

Pelvimeters, and the Practice of Pelvimetry as a Means of Discovering Irregularities of the Pelvis which are Likely to Embarrass Parturition.

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It is probably safe to assert that of the women now pregnant one or two of every thousand have pelves so small, flattened, or otherwise distorted, as to render it impossible for their children to be born alive at term in the natural way.

It may be further said that of every one thousand cases now pregnant, there is an additional small group possessing sufficient pelvic contraction or deformity to arrest the progress of the child, who may be delivered only by the aid of the forceps.

In the first group of cases foetal and maternal mortality will figure in large proportion, except for the timely intervention of art. In the second group foetal and maternal injury and mortality are again likely to figure, although the embarrassments consequent to failure and unskill may be less pronounced than in the first or more limited group of cases.

Those who have intentionally mutilated or destroyed children to effect delivery have, with few exceptions, acquired a most pronounced feeling of repugnance and disgust for such procedures. Fortunately modern art has brought most encouraging relief to these unfortunate women, and there is consequently less excuse for us to soil our hands with the blood of unskill and disgrace. Modern art,

indeed, has so greatly enhanced the possibilities of both maternal and foetal safety, that we should well consider the means whereby these unfortunates can be discovered in time to be saved.

A very large proportion of the cases of Cæsarean section and symphysiotomy present a previous history of unsuccessful, and often repeated, attempts at delivery by the forceps. These are the cases which have swelled the mortality percentages of pubic and abdominal section. In many of them only failure to effect delivery by the forceps revealed the presence of osseous impediment to delivery, or established the necessity for resort to other measures. The maximum degree of maternal and foetal safety depends upon our early discovery of these deformities.

Our duties in this relation should be remembered at our introduction to each case. Women whom we shall then find to have given birth to small children only, who present the history of long labor, especially of a prolonged second stage, or, who have been delivered by version or the forceps, should be at once, or at our early convenience, subjected to at least the common external measurements of the pelvis.

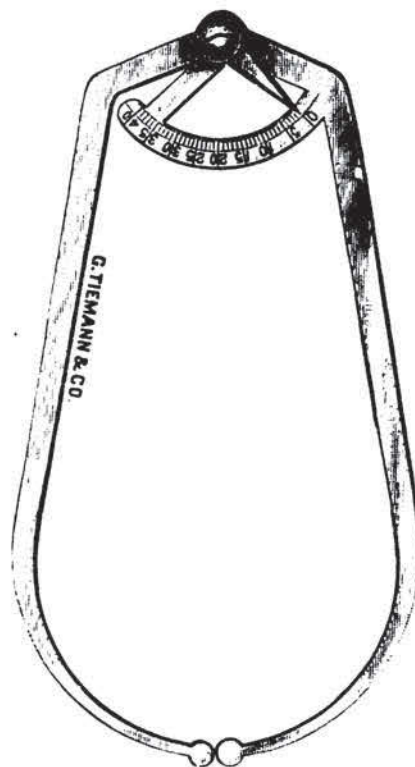
External measurements of all primiparæ should be carefully made

when our services are engaged, or shortly thereafter. For the purpose of making these external measurements of the pelvis, calipers, or the pelvimeter, are indispensable. In former times the English inch was the only unit of measure for pelvimetry in this country. At present I believe a majority of the obstetrical teachers and writers here prefer and employ the French centimetre as a unit of measure, and its extensive employment in other countries should lead to its general adoption here. Many continue to "think," as they say, "in inches." Such may be reminded of the following simple method of reducing inches to centimetres: Multiply the number of inches by ten, divide the product by four, and the result is centimetres. Thus: $7\frac{1}{2}$ inches $\times 10$, divided by 4, equals 18.6 cm.

To reduce eighteen and six-tenths centimetres to inches, multiply by four and divide the product by ten, and the result is seven and one half inches. Thus: 18.6 centimetres $\times 4$, divided by 10, equals $7\frac{1}{2}$ inches.

In the selection of a pelvimeter certain qualities are requisite: First, accuracy; second, that the instrument shall span sufficiently to take the various measurements of stout women. Two or three of the instruments in my collection are markedly deficient in this latter quality. An intimation of their deficiency in this respect is clearly shown by the accompanying illustration.

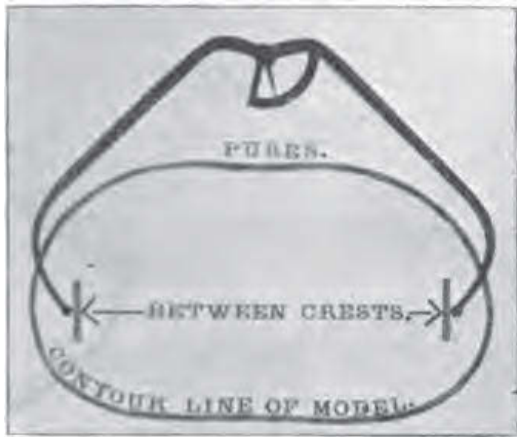
Almost any pelvimeter will span to the iliac crests or spines by anterior or posterior approach, but not so when we attempt to take the external conjugate.



The seductive little instrument of Collin, and also that of Robert and Collin, as sold here, do not span sufficiently to measure the external conjugate in stout women. Flattened pelvises in such women—the very ones we must determine—only increase the incompetency of these instruments.

Neither the arm, nor any part of the instrument, except the points, should exert pressure upon the patient.

