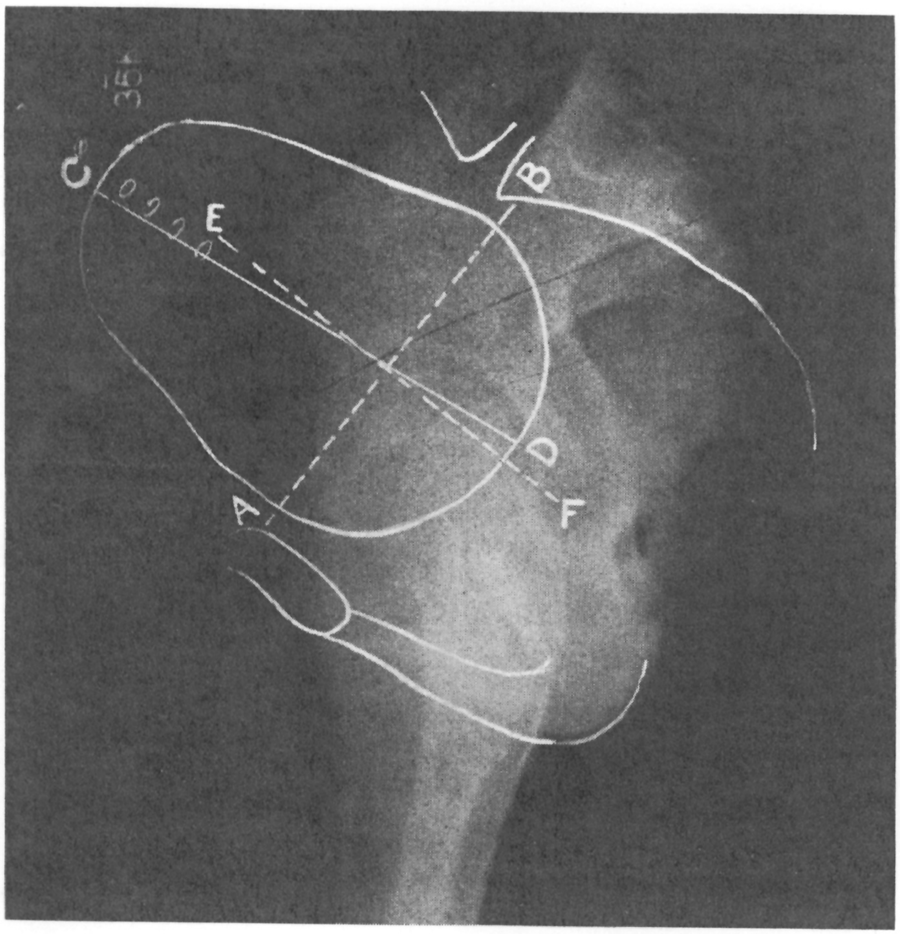


Fig. 4.—Lateral roentgenogram early in labor. *A. B.*, First plane of inlet and true conjugate diameter. *C. D.*, Long axis of fetal head. *E. F.*, Perpendicular to inlet through midpoint of true conjugate diameter. A relatively rare, but no uncommon form of an anterior parietal position at the inlet. Note that *C. D.* is almost perpendicular to the inlet but is inclined slightly behind *E. F.* This tendency is more noticeable when the fetal spine is located and found to be in front of the perpendicular *E. F.*

same position, as illustrated in Fig. 4, are somewhat more frequent, but when such a position is found, it is usually associated with a sagging forward of the uterus, carrying with it the body of the fetus. If the relationship of *C. D.* to *E. F.* is closely studied in Fig. 4, it will be noted that, although the head is, to all intent and purpose, perpendicular to the inlet *A. B.*, its long axis *C. D.* points slightly behind *E. F.* This minor anterior parietal tendency becomes more obvious when the long axis of the head is associated with the line of the fetal vertebral column, when it will be found that the fetal axis is definitely in front of the perpendicular of the inlet. The axis of descent, under these circumstances, is straight downward

Stage 2

and backward in the line of the long axis of the fetal head *C. D.* until at a low level in the posterior pelvis the head is found almost parallel to the sacrum as in Fig. 6. The principle of descent is similar for both these minor posterior and anterior parietal tendencies at the inlet. The posterior parietal tendency necessitates that the long axis of the fetal head *C. D.* cross behind the perpendicular in conjunction with a forward movement of the uterus in labor. In the case of an anterior parietal tendency, or with any head which at the onset of labor is fitting squarely in the inlet,

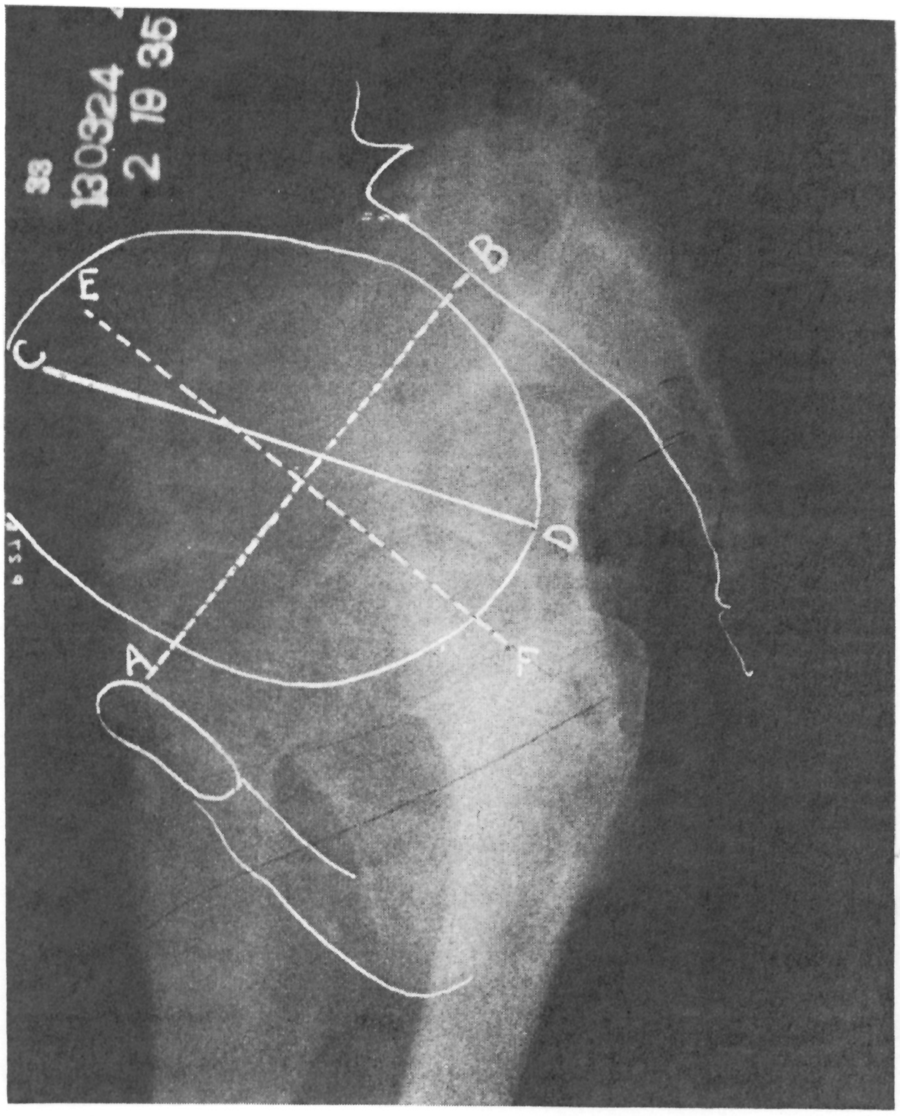


Fig. 5.—Lateral roentgenogram in labor. *A. B.*, First plane of inlet and true conjugate diameter. *C. D.*, Long axis of fetal head. *E. F.*, Perpendicular to inlet through midpoint of true conjugate diameter. Engagement has occurred. Note that the long axis of head *C. D.* is directed against sacrum behind *E. F.*, having engaged from a posterior parietal position.

the first part of this movement is unnecessary (compare Figs. 3 and 4). For both, the normal line of descent is one which carries the head downward and backward, ultimately at or behind the perpendicular of the inlet to the bottom of the posterior pelvis close to the lower aspect of the sacrum.

What factors may be suggested in explanation of this method of engagement? A study of the relationship of *E. F.* to *C. D.* in Figs. 5 and 6 will indicate that this posterior curve of descent can scarcely be considered primarily due to the static pelvis, because in Fig. 5 the long axis of the head at that particular level is directed against the sacrum, not parallel with it as in Fig. 6. We believe that the lower pole of the uterus plays an important directing rôle in this mechanism, in conjunction with a forward movement of the uterus and the fetal axis.

Another important point which needs further explanation concerns the particular static axis followed by the head through the pelvis. The region used consistently by

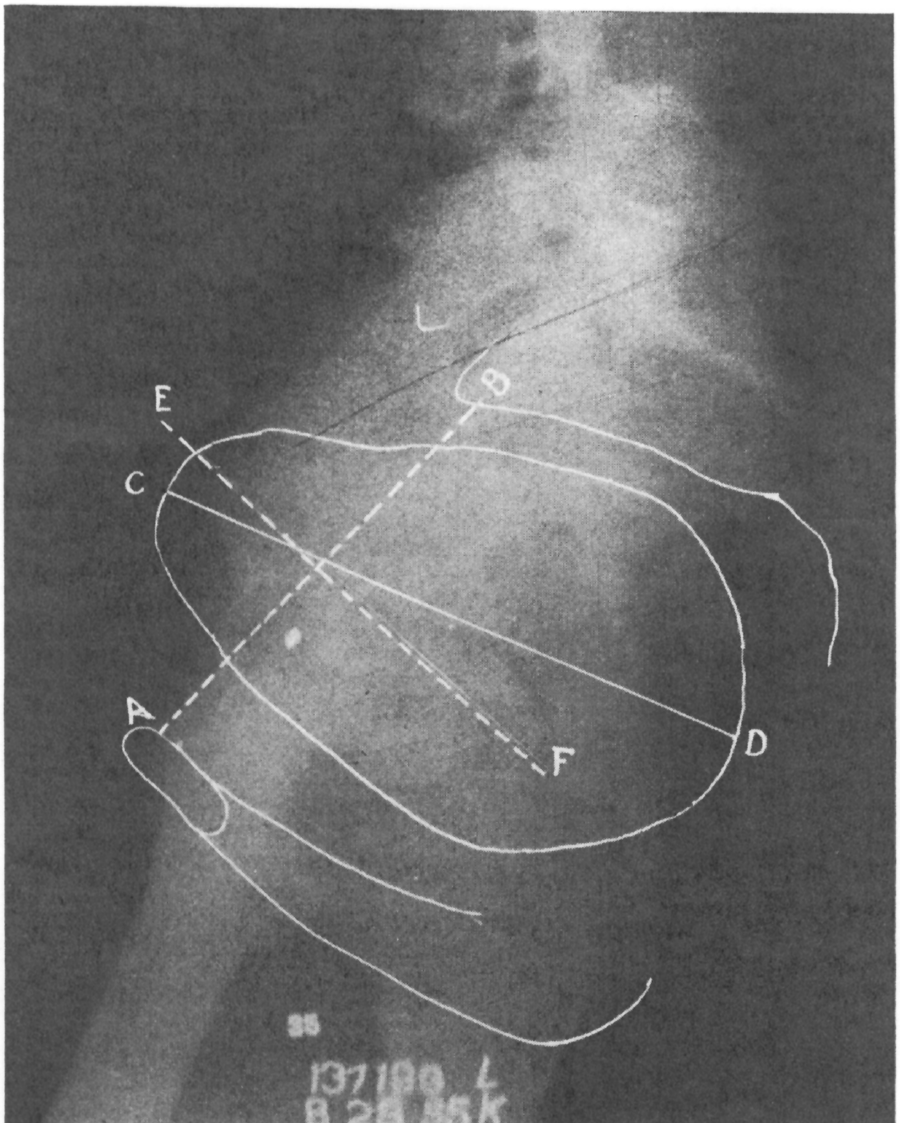


Fig. 6.—Lateral roentgenogram in labor. *A. B.*, First plane of inlet and true conjugate diameter. *C. D.*, Long axis of fetal head. *E. F.*, Perpendicular to inlet through midpoint of true conjugate diameter. Engagement has occurred. Note that *C. D.* is parallel to sacrum and behind *E. F.* In this case, engagement occurred from a slight anterior parietal position as in Fig. 4.

the head in all pelves is indicated to advantage in Fig. 55. In all pelves, the widest transverse diameters are located behind the midpoint of the anteroposterior diameter. In order that the head may make consistent use of this more ample region, the lower pole of the uterus guides it into the posterior pelvis close to the sacrum and offers a restraint which prevents it from encroaching too soon on the fore pelvis where narrower diameters may exist. In Fig. 55, it will be observed that the major portion of the head is located behind and above the ischial spines. The fore pelvis is avoided. Thus the central axis of the superior strait is too far forward in the pelvis to represent the axis followed by the head through the true pelvis. This latter axis of the posterior pelvis is illustrated in Fig. 24 (*C. D.*).

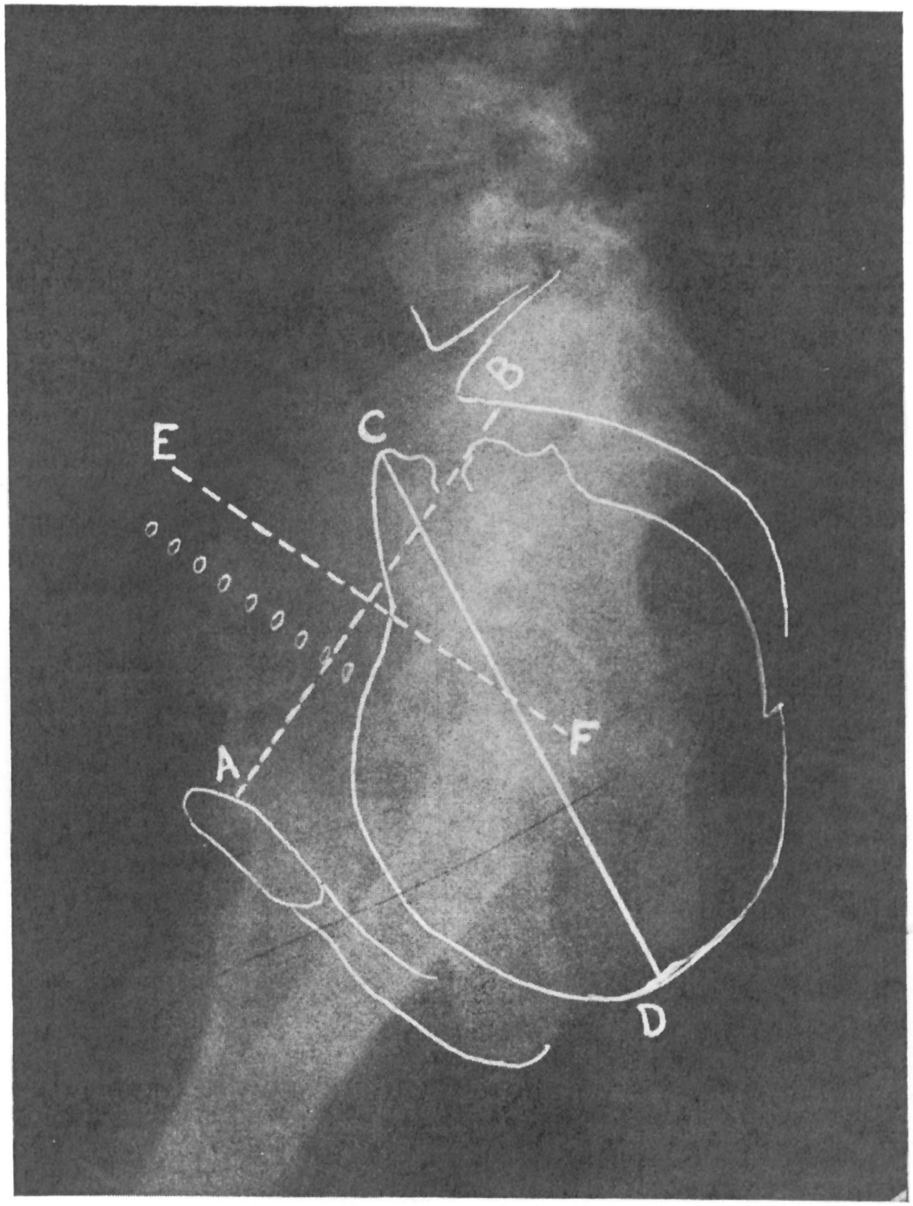


Fig. 7.—Lateral roentgenogram late in labor. *A. B.*, First plane of inlet and true conjugate diameter. *C. D.*, Long axis of fetal head. *E. F.*, Perpendicular to inlet through midpoint of true conjugate diameter. Head in fore pelvis with back anterior and parallel to symphysis. Long axis of head *C. D.* points into upper posterior pelvis. Fetal back in advance of *E. F.* in axis of fore pelvis (see *G. F.*, Fig. 24).

In these roentgenograms it will also be observed that the anterior boundary of the fore pelvis is not the width of the symphysis alone, as usually accepted, but includes the entire depth of the fore pelvis consisting of the posterior aspects of the symphysis and the pubic rami. The true pelvic cavity, therefore, actually approaches the form of a parallelogram, in which the anterior bony boundary is comparable in length to the pelvic surface of the sacrum posteriorly.

Section VI

Two Chapters from *The Principles and Practice of Obstetrics,* by De Lee and Greenhill, 1943. The images used in these chapters consistently represent the gynecoid pelvic types and cranial molding. 6.00

CHAPTER XII

THE PASSENGERS

For the study of the mechanism of labor a consideration of the fetus as a mechanical object is essential—we must consider its size, shape, compressibility, and pliability. The *head* is larger and more important, but the trunk takes no inconsiderable part in the normal mechanism of labor, and, when pathologically enlarged, may give rise to dystocia and even cause the death of mother or child or both. In the fetus at term the face is small, the vault of the cranium forming the major portion of the head. Four large squamous bones make up the cranial vault—the two parietal, the frontal, and the occipital. At the sides the temporal bones unite with the parietals. To provide for the molding necessary in the child's passage through the maternal parts, and for the rapid growth of the brain

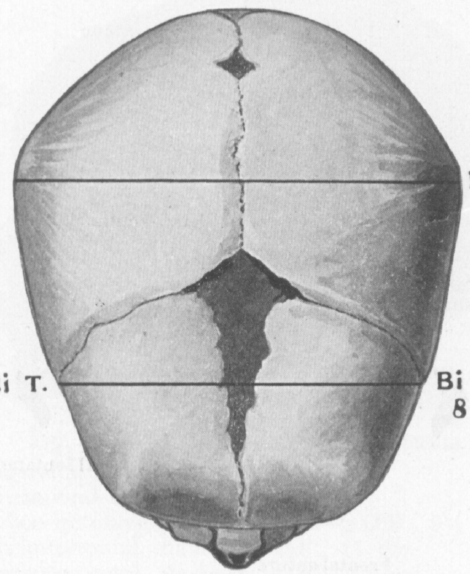


Fig. 185.—Fetal Head with Diameters.

in the first year of life, these bones are not united, but the ossification halts at the lines of impingement, which later become the *sutures* of the skull. The bones are held together by the membrane in which ossification takes place—the chondrocranium. The lines of impingement are called *sutures,* and at the junctions of the sutures, owing to rounding of the bony corners of the separate bones, spaces filled by membrane are left, and these spaces are termed *fontanels.* Outside of the configurability conferred on the head by the sutures and fontanels, these spaces are of vital importance to the practicing physician, for by means of them he determines the relation of the head to the maternal pelvis, studies the mechanism of labor, and guides his application of the obstetric forceps.

Between the two parietal bones lies the sagittal suture (Figs. 185 and 186); between the parietals and occipital, the bent lambdoid suture; between the frontal bone and the parietals, the coronal suture, while between the two plates of the frontal bone lies the frontal suture, the length of which varies. At the sides, where the parietal bones touch the temporals, lie the lateral or temporal sutures, of little obstetric importance.

At the junction of the sagittal, frontal, and coronal sutures lies a lozenge-shaped space, the anterior or large fontanel. Its size depends on the degree of ossification of the abutting bones, and its shape also, since with advanced ossification it becomes more square. Four sutures run into the large fontanel, which fact distinguishes it from the others, and, of its angles, three are acute and one obtuse, which points enable us to diagnose the position of the fetal head in the pelvis. The obtuse angle, which is also the shortest (Fig. 186), points toward the occiput, or posterior pole of the head, and the longest acute angle points toward the face.

Behind, at the junction of the sagittal suture with the lambdoid, a small triangular space exists, called the posterior or small fontanel. It is best to use the terms small and large fontanel to avoid confusion in the study of the mechanism of labor. Three sutures enter the small fontanel, which during labor is obliterated as a space, the three lines coming together at a point like the letter **Y**. The stem of the **Y** is the sagittal suture and runs toward the face.

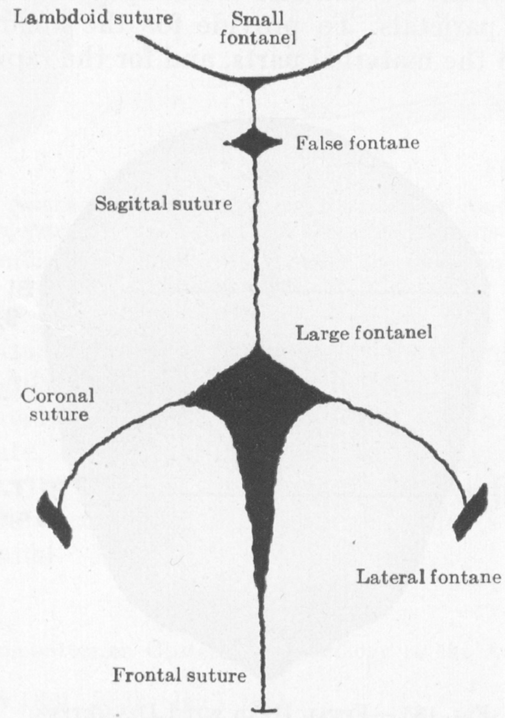


FIG. 186.—DIAGRAM OF THE SUTURES AND FONTANELS.

Where the lateral sutures meet the ends of the coronary and lambdoid, spaces exist which are called the lateral fontanels. They are important because they may impose as the other fontanels and lead to costly diagnostic errors. The ear is close to the posterior lateral fontanel, the bony orbit next to the anterior, and hereby mistakes are readily avoided. Wormian bones are accessory centers of ossification which sometimes occupy the spaces of the fontanels, but they have no obstetric importance. In the sagittal suture occasionally a quadrangular space is found (Figs. 185, 186, 188), which is most easily mistaken for the large fontanel, and may cause serious errors in diagnosis. It is a false fontanel (Fig. 188). Confusion may be avoided by following the sagittal suture to its terminal fontanels.

We distinguish the regions of the skull by particular names. The occiput is that portion (Fig. 187) lying behind the small fontanel; the sinciput is that portion lying anterior to the large fontanel; the bregma, the region of the large fontanel; the vertex, the region between the two fontanels and extending to the parietal protuberances. In shape the fetal head is irreguarly ovoid—narrow in front, broad behind. The frontal bone is quite square, the result of the angularity of the frontal protuberances, and the parietal bones have on each side a prominence which is more or less sharp—the parietal bosses. They mark the points where the head meets the greatest resistance in passing through the pelvis. Certain vagaries have been noted in the ossification of the sutures, which give the skull peculiar shapes. If the sagittal suture unites too early, a scaphocephalus results; the head is boat-shaped, being as broad in front as behind. If the frontal suture ossifies early, a three-cornered head results—trigonocephalus. In similar ways brachycephalus—short head—and dolichocephalus—long head—are produced. These various shapes modify the mechanism of labor and may produce dystocia. One can readily imagine that a long, pointed head (dolichocephalus) will lead the way through the pelvic canal better than a blunt brachycephalus (see Fig. 212).

The **fetal head diameters** vary quite a little within normal limits. The molding of the head by labor shortens some diameters and lengthens others. The

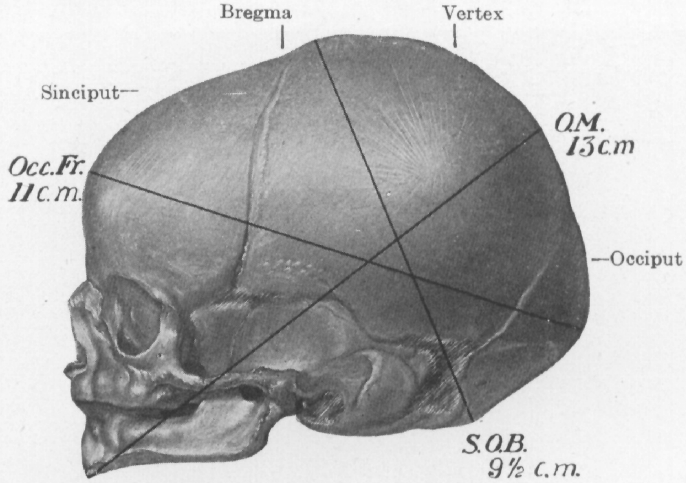


FIG. 187.—SIDE VIEW OF FETAL SKULL.
Biparietal diameter—B.P., 9½ cm.
Bitemporal diameter—Bi.T., 8 cm.
Suboccipitobregmatic diameter—S.O.B., 9½ cm.
Occipitofrontal diameter—O.F., 11 cm.
Occipitomental diameter—O.M., 13 cm.

measurements, therefore, should be taken a second time four or five days after birth, when the head has recovered its original shape. The measurements here given are the averages of a large number of children (Jaggard).

There are many other diameters, but these are the only ones practically necessary. Two circumferences of the head should be taken, the large and the small, the first taken around the occipitofrontal diameter, the other around the suboccipitobregmatic. They measure 34 and 31 cm., respectively.

