ART. XIV.—*Measurements of the Diameters of the Fœtal Head at Term, collected from Seven Hundred Cases of Labour.* By JOSEPH K. T. VAN PELT, M. D.

IN calling the attention of the profession to the following cephalo-metrical tables, I deem it right to state *in limine*, that the most scrupulous caution has been observed to determine, with mathematical accuracy, the dimensions of the three most important diameters of the fœtal cranium.

As many of my cases have necessitated instrumental interference, from the magnitude or position of the child's head, a limited time has always been permitted to pass, thus allowing those diameters which were elongated or reduced from compression made by the forceps to assume their original extent; and the same course has also been adopted whenever in a natural labour any overriding of the frontal, occipital, or parietal bones has been observed.

The method of determining the diameters while the fœtus is still within the maternal organs, as commended by MM. Flamant and Foulhioux, and mentioned by Velpeau, proving uncertain, and their deductions being too variable to use in practice, I have employed the cephalometre of Stein,[1] its simplicity insuring a greater precision than can be obtained from any other expedient. I have also carefully preserved a written history of each of the seven hundred cases of labour that have come under my own personal attention. It is this accuracy of the deductions which gives to the record all its value and importance, at the same time it will be perceived that the details here presented are more numerous and varied than any hitherto contributed to obstetrical science.

It does not come within my province to dwell upon the importance of a knowledge of this subject, as bearing upon the judicious exercise of manual or instrumental skill, or in correcting the different aberrations of the head. If parturition were always unattended with accidents, never requiring the assistance of art, and if the fundamental principles of midwifery were not drawn from an understanding of the correspondence of the fœtal axes and those of the pelvis, then these researches would be a matter of but little moment.

It has been suggested that sex may exert an influence by increasing the bulk of the fœtal skull, and Drs. Clark, Burns, and Ryan assert that the heads of boys is from $\frac{1}{28}$ to $\frac{1}{30}$ of an inch larger than that of girls, while Prof. Simpson,[2] of Edinburgh, estimates the former as exceeding in its circumference by $\frac{3}{8}$ of an inch, in its transverse by $\frac{1}{8}$ of an inch, and in the inter-aural diameter by $\frac{2}{8}$ of an inch; regarding this difference as an expla-

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[1] Nysten, Dict. de Médecine. Paris, 1858. Céphalomètre, p. 250.
[2] Edin. Med. and Surg. Journal, Oct., 1844.

nation of the greater frequency of stillborn males than females, we may also consider it as the frequent occasion of difficult, prolonged, and even fatal labours.

I have inserted here a collection of the longest diameters, as observed by me in the heads of both sexes; while many of them belong to females, the majority will readily be perceived to pertain to males: the occipito-mental measured $5\frac{13}{16}$, in eight males and in five females; $5\frac{14}{16}$, in four males and in five females; $5\frac{15}{16}$, in two males and in one female; 6 inches in three males; the occipito-frontal was 5 inches in twenty males and in seventeen females; $5\frac{1}{16}$, in twelve males and in six females; $5\frac{2}{16}$, in five males and in one female; $5\frac{3}{16}$, in one female; the bi-parietal measured 4 inches in twenty-one males and in fourteen females; $4\frac{1}{16}$, in seven males and in four females; $4\frac{2}{16}$, in three males and in three females; $4\frac{3}{16}$, in two males; $4\frac{1}{16}$, in one female.

My measurements of the fœtal head are the following, viz :—

I. In six hundred and forty-six crania the occipito-mental measured—

Inches.			Inches.		
$4\frac{15}{16}$	in	8	$5\frac{8}{16}$	in	115
5	in	25	$5\frac{9}{16}$	in	52
$5\frac{1}{16}$	in	20	$5\frac{10}{16}$	in	48
$5\frac{2}{16}$	in	29	$5\frac{11}{16}$	in	37
$5\frac{3}{16}$	in	29	$5\frac{12}{16}$	in	22
$5\frac{4}{16}$	in	61	$5\frac{13}{16}$	in	13
$5\frac{5}{16}$	in	56	$5\frac{14}{16}$	in	9
$5\frac{6}{16}$	in	54	$5\frac{15}{16}$	in	3
$5\frac{7}{16}$	in	62	6	in	3

The sum of which was three thousand five hundred and two inches and fourteen-sixteenths, and the mean or average five inches and seventeen-fortieths.

II. In six hundred and forty-six the occipito-frontal measured—

Inches.			Inches.		
$4\frac{1}{16}$	in	4	$4\frac{11}{16}$	in	77
$4\frac{2}{16}$	in	8	$4\frac{12}{16}$	in	81
$4\frac{3}{16}$	in	6	$4\frac{13}{16}$	in	77
$4\frac{4}{16}$	in	13	$4\frac{14}{16}$	in	76
$4\frac{5}{16}$	in	19	$4\frac{15}{16}$	in	30
$4\frac{6}{16}$	in	18	5	in	37
$4\frac{7}{16}$	in	27	$5\frac{1}{16}$	in	18
$4\frac{8}{16}$	in	37	$5\frac{2}{16}$	in	6
$4\frac{9}{16}$	in	48	$5\frac{3}{16}$	in	1
$4\frac{10}{16}$	in	63			

The sum was three thousand and thirty-three inches and fifteen-sixteenths, the mean being four inches and twenty-eight-fortieths.