For the purpose of studying and comparing the spanning capabilities of the various pelvimeters in my collection, I have secured the contour of a stout patient, and reproduced it, life-size, on accompanying drawing. It was obtained by moulding a lead tape to the patient, on a line corresponding with the projection of a plane, which intersected the body at the lumbo-sacral joint posteriorly



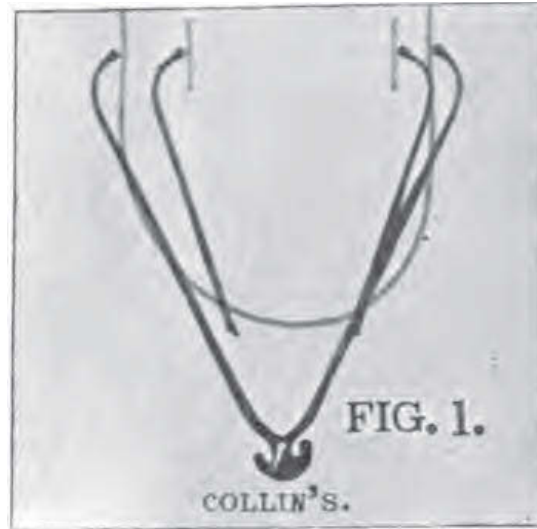
and near the upper border of the symphysis pubis anteriorly. The distance around the patient on the contour line was one hundred and one centimetres. She weighed one hundred and eighty-five pounds, and was of the following general dimensions : —

Height.....	161.5 cm. =	5 ft. 4½ in.
Shoulders.....	39 cm. =	15½ in.
Crest iliac.....	31 cm. =	12¼ in.
Iliac spines.....	28 cm. =	11¼ in.
External conjugate....	21 cm. =	8¾ in.
Internal trocha.....	39 cm. =	15¾ in.

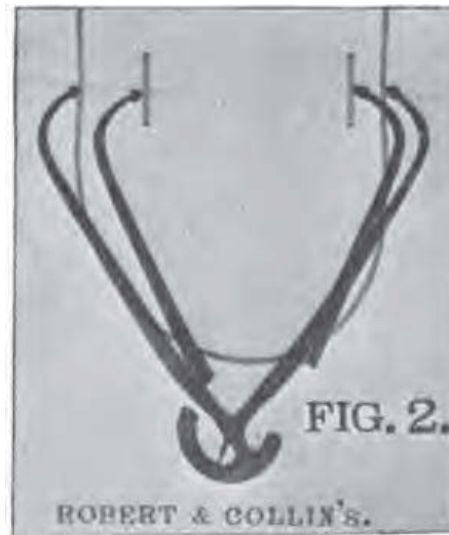
The reproduction of this patient's contour — life-size — on a number of cardboards, and the application and tracing of the several pelvimeters all in position for taking the external conjugate, and, of course, open to twenty-one centimetres, affords a ready means of comparing the form, size, and spanning capabilities of the various instruments hereafter delineated. The illustrations are all photolithographed from the original tracings, and are thus relieved of any suspicion of error.

The relations of the various instruments to a stout person with a large, but flattened, pelvis, is illustrated by tracings of the several pelvimeters

with points approximated to fifteen centimetres. Only a portion of the arms of the various instruments appear in this part of each drawing.



Figures 1 and 2 represent the pelvimeters of Collin, and of Robert and Collin, instrument makers, Paris.



These instruments were made in New York; they span insufficiently, and must, on that account, be condemned as universal external pelvimeters. Both are graduated from taking internal diameters. The expression of measure is in *centimetres*.

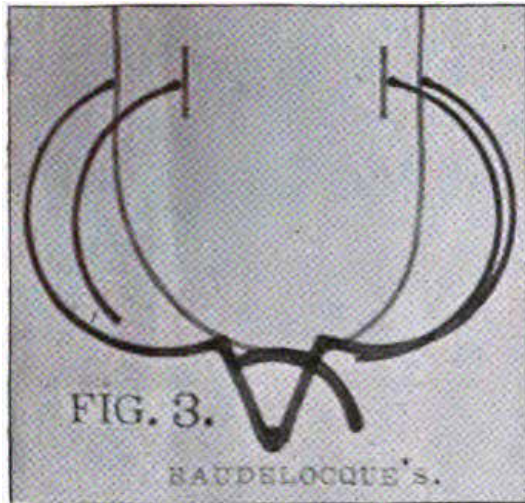


Figure 3 represents a pelvimeter of Baudelocque in my possession. It spans insufficiently.

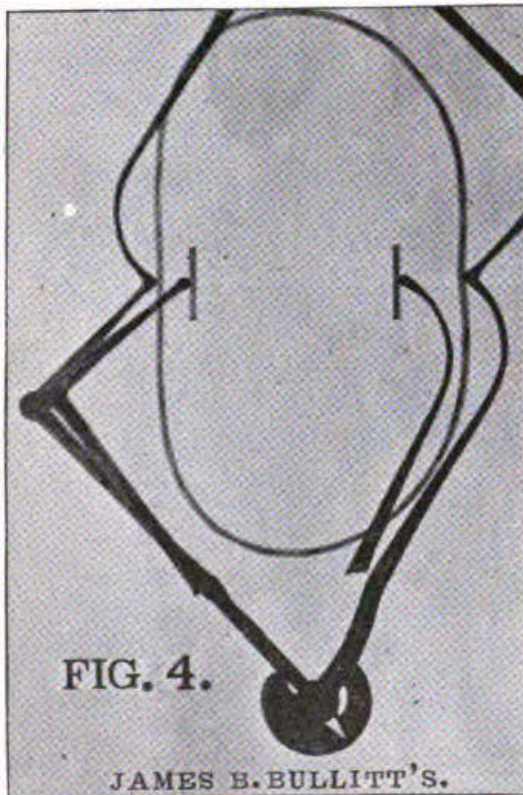


Figure 4, representing the instrument of Doctor Bullitt, seems a good deal short in spanning, but the shortage might, to some extent, be overcome by applying it upside down, or

from the other side, in individual cases. The relation of the arms thus applied to model is shown in the accompanying illustration. This very ingenious instrument is adapted to certain internal measurements. I have not used the instrument for internal measurement, and am therefore unable to judge of its merits for this service.