The **trunk,** while apparently larger, presents smaller diameters to the birth-canal, because it may be compressed to assume cylindric proportions. In some children the shoulders are much broader, in others relatively much smaller, than the head. Boys usually have larger heads at birth, and so does the first child, regardless of sex. The bisacromial diameter of the fetus is 11 cm.; the bisiliac, 9 cm. The circumference of the shoulders is 34 cm.; of the chest, 32 cm.

By *attitude* is meant the relation of the various parts of the fetal body to one another. The normal attitude of the child, when there is no scarcity of liquor amnii, is one of moderate flexion of all the joints, the back curved forward, the head slightly bent on the chest, the arms and legs free to move in all natural directions. We find various attitudes at different times during pregnancy—flexion, deflexion, lateroflexion of the head, while the extremities are placed in

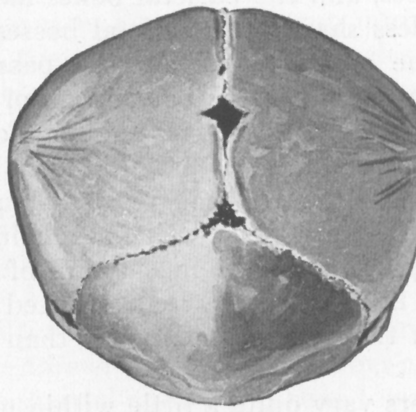
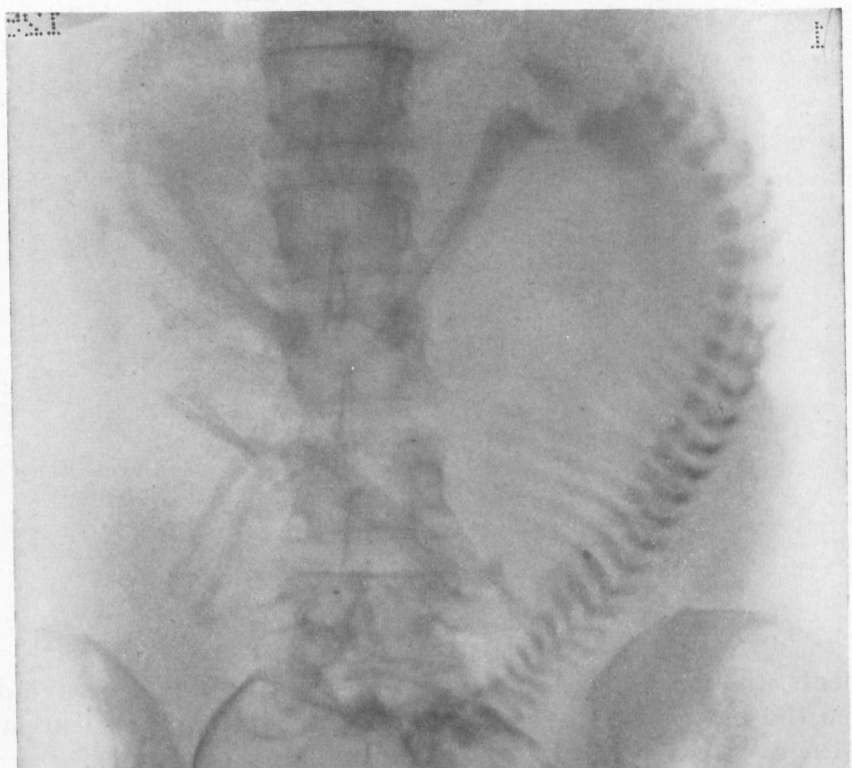


FIG. 188.—BACK VIEW OF FETAL SKULL.
Shows small fontanel and a "false" fontanel.



Changes in the Fetus the Result of Labor.—The x-ray studies of Warnekros, Thoms, Caldwell, Moloy, and D'Esopo, the frozen sections of Barbour and others, together with clinical studies, give us a clear idea of the molding of the child during labor. The child as a mechanical object for labor presents two ovoids joined by a flexible shaft, the neck. The trunk is flexible to a certain degree, and more flexible in certain directions than in others. Since this jointed object has to pass through a bent canal, one can readily perceive that this adaptability will

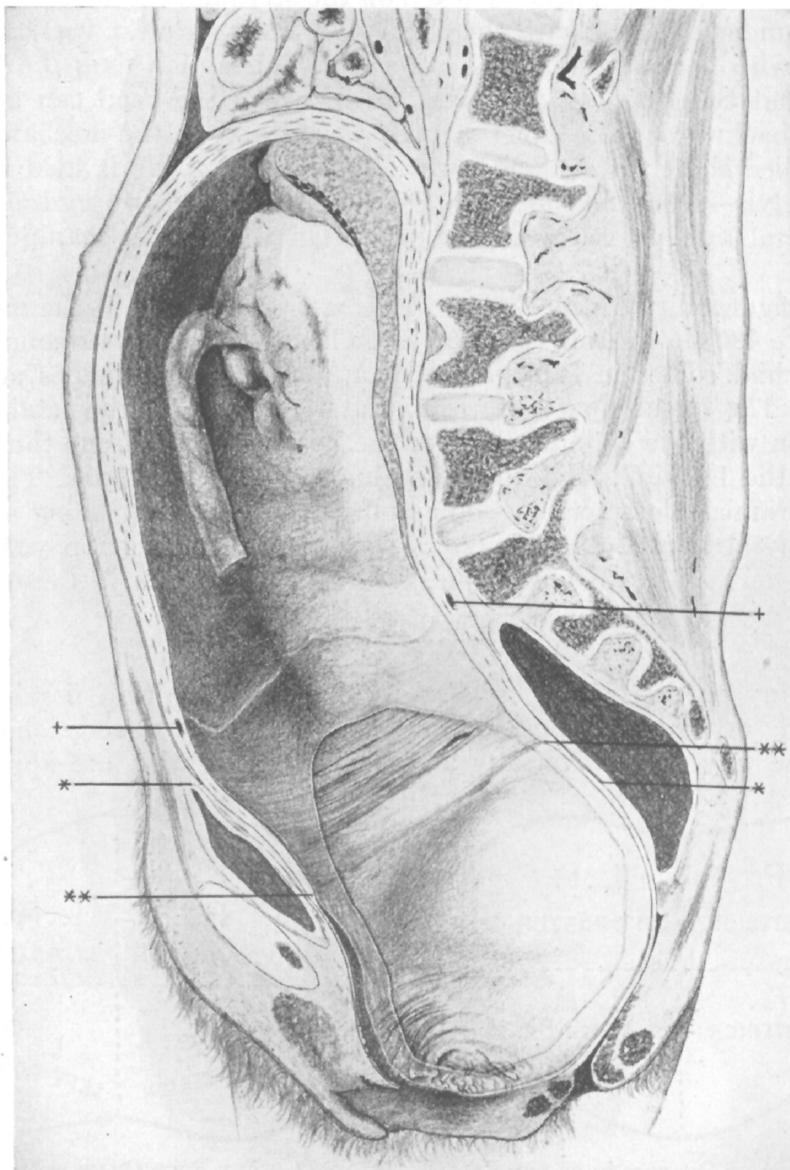


Fig. 190.—Frozen Section of Uterus in Second Stage of Labor. The Patient Died While the Baby's Head Was in the Vagina (Chiari).

**—External os. *—Peritoneal reflection. + Sinus at junction of corpus and lower uterine segment.

come into play. The neck is most readily extended, and extension is its greatest movement, because the strong posterior neck muscles prevent any great degree of flexion of the chin onto the sternum. The child can bend its dorsal spine best in a lateral direction, because the arms and thighs, by pressure against the trunk from the front, act like splints, stiffening it against flexion in this direction.

As the child is forced through the girdle of resistance its frankly ovoidal shape is squeezed into more cylindrical form, the better to pass the narrows and follow the line of least resistance or, as Sellheim says, the direction of least coercion. The uterus is aided by the inherent formation of the lower uterine segment (Fig. 190). Its cavity, therefore, lengthens, its walls apply themselves closer on the fetus, the extremities of the latter are pressed against the trunk, the latter is straightened out and the fetus is lengthened. This lengthening of the child is easily determined during every normal labor—one finds the fundus uteri rising higher toward the ensiform, while the head advances through the birth canal and it is confirmed by x-ray pictures of women in labor.

By the same forces the head is flexed on the sternum, the shoulders sometimes thrown up under the ears, with the clavicles standing almost vertically, a condition found with normal pelvis and soft parts. This action fixes the head on the trunk, so that there is only one direction in which the head can bend readily, and that is backwards. The effect of such a condition on the mechanism of labor will be studied shortly. In many cases the shoulder girdle is held back by the cervix or pelvis—then the shoulders are wedged through by hydraulic pressure aided by fetal axis pressure—or the physician helps with manipulation from below.

The configurability of the skull is of utmost importance in the mechanism of labor. Figure 480 shows how the head is molded in the most common deliveries. When the child comes in face presentation, other cranial shapes are produced (Fig. 457). The circular pressure of the uterus forces all the fetal tissues into conformation with the cylindric bore of the birth canal, and one thus finds cross sections of the fetal ellipsoid to show almost circular outlines. The reduction of the bisacromial diameter may be as much as 2 cm., depending on the hardness of the fetal tissues. If the child is overgrown, it is poor in water, and the flesh is tougher and less compressible. Dystocia is common in these cases.

PRESENTATIONS AND POSITIONS

Almost any portion of the child's body can present itself first for delivery, and since the attitude and position of the child change during labor, the difficulties in the way of a universally acceptable classification are apparent. That

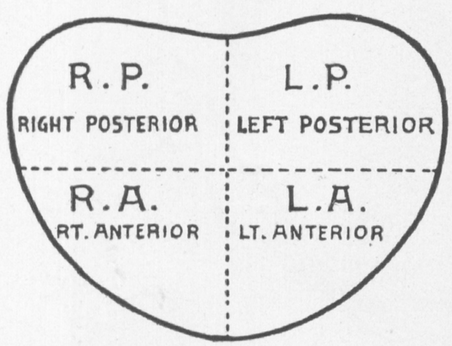


FIG. 191.—THE FOUR QUADRANTS OF THE PELVIS. Looked at from above.

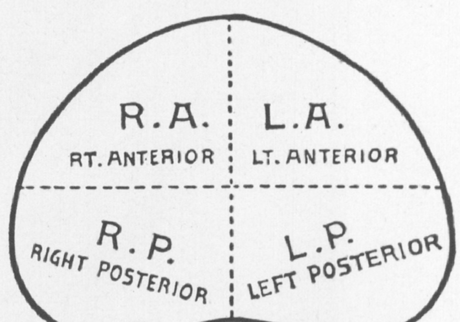


FIG. 192.—THE FOUR QUADRANTS OF THE PELVIS. Looked at from below.

accepted at the Ninth International Medical Congress at Washington, 1887, is generally recognized as the best, but it is not complete enough. The terminology adopted by the Basle Congress has been employed.

Definitions.—By *"presentation"* is meant that portion of the fetus which is touched by the examining finger through the cervix, or which, during labor, is bounded by the girdle of resistance. According to Hodge, it is that part felt by the examining finger "toward the center of the pelvis." Much confusion will be avoided if the word *presentation* is adopted as here defined, and made synonymous with the much-used expression "presenting part." Further it is etymologically correct (L. praesentare, to show).

Position is the situation of the child in the pelvis, and is determined by the relation of a given, arbitrary point in the presenting part to the periphery of the pelvic planes.

The point of direction is this arbitrary point in the presenting part, by which we determine the topographic relation of the presenting part to the periphery of the pelvic planes, *i. e.*, its position. In occipital presentation the occiput is the point of direction; in breech presentation, the sacrum; in shoulder presentation, the scapula; in face, the chin, etc.

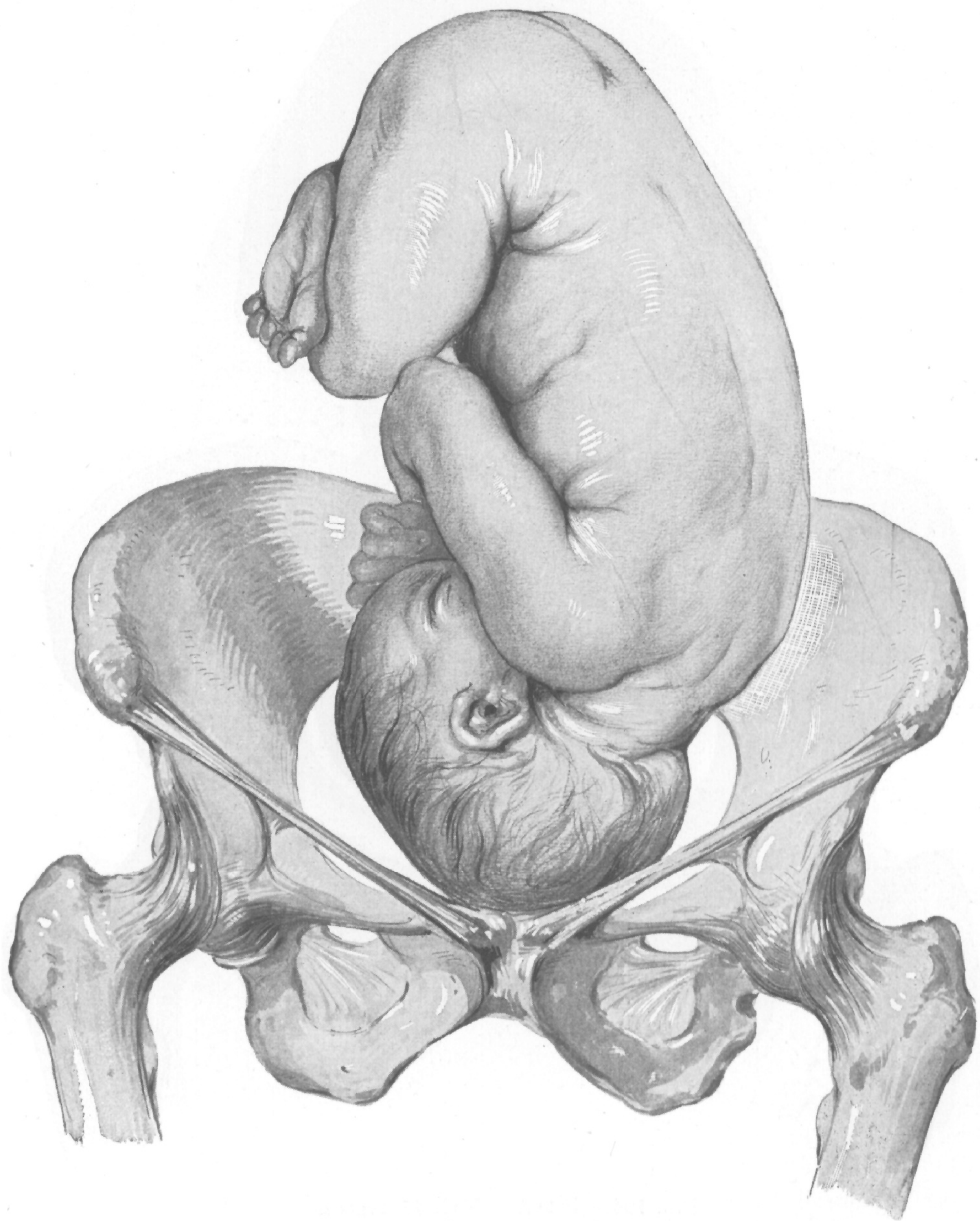


FIG. 193.—L.O.A.—L.O. 45 degrees.

Attitude is the relation of the fetal members to each other; it is habitus or posture. The attitude of the fetus has much to do with its presentation, but they are not identical. Attitude may be disturbed by the arms leaving the chest, the legs leaving the abdomen and prolapsing, or the cord prolapsing, the chin extending, making the various deflexion presentations.

All terms as to direction are referred to the mother in the erect position. The term *upper* means the part in the direction of the fundus uteri; *lower*, the part near the vulva; *anterior*, means the direction to the front of the mother; *right*, the right side of the mother, etc.—these terms having no application to the child nor to the examiner nor are they changed in any position the mother may take. By keeping this rule in mind confusion will be avoided. These notions of direction have been taught by anatomists, physiologists, surgeons, and obstetricians for many centuries. In most of the illustrations the authors have shown the conditions conformable to these ideas of direction, trusting the reader to transfer the images to the patient lying down.

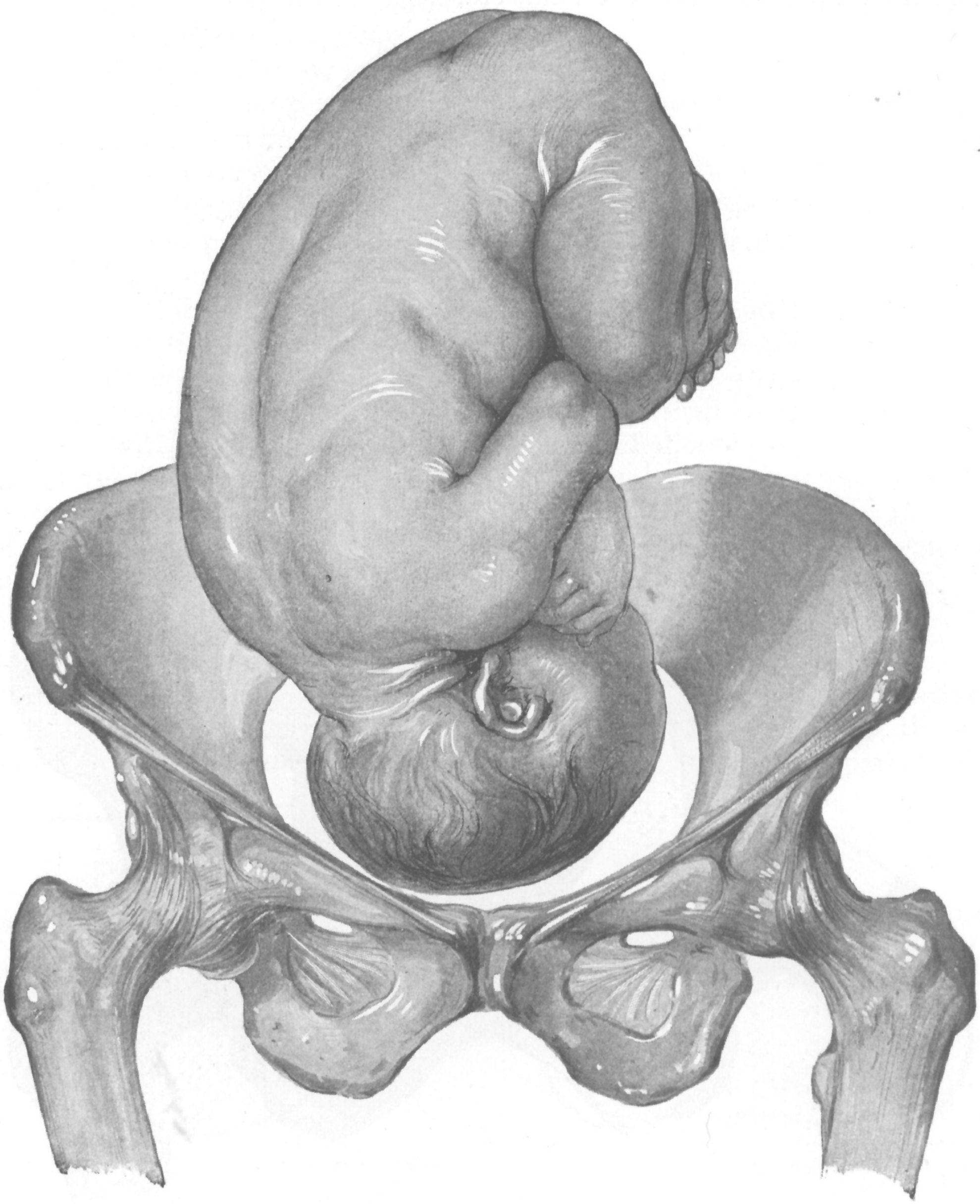


FIG. 194.—R.O.A.—R.O. 45 degrees.

For convenience of description the pelvis is divided into four quadrants—a left anterior, a right anterior, a right and left posterior (Figs. 191 and 192). The position of the presenting part is defined according to that quadrant in which the point of direction lies. Three grand divisions of presentation are recognized:

I. Cephalic presentation and its varieties—occiput, bregmatic, brow, and face. The occiput is the normal, the others are transitional, or pathologic, being due to deflexion of the head. They are sometimes called "deflexion attitudes."

II. Pelvic or breech presentation and its varieties—complete breech, footling, double footling, knee, double knee, and single or "frank" breech.
III. Transverse presentation, including shoulder, arm, and any part of the trunk.

In the first two groups the axis of the fetus lies parallel with that of the uterus; in the last group it lies obliquely, more or less.

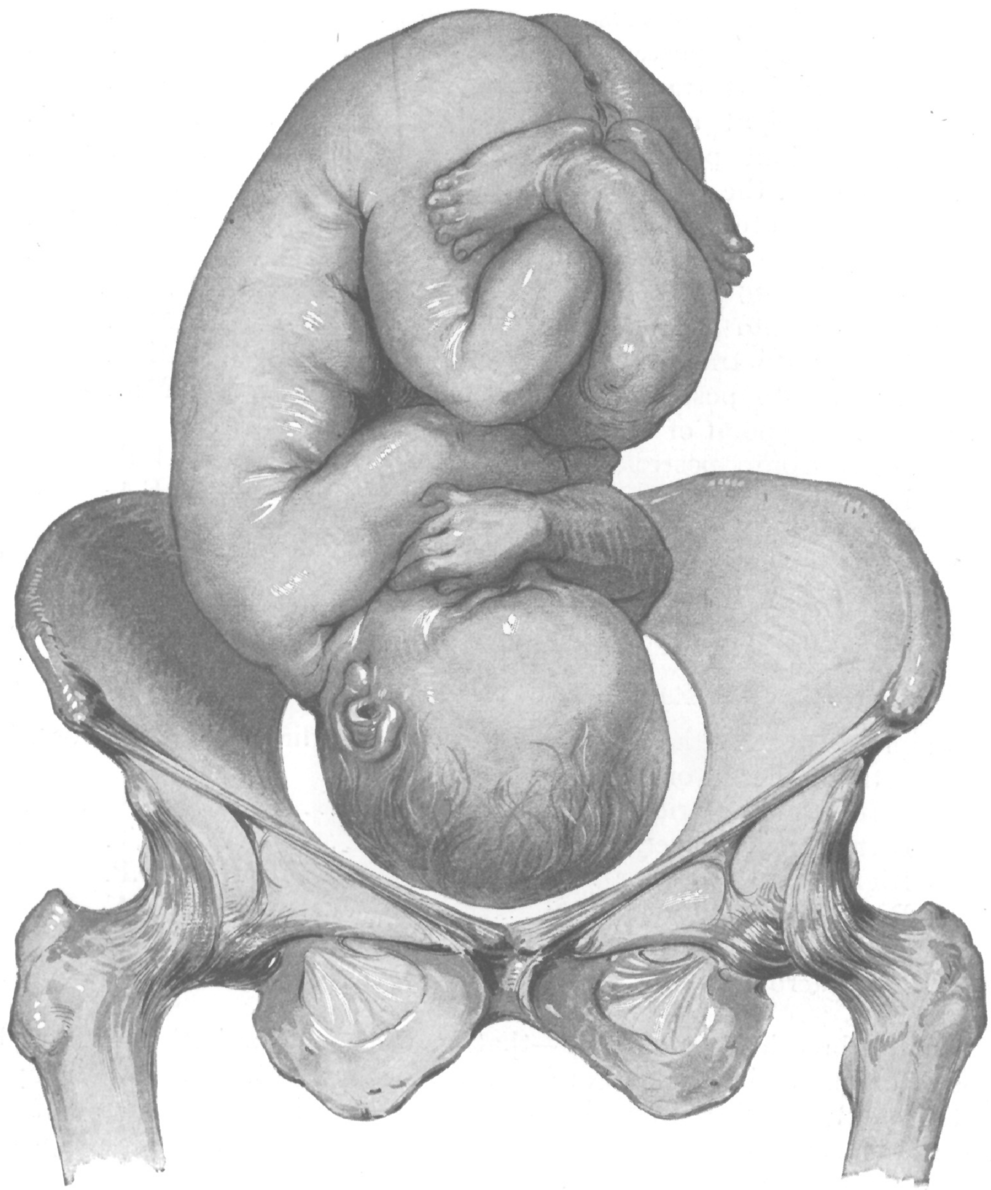


Fig. 195.—R.O.P.—R.O. 135 degrees.
Radiography has shown that, before the actual labor, the child has much freedom of motion of its limbs which are folded tightly together only in a dry uterus.

Presentation has to do with the part of the fetus which presents itself to the parturient passage first for delivery. It is determined by the attitude of the child and the relation of its axis to that of the birth canal. Position, in its technical sense, means the topographic relation of the presenting part to the plane of the pelvis in which it lies; that is, to the four quadrants of the pelvis. Each presenting part may so occupy the pelvis that its point of direction may lie in any pelvic diameter; for example, the occiput may be to the right, to the left, behind, in front, or at any intermediate point, when labor begins. The most common locations are used for teaching. The Committee at Washington adopted four main positions. Six are given here. In the following table the positions are named about in the order of frequency:

CEPHALIC PRESENTATIONS

1. Vertex—occiput, the point of direction.

Left occiput anterior	L.O.A.	(Fig. 193)
Left occiput transverse	L.O.T.	
Right occiput posterior	R.O.P.	(Fig. 195)
Right occiput transverse	R.O.T.	
Right occiput anterior	R.O.A.	(Fig. 194)
Left occiput posterior	L.O.P.	(Fig. 196)

2. Face—chin, the point of direction.

Right mento posterior	R.M.P.	(Fig. 464)
Left mento anterior	L.M.A.	(Fig. 458)
Right mento transverse	R.M.T.	
Right mento anterior	R.M.A.	
Left mento transverse	L.M.T.	
Left mento posterior	L.M.P.	

3. Brow—the point of direction.

Right fronto posterior	R.F.P.	
Left fronto anterior	L.F.A.	
Right fronto transverse	R.F.T.	
Right fronto anterior	R.F.A.	(Fig. 456)
Left fronto transverse	L.F.T.	
Left fronto posterior	L.F.P.	