III. In six hundred and forty-six the bi-parietal measured—

Inches.			Inches.		
$3\frac{4}{16}$	in	7	$3\frac{13}{16}$	in	82
$3\frac{5}{16}$	in	8	$3\frac{14}{16}$	in	72
$3\frac{6}{16}$	in	16	$3\frac{15}{16}$	in	31
$3\frac{7}{16}$	in	14	4	in	35
$3\frac{8}{16}$	in	30	$4\frac{1}{16}$	in	11
$3\frac{9}{16}$	in	47	$4\frac{2}{16}$	in	6
$3\frac{10}{16}$	in	72	$4\frac{3}{16}$	in	2
$3\frac{11}{16}$	in	78	$4\frac{4}{16}$	in	1
$3\frac{12}{16}$	in	132			

The sum being two thousand four hundred and nine inches and three-sixteenths, the mean being three inches and twenty-nine-fortieths.

Other diameters than those just mentioned have been enumerated by obstetrical authors, and they be multiplied *ad infinitum*; Churchill records seven, Velpeau seven, Jacquemier describes ten, Naegele four, and Scanzoni seven, Moreau also seven. Of the three that have just occupied our attention, different estimates have been made by writers on midwifery; the annexed table is a summary of their observations :—

	Occipito-Mental.	Occipito-Frontal.	Bi-Parietal.
Churchill,	5	4—$4\frac{1}{2}$	$3\frac{1}{2}$—4
Velpeau,	5	4	$3\frac{1}{2}$
Cazeaux,	$5\frac{1}{4}$	$4\frac{1}{4}$—$4\frac{1}{2}$	$3\frac{1}{2}$—$3\frac{3}{4}$
Maygrier,	5	$4\frac{1}{2}$	$3\frac{1}{2}$
Ryan,	5	5	$3\frac{1}{2}$
Burns,	5	4	$3\frac{1}{4}$—$3\frac{1}{2}$
Lee,	—	4	3
Ramsbotham,	$5\frac{1}{2}$	$4\frac{1}{2}$	$3\frac{1}{2}$
Moreau,	5	4 and 4 lines	3 and 8 lines
Ashwell,	$5\frac{1}{4}$	$4\frac{1}{2}$	$3\frac{1}{2}$
Murphy,	5	$4\frac{1}{2}$	$3\frac{1}{2}$
Baudelocque,	$5\frac{1}{2}$	$4\frac{1}{2}$	$3\frac{1}{2}$
Naegele,[1]	5	$4\frac{1}{2}$	$3\frac{1}{3}$
Jacquemier,[2]	$4\frac{1}{2}$	4	$3\frac{1}{3}$
Meigs,[3]	$5\frac{1}{2}$	$4\frac{10}{12}$	$3\frac{11}{12}$
My own,	$5\frac{17}{40}$	$4\frac{28}{40}$	$3\frac{29}{40}$

Prof. C. D. Meigs states that he measured the occipito-frontal of one hundred and fifty crania; in fifty-two of them he found it to exceed five inches; in 11, it was $5\frac{1}{12}$; in 8, $5\frac{2}{12}$; in 3 it was $5\frac{3}{12}$; in 1, $5\frac{4}{12}$; in 1, $5\frac{6}{12}$; in 2, $5\frac{7}{12}$; and in 1, $5\frac{10}{12}$: of one hundred and fifty bi-parietal dia-

[1] Geburtshülfe, Heidelberg, 1842, p. 64.

[2] Jacquemier, Traité d'Obstetrique, Paris, 1846, tom. prem. p. 296.

[3] "Proceedings" Amer. Phil. Soc., vol. iii. p. 127.

meters measured, sixty-eight of them exceeded 4 inches; in 19, it was 4.1; in 5, it was 4.2; in 6, 4.3; in 3, 4.4; in 1, 4.5; in only one case was it less than 3.6, the usual estimate, and in that case it fell to 3.4.

Scanzoni[1] furnishes seven diameters, viz:—

Longitudinal
1. Occ.-ment. (grosse diagonaldurchmesser) . 5″—5½″
2. Occ.-front. (gerade durchmesser) . . 4—4½″
3. From middle of gt. fontanel to deepest part of occiput (der kline diagonaldurchmesser) 3½—3¾″

Transversal.
1. From roots of both zygomatic processes (kleine querdurchmesser) . . . 3—3¼″
2. Bi-parietal (grosse querdurchmesser) . 3½″

Vertical.
1. From highest point of the vault of the cranium to the anterior circumference of foramen magnum (senkrechte durchmesser) . . . . . , . 3½″
2. Fronto-mental (die höhe des gesichtes) . 3″

Scanzoni[1] observes that Kilian recommends us to recognize the fact, that at birth three varieties of the head are to be found, the elliptical (elliptischen form), the round (runden), and the oval (ovale form), and to class our measurements under those divisions. Accurate measurements have also been made by Dr. Addinell Hewson,[2] of one hundred and sixty-six crania: his results are occipito-mental, 5.25; occipito-frontal, 4.68; bi-parietal, 3.60. It will thus be perceived that the estimates as given by Prof. Meigs, Dr. Hewson, and myself, are far greater than those detailed by any foreign author, it then, according to Dr. Hewson, becomes a question whether the difference of the results is to be decided and explained by ethnological investigations.

I have commenced a new series of measurements, which will be published at some future period, when they have become entitled to interest by their number.