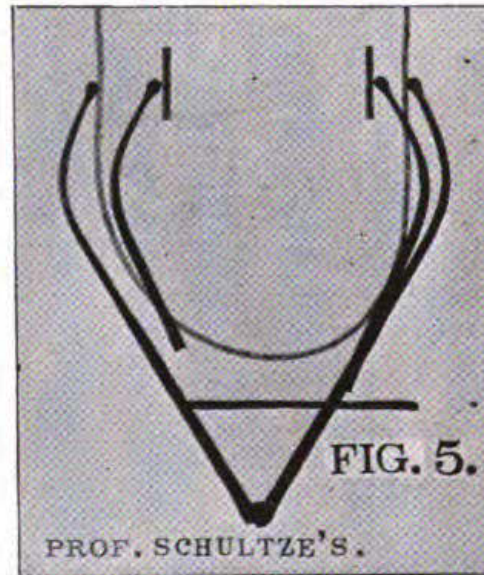


Figure 5, or the instrument of Schultze, is short in spanning effect, but will measure most cases.

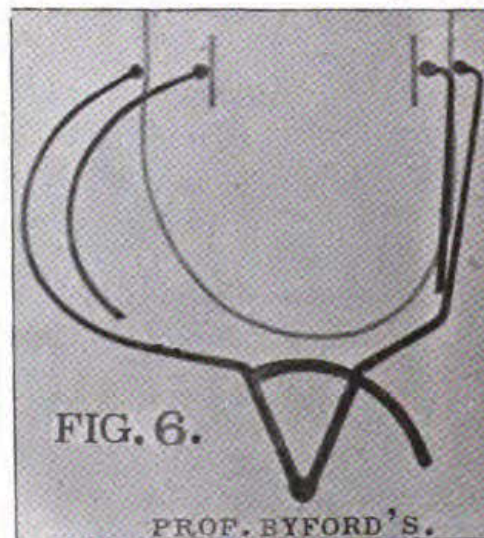


Figure 6, Dr. Byford's pelvimeter, spans sufficiently.

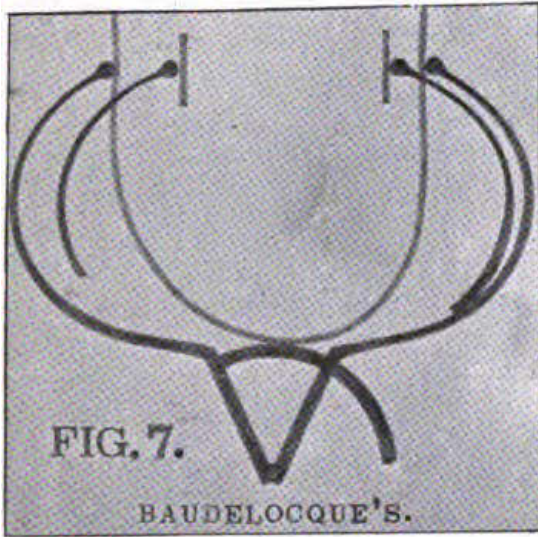


Figure 7, of true Baudelocque type, but larger than figure 3, spans amply.

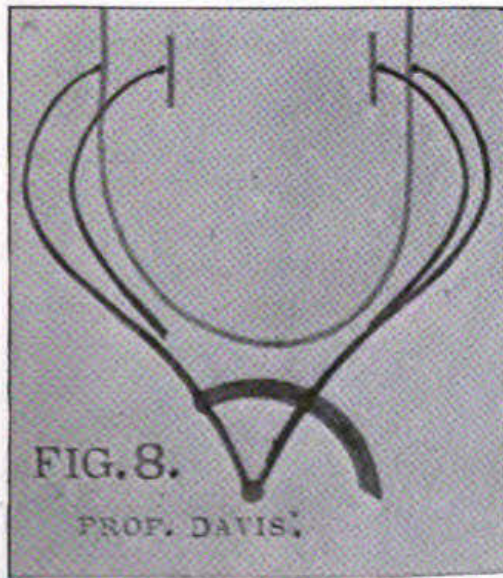
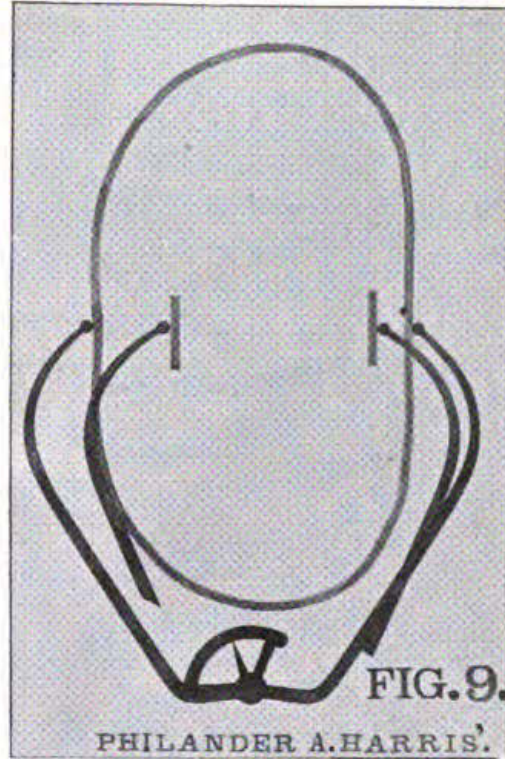


Figure 8, representing Dr. Davis' improved pelvimeter, spans very amply.

Figure 9 represents the reader's instrument. Its general conformation has not been altered since the first one was made eighteen months



ago. It registers in centimetres. Its points are dis-shaped, that being regarded as the best form for holding between the thumb and first finger during mensuration.



Figure 10 represents Dr. Herman L. Collyer's recent invention.

In addition to the necessary qualities of accuracy and spanning we

should select an instrument possessing as many other good attributes as possible.