BREECH OR PELVIC PRESENTATIONS

Complete Breech—the sacrum is the point of direction (feet crossed and thighs flexed on abdomen).

Left sacro anterior	L.S.A.	(Fig. 470)
Left sacro transverse	L.S.T.	
Right sacro posterior	R.S.P.	
Right sacro anterior	R.S.A.	
Right sacro transverse	R.S.T.	
Left sacro posterior	L.S.P.	

When the breech is incomplete—that is, when one or both feet have been prolapsed, or one or both knees are down, or when the feet are turned upward along the chest, so-called frank breech—the sacrum is still the point of direction, the designations remaining as above, and one simply adds the qualification, footling, knee, etc.

TRANSVERSE OR TORSO PRESENTATIONS

Shoulder—the scapula being the point of direction.

Left scapulo anterior	L.Sc.A. (Fig. 484)	Back, anterior positions
Right scapulo anterior	R.Sc.A.	Back, anterior positions
Right scapulo posterior	R.Sc.P.	Back, posterior positions
Left scapulo posterior	L.Sc.P.	Back, posterior positions

The back, side, or abdomen may present, but these are rare, and come readily under the above classification.

One important dimension is lacking in this presentation. How are we to determine the distance the fetus has advanced down the birth canal toward the vulvar outlet? How shall we convey the idea of the location or degree of progression of the presenting part in the birth canal? Müller suggested the word "station" or "statio," and used it thus, for example, "statio in aditu," presenting part in the inlet, "statio in exitu," at the outlet. The term "degree of engage-

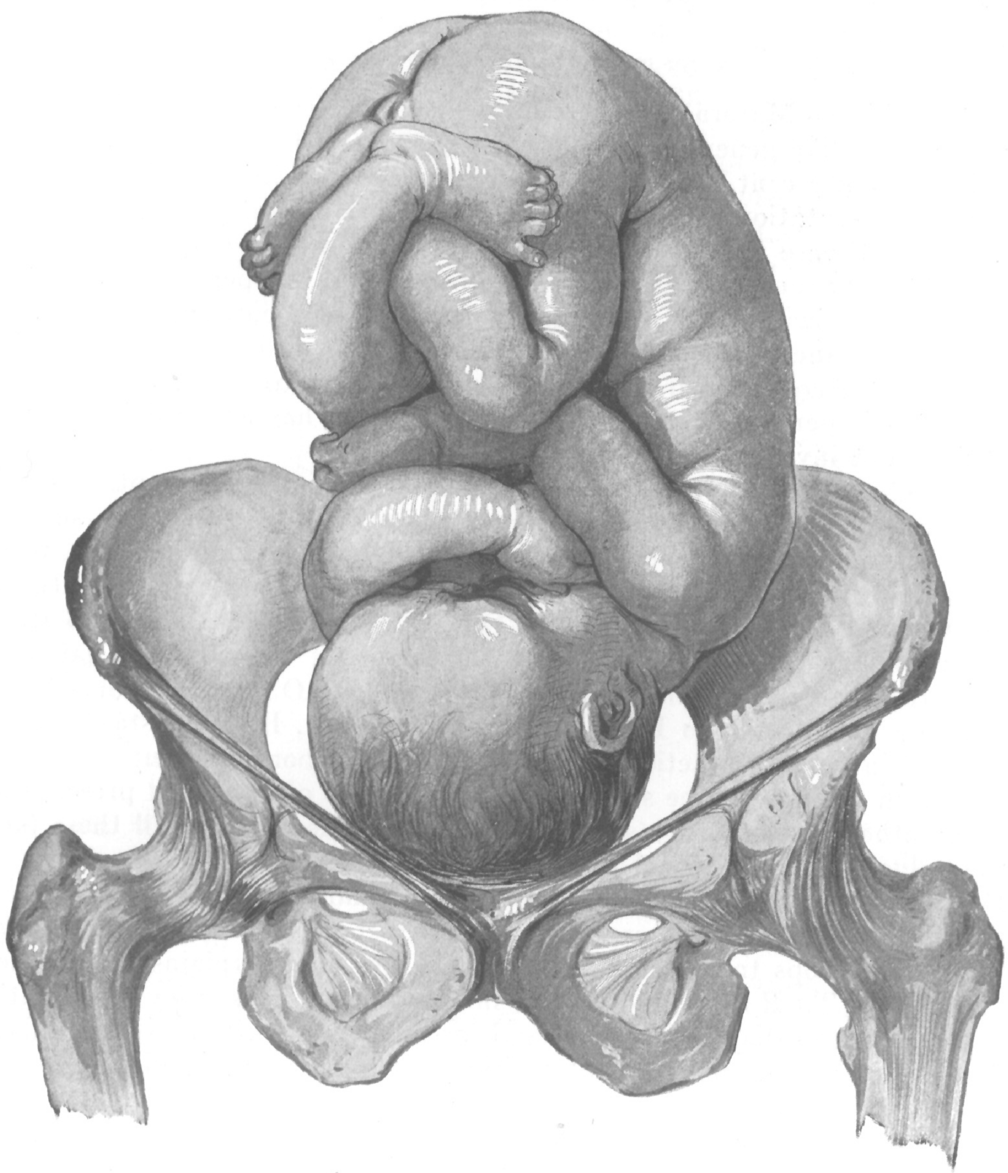


Fig. 196.—L.O.P.—L.O. 135 degrees.

ment" was used by Jaggard and is often employed, and the entry of the head into the pelvis he called "engagement." "Location" is another term, but "station" is better.

A head is "not engaged" when its greatest transverse diameter is still above the plane of the inlet. If freely movable, we call it "floating," or "caput ballitabile." A head is "engaged" when the largest transverse diameter has passed the plane of the inlet—"caput ponderosum." A head is "deeply engaged" when the largest diameter lies in the narrow pelvic plane. A head is "at the outlet" when the largest diameter is lying in the bony outlet. The perineum is beginning to bulge at this time. A head is "on the perineum" when the largest diameter has passed the bony outlet and the head begins to show in the vulva. This might be called the period of *disengagement*.

A diagnosis of the mechanical conditions of a given labor, therefore, requires a statement of the presentation, the position and the station or degree of engagement of the presenting part. The last is of great importance, but much neglected, and often with fatal results to mother and child.

DeLee devised plans for the designation of the different positions by "degrees," and the engagement, by centimeters. (See p. 262.)

FREQUENCY OF THE PRESENTATIONS AND POSITIONS

In the Chicago Maternity Center from 1932–1938 (all home service cases and therefore more like general practice), of 14,200 cases there were 96.13 per cent cephalic, 3.24 per cent breech, 0.28 per cent face and brow and 0.35 per cent transverse presentations. At the Chicago Lying-in Hospital, among 35,179 births 94.95 per cent were vertex, of which 12.1 per cent were occiput posteriors and of these 52.7 per cent were R.O.P. Breech occurred in 4.2 per cent, transverse in 0.45 per cent, brow in 0.068 per cent, and face 0.33 per cent. During the last few weeks of pregnancy both the presentation and the position of the fetus may change, most frequently from breech and shoulder to head. Ordinarily, the presentation is permanent after the presenting part has engaged in the pelvis, but this is not invariable.

While changes of the long axis of the child are not infrequent, changes in position are of almost daily occurrence. Examination of women on successive days, in the morning and evening, will show the back now on one side, now on the other. Multiparas, because of the lax uterine and abdominal walls, show the most marked mobility of the fetus. During labor the fetus may also alter its presentation and position, particularly the latter. If the observer happens to examine the patient early in labor, he may find an L.O.P., a few hours later an L.O.T., and again later an L.O.A., or even an R.O.A. Hospital statistics differ from those in private practice because pathologic labors are sent to hospitals. Figures from the one source show a large percentage of abnormal presentations; from the other, a necessarily smaller percentage. The effect of all these factors on the value of our statistical information is evident.

During pregnancy the child is more movable and accommodates itself to the varying position of the mother. When she is erect, its back falls forward; when on the side it drops to the side on which she lies. This explains the frequency of L.O.T., R.O.T., R.O.P., and L.O.P. in our routine pregnancy examinations. One examiner may diagnose R.O.A., and his follower R.O.P., the change having resulted from the prolonged dorsal position of the mother and displacement by the palpating hand.

Causes of the Frequency of Cephalic Presentations.—The law of accommodation of Pajot best explains the preponderance of head presentations. Where an ovoid body lies free in an ovoid container, the two long axes tend to become parallel, which is especially true if the container contracts, as does the uterus. The child, as it lies folded together, is ovoid; the uterus, at the end of pregnancy, likewise. The uterus is not a flaccid sac, but has some tonus and keeps its form, and further it contracts frequently (the contractions of pregnancy). During these contractions it assumes an exquisitely oval shape, and one can readily perceive how it would gradually force the contained fetal ovoid to conform to the shape of its cavity (Figs. 197–199). Even in early pregnancy the head lies in the lower segment of the uterus, and this tendency is enhanced by the shape of the uterus growing more ovoid all the time. After the head is once in the smaller end of the ovoid it is, to an extent, anchored. This stability is favored by a normal pelvis and head (de Snoo). The explanation of the occurrence of the various positions of the child is easy. With the woman in the erect posture the back of the child will naturally occupy the roomy anterior half of the uterus. Behind, the lumbar spine projects sharply into the uterine ovoid, and, when the woman lies down, the round heavy fetal back falls to one or the other side of it. Since the uterus has some dextrolateral torsion, and since the sigmoid and rectum push forward the left side of the uterus, a cross section of its cavity will appear elliptic. The back communicates its forward or backward tendency to the head, rotating it on an axial diameter so as to bring the occiput to the front or rear. The left occipito-anterior position is over twice as frequent as the right posterior, and this disproportion becomes greater until the end of pregnancy. During any twenty-four hours a woman remains twice as long in the erect posture as lying down and, therefore, the back is more likely to fall to the front. This accounts for the predominance of L.O.A. We use this knowledge to influence the mechanism of labor. Other reasons for the frequency of L.O.A. have been advanced, as the flattening of the right half of the pelvis and enlargement of the left half, the right oblique diameter of the inlet being greater than the left; the

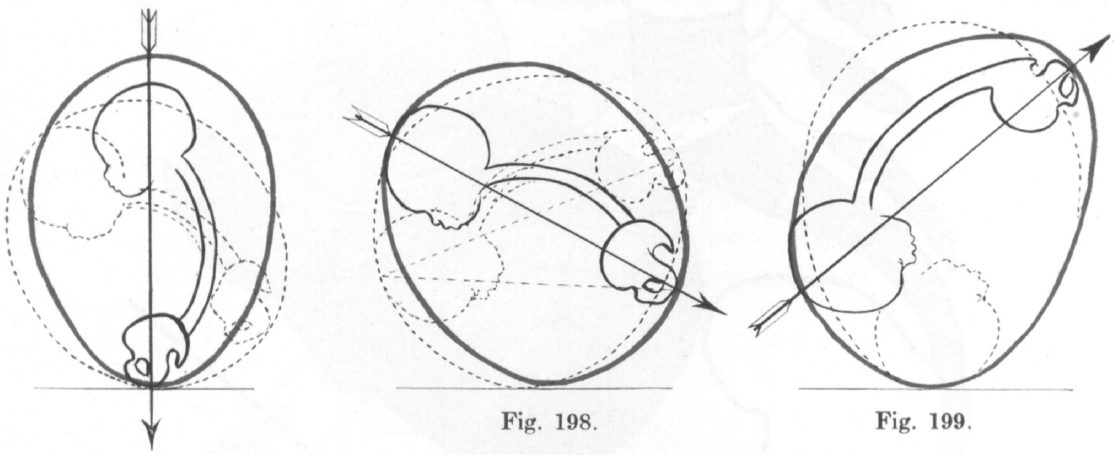


Fig. 197. Fig. 198. Fig. 199.

FIGS. 197, 198, AND 199.—DIAGRAMS TO ILLUSTRATE ACTION OF UTERUS IN ALTERING PRESENTATION OF FETUS FROM BREECH TO HEAD (modified from Kristeller).

inclination of the pelvis to the left side; the presence of the liver on the right side, but all these reasons have little influence. The location of the placenta affects the location of the back, the latter usually lying opposite the former.

Abnormal and unusual presentations are caused by absence or inefficiency of the above-mentioned factors. If the uterus is overdistended, as by polyhydramnion or twins, its walls cannot grasp the fetal ovoid, which, therefore, is often found presenting wrongly. Multiparas with flaccid uteri and lax abdominal walls (pendulous belly) often suffer with malpresentations.

CHAPTER XIII

MECHANISM OF LABOR IN OCCIPUT PRESENTATION

THE demands of asepsis restrict the frequent examination of the parturient which is necessary for a minute study of the mechanism of labor. The use of sterile rubber gloves, rectal touch, and extreme asepsis will reduce the danger of infection, and a few thorough examinations will give the student a great deal of information. Caldwell, Moloy, and D'Esopo, combining the x-ray with the "precision" stereoscope, and the studies of Steele and Javert have cleared up many moot points in our knowledge of the mechanism of labor, but one must not forget that the intelligent examining finger gives more valuable information.

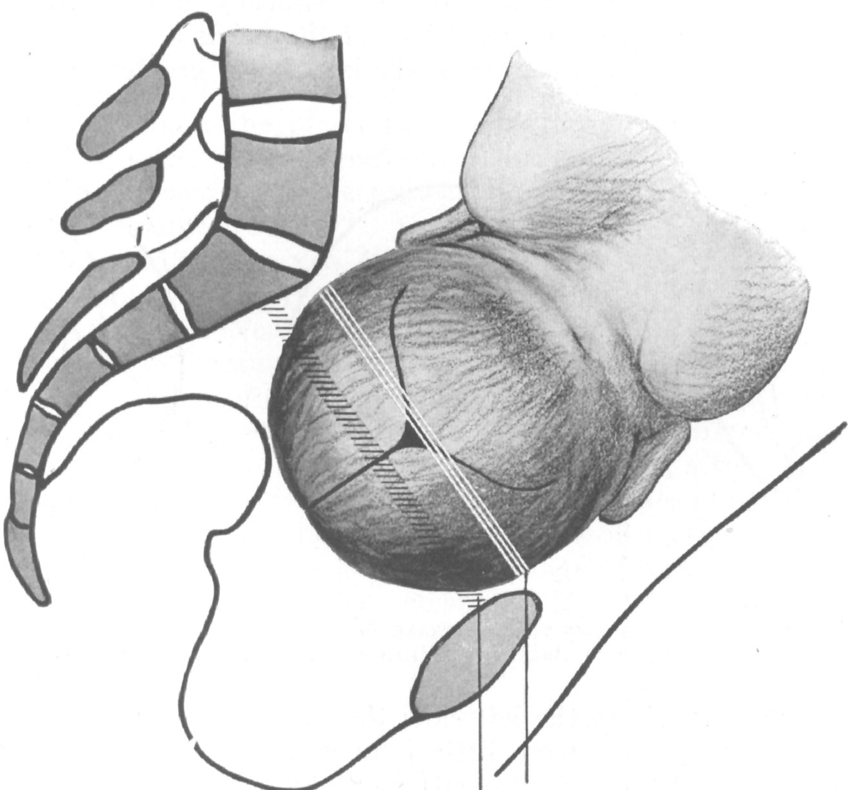


FIG. 200.—SYNCLITISM OR PARALLELISM.

Broadly, the mechanism of delivery is as follows: An object consisting of two ovoids united by a hinge (*i. e.*, the head and trunk united by the neck) is to be forced through a passage, straight at the beginning and sharply curved at its lower end. We must consider the manner of passage of the head and of the trunk. Each makes three movements—*engagement*, or entry into the pelvis; *rotation*, or adaptation to the shape of the pelvis, and *disengagement*, or exit from the pelvis.

Engagement of the Head.—*Multipara, L.O.A.*—At the beginning of labor the head lies over the inlet. In most cases the sagittal suture runs transversely and lies nearer the symphysis. Therefore the posterior parietal bone presents in the inlet and this is known as a posterior parietal presentation (Fig. 202). Because the sagittal suture is not exactly midway between the symphysis and the sacral

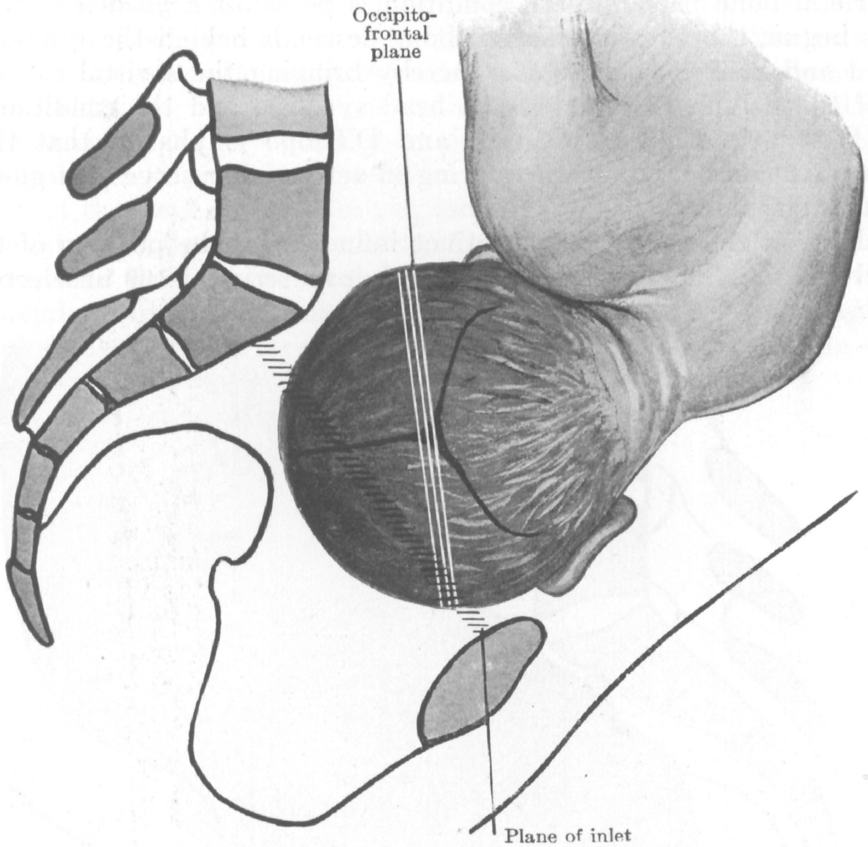


FIG. 201.—ANTERIOR ASYNCLITISM (Naegele's obliquity).

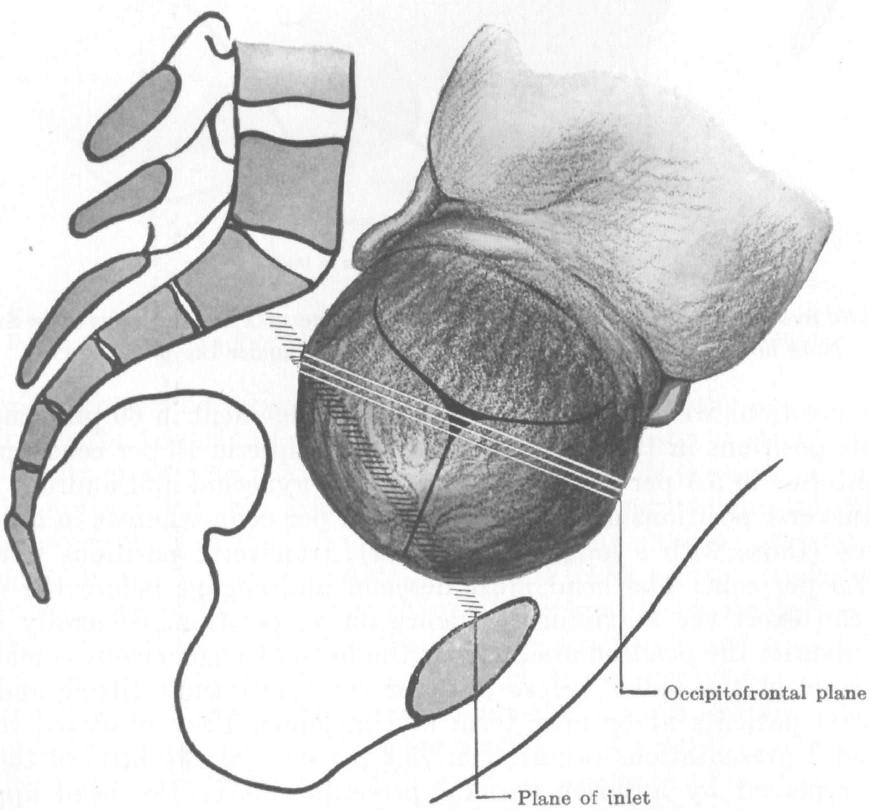


FIG. 202.—POSTERIOR ASYNCLITISM (Litzmann's obliquity).

promontory, there is *asynclitism* (oblique presentation), and because the posterior parietal bone presents, the condition is *posterior asynclitism.* Soon after labor has begun, the anterior parietal bone descends behind the symphysis in a downward and backward direction, thereby bringing the sagittal suture in the middle of the pelvis. This makes the head synclitic and the condition is *synclitism* (Fig. 200). Caldwell, Moloy, and D'Esopo emphasize that the lower uterine segment and cervix while dilating in active labor serve as a guiding factor during engagement.

The shape of the pelvis has a distinct influence on the position of the head at the pelvic brim. Thus in Caldwell and Moloy's series of 199 unselected cases,

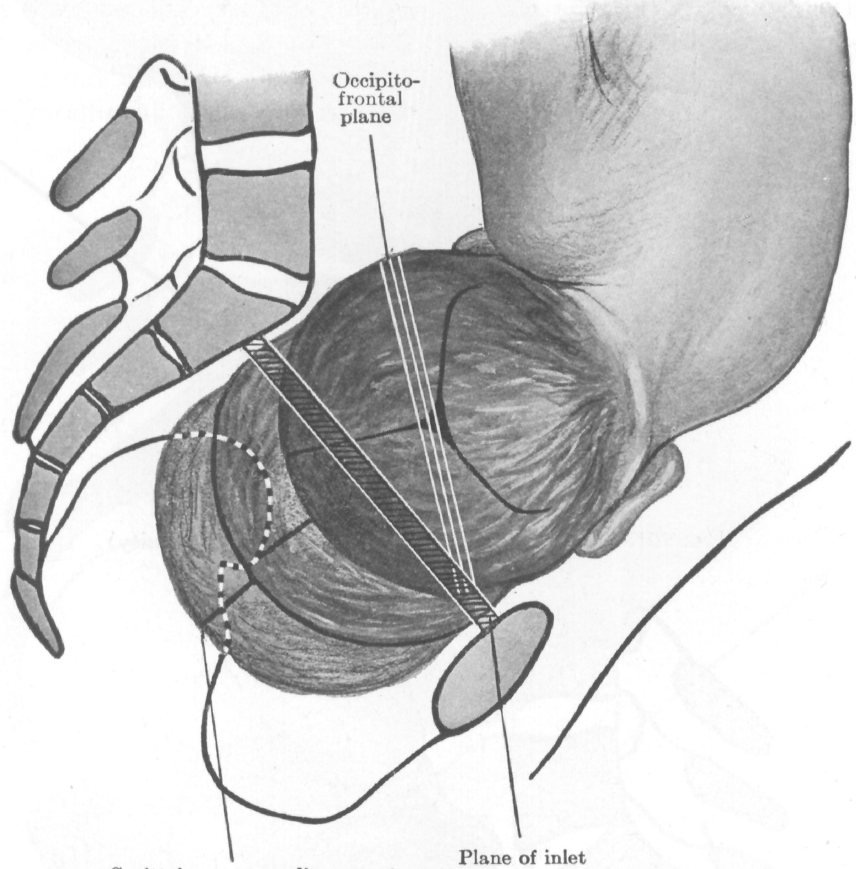


FIG. 203.—THE SYNCLITIC MOVEMENT, LEVELING OR JOCKEYING IN A CASE OF ANTERIOR SYNCLITISM. Note how the posterior parietal bone has slipped under the promontory.

transverse positions were found at the time of engagement in 60 per cent, posterior oblique positions in 18.5 per cent, anterior oblique in 16 per cent, and direct occipito-anterior in 5.5 per cent. However, in the gynecoid and android types of pelvis, transverse positions occurred in about 70 per cent, whereas in the anthropoid pelves (those with a long, narrow inlet), transverse positions were found in only 37.5 per cent. The head must descend and engage before the shape of the inlet can exert the maximum influence on its position. Generally in spontaneous deliveries the position assumed by the head at engagement is maintained to a low level in the pelvis before anterior rotation occurs. Steele and Javert studied 1,300 patients at or near term and in labor. They observed that posterior parietal presentations occurred in 75.2 per cent at the brim of the pelvis, and were replaced by anterior parietal presentations as the head appoached the spines.

If the woman has a pendulous belly, if the pelvis is anteverted, *i. e.,* if the pelvic inclination is marked or if the pelvis is contracted, preventing a normal mechanism, the body of the fetus falls forward, the sagittal suture nears the promontory, the head presents its anterior parietal bone to the parturient canal, the parallelism between the occipitofrontal plane of the head and the plane of the inlet is destroyed, the head is asynclitic—it is in anterior asynclitism (Fig. 201). This is called Naegele's obliquity as opposed to posterior asynclitism or Litzmann's obliquity. Marked asynclitism is pathologic. In a multipara one finds the small and the large fontanel in the same plane of the pelvis. Therefore, the head is not strongly flexed on the chest.

Descent.—As soon as the uterine contractions begin, general intra-uterine pressure tends to force the fetus downward, and as the os nears complete dilation, rapid *descent* begins. Descent of the head is also favored by the extension of the fetal body.