WEIGHT.	
Dr. Bullitt's pelvimeter weighs	400 grammes.
Dr. Baudelocque's " "	309 " "
Prof. Schultze's " "	279 " "
Prof. Byford's " "	252 " "
Prof. Davis' " "	220 " "
The author's, in steel " "	195 " "
" " " aluminum " "	97 " "
Dr. Collyer's " "	229 " "

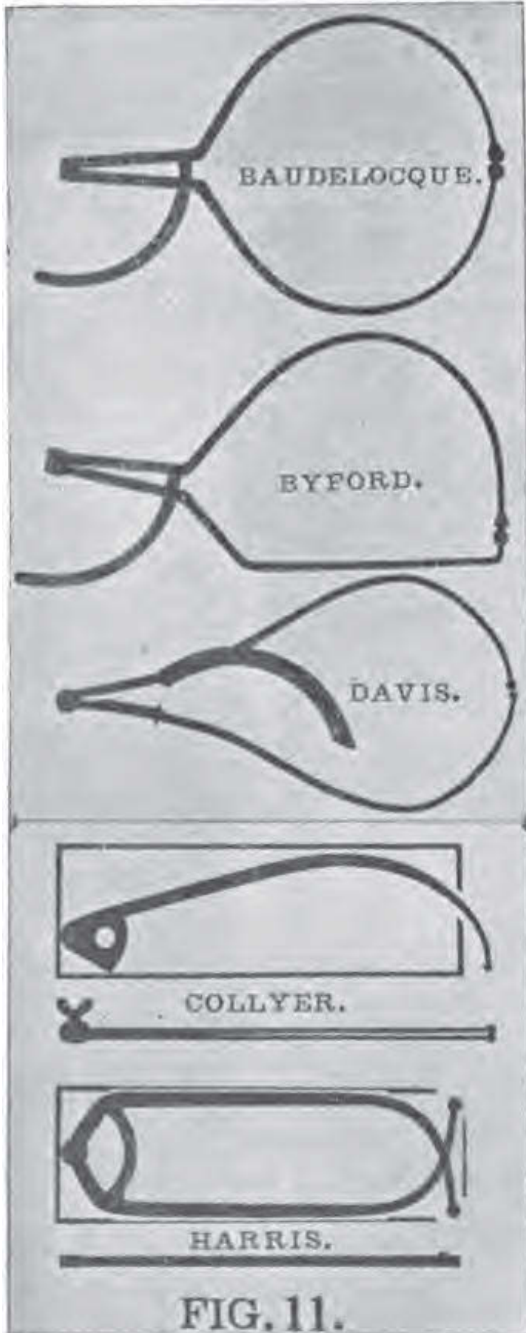


FIG. 11.

RECTANGULAR AREA OCCUPIED BY CLOSED INSTRUMENT.

Baudelocque's	111 square inches.
Byford's	103 " "
Davis'	84 " "
Bullitt's	43 " "
The author's	40 " "
Collyer's	39 " "
Schultze's	35 " "

THE THICKEST PART OF

Collyer's measures	32 millimetres.
Schultze's " "	31 " "
Baudelocque's " "	27 " "
Davis' " "	26 " "
Bullitt's " "	26 " "
Byford's " "	25 " "
The author's " "	16 " "

BAUDELLOCQUE'S CLOSED INSTRUMENT MAY BE PUT IN A RECTANGULAR BOX OF 139 CUBIC INCHES CAPACITY.

Byford's	in 111 cubic inches capacity
Davis'	87 " " "
Bullitt's	44 " " "
Schultze's	44 " " "
Collyer's	43 " " "
The author's	26 " " "

Bullitt's pelvimeter has many distinct parts; Davis' has seven, with antiseptic lock.

Baudelocque's	6 parts (screw pivot).
Schultze's	6 " " "
Collyer's	6 parts (thumb-screw pivot).
Byford's	4 parts (screw pivot).
The author's	5 " " "

Of the competent instruments in my collection,

Byford's registers in inches and half inches.
 Davis' " " " " " "
 Baudelocque's " " " " " "
 Schultze's " " " " " "
 Bullitt's in centimetres.
 Collyer's in both inches and centimetres.
 The author's in centimetres, but may be obtained to read in inches.

Baudelocque's pelvimeter has a screw with which an assistant can set the points at any degree of separa-

tion. This permits the mensurator to remove it to better light, or examine it at leisure. This feature also characterizes the pelvimeters of Professors Byford, Davis and Schultze.

The pelvimeters of Bullitt, Collyer and that of the reader are in no instance provided with set screws, but the graduations are legibly marked, and may be easily read by the smallest candle light during application.

Lately much has been said about pocket pelvimeters. In addition to the weight and dimensions above given, I wish to direct attention to figure 11, in which are delineated the fully-closed and amply-spanning instruments.

Shultze's pelvimeter (the one in my possession), like the two lowermost ones shown, is a pocket pelvimeter, but it spans insufficiently, and can only be employed in some cases by perineal approach.

The external measurements of the pelvis of special value, and with which this paper mainly deals, are:

First. The greatest distance between the iliac crests and their external margins.

Second. The distance between the external margins of the anterior superior spinuous processes of the iliac bones.

Third. The so-called external conjugate, or the distance between the fossa beneath the spinous process of the last lumbar vertebra and the middle of the upper border of the symphysis pubis.

Taken from life in the normal pelvis of average size, these three measurements should be about as follows:

Between iliac crests.....	28 centimetres.
Between iliac spines.....	25 "
External conjugate.....	20 "

The internal conjugate of such a pelvis, or *conjugata vera*, or distance between promontory of sacrum, and the posterior surface of the symphysis pubis, should be about eleven and five-tenths centimetres, leaving eight and five-tenths centimetres, which is made up of sacrum, pubes, and overlying structures.