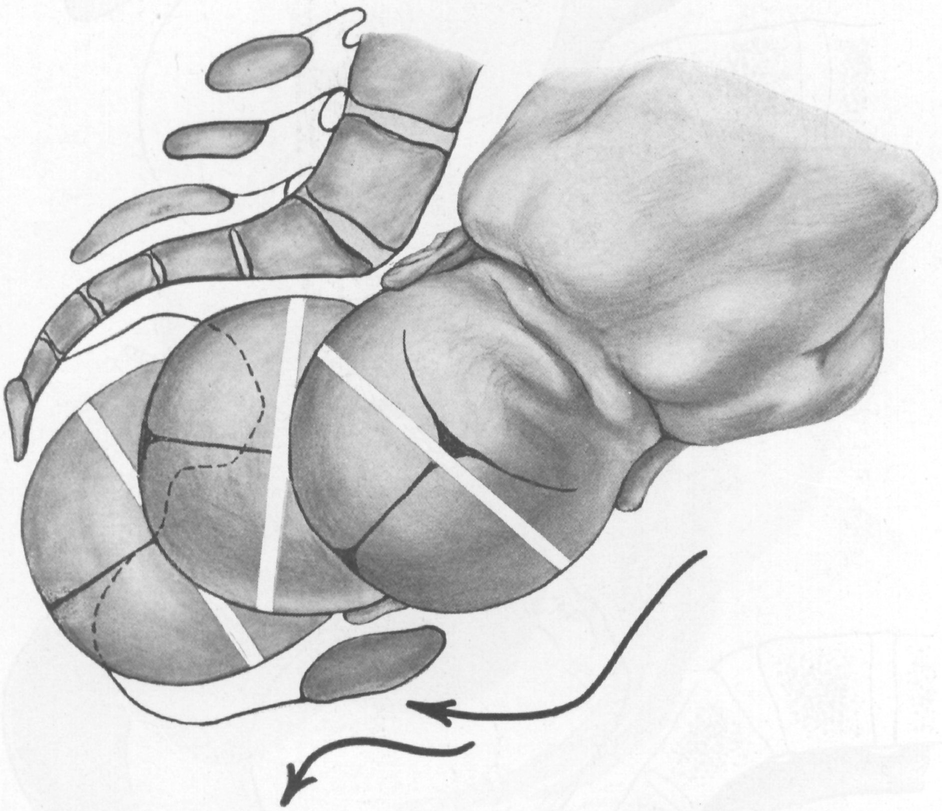


FIG. 204.—ENGAGEMENT OF THE HEAD IN POSTERIOR ASYNCLITISM SHOWING HOW A HEAD, OVERRIDING THE PUBIS, SLIPS UNDER THE PROMONTORY AND THEN LEVELS. Arrows show the trajectory.

Owing to the jutting forward of the sacral prominence, the head at first rests against it and the top of the pubis. As the contracting uterus stiffens and starts the baby on its journey to the external world, the head is pressed backward, sliding on the horizontal pubic rami, and the posterior parietal protuberance slips under the promontory of the sacrum. At this time the anterior parietal eminence may remain above the pubis or slide downward on it a little depending on the depth of the region of the inlet, the shape of the fetal head, its degree of flexion or lateroflexion, and also upon the shape of the forepelvis and the soft parts in it. If the finger is held against the head through the cervix for two or three pains one can feel how the intra-uterine pressure fits the head to the inlet and the soft parts; the head can be felt to flex, deflex and lateroflex a little, rotate a few degrees either forward or back, until it finally finds the path of least resistance and thus nature establishes the mechanism for that particular birth.

One result of descent is an increase of the *flexion* of the head. Mechanically the head acts like a two-armed lever, with the fulcrum at the junction of the spine with the occipital condyles. The sinciput and occiput meet equal resistances in the birth canal, but the sincipital end of the head lever is usually longer than the occipital end, hence the sinciput is held back and the occiput descends. Any ellipsoid body passing through a canal, in order to avoid resistance, will

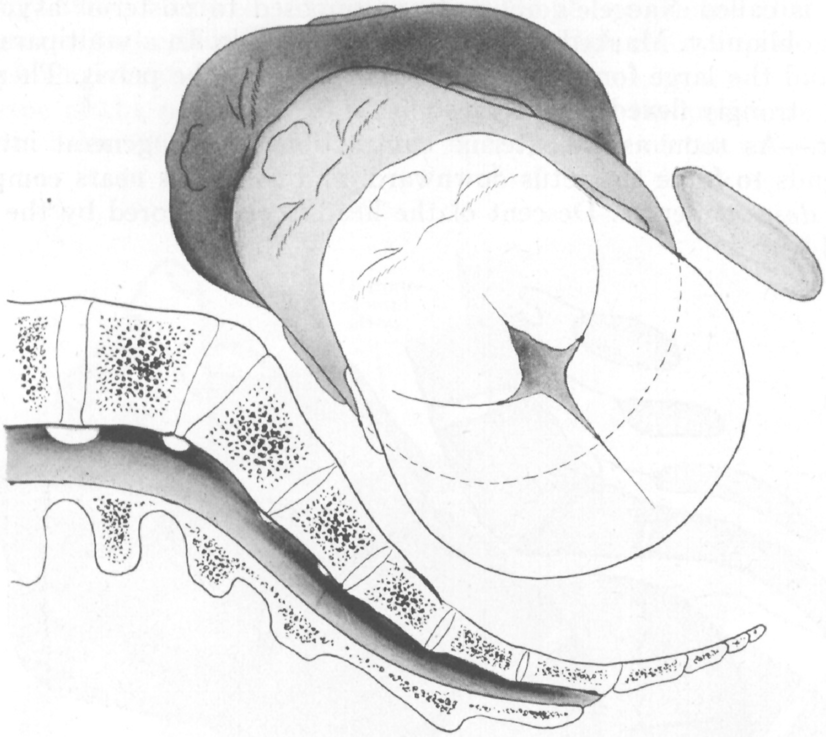


Fig. 205.

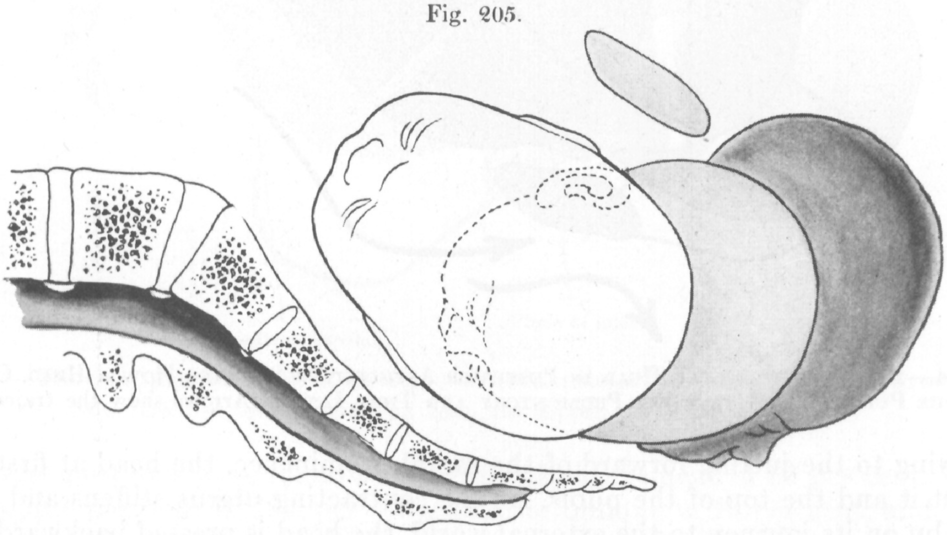


Fig. 206.

FIGS. 205 AND 206.—ENGAGEMENT OF THE HEAD WITH VARIATION IN THE POSITION OF AXIS OF DESCENT.

This is the common mechanism of engagement according to Caldwell and Moloy. The posterior parietal bone overhangs the inlet with the sagittal suture directed downward and forward. The anterior parietal bone descends behind the symphysis in a downward and backward direction following a curved axis of descent. (Courtesy of Caldwell and Moloy.)

adapt its long axis to the long axis of the canal. The mechanical gain in flexion is that instead of an occipitofrontal diameter of 11 cm. and a circumference of 35 cm., there is presented to the birth canal the suboccipitobregmatic plane with a diameter of 9 cm. and a circumference of 31 cm. Flexion may be pronounced, as occurs in generally contracted pelves and if the baby has a long head. But it is less in cases of brachycephalus. It may not occur until the head is well down on the pelvic floor, and thus labor may be delayed. Another result of descent and flexion is the disappearance of asynclitism, that is, the parallelism is restored. By "leveling" or "jockeying" the sagittal suture approaches the middle of the pelvis (Figs. 203–207) and the head occupies the excavation.

In pathologic cases the asynclitism persists until the head has descended deeply into the pelvis and may interfere with the next movement—rotation. Descent of the head into the pelvis, or engagement, is one of the most important phenomena of labor presented to the accoucheur for study, and clinically its importance is vital. A head is engaged in the pelvis when the biparietal diameter has passed the region of the inlet.

Internal Rotation.—The lowest part of the head now nears the pelvic floor and a new movement is imparted to it. The occiput rotates from the transverse

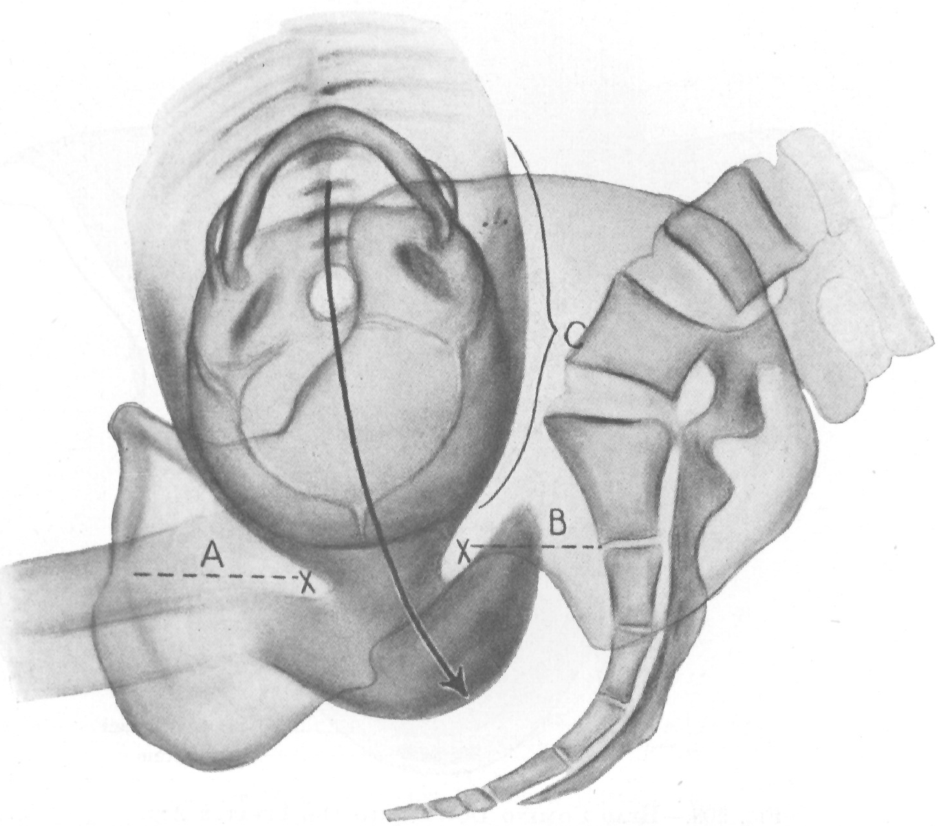


FIG. 207.—THE METHOD OF ENGAGEMENT ILLUSTRATED IN FIGS. 205 AND 206 TAKES PLACE ALONG THE AXIS OF THE CURVED ARROW.
Variations in the length AX and BX may bring about descent close to the symphysis or the sacrum. (Courtesy of Caldwell and Moloy.)

diameter into the oblique, and, finally, anteroposteriorly. This movement is called *internal anterior rotation,* and many theories are advanced to explain it. One of the oldest notions was that the pelvis presented a long transverse diameter in the inlet and a long sagittal diameter at the outlet, and that the head had to seek these diameters in its passage. This is only partly true. If one looks into a pelvis from above, one will see the spines of the ischia projecting sharply into its lumen. The sides of the pelvis anterior to the spines curve gracefully downward, forward, and inward. A finger following the curve glides gently forward under the pubis. Without doubt this portion of the bone forming a part of the lateral inclined planes, so important to Hodge, has some useful function in anterior rotation. The levator ani hangs like a sling, or trough or gutter, from the sides of the pubis and the ischia (which form the anterior lateral inclined planes), with the direction of its canal from behind forward. The occiput, sliding down the side of the pelvis, is directed under the pubis, the long diameter of the head accommodating itself to the length of the trough, according to the law of inclined planes. Since the occiput is almost always lower than the sinciput, it strikes the pelvic floor first and, therefore, has the greater tendency to rotate anteriorly under the pubis (Fig. 208). Examination at this period of labor will demonstrate the action of the pelvic floor in rotating the head forward. Experiment—forcing the head through the pelvis of a female cadaver—shows that, as long as the integrity of the pelvic floor is preserved, its action is to direct the occiput forward, the head following the path of least resistance (Fig. 209). In women with old lacerations of the pelvic floor anterior rotation is often delayed or absent. When the sacrum is insufficiently curved, and the pubic arch very narrow, the trough or gutter is not sufficiently sharply bent

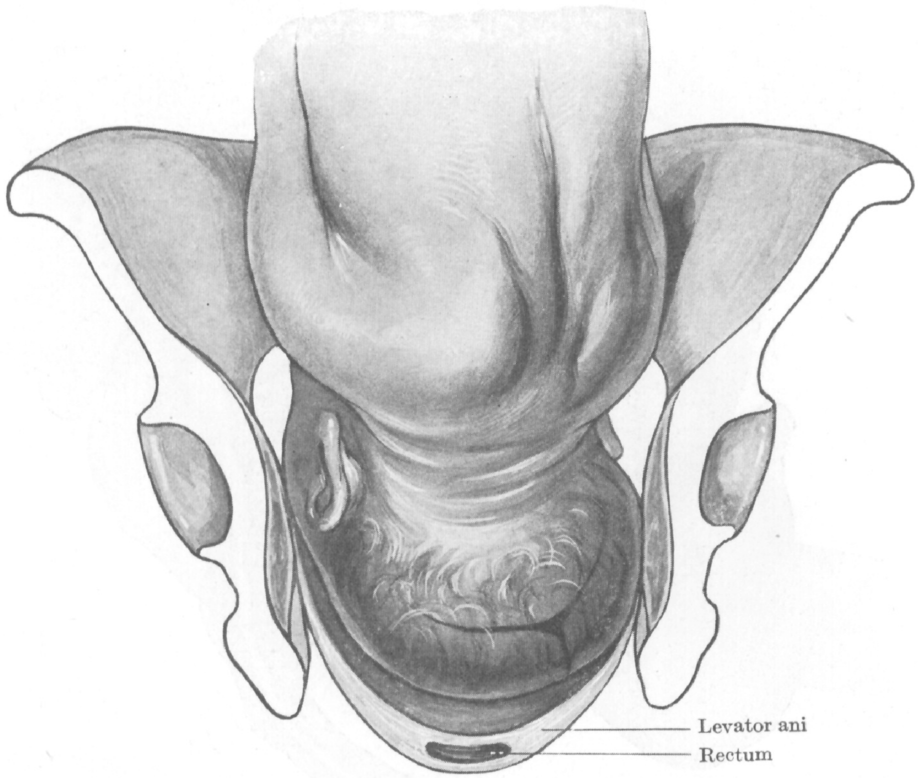


FIG. 208.—HEAD COMING DOWN ONTO THE LEVATOR ANI.
Note lateroflexion of head.

on the axis of the parturient canal to favor anterior rotation, which, therefore, is often arrested—a pathologic condition called "deep transverse arrest."

When the uterus contracts in the second stage it flattens from side to side, and the trunk of the child finds better lodgment in the anterior portion of the uterus. That the back rotates to the front is easily demonstrable in most labors both by abdominal palpation and x-ray pictures. The flexion of the chin on the sternum and the raising of the shoulders against the head tend to fix the head and trunk, so that when the back turns, the head goes with it. One may easily convince himself of this by making the movement with a newborn infant. In cases where the back remains persistently behind, anterior rotation does not occur, and such conditions are pathologic. In manual correction of occipitoposterior positions the operator knows that unless he can get the back to the front, rotation of the head is incomplete, impossible, or unstable.

Sellheim taught that the body of the child possesses qualities which determine its movements in the birth canal, and that during delivery, in order to present the least resistance to the passage, it is compressed into the shape of a cylinder. This fetal cylinder bends with facility only in certain directions. The head bends backward, *i. e.,* deflexes easily, and this deflexion is aided by the natural movements of the child. The head cannot be bent much on to the chest. Owing to the pressure of the arms and legs on to the body and the construction of the spinal column, the trunk cannot bend sagittally, but may bend easily toward one or the other side.

One may readily see that the fetal cylinder will be bent in its passage through the curved birth canal, to correspond with the curve of the canal. If the child were flexible evenly in all directions, a bending of the cylinder in an anteroposterior diameter would be all that would be necessary. But the bending of the cylinder can occur only in certain ways—at the neck from before behind and in the trunk from one side to the other, and these two directions cross each other

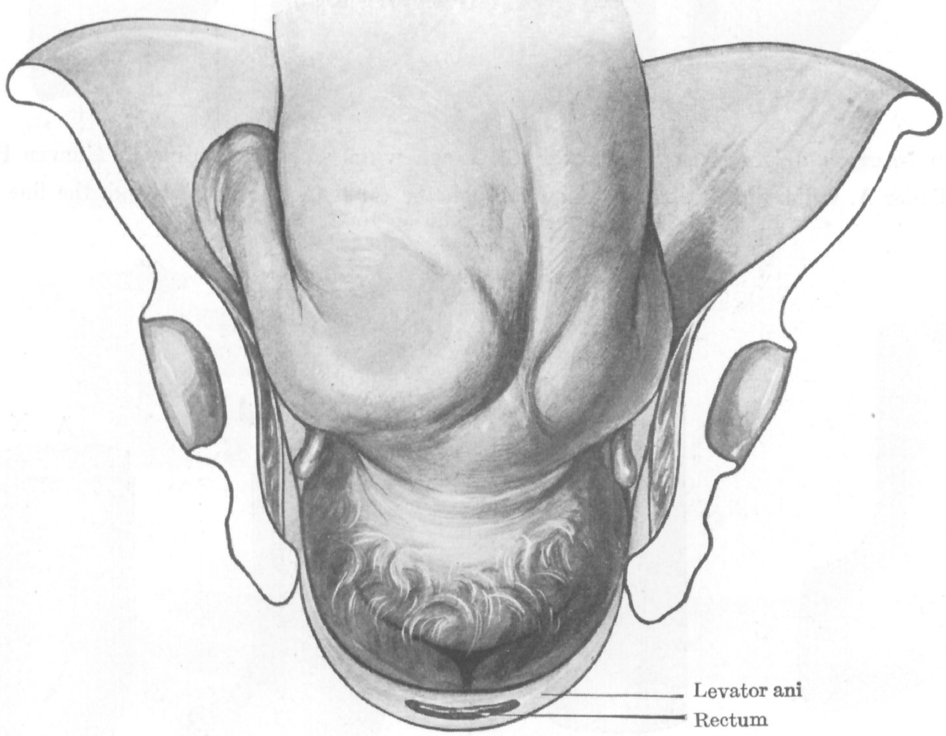


Fig. 209.—Anterior Rotation Completed.
Head on the levator ani. Note lateroflexion is corrected, *i.e.,* synclitism is restored.

at a right angle. Therefore, in order for the fetal cylinder to pass through the curved canal, it must rotate on its long axis so as to bring the plane in which the bending can most easily occur to correspond with the axis of the birth canal (Fig. 210). In other words, the child is forced to rotate until that part of its body which can be most easily bent, that is, the nape of the neck, comes to be adapted to the knee of the canal. The movement is similar to that of pushing the foot into a boot when the action is started wrongly—as the foot advances it rotates until the curve at the ankle corresponds to the curve of the boot (Fig. 211).

Anterior rotation of the child from all positions of the pelvis may be explained by this law of the accommodation of elastic resistance to the shape of the container (Sellheim).

While admitting the full power of Sellheim's arguments and proof, and agreeing with him that this law explains the rotation of the head and trunk, the other factors, especially the construction of the pelvic gutter and the action of the trunk on the head and the shape of the head, also must be adequately evaluated.

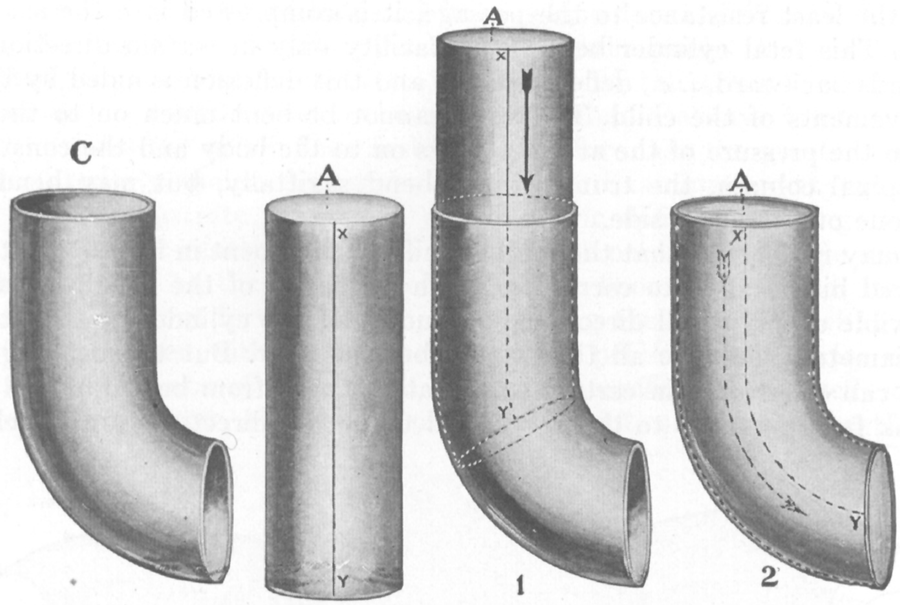


Fig. 210.—Action of an Evenly Flexible Cylinder when Forced through a Curved Passage. The cylinder A, uniformly flexible, in going through the canal C, will simply bend, the line X-Y not changing its relation to C.

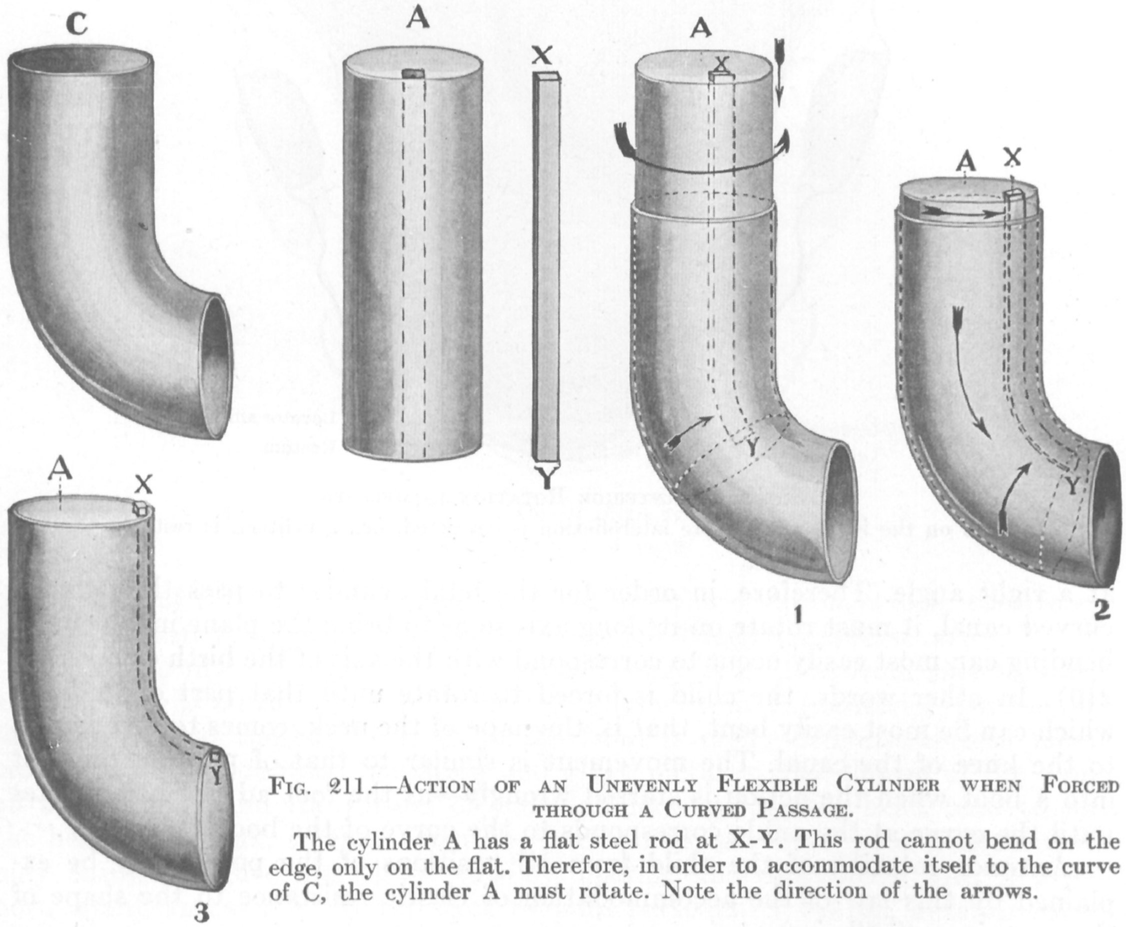


Fig. 211.—Action of an Unevenly Flexible Cylinder when Forced through a Curved Passage.

The cylinder A has a flat steel rod at X-Y. This rod cannot bend on the edge, only on the flat. Therefore, in order to accommodate itself to the curve of C, the cylinder A must rotate. Note the direction of the arrows.

Further, the x-ray shows that the fetus is not always compressed to a cylindric form, but is sometimes more pyramidal, and it becomes cylindric with the extremities flattened against the trunk when they are passing through the girdle of resistance (Warnekros, Liepmann, and Danelius).