For the purpose of approximate estimation of the *conjugata vera*, from the *conjugata externa*, some authors have suggested that a certain fixed deduction should be made for sacrum, pubes and overlying structures. Baudelocque, for example, mentioned seven and five-tenths centimetres for spare, and eight and two-tenths centimetres for women of fleshy habit; Litzmann made measurement of the pubes of thirty women, post-mortem, with the result that the mean amount to be deducted from the external conjugate for sacrum, pubes and overlying structures, should be eight and six-tenths centimetres. He remarked, however, that the amount in individual cases varied widely, owing to the difference in the thickness of the bones and integument, the maximum amounting to nearly twelve centimetres, while the minimum did not reach eight centimetres.

To say that we may, for the purpose of brevity in expression, convenience in estimation, or for any other reason, suggest that a certain fixed deduction shall be made from the *conjugata externa*, to obtain the *conjugata vera* without regard to the size of the pelvis, appears illogical,

and I am sure will prove misleading. To avoid error and misapprehension regarding the relation of the conjugata vera to the conjugata externa in pelvis of normal conformation, I desire to emphatically exclude suggestion that any given number of centimetres may be deducted in all cases to arrive at a result.

A symmetrically formed and anatomically correct pelvis, with an external conjugate of twenty-two centimetres, measured in life, should have a conjugata vera of twelve and five-tenths centimetres. The deduction, in this instance, from the external conjugate amounts to nine and five-tenths centimetres. The deduction for sacrum, pubes and overlying structure in a similarly formed pelvis, having an external conjugate of sixteen and five-tenths centimetres, would be seven centimetres, while the deduction from an external conjugate of twenty centimetres would be eight and six-tenths centimetres, making a conjugata vera eleven and four-tenths centimetres. These external measurements are made with slight, but not painful, pressure of the points of the pelvimeter during reading.

A deduction of one centimetre from the external conjugate should be made for obesity, and at least two centimetres for very pronounced obesity.

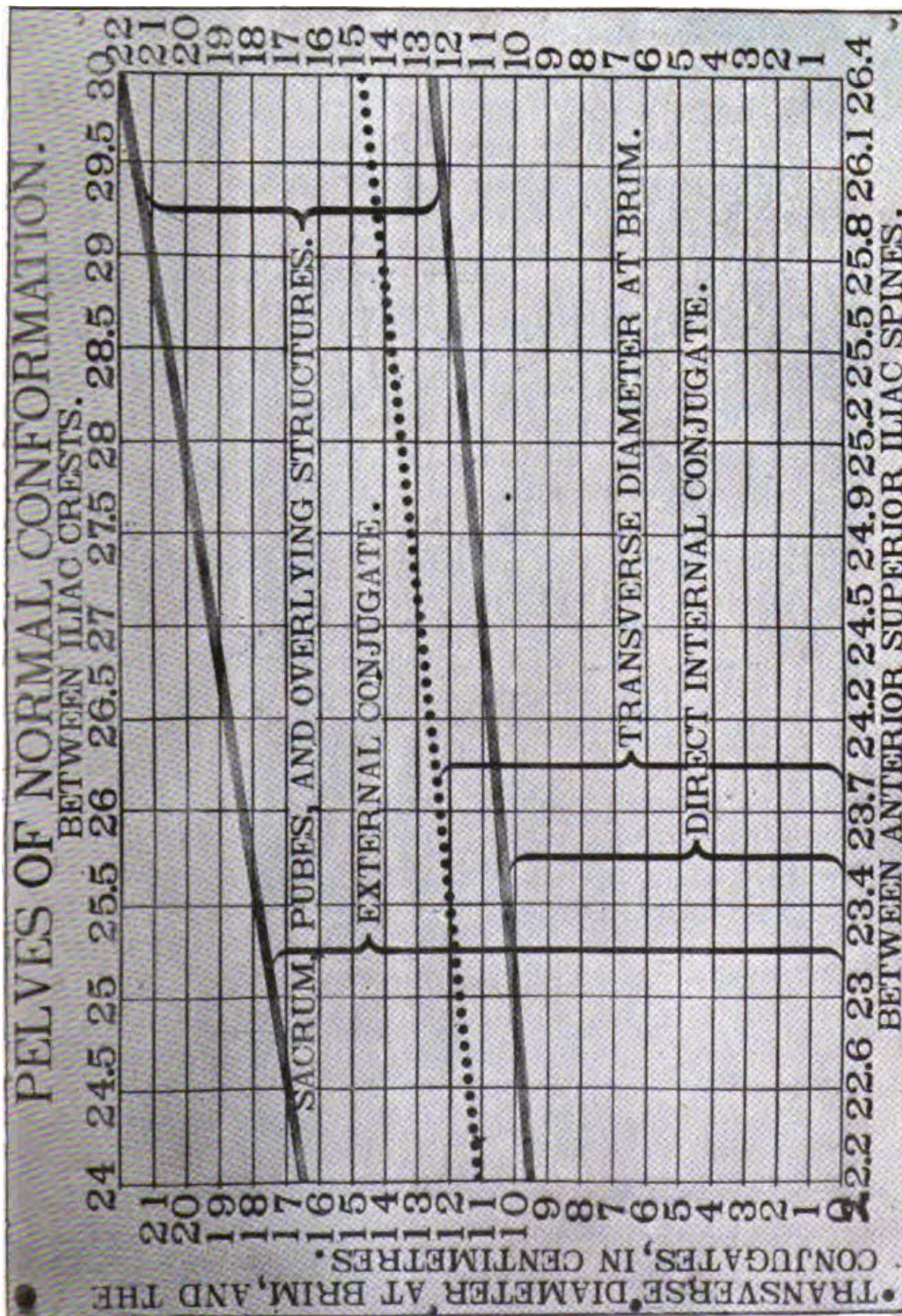
A deduction from inter-crest and inter-spinal measurements, amounting to five-tenths centimetres or one centimetre is all the allowance which need be made on account of obesity or very pronounced obesity respectively.

For the purpose of illustrating the

relations which these three common external diameters bear to one another in pelvis of normal conformation, I wish to direct attention to the accompanying chart, marked "Pelves of Normal Conformation."

The space between any two horizontal lines represents one centimetre, the figures at the left and the right, reading from zero, indicate the number of centimetres for antero-posterior measurements. At the top of the chart there appears a progressive series of numbers, any one of which may be utilized for an iliac crest measurement. The lines which descend from these numbers terminate at the bottom of the chart where another progressive series of figures indicate the several companion measurements for the anterior superior spinous process of the ilium. The average difference between inter-crest and inter-spinous process of the ilium, with a crest of twenty-four centimetres is about one and eight-tenths centimetres, while the difference between these companion measurements with an inter-crest distance of thirty centimetres is about three and six-tenths centimetres. Here again the distances between companion measurements are seen to vary according to the size of the pelvis. Any point of the gradually ascending upper broad line, beginning at sixteen and five-tenths centimetres on the left, and terminating at twenty-two centimetres on the right, may be taken to represent a conjugata externa of any particular case. The intersecting vertical lines lead to the corresponding inter-crest measurement at the top, and to the inter-iliac spine

at the bottom; while the horizontal The broad ascending line of the intersecting lines lead to the cor- chart, beginning at nine and five-



responding measurement for the external conjugate.

tenths centimetres on the left, and terminating at twelve and five-tenths

centimetres on the right, is intended to show the *conjugata vera* in pelves of varying sizes, according to its intersection with any descending line from the intersections above. The other broad ascending line, beginning at sixteen and five-tenths centimetres, on the left, and terminating at twenty-two centimetres on the right, is intended to show the *conjugata externa* of the pelves of varying sizes, according to its intersection with any two lines, one of which must be horizontal and the other vertical.

The gradually ascending dotted line, beginning at eleven centimetres on the left, and terminating at fourteen and seven-tenths centimetres on the right, is intended to demonstrate the transverse measurement of any particular pelvis according to its intersection with any vertical line in interest.

Let us make practical application of this table by assuming that we have measured a pelvis with an intercrest distance of twenty-eight centimetres. Follow this line to the bottom of chart, where we read that the companion interiliac spinous measurement should be twenty-five and two-tenths centimetres. This descending line intersects the external conjugate line at twenty centimetres above zero. The intersection of this line, descending from twenty-five centimetres, with the dotted line, affords the transverse measurement of about thirteen and five-tenths centimetres. By following this descending line to its intersection with the lower broad ascending line, we shall find that the internal conjugate should be about eleven

and five-tenths centimetres. Let us suppose that we have a pelvis with an external conjugate of eighteen centimetres. Allow the eye to follow the horizontal line on chart until it intersects the upper broad ascending line. From that point the ascending line carries us to the iliac-crest measurement at the top of the chart, which is twenty-five and five-tenths centimetres, and to the bottom of the chart, where the distance between the anterior superior iliac spines is found to be twenty-three and four-tenths centimetres. Marked deviation from the indications of these converging and intersecting lines is a presumption of asymmetry.

The deduction for sacrum, pubes, and overlying structure is readily determined from the chart by counting the centimetre spaces on any vertical line between its intersections with the two broad ascending lines.

I believe that the chart is laid out on lines sufficiently in accord with nature to render it useful and fairly reliable as a reference table, to determine the relations which certain pelvic measurements should bear to one another in such as are of fairly normal anatomical form and symmetry. While a large proportion of all pelves in their transverse and antero-posterior diameters will quite nearly exemplify the relations indicated by the chart, yet the size of the pelvis in many individual cases will be found quite out of proportion to the height of the individual. For example:—

CASE A.

Height	147	centimetres.
Crest	27	"
Iliac spines	24.5	"
External conjugate	19	"

CASE B.

Height.....	172.5	centimetres.
Crest.....	27	"
Iliac spines.....	24.5	"
External conjugate.....	18.8	"

These pelves of apparently normal conformation have about the same diameters, yet one is that of a short, and the other of a very tall woman.

While the ratio of proportion between the size of the pelvis and the height of the individual is generally maintained, the instances of relative disproportion are sufficiently numerous to deter us from concluding that the pelvis of any woman is amply large because she is tall in stature.

Certain terms, such as "generally contracted pelvis," "aequabiliter justo major pelvis," are employed partly to designate — inferentially, of course — the sizes of pelves. Dimensions have been so infrequently quoted in connection with the employment of these expressions, that the greatest latitude of interpretation is possible. The use of the expression "contracted pelvis" has been subjected to a variety of, and, in some unusual instances, definitions. To the ambiguity of this expression, rather than to differences of experience or observation, is to be attributed, no doubt, the conflicting statements regarding the frequency of this so called condition. In my chart of "Pelvis of Normal Conformation" I have introduced, in the gradually ascending scale of distances between the anterior superior iliac spines, tenths of a centimetre. These divisions of a centimetre, as you will observe, are necessary for mathematical approximation, and I mention the fact that no one may attribute to me impossible mensuration.

Not all pelves whose external diameters are in close keeping with the indications of the chart will be found to have the exactly corresponding internal diameters. The thin, delicate structure of some pelves, and the generally thickened formation of others, affords a certain latitude of variation. The degree of latitude, however, will not be considerable. So soon as the relative disproportion becomes marked, we shall find that one or other of the external diameters is out of its proper relation with the other diameter. In just this particular does external pelvimetry afford valuable and almost unerring intimation of asymmetry.

The following case is especially illustrative of the value of pelvimetry, because opportunity was offered for internal measurement at autopsy :

CASE C.