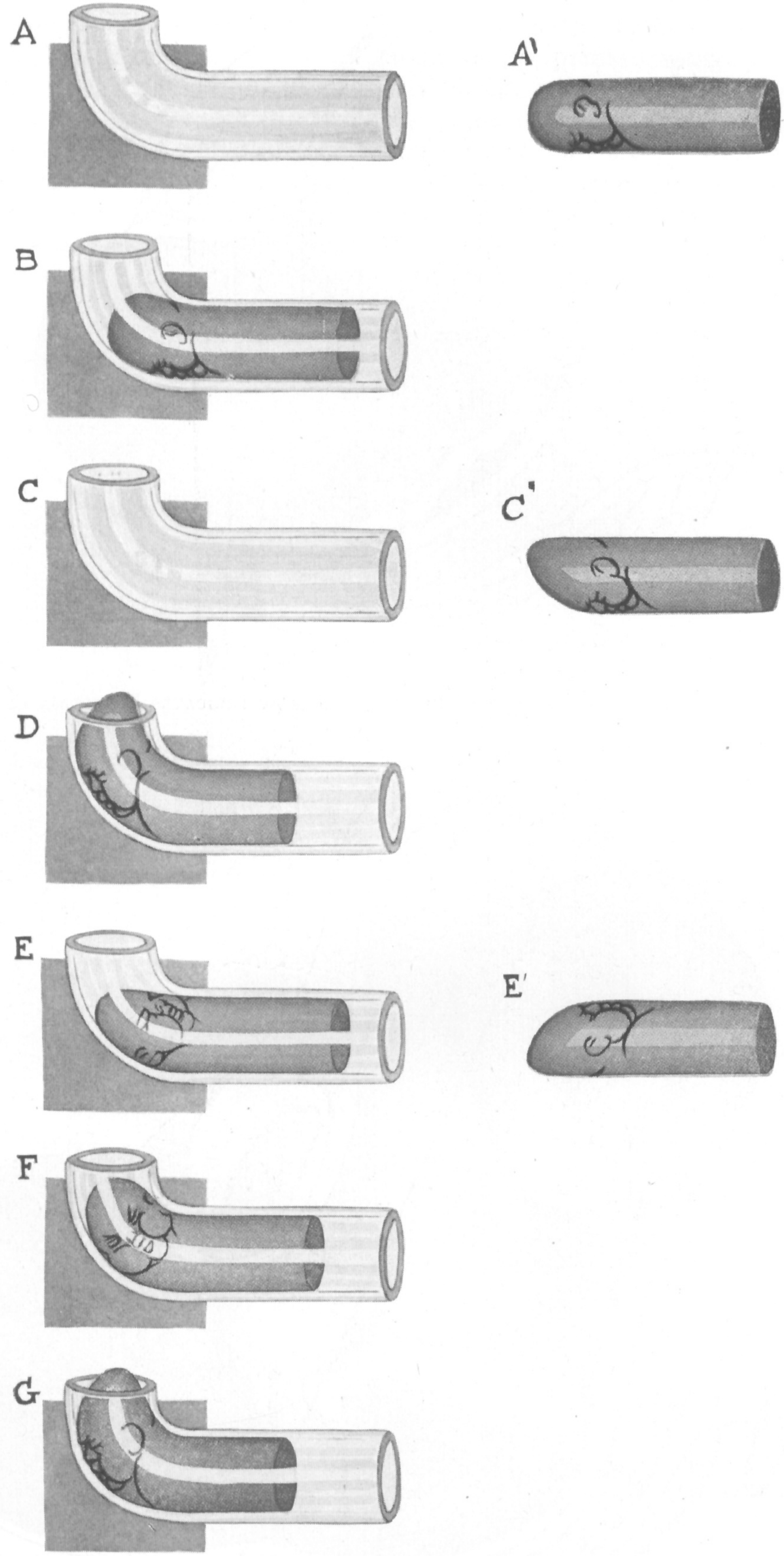


FIG. 212.—DE SNOO'S EXPERIMENTS.

A, Glass cylinder to represent birth canal. A′, Rubber piston represents conditions of a baby with a deflexed square head. B, Experiment I. The blunt wedge meets resistance at the bend and stops. C, C′, D, Experiment II. The pointed wedge (long head, flexed) passes through readily. E, E′, Experiment III. The same but the occiput is posterior. Owing to the effects of the two inclined planes, one in the bend and one on the head, rotation occurs, as in F, G. This requires more force.

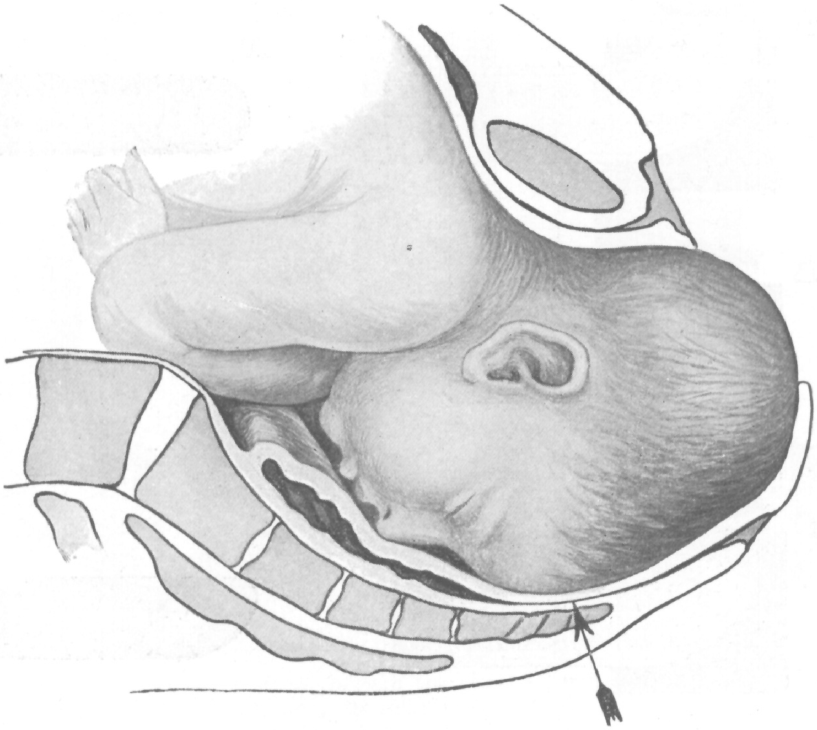


Fig. 213.—Increased Flexion of Head at Perineum. Arrow Indicates Direction of Force.

The shape of the head has much to do with the facility of rotation. The long head by flexing on the chest will present a pointed wedge to the curved canal through which it is to pass. A short head, set solidly on the torso, makes a blunt wedge which hits the resistance squarely and will tend under greater force to pass as it is, while the more pointed body, possessing two inclined planes, can meet the curve of the canal, as if on an inclined plane, and slide around it by twisting itself. See de Snoo's experiment (Fig. 212).

Disengagement.—Descent continues during anterior rotation, as also does flexion of the head. Indeed, flexion is exaggerated by the opposition of the pelvic

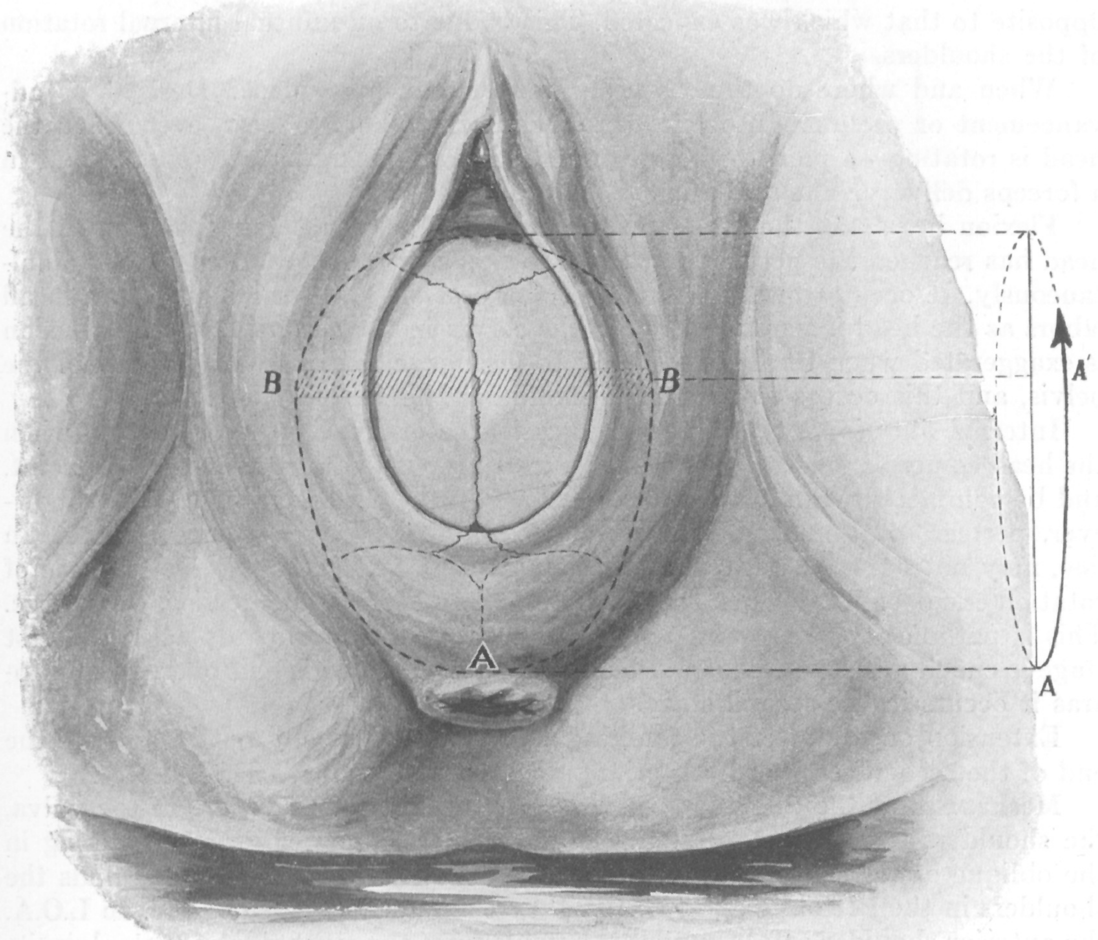


FIG. 215.—THE FACTORS IN EXTENSION OF FETAL HEAD WHEN ON PERINEUM.
Parietal bosses meet resistance at B-B. There is a tendency for A to come down, which is opposed by perineal floor, giving curve A-A'.

floor, the forehead being pressed upward by the resistant sacrosciatic ligaments, the tip of the coccyx, and the levator ani (Fig. 213). After the forehead has passed the coccyx, and the nape of the neck has come to lie under the arch of the pubis, deflexion of the head begins. The chin leaves the chest, the occiput rises in front of the pubis, the forehead presses out the soft perineum, and the head is delivered in extension (Fig. 214). The causes of *extension* are generally agreed upon. The head meets an inclined plane—the perineum. The fetal axis pressure, or the general intra-uterine pressure, or the bearing-down effort of the patient, forces the trunk down upon the head, acting only on the sincipital arm of the head lever, since the occipital arm is under the pubis. The parietal bosses strike the sides of the levator ani near the rami pubis and are held firmly while the forehead is driven down and forward (Fig. 215). The perineum is thus displaced downward as well as backward, a point of importance in considering lacerations of the pelvic floor and their repair.

External Restitution.—After the head is delivered it slowly rotates in a direction opposite to that taken in internal anterior rotation; that is, in L.O. positions the occiput turns back to the left, in R.O. positions it turns back toward the right side of the mother. The movement is called "external restitution," and is due to the untwisting of the neck and to the impulse imparted to the head by the internal rotation of the shoulders. External restitution or rotation does not invariably occur, and occasionally the occiput turns in a direction opposite to that which was expected. This is due to an unusual internal rotation of the shoulders.

When and where do these various movements take place? Descent or advancement or progression occurs throughout the whole process, even when the head is rotating—a point to bear in mind when imitating nature's method, as in a forceps delivery. The movement is turbinal.

Flexion begins at the inlet of the pelvis, but may not take place until the head has reached the pelvic floor, when flexion and rotation occur almost simultaneously. It occurs toward the end of the first stage in primiparas, and in all labors as the head is passing through the cervix in the second stage. The flexion is exaggerated when the head is ready to disengage from the bony outlet of the pelvis, and this occurs at about the middle of the second stage.

Internal anterior rotation takes place in the excavation of the pelvis, when the head comes to meet the pelvic floor, or it may begin a little before this point, and be completed when the head has escaped from the bony pelvis. Often, however, perfect rotation, bringing the small fontanel absolutely into the median line, may not occur at all, the head being delivered slightly oblique. Absence of rotation can occur only when the child is small and soft or the pelvis is very large. This is pathologic. Internal rotation usually begins in primiparas when the first stage is ended and it is completed before the second stage is half over. In multiparas it occurs in the second stage.

Extension occurs after the forehead has passed the bony outlet, toward the end of the second stage of both primiparas and multiparas. (See Fig. 216.)

Mechanism of the Shoulders.—When the head becomes visible in the vulva, the shoulders engage in the inlet, the bisacromial diameter usually entering in the oblique opposite to that in which the head entered. In L.O.A. one finds the shoulders in the left oblique; in L.O.P. they enter in the right oblique. In L.O.A. the anterior shoulder rotates under the pubis from the right side of the pelvis, its direction of progression being opposed to that which the head underwent; while in L.O.P. the anterior shoulder follows the movement of the head from the left behind to the pubis in front. The movements imparted to the shoulders are engagement, rotation, and disengagement. General intra-uterine pressure forces the child down the parturient canal, and this action is reinforced by the direct pressure of the uterus on the fetal body. The anterior shoulder slides down the lateral wall of the pelvis until it reaches the pelvic floor, then rotates under the pubis. Anterior rotation of the shoulders is accomplished by the same factors which operate on the head—the shape of the pelvic floor, the direction of the opening in the pelvis, and the elastic resistances of the fetal body. Flexion of the child's trunk is necessary to accommodate it to the concavity of the pelvic canal. The child's body bends best laterally, and, therefore, according to Sellheim's law, the trunk will rotate until it corresponds to the direction of the curve of the canal through which it has to pass (Fig. 209). In rare cases no rotation of the back occurs, the shoulders appearing transversely, and sometimes the shoulders rotate to the opposite oblique, the back appearing on the other side to that in which it was expected. Delivery of the shoulders is quite typical. The anterior shoulder stems behind the pubis, the posterior rolls up over the peri-

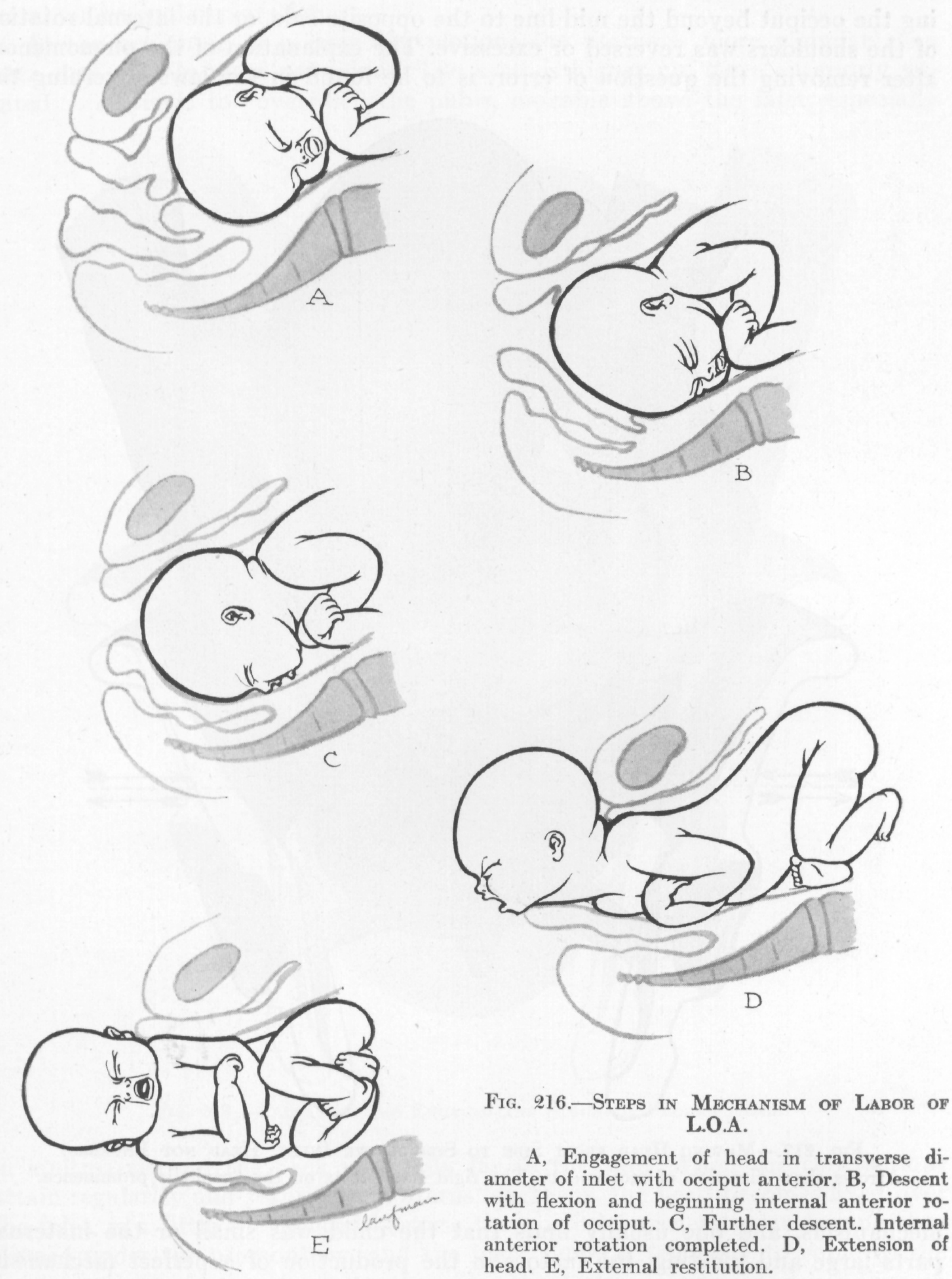


FIG. 216.—STEPS IN MECHANISM OF LABOR OF L.O.A.

A, Engagement of head in transverse diameter of inlet with occiput anterior. B, Descent with flexion and beginning internal anterior rotation of occiput. C, Further descent. Internal anterior rotation completed. D, Extension of head. E, External restitution.

neum, after which the anterior shoulder comes from behind the pubis. If the perineum is much torn, a reverse mechanism occurs. Often nature needs a little aid at this stage, and the physician must imitate the natural modus of delivery. Trouble with the shoulders is rare unless they are large, but laceration of the perineum frequently results from carelessness in their delivery, as also may fracture of the child's clavicle—even Erb's paralysis. After the chest is born, the rest of the child follows without any particular mechanism.

Overrotation.—One is occasionally surprised to note that a labor starting out as an L.O.A. becomes, in its course, an R.O.A., and external restitution follows such a mechanism. In these cases the internal rotation was excessive, carrying the occiput beyond the mid line to the opposite side, or the internal rotation of the shoulders was reversed or excessive. The explanation of the phenomenon, after removing the question of error, is to be found in the laws governing the

FIG. 217.—MOVING HEAD FROM SIDE TO SIDE ABOVE INLET. HEAD NOT ENGAGED. Arrows show direction of movements. The right hand rests on the "cephalic prominence."

mechanisms, and one usually finds that the child was small or the maternal parts large and yielding, the factors in the production of a perfect mechanism being weakened.

What One Observes of the Mechanism of Labor in L.O.A.—Careful observation of the course of labor enables us to closely follow the mechanism, to determine, at any time, its rate of progress, and to discover any variation from the normal. It is the knowledge of the mechanism of labor and the ability to recognize and correct abnormal variations that mainly distinguish the real accoucheur from the blind midwife, male or female. It will simplify and clarify this study if the student will follow the described mechanisms on the manikin or with a pelvis and fetal skull. Abdominal examination furnishes most valuable information, is less dangerous to the patient, less painful, and should always be practiced first, though it is often necessary to supplement it by internal, rectal, or vaginal exploration.

At the beginning of uterine contractions the uterus is more globular than later, and slightly more pendulous. The head is higher up, more anteriorly situated, *i. e.,* tends to "override" the pubis, movable above the inlet, especially

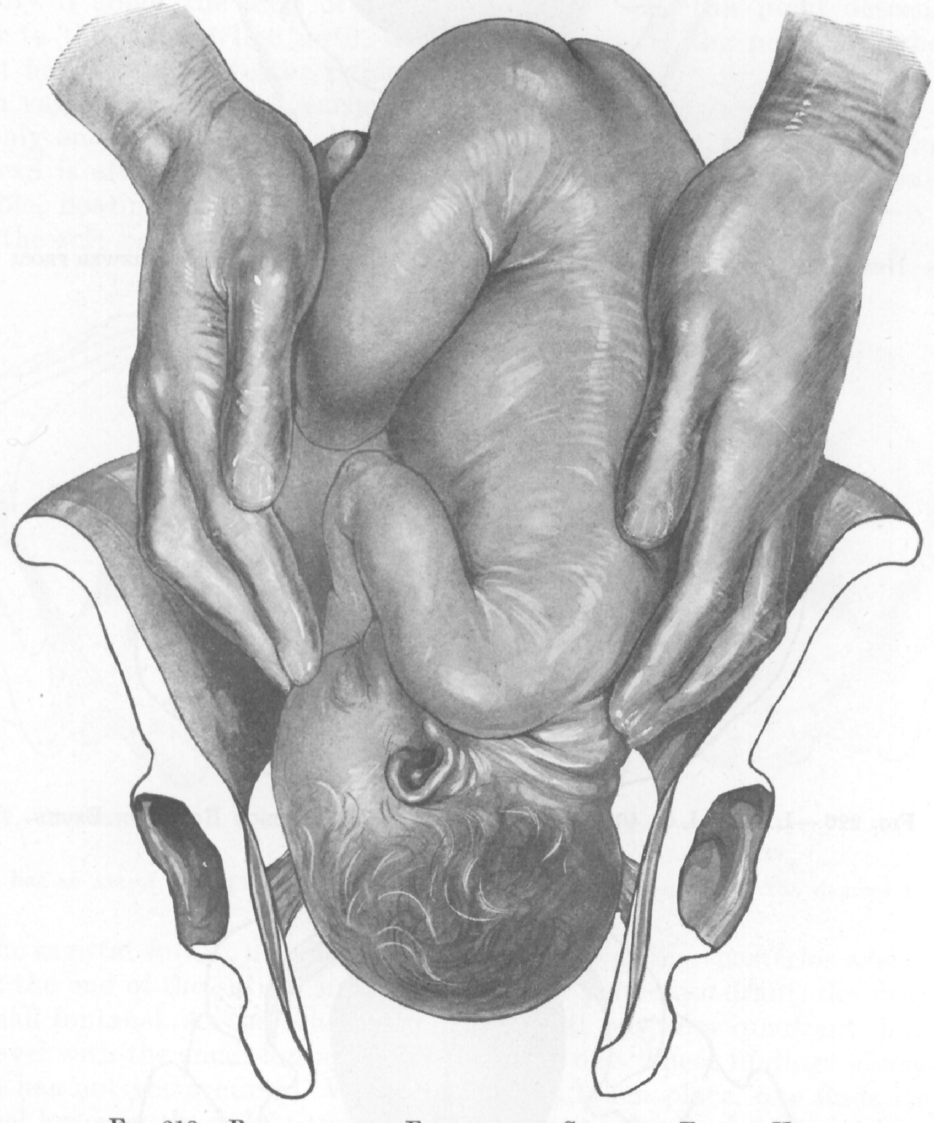


FIG. 218.—PALPATING THE ENGAGED AND STRONGLY FLEXED HEAD.

in multiparas, and the back is usually far to the side. When the contractions attain regularity and severity, the uterus lengthens, the head becomes fixed over the inlet, is a little retroplaced because the posterior parietal protuberance has slipped under the promontory, and the back shows a tendency to come to the front or to go further back to the side, the latter movement depending on whether the position is an anterior or a posterior one. Figure 217 shows the hands palpating the head before it is engaged in the pelvis; one sees how the fingers can move the head from side to side above the inlet. Figure 218 shows the hands as they come to rest on the head, after it is engaged; one hand feels the occiput deep in the pelvis, to the left, behind the pubic ramus; the other hand finds the sharp forehead on the right and somewhat behind the median line. When flexion is marked, as in generally contracted pelves, one can hardly feel the occiput,

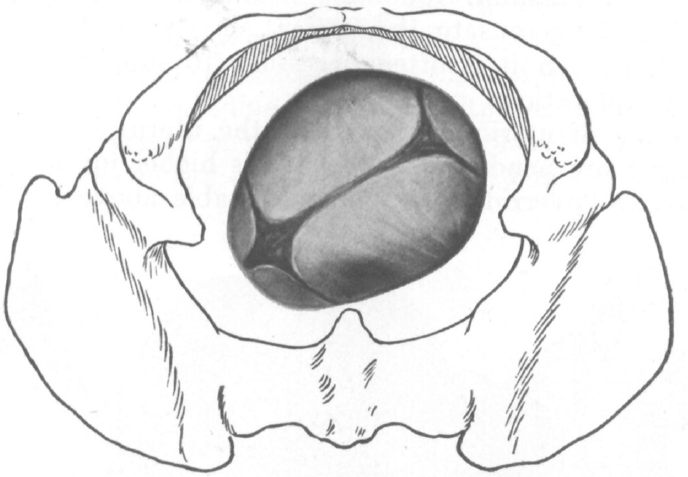


Fig. 219.—Head Ready for Anterior Rotation in L.O.A.—L.O. 50 Degrees. Viewed from Below.

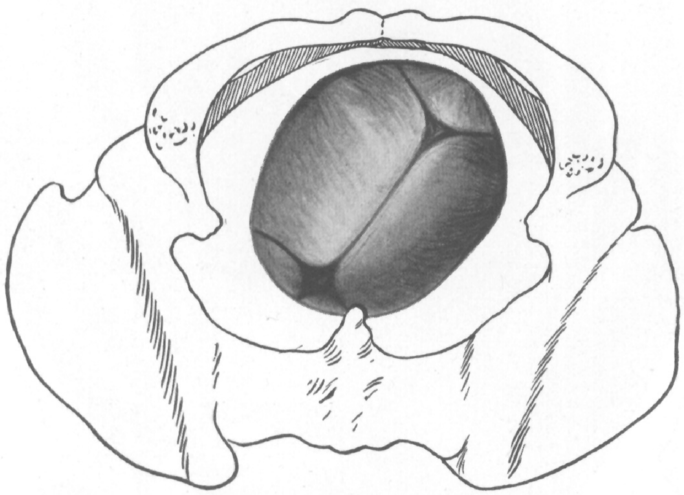


Fig. 220.—L.O.A.—L.O. 40 Degrees. Flexion and Anterior Rotation Begun.

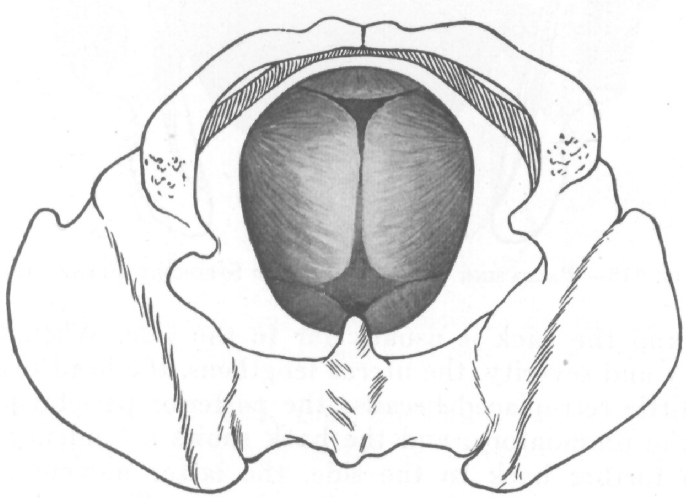


Fig. 221.—L.O.A.—L.O. 0 Degrees. Anterior Rotations Completed.

because it is so low in the pelvis, but the forehead is high up and easily palpated. If one now tries, with the two hands, to push the head from side to side, it will be found impossible: the head is fixed. As labor goes on and internal anterior rotation occurs, the occiput sinks behind the left pubic ramus out of reach of the external hand, and the forehead rises, then turns, disappearing in the right flank. When the occiput sinks beyond the reach of the fingers, the head is engaged.

The back at first is directed to the left side, but as labor advances it rotates to the front. One can follow the anterior shoulder as it goes from the left, behind and above, to the middle line just over the pubis. The shoulder remains in the mid line until the head is delivered. The movement of the back is also indicated by the course of the fetal heart tones. At first the point of their greatest intensity is about the level of the navel, on the left; this point descends and comes to the median line until, when the head is on the perineum, the heart is best heard just above the pubic hair margin.

On vaginal exploration, early in labor, one finds the cervix closed or admitting only one or two fingers, which renders the diagnosis difficult. In primiparas the head is often engaged; in multiparas it usually lies in the inlet, but freely movable, floating, or is a "caput ballitabile." The finger in the cervix comes upon the soft bag of waters, and through this feels the head. Lying across the

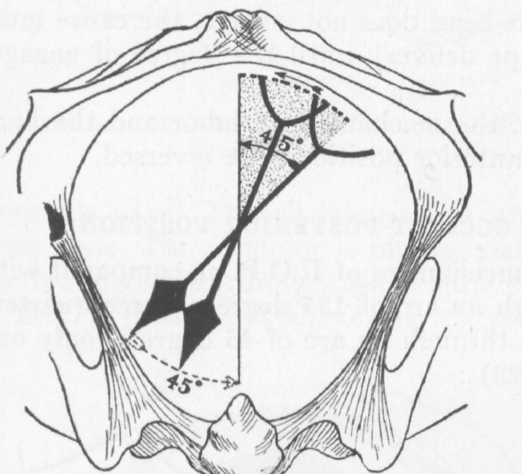


FIG. 222.—ROTATION IN L.O.A.—L.O. 45 DEGREES.

Occiput has an arc of only 45 degrees to travel.

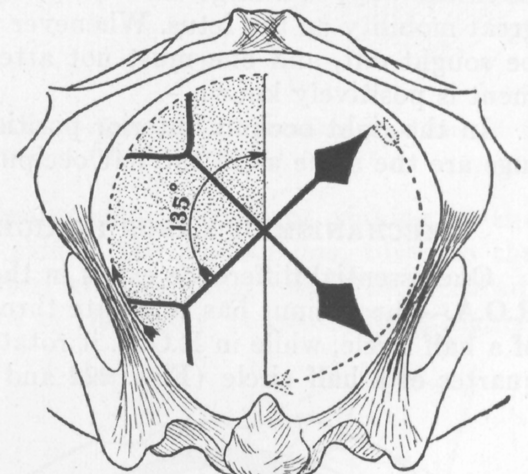


FIG. 223.—ROTATION IN R.O.P.—R.O. 135 DEGREES.

Occiput has an arc of 135 degrees to travel.

os is the sagittal suture, usually running nearer the pubis (posterior asynclitism), and at the end of the suture, in the left anterior pelvic quadrant, the finger finds the small fontanel. At the other end, in the right posterior quadrant, but nearly on a level with the small fontanel, lies the large one. These findings indicate that flexion has not yet occurred. When flexion has taken place, one finds the small fontanel lower in the pelvis and nearer the center, the large fontanel higher and harder to reach, the sagittal suture more nearly paralleling the axis of the body, and lying almost in the right oblique. The fontanel which is nearer the center of the pelvis is the lower one. While internal anterior rotation occurs, the small fontanel descends and sweeps around the left anterior quadrant of the pelvis until it lies directly behind the pubis, the sagittal suture now running exactly in the median line from before backward (Figs. 219–221). Coincident with these movements the effacement and dilatation of the cervix have been taking place, and usually, by the time the head comes to rest in the perineal gutter, the os is completely dilated and retracted above the neck. A caput succedaneum begins to form, and in long, tedious labors may grow so large that it makes the landmarks on the skull hard to find. Firm pressure or massage will obviate the difficulty. Of equal importance to the determination of the rotation is the recognition of the degree of engagement of the fetal head—the "station" (Müller). A head that is even visible at the outlet may be pushed up out of the pelvis, and a head that is not engaged may be fixed so that it cannot be moved; therefore, one must not be guided by the displaceability. The head is engaged when its largest plane—that is, the one through the parietal bosses—has passed the region of the inlet. How may we determine that this has occurred? We know that the head is engaged when, first, the most dependent portion of the skull (not the caput succedaneum) has passed a line drawn between the spines of the ischia; second, when two thirds of the sacrum is covered by the cranial prominence, that is, the sacral hollow is occupied by the head; third, when the finger can feel only one fourth of the pubis. Of these three criteria, the one measuring the distance of the head above or below the interspinous line is the most valuable and reliable. (See p. 263.)

Engagement varies with the different presentations of the head. It is prevented by highly contracted pelves, tumors blocking the inlet, and by pendulous abdomens. An abnormally large head engages with difficulty; the placenta may be in the way, or a large amount of liquor amnii (polyhydramnion) may confer great mobility on the fetus. Whenever the head does not engage, the cause must be sought out, and one must not attempt delivery until the degree of engagement is positively known.

In the right occiput anterior position, the mechanism of labor and the findings are the same as in the left occiput anterior position, but reversed.

MECHANISM OF LABOR IN RIGHT OCCIPUT POSTERIOR POSITION

One essential difference exists in the mechanism of R.O.P. as compared with R.O.A.—the occiput has to rotate through an arc of 135 degrees, three quarters of a half circle, while in R.O.A. it rotates through an arc of 45 degrees, only one quarter of a half circle (Figs. 222 and 223).

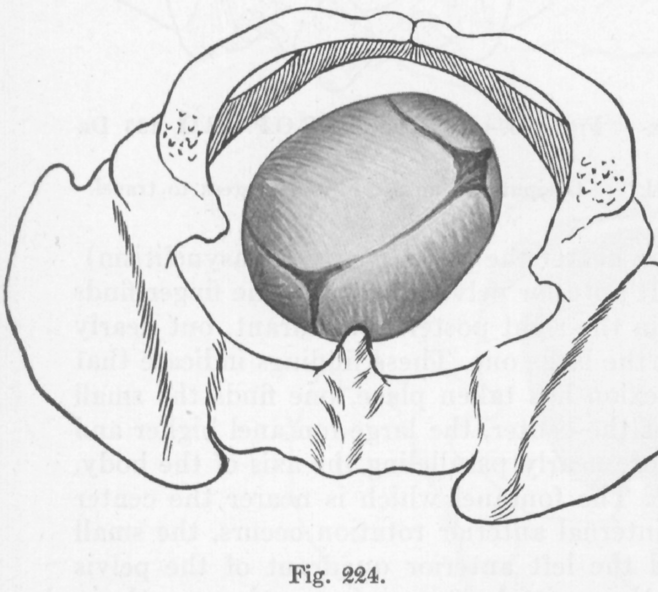


Fig. 224.

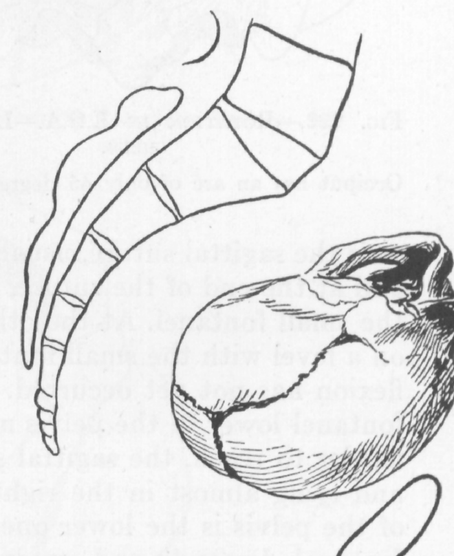


Fig. 225.

Figs. 224 and 225.—Rotation in R.O.P.—R.O. 135 Degrees. (Seen from below and from the side.)

Engagement of the head is slower because the broad part of the head is likely to impinge on the promontory of the sacrum, and for the same reason flexion is not so marked, and may not occur until the head is well down on the pelvic floor. Internal anterior rotation takes much more time—naturally, since the occiput has three times as far to travel. After it has occurred, the mechanisms of all positions are identical. The factors bringing about all the movements are the same in posterior positions as in anterior, and a new one is invoked.

The Findings in Right Occiput Posterior.—*Abdominally,* the back is felt to the right and posteriorly, and the heart tones are deeper in the flank, further

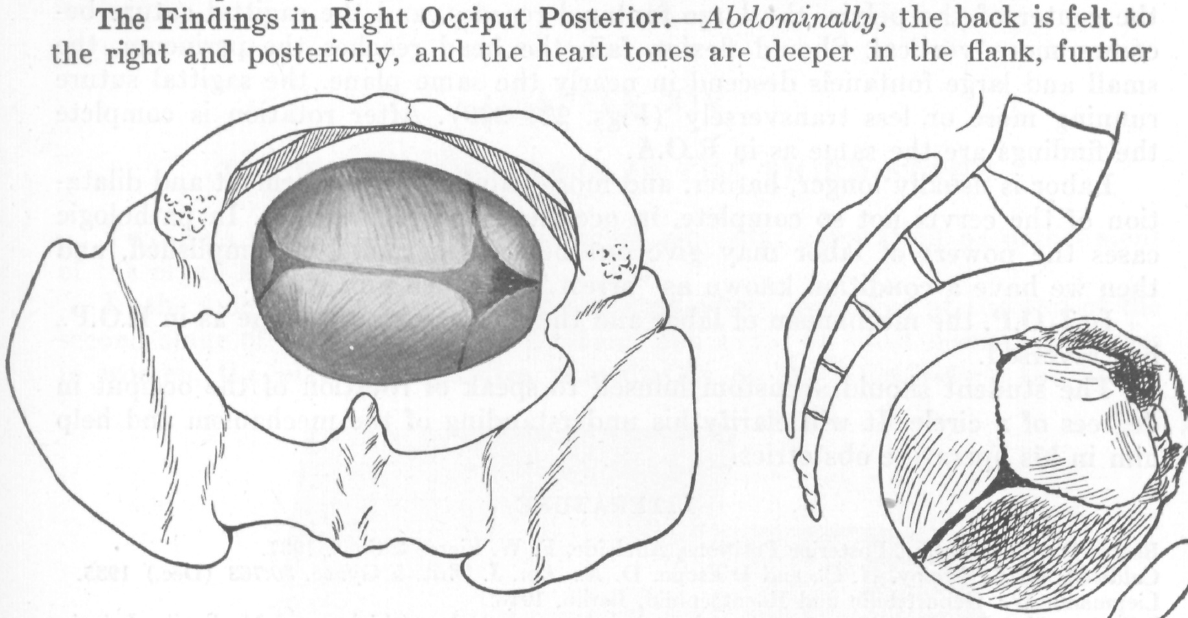


Fig. 226. Fig. 227.

Figs. 226 and 227.—It Is Now Called R.O.T.—R.O. 90 Degrees. (If rotation stops here, it is called transverse arrest or arrest at right 90 degrees.)

from the navel. During labor, both gradually come anteriorly, sinking at the same time. The shoulder is on the right side of the median line, turns to the front, and then to the left side of the center, as labor progresses. The forehead, at first, is plainly felt above the left ramus of the pubis. It rises a little higher,

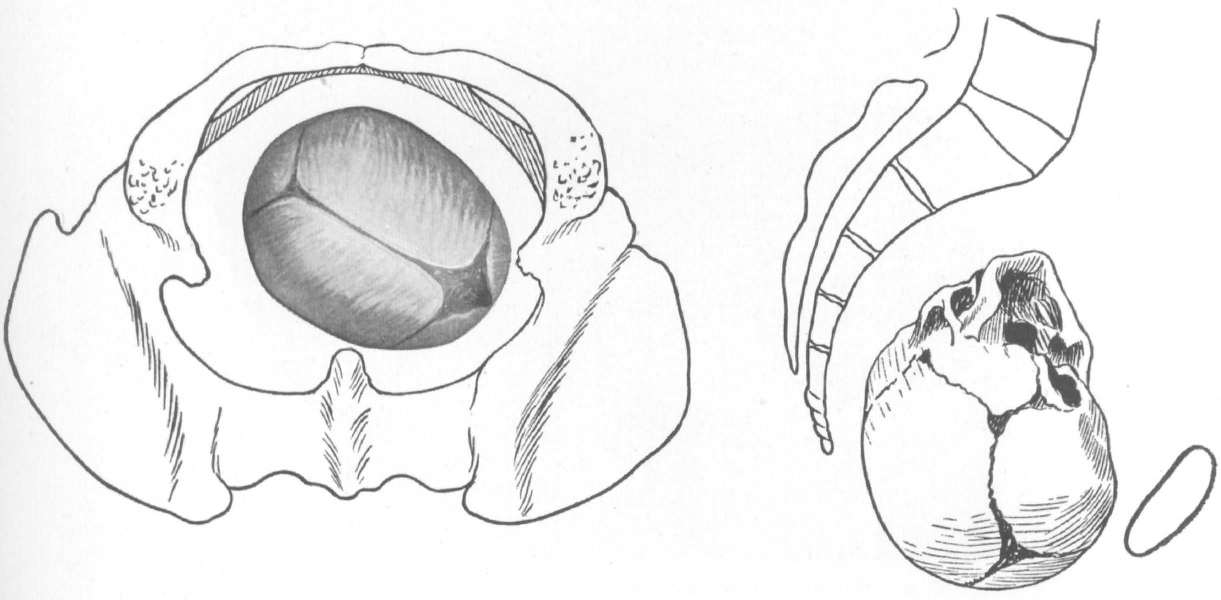


Fig. 228. Fig. 229.

Figs. 228 and 229.—Rotation in R.O.T—R.O. 135 Degrees. (Now it has become R.O.A.—R.O. 45 Degrees.)

due to flexion of the head, then it sinks lower as the head engages; finally, it sweeps backward, around the left half of the pelvis, disappearing at the side. The small parts, feet and arms, are felt anteriorly around the umbilicus. *Internally,* at the beginning of labor, the head is high up, the sagittal suture in the *right* oblique, the large fonanel in the left side anteriorly, and the small fontanel high up and at the right sacro-iliac joint. Flexion is less marked in these cases. After descent is started the flexion of the head throws the small fontanel nearer the center of the pelvis, the large fontanel recedes, and the sagittal suture becomes more vertical. Should flexion fail, the head reaches the perineum, the small and large fontanels descend in nearly the same plane, the sagittal suture running more or less transversely (Figs. 224–229). After rotation is complete the findings are the same as in R.O.A.

Labor is usually longer, harder, and more painful, and effacement and dilatation of the cervix not so complete, in occipitoposterior positions. In pathologic cases the powers of labor may give out before rotation is accomplished, and then we have a condition known as "arrest," of which more later.

In L.O.P. the mechanism of labor and the findings are the same as in R.O.P., but reversed.

The student should accustom himself to speak of rotation of the occiput in degrees of a circle. It will clarify his understanding of the mechanism and help him in his operative obstetrics.

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Section VII

Pelvic Type Examples

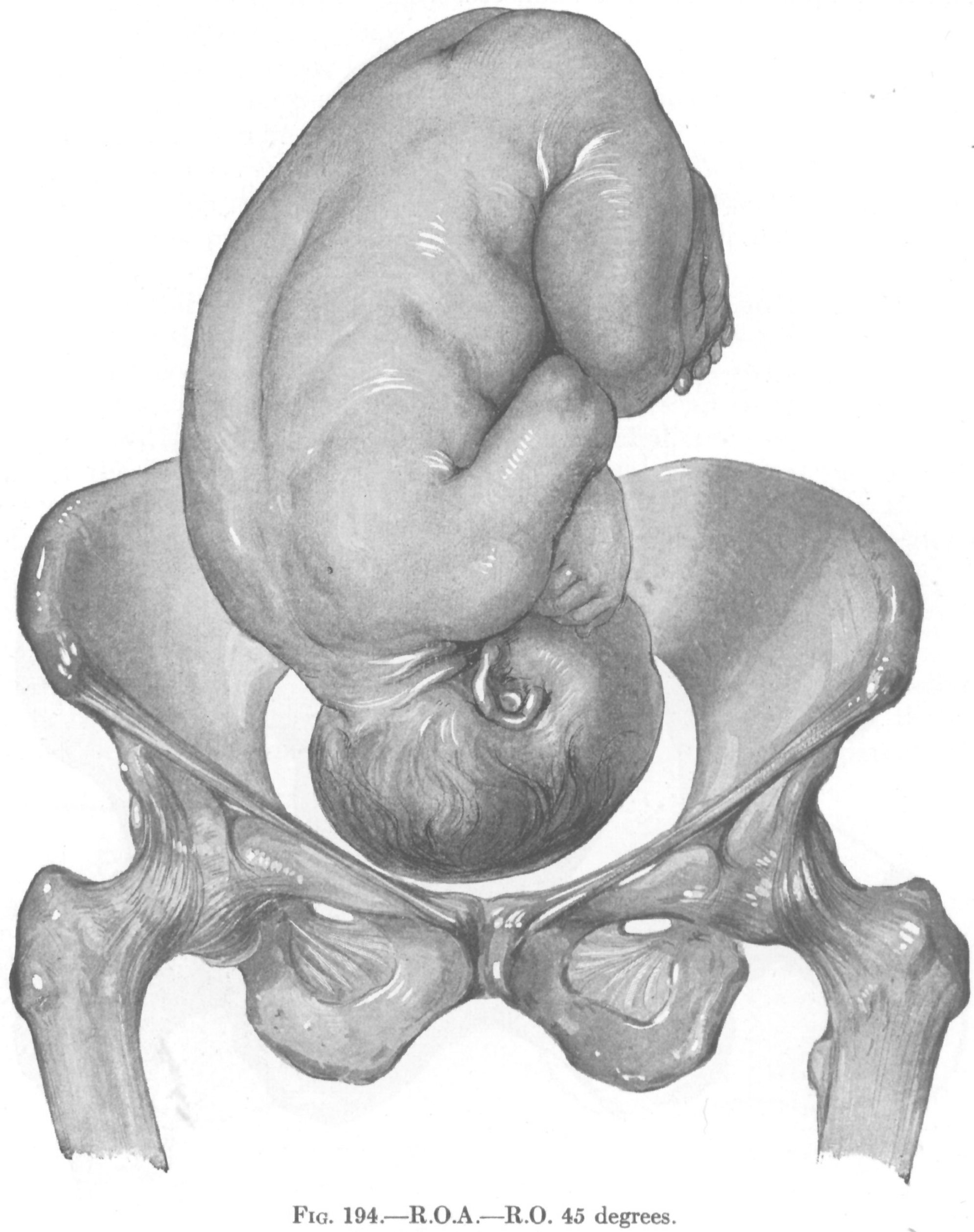

Fig. 194.—R.O.A.—R.O. 45 degrees.

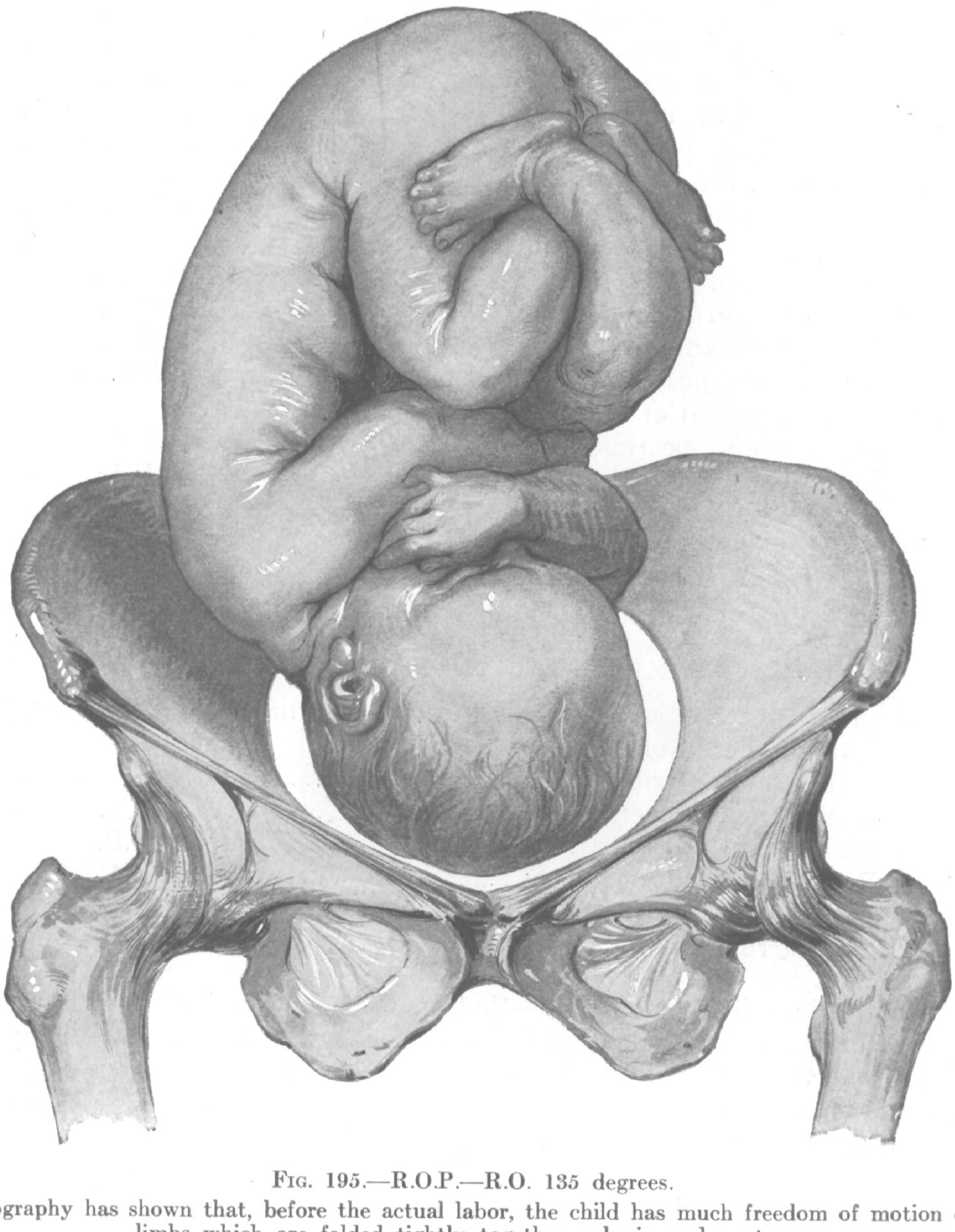

FIG. 195.—R.O.P.—R.O. 135 degrees.
Radiography has shown that, before the actual labor, the child has much freedom of motion of its limbs which are folded tightly together only in a dry uterus.