Crest.....	29	centimetres.
Iliac spines.....	29	"
External conjugate.....	19	"

At autopsy, when post-mortem symphysiotomy was performed, the following internal diameters were taken : —

Direct internal conjugate.....	6.3	centimetres
Transverse.....	13.8	"

In this case I claim that the increased distance between the iliac spines afforded most pronounced indication of asymmetry.

A friend who recently performed Cæsarean section upon a young woman with narrowed pelvis, kindly afforded me the opportunity of taking the following measurements :

CASE D.

Crest.....	23.5 centimetres.
Iliac spines.....	21.5 "
External conjugate.....	18 "

AT AUTOPSY.

Internal conjugate.....	10.1 centimetres.
Transverse.....	10.2 "

I claim that the relative lengthening of the external conjugate in this case, or the relative shortening of the inter-crest measurements, afforded sufficient presumption of asymmetry at the pelvic inlet. It was a small pelvis, and far from normal in its conformation.

Another case (E), a handsome young woman, with broad hips, presented the following parturient history: First labor, very prolonged second stage, instrumental delivery with dead child weighing seven and one-half pounds; second labor, prolonged second stage, delivery of a living child weighing six and one-half pounds, without instrumental aid; third labor, head rested at the superior strait, instrumental delivery of a living child weighing seven pounds.

Crest.....	27 centimetres.
Iliac spines.....	22.5 "
External conjugate.....	17.5 "

In this instance, one might assume the inter-crest diameter at fault, since the relation of the inter-iliac spine to external conjugate is correct. However this may be, it is sufficient to note that the external measurements indicated internal asymmetry. An external conjugate of seventeen and five tenths centimetres does not be long to a crest of 27 centimetres.

Another case (F), probably rachitic, with the following parturition

history and pelvic measurement: First labor, instrumental delivery of a dead child after a prolonged second stage, attended by a professional friend of mine; second labor, delivery without instrumental aid, after a short second stage, of a living child weighing five and one-half pounds; third labor, instrumental delivery of a living child weighing seven pounds; fourth labor, instrumental delivery of a living child weighing seven pounds. This woman was attended by the reader in all but her first confinement, and her three children born alive are still living.

Crest.....	26 centimetres.
Iliac spines.....	25.5 "
External conjugate.....	17 "

Comparison of these diameters with the indications of the chart, shows that no two measurements are right in their relation to each other.

Another case (G), probably also rachitic, with the following parturient history; Prolonged second stage, head arrested at brim, delivery with the forceps of a dead child weighing eight pounds.

Crest.....	27 centimetres.
Iliac spines.....	26 "
External conjugates.....	21 "

Here again the measurements are not in accordance with the indications of the chart.

Case A, at the age of twenty-seven, after a labor of two days, was delivered by the forceps of a living child which died in nine weeks. In her second labor she gave birth, unaided, to a smaller child, weighing six or seven pounds, which lived to sixteen

months, and died of diphtheria. The labor of her third child-bed lasted seventy-two hours; this child born without forceps is still living. The weight of this child is believed to have been between seven and eight pounds. Fourth child-bed, chloroform, forceps, and a dead child in nine hours from beginning of labor. Fifth child-bed, labor began at 2 A. M. on the fifth of the present month. membranes spontaneously ruptured two hours later; second stage began at 6 A. M. Anæsthesia and application of forceps by her physician before noon. Another unsuccessful effort with forceps by a consultant at noon. At request of the attendants, I saw the woman at 2 P. M. Head above the brim, L. O. A., large caput succedaneum, pains very powerful and in quick succession.

DIMENSIONS.

Weight.....	185 pounds.
Height.....	158 centimetres.
Crest.....	29 “
Iliac spines.....	27 “
External conjugate..	20 “

CORRECTION OF MEASUREMENTS ON ACCOUNT OF OBESITY.

Crest.....	28.8 centimeters.
Iliac Spines.....	26.8 “
External conjugate...	18.6 “

This patient was at once removed to the Paterson General Hospital, where I performed symphysiotomy at half past five o'clock. Upon withdrawal of the ether her pains almost immediately recurred, and, without further aid, effected the delivery of a dead child weighing ten and one-half pounds (nude) in less than ten min-

utes after pubic section. Conjugata vera was found to be seven and six tenths centimetres. As this is the first report of this case, I wish to state, apologetically, of course, that although unable to discover foetal heart sounds, the patient experienced foetal movement one hour before operation. She had not, however, with this exception, felt foetal movement for about nine hours before operation. The child's left eyelid was swollen, and ecchymosed, but, aside from this, no other external marks of injury were discoverable. This case further exemplifies the claim that even moderate variation from the typically normal, afforded decided indication of asymmetry.

I will not weary you with further reference to notes in this relation. I have introduced these cases to show that in every instance one or other of the external diameters were markedly out of their normal relation with one or both of the other diameters.

In addition to the three common measurements already considered, there are two additional measurements which are important in the detection of pelvic asymmetry. They are the distances between the posterior, superior, spinous process of the iliac bone on the right side, and the anterior, superior, spinous process of the ilium on the left side, and the corresponding companion measurement from left to right generally referred to as the right and left oblique. These measurements, in pelves of normal conformation, are equal. Inequality of these companion measurements indicates lateral deflection or pelvic obliquity.

I can conceive the possibility of deformity of the pelvic inlet, of which common external pelvimetry might fail to excite suspicion, but I believe that such cases are so rare that they will form but a very, *very* small percentage of the whole number of pelvic deformities which embarrass parturition.

In earlier experience I committed error, in some instances, by pronouncing flattening when none existed. Flattening of the pelvis, or shortening of the conjugates, must not from external mensuration be assumed to be present in any case until we have determined that the transverse measurements are disproportionately long. If the chart of pelvises of normal conformation here shown is constructed on lines in close accordance with nature, it must then be clearly apparent that many others have committed the error which I have just confessed. No pelvis can be said to be flattened until one or other of the transverse measurements are also determined.