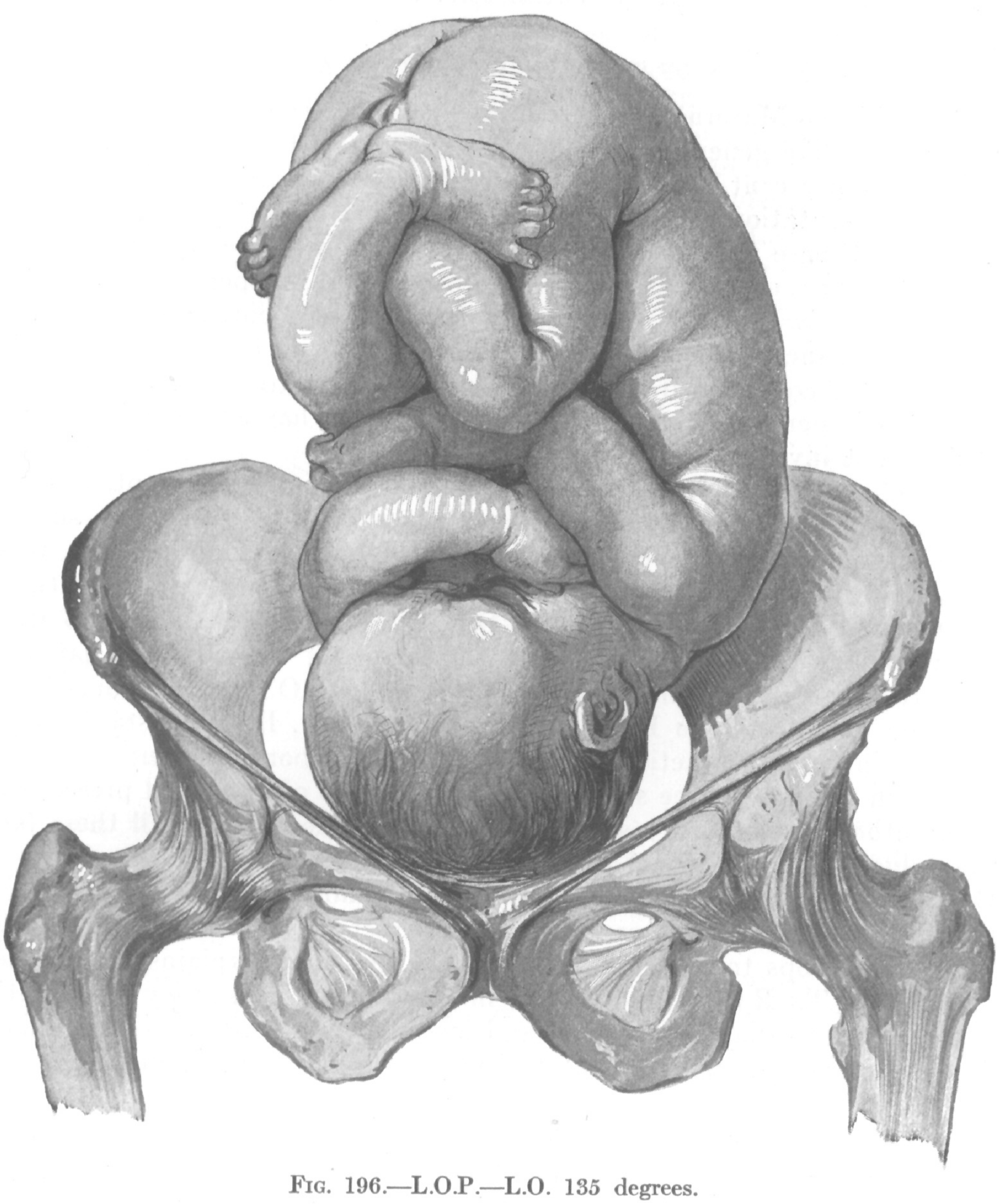

Fig. 196.—L.O.P.—L.O. 135 degrees.

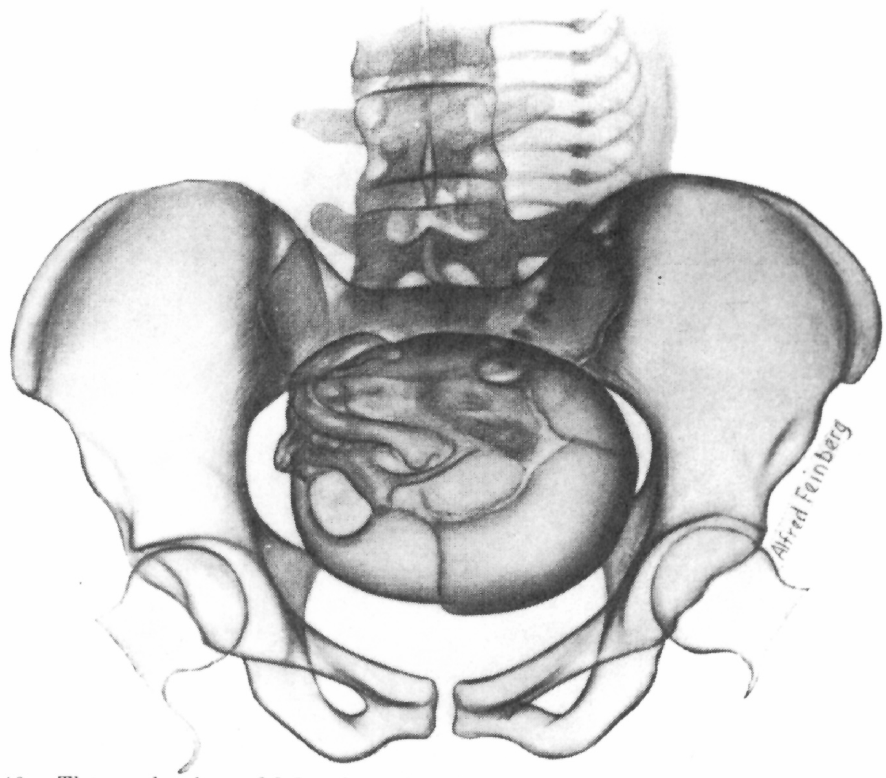

Fig. 42.—The mechanism of labor in android pelves, as complicated by a narrow interspinous diameter. Normal posterior parietal O T position engaging at inlet.

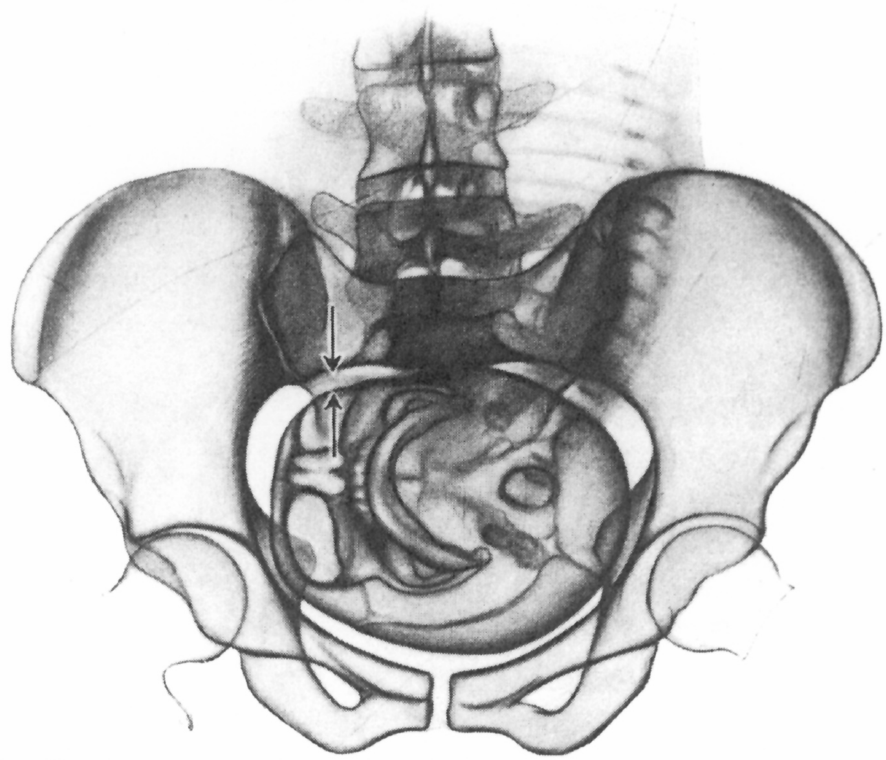

Fig. 43.—Same case as Fig. 42. Arrest at bottom of posterior pelvis in the O T position. Rotation to anterior oblique position is prevented by the flat android pelvis at the inlet (see arrows) and the narrow interspinous diameter below.

Android

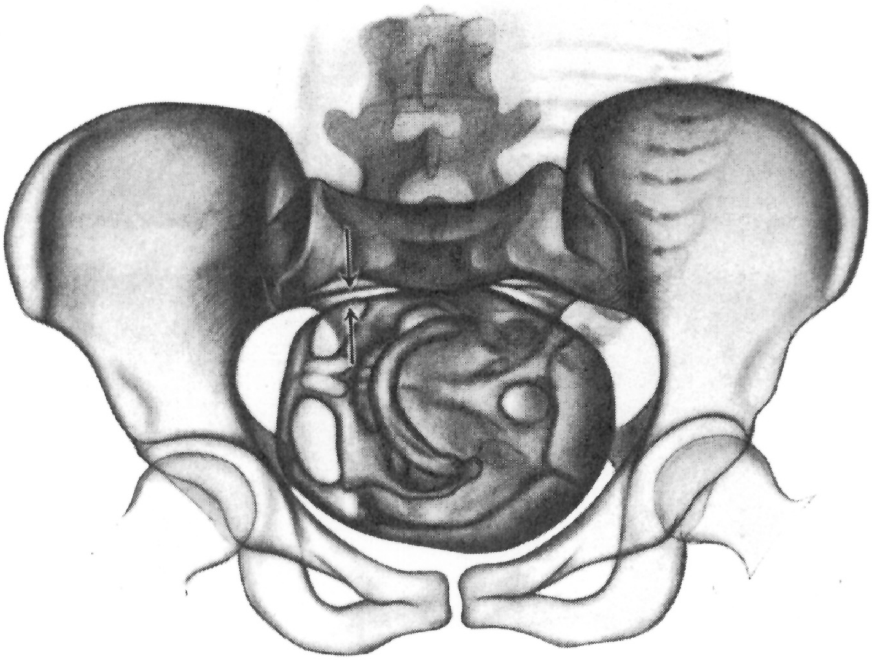

Fig. 38.—The normal mechanism in android types (occipitotransverse position maintained to a low level). Inlet view: rotation from the O T position to an oblique anterior position fails to occur in the low posterior pelvis on account of the opposing forces between the temporal region of the head and the lateral aspects of the sacral region at the inlet (see arrows).

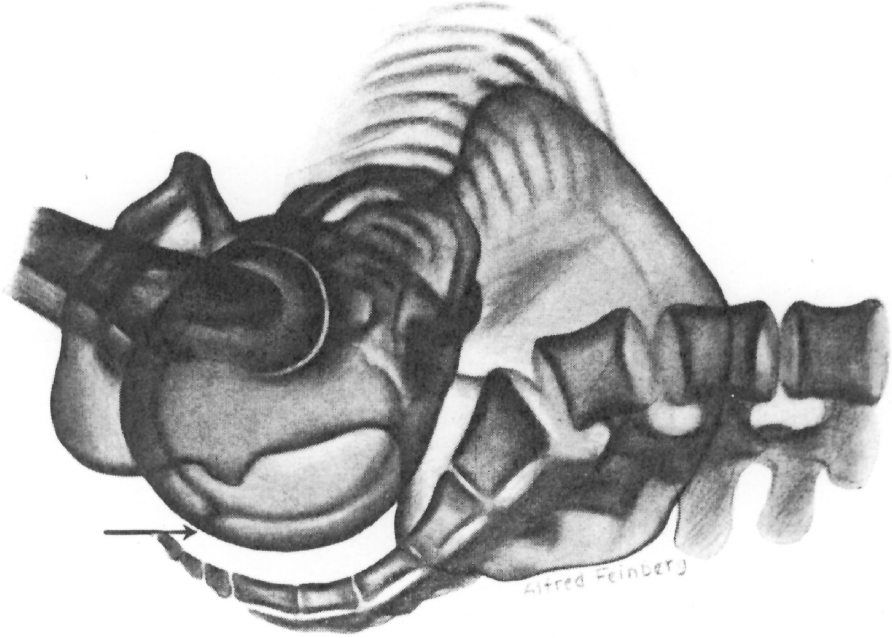

Fig. 39.—Normal mechanism in android types. Lateral view of Fig. 38. Vertex in O T position at bottom of posterior pelvis close to lower sacral region.

Android

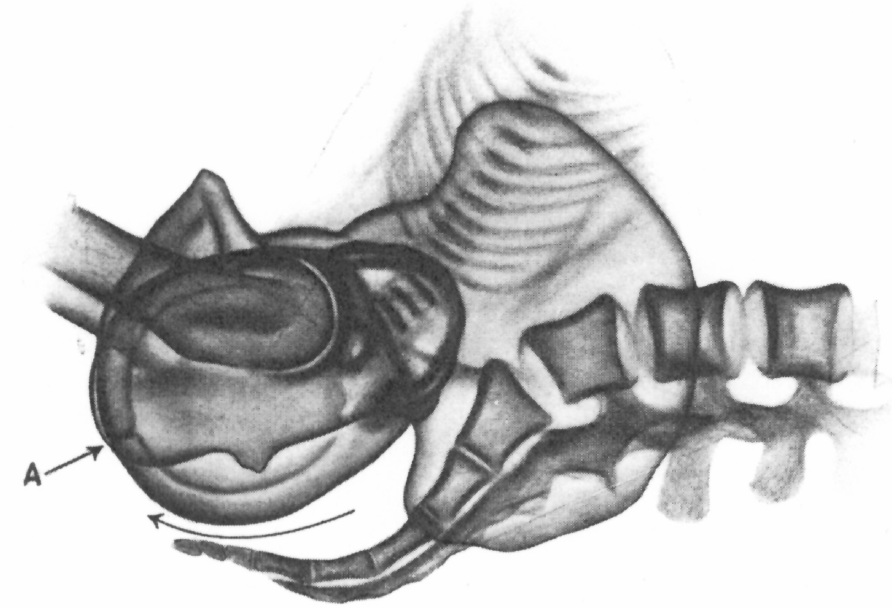

Fig. 40.—Normal mechanism in android types. Lateral view. If the side walls of the pelvis are straight and the interspinous diameters wide, the O T position persists (for reasons illustrated in Fig. 38). For descent to occur the head demonstrates "anterior lateral flexion" between contractions as it descends in the fore pelvis. This means that the median sagittal suture moves more and more in front of the ischial spines and downward.

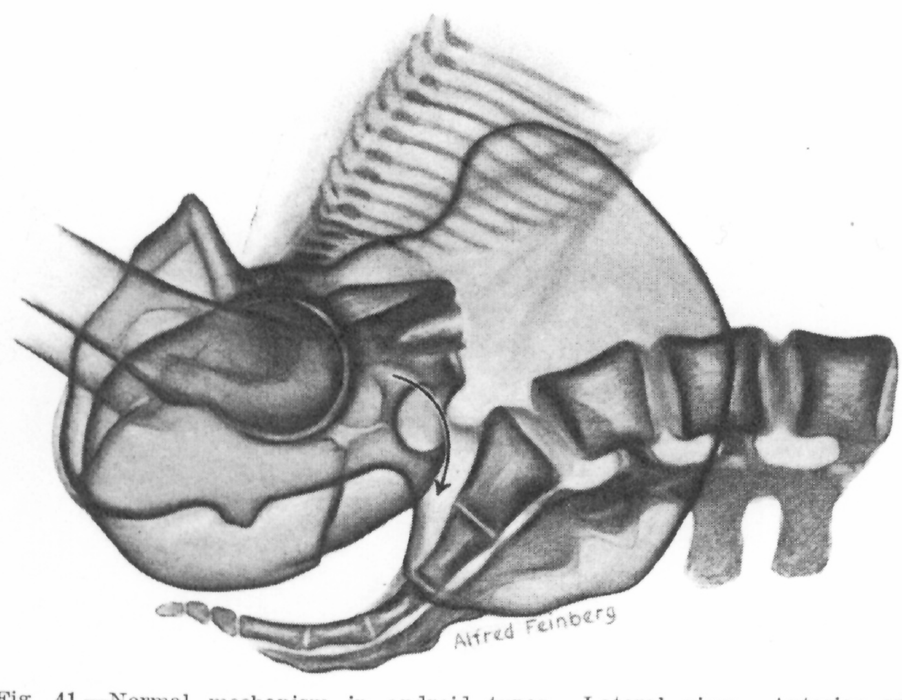

Fig. 41.—Normal mechanism in android types. Lateral view. Anterior spiral rotation from the O T position occurs at such a level in the lower fore pelvis that the fetal brow may move without resistance under the promontory.

Android

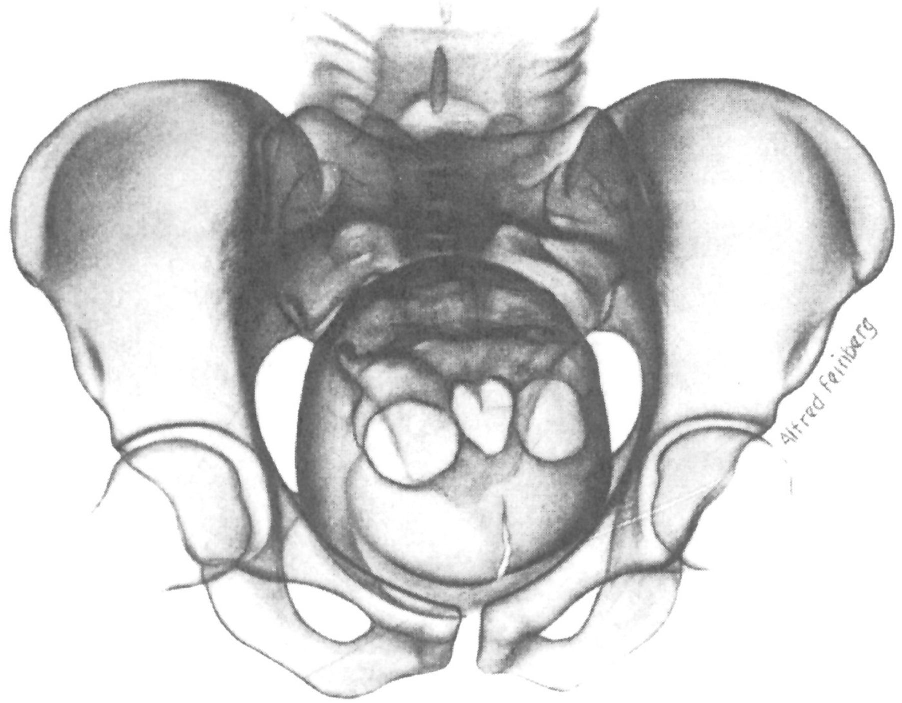

Fig. 51.—The type of pelvis associated with the persistent posterior position. The persistent direct O P position low in the fore pelvis (inlet view). The pelvis conforms to the *android type with anthropoid characteristics, converging side walls, and possesses a narrow interspinous diameter.*

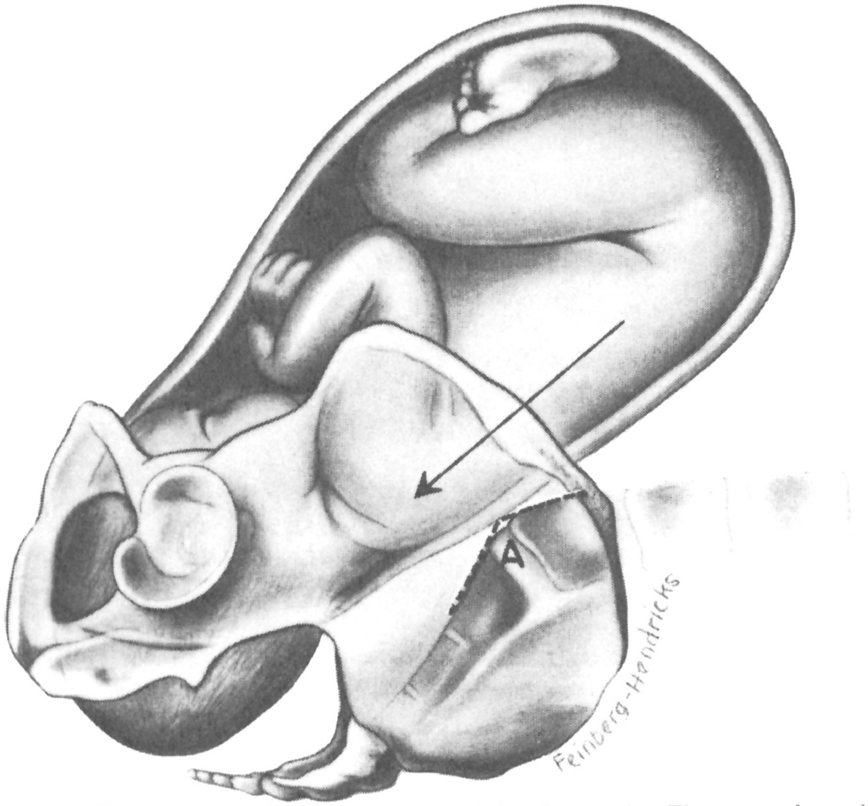

Fig. 52.—Same case as Fig. 51 from the lateral aspect. The normal mechanism of labor has been followed, and descent has occurred to a low level, largely, we believe, because the uterine contraction has been enabled to exert its influence as a straight drive through the fetus because of the wide angle at "*A*."

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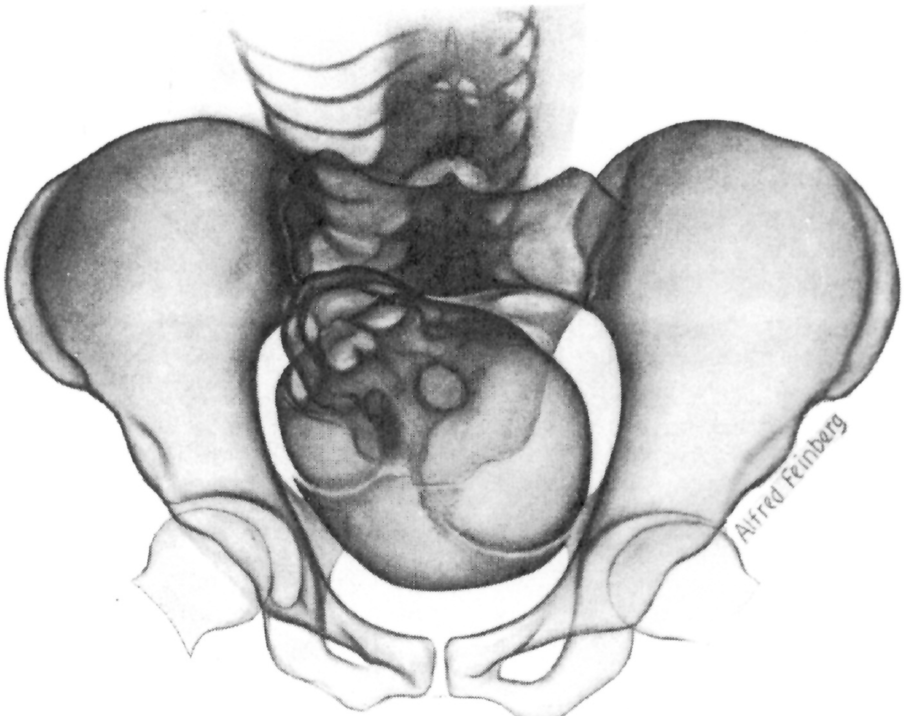

Fig. 47.—Fetal pelvic adaptation at the inlet. An anterior oblique position at the inlet in an anthropoid type with a narrow fore pelvis.

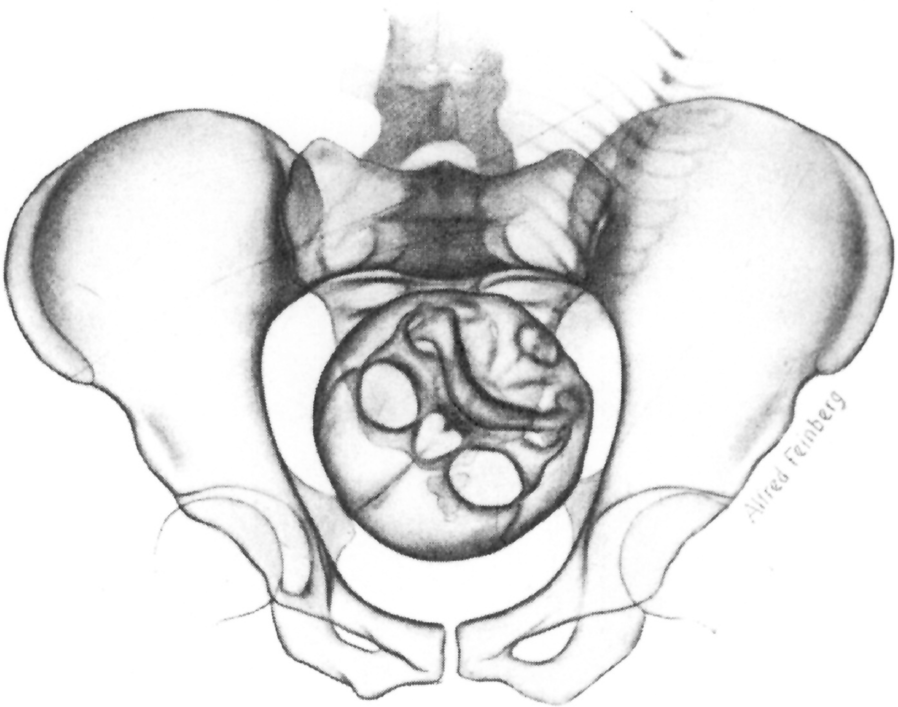

Fig. 48.—Fetal pelvic adaptation at the inlet. Same case as Fig. 47. The head, remaining high until membranes ruptured, engaged and rotated in a spiral manner to an oblique posterior position. The occiput is not as adaptable to a narrow fore pelvis as is the frontal aspect of the head.

Anthropoid

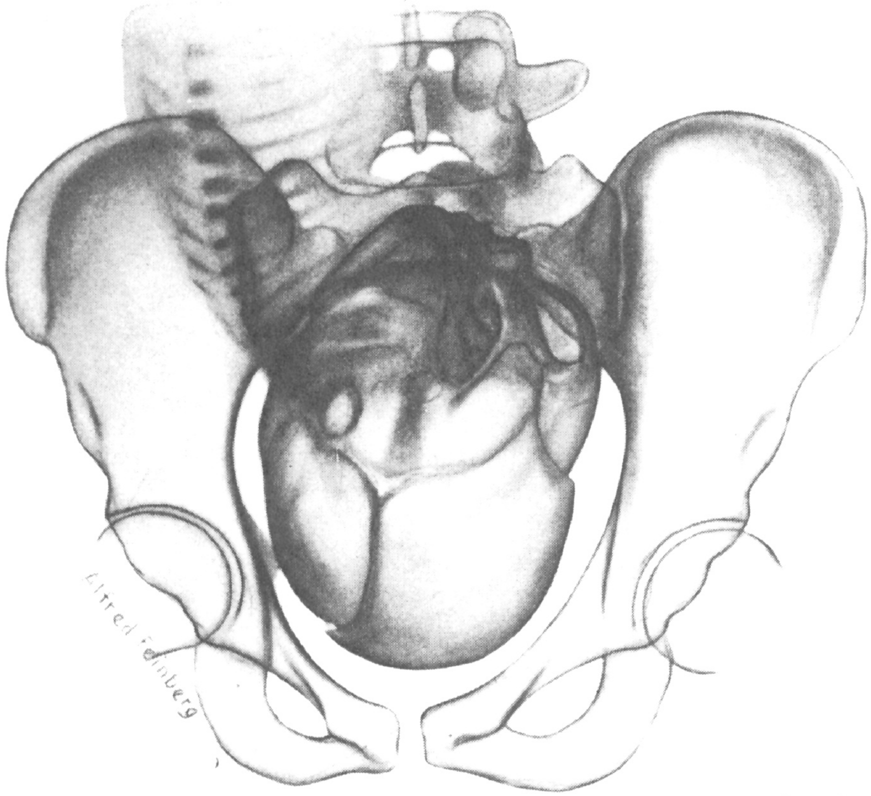

Fig. 49.—Abnormalities in the mechanism of labor at the inlet. Arrest of an anterior oblique position in an anthropoid type with a narrow fore pelvis. Appearance of the head (inlet view) wedged in the narrow fore pelvis in an oblique anterior position.

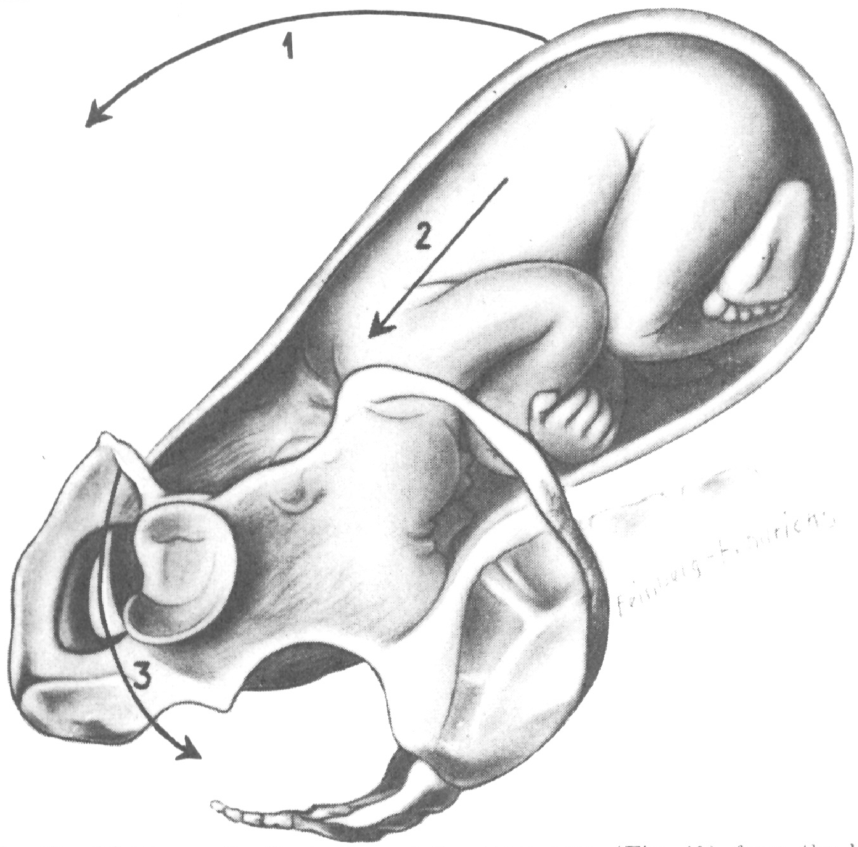

Fig. 50.—Diagrammatic illustration of the same case (Fig. 49) from the lateral aspect. The head is impacted in the narrow fore pelvis. Thus the uterus is prevented from swinging forward, and the head cannot move downward and backward to utilize the available posterior pelvis as in the normal mechanism of labor.

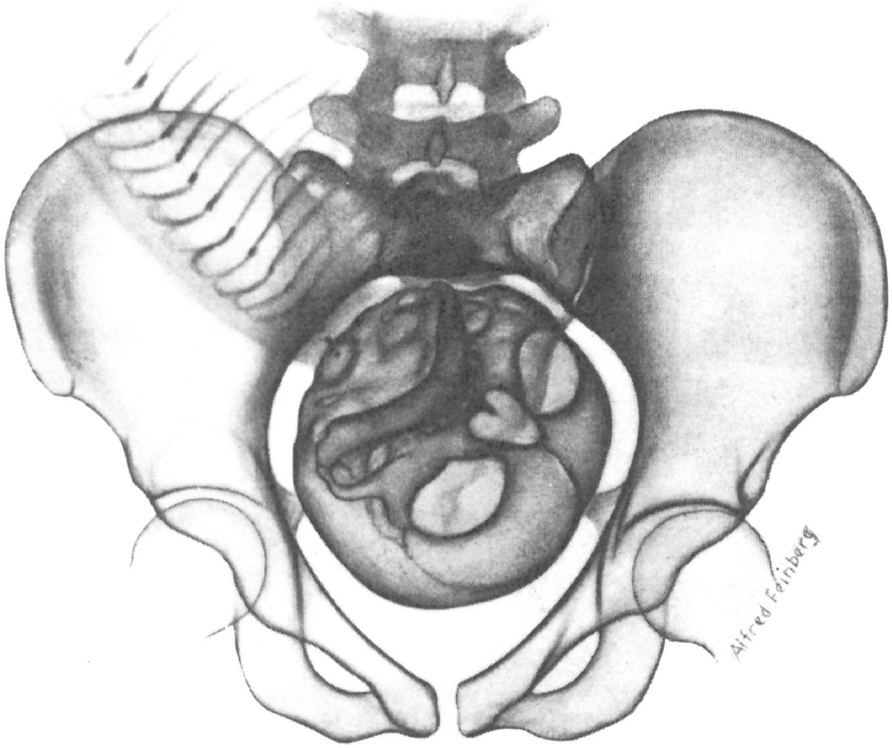

Fig. 53.—The type of pelvis associated with a persistent posterior position. Arrest of the head at bottom of posterior pelvis in the oblique O P position. The pelvis conforms to the *typical anthropoid type with straight side walls and a moderate outlet*. The fore pelvis is avoided. The head is impacted close to the sacrum and side walls of the pelvis.

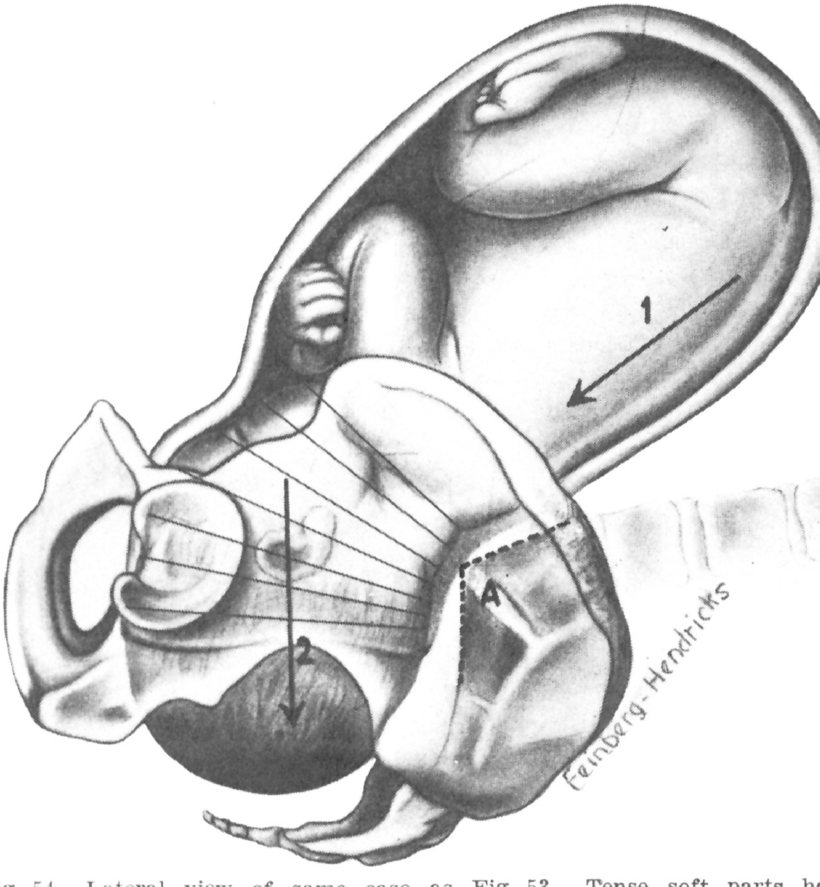

Fig. 54.—Lateral view of same case as Fig. 53. Tense soft parts hold head against sacrum. The sharp angle at *"A"* prevents the uterus from gaining a direct drive through the fetal piston into the posterior aspects of the pelvis. Note the posterior angle between axis of fetal body (1) and head (2).

Platypelloid

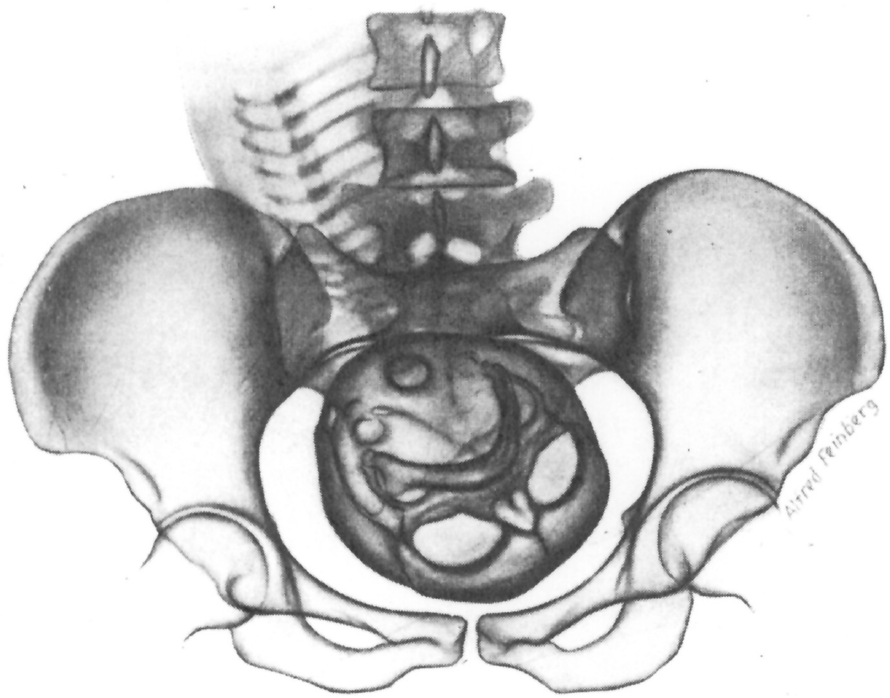

Fig. 45.—Fetal pelvic adaptation at the inlet. An original posterior position in a flat type of pelvis. This position is caused by the soft parts.

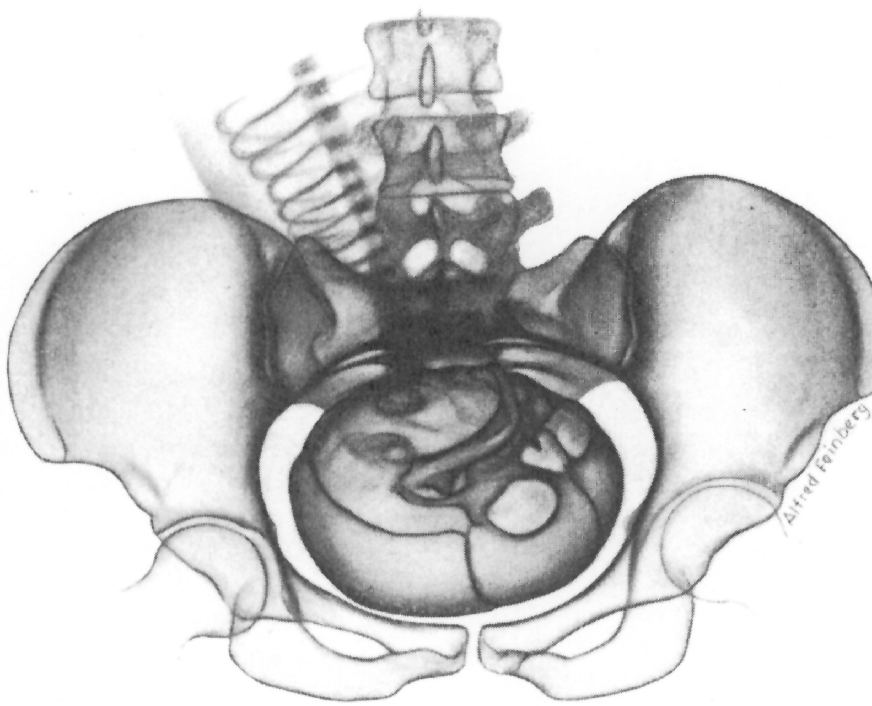

Fig. 46.—Fetal pelvic adaptation at the inlet. Same case as Fig. 45. For engagement to occur the head must adjust itself to the inlet to a transverse position. This latter position is maintained to a low level for reasons illustrated in Figs. 38 to 41.

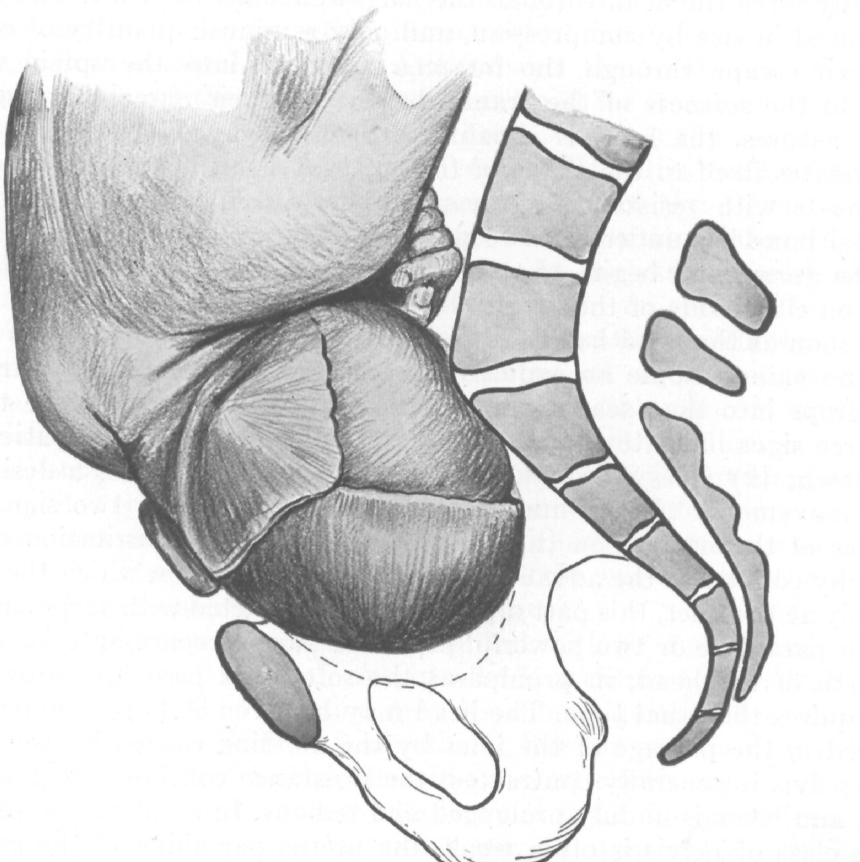

FIG. 543.—ANTERIOR PARIETAL BONE PRESENTATION. HEAD MOLDING ITS WAY INTO FLAT PELVIS (adapted from Smellie).
Dotted line shows caput succedaneum.

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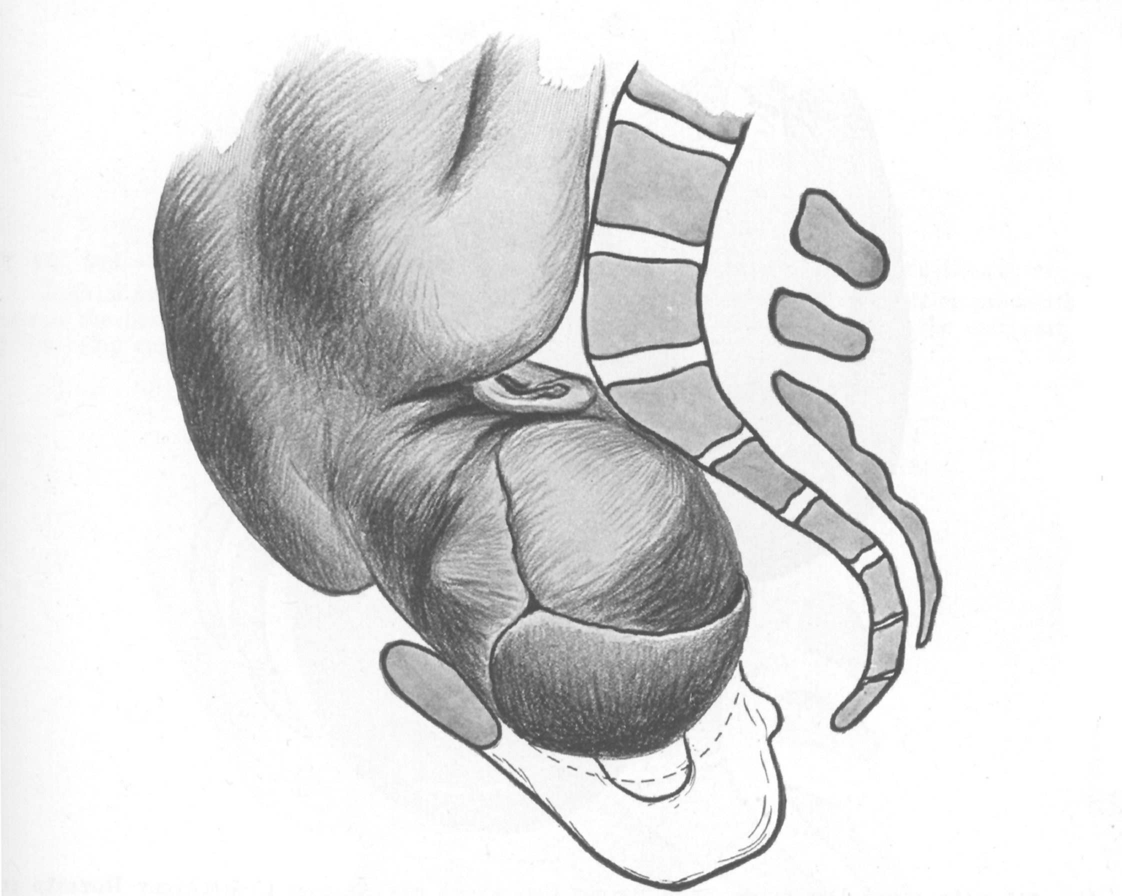

FIG. 544.—NEXT STAGE OF THE MOLDING. POSTERIOR PARIETAL ROLLS OVER THE PROMONTORY. HEAD NOW ENGAGED.

Sagittal suture comes near middle line. Levelling takes place.

FIG. 545.—HEAD HAS DESCENDED ONTO PELVIC FLOOR AND HAS ALMOST COMPLETELY ROTATED TO FRONT.
Some lateroflexion of head persists even as late as this. Levelling is not always complete.

Section VIII

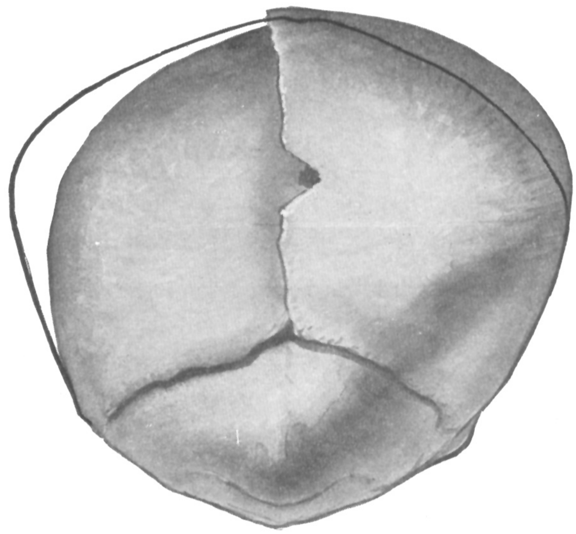

Fig. 249.—Rear View of Skull Molded in L.O.A. Line shows shape before molding.

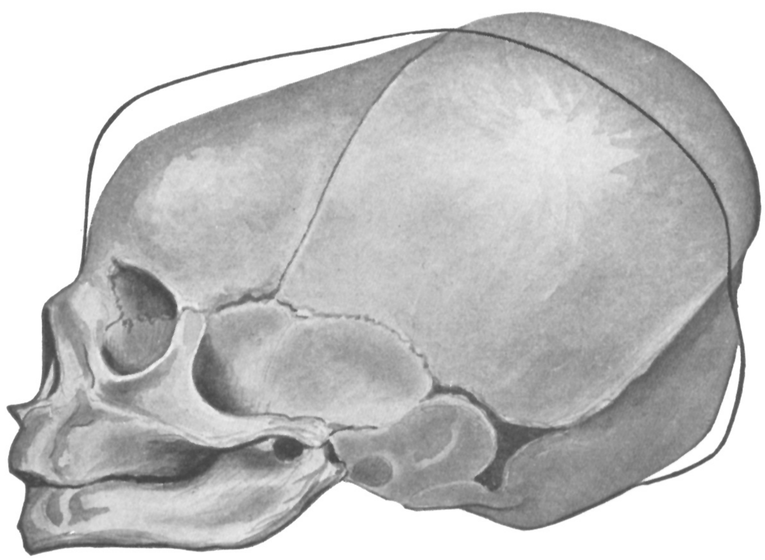

Fig. 250.—Side View of Skull Molded in R.O.A. Line shows shape before molding.

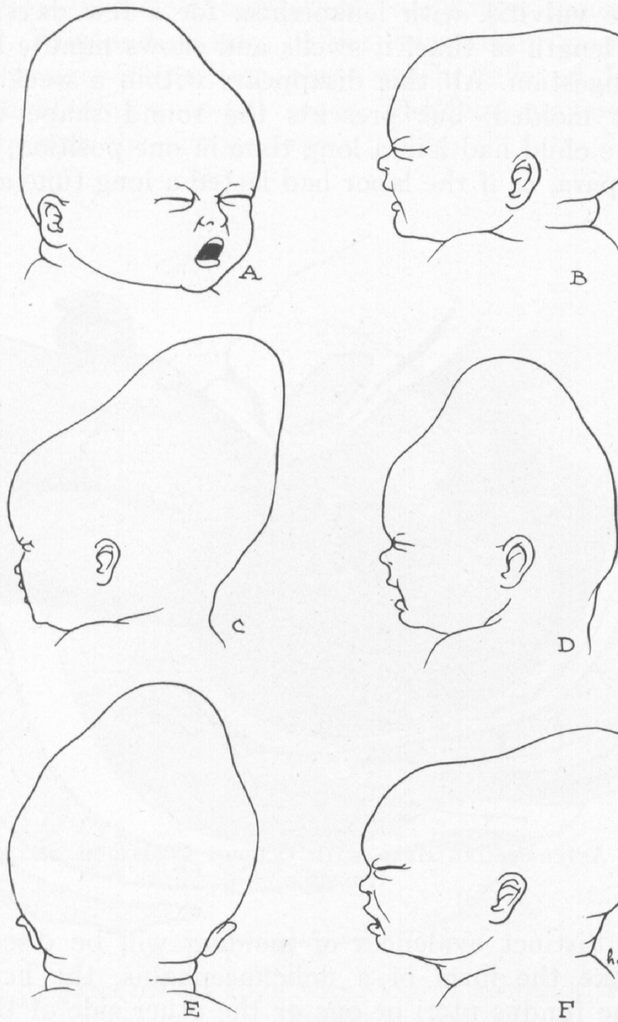

FIG. 480.—VARIOUS TYPES OF CAPUT SUCCEDANEUM OR MOLDING OF THE FETAL HEAD.

A—O.L.A., B—Breech presentation, C—Persistent occiput posterior delivered by extension, D—Persistent occiput posterior delivered by flexion, E—Molding of head in flat pelvis, F—Molding of head in generally contracted pelvis.

Fig. 247.—Unmolded Head; from Cesarean Section.

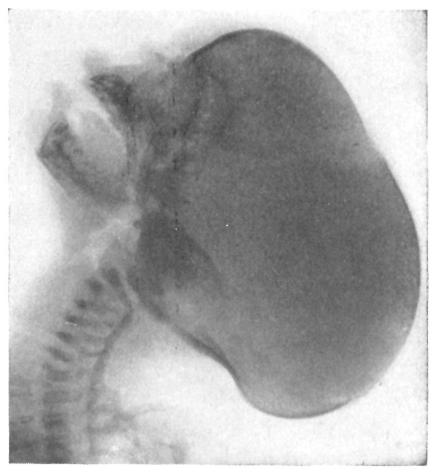

Fig. 248.—Extreme Molding—Case of Face Presentation.

CASTELLINO PRENATAL AND BIRTH TRAINING, Module 3:
"Vaginal Birth: Birth Stages, Pelvic Types and Cranial Molding"

Written and compiled by Dr. Raymond Castellino, D.C., R.P.P.