A pelvis with the following measurements

Crest.....24.5 centimetres.
External conjugate....17 "

is a normal pelvis so far as these two measurements can determine, but a pelvis with crest of twenty-eight centimetres and an external conjugate of seventeen centimetres is a flattened pelvis.

It has been generally considered that relative widening of the distance between the iliac spines indicates the rachitic pelvis, and with a relatively shortened conjugate, a

rachitically flattened pelvis; while a wide crest, and relatively shortened distance between iliac spines, and the external conjugate, relatively shorter than the inter-crest measurement demands, indicates the non-rachitically flattened pelvis. As between these two varieties of flattening at any particular degree of distortion, as indicated by external mensuration, I have no hesitancy in asserting that the so-called rachitically flattened pelvis will present the greater degree of osseous impediment to parturition.

Having discovered, by external pelvimetry, a very small pelvis, or one presenting indication of pronounced asymmetry, how may we render such knowledge of advantage to our patient? Vaginal exploration is clearly the next step; such exploration is the important test which science must interpose. With the patient anæsthetized, the promontory of the sacrum can generally be reached by the index or second finger, especially with the hand in the vagina. We thus determine the conjugata diagonalis, and make such deduction from its measurement in individual cases as may seem proper to obtain the conjugata vera.

The fingers may be directed to the right and to the left, and such knowledge gained of the transverse and oblique diameters as is possible. The size and shape of the sacrum and its promontory, the formation of the pubes and the approximation of the tubera ischii, will appear for estimation, and, most important of all, the location and position of the head, if it presents. If, in labor the os is found fully dilated, the membranes rup-

tured, the pains active, and the head above the pelvic inlet and not descending, we have most substantial proof of the relative disproportion of child and pelvis.

While, by means of external and internal pelvimetry, we may reckon almost to a nicety the size and formation of almost any particular pelvis, we have, as yet, made but little progress toward determining the size of the unborn child.

Living children have been born through flattened pelves, whose conjugata vera did not exceed seven centimetres. Case C, referred to in this paper, gave birth to four living children prior to her death in the last parturition. It is needless to say that these children, and all born under like circumstances, were at least small, and probably much beneath the average size of birth.

Resort to unusual operation for the delivery of small children, in pelves of moderately limited capacity, has brought no little embarrassment to certain operators. I think it may be plainly stated that in any instance where pelvic contraction is not so pronounced as to preclude the possibly safe delivery of an undersized child, it will be well to await the occurrence of labor, permitting it to advance sufficiently to enable us to determine nature's capabilities. This suggestion may be adopted by those who ignore the practice of premature delivery, or by any who may be introduced to a case at, or very near, the completion of uterogestation. If, in any such instance the child be small, delivery may be effected without serious consequences

to mother or child. The interest of the two lives at stake will be far better subserved, if, while awaiting the powers of nature, we have placed the mother amidst surroundings which will enable us to resort to Cæsarean section, or symphysiotomy under favorable circumstances. If such cases reside in out-of-the-way places, if in the houses of the dirty, or the very poor, or if in the country where the physician is unprepared or unwilling to operate, or, when he cannot at once command the required assistance, it is then clearly his duty to commit the patient to the care of one skilled in the procedure which may be required. This may, of course, necessitate change of residence. When such change is decided upon, the well-ordered hospital or retreat is the haven of maximum safety for the lives in jeopardy.

Most operating obstetricians base their treatment of cases upon the assumption that so long as the size and quality of the child remains undetermined, they have the right to assume that it is at least of average size. With this assumption, elective Cæsarean section, before a test of the second stage, has been done upon women with conjugata vera seven and five-tenths diameters.

My only Cæsarean section was an elective operation, in that I did not await a test of the second stage of labor. A primipara, aged eighteen, of the following dimensions:

Height.....	137	centimetres.
Crest.....	22	"
Iliac spines.....	21.5	"
External conjugate..	16.5	"
Internal conjugate..	7	"

Living child, eight and one-half pounds, which was taken out of the Paterson General Hospital by its mother about six weeks from the date of operation, both in a condition of health.

This result was, of course, satisfactory, but I am inclined to think that for cases where we can determine the internal conjugate to be between six and eight centimetres, and suspect a child of average size, it would be better to prepare for the unusual operations, but allow the second stage of labor to afford some demonstration of nature's capabilities. If a flattened pelvis is definitely determined to be five and nine-tenths centimetres, or less, and the child believed to be of average size, I should then decide upon the purely elective Cæsarean section.

As to the personal equation of mensurators, I should say that there should not be much difference between the results of the experienced who adhere to the same direction. Anyone who has not practiced external pelvimetry may, by measuring forty or fifty women, especially if he records, preserves and studies his results, become a fairly expert pelvic mensurator.

I should not expect my measurements in any particular case to be much at variance with his. All who practice midwifery should systematically practice external pelvimetry.

The greatest success in detecting asymmetry will accrue to those who possess the most accurate knowledge of normal pelves in their varying sizes. I must anticipate and answer a question which some of you may be waiting to ask me: as to what percentage of women have pelves nearly in accordance with the indications of the chart of normal conformation. Perhaps seventy per cent. or eighty per cent. will measure quite closely to the lines of the chart. The remaining twenty per cent. or thirty per cent. will present various grades of departure; while only a small per cent. will present *extreme* variations from the normal.

The chart of pelves of normal conformation is, of course, the result of much study and a considerable amount of personal mensuration of women. I have no right to expect, nor do I desire, that it shall be received and permanently retained as a criterion without amendment. The great necessity for some such standard, I am convinced, will present itself to all pelvic mensurating obstetricians. From them, and from such aid as cœliotomists interested may offer, let us hope that facts may be adduced with sufficient authenticity to establish the readings of my chart in its present form, or, alter them, and bring its lines in closer relation with nature.